

PARISH'S PHACELIA

Phacelia parishii Gray

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Management status: Federal: None (former C2)
California: S1.1 (CDFG, 1998)
CNPS: List 2/RED 3-3-1(CDFG, 1997a)(Skinner and Pavlik, 1994).

General Distribution:

Parish's phacelia has been collected at three sites in San Bernardino County, California (Skinner and Pavlik, 1994), and is more widely distributed to the east and northeast, in Clark, Lincoln, Nye, and White Pine Counties, Nevada, and Mohave County, Arizona (Cronquist et al., 1984; James Morefield, pers. comm.). Understanding of its distribution and habitat has been plagued by misidentifications, vague location descriptions, and the overall paucity of collection and documentation of the lowland Mojave Desert flora.

Parish's phacelia has been reported from the Santa Rosa Mountains in Riverside County, but this report was based on a misidentified specimen (*Munz 15101* POM), annotated in 1941 by J.T. Howell as Lemmon's phacelia (*P. lemmonii*). Duplicates of Munz's specimen at the Dudley Herbarium (Stanford) and at UCLA evidently remain misidentified and have been cited in unpublished summaries of the plant's distribution (Cochrane 1979; Constance 1979; Blomquist et al., 1995). All Parish's phacelia collections from California have been from alkaline playas or lakebeds below about 900 m (3000 ft.) elevation. In Nevada, it occurs in similar habitat to about 1800 m (6000 ft.) elevation. It also has been reported from volcanic and gypsum outcrops and gravelly bajadas (Cochrane, 1979), but these reports are evidently based on misidentifications of Beatley's phacelia (*P. beatleyae*) or a new taxon not yet formally described (Duane Atwood, pers. comm.; James Morefield, pers. comm.).

Distribution in the West Mojave Planning Area:

All three California locations are within the WMPA. Two are reported as "presumed extinct" (Skinner and Pavlik, 1994), and the only confirmed extant location is southeast of Coyote Dry Lake, near the southern boundary of Fort Irwin.

The type locality of Parish's phacelia is described as "near Rabbit Springs, of the Mohave Desert" in Gray's original description (Gray, 1883, citing S.B. & W.F. Parish's collection taken in 1882 [no number cited]). Given the plant's habitat, this locality might be interpreted as Rabbit Springs itself, Rabbit Dry Lake to the south, or Lucerne Dry Lake to the north. Parish's phacelia was collected again at or near the type locality, at about 880 m elevation (2900 ft.), Lucerne Dry Lake in 1941 (*Ripley and Barneby 3265* POM; Howell, 1943). This specimen's identification was recently confirmed by D. Atwood. Constance (1979) reported that "recent searches of the type locality have been unsuccessful," and Skinner and Pavlik (1994) presumed that the type location is extinct. There is no written documentation in California Native Plant Society or California Department of Fish and Game files reporting unsuccessful searches in this area (Melissa Kauffman, pers. comm.). Both Lucerne and Rabbit Dry Lakes are largely undisturbed, though both are crossed by paved roads.

The second California location was described as "Waterman's near Calico," collected in 1884 by J.G. Lemmon (Cochrane, 1979) and has been reported by Skinner and Pavlik (1994) as "presumed extinct." It has been interpreted by the California Dept. of Fish and Game (1997b) as occurring on the USGS Yermo 7½-minute topographic map, within a 1-mile radius of a mapped point on the bajada below the Calico Mountains. This interpretation is unrealistically precise, given Lemmon's vague location, and is well above seemingly more suitable flat topography nearer to the town of Yermo and west to Barstow and beyond. The location of "Waterman's" is probably best interpreted as the ranch of Robert W. Waterman, a "desert valley rancher near the site of the future Barstow" (Pierson, 1970). His ranch was near the present-day location of Waterman Road at the western margin of Barstow, south of Highway 58 and north of the Mojave River. This is also the location of a railroad stop between Barstow and Hinkley once known as Waterman (Preston, 1974) and is the site reported for Waterman's Ranch in the Jepson Herbarium on-line place name atlas (<http://www.ucjeps.berkeley.edu>). Calico, now a ghost town and tourist attraction, was a more significant regional reference point than Barstow in the late nineteenth century.

The only known extant California location is southeast of Coyote Dry Lake, along a string of dry lakes between Manix Tank Trail and Coyote Dry Lake, about 20 km (12 miles) northeast of Yermo. It was first reported by Bagley (1989), and subsequently by Rutherford and Bransfield (1991) and Trask (1993). These reports have indicated thousands, or even millions (Rutherford and Bransfield, 1991; Trask 1993) of individual plants in the habitat where it occurs. Several remarked that suitable unsurveyed habitat extends well beyond the mapped locations. Rutherford and Bransfield (1991) also searched for Parish's phacelia at several sites around the margins of Coyote Dry Lake and along the roadside on the lakebed, but did not find it. The occurrence has been documented by two voucher collections (*Sanders 16397* RSA, UCR; and *Sanders 16401* UCR, both taken in 1995).

One additional specimen, *Charlton s.n.* RSA, taken in 1992 and recently annotated by D. Atwood, seems to represent an otherwise undocumented occurrence. Charlton's label reads "Powerline Rd. near Surprise [Sunrise?] Canyon Rd. offramp, Yermo. East of Barstow . . . clay lakebed. . . ." Sunrise Canyon Road is immediately north of Interstate 10, east of Yermo, and is reached via the Minneola Rd. exit. The junction of Powerline Road and Sunrise Canyon Road is about 1 mile east of the freeway exit, in Township 10 North, Range 2 East, Section 34. The USGS Yermo 7½' topographic map shows this area as a small basin at about 1880 ft. (570 m.) elevation. This location does not appear in other literature, and is about 6 miles (10 km) southwest of the Coyote Dry Lake site.

Natural History:

Howell's (1943) detailed description of Parish's phacelia is summarized here. It is an annual with several finely glandular-puberulent stems, 2-6 in. (5-15 cm) long spreading from the base. The leaves are oblong, elliptic, ovate, or obovate, about 0.5-1.5 in. (1-3 cm.) long, sparsely glandular and minutely coarse; the basal leaves are on pedicels about 0.5-1 in. (1-2 cm) long, while upper leaves are nearly sessile. The flowers are in dense, elongate, coiled racemes. The sepals are glandular and hairy, about 0.14-0.18 in. (3.5-4.5 mm) long in flower and elongating to about 0.25-0.3 in. (6-7.5 mm) long in fruit. In flower, they are oblong or obovate, about 0.04-0.1 in. (1-2.5 mm) wide and unequal in width; in fruit, one sepal is conspicuously wider than the others, obovate in shape and about 0.1- 0.16 in. (2.5-4 mm) wide. The corolla is about 0.2 - 0.23 in. (5 - 6 mm) long, bell-shaped, lavender, with pale yellow at the base of its tube. The fruit is ovate to oblong, about 0.16 in (4 mm) long, with many seeds, each about 0.04 in (1 mm) or slightly longer. The plant is illustrated in Skinner and Pavlik (1994: p. 224), Cronquist et al. (1984: p. 171), and Abrams (1951: p. 513).

Parish's phacelia's simple leaves, toothed to shallowly lobed, distinguish it from many other *Phacelias* which often have deeply divided leaves. Howell (1943) noted that Parish's phacelia is distinguished from closely related species by the unequal size of the sepals (in fruit); other species within its range with similarly unequal sepals have much showier corollas. Constance (1979) discussed other *Phacelia* species occurring in similar habitat and geographic ranges: Common heliotrope (*P. distans*) and tansy phacelia (*P. tanacetifolia*) are larger plants with larger leaves and flowers, and with only 2-4 seeds per fruit. Thick-leaved phacelia (*P. pachyphylla*) has characteristic black tack-shaped glands and many more seeds per capsule. The most closely related species are Beatley's phacelia (*P. beatleyae*) and the undescribed taxon mentioned above. These occur within Parish's phacelia's range in southern Nevada, but neither plant has been collected in California. Beatley's phacelia occurs on volcanic outcrops and is distinguished by its more erect stature, absence of basal rosette, generally smaller seeds and more seeds per capsule (about 40-50 rather than 30-40), and two (rather than one) calyx lobe distinctly wider than the others (Reveal and Constance, 1972). The undescribed taxon occurs at 13 known sites on clay knolls within and around the Nevada Test Site (Clark and Nye Cos.; James Morefield, pers. comm.). Diagnostic characters are not yet available.

The flowering season for Parish's phacelia has been reported as April - June (Munz, 1974) and April-July (Howell, 1943; Skinner and Pavlik 1994), but all California collections and observations have been made between 6 April and 11 May. The June and July dates have generally been for collections made in White Pine County, Nevada, at much higher elevation and latitude than the California occurrences.

No information is available on pollination vectors, self-compatibility, seed dispersal, mycorrhizal associates, or other aspects of Parish's phacelia natural history. Given its restriction (at least in California) to seasonally wet alkaline flats, and its many small seeds, it probably is not normally dispersed more than a few feet from the parent plant, but may occasionally be ingested by shorebirds or picked up with mud on their feet, and carried long distances. Mycorrhizae are unlikely to be important the dry pools where Parish's phacelia grows because the symbionts are inhibited by anaerobic conditions during saturation and by severe drying later in the year (Rendig and Taylor, 1989).

Habitat Requirements:

All known occurrences are on sparsely vegetated alkaline flats, generally in dry, cracked mud flats of seasonal pools filled in years of high rainfall. Most accounts have given little attention to co-occurring plants, but saltbush (*Atriplex*), patata (*Monolepis nuttalliana*), Fremont's phacelia (*P. fremontii*), thick-leaf phacelia (*P. pachyphylla*), and split grass (*Schismus barbatus*) have been mentioned on field reports or herbarium labels. Sanders (16397 UCR) described its habitat at the Coyote Dry Lake site as "Shallow dried alkaline pools, mostly barren except for annuals. Pool bottom bare except for skeletons of plants from previous years. Growth appears controlled by water level and timing. Generally there is a band of *Monolepis* above . . ." Evidently, these ephemeral plants may appear at different levels of the pools, depending on water levels in a given year. Other habitat descriptions transcribed from herbarium labels by Cochrane (1979) read: "gray gumbo playa," and "damp alkaline mud."

Rhodes and Williams (1977), Rhodes et al. (1979) and Cochrane (1979) described several sites in Nevada where Parish's phacelia was reportedly growing on knolls of sedimentary or volcanic material. The plants are from the French Valley area of the Nevada Test Site, near the type locality of Beatley's phacelia. Further, Rhodes and Williams (1977) noted that the calyces of these plants had two wider lobes and three narrower ones. Parish's phacelia has only one wider calyx lobe (Howell 1943), but Beatley's phacelia has two (Reveal and Constance, 1972). Parish's phacelia is either rare or absent on the Test Site, and it is restricted to playas and flats (Duane Atwood pers. comm.). Plants reported from knolls at the Test Site must be interpreted as either Beatley's phacelia or the new taxon, misidentified as Parish's phacelia.

Population Status:

Field data forms and herbarium labels have often described Parish's phacelia as abundant, but it is an ephemeral annual and its occurrence in any given year is apparently undependable. Rutherford and Bransfield (1991) estimated total numbers at the Coyote Dry Lake site as 200 million, by estimating densities in square-meter plots and extrapolating to the estimated area of occupied habitat. Bagley (1996) visited the same site and found "huge numbers of skeletons from last year. No sign of any growth on the playas this year. Very, very dry." Ripley & Barneby (3265 POM) reported it as "locally abundant" at the type locality, but that occurrence has not been documented since. Charlton (*s.n.* RSA) reported it as "locally common." Rainfall is the most likely determinant of the plant's numbers in any given year, but there is no information available on the necessary amount or season, or on other climatic variables that may affect its numbers.

Rhodes and Williams (1977) felt that Parish's phacelia was rare enough to warrant status as a federal candidate for listing as threatened or endangered, and discussed its likely extirpation at historic occurrences on the Nevada Test Site and at Indian Springs Valley (Clark County, Nevada). Following surveys in years of greater rainfall, Rhodes et al. (1979) reported Parish's phacelia in much higher numbers and recommended against consideration for candidate status. Their recommendation were evidently based on misidentifications (above), and should not be considered in management planning for Parish's phacelia. Confirmed Parish's phacelia is known from 15 occurrences in Nevada, some of which are very large (James Morefield, pers. comm.).

Threats Analysis:

Because Parish's phacelia is known from only one or two extant occurrences in California, extending over a relatively small area, it may be at risk of stochastic or catastrophic extinction. Part or all of the well-documented occurrence is within the proposed Fort Irwin expansion area, and some military land uses (e.g., tank maneuvers) would likely extirpate the species. Several field forms and written reports have cited off-road vehicle use as potential threats, and other development (e.g., powerline and access road construction) would affect populations if they crossed Parish's phacelia occurrences or interrupted their hydrology.

Biological Standards:

The distribution of Parish's phacelia in California remains unclear. Actual locations of historic occurrences at Lucerne Dry Lake, "Waterman's," and Yermo should be identified and suitable habitat near the sites surveyed in years of relatively high rainfall to confirm the reported extirpations at the first two sites and the reported occurrence at the third.

The wide geographic distribution but irregularity of documented occurrences suggests either that Parish's phacelia is very rare in California, or that its habitat has not been adequately searched.

Surveys should be completed for any new projects or land use changes that might cause soil disturbance or affect surface hydrology of suitable habitat. Additional surveys of alkaline flats, playas, dry lake beds and their margins throughout the Mojave Desert, carried out whenever funding and scheduling allow, might improve understanding of the plant's distribution. Surveys should be completed between early April and early May in years of above-average rainfall. Botanists should be familiar with the plant's diagnostic characters (Howell, 1943; Wilken et al., 1993). Any new locations should be documented by voucher specimens and reported to the CNDDDB.

The single well-documented extant California occurrence should be given special attention, perhaps by designation as a BLM "Area of Critical Environmental Concern," and any proposed land use changes should be closely analyzed to confirm that the population is not affected. Rutherford and Bransfield (1991) recommended changing the site class from Multiple Use to Limited Use, minimizing military and recreational impacts by restricting vehicles to the eastern portion of the tank trail, acquisition of private land supporting parts of the Parish's phacelia population, and implementing an annual monitoring program. Monitoring should be designed to seek correlations between plant densities, pool depths, and rainfall patterns. These data would likely be useful to identify the most similar sites and best years in which to survey potential new locations.

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