**CHARLOTTE'S PHACELIA**
*Phacelia nashiana* Jepson

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**Management Status:** Federal: None
California: G3; S3.2 (CDFG, 1998)
CNPS: List 1B; R-E-D code 1-2-3 (Skinner and Pavlik, 1994)

**General Distribution:**

Charlotte's phacelia occurs in the high Sierra Nevada, its desert-facing foothills, and the adjacent El Paso Mountains, in Tulare, Inyo, and Kern Counties. Its elevation ranges from 2000-7200 ft. elevation (600-2200 m). Most occurrences are east of the Sierra Nevada crest, from the foothills above Fremont Valley, north through Red Rock Canyon State Park, to east-facing canyons above Indian Wells Valley. East of Red Rock Canyon, there are several occurrences along the southern slopes and canyons of the El Paso Mountains eastward to Iron Canyon. There also is one record from the northeastern slope of the El Paso Mountains. In the high Sierra Nevada, there are several occurrences along the Pacific Crest Trail in Inyo and Tulare Counties from Morris Peak to the head of Nine-mile Canyon. One record is from the Volcano Peak area, east of the Sierra Nevada, within the China Lake Naval Weapons Center. To the west, there are several occurrences in the headwaters of Canebreak Creek, in the Lake Isabella watershed. All known occurrences are on public land (Anon. 1989).

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

Most of *Phacelia nashiana's* range is within the WMPA; the only exceptions are the occurrences west of the Sierra Nevada crest. Within the WMPA, most documented populations are near roads or trails in the lower canyons and washes, or are in high-interest natural areas (e.g., Red Rock Canyon State Park). Several locations are associated with the Los Angeles Aqueduct and its various access roads. In view of the documented locations at the Sierra Nevada crest and on its lower slopes, it is likely that additional undocumented populations occur on the inaccessible mountain slopes above the foothills, washes, and lower canyons. Additional populations also are likely to occur within the China Lake Naval Air Weapons Center.

**Natural History:**

Charlotte's phacelia, a striking plant while in flower, is an annual, to about 7 in. (18 cm) tall, single or several-stemmed from base, short coarse hairs with black gland tips throughout much of the plant. Leaves are mostly basal, ovate or round to about 3 in. (7 cm) long, with irregularly toothed or lobed margins, on long petioles. Flowers are on pedicles about 0.2-0.4 in. (5-10 mm) long. Sepals are about 0.15 in. (4 mm), longer in fruit. Petals are fused at their bases in a widely open or bell shaped corolla to about 0.7 in (18 mm) long; they are bright blue with white spots at the bases of the petals and a white tube, dropping entirely from the flower before the fruit develops. The fruit is ovoid, and many seeded, about 0.3-0.6 in. (7-14 mm). Important characters for field identification are the annual habit, wide, crenate to weakly lobed leaves, large brightly colored deciduous corolla, toothed filament bases (the teeth glabrous), and many-seeded fruits (Jepson, 1943; Wilken et. al., 1993). The most similar species is Parry's phacelia *P. parryi* but the two do not overlap in geographic range and field identification need not distinguish them. (Charlotte's phacelia is treated with *P. parryi* in both the key and description by Abrams [1951]). Other similar species are sticky phacelia (*P. viscida*), wild Canterbury bells (*P. minor*), and long-stalked phacelia (*P. longipes*). These species also overlap little or not at all with Charlotte's phacelia.

Flowering has been reported from May to June (Munz, 1974), April to June (Anon., 1989) and March to June (Skinner and Pavlik, 1993). The earliest flowering specimen in the Rancho Santa Ana Botanic Garden collection (*Charlton 4767*) is dated 6 April and was collected at 2500 ft. elevation (760 m). The plant was in both flower and fruit, and was presumably flowering during late March. In the

SMASCH (Specimen Management System for California Herbaria) database, The Jepson Herbarium reports a specimen collected on 25 March at the same elevation (*Bacigalupi 6268*). Presumably, Charlotte's phacelia can be found in flower by late March, at least at lower elevations.

Several of the most similar species, including Parry's phacelia, large-flowered phacelia (*P. grandiflora*), sticky phacelia, and wild Canterbury bells are chaparral fire-followers whose seeds germinate in response to incubation with charred wood (Keeley, 1991). The close relationships among these species suggest that post-fire germination may have evolved in a common ancestor. However, given the high elevations and open sites where Charlotte's phacelia occurs, it seems unlikely that a fire-following life history would have an ecological benefit. There is no data on the dormancy mechanism (if any) of Charlotte's phacelia; it would be interesting to learn whether it shares the post-fire germination cue, perhaps as an evolutionary anachronism rather than an *in situ* adaptation.

No information is available on pollination vectors, self-compatibility, seed dispersal, mycorrhizal associates, or other aspects of Charlotte's phacelia's natural history. The plant's large and brightly colored flowers suggest a large investment in attracting pollinators. Its annual habit and occurrence on arid mountain slopes suggests that its numbers may vary widely with precipitation, and data cited below indicates wide population fluctuations; whether these are controlled by climatic variables or other factors is unknown.

**Habitat Requirements:**

At higher elevations, Charlotte's phacelia generally occurs in steep, coarse sand and talus in open pinyon woodland with single-leaf pinyon (*Pinus monophylla*) and green ephedra (*Ephedra viridis*). At lower elevations, it generally is in canyons and washes, in desert shrublands composed of widespread desert species including burrobush (*Ambrosia dumosa*), creosote bush (*Larrea tridentata*), box thorn (*Lycium cooperi*), beavertail cactus (*Opuntia basilaris*), smoke tree (*Psorothamnus fremontii*), and Joshua tree (*Yucca brevifolia*). Substrates generally are granitic, but the El Paso Mountains populations are on metamorphic rock (Twisselmann, 1967) and the Volcano Peak population is on dark volcanic material (CDFG, 1997b). Occasional waifs occur on the broader alluvial fans below desert canyons (Twisselmann, 1967). *P. nashiana* commonly occurs with other annual plants, including other *Phacelia* species, coreopsis (*Coreopsis bigelovii*), lupine (*Lupinus concinnus*), and chia (*Salvia columbariae*).

*Phacelia nashiana* is generally associated with naturally disturbed or unstable habitats such as loose sand, talus, and washes. Rowlands et. al. (1995) cite Glenn Harris observing *P. nashiana* "growing vigorously on disturbed soils." Based on these observations, it also is likely to occur on some human-disturbed sites such as road cuts and berms, especially where dirt roads cross alluvial fans and washes.

**Population Status:**

Charlotte's phacelia populations were censused at 28 locations in 1986 by Mary Ann Henry, and these data are reported in the California Natural Diversity DataBase (CDFG 1997b). Many of the locations had hundreds of plants that year. Some locations had only a few plants, and two locations could not be relocated (i.e., mapping information was inaccurate, or there were no plants present during the census). A few sites have been censused in several different years, and appear to fluctuate considerably from year to year. For example, NDDB location number 4 increased from fewer than 40 plants in 1982 to 92 in 1986, to 100-300 in 1987. The high numbers of individuals at many widespread locations suggest that Charlotte's phacelia is secure over most or all of its range.

**Threats Analysis:**

Most of the known populations are within grazing allotments and some observers (e.g., Anon., 1989) consider cattle grazing "the primary threat to Charlotte's phacelia." Grazing is mentioned repeatedly in CNDDB records, but there appears to be no documentation of population declines in response to grazing. Other potential threats are off-road vehicles and wildflower collecting (Anon. 1989). All of these potential threats are general in nature, and are likely to affect specific populations that are accessible to cattle, vehicles, and hikers. Given the wide distribution circumscribing large areas inaccessible to these effects, it is likely that many Charlotte's phacelia populations are secure from harm.

**Biological Standards:**

Due to the extensive and meticulous survey and census data prepared by Mary Ann Henry, far better Charlotte's phacelia population data is available than for the vast majority of other special-status plants. Even so, this data is largely from a single year, and constitutes a "snapshot" of populations but gives no indication of trends over multiple years. Land managers should encourage energetic plant enthusiasts to follow up on Henry's work (CDFG 1997b and unpublished files) to document population fluctuations in response to climate, grazing, or other factors. This plant is easily identified and inherently attractive; it provides an excellent opportunity for amateur botanists to make a significant contribution to broader understanding of population ecology in an annual desert species. No specific areas seem in need of new focused surveys, but any new locations should be documented by voucher specimens and reported to the CNDDB.

Range condition at significant Charlotte's phacelia sites should be evaluated. While the specific effects of grazing are unknown, it is likely that heavy grazing would result in cattle feeding on the plant and/or regularly disturbing its habitat. It is unknown whether seeds can pass through the bovine digestive tract or germinate from feces, or whether the season and nature of grazing disturbance is compatible with the plant's evident adaptation to regular soil disturbance.

Management actions planned within the species range should consider potential effects to Charlotte's phacelia populations and habitat suitability. Management conflicts should be minimal since the plant is associated with soil disturbance and its distribution is largely in poorly accessible areas. The species appears to be secure and not in need of active conservation efforts; instead, management should seek to retain populations and habitat in their present states.

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