# PETITION TO THE CALIFORNIA FISH AND GAME COMMISSION TO LIST GERRY'S CURLY-LEAVED MONARDELLA (*MONARDELLA SINUATA* SUBSP. *GERRYI*) UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

**Figure 1:** *Monardella sinuata* subsp. *gerryi* (Photograph by M. Elvin; iNaturalist 2024)

February 6, 2025

***The California Native Plant Society***

**FGC – 670.1 (3/94)**

# NOTICE OF PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Sections 2072 and 2073 of the Fish and Game Code relating to listing and delisting endangered and threatened species of plants and animals.

## I. SPECIES BEING PETITIONED

**Common name:** Gerry's curly-leaved monardella
**Scientific name:** *Monardella sinuata* subsp. *gerryi*

## II. RECOMMENDED ACTION

a. **List** **X**
**As endangered**
b. Change Status ☐
c. Or Delist ☐

## III. AUTHORS OF PETITION

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*I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.*

**Signature**

**Date** 19-February-2025

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# EXECUTIVE SUMMARY

*Monardella sinuata* subsp. *gerryi* (Gerry's curly-leaved monardella) is an annual herb in the mint family, Lamiaceae (Elvin et al. 2015). It was described in 2015 and occurs in the Camarillo and Las Posas hills of Ventura County (Elvin et al. 2015, CCH2 2024, CNDDB 2024). Prior to being described as *Monardella sinuata* subsp. *gerryi* in 2015, it was only known from two historical herbarium specimens (Elvin et al. 2015, CCH2 2024). The discovery of an extant population in 2013, which would become Element Occurrence (EO) #3, supported the description by Elvin et al. (2015) as a taxon new to science. Recent genetic research supports its treatment as a full species distinct from *Monardella sinuata* (Drew 2024 pers. comm.). *Monardella sinuata* subsp. *gerryi* grows in open sandy patches within coastal sage scrub (Elvin et al. 2015). It only occurs on the Las Posas Sand, a Pleistocene geological formation with a distribution limited to central Ventura County (Tan et al. 2004a, Elvin et al. 2015, CCH2 2024). It has been documented from three

occurrences, one of which is presumed extirpated by development, and its total distribution is less than 2 square kilometers (Elvin et al. 2015, CNDDB 2024). Since 2013, only one additional extant site has been documented when a population was rediscovered in the Camarillo Hills in 2024 (EO#2; CNDDB 2024). Given the extremely limited collection record, the historical distribution of *Monardella sinuata* subsp. *gerryi* is unknown but may have included much of the southern slope of the Camarillo and Las Posas hills in areas with suitable geological conditions and microhabitat. While additional occurrences may exist in remnant coastal sage scrub of the Camarillo and Las Posas hills, all potentially suitable habitat is highly fragmented and threatened by development and conversion to agriculture. Agricultural conversion, development, land clearing and grading, maintenance and construction of roads or trails, nonnative plants, vegetation succession, and erosion are direct threats to *Monardella sinuata* subsp. *gerryi* (CNDDB 2024). Its fragmented distribution, limited number of occurrences/populations (both of which are threatened with extirpation), and small population sizes further increases its risk of extinction from stochastic events and low genetic diversity (Shaffer 1981, Newman and Pilson 1997, Aguilar et al. 2006, Ouborg et al. 2006).

CESA defines "endangered species" as a "native species or subspecies… which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (FGC Sec. 2062). *Monardella sinuata* subsp. *gerryi* is already extremely rare throughout its very limited range, is at imminent risk of extinction, and warrants listing as Endangered pursuant to the California Endangered Species Act (CESA).

# LIFE HISTORY

## TAXONOMIC HISTORY

*Monardella sinuata* Elvin & A. C. Sanders subsp. *gerryi* Elvin, A.C. Sanders & R.A. Burgess is an annual herb in the Lamiaceae (Elvin et al. 2015). It was not included in *The Jepson Manual* (Jokerst 1993) or *Jepson eFlora* (Sanders et al. 2012) as it was described after their publication. The *Flora of North America* Lamiaceae treatment is not yet published. Prior to 2013, there were only two collections of the annual, wavy-leaved *Monardella* that is now called *Monardella sinuata* subsp. *gerryi*: one from 1934 (*French 311*) and one from1976 (*Howe 4924*) (Elvin et al. 2015, CCH2 2024). The collections were originally identified as *Monardella undulata* Benth. and *Monardella breweri* Gray, respectively (CCH2 2024). For over 100 years, the name *Monardella undulata* Benth. was erroneously applied to wavy-leaved annual *Monardella* from coastal Ventura County to Marin County (Elvin and Sanders

2009, Sanders et al. 2012). The *M. undulata* type specimen is a wavy-leaved shrubby perennial, not an annual (Elvin and Sanders 2009). To resolve this situation, *Monardella sinuata* Elvin & A. C. Sanders was described to include the wavy-leaved annual *Monardella* that occur along the coast from Ventura County to Marin County (Elvin and Sanders 2009). *M. undulata* was applied to the shrubby perennial taxa of coastal dunes of central California (Elvin and Sanders 2009, Sanders et al. 2012). Elvin and Sanders (2009) and Sanders et al. (2012) included two subspecies within *M. sinuata*: subspecies *sinuata*, which ranges from the Purisima Hills in Santa Barbara County north to Morro Bay in San Luis Obispo County, and subspecies *nigrescens* Elvin & A. C. Sanders, which ranges from Monterey Bay in Monterey County north to Pt. Reyes in Marin County (Sanders et al. 2012, Elvin et al. 2015).

Prior to 2013, the two historical collections from Ventura County were considered a disjunct population of *M. sinuata* subsp. *sinuata* (Elvin and Sanders 2009, Sanders et al. 2012). In 2013, M. Elvin and R. Burgess discovered a population in the Las Posas Hills east of Camarillo (Elvin et al. 2015). They found morphological differences between the Camarillo plants and subspecies *sinuata*, including differences in calyx size and hairs, stem glands, and nutlet size (Elvin et al. 2015; see *Similar Species*, below, for more details and for differentiation from other taxa). They considered describing the Ventura County plants as a new species, but conservatively described it as a new subspecies (Elvin et al. 2015). They also suggested that further research was needed to determine whether subsp. *gerryi* warranted treatment as a full species. Recent phylogenetic analyses of *Monardella* by B. Drew (2024 pers. comm.) support the treatment of *M. sinuata* subsp. *gerryi* and *M. sinuata s.s.* as separate species. Samples of subsp. *gerryi* are sister to a group that contains multiple taxa including other annuals such as *Monardella sinuata s.s.*, and perennials such as *M. undulata* subsp. *crispa* and *M.* subsp. *undulata*. The results of this research, including suggested taxonomic and nomenclatural changes, are being prepared for publication.

## SPECIES DESCRIPTION

The following description of *Monardella sinuata* subsp. *gerryi* is taken from Elvin et al. (2015):

> Annual, erect, gracile, 7–30(43) cm tall, simple to moderately branched, +/- glabrous to very sparsely pubescent, stem with 1 type of trichome, non-glandular, 0.1–0.2 mm, retrorse, stems stramineous to tan, with conoideus glands sparsely present. Leaves 10–35 × 2–6 mm, with length-to-width (L:W) ratios of 5–7:1, blades narrowly elliptic, +/- glabrous to very sparsely pubescent, with 1 type of trichome on adaxial surface, non-glandular, 0.1–0.2 mm (rare), with 1 type of trichome on abaxial

surface, non-glandular, 0.1–0.2 mm (sparse), leaves subsessile to decurrent (rarely cuneate), margins generally slightly undulate, occasionally strongly undulate, bases acute, apices acute. Inflorescence solitary to an open compound cyme; flowers in terminal glomerules; glomerules 1 to 7 per plant, glomerules on main stem 10–17 mm wide, glomerules on axillary branches, 7–12 mm wide; glomerule bracts 7–9(12) × 33.5–6 mm; with 1 type of trichome, non-glandular, 0.1–0.2 mm, and with 2 types of cilia, (1) non-glandular, 0.1–0.2 mm and (2) non-glandular, 0.3–0.5 mm (sparse), bracts elliptic to widely lanceolate, veins green, +/- translucent between veins, apices acute to acuminate, purple tinged or not, less than or equaling calyces. Flowers with pedicels 1–1.5 mm; calyx 5.5–6mm, rapidly caducous after anthesis, +/- glabrous to very sparsely pubescent; with 2 types of trichomes, (1) glandular, 0.02–0.04 mm, and (2) non-glandular, 0.3–0.6 mm; calyx teeth with 1 type of trichome, non-glandular, 0.3–0.6 mm; corolla 11–14 mm, upper 2 corolla lobes gland-tipped, purple; stigma 13–17 mm, exserted; stamens 13–17 mm, exserted. Fruit a nutlet, light brown with dark brown spots and streaks, oblong, 1.5–1.6 × 0.8 mm.


**Figure 2:** Isotype of *Monardella sinuata* subsp. *gerryi* (*Elvin 7121*, SBBG CC BY-NC 4.0) (CCH2 2024)

## SIMILAR TAXA

*Monardella sinuata* subsp. *gerryi* is morphologically most similar to *Monardella sinuata* subspp. *sinuata* and *nigrescens*, neither of which occurs in Ventura County (Sanders et al. 2012, Elvin et al. 2015, CCH2 2024). The nearest populations of *M. sinuata* subsp. *sinuata* are approximately 125 km northwest of Camarillo near Lompoc in Santa Barbara County and the nearest occurrences of subsp. *nigrescens* are much further north in Monterey County (Sanders et al. 2012, Elvin et al. 2015, CNDDB 2024). The only other annual *Monardella* taxa known from Ventura County are *Monardella breweri* subspp. *breweri* and *lanceolata* (Sanders et al. 2012, Calflora 2024, CCH2 2024, Jepson 2024).

In addition to the characters provided in Table 1, *Monardella sinuata* subsp. *gerryi* differs from subsp. *sinuata* by its nearly complete lack of pubescence on the adaxial leaf surfaces, presence of minute glandular trichomes on the calyces (vs. none in subsp. *sinuata*), contains bracts that do not exceed the calyces (vs. exceeding them in subsp. *sinuata*), and contains multiseriate-multicellular (MSMC) trichomes (conoideous glands) on the stems (vs. lacking them in subsp. *sinuata*) (Elvin et al. 2015).

| | **Leaf L:W ratio** | **Leaf width (mm)** | **Primary glomerule size (mm)** | **Bract width (mm)** | **Pedicel length (mm)** | **Calyx length (mm)** | **Corolla length (mm)** | **Nutlet length (mm)** |
|---|---|---|---|---|---|---|---|---|
| subsp. *gerryi* | 5 – 7:1 | 2 – 6 | 10 – 17 | 3.5 – 6 | 1 – 1.5 | 5.5 – 6 | 11 – 14 | 1.6 |
| subsp. *sinuata* | 3 – 6:1 | (3)4 – 10 | 10 – 35 | 3 – 12 | 0.5 – 1 | 7 – 8 | 13 – 16 | 1.1 |

**Table 1:** Morphometric characters separating *Monardella sinuata* subspp. *gerryi* and *sinuata* (Elvin et al. 2015). Parenthetical values are outliers.

See Elvin et al. (2015) for characters differentiating *Monardella sinuata* subsp. *gerryi* from *M. sinuata* subsp. *nigrescens*. *Monardella sinuata s.l.* is differentiated from *Monardella breweri s.l.* by its leaves which have wavy margins that are usually entire (or occasionally serrate) versus *M. breweri* leaves which are slightly wavy or not wavy, and entire to serrate (Elvin and Sanders 2009, Sanders et al. 2012). *M. breweri* occurs across a broader range of elevations, substrates, and habitat types than *M. sinuata* and it is not known to co-occur with *M. sinuata* subsp. *gerryi* (Sanders et al. 2012).

## REPRODUCTION AND GROWTH

No publications on pollination, reproduction, or seed dispersal in *Monardella sinuata* subsp. *gerryi* or *Monardella sinuata s.l.* were found. *Monardella sinuata* subsp. *gerryi* flowers have been observed from April through June (Elvin et al. 2015, CCH2 2024, CNPS 2024, iNaturalist 2024). Confirmed and potential pollinators of other *Monardella* taxa include hummingbirds, bees, butterflies, and flies (CPC 2024). *Monardella venosa* (CRPR

1B.1) is a rare annual known from two extant occurrences in the Sierra Nevada foothills (CNDDB 2024, CNPS 2024). Hanson (2012) recorded the following bee taxa with *M. venosa* pollen grains adhered to their bodies; *Anthophora urbana*, *Apis mellifera*, *Bombus* spp., and *Xeromelecta californica*. Self-pollination was confirmed for *M. venosa*, but cross pollination is likely required for maximum seed yield (Hanson 2012). *Monardella venosa* seedbank studies found that most seedlings germinated very close to parent plants and no specialized dispersal mechanisms were found (Hanson 2012). Seed dispersal mechanisms of *Monardella sinuata* subsp. *gerryi* are unknown but seeds probably exhibit similar short-distance dispersal. Elvin et al. (2015) observed that the calyces of subsp. *gerryi* are more rapidly deciduous than in the other two *M. sinuata* subspecies. How this characteristic may relate to reproductive biology is unknown. The presence of nonnative forbs has significant impacts on the growth and reproductive output of *Monardella venosa* (Hanson 2012). Plots with experimental removal of nonnative forbs exhibited higher growth rates and produced more flowers and almost three times as many seeds as plants in control plots with nonnative forbs (Hanson 2012). While not confirmed experimentally, the low numbers of *Monardella sinuata* subsp. *gerryi* observed during wet years such as 2023 were presumably caused by higher levels of competition from nonnative plants (Drew 2024 pers. comm.). The impacts on its growth and reproduction are probably similar to those documented by Hanson (2012) for *Monardella venosa*.

## HABITAT

Occurrences of *Monardella sinuata* subsp. *gerryi* range in elevation from 150 to 245 m (490-–805 ft) above sea level (Elvin et al. 2015, CCH2 2024, CNDDB 2024). All occurrences are on soils derived from the Las Posas Sand, an unlithified or weakly lithified sandstone prone to high rates of erosion and landsliding (Tan et al. 2004a, Gutierrez et al. 2008, Devecchio et al. 2012, Elvin et al. 2015). The Las Posas Sand was formed during the Pleistocene as sediment from the Santa Clara River was deposited in a shallow marine environment (DeVecchio et al. 2012). The formation was uplifted with the Camarillo and Las Posas hills over the last ~ 200,000 years (Devecchio et al. 2012). The two other subspecies of *Monardella sinuata* are also limited to sandy substrates of marine origin including active coastal dunes, inactive dune sands of Pleistocene age, and sands derived from much older marine sandstones of Miocene age (McGraw and Levin 1998, USFWS 1998). *Monardella sinuata* subsp. *gerryi* occurs within coastal sage scrub characterized by plant taxa such as *Acmispon glaber*, *Artemisia californica*, *Eriogonum fasciculatum*, and *Salvia mellifera* (Elvin et al. 2015). Within the coastal sage scrub, it occupies a microhabitat of sandy openings with associates such as *Croton californicus*, *Eriastrum densifolium* subsp. *elongatum*, *Euphorbia polycarpa*, *Horkelia cuneata* var. *puberula* (CRPR 1B.1), *Mucronea californica* (CRPR 4.2), and *Stillingia linearifolia* (Elvin et al. 2015, CNPS 2024).

# DISTRIBUTION

## ELEMENT OCCURRENCE INFORMATION

### EXTIRPATED OCCURRENCES

**ELEMENT OCCURRENCE #1**

Occurrence #1 is based on an herbarium specimen collected in 1976 in the Santa Rosa Valley "on Las Posas Road, 0.5-mile north of Santa Rosa Valley Blvd" (*Howe 4924*) (Elvin et al. 2015, CCH2 2024, CNDDB 2024). The exact collection location is unknown, and the occurrence is mapped as a 'best guess' by the CNDDB approximately 3 km east of EO #3. Much of the Santa Rosa Valley has been developed and this EO is presumed extirpated (CNDDB 2024).

### EXTANT OCCURRENCES

**ELEMENT OCCURRENCE #2**

Until 2024, when a population was rediscovered, occurrence #2 was presumed extirpated (CNDDB 2024). The occurrence was based on a single herbarium specimen (*French 311*) collected in 1934 "2 miles north of Camarillo" (CCH2 2024, CNDDB 2024). The exact collection location is unknown, and until July 2024, the occurrence was mapped as a 'best guess' with an uncertainty of 1,300 meters (CNDDB 2024). The rediscovered population is approximately 0.3-mile east-southeast of the previously georeferenced location of *French 311* (CNDDB 2024). Since the most recent CNDDB update to *Monardella sinuata* subsp. *gerryi* in July 2024, this EO is mapped at the rediscovered population and *French 311* is now attributed to this site (CNDDB 2024).

**ELEMENT OCCURRENCE #3**

Occurrence #3 was discovered in 2013 and is the type locality of *Monardella sinuata* subsp. *gerryi* (Elvin et al. 2015, CNDDB 2024). The population is mapped as a polygon approximately 650 meters long by 200 meters wide, although plants are not distributed continuously within this polygon (CNDDB 2024). Herbarium collections from the site include *Elvin 7121*, *Elvin 7131*, *Burgess 9378*, and *Burgess 10035* (Elvin et al. 2015, CCH2 2024, CNDDB 2024). In 2024, this EO comprised approximately 20 individuals in an area approximately 4 X 15 m (M. Elvin 2024 pers. comm.).

| CNDDB EO # | Status | Latitude | Longitude | Elevation (ft) | Land Ownership |
|---|---|---|---|---|---|
| 1 | Presumed extirpated | 34.2456 | -118.9067 | 700 | Private |
| 2 | Extant | 34.2489 | -119.0304 | 520 | Private |
| 3 | Extant | 34.2521 | -118.9378 | 650 | Private |

**Table 2:** *Monardella sinuata* subsp. *gerryi* occurrence locations and ownership (CCH2 2024, Elvin 2025 pers. comm.)

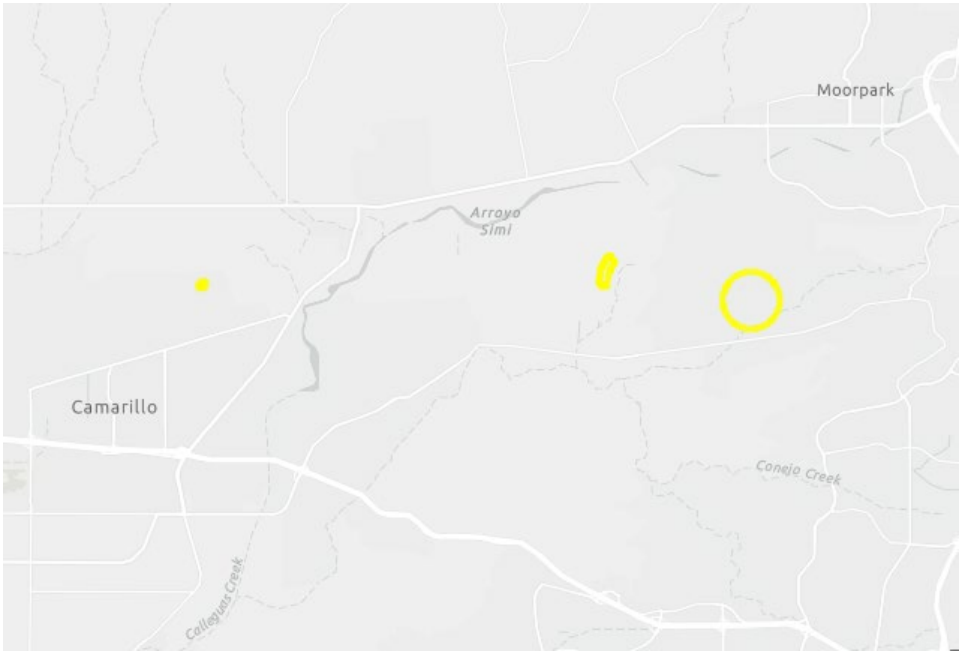


**Figure 3:** CNDDB (2024) map of all three occurrences in the Camarillo and Las Posas hills (left to right; EO #s 2, 3, and 1).


**Figure 4:** Aerial imagery map of all three occurrences in the Camarillo and Las Posas hills.


**Figure 5:** Aerial map of occurrence #2 in the Camarillo Hills showing encroaching development.


**Figure 6:** Aerial map of the Las Posas Hills showing occurrence #3 with encroaching agricultural conversion.

## CURRENT DISTRIBUTION

*Monardella sinuata* subsp. *gerryi* is endemic to Ventura County, California, where it is only known from the Camarillo and Las Posas hills (Elvin et al. 2015, CNDDB 2024). The Camarillo Hills lie immediately north of the city of Camarillo and run from near the intersection of Springville Drive and Highway 101 east-northeast for approximately 8 km to the town of Somis. They range in elevation from approximately 100 to 880 feet above sea level. The Las Posas Hills run from the northeastern edge of Camarillo east-northeast for approximately 12 km to the Tierra Rejada Valley. They range in elevation from approximately 200 to 1,020 feet above sea level. The two ranges are separated by the floodplain and channel of Arroyo Las Posas/Calleguas Creek, which runs through eastern Camarillo.

The current distribution of *Monardella sinuata* subsp. *gerryi* is limited to two extant occurrences, one in the Camarillo Hills (EO #2) and one in the Las Posas Hills (EO #3) (CNDDB 2024). EO #2 was based on a collection from 1934 (*French 311*) from "2 miles north of Camarillo" and was considered extirpated until a population was discovered in 2024 (Elvin et al. 2015, CNDDB 2024). EO #3 was the site where the taxon was rediscovered in 2013, and plants were confirmed present there through spring of 2024 (Elvin et al. 2015,

CNDDB 2024). The extent and population size at this occurrence has declined considerably since 2013 (CNDDB 2024).

Based on the single extant occurrence known at the time, Elvin et al. (2015) reported both the Area of Occupancy (AOO; sum of 1 $km^2$ grid squares) and EOO (Extent of Occurrence) to be less than 1 $km^2$. Based on the two extant populations, the current AOO of *Monardella sinuata* subsp. *gerryi* is estimated at 2 $km^2$ (Bachman et al. 2011). The decision to use 1 × 1 km cells for the AOO follows the cell size chosen by Elvin et al. (2015). The EOO of extant populations cannot be calculated, as a minimum of three sites are required to create a polygon. AOO and EOO calculations usually overestimate the actual and potentially occupied ranges of taxa due to the inclusion of unoccupied or unsuitable habitat (Burgman and Fox 2003). In the case of *Monardella sinuata* subsp. *gerryi*, most of the area included in these estimates has unsuitable substrate/microhabitat or has been developed and no longer supports native vegetation (Elvin et al. 2015, Google Earth 2024). Based on site visits to both occurrences in 2024, the actual occupied area of *Monardella sinuata* subsp. *gerryi* is approximately 540 square meters (Elvin 2024 pers comm.).

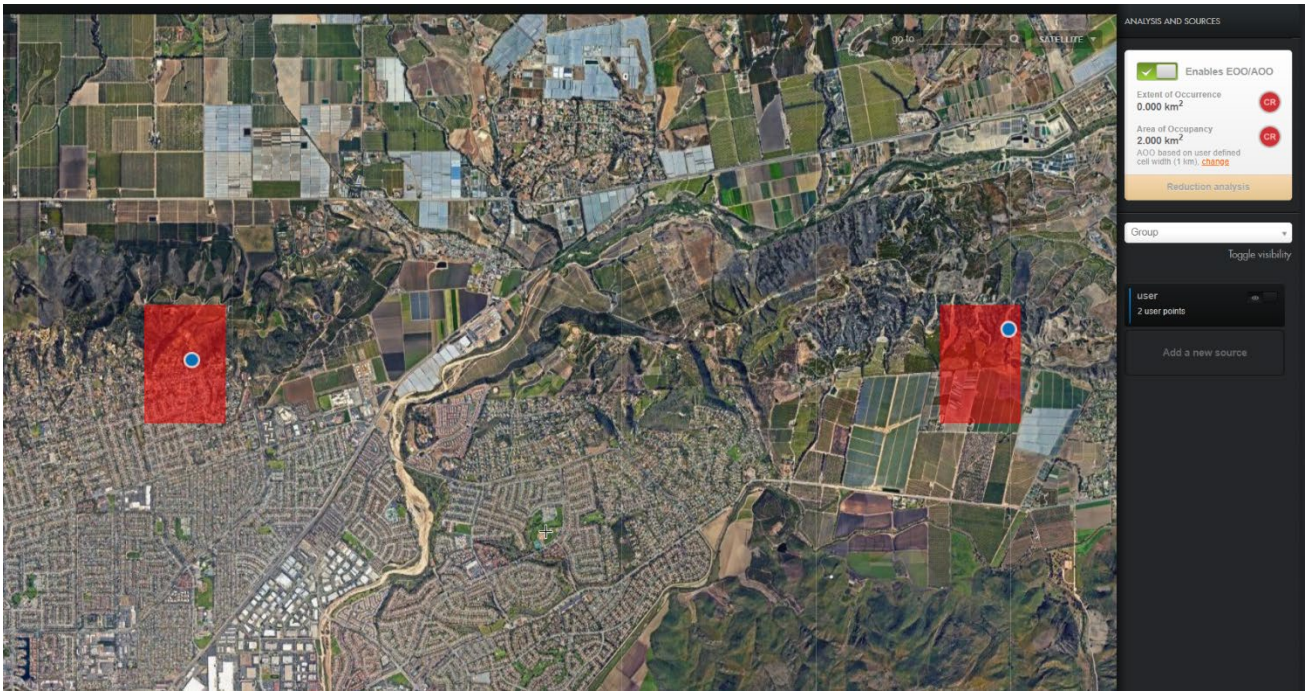


**Figure 7:** The estimated Area of Occupancy (AOO) of the two extant occurrences is 2 $km^2$ (GeoCAT, Bachman et al. 2011; CNDDB 2024). Much of the area within the estimated AOO (in red) has been converted to housing or agriculture.

## POTENTIAL FOR ADDITIONAL OCCURRENCES

*Monardella sinuata* subsp. *gerryi* is a substrate specialist that occurs on soils derived from the Las Posas Sand (Elvin et al. 2015). Las Posas Sand is mapped on approximately 12 $km^2$ of the Camarillo and Las Posas hills, including approximately 8.5 $km^2$ that have been developed or converted to agriculture (Table 3; Dibblee and Ehrenspeck 1990a, 1990b, 1992; Tan et al. 2004a, Guttierez et al. 2008). The Las Posas Sand also occurs on the southern slopes of South Mountain near Saticoy, and on the north side of the Santa Clara River as a narrow, discontinuous exposure from the Ventura River mouth to the vicinity of the Sespe and Santa Clara River confluence in Fillmore (Dibblee and Ehrenspeck 1990b, Tan et al. 2004a, 2004b, 2004c; Tan and Irvine 2005, Guttierez et al. 2008, DeVecchio et al. 2012). Whether or not the Las Posas Sand exposures on South Mountain and in the Santa Clara River valley have suitable microhabitat and climatic conditions for *Monardella sinuata* subsp. *gerryi*, is unknown; however, these areas are further inland, fragmented, and disjunct from the known occurrences, decreasing their likelihood of occupancy. Regardless, any undeveloped sites in these areas should be surveyed for appropriate habitat and new occurrences, and surveys should be conducted over multiple years.

Nearly all mapped exposures of the Las Posas Sand in the Camarillo and Las Posas Hills are on private land, approximately 72% of which has already been converted to agriculture or housing (Google Earth 2024). Further surveys should be conducted on any undeveloped exposures of Las Posas Sand during the appropriate time of year for detection of *Monardella sinuata* subsp. *gerryi*, which has a short blooming window from late May through June (CNPS 2024, Elvin 2024 pers. comm.).

Substrates adjacent to Las Posas Sand exposures or known *Monardella sinuata* subsp. *gerryi* sites are composed of substrates such as the Conejo volcanics, non-marine sedimentary rocks, or various alluvial deposits (Dibblee and Ehrenspeck 1990a, Guttierez et al. 2008, Elvin et al. 2015). *Monardella sinuata* subsp. *gerryi* is only known from sands derived from marine environments, so these non-marine or non-sedimentary substrates are unsuitable habitat for the taxon.

## FORMER DISTRIBUTION

Given the sparse collection record of *Monardella sinuata* subsp. *gerryi*, its historical distribution can only be inferred by estimating the former extent of potentially suitable habitat. There are only two historical collections, one from 1934 (*French 311*) and one from 1976 (*Howe 4924*), neither of which provide any information on the extent or size of populations (CCH2 2024). Using GeoCAT and all three known occurrences, presumed

extant or extirpated, the estimated extent of occurrence (EOO) is 3.2 km$^2$ and the area of occupancy (AOO; sum of 1 km$^2$ grid squares) is 3 km$^2$ (Bachman et al. 2011).

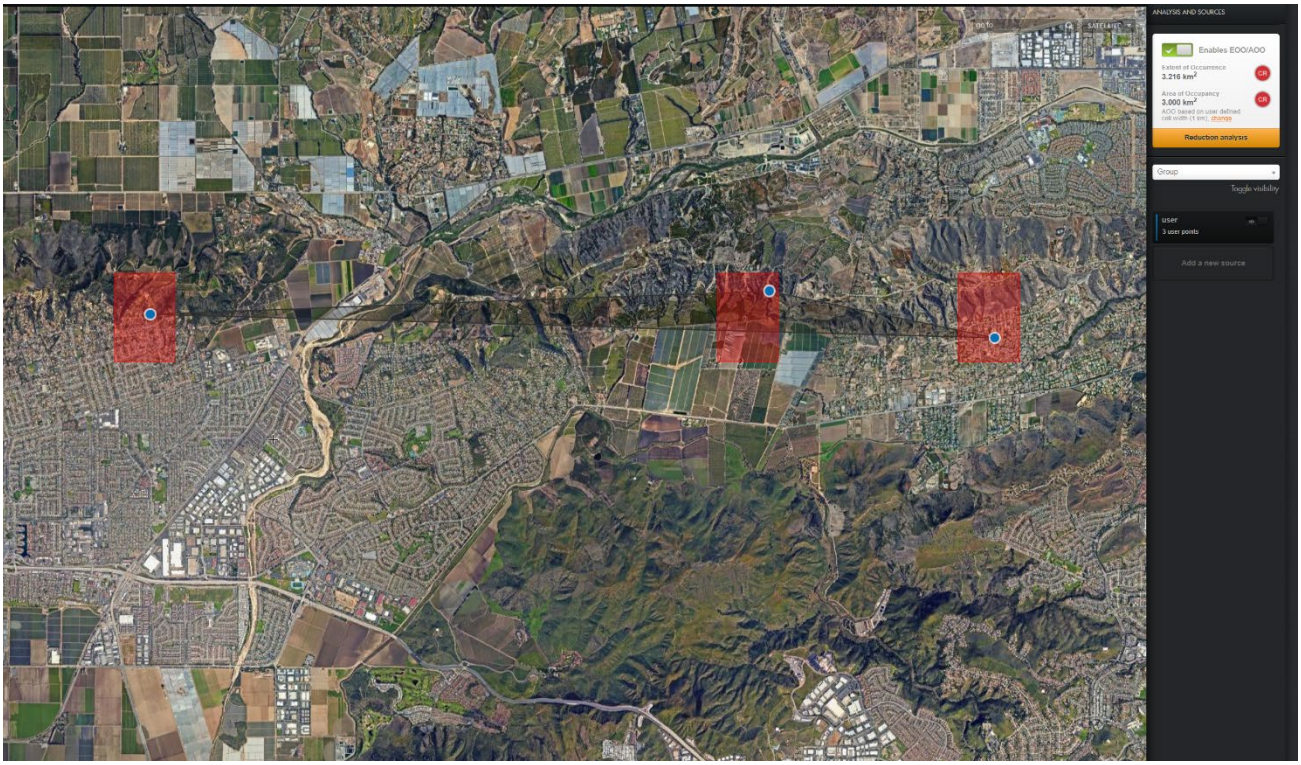


**Figure 8:** Estimated EOO and AOO (using a 1 km$^2$) of extant and presumed extirpated occurrences is 3.2 km$^2$ (gray polygon) and 3 km$^2$ (red rectangles), respectively (GeoCAT; Bachman et al. 2011). Large amounts of unsuitable and developed habitat are visible in both the EOO and AOO.

The historical extent of suitable habitat was likely much larger than the EOO and AOO estimates. Since it is impossible to estimate either the historically occupied area or the former extent of suitable microhabitat, the most useful metric for estimating the potential historical range of *Monardella sinuata* subsp. *gerryi* is the extent of the Las Posas Sand within the taxon's known range in the Camarillo and Las Posas hills.

To estimate the potential historical range, geological maps of the Camarillo and Las Posas hills were examined, and the total area mapped as Las Posas Sand was estimated (Dibblee and Ehrenspeck 1990a, 1992; Tan et al. 2004a, 2004b; Guttierez et al. 2008). The maps were overlaid onto aerial imagery and the amount of developed and undeveloped Las Posas Sand was mapped in both the Camarillo and Las Posas hills (Google Earth 2024). Most imagery was from 2023, but some imagery was taken in 2019 or 2020, so the amount of developed or altered habitat in those areas may be higher than the estimates reported here.

The Las Posas Sand is mapped over approximately 9 km$^2$ of the Camarillo Hills and approximately 3 km$^2$ of the Las Posas Hills for a total of approximately 12 km$^2$ (Dibblee and Ehrenspeck 1990a, 1992; Tan et al. 2004a, 2004b; Guttierez et al. 2008). Approximately 8.5 km$^2$ have been converted to agriculture or housing and approximately 3.3 km$^2$ still support native vegetation and could be suitable habitat for *Monardella sinuata* subsp. *gerryi* (Google Earth 2024). This represents a loss of approximately 72% of potentially suitable former habitat. These estimates are coarse, and many areas appear densely vegetated and probably lack the microhabitat required by *Monardella sinuata* subsp. *gerryi*. Table 3 includes estimates of potential former habitat, developed and undeveloped habitat, and percentage of habitat lost in each range of hills. The approximately 0.5–0.75 km$^2$ of undeveloped Las Posas Sand on the north side of the Camarillo Hills was excluded from the totals reported here: the northern slope is more mesic and supports different vegetation than the southern slope, and while the geology may be suitable for the taxon, all known records of *Monardella sinuata* subsp. *gerryi* are from the more xeric slopes on the south facing sides of the Camarillo or Las Posas hills (CNDDB 2024).

| | **Total Las Posas Formation (km$^2$)** | **Developed Las Posas Formation (km$^2$)** | **Undeveloped Las Posas Formation (km$^2$)** | **Percent loss** |
|---|---|---|---|---|
| **Camarillo Hills** | 8.77 | 7.19 | 1.58 | ~ 82% |
| **Las Posas Hills** | 3 | 1.27 | 1.73 | ~ 42% |
| **Totals:** | **11.77** | **8.46** | **3.31** | **~ 72%** |

**Table 3:** Total area of the Camarillo and Las Posas Hills mapped as Las Posas Sand and estimated area lost to development. The extent of development was estimated using the most recent Google Earth imagery from 2019, 2020, and (mainly) 2023 (Google Earth 2024).

The estimated former extent of approximately 12 km$^2$ of potentially suitable habitat reported differs from the estimate reported by Elvin et al. (2015) (15.64 km$^2$). The discrepancy is likely the result of finer scale substrate mapping reported here (Elvin 2025 pers. comm.).

As noted above under Potential for Additional Occurrences, geologists have mapped Las Posas Sand in the westernmost Santa Susana Mountains on the southern slopes of South Mountain (near Saticoy) and on the north side of the Santa Clara River in a discontinuous band from near Ventura to an area just west of Fillmore (Dibblee and Ehrenspeck 1990, Tan and Irvine 2005, Guttierez et al. 2008). Approximately 2.4 km$^2$ of Las Posas Sand is mapped on South Mountain and approximately 14.75 km$^2$ is mapped on the north side of the Santa Clara River (Dibblee and Ehrenspeck 1990, Tan and Irvine 2005, Guttierez et al. 2008), approximately 2.6 km$^2$ of which has been converted to agriculture or housing (Google Earth 2024). It is not known whether the correct microhabitat exists in these areas, but the vegetation in the vicinity of South Mountain is more like that found in the Camarillo and Las

Posas Hills while much of the vegetation north of the Santa Clara River is dominated by different plant taxa (A. Searcy 2025 pers. comm.). Unless *Monardella sinuata* subsp. *gerryi* is confirmed to occur in these areas, they should not be included in estimates of the taxon's current or historical range.

# ABUNDANCE AND POPULATION TRENDS

Due to the lack of collection records or other historical data, the former population size of *Monardella sinuata* subsp. *gerryi* is unknown. Given the losses of habitat due to development and agriculture, the long-term population trend is presumably negative. Population data for all three occurrences are provided in Table 4. When it was rediscovered in 2024, the population at EO #2 had 350 to 400 plants (CNNDB 2024). The population at EO #3 had 50 to 100 plants in 2013 and only 21 plants in 2024 (CNDDB 2024). The population size and extent at this occurrence has been declining since 2013 (Table 4) (CNDDB 2024). Additional surveys of extant occurrences should be conducted annually to monitor their reproductive status, population sizes, and threats.

| CNDDB EO # | Historical Population Size | 2013 | 2015 | 2023 | 2024 |
|---|---|---|---|---|---|
| 1 | Historical size unknown: Presumed extirpated | N/A | N/A | N/A | N/A |
| 2 | Historical size unknown | N/A | N/A | N/A | **350 – 400** |
| 3 | Historical size unknown | **50 – 100** | **Present*** | **None found** | **21** |

**Table 4**: **Occurrence population information** (CNDDB 2024). ***No population size estimate was reported in 2015, but observers noted "fewer than in previous years due to drought" (CNDDB 2024).

# FACTORS IMPACTING SURVIVAL AND REPRODUCTION

The two extant populations of *Monardella sinuata* subsp. *gerryi* are both small and isolated. Populations at both occurrences are at risk of extirpation due to numerous anthropogenic threats, especially development, road maintenance, vegetation succession, and agricultural conversion (CNDDB 2024). Occurrence #2 was rediscovered within the footprint of a proposed housing project and is threatened by proposed development, land clearing and grading, and vegetation succession (CNDDB 2024, CVRMA 2025). Occurrence #3 is threatened by agriculture, construction and maintenance of roads and trails, vegetation succession, and erosion (CNDDB 2024). Occurrence #1 is presumed extirpated since the habitat at the collection locality has been converted to housing and agriculture (CNDDB 2024, Google Earth 2024).

| CNDDB EO # | EO Rank | Threats |
|---|---|---|
| 1 | X - Possibly Extirpated | Development, Agriculture |

| | | |
|---|---|---|
| 2 | C – Fair. Presumed Extant | Development, Clearing/grading, vegetation succession |
| 3 | D – Poor. Presumed Extant | Agriculture, Non-native plant impacts, Road/trail construction/maintenance, Erosion/runoff |

**Table 5:** Element Occurrence Rank and Threat Information (CNDDB 2024)

# DEGREE AND IMMEDIACY OF THREAT

*Monardella sinuata* subsp. *gerryi* is extremely rare and is at serious risk of imminent extinction. The taxon has an extremely small range of less than 2 $km^2$ and a total population of fewer than 500 plants, approximately 95% of which occur at one site (occurrence #2) within the footprint of a proposed development project which has permits pending with the County of Ventura (CNDDB 2024, CVRMA 2025). A third occurrence based on a single herbarium specimen from 1976 is presumed extirpated by development (CNDDB 2024). Both extant occurrences are on privately owned land and are highly threatened by agricultural conversion, land clearing and grading, construction and maintenance of roads and trails, nonnative plants, vegetation succession, and erosion (CNDDB 2024). Potential habitat for new occurrences is extremely limited, fragmented, and restricted to private land. Since the time the taxon was rediscovered, the population at occurrence #3 has steadily declined, and some habitat has been converted to agriculture (Elvin et al. 2015, CNDDB 2024).

Even active protection and management of the extant occurrences of *Monardella sinuata* subsp. *gerryi* would not guarantee the long-term survival of the taxon. Plant taxa with small, fragmented populations are at greater risk of extinction from genetic, demographic, or environmental stochasticity (Shaffer 1981, Brito and Fernandez 2000). Fragmented populations may suffer from inbreeding depression and pollen limitation which may in turn lead to decreased germination rates, decreased genetic variability, and higher probability of extinction (Menges 1991, Newman and Pilson 1997, Aguilar et al. 2006, Ouborg et al. 2006). Plant taxa with small populations are also at higher risk of extinction from climate change (Loarie et al. 2008, Smith and Kay 2018). These risks are exacerbated for edaphic specialists such as *Monardella sinuata* subsp. *gerryi*, which may be unable to migrate to new sites as the climate changes (Loarie et al. 2008).

# MANAGEMENT

## IMPACT OF EXISTING MANAGEMENT EFFORTS

*Monardella sinuata* subsp. *gerryi* was added to the CNPS Rare Plant Inventory and CNDDB in 2015 (Sims and Bittman 2015, CNDDB 2024, CNPS 2024). It has a current conservation

status of CRPR 1B.1 G3T1 / S1 (CNDDB 2024, CNPS 2024, NatureServe 2024). It is not listed under either the federal or California Endangered Species Acts. No conservation management plans have been written, and no direct conservation actions have been taken to protect *Monardella sinuata* subsp. *gerryi*. Seed has been collected from at least one occurrence (CNDDB 2024, H. Schneider 2025 pers. comm.).

As a CRPR 1B taxon, *Monardella sinuata* subsp. *gerryi* is included on the CDFW Special Vascular Plants, Bryophytes, and Lichens list. Per the California Environmental Quality Act (CEQA), any project-level impacts to this taxon must be characterized and mitigation measures should be adopted to reduce impacts to less than significant. However, the consideration afforded by CEQA does not necessarily prevent projects from severely impacting or even extirpating populations of critically imperiled taxa. While CEQA requires that an analysis of impacts be presented to the public and decision makers, and that feasible mitigation measures be adopted, lead agencies routinely propose and approve mitigation measures that result in the degradation or loss of rare plant populations. In a worst-case scenario, a lead agency could adopt a statement of overriding considerations, even if impacts to a critically imperiled plant are significant and unavoidable but they wish to see a project proceed, nonetheless. Of particular concern is the potential for a lead agency to approve the use of compensatory mitigation in the form of transplantation, relocation or reintroduction in lieu of selecting an alternative that avoids impacts to a population, as allowed under CEQA. In nearly every case, impact avoidance, onsite conservation, and onsite management are preferrable to other mitigation measures. A review of mitigation-related transplantation, relocation, and reintroduction attempts (Fiedler 1991) showed that only 8% of these attempts were successful, and that only 33% of projects reviewed included specific success criteria. Another review (Fahselt 2007) offers multiple examples of recreated populations failing after multiple years of maintenance and monitoring. This occurred even when multiple receptor sites were used, as no receptor site will be identical to the original site and habitat and the soil microbiome for endangered species cannot be duplicated (Fahselt 2007). This review also found that the introduction of transplants can potentially damage the ecosystems and surrounding environments they are introduced into. CNPS has an extensive history of commenting on environmental documents prepared under CEQA, and our decades of experience on hundreds of projects leads us to conclude that mitigation required under CEQA is simply insufficient for some of our rarest plant taxa. Avoidance of special status species should be the standard given the evidence that transplantation, relocation, and new site creation are largely ineffective, and the fact that these unsubstantiated mitigation techniques have become widely accepted has led to the loss of countless populations and individuals of special-status plant taxa.

Should CDFW consider this petition to be sufficient and the Fish and Game Commission accepts the petition for consideration, *Monardella sinuata* subsp. *gerryi* would then be considered a candidate under CESA. Candidates under CESA are afforded the same protections provided to threatened or endangered species. The increased protection afforded by candidate status and subsequent potential listing of *Monardella sinuata* subsp. *gerryi* as a threatened or endangered species would give this taxon the best hope for survival given current and potential future threats. Specifically, the Fish and Game Code requires full mitigation of all impacts to CESA-listed taxa that can be considered "take". The measures a project must enact to ensure that impacts are fully mitigated are outlined in an Incidental Take Permit (ITP), which is completed following CEQA review. In general, an ITP must be adopted prior to any project proponent breaking ground; as a result, ITPs can be a very important requirement to ensure that CESA-listed taxa are conserved. Specifically, an ITP must ensure that take does not jeopardize the continued existence of a species (Fish & G. Code § 2081 (b); Cal. Code Regs., tit. 14, §§ 783.2-783.8). In the case of *Monardella sinuata* subsp. *gerryi*, where population size and area of occupancy are incredibly small, potential project-level impacts could lead to the extirpation of one or more occurrences which could result in extinction. The protections afforded by CESA are well aligned to ensure that *Monardella sinuata* subsp. *gerryi* does not go extinct.

Outside of potential impacts associated with projects reviewed under CEQA, *Monardella sinuata* subsp. *gerryi* may be impacted by other land management actions. For example, EO #3 occurs on private land where land use and management activities have led to degradation of habitat and are likely linked to a decline in population numbers. Unfortunately, these actions are not subject to discretionary approval by lead agencies or natural resource agencies, so even with the protection afforded by CESA, the habitat and populations of listed taxa may degrade over time. Taxa like *Monardella sinuata* subsp. *gerryi* need comprehensive management and conservation strategies which are sometimes only afforded to CESA-listed taxa. Collaboration and cooperation between private landowners and natural resource agencies is essential for the success of such conservation strategies.

## SUGGESTIONS FOR FUTURE MANAGEMENT

Currently there are no management efforts in place for *Monardella sinuata* subsp. *gerryi*. Below we provide some suggestions for potential future management actions.

- **Conservation of all occurrences**: The two known populations of *Monardella sinuata* subsp. *gerryi* occur on private land, where there are ongoing and immediate threats. Neither of these populations are being managed for the conservation of this taxon. Efforts should be made to protect both known populations and management actions should ensure their long-term survival. The destruction, removal, or

transplantation of *Monardella sinuata* subsp. *gerryi* plants and habitat should not be accepted as mitigation for any project that proposes to impact extant occurrences. Habitat buffers should be created around known occurrences to allow for natural vegetation and population dynamics and to increase the habitat and food plants of potential pollinators. Furthermore, suitable habitat corridors should also be created beyond buffers to allow natural vegetation and population dynamics and ecosystem processes to continue to occur.

- **Conservation seed banking**: Maternal-line seed collections should be made from both occurrences. This will ensure that sufficient propagules are available for emergency reintroduction efforts should one or more occurrences become extirpated, while also being available to augment existing occurrences as well as preventing them from further decline. Seeds stored in conservation seed banks may also be made available for scientific research that could be necessary to prepare for emergency reintroduction actions. The potential use of seeds in scientific research can also lead to a better understanding of the ecology and life history of this taxon, resulting in more informed management actions. Seeds collected may also be used for seed bulking, which can increase the number of seeds available for conservation actions.
- **Surveys of potential habitat**: Surveys should be conducted in all potentially suitable habitat to search for additional populations. Known occurrences should be surveyed annually at the proper time of year and landowners should be made aware of the presence of the taxon and its imperiled status.
- **Additional Scientific research**: Currently, we lack information on the basic biology and ecology of this taxon, which may be helpful in informing conservation and management actions. Specifically, we suggest the following studies:
    - Genomic studies
    - Pollination studies
    - Seedbank studies
    - Dispersal ecology
    - Population Viability Analysis
    - Substrate affinity studies
    - Microhabitat studies
- **Monitoring and maintenance**: Population trends at existing occurrences should be evaluated with annual monitoring. This will help to identify if/when management actions are required. Efforts should be made to ensure that existing occurrences are managed for their long-term persistence/expansion. This may include the management of invasive plant species, and/or the management of vegetation to ensure that the microhabitat characteristics required by *Monardella sinuata* subsp.

*gerryi* are maintained. Management actions should be informed by the scientific research outlined above.

- **Enhance existing/establish new populations**: Efforts should be made to determine if enhancing the populations at existing occurrences is feasible. This could, for example, take the form of management actions to alleviate competition followed by seeding from seeds bulked from conservation seedbank collections. Efforts should also be made to determine if suitable sites for the establishment of new populations within the range of this taxon are available. Scientific research on microhabitat requirements could inform if this measure is possible and help to inform site selection if it is.
- **Education**: The public should be educated about *Monardella sinuata* subsp. *gerryi* and why its conservation is important. People will not be able to stand up for the conservation of a species if they don't even know it exists.

# CONCLUSION

*Monardella sinuata* subsp. *gerryi* is at risk of imminent extinction. It is extremely rare throughout its very limited range where it is only known from two extant occurrences with a global distribution of less than two square kilometers (Elvin et al. 2015, CNDDB 2024). Its distinctive morphological characters and unpublished genetic results support its treatment as a full species (Drew 2024 pers. comm.). One occurrence has already been extirpated by development, and the two remaining extant occurrences are on private land and are threatened by development, agricultural conversion, land clearing and grading, maintenance and construction of roads or trails, nonnative plants, vegetation succession, and erosion (CNDDB 2024). While its former population size and range extent are unknown, the current population size is extremely small with a total estimated population of 360 to 420 plants distributed at two occurrences (CNDDB 2024). Since it was rediscovered in 2013, it has declined at the rediscovery site where no plants were seen in 2023 and only 21 plants were seen in 2024, leaving approximately 95% of the global population at one site where a planned development would impact all plants present (CNDDB 2024). Due to its fragmented small populations, *Monardella sinuata* subsp. *gerryi* is at increased risk of extinction from stochastic events, low genetic diversity, and climate change (Shaffer 1981, Newman and Pilson 1997, Aguilar et al. 2006, Ouborg et al. 2006, Loarie et al. 2008, Smith and Kay 2018). Potential habitat for new occurrences is extremely limited, fragmented, and restricted to private lands. Approximately 70% of the potentially suitable habitat has already been lost to agriculture and development.

Based on the available information presented in this petition, *Monardella sinuata* subsp. *gerryi* warrants listing as Endangered pursuant to the California Endangered Species Act (CESA).

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