

Acanthomintha ilicifolia
(San Diego Thornmint)

**5-Year Review:
Summary and Evaluation**



Photos by Jessie Vinje.

**U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California**

August 2022

5-YEAR REVIEW

Acanthomintha ilicifolia (San Diego thornmint)

GENERAL INFORMATION

Species: *Acanthomintha ilicifolia* (San Diego thornmint), a plant species

Date listed under the Endangered Species Act: October 13, 1998

Federal Register citation: USFWS 1998 (63 FR 54938)

Classification: Threatened

Recovery Plan: There is no recovery plan for this species.

Recovery Priority Number: 8

Critical Habitat Designation: August 26, 2008, (73 FR 50454; USFWS 2008a).

BACKGROUND

Under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq.*), the U.S. Fish and Wildlife Service (Service), referred to as “we” in this document, maintain lists of endangered and threatened wildlife and plant species (referred to as the List) in the Code of Federal Regulations (CFR) at 50 CFR 17.11 (for wildlife) and 17.12 (for plants). Section 4(c)(2)(A) of the Act requires us to review each listed species’ status at least once every 5 years.

Most recent status review: USFWS 2009. *Acanthomintha ilicifolia* (San Diego thornmint) 5-year review: summary and evaluation. Prepared by the Carlsbad Fish and Wildlife Office, Carlsbad, California. 39 pp.

We initiated the previous status review for *Acanthomintha ilicifolia* on March 5, 2008 (USFWS 2008b). The review was finalized on August 12, 2009 and recommended no change in status. This current review is based on the previous review.

Federal Register notice announcing this status review: On May 20, 2021, we published a Federal Register notice announcing initiation of the 5-year review of this species, and the opening of a 60-day comment period to receive information (USFWS 2021, pp. 27462–27464).

Species Overview and Habitat: *Acanthomintha ilicifolia* (San Diego thornmint) is an annual aromatic herb in the Lamiaceae (mint family). This plant ranges in height from 5 to 15 centimeters (2 to 6 inches) and has white, two-lipped, tubular flowers with lavender- or rose-colored markings on the lower lip (Jokerst 1993, p. 713). Up to four smooth and ovoid seeds may be produced by each flower, but each plant can produce between 70 and 200 seeds (DeWoody *et al.* 2018, p. 894). *Acanthomintha ilicifolia* occurs in openings within coastal sage scrub, chaparral, and native grassland (Beauchamp 1986, p. 175; Reiser 2001, pp. 3–5). Plants occur mainly on clay soils or clay lenses or on gabbro soils derived from igneous rock, and gray calcareous clay soils derived from soft calcareous sandstone (Oberbauer and Vanderwier 1991, pp. 208–209; CBI 2018, p. 3). This species is endemic to San Diego County, California, and northwestern Baja California, Mexico.

ASSESSMENT

Information acquired since the last status review

This 5-year review was conducted by the Service's Carlsbad Fish and Wildlife Office. Information for this review was solicited from the public and interested parties through a Federal Register notice announcing this review on May 20, 2021. We also contacted the San Diego Monitoring and Management Program (SDMMP), United States Geological Survey (USGS), and species experts to request any data or information we should consider in our review. Additionally, we conducted a literature search and reviewed information in our files.

SUMMARY OF NEW INFORMATION SINCE 2009

Biology

Genetics

Milano and Vandergast (2018, entire) sampled 350 individuals from 24 occurrences throughout the species range in the United States to assess the genetic diversity and structure of *Acanthomintha ilicifolia*. Population structure analysis found five genetic clusters of *A. ilicifolia* corresponding to geographic regions: a northern group, an eastern group, a southern group, a central-east group, and a central-west group (Milano and Vandergast 2018, p. 8). There was evidence of genetic differentiation across the region, with higher differentiation between more distant areas (Milano and Vandergast 2018, p. 8). Genetic diversity was particularly low in the northern and eastern parts of the range (Milano and Vandergast 2018, p. 42).

DeWoody *et al.* (2018, entire) sampled individuals from a subset of natural occurrences throughout the U.S. range of *Acanthomintha ilicifolia* to compare three measures of genetic diversity: (1) the amount and structure of selectively neutral genetic diversity, (2) differentiation in potentially adaptive traits, and (3) evidence of polyploidy within or among populations. Similar to the Milano and Vandergast (2018, p. 8) study, DeWoody *et al.* (2018, p. 901) found evidence of significant differentiation among populations, with differences increasing with distance, further indicating gene flow is restricted locally. Additionally, DeWoody *et al.* (2018, p. 905) found low proportions of cytogenetic variation within two sampled occurrences.

Pollination

Klein (2009, entire) conducted flower observations to determine potential pollinators of *Acanthomintha ilicifolia*. Overall, there were very few insect visitors to *A. ilicifolia* plants. Insect visitors observed from most to least common were Coleoptera (beetles, primarily from the Cleridae and Melyridae families); Hymenoptera (bees, primarily from the Apidae and Halictidae families); Diptera (flies, primarily from the Bombyliidae and Syrphidae families); and Lepidoptera (butterflies, primarily from the Hesperidae family) (Klein 2009, p. 27). The most effective pollinators of the recorded insect visitors observed were bees from the Apidae and Halictidae families (Klein 2009, p. 36). Klein also determined that the most effective pollinators were

6 millimeters (mm) [0.24 inches (in)] or smaller and it is unlikely that *A. ilicifolia* is pollinated by a specialist or specialists (2009, p. 36).

In another study, Marschalek and Deutschman (2016, entire) also conducted flower observations to determine potential pollinators of *Acanthomintha ilicifolia*. Similar to the study conducted by Klein, there were overall very few visitors to *A. ilicifolia* plants. Most insect visitors observed by Marschalek and Deutschman were Diptera (flies) and Hymenoptera (bees). Observed fly species were mostly *Exiliscelis californiensis* and Syrphidae (Marschalek and Deutschman 2016, p. 20). Bee observations were included Apidae, Halictidae, and Megachilidae (*Osmia*) in relatively equal proportions (Marschalek and Deutschman 2016, p. 20).

Soil Attributes

The Conservation Biology Institute (CBI), in association with the California Department of Fish and Wildlife (CDFW) and the SDMP, conducted a study to characterize the soil chemistry and other attributes that define suitable habitat for *Acanthomintha ilicifolia*. The study found that the clay soils that *A. ilicifolia* is restricted to must be particularly low in sand and metal content (CBI 2018, p. 7). While *A. ilicifolia* does occur on gabbroic soils, which tend to be metal-rich, these soils weather easily (Medeiros *et al.* 2015, pp. 76–77). CBI therefore concluded that it is the weathering properties, rather than the chemical content, that promotes the occurrence of *A. ilicifolia* on gabbroic clays (CBI 2018, p. 7). Overall, the soil variables influencing *A. ilicifolia* presence are: (1) clay presence (42–52 percent), (2) low sand content (25–35 percent), and (3) low metal content.

Occurrence Status

To update *Acanthomintha ilicifolia* occurrence¹ status, we reviewed Element Occurrence (EO) data from the California Natural Diversity Database (CNDDDB), monitoring data from the SDMP, herbaria records from the Consortium of California Herbaria (CCH2) and the San Diego Natural History Museum’s Flora of Baja California, and survey information from Baja California, Mexico.

To describe the location of *Acanthomintha ilicifolia* plants we reference the CNDDDB EO Number (“occurrence”). Following the CNDDDB definition of an EO, two occurrences are unique if the distance between their closest parts is less than or equal to 0.40 kilometers (km) [0.25 miles (mi)] without regard to whether individuals interbreed (CNDDDB 2020, p. 10). This is consistent with terminology used by the Service in previous documents and provides clarity in referencing plant locations that may be referred to by multiple or changing names.

For this review, we considered an occurrence extant if *Acanthomintha ilicifolia* was observed within the last 10 years. If the species had not been observed for over 10 years but suitable

¹ The California Natural Diversity Database (CNDDDB) is an inventory of the status and locations of rare plants and animals in California. The CNDDDB assigns “Element Occurrence” numbers to unique locations of rare taxa. In this document, we use the term “occurrence” to refer to EOs delineated by the CNDDDB, or locations not in the CNDDDB that are greater than 0.40 kilometers (0.25 miles) apart.

habitat is present, we considered it presumed extant. If *A. ilicifolia* had not been observed for over 20 years, or the habitat is degraded or partially developed, we considered the occurrence possibly extirpated. Lastly, we considered the occurrence extirpated if suitable habitat is no longer present.

Changes to occurrence status in San Diego County, United States

Since 2009, we have new survey information from 2014 to 2019 SDMMP annual monitoring on Management Strategic Planning Area (MSPA) lands and survey reports from our GIS database.

Based on new information we have updated the *Acanthomintha ilicifolia* occurrence table and added additional occurrences that were not considered in the 2009 5-year review ([Table 2](#)).

Changes to occurrence status between 2009 and 2022 are:

1. The occurrence listed as “Bonita Meadows” without an assigned EO number in the 2009 occurrence table is now part of CNDDDB EO 10. We considered it extirpated in 2009 and we now consider it extant because the species was observed during SDMMP Rare Plant Monitoring surveys in 2016 and 2017 (CBI and AECOM 2021, p. 60).
2. CNDDDB EO 11 was considered extirpated in 2009 and we now consider is possibly extirpated because habitat is still present that could support the species.
3. Five EOs (CNDDDB EO 17, 26, 34, 57, and 69) we considered presumed extant in 2009 are now considered possibly extirpated because the species has not been observed in over 20 years.
4. Four EOs (CNDDDB EO 31, 45, 59, and 64) we considered presumed extant in 2009 are now considered extant because the species has been observed within the past 10 years.
5. CNDDDB EO 42 was considered extant in 2009 and is now considered extirpated due to development.
6. Former CNDDDB EO 48 is now part of CNDDDB EO 47. There is no change is occurrence status.
7. Four EOs (CNDDDB EO 56, 74, 78, and 80) considered extant in the 2009 occurrence table are now considered presumed extant because the species has not been observed but suitable habitat is still present.
8. Four occurrences listed without an assigned CNDDDB EO number in the 2009 occurrence table have been assigned CNDDDB EO numbers and have no change in occurrence status:
 - a. The occurrence listed as “Viejas Hills” is now part of CNDDDB EO 5.
 - b. The occurrence listed as “Hollenbeck Wildlife Area” is now CNDDDB EO 86.

- c. The occurrence listed as “Cal Terraces” is now CNDDDB EO 96.
 - d. The occurrence listed as “Taylor” is now CNDDDB EO 97.
 - e. The occurrence listed as “Denney Canyon” is now CNDDDB EO 95.
9. Five occurrences listed without an assigned CNDDDB EO number in the 2009 occurrence table have been assigned CNDDDB EO numbers and have a change in occurrence status:
- a. The occurrence listed as “Rancho Jamul Ecological Reserve” is now CNDDDB EO 85. We considered it extant in 2009 and now consider it presumed extant because the species has not been observed in over 10 years, but habitat is still present.
 - b. The occurrence listed as “Hobbes Property” is now CNDDDB EO 92. We considered it extant in 2009 and now consider it presumed extant because the species has not been observed in over 10 years, but habitat is still present.
 - c. The occurrence listed as “Palisades Estates” is now CNDDDB EO 93. We considered it extant in 2009 and now consider it presumed extant because the species has not been observed in over 10 years, but habitat is still present.
 - d. The occurrence listed as “Calavera Hills” is now CNDDDB EO 94. We considered it extant in 2009 and now consider it presumed extant because the species has not been observed in over 10 years, but habitat is still present.
 - e. The occurrence listed as “Otay Lakes (south side)” is now CNDDDB EO 84. We considered it extant in 2009 and now consider it possibly extirpated due to fire.
10. Nine occurrences (CNDDDB EO 83, 87, 88, 89, 90, 91, 98, 99, 100) are new since our last 5-year review. Seven EOs (83, 87, 89, 90, 98, 99, and 100) are considered extant and two EOs (88 and 91) are considered possibly extirpated.

In total, there are 36 extant occurrences of *Acanthomintha ilicifolia* in San Diego County. Additionally, there are 16 presumed extant, 9 possibly extirpated, and 23 extirpated occurrences ([Table 1](#)).

Changes to occurrence status in Baja California, Mexico

Since 2009, we have also received new information about *Acanthomintha ilicifolia* in Baja California, Mexico. At the time of the last 5-year review, we had records for 13 historical occurrences in Baja California (USFWS 2009, p. 5). Based on historical records² and survey

² Historical record locations are not precise.

reports, we now have records for 25 occurrences; 12 are extant, 9 are presumed extant, 1 is possibly extirpated, and 3 are extirpated ([Figure 2](#)).

Table 1. Summary of *Acanthomintha ilicifolia* occurrence status change in the United States and Mexico between 2009 and 2022.

Occurrence status	Number of occurrences in 2009 United States	Number of occurrences in 2009 Mexico	Number of occurrences in 2022 United States	Number of occurrences in 2022 Mexico
Extant	37		36	12
Presumed extant	18	13	15	9
Possibly extirpated	0		10	1
Extirpated	25		23	3
Total number of occurrences	80	13	84	25

Summary

In summary, monitoring for *Acanthomintha ilicifolia* has occurred at 61 occurrences throughout its range since 2009 ([Table 2](#)), providing new information about the species presence and abundance. For San Diego County occurrences, we reassessed our 2009 occurrence status determinations and updated the status of 22 occurrences based on monitoring data, the date since the last survey, and information in the CNDDDB. One occurrence was removed (EO 48) because it is now part of another EO. Nine occurrences were listed in the 2009 occurrence table without assigned EO numbers and now have assigned CNDDDB EO numbers; four had no change in status, and five had a change in status. Additionally, we added occurrence information for nine occurrences that were reported since the previous 5-year review. For Baja California, Mexico occurrences, we have updated the information of 16 occurrences based on new survey information.

Based on those updates, there are now 84 occurrences of *Acanthomintha ilicifolia* in San Diego County and 25 occurrences in Baja California, Mexico ([Figure 1](#); [Figure 2](#); [Table 2](#)). In total 48 occurrences are extant, 25 are presumed extant, 10 are possibly extirpated, and 26 are extirpated.

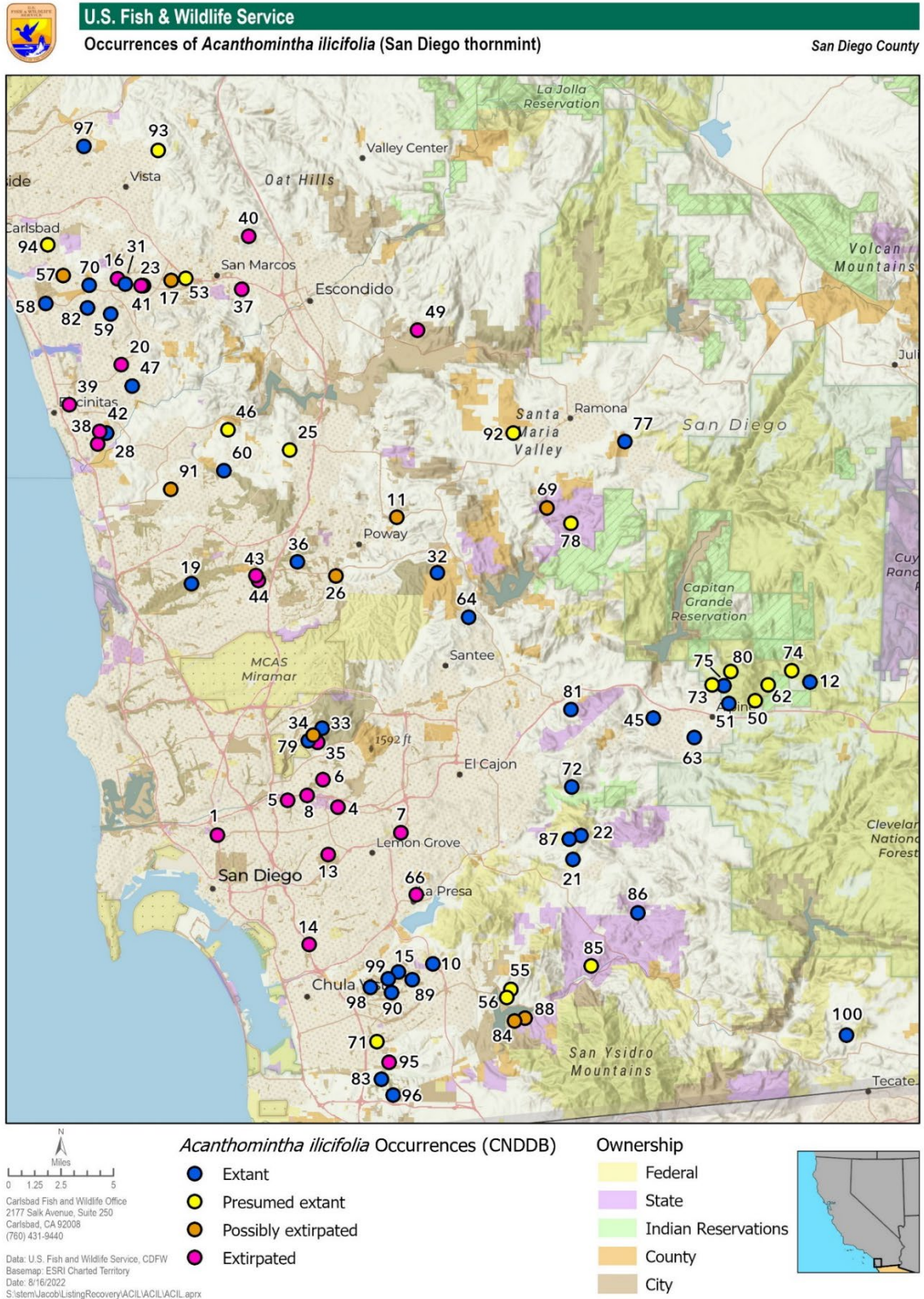


Figure 1. Distribution of *Acanthomintha ilicifolia* in San Diego County showing occurrence status, CNDDDB EO number, and land ownership.



Figure 2. Distribution of *Acanthomintha ilicifolia* in Baja California, Mexico showing occurrence status and location name.

Table 2. Occurrence status for *Acanthomintha ilicifolia*, including summary changes between 2009 and 2022. The occurrences are generally listed from north to south.

General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Oceanside	Taylor	97	N/A	Extant	Extant	San Diego Habitats Conservancy	Unknown (2021)	This occurrence was included in the 2009 5-year review occurrence table as “Taylor” without an EO number. There is no change in occurrence status. Urbanization, non-motorized recreation, and nonnative plants are threats at this occurrence.	CDFW 2022, p. 110
Carlsbad	Carlsbad Racetrack (south)	16	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 16
Carlsbad	La Costa Avenue and Rancho Santa Fe Road	20	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 20
Carlsbad	Carlsbad Racetrack (north)	31	ACIL_6CARA034	Presumed Extant	Extant	San Diego Habitats Conservancy	26 (2010) 3 (2017) 9 (2018) 5 (2019) 15 (2020)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. It was considered presumed extant in 2009 and we now consider it extant. Competitive native plants, nonnative plants, urbanization, and non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 31–32
Carlsbad	Southeast Carlsbad (west)	47 (includes former EO 48)	ACIL_6CARL036	Extant	Extant	Private Conserved	700 (2010) seen (2021)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Former EO 48 is now part of this occurrence. There is no change in occurrence status. Urbanization, non-motorized recreation, and nonnative plants are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 51–52

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Carlsbad	Letterbox Canyon (Spyglass)	57	N/A	Presumed Extant	Possibly Extirpated	Private		This occurrence was considered presumed extant in the 2009 occurrence table. We now consider it possibly extirpated because the species has not been observed in over 20 years and habitat is developed and partially degraded. Development and nonnative plants are threats at this occurrence.	CDFW 2022, p. 61
Carlsbad	Emerald Pointe	58	ACIL_6EMPO037	Extant	Extant	SDHC	93 (2010) 22 (2015) 39 (2016) 17 (2017) 22 (2018) 40 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Development, nonnative plants, competitive native plants, and non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 62–63
Carlsbad	El Fuerte Street (Rancho Carrillo)	59	ACIL_6RACA044	Presumed Extant	Extant	Private Conserved	10 (2010) 23 (2017) 3 (2018) 5 (2019) seen (2021)	This occurrence was presumed extant in the 2009 occurrence table. We now consider is extant because the species was observed in 2021. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Nonnative plants and urbanization are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 64

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Carlsbad	Palomar Airport Road	70	ACIL_6PARO043	Extant	Extant	County of San Diego PWD	11,300 (2010) 327 (2014) 420 (2015) 15,586 (2016) 36,533 (2017) 1,919 (2018) 6,693 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, nonnative plants, non-motorized recreation, herbivory, erosion, and drought are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 73–74
Carlsbad	La Costa Greens	82	ACIL_6LCGR038	Extant	Extant	CNLM	520 (2010) 652 (2014) 378 (2015) 237 (2016) 966 (2017) 278 (2018) 1,396 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Nonnative plants and non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 89–90
Carlsbad	Calavera Hills	94	ACIL_6CAHI033	Extant	Presumed Extant	Calavera Hills HOA	2 (2010) 0 (2011) 0 (2012)	This occurrence was included in the 2009 5-year review occurrence table as "Calavera Hills" without an EO number. We considered it extant at that time and we now consider it presumed extant. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Non-motorized recreation and nonnative plants are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 107

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General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
San Marcos	Upham	17	N/A	Presumed Extant	Possibly Extirpated	Private		This occurrence was considered presumed extant in the 2009 occurrence table. We now consider it possibly extirpated due to development and habitat degradation.	CDFW 2022, p. 17
San Marcos	Las Brisas	23	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 25
San Marcos	Indian Hill	37	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 41
San Marcos	Twin Oaks (s, EO 49)	40 (includes former EO 61)	N/A	Extirpated	Extirpated	Private		Former EO 61 is now included in this occurrence. There is no change in occurrence status. Surrounding development and nonnatives are threats at this occurrence.	CDFW 2022, p. 44
San Marcos	Las Brisas transplant site (t, EO 23)	41	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 45
San Marcos	Linda Vista and Bent Avenue	53	N/A	Presumed Extant	Presumed Extant	Private		No change.	CDFW 2022, p. 58
San Marcos	West of south fork of Gopher Canyon/Palisades Estates	93	N/A	Extant	Presumed Extant	Private		This occurrence was included in the 2009 5-year review occurrence table as “Palisades Estates” without an EO number. We considered it extant at that time and we now consider it presumed extant. Urbanization and a proposed development threaten this occurrence.	CDFW 2022, p. 106
Escondido	San Diego Wild Animal Park (t, EO 40)	49	N/A	Extirpated	Extirpated	City of San Diego		No change	CDFW 2022, p. 53

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Encinitas	Lux Canyon (east), Manchester Avenue Mitigation Bank (sp, EO 38, 39, 42)	28	ACIL_6MAMI041	Extant	Extant	CNLM	3591 (2010) 5329 (2011) 236 (2014) 1086 (2015) 318 (2016) 4722 (2017) 80 (2018) 2506 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, dumping, erosion, nonnative plants, and motorized and non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 29–30
Encinitas	Lux Canyon (west) (t, EO 28)	38	ACIL_6LUCA040	Extirpated	Extirpated	Private	0 (2017)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Extirpated due to development.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 42
Encinitas	Quail Botanical Garden (t, EO 28)	39	N/A	Extirpated	Extirpated	County of San Diego		No change	CDFW 2022, p. 43
Encinitas	Manchester Avenue Mitigation Bank (t, EO 28)	42	ACIL_6LUCA042	Extant	Extirpated	Private	0 (2017)	This occurrence was listed as extant in the 2009 occurrence table. We now consider this occurrence extirpated due to development and mowing. This occurrence is now included in the SDMMP Rare plant monitoring and management plan.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 46

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Ramona	Monte Vista (Daney Canyon)	69	ACIL_4CSVI019	Presumed Extant	Possibly Extirpated	CDFW	0 (2010) 0 (2016) 0 (2018)	This occurrence was presumed extant in the 2009 occurrence table. We now consider it possibly extirpated because the species has not been observed in over 20 years despite surveys. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Grazing, fire, and nonnative plants are threats at this occurrence. Habitat does not appear to support species.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 72
Ramona	1 mile NW of Bassett Ranch	77	ACIL_4SIPR026	Extant	Extant	County of San Diego DPR	956 (2016) 6,000 (2017) 1,600 (2018) 2,420 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, nonnative plants, erosion, and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 82–83
Ramona	Monte Vista (Long's Gulch)	78	ACIL_4CSVI020	Extant	Presumed Extant	CDFW	0 (2010) 0 (2016) 0 (2017) 0 (2018)	This occurrence was considered extant in the 2009 occurrence table. We now consider it presumed extant because the species has not been observed in over 10 years, but suitable habitat is present. Fire, nonnative plants, brush management, and historic grazing are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 84

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Ramona	Ramona Grasslands Hobbes Property	92	ACIL_5RAGR031	Extant	Presumed Extant	Ramona Municipal Water District	58 (2010) 0 (2016) 0 (2017) 0 (2018)	This occurrence was included in the 2009 5-year review occurrence table as "Hobbes Property" without an EO number. We considered it extant at that time and we now consider it presumed extant. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Grazing, nonnative plants, and fire are threats at this location.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 105
Poway	Poway Grade	11	ACIL_4POGR023	Extirpated	Possibly Extirpated	Private	0 (2018)	This occurrence was listed as extirpated in the 2009 occurrence table. We now consider it possibly extirpated because habitat is present, but species has not been seen in over 20 years despite surveys. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Development and road building are threats at this occurrence.	CBI and AECOM pp. 60–63, 75–80; CDFW 2022, p. 9
Poway	Saber Springs (east)	26	ACIL_4SASP024	Presumed Extant	Possibly Extirpated	City of Poway	0 (2016) 0 (2018)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. This occurrence was considered presumed extant in the 2009 occurrence table. We now consider it possibly extirpated because the species has not been seen in over 20 years. Urbanization and nonnative plants are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 28

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Poway	Sycamore Canyon	32	ACIL_4SYCA027	Extant	Extant	County of San Diego, City of San Diego	32160 (2010) 17,550 (2016) 777,300 (2017) 5,525 (2018) 27,200 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Nonnative plants, non-motorized recreation, erosion, and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 33–34
Poway	Sabre Springs (west)	36	ACIL_4SASP025	Extant	Extant	City of San Diego	1,200 (2010) 5 (2014) 20 (2015) 11 (2016) 85 (2017) 0 (2018) 0 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Brush management, nonnative plants, non-motorized recreation, and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 39–40
Poway	Asphalt Inc. (Slaughterhouse Canyon)	64	ACIL_4SLCA047	Presumed Extant	Extant	Private Conserved	30,000 (2017) 4,388 (2018)	This occurrence was presumed extant in the 2009 occurrence table. We now consider it extant because the species was observed in 2018. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Urbanization and non-native plants are threats at this occurrence.	CDFW 2022, p. 70
Black Mountain	Thornmint Court	25 (includes former EO 18)	N/A	Presumed Extant	Presumed Extant	Private		No change.	CDFW 2022, pp. 26–27

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Black Mountain	Rancho Santa Fe	46	ACIL_6RSFE045	Presumed Extant	Presumed Extant	Private Conserved		This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, nonnative plants, and mowing are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 50
Black Mountain	Black Mountain	60	ACIL_6BLMO032	Extant	Extant	City of San Diego	56 (2010) 0 (2014) 10 (2015) 5 (2016) 1 (2017) 0 (2018) 0 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, brush management, nonnative plants, motorized and non-motorized recreation, and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 65–66
North San Diego	University Heights	1 (includes former EO 2 and 3)	N/A	Extirpated	Extirpated	Private, City, State	No estimate	No change	CDFW 2022, p. 1
North San Diego	0.5 miles east of SDSU	4	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 2
North San Diego	2 mi. west of SDSU	5	N/A	Extirpated	Extirpated	Private, City, State		No change	CDFW 2022, p. 3
North San Diego	1 mi. north of SDSU	6	N/A	Extirpated	Extirpated	Private, City		No change	CDFW 2022, p. 4
North San Diego	Alvarado Canyon	8	N/A	Extirpated	Extirpated	Private, City, State		No change	CDFW 2022 p. 6

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
North San Diego	Los Peñasquitos Canyon	19	ACIL_6LPCA039	Extant	Extant	City of San Diego	510 (2010) 100 (2014) 57 (2015) 38 (2016) 91 (2017) 241 (2018) 1072 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, brush management, nonnative plants, non-motorized recreation, and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 18–19
North San Diego	Mission Trails Park	33	ACIL_4MTRP021	Extant	Extant	City of San Diego	618 (2010) 598 (2012) 21 (2014) 510 (2015) 105 (2016) 360 (2017) 77 (2018) 300 (2019) seen (2021)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Development, nonnative plants, motorized and non-motorized recreation, fire, trash, drought, and vegetation clearing are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 35–36
North San Diego	Near Mission Trails Park	34	ACIL_2EDHI002	Presumed Extant	Possibly Extirpated	City of San Diego	0 (2010) 0 (2016)	This occurrence was considered presumed extant in the 2009 occurrence table. We now consider it possibly extirpated because the species has not been observed for over 20 years despite surveys. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Urbanization, fire, non-motorized recreation, and nonnative plants are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 37

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
North San Diego	SW Tierra Santa parcel, NW of mouth of Mission Gorge	35	ACIL_4MTRP022	Extirpated	Extirpated	City of San Diego	0 (2010) 0 (2016)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Habitat destroyed by mowing.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 38
North San Diego	Black Mountain Road (t, EO 44)	43	N/A	Extirpated	Extirpated	City of San Diego		No change	CDFW 2022, p. 47
North San Diego	Black Mountain Road (s, EO 43)	44	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 48
North San Diego	Near Mission Gorge	79	ACIL_2EDHI001	Extant	Extant	City of San Diego	50 (2016)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, nonnative plants, and power lines are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 85
North San Diego	San Dieguito Valley, between San Dieguito Road and Saratoga Corte	91	N/A	Unknown	Possibly Extirpated	Private		This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence to be possibly extirpated because the species has not been observed in over 20 years and the area has been developed.	CDFW 2022, p. 104

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
El Cajon	Suncrest	72	ACIL_3SOCR016	Extant	Extant	Endangered Habitats Conservancy	0 (2011) 1,135 (2012) 64 (2014) 474 (2015) 352 (2016) 620 (2017) 1,375 (2018) 5,240 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, fire, motorized recreation, nonnative plants, competitive native plants, and herbivory are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 76–77
El Cajon	Crestridge Ecological Reserve	81	ACIL_3CERE004	Extant	Extant	CalTrans	17 (2010) 1 (2011) 0 (2014) 0 (2015) 0 (2016) 1 (2018)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Fire, nonnative plants, trails, and brush management are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 87–88
Alpine	Poser Mountain (south slope)	12	ACIL_4POMT049	Extant	Extant	USFS	900 (2010) 7 (2017) 1 (2018) 4971 (2019) 1000s (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Nonnative plants, development, powerlines, fire and trampling are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 10–11
Alpine	Sky Mesa Ranch	45	N/A	Presumed Extant	Extant	Private	1,000 (2017)	This occurrence was presumed extant in the 2009 occurrence table. We now consider is extant because the species was observed in 2017. Urbanization and nonnative plants are threats at this occurrence.	CDFW 2022, p. 49

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General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Alpine	Viejas Mountain (lower slope and plateau)	50	N/A	Presumed Extant	Presumed Extant	USFS		No change.	CDFW 2022, pp. 54–55
Alpine	Viejas Mountain (southwest slope)	51 (includes former EOs 52 and 76)	ACIL_4VIMT0029	Extant	Extant	USFS, Private	21,000 (2010) 2,245 (2017) 859 (2018) 6,491 (2019)	The occurrence listed as "Viejas Hills" in the 2009 occurrence table is now part of EO 51. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, motorized and non-motorized recreation, nonnative plants, and fire are threats at this occurrence.	CDFW 2022, pp. 56–57
Alpine	Viejas Mountain (eastern slope)	62	N/A	Presumed Extant	Presumed Extant	USFS, Reservation		No change	CDFW 2022, p. 67
Alpine	Wright's Field (north)	63 (includes former EOs 67 and 68)	ACIL_3WRFI018	Extant	Extant	Back Country Land Trust, Private	136 (2010) 250 (2016) 2,750 (2017) 2,150 (2018) 3,000 (2019) 1,000 (2020) seen (2021)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Former EO 67 is now included in this occurrence. There is no change in occurrence status. Motorized and non-motorized recreation, urbanization, nonnative plants, and erosion are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 68–69
Alpine	East of Murphy Ranch	73	N/A	Presumed Extant	Presumed Extant			No change	CDFW 2022, p. 78

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General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Alpine	Poser Mountain (southwest flank)	74	ACIL_4POMT048	Extant	Presumed Extant	USFS	65 (2010)	This occurrence was extant in the 2009 occurrence table. We now consider it presumed extant because the species has not been observed at the site for over 10 years, but suitable habitat is present. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Nonnative plants and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 79
Alpine	Viejas Mountain (west-southwest flank)	75	ACIL_4VIMT0030	Extant	Extant	USFS	1,638 (2010) 113 (2016) 233 (2017) 80 (2018) 401 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Motorized and non-motorized recreation, nonnative plants, fire, herbicides, land clearing, roads, and altered hydrology are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 80–81
Alpine	Viejas Mountain (summit)	80	ACIL_4VIMT0028	Extant	Presumed Extant	USFS	44 (2010) 0 (2016) 0 (2017) 0 (2018)	This occurrence was considered extant in the 2009 5-year review occurrence table. We now consider it presumed extant because the species has not been observed at the site for over 10 years, but suitable habitat is present. Nonnative plants and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 86

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Jamul	McGinty Mountain (southwest slope)	21 (includes former EO 29)	ACIL_3MGMT00 ACIL_3MGMT051	Extant	Extant	TNC, Private	558 (2010) 276 (2016) 700 (2017) 178 (2018) 262 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Erosion, nonnative plants, and non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022 pp. 21–22
Jamul	McGinty Mountain (summit and ridgeline)	22	ACIL_3MGMT009 ACIL_3MGMT010	Extant	Extant	TNC, USFWS	2559 (2010) 866 (2015) 172 (2016) 230 (2017) 505 (2018) 986 (2019) seen (2021,2022)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Historical agriculture and grazing, development, nonnative plants, erosion, herbivory, and motorized and non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 23–24
Jamul	Rancho Jamul Ecological Reserve	85	ACIL_3RJER015	Extant	Presumed Extant	CDFW	125 (2010) 0 (2016) 0 (2017) 0 (2018)	This occurrence was included in the 2009 5-year review occurrence table as "Rancho Jamul Ecological Reserve" without an EO number. We considered it extant at that time and we now consider it presumed extant. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Nonnative plants, fire, non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp 60–63, 75–80; CDFW 2022, p. 95

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General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Jamul	Hollenbeck Wildlife Area	86	ACIL_3HCWA006	Extant	Extant	CDFW	5,000 (2010) 4 (2014) 338 (2015) 192 (2016) 803 (2017) 1,722 (2018) 2,700 (2019)	This occurrence was included in the 2009 5-year review occurrence table as "Hollenbeck Wildlife Area" without an EO number. There is no change in occurrence status. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Nonnative plants, non-motorized and motorized recreation, fire, brush management, and competitive native plants are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 96–97
South San Diego	Spring Valley	7	N/A	Extirpated	Extirpated	Private, City, State		No change	CDFW 2022, p. 5
South San Diego	Proctor Valley Road	10	ACIL_3BOME003	Extirpated	Extant	CalTrans, Private	300 (2016) 1200 (2017) 0 (2018) 2250 (2019)	This occurrence was listed as extirpated under the name "Bonita Meadows" in the 2009 occurrence table without an assigned EO number. We now consider it extant due to the observation of ACIL in 2016 and 2017. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Development, nonnative plants, and motorized and non-motorized recreation are major threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 7–8
South San Diego	Chollas Mesa	13	N/A	Extirpated	Extirpated	City of San Diego		No change	CDFW 2022, p. 12
South San Diego	Paradise Valley	14	N/A	Extirpated	Extirpated	Private, City, State		No change	CDFW 2022, p. 13

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
South San Diego	Bonita Wheeler Ridge	15	ACIL_3WHRI017	Extant	Extant	City of Chula Vista	37 (2013) 81 (2015) 358 (2016) 965 (2017) 6 (2018) 2300 (2019)	This occurrence is now included in the SDMMP Rare plant monitoring and management plan. There is no change in occurrence status. Urbanization, nonnative plants and non-motorized recreation are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 14–15
South San Diego	Otay Lakes (northeast side)	55	N/A	Presumed Extant	Presumed Extant	Private		No change.	CDFW 2022, p. 59
South San Diego	Otay Lakes (northeast side)	56	N/A	Extant	Presumed Extant	Private		This occurrence was considered extant in the 2009 occurrence table. We know consider it presumed extant because the species has not been observed in over 20 years, but suitable habitat is present. Development, grazing, non-motorized recreation, fire, and nonnative plants are threats at this occurrence.	CDFW 2022, p. 60
South San Diego	Sweetwater Reservoir (north side)	66 (includes former EO 9)	N/A	Extirpated	Extirpated	Private		No change	CDFW 2022, p. 71

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
South San Diego	Poggi Canyon	71	ACIL_3PMA3014	Presumed Extant	Presumed Extant	City of Chula Vista	0 (2016) 0 (2018)	The species has not been observed at his occurrence in over 20 years despite surveys; however, we still consider it presumed extant because habitat is still present. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Urbanization, motorized and non-motorized recreation, and nonnative plants are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 75
South San Diego	Dennery Ranch East	83	ACIL_3DREA005	Unknown	Extant	City of San Diego	267 (2010) 0 (2014) 150 (2015) 16 (2016) 24 (2017) 0 (2018) 178 (2019)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence to be extant. This occurrence is included in the SDMMP Rare plant monitoring and management plan. Nonnative plants, herbivory, and brush management are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 91–92
South San Diego	Otay Lakes (south side)	84	ACIL_3OTLA012	Extant	Possibly Extirpated	City of San Diego	0 (2014) 0 (2015) 0 (2016) 0 (2017) 0 (2018) 0 (2019)	This occurrence was included in the 2009 5-year review occurrence table as "Otay Lakes (south side)" without an EO number. We considered it extant at that time and we now consider it possibly extirpated. This occurrence is now included in the SDMMP Rare plant monitoring and management plan. Grazing, trampling, fire, and nonnative plants are threat at this occurrence. Occurrence potentially extirpated from the 2003 fire.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 93–94

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General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
San Diego National Wildlife Refuge	McGinty Mountain	87	ACIL_3MGMT008	Unknown	Extant	USFWS	6,500 (2011) 400 (2012) 136 (2014) 15 (2016) 100 (2017) 5 (2018) 140 (2019)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence to be extant. This occurrence is included in the SDMMP Rare plant monitoring and management plan. Nonnative plants, non-motorized recreation, erosion, and drought are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp. 98–99
South San Diego	Lower Otay Reservoir	88	ACIL_3OTLA011	Unknown	Possibly Extirpated	CDFW	0 (2016) 0 (2017) 0 (2018)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence to be possibly extirpated. This occurrence is included in the SDMMP Rare plant monitoring and management plan. Nonnative plants, dumping, recreation, and fire are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 100
South San Diego	Long Canyon (Preserve Management Area 4-2b)	89	ACIL_3LONC007	Unknown	Extant	City of Chula Vista	67 (2016) 200 (2017) 180 (2018) 611 (2019) seen (2021)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence to be extant. This occurrence is included in the SDMMP Rare plant monitoring and management plan. Nonnative plants and trampling are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, p. 101

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
South San Diego	Rice Canyon (Preserve Management Area 1)	90	ACIL_3PMA1013	Unknown	Extant	City of Chula Vista	8,542 (2011) 32,200 (2012) 12,568 (2013) 168 (2014) 6,240 (2015) 2,408 (2016) 10,019 (2017) 341 (2018) 3,073 (2019)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence to be extant. This occurrence is included in the SDMMP Rare plant monitoring and management plan. Nonnative plants, non-motorized recreation, and erosion are threats at this occurrence.	CBI and AECOM 2021, pp. 60–63, 75–80; CDFW 2022, pp 102–103
South San Diego	Dennery Canyon (s, Cal Terraces)	95	N/A	Extirpated	Extirpated	Private		This occurrence was included in the 2009 5-year review occurrence table as "Dennery Canyon" without an EO number. There is no change in occurrence status.	CDFW 2022, p. 108
South San Diego	Cal Terraces (t, Dennery Canyon)	96	N/A	Extant	Extant	CalTrans	Unknown (2019)	This occurrence was included in the 2009 5-year review occurrence table as "Cal Terraces" without an EO number. There is no change in occurrence status. Urbanization and nonnative plants are threats at this occurrence.	CDFW 2022, p. 109
South San Diego	North of Terra Nova Drive and Rancho Del Rey Parkway junction	98	N/A	Unknown	Extant	City of Chula Vista	476 (2012) 322 (2013) 15 (2014)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence extant.	CDFW 2022, p. 111

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
South San Diego	South side of Otay Lakes Road, north end of Abeto Drive	99	N/A	Unknown	Extant	City of Chula Vista	140 (2012) 350 (2013) 32 (2014)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence extant.	CDFW 2022, p. 112
Potrero	0.65-mile SW of Potrero Peak	100	N/A	Unknown	Extant	Unknown	Unknown (2021)	This occurrence was not included in the 2009 5-year review occurrence table. We consider this occurrence extant.	CDFW 2022, p. 113
NW Baja California, Mexico	Mesa on top of lava hill 20 miles south of Tijuana, near Rancho Cuevas; Rosarito	N/A	N/A		Extirpated	Unknown		This occurrence information is based on historical herbaria records. Location is not exact. Extirpated due to toll booth per Campos <i>et al.</i> 2019.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset
NW Baja California, Mexico	Corredor Tijuana Rosarito 2000 (west)	N/A	N/A		Extant	Private	200 (2019)	New occurrence observed in 2019. Nonnatives threaten.	Vanderplank 2022, pers. comm.
NW Baja California, Mexico	Corredor Tijuana Rosarito 2000 (east)	N/A	N/A		Extant	Private	50 (2019)	New occurrence observed in 2019. Urbanization threatens.	Vanderplank 2022, pers. comm.
NW Baja California, Mexico	1km north northeast of Rancho el Coyote; Tijuas	N/A	N/A		Extirpated	Unknown		Historical occurrence visited in 2019, extirpated per Campos <i>et al.</i> 2019. Development threatens.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset
NW Baja California, Mexico	Rancho Caspian MTB Trails	N/A	N/A		Extant	Unknown	500 (2019)	New occurrence observed in 2019. Area proposed for development	Vanderplank 2022, pers. comm.

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General Location	Location Description ¹	2022 CNDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
NW Baja California, Mexico	Valle de las Palmas, uplands surrounding Moran Vernal Pools. Above La Esperanza; VDLP; Valle de las Palmas	N/A	N/A		Extant	Unknown	500–5000 (2019)	Observed and collected in 2019 (Valle de las Palmas location in Campos et al 2019; Vanderplank 2022, <i>in litt.</i>). This occurrence is threatened by agricultural and a proposed housing development.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset; Vanderplank 2022, pers. comm.
NW Baja California, Mexico	South of Valle de Las Palmas, at km 39 of Mex. Rte. 3 between Tecate and Ensenada	N/A	N/A		Presumed Extant	Unknown		Historical occurrence based on herbaria records. Location may not exact.	Baja Flora 2022, dataset
NW Baja California, Mexico	4 miles southeast of Cerro Coronel	N/A	N/A		Presumed Extant	Unknown		Historical occurrence based on herbaria records. Location may not exact.	Baja Flora 2022, dataset
NW Baja California, Mexico	San Jose del la Zorra	N/A	N/A		Extant	Unknown	5000 (2019)	New occurrence observed in 2019. Agricultural activities threaten.	Campos <i>et al.</i> 2019, pp. 19–21; Vanderplank 2022, pers. comm.
NW Baja California, Mexico	Ranch 29 miles southwest of Tijuana	N/A	N/A		Presumed Extant	Unknown		Historical occurrence based on herbaria records. Location may not exact.	Baja Flora 2022, dataset
NW Baja California, Mexico	North side of Ensenada - El Sauzal	N/A	N/A		Extant	Private	200 (2019)	New occurrence observed in 2019. Inside private development Cibolas del Mar.	Vanderplank 2022, pers. comm.

2022 5-year review for *Acanthomintha ilicifolia* (San Diego thornmint)

General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Ensenada Municipality, Baja California, Mexico	Ridge northeast of San Miguel. In cracked mud of dried-up vernal pools; Ensenada	N/A	N/A		Possibly Extirpated	Unknown		Historical occurrence based on herbaria records. Visited in 2019, no plants were found at coordinates.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset
Ensenada Municipality, Baja California, Mexico	4km east southeast of Eréndira; Ejido Eréndira	N/A	N/A		Extirpated	Unknown		Visited in 2019, extirpated due to agriculture.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset
Colonet Mesa, Baja California, Mexico	Colonet, 77 miles south of Ensenada, on road to San Antonio Del Mar; Ejido 27 de Enero (SADM); Colonet Mesa - road to San Antonio del Mar	N/A	N/A		Extant	Ejido Land	500–5000 (2019)	Observed and collected in 2019, Heavy agricultural activities all around.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset; Vanderplank 2022, pers. comm.
Colonet Mesa, Baja California, Mexico	Colonet Mesa; Punta Colonet	N/A	N/A		Extant	Ejido Land ²	500–5000 (2019)	Observed and collected in 2019. Possibly located on Ejido land, so threatened mostly from agriculture.	Campos <i>et al.</i> 2019, pp. 19–21; Vanderplank 2022, pers. comm.
Colonet Mesa, Baja California, Mexico	Colonet Mesa - Complejo Medina Natural Reserve	N/A	N/A		Extant	Preserved		Observed in 2019, unsure if new location. Located on a natural preserve.	Campos <i>et al.</i> 2019, pp. 19–21; Vanderplank 2022, pers. comm.

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
Ensenada Municipality, Baja California, Mexico	1 mile east of San Telmo; San Telmo	N/A	N/A		Presumed Extant	Unknown		Historical occurrence based on herbaria records. Location may not exact. This site was not visited in 2019.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset
Ensenada Municipality, Baja California, Mexico	Sierra San Pedro Mártir, flat ridgetop 6km northwest of Buena Vista; San Pedro Mártir		N/A		Presumed extant	Unknown		Historical occurrence based on herbaria records. Location may not exact. This site was not visited in 2019.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset
San Quintín Municipality, Baja California, Mexico	11 km east by north of Camalú; Camalú		N/A		Presumed extant	Unknown		Historical occurrence based on herbaria records. Location may not exact. This site was not visited in 2019.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset
San Quintín Municipality, Baja California, Mexico	Mesa 2.5km west southwest of El Carricito	N/A	N/A		Presumed extant	Unknown		Historical occurrence based on herbaria records. Location may not exact.	Baja Flora 2022, dataset
San Quintín Municipality, Baja California, Mexico	Arroyo de la Escopeta	N/A	N/A		Presumed extant	Unknown		Historical occurrence based on herbaria records. Location may not exact.	Baja Flora 2022, dataset

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General Location	Location Description ¹	2022 CNDDDB EO number	SDMMP Occurrence ID	2009 Status	2022 Status	2022 Ownership	2022 Plant Counts (#, Year)	2012–2022 change summary and threats present	2022 References
San Quintín Municipality, Baja California, Mexico	Up long road to Nueva York; San Quintín (Arroyo Nueva York); Road to Nueva York	N/A	N/A		Extant	Ejido Land	500–1000 (2019)	Observed and collected in 2019 (Campos et al 2019). Located on Ejido land so mostly threatened from agricultural activities.	Campos <i>et al.</i> 2019, pp. 19–21; Baja Flora 2022, dataset; Vanderplank 2022, pers. comm.
San Quintín Municipality, Baja California, Mexico	Up long road to Nueva York (east)	N/A	N/A		Extant	Ejido Land	500–1000 (2019)	New occurrence observed in 2019. Located on Ejido land so mostly threatened from agricultural activities.	Vanderplank 2022, pers. comm.
San Quintín Municipality, Baja California, Mexico	6.0 miles northeast of Las Escobas.	N/A	N/A		Presumed extant	Unknown		Historical occurrence based on herbaria records. Location may not exact.	Baja Flora 2022, dataset
San Quintín Municipality, Baja California, Mexico	Road to Nueva York (southwest)	N/A	N/A		Extant	Ejido Land	500–1000 (2019)	New occurrence observed in 2019. Located on Ejido land so mostly threatened from agricultural activities.	Vanderplank 2022, pers. comm.

¹ Translocation notations in some of the cells under Location Description: (s, xx) salvaged/removed from this location, xx is the location where the original occurrence was moved to; (sp, xx) partially salvaged/removed from this location (some plants left at original location), xx is the location where the original occurrence was moved to; (t - xx) translocated to this location, xx is the location of the original occurrence.

² Ejido lands, or “propiedad communal,” are areas of land collectively owned by the community and mainly used for agricultural purposes.

Threats

In the 2009 5-year review, we discussed Factor A threats (present or threatened destruction, modification, or curtailment of habitat or range) to *Acanthomintha ilicifolia* from urbanization, recreation, mining, nonnative plants, illegal dumping, and fire, fuel modification and postfire restoration. We also discussed Factor E threats (other natural or manmade factors affecting a species' continued existence) from small population size, grazing, and climate change.

This section summarizes new information about threats to *Acanthomintha ilicifolia* since 2009. We have new information about the threats of urbanization and development, nonnative plant species, and climate change.

Urbanization and Development

Urbanization and development were considered the most significant threat to *Acanthomintha ilicifolia* at the time of listing (USFWS 1998, pp. 54945–54946). In the 2009 5-year review, the threats from urbanization and development were considered greatly reduced through application of the Act, other State and Federal laws, and the regional planning efforts in San Diego County. While these conservation efforts have greatly reduced the threat of direct habitat loss, urbanization and development are still considered a threat at 15 occurrences (EOs 12, 22, 25, 28, 31, 33, 51, 53, 55, 56, 58, 60, 72, 73, and 93) and was a contributing factor to extirpation at 13 occurrences (EOs 6, 10, 11, 13, 16, 20, 23, 35, 38, 40, 44, 49, and 66). Since the last 5-year review, EO 42 is considered extirpated from development and EOs 17 and 57 are possibly extirpated due to development and habitat degradation ([Table 2](#)).

In Baja California, Mexico, all occurrences are considered highly threatened from development (Mulligan 2022, pers. comm.).

Nonnative Plant Species

Nonnative plants were identified as a threat to *Acanthomintha ilicifolia* in the listing rule and 2009 5-year review (USFWS 1998, p. 54950; 2009, p. 19). This threat is ongoing and has become the most common threat throughout the U.S. range of the species (CBI and AECOM 2021, p. 72) and is listed as a threat at 52 occurrences ([Table 2](#)). In monitoring of *A. ilicifolia* occurrences present on MSPA lands, SDMMP noted nonnatives as a medium (threat occurs in 10 to 50 percent of area within maximum extent) or high (threat occurs in 50 to 100 percent of area within maximum extent) level threat at 24 out of 43 occurrences monitored in the most recent survey year (CBI and AECOM 2021, pp. 74–80).

Additionally, nonnatives such as *Brachypodium* (ssp.) are becoming more pervasive at *Acanthomintha ilicifolia* occurrences in the northern portion of Baja California, Mexico (Mulligan 2022, pers. comm.).

Climate Change

The term “climate change” refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2013, p. 1450). Downscaled projections under several future climate scenarios are available for the range of *Acanthomintha ilicifolia*.

Temperature Changes

Southern California has already experienced a warming trend from 1951 to 2006 (Hall *et al.* 2018, p. 9). In San Diego County, Cal-Adapt models project increases in annual average maximum and minimum temperatures between a baseline period (1961 to 1990) and an end of century period (2070 to 2099) (CEC 2022, pp. 2–4). Specifically, between 2070 and 2099, annual average maximum temperatures are projected to increase by 2.7 degrees Celsius (°C) [5.0 degrees Fahrenheit (°F)] under Representative Concentration Pathway (RCP) 4.5, and by 4.5°C (8.2°F) under RCP 8.5 (CEC 2022, p. 3). The frequency, duration, and intensity of heat waves are also expected to increase (Hall *et al.* 2018, p. 12; Kalansky *et al.* 2018, p. 21).

Precipitation Changes

Climate change has already altered, and will continue to alter, the water cycle. Changes in the water cycle include: (1) changes in precipitation patterns and intensity; (2) changes in the incidence of drought; (3) widespread melting of snow and ice; (4) increasing evaporation; and (5) changes in soil moisture and runoff (USGCRP 2009, p. 41).

Precipitation in southern California is highly variable from year to year (Hall *et al.* 2018, p. 12; Kalansky *et al.* 2018, p. 24). Models of future precipitation generally project small mean changes relative to the historical variability, and the overall direction of future precipitation is unclear (Hall *et al.* 2018, p. 13). Models do project increases in extreme precipitation frequency and intensity (Polade *et al.* 2017, p. 7; Swain *et al.* 2018, p. 428), including increases in the frequency of atmospheric-river storms, which deliver intense precipitation and can cause severe flooding (Dettinger 2011, p. 519). However, droughts are also projected to become more frequent and intense and will be exacerbated by higher temperatures (Kalansky *et al.* 2018, p. 25). As a result, the average annual precipitation will likely not change significantly between baseline observations (1961–1990) and the end of century period (2070–2099); however, precipitation will likely occur during more intense storms and over a shorter rain season. Furthermore, dry years will be more likely to occur consecutively, increasing drought risk (CEC 2022, p. 5).

Potential Effects of Climate Change on *Acanthomintha ilicifolia*

As discussed in the 2009 5-year review, rainfall and temperature both affect the germination rate of and successful reproduction of *Acanthomintha ilicifolia*. We also discussed five factors associated with climate change that may affect the long-term viability of *A. ilicifolia* occurrences: (1) Drier conditions may result in a lower percent germination and smaller

population sizes; (2) higher temperatures may inhibit germination (Bauder and Sakrison 1999, p. 32); (3) a shift in the timing of the annual rainfall may favor nonnative species; (4) the timing of pollinator life-cycles may become out of sync with timing of flowering *A. ilicifolia*; and (5) drier conditions may result in increased fire frequency, making the ecosystems in which *A. ilicifolia* currently grows more vulnerable to the threats of subsequent erosion and nonnative/native plant invasion.

Since the previous 5-year review, USGS and SDDMMP developed habitat suitability models to assess current and future habitat conditions for five rare plant species under a range of global climate models, greenhouse gas emission scenarios, and time periods (CBI 2018, p. 12). For *Acanthomintha ilicifolia* they found that suitable habitat declines in all emission scenarios for all future time periods (CBI 2018, p. 12). Under the high emissions scenario (RCP 8.5), they predict most suitable habitat for *A. ilicifolia* remains during the first third of the century (2010–2039) but is followed by great reductions over second two-thirds of the century (2040–2069 and 2070–2099; CBI 2018, p. 12).

Additionally, soil moisture is very important for the clay lens soils that support *Acanthomintha ilicifolia* which may be especially sensitive to drying out as temperatures increase (Mulligan 2022, pers. comm.). Clay lenses are distinct, open areas that occur at the boundary of clay and non-clay soils. They readily absorb water, thickening when wet, and shrink back when dry (McMillan 2020, unpubl.). Clay lenses typically support native, often rare or endangered, endemic species that have adapted to survive in these conditions (McMillan 2020, unpubl.). Increasing temperatures, especially nighttime temperatures, dry out the soils too much for plants to extract water and nutrients (Mulligan 2022, pers. comm.). Decreasing population numbers have been observed throughout the range; with decreases especially apparent on south-facing clay lenses, which have shown a decrease in all plant species (Mulligan 2022, pers. comm.).

Summary of Threats

Since the 2009 5-year review, we received new information about ongoing threats at *Acanthomintha ilicifolia* occurrences. The new information relates to the threats of (1) urbanization and development, (2) nonnative plant species, and (3) climate change. The new information does not alter the five-factor analysis or conclusions of our 2009 5-year review.

CONCLUSION

In the 2009 5-year review, we recommended no status change for *Acanthomintha ilicifolia*. Since 2009, we received new monitoring and survey information, and some new information about threats to *A. ilicifolia*. Based on the new information, we updated the status of 22 occurrences considered in previous reviews and added occurrence information for 9 occurrences reported since 2009. There are now 84 occurrences of *Acanthomintha ilicifolia* in the United States and 25 in Baja California, Mexico ([Table 1](#)); 48 are extant, 24 are presumed extant, 11 are possibly extirpated, and 26 are extirpated.

The new information and updated occurrence statuses does not substantially alter the species' status or the results of our five-factor analysis in the 2009 5-year review. Therefore, we conclude that *Acanthomintha ilicifolia* remains a federally threatened species.

RECOMMENDATIONS FOR FUTURE ACTIONS

The recommended actions listed below are to be initiated over the next 5–10 years. Successful implementation of these actions will reduce threats to *Acanthomintha ilicifolia* and provide information to better understand the biological and physical factors limiting population growth and distribution. We recognize that conservation of this taxon will require cooperation and coordination with partners to minimize impacts from current threats and aid future restoration efforts.

1. Support partners to enhance habitat and manage nonnative plants at *A. ilicifolia* occurrences.
2. Conduct additional research into *A. ilicifolia* genetic fitness between and within populations, seed bank dynamics, and habitat characteristics to better support habitat enhancement, reintroduction, and augmentation efforts.
3. Encourage the participation of academic researchers to investigate questions of pollination and seed set, climate change, and fire effects in relationship to *A. ilicifolia*.
4. Work with researchers and government agencies in Mexico to evaluate the status of *A. ilicifolia* in Baja California, Mexico.
5. Identify opportunities to work with private landowners to encourage conservation actions for *A. ilicifolia* on sites that are not conserved. This could be done through the Partners for Fish and Wildlife Program as well as other cooperative programs. Projects could identify and reduce threats and enhance areas that support *A. ilicifolia*.

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FIELD OFFICE APPROVAL

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Approve

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