

5-YEAR REVIEW

Ambrosia pumila (San Diego Ambrosia)

GENERAL INFORMATION

Species: San Diego Ambrosia (*Ambrosia pumila*), a plant species

Date listed under the Endangered Species Act: July 2, 2002

Federal Register citation: USFWS 2002 (67 FR 44372–44382)

Classification: Endangered

Recovery Priority Number: 11C

Final Critical Habitat Designation: November 30, 2010 (75 FR 74546–74604)

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 (USFWS), 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. 2010. *Ambrosia pumila* (San Diego Ambrosia) 5-year Review: Summary and Evaluation. Carlsbad Fish and Wildlife Office, Department of the Interior. 39 pp.

We initiated a status review for *Ambrosia pumila* in 2010. The review was finalized on July 15, 2010 and recommended no change in status.

Federal Register notice announcing this status review: On January 27, 2020, we published a *Federal Register* notice announcing initiation of the 5-year review of this species, and the opening of a 60-day period to receive information from the public (USFWS 2020). We received one comment regarding *Ambrosia pumila* monitoring and management on the Center for Natural Lands Management (CNLM) Skunk Hollow Vernal Pool Preserve (Rogers and Klementowski 2020, pers. comm.).

Species Overview and Habitat: *Ambrosia pumila* (San Diego ambrosia) is a clonal herbaceous perennial plant occurring in southern California historically known from western Riverside County, south through western San Diego County, to central Baja California, Mexico. The species is found primarily on upper terraces of rivers and drainages. However, several patches of the plant occur within the watershed of a large vernal (ephemeral) pool at the Barry Jones (Skunk Hollow) Wetland Mitigation Bank in Riverside County and near dry lake beds in Baja California, Mexico.

ASSESSMENT

Information acquired since the last status review

This 5-year review was conducted by the USFWS Carlsbad Field Office. Data for this review were solicited from the public and interested parties through a *Federal Register* notice announcing this review on January 27, 2020. We used information in the 2002 listing rule, 2010 5-year review, available literature, reports, and information in our files. We also contacted Western Riverside Regional Conservation Authority, California Department of Fish and Wildlife, and species experts to request any data or information we should consider in our review. This review relies heavily on the California Natural Diversity Database (CNDDDB) that organizes plant records into unique element occurrences (EO; CNDDDB 2021, unpaginated). The EO structure is used throughout this review consistent with the 2010 5-year review.

SUMMARY OF NEW INFORMATION SINCE 2010

Critical Habitat

In 2010, we designated approximately 783 acres (ac) [317 hectares (ha)] of critical habitat for *Ambrosia pumila* in Riverside and San Diego counties, including 6 units with 13 subunits (USFWS 2010a, p. 74546). The final rule excluded habitat within approved habitat conservation plans where *A. pumila* was a covered species and afforded protections under those plans.

Biology and Distribution

Since the last 5-year review in 2010, no studies have been published on *Ambrosia pumila* biology, life history, or genetics. A management study was published and is summarized below under conservation. A comprehensive range wide survey for *A. pumila* has not been conducted. Our current understanding of the species distribution is based on survey records documented in botanical databases including CNDDDB, and the Consortium of California Herbaria (CCH2). Periodic species monitoring is conducted to support large scale habitat conservation plans and the Skunk Hollow Wetland Mitigation Bank (Rogers and Klementowski 2020, pers. comm.). The San Diego Management and Monitoring Program conducted surveys on conserved lands within the San Diego Multiple Species Conservation Program (MSCP) between 2017 and 2019 that documented occurrences and evaluated threats to develop specific management recommendations (SDMMP 2019). Within the Western Riverside Multiple Species Habitat Conservation Plan (WR-MSHCP) surveys were conducted from 2005 to 2012 during the inventory phase of the monitoring program (Drennen and Grillo 2021, pers. comm.; Biological Monitoring Program 2021). Beginning in 2012, the monitoring phase began and included presence/absence surveys conducted every 8 years to document whether the occurrences are persisting. In addition, incidental records are documented in their annual rare plant monitoring reports (Biological Monitoring Program 2020, entire). This status review includes data from both monitoring programs and inform our understanding of current threats, as described below. Due to its clonal growth form, it is difficult to determine what constitutes an individual in the field; introducing inconsistencies when describing abundance across different monitoring programs. Therefore, abundance may be characterized differently depending on the parameters used by the

researcher to identify individual plants. This status review emphasizes the status of individual occurrences.

Appendix A summarizes the species status by geographic area including the CNDDDB EO, current status, threats, and conservation mechanism, where applicable. An occurrence is considered extant if the species was observed within the last 10 years. If the species was not observed in the last 10 years but suitable habitat is present, the occurrence is presumed extant. If the species was not observed for over 20 years or the habitat is degraded or partially developed, the occurrence is considered possibly extirpated. If the species has not been observed for greater than 20 years and the habitat is no longer suitable, we consider the occurrence to be extirpated. To determine if the occurrence is conserved, the proportion of habitat conserved is summarized as follows: conserved (greater than 95%); mostly conserved (55-95%), half conserved (45-55%) and partially conserved (less than 45%). In addition, whether the occurrence is within an approved subarea plan for one of the three approved multiple species habitat conservation plans (HCP) in the region [MSCP, North County Multiple Habitat Conservation Plan (MHCP), or WR-MHCP] is listed as well as the preserve name, when that information is available.

At listing, 15 native occurrences of *Ambrosia pumila* were considered extant in the United States: 3 in Riverside County and 12 in San Diego County (USFWS 2002, pp. 44372–44382). There are currently 40 occurrences in the United States that were known at the 2010 5-year review or were recently discovered since the last 5-year review: 7 in Riverside County, 32 in San Diego County (including 11 extant translocations), and 1 in Los Angeles County (Table 1, Figure 1, Appendix A). In addition, the species is known from three geographic areas in northern Baja California, Mexico and two records from southern Baja California (Figure 2).

Table 1. Summary of Extant Element Occurrences by Location.

Location	Number of Occurrences	Extant or Presumed Extant Natural Occurrences	Extant Translocations	Number of Occurrence with some level of conservation
San Diego County	32	18	11	20
Riverside County	7	7	-	3
Los Angeles County	1	1	-	1
Baja California, Mexico	5	5	-	0
Total	45	31	11	24

A total of 25 occurrences were extirpated or possibly extirpated at listing, although EO 24 and 31, 42, 50 were not specifically listed as such in the last 5-year review (USFWS 2010b, p. 12). A total of 22 EOs were historically considered extirpated and remain extirpated (Table 2) and are not discussed further or included in the summary of occurrences (Appendix A). EO 64 was not described at listing or the 2010 5-year review; the occurrence was only described in 1996 and is possibly extirpated (CNDDDB 2021). Element occurrences 17, 32, 33, 38, 53 and 56 located in Otay Mesa are believed to be misidentified and are not addressed further (USFWS 2010b, p. 6).

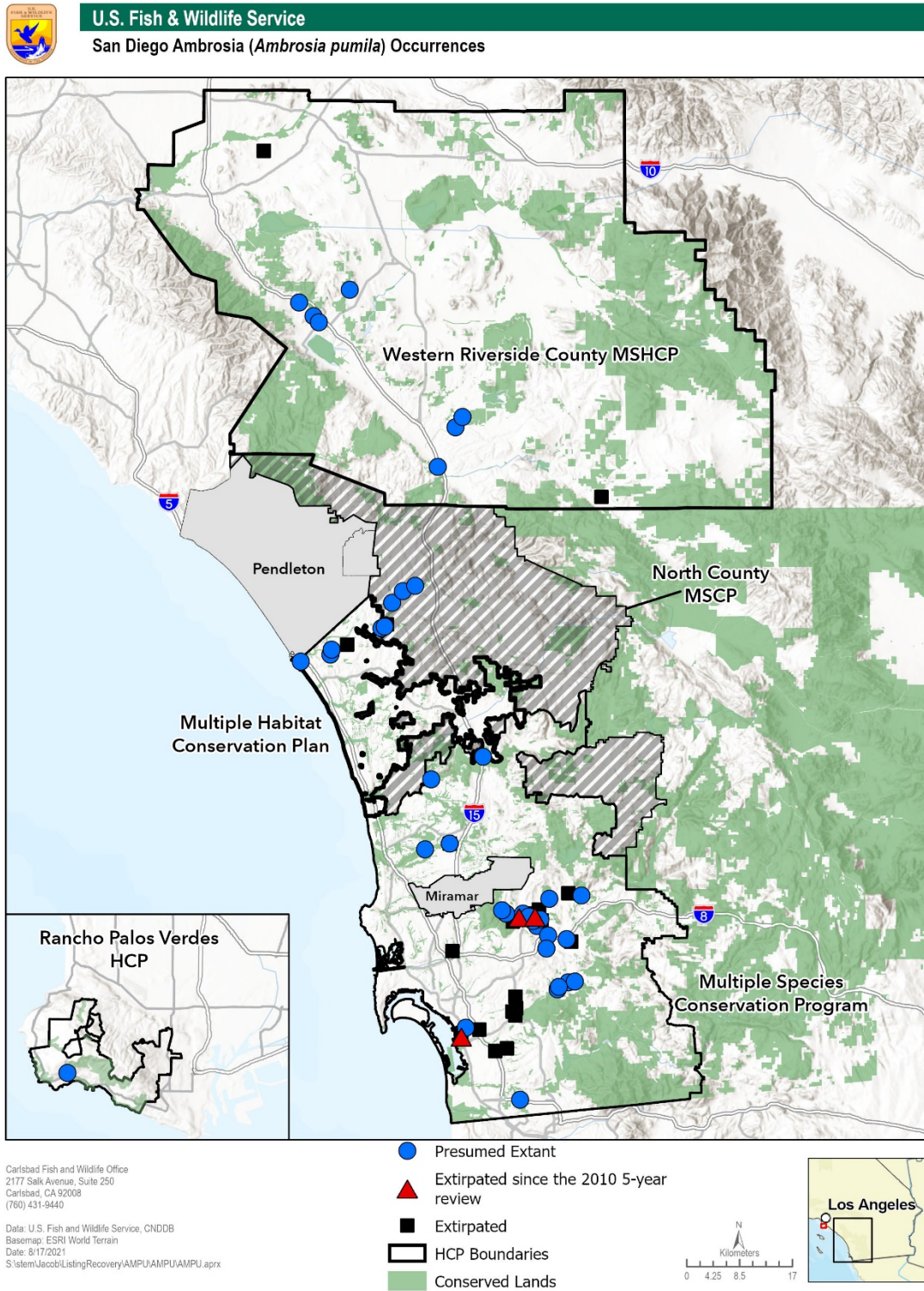


Figure 1. Map of *Ambrosia pumila* distribution and multiple species habitat conservation plans in the United States.

2021 5-year Review for *Ambrosia pumila*

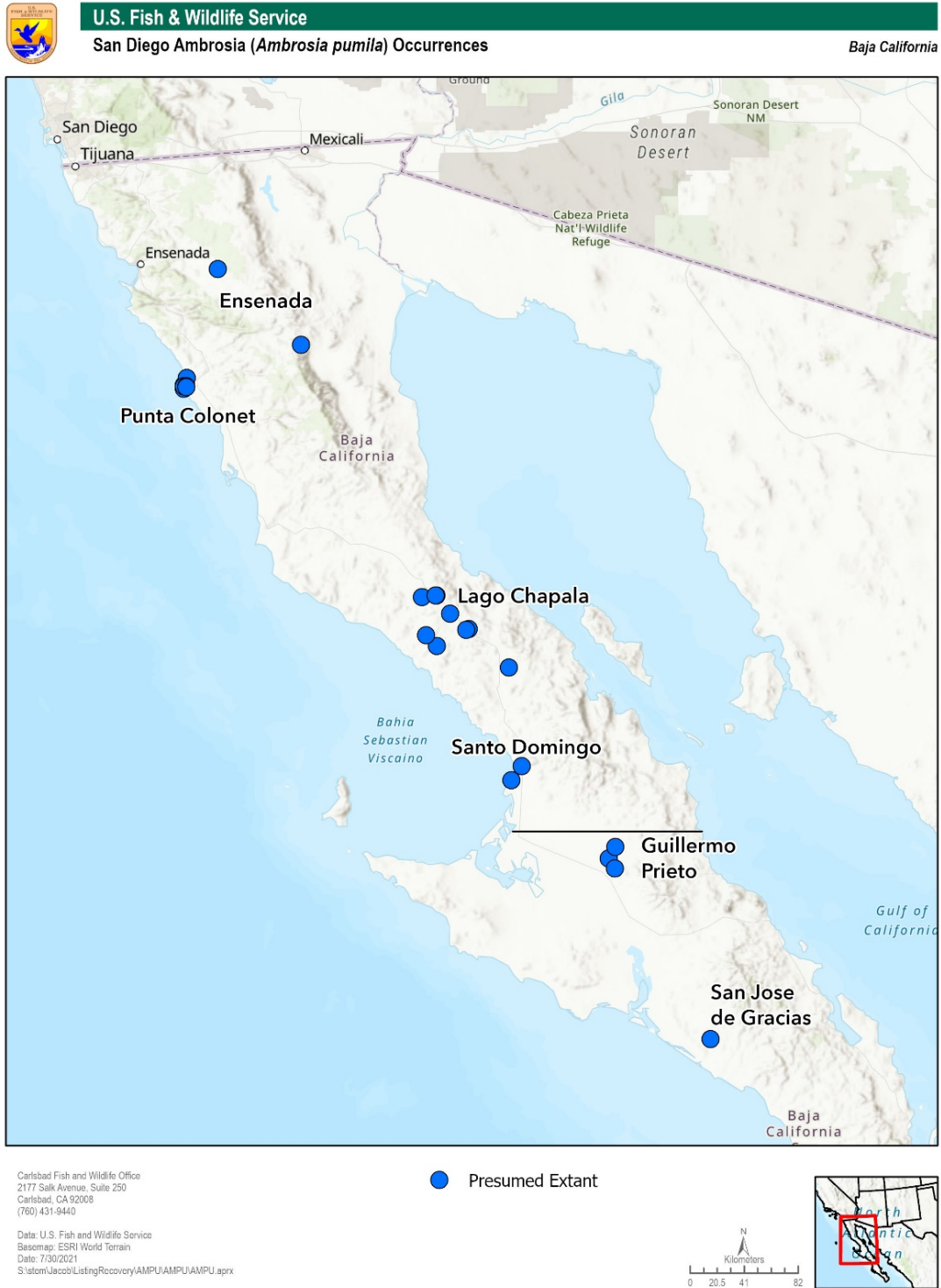


Figure 2. Map of *Ambrosia pumila* occurrences in Baja California, Mexico.

Table 2. Element Occurrences not addressed in this status review

Condition	Element Occurrences
Extirpated at listing and currently considered extirpated	EO 2, 4, 7, 8, 9, 13, 15, 18, 19, 24, 25, 26, 27, 28, 31, 36, 39, 42, 50, 52 and 64
Extirpated at the 2010 5-year review and currently considered extirpated	EO 42
Possibly extirpated and not previously documented.	EO 64
Combined prior to listing	EO 5, 10, 23, 37, 46, 47, 49, and 51
Erroneous (Considered misidentified)	EO 17, 32, 33, 38, 53 and 56

San Diego County

Within San Diego County, *Ambrosia pumila*'s distribution is centered in the City of Santee and Mission Trails Regional Park, extending north to Highway 76 in the City of Bonsall, east to El Cajon, and south to Chula Vista (Figure 3 and 4). The known occurrences include extant natural records, recent extirpations, historical extirpations that have been rediscovered and new occurrences as a result of reintroductions. Four previously extirpated occurrences have recently been rediscovered in San Diego County (EO 6, 11, 30, and 41); however, the viability of three of these occurrences (EO 6, 11 and 30) is uncertain due to their proximity to development and lack of conservation (Appendix A). In our 2010 5-year review, we identified two newly extirpated occurrences (EO 3 and 42) that were extant at listing (Appendix A; USFWS 2010b, pp. 6, 34). Portions of EO 3 were impacted by development; however, the eastern portion of the occurrence was not impacted. Therefore, the occurrence is considered extant now and was extant at the 5-year review (Appendix A; CNDDDB 2021). EO 23 and 47 were combined with other occurrences at listing but are now extant and described separately (USFWS 2010b, p. 6, CNDDDB 2021). There are a total of 18 extant, natural occurrences, including the 15 natural occurrences known at the 2010 5-year review (USFWS 2010b, p. 6). New occurrences have increased the number of populations within the species known range in San Diego County (Figure 3 and 4). Three natural occurrences on unconserved lands in the City of Santee are now considered extirpated, of which EO 68 and 73 were documented after the 5-year review. There is an overall increase in the number of occurrences in San Diego County despite the extirpations described above.

Riverside County

Ambrosia pumila generally occurs in the vicinity of Lake Elsinore and Temecula in Riverside County. Since the 2010 5-year review, the number of occurrences has more than doubled within the known range. Seven occurrences are extant or presumed extant compared to three at the 2010 5-year review (Figure 5; USFWS 2010b, p. 6). This number includes EO 54 that was considered extirpated at the 2010 5-year review due to discing that occurred in 2009 (USFWS 2010b, p. 38). However, the occurrence is now extant suggesting that the species is tolerant to limited disturbance. Appendix A does not include EO 50 that is considered currently extirpated and was extirpated at listing (USFWS 2010b, p. 38). Although we do not have current information to estimate abundance, new localities were reported at Skunk Hollow vernal pool preserve (EO 22; Rogers and Klementowski 2020, pers. comm.).

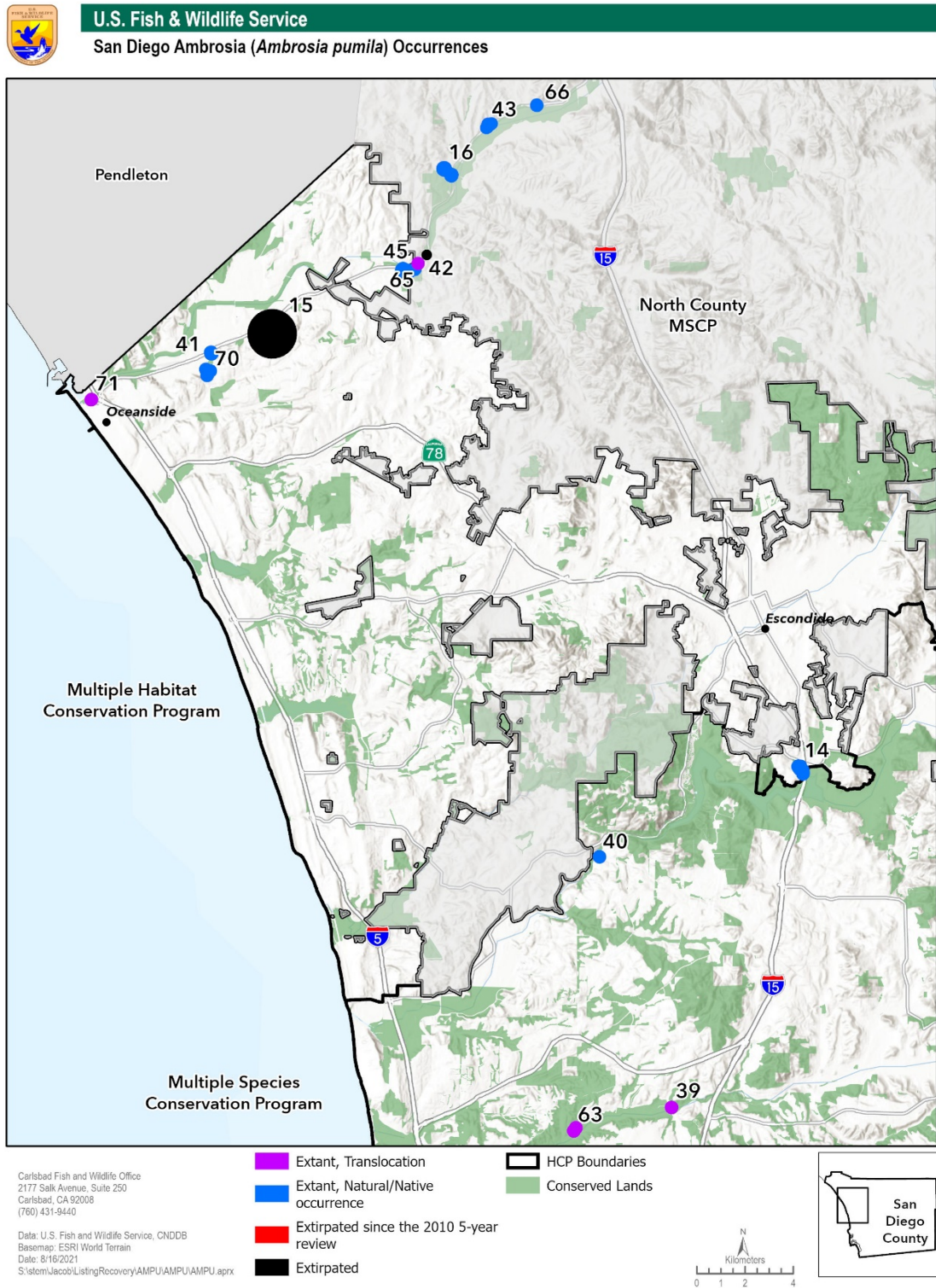


Figure 3. Map of *Ambrosia pumila* occurrences in northern San Diego County.

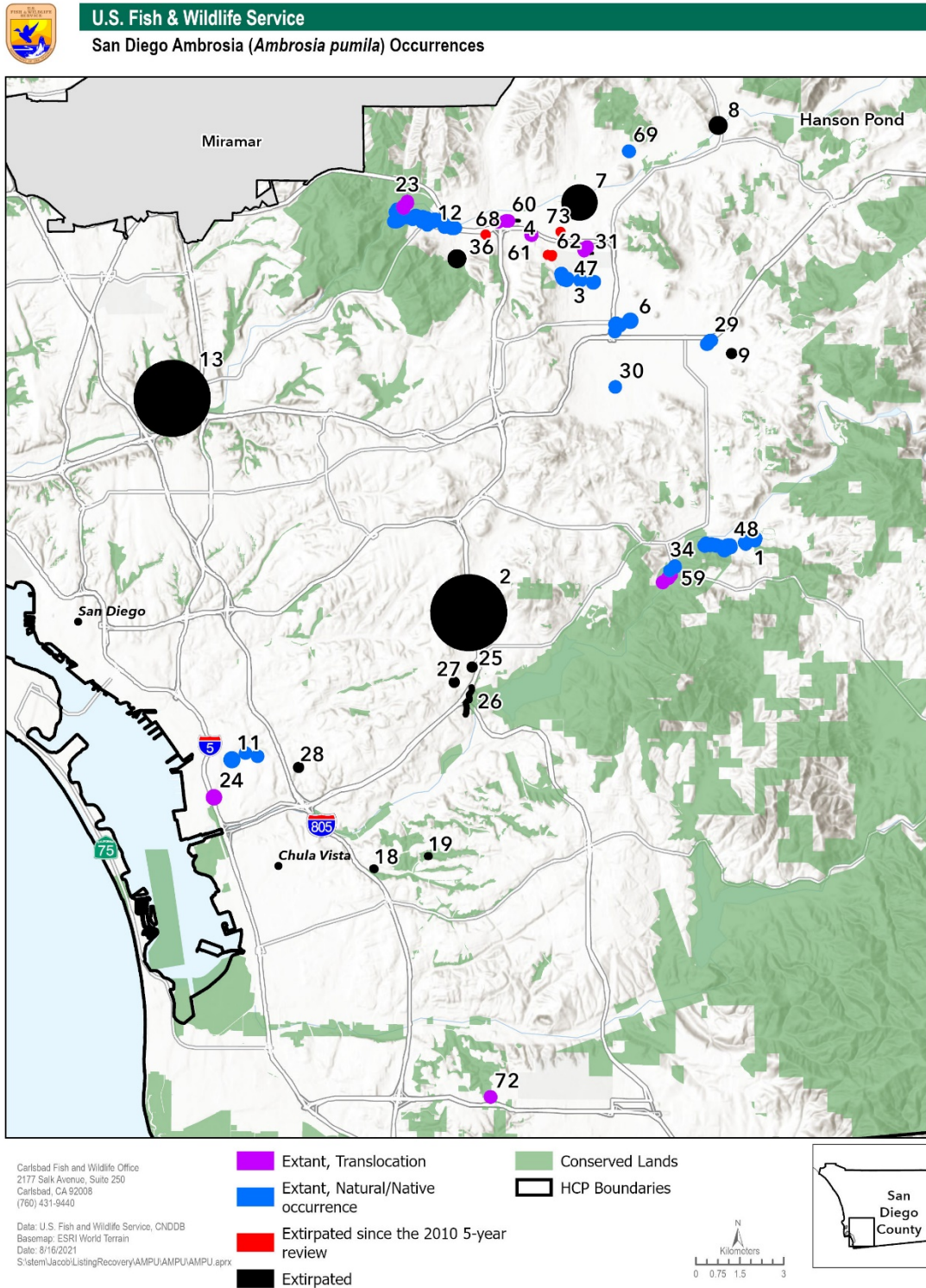
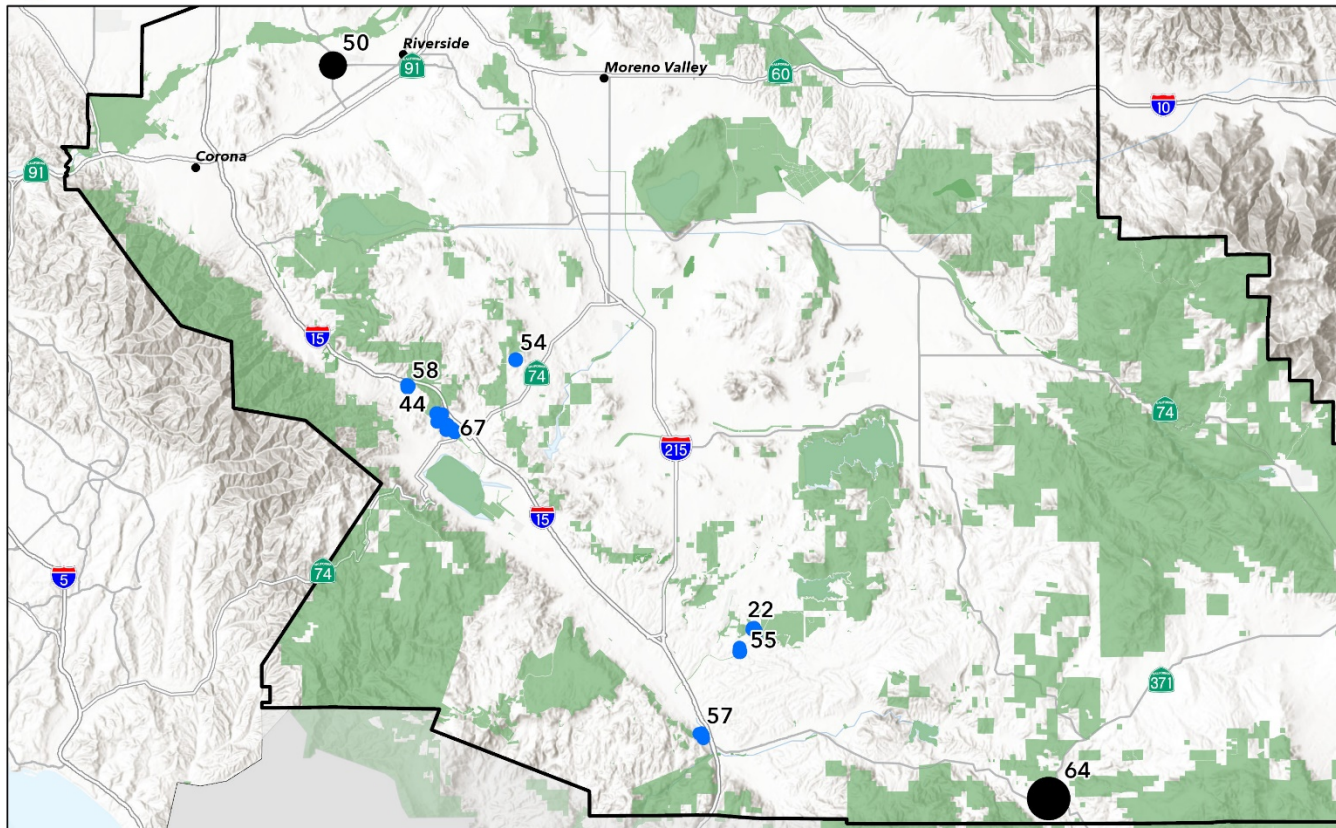


Figure 4. Map of *Ambrosia pumila* occurrences in southern San Diego County.



U.S. Fish & Wildlife Service
San Diego Ambrosia (*Ambrosia pumila*) Occurrences



Carlsbad Fish and Wildlife Office
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Carlsbad, CA 92008
(760)431-9440

Data: U.S. Fish and Wildlife Service, CNDDB
Basemap: ESRI World Terrain
Date: 8/16/2021
System:\sacobl\Listing\Recovery\AMPU\AMPU\AMPU.aprx

- Extant, Natural/Native occurrence
- Extirpated
- Conserved Lands
- HCP Boundaries

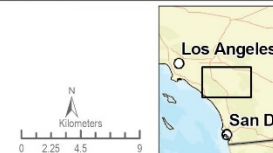


Figure 5. Map of *Ambrosia pumila* occurrences in Riverside County.

Los Angeles County

In 2017 a herbarium specimen was collected from the Three Sisters Reserve on the Palos Verde Peninsula in Los Angeles County (CCH2a 2021; Figure 1). The collection and identification were confirmed by botanist, Andrew Sanders at the University of California Riverside herbarium (Sanders 2021, pers. comm.). This record documents a significant range expansion, as the species was previously only known from San Diego and western Riverside.

Baja California, Mexico

The documented range of *Ambrosia pumila* in Mexico at the time of listing extended from Cabo Colonet south to Lake Chapala in northern Baja California, Mexico (USFWS 2010b, p. 9). There is limited available records in Mexico; however, 28 herbarium records document that the species range is broader (CCH2b, 2021). For purposes of this review, the records are organized into five geographic areas: Punta Colonet, Lago Chapala, Santo Domingo and Guillermo Prieto in northern Baja California, and San Jose de Gracias in southern Baja California (Figure 2). Herbarium records indicate that the current distribution was known at listing and the 2010 5-year review, with the exception of San Jose de Gracias which was recorded in 2009 (CCH2 2021). Based on a review of current aerial imagery, all records are presumed to be extant; and herbarium records provided recent confirmation at three of the areas within the last 12 years (Appendix A). The species was documented as recently as 2017 west of Lake Chapala; but the peninsula is largely unsurveyed (iNaturalist 2021).

Translocated Occurrences

In the 2010 5-year review, we acknowledged seven known instances in which *Ambrosia pumila* had been translocated from their place of origin to new areas, with one translocation planned for 2011 (USFWS 2010b, p. 6). Due to the lack of information available regarding the biology and life history of *Ambrosia pumila*, we were unable to determine if transplanted occurrences sufficiently support the biology and life history of the species. But we acknowledged that translocated occurrences may contribute to the conservation and recovery of *A. pumila*, since they contain individuals that likely preserve the genetic diversity of the original occurrences. But until we know more about the biology of the species, we cannot be sure these occurrences will be viable long term.

Since the last review, there has been a substantial effort to translocate *Ambrosia pumila* as mitigation for development projects [Caltrans 2013; Caltrans 2017; Schaefer 2021, pers. comm; USFWS 2014; and AECOM 2010 (Appendix A)]. Translocation efforts have generally been guided by McGlaughlin and Friar (2007) with numerous individuals salvaged across the impact area to collect as many genets as possible and translocations generally remain in the same watershed as the source population (Osborne 2021, pers. comm.). These efforts have resulted in the establishment of 11 new occurrences as well as augmentation of 2 existing occurrences (EO 45 and 66; Appendix A). Translocations generally occurred in association with widening of Highway 76 in north San Diego County and development projects in the City of Santee. Approximately 85 percent of the translocation efforts (11 of 13; Appendix A) resulted in the establishment of *A. pumila* plants and two projects are too preliminary to evaluate the success (Hanson Pond (unassigned EO) and the Railroad Preserve (EO 47)). However, each project varies

in the proportion of plants established and the extent they are reproducing vegetatively. There are numerous potential explanations including poor horticultural practices such as lack of watering or extended periods between salvage and translocation. Historical translocations were also often not well documented, making it difficult to understand why they were unsuccessful. Individuals from EO 73 (Buena Vista and Mission Greens Rd) in Santee were translocated to EO 61 (Forester Creek) but the plants did not establish, although the EO is extant due to a successful 2009 translocation from EO 4 (Osborne 2021, pers. comm.). Similarly, EO 41 was thought to be extirpated and is now considered extant, potentially due to an unspecified translocation effort (CNDDDB 2021). Overall, there is evidence that plants can establish after translocation. But there is minimal documentation of sexual reproduction or viable seed. Consistent with a clonal life strategy, naturally occurring populations of *A. pumila* are also known to set seed infrequently and the seed set may also be unviable, making it difficult to ascertain the importance of sexual production in the long-term viability of translocations. Appendix A includes a summary of the translocation efforts, all of which have occurred in San Diego County. When information was available, the source populations are indicated.

Threats

The 2002 listing rule identified potential threats to *Ambrosia pumila* from: 1) development, including utility and highway construction, 2) nonnative plants, 3) mowing/discing; 4) trampling and grazing, and 5) inadequate regulatory mechanisms (USFWS 1998, pp. 44376–44378). The 2010 5-year review identified habitat fragmentation and climate change as additional threats to the species and that grazing was no longer a threat (USFWS 2010b, pp. 12–20). Inadequate regulatory mechanism was previously considered a threat. We no longer consider this to be a threat and instead focus on impacts from current threats to the species as discussed under the threat of development (USFWS 2002, p. 44379; USFWS 2010b, pp. 14–20). This section summarizes new information about threats. Threats in Baja California, Mexico was inferred from aerial imagery. Updates to threats in this status review are discussed under the following headings: Development, Mowing and Discing, Trampling, Nonnative Plants, and Climate Change.

Development

In our listing rule, we described construction and maintenance of highways, maintenance of utility easements, development of recreational facilities, and residential and commercial development as potential threats to *Ambrosia pumila* (USFWS 2002, p. 44373). Approximately, 21 of the historical, natural occurrences at that time were believed to have been extirpated by human activities, including, but not limited to, urban development (USFWS 2002, p. 44376). As discussed in more detail below under Conservation Mechanisms, *A. pumila* occurrences are protected from habitat loss if they are on lands that are conserved – lands on which development activities and other man-made disturbances are legally precluded. Protections afforded under the approved, regional HCPs have decreased but not eliminated major habitat loss and alteration. Currently these plans afford protection to 10 of the 26 extant, natural occurrences in the United States through direct conservation of habitat or a regulatory framework to address impacts. In addition to the regional HCPs, we issued three biological opinions since the 2010 5-year review

with the potential to impact *A. pumila*. However, the majority of the impacts to the species are from projects on private land. The description of applicable State and Federal laws and regulations in the 2010 5-year review provides an accurate summary of the regulations currently afforded to the species (USFWS 2010b, pp. 12–20). In the absence of Federal and State regulations, avoidance and mitigation measures are often not thoroughly addressed on private lands outside of approved HCPs during the environmental review process (Osborne 2021, pers. comm.). Therefore, development remains a high magnitude threat to occurrences in the United States, including those areas not covered under an approved subarea plan (13 EOs), and for occurrences that are not fully conserved (9 EOs) (Appendix A). In the near-term there are plans to salvage the remaining individuals from EO 29 and the site is planned for development.

In Baja California, Mexico, threats due to habitat loss and degradation include development and agriculture. However, the magnitude of these threats is significantly reduced relative to the occurrences in the United States.

Mowing and Discing

In our listing rule, we noted that several occurrences of *Ambrosia pumila* are threatened by periodic mowing or disking for fuel modification and weed abatement, which can reduce the vegetative vigor of the plants and may greatly reduce or eliminate the chances of reproductive output for the year (USFWS 2002, p. 44378). If the plants are mowed in midsummer to early fall, it is likely that the flowering portions of the aerial stems could be removed along with vegetative material, thus decreasing reproductive output. Discing, grading, or plowing occupied areas can also break apart stems and rhizomes and leave rhizomes vulnerable to desiccation, potentially killing plants. We noted in the 2010 5-year review, that mowing can control nonnative plants and increase *A. pumila* cover, if conducted at the appropriate time of year (USFWS 2010b, p. 22). *Ambrosia pumila* has some tolerance to disturbance; EO 54 was previously considered extirpated due to discing of the site; but the same location is currently extant suggesting some tolerance to limited discing and disturbance (Appendix A). However, repeated discing or mowing during the flowering season is likely not compatible with the species long term survival. Mowing, discing, grading, and plowing is an on-going threat at 7 natural, extant occurrences.

Trampling

At the time of listing, trampling was identified as a threat to *Ambrosia pumila* (USFWS 2002, p. 44378). Trampling by hikers, horses, and vehicles (including off highway vehicles (OHV)) is a threat to any of the occurrences that are found along trails, access roads, rights-of-way, and utility easements. Trampling may result in depressed growth, mortality, soil compaction and contributes to habitat fragmentation. We noted in the 2010 5-year review that *A. pumila* readily resprouted in areas where trails were decommissioned indicating a limited tolerance to soil compaction and associated altered hydrology (USFWS 2010b, p. 22). Installation of fencing at conserved occurrences has reduced the risk of trampling; however, it remains a threat at 14 of the

26 extant natural occurrences including many which are conserved, due to the proximity of the plants to trails.

Nonnative Plants

Competition and overgrowth of nonnative plants was identified as a threat at the time of listing, (USFWS 2002, p. 44378). While scientific studies on the effects of nonnative plants on *Ambrosia pumila* have not been undertaken, the presence of nonnative plants is likely to affect (1) pollen and fruit dispersal by impeding flow of wind-blown pollen and local dispersal of seeds; (2) fire patterns by increasing the fuel loads due to the influx of nonnative plants; (3) hydrological conditions by decreasing the amount of water available for *A. pumila*; and (4) the cumulative effects by reducing the vegetative productivity and the seed production for this species (USFWS 2002, p. 44378). Nonnative plants were a noted threat in the 2010 5-year review in at all but two extant occurrences in the United States despite management efforts (Appendix A). In addition, *A. pumila* can be susceptible to competition and crowding by native plant species that shade out the understory (Scatolini 2016, pers. comm.). Nonnative plants are also a threat at the occurrences in Baja California, Mexico, in part due to habitat disturbance associated with development and agriculture. However, we do not have information to classify the magnitude of the threat.

Climate Change

In our 2010 5-year review, we noted that climate change is a potential threat to *Ambrosia pumila*. Although there is currently uncertainty with current model projections of precipitation in southern California, we believe that predictions of warmer temperatures and increased variability in extreme rain or flood events are a threat to *A. pumila* through resultant changes in precipitation patterns that create conditions essential for maintaining habitat that supports plant populations. The potential for increased temperatures contributes to drier climatic conditions that can stress native species and reduce germination and survival rates. If combined with other stressors, this changed condition can increase the threat to sensitive plant species that rely on seasonal rainfall and flooding. Therefore, climate change is considered a threat to the species throughout its range.

Summary of Threats

Since the 2010 5-year review, we have received new information about ongoing threats at *Ambrosia pumila* occurrences (Appendix A). The information allowed us to update the threats at specific occurrences. However, the new information does not alter the conclusion of our 2010 5-year review (USFWS 2010b, pp. 10–24).

Conservation

At the 2010 5-year review, some degree of conservation was afforded to 11 of 16 occurrences (USFWS 2010b, p. 20). Of the 26 extant, natural occurrences of *A. pumila* in the United States, only 6 are completely conserved and 9 are partially conserved (Appendix A). The remaining 11 occurrences are not conserved and are more vulnerable to habitat loss from urban development.

Protections afforded under the approved, regional HCPs (MSCP, MHCP, WR-MHCP) have decreased but not eliminated major habitat loss and alteration. Currently approved HCPs afforded protection to 11 natural occurrences and 6 translocations through direct conservation of habitat or a regulatory framework to address impacts. Overall, 41 percent (78.4 of 191.8 ac; 31.7 of 77.6 ha) of occupied habitat (natural, extant records) is considered conserved, typically with some degree of management including 15.1 of 54.4 ac (6.1 of 22.0 ha) (28 percent) in Riverside County and 63.4 of 137.4 ac (25.6 of 55.6 ha) (46 percent) in San Diego County (USFWS 2021). However, the proportion of known occurrences preserved is unchanged since the 2010 5-year review, despite a 73 percent increase in occurrences. None of the record in Baja California, Mexico is conserved or provided regulatory protection.

A 2012 study evaluated strategies for managing nonnative annual plants in *Ambrosia pumila* occupied habitat (Hasselquist et al. 2012, entire). Mowing, hand-pulling and post-emergence grass-specific herbicide (Fusilade II) applications were evaluated for effectiveness at two grassland sites in San Diego County dominated by nonnative grasses (Mission Trails) and nonnative herbs (San Diego USFWS Refuge). The study found an increase in *A. pumila* stems when nonnative plant species were controlled, documenting that nonnative species compete for resources and space (Hasselquist et al. 2012, p. 229). Hand-pulling was most effective in increasing *A. pumila* cover and reducing nonnative plant cover; the results were hypothesized to be related to competitive release and the fact that the species response was favorable to disturbance. The authors were not certain if the reduced effectiveness of mowing and herbicide treatments were confounded by the increased litter remaining in plots after treatment that can reduce sunlight at the soil surface and recruitment. Fusilade II was also effective in controlling nonnative *Erodium* sp., although it is not a grass species.

CONCLUSION

In the 2010 5-year review, we recommended no status change for *Ambrosia pumila*. Since 2010, we have received new occurrence information for *A. pumila*, and new information regarding threats to the species. Based on currently available information, there are 37 occurrences of *Ambrosia* extant or presumed extant in the United States, including translocations. Although, three occurrences are extirpated due to development projects, the current distribution in the United States is consistent with the distribution at listing and the 2010 5-year review. There are 31 records in Baja California, Mexico concentrated in six areas that extended the distribution south into southern Baja California relative to the distribution known at the 2010 5-year review. After reviewing the best available scientific information, we conclude that *Ambrosia pumila* remains an endangered species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Act and analysis of the status of the species in our 2010 5-year review remains an accurate reflection of the species current status.

RECOMMENDATIONS FOR FUTURE ACTIONS

The recommended actions listed below are to be completed over the next 5 years. Successful implementation of these actions will reduce threats to *Ambrosia pumila*. We recognize that conservation of this taxon will require cooperation and coordination with partners to minimize impacts from current threats and aid with future restoration efforts.

1. Develop a habitat suitability model and conduct surveys on potentially suitable habitat to inform our understanding of the species distribution, as new occurrences continue to be recorded in both the United States and Mexico.
2. Work with partners to secure conservation of the occurrences that currently receive no protection.
3. Work with partners to manage occurrences to support the long-term viability of the species including nonnative plant control and identifying opportunities through the Service's Partners for Fish and Wildlife Program to seek habitat restoration and enhancement opportunities.
4. Conduct research on the biology and life history of *Ambrosia pumila* to understand the factors that contribute to the production of viable seed and the role of sexual reproduction in maintaining resilient populations such as confirming the pollination mechanism, testing for self-compatibility, seed germination requirements, mechanism of seed dispersal, and seed viability. This will assist in identifying reasons for the persistence of certain occurrences and actions needed to help conserve others.
5. Develop a translocation program that details successful approaches, greenhouse techniques for propagation and identifies potential sites for translocation within a genetic framework. The plan should maximize redundancy in terms of the geographic locations and number of occurrences to be established.

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2021 5-year Review for *Ambrosia pumila*

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Appendix A

Table A1. Occurrence Table for San Diego County. Occurrences that are Conserved (>95%), Mostly Conserved (55-95%), Half (45-55%) or Partially Conserved (<45%).

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status ¹	Ownership	Conservation Mechanism status, HCP (approved subarea plan), preserve name	Current Threats
EO 1 (includes former EO 49)	Intersection of Steel Canyon Road and Jamul Drive, El Cajon	Extant	Extant	Extant	Private, SDGE	Partially conserved MSCP (County of SD)	Factor A – Development, nonnative plants, trampling (ORV), discing/mowing Factor E – Nonnative plants, climate change
EO 12 (includes EO 35, 37 & 51)	Mission Trails Regional Park	Extant	Extant	Extant	City of SD, Private, Caltrans	Mostly conserved MSCP (City of SD, not approved) Mission Trails Regional Park	Factor A – Development, nonnative plants, trampling, mowing Factor E – Nonnative plants, climate change
EO 14	I-15 and Via Rancho Pkwy	Presumed extirpated	Extant	Extant	City of SD, Private, State	Mostly conserved MHCP (not approved) Hodges Reservoir Open Space	Factor A – Development, nonnative plants, trampling Factor E – Nonnative plants, climate change
EO 16	Olive Hill Rd. and Mission Rd, Bonsall (Grove Mitigation Site)	Presumed extirpated	Extant (southern portion)	Extant (southern portion)	Private, Caltrans	Half conserved NC-MSCP (not approved) Groves Open Space Preserve	Factor A – Development, nonnative plants, trampling erosion Factor E – Nonnative plants, climate change
EO 34	SR-94 at Steel Canyon Bridge	Extant	Extant	Extant	Private, USFWS	Half conserved MSCP (County SD) SDNWR	Factor A – Development, nonnative plants, trampling Factor E – Nonnative plants, climate change

¹ Records that were extirpated at listing and are currently extirpated: EO 2, 4, 7, 8, 9, 13, 15, 18, 19, 24, 25, 26, 27, 28, 31, 36, 39, 42, 50, 52 and 64.

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (approved subarea plan), preserve name	Current Threats
EO 40	Rancho Santa Fe Golf course and San Dieguito River	Extant	Extant	Extant	County of SD, Private	Half conserved MSCP (County SD) Crosby at Rancho Santa Fe	Factor A – Development (golf course), nonnative plants, trampling Factor E – Nonnative plants, climate change
EO 41	El Camino Real and Highway 76, Oceanside	Extirpated	Extirpated	Extant	Private, Caltrans	Mostly conserved MHCP (not approved) Westminster Preserve	Factor A – Development, nonnative plants, trampling, erosion Factor E – Nonnative plants, climate change
EO 45	SR-76 and Vista Way, Oceanside (Jefferies Ranch & Stacco/Timeout Mitigation)	Extant	Extant	Extant	Caltrans, Private	Mostly conserved NC-MSCP, MHCP Caltrans-Stacco/Timeout Jefferies Ranch	Factor A – Development, nonnative plants, trampling, collection Factor E – Nonnative plants, climate change
EO 48	San Diego National Wildlife Refuge, El Cajon	Extant	Extant	Extant	USFWS, Private	Conserved MSCP (County of SD) SDNWR	Factor A – Nonnative plants, trampling, mowing Factor E – Nonnative plants, climate change
EO 66 (Morrison Mitigation Site)	Hwy 76 and Gird Rd., Fallbrook	Not known	Extant*	Extant	Private, Caltrans	Partially conserved. NC-MSCP (not approved) San Luis Rey River Park	Factor A – Development, nonnative plants Factor E – Nonnative plants, climate change
EO 70	El Camino Real and Las Vegas Dr., Oceanside	Not known	Not known	Extant	City of Oceanside	Conserved MHCP (not approved) Vista de la Valle Preserve	Factor A – Nonnative plants, trampling, erosion Factor E – Nonnative plants, climate change

Table A2. Occurrence Table for San Diego County. Occurrences that are Not Conserved.

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (approved subarea plan), preserve name	Current Threats
EO 3 (includes former EO 5)	South of Gillespie Field	Extant	Extant (eastern portion)	Extant (eastern portion)	County of SD	None MSCP (not approved)	Factor A – Development, nonnative plants Factor E – Nonnative plants, climate change
EO 6 (includes EO 46)	I-8 and Highway 67	Extirpated	Extant*	Extant (southwest and middle portion)	Private, Caltrans	None MSCP (not approved)	Factor A – Development, nonnative plants Factor E – Nonnative plants, climate change
EO 11	I 805 and Plaza Blvd, National City	Presumed extant (unviable)	Presumed extant (unviable)	Extant	Private, National City	None MSCP (not approved)	Factor A – Development, trampling Factor E – Climate change
EO 29	South of I-8 at Madison Ave, El Cajon	Extant	Extant*	Extant	Private, Caltrans	None MSCP (not approved)	Factor A – Development, nonnative plants, mowing Factor E – Nonnative plants, climate change
EO 30	Washington Ave and Jefferson Ave, El Cajon	Extirpated	Extirpated	Extant	Private	None MSCP (not approved)	Factor A – Development Factor E – Climate change
EO 43	SR-76 at Calle del Vuelta	Extant	Extant	Extant	Private, Caltrans	None NC-MSCP (not approved)	Factor A – Development, nonnative plants, trampling, mowing, grazing Factor E – Nonnative plants, climate change
EO 62	Cuyamaca St and Weld Blvd., Santee (Weld Project)	Not known	Extant*	Extirpated (moved to Hanson pond in 2021)	County of SD	None MSCP (not approved)	Factor A – Development Factor E – Climate change

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (approved subarea plan), preserve name	Current Threats
EO 68	SR-52 and Mission Gorge Rd., Santee	Not known	Not known	Extirpated	Private	None MSCP (not approved)	Factor A – Development, nonnative plants, trampling Factor E – Nonnative plants, climate change
EO 69	El Nopal and Los Ranchitos Rd., Santee	Not known	Not known	Extant	Private	None MSCP (County of SD)	Factor A – Development, nonnative plants Factor E – Nonnative plants, climate change
EO 73	Buena Vista Ave. and Mission Greens Rd., Santee	Not known	Not known	Extirpated (moved to EO 61 and failed)	Private	None MSCP (not approved)	Factor A – Development Factor E – Climate change

Table A3. Occurrence Table for Riverside County. Occurrences that are Conserved (>95%), Mostly Conserved (55-95%), Half (45-55%) or Partially Conserved (<45%).

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (approved subarea plan), preserve name	Current Threats
EO 22	Barry Jones (Skunk Hollow) Wetland Mitigation Bank	Extant	Extant*	Extant	Private (CNLM)	Conserved WR-MHCP Skunk Hollow	Factor A – Development, nonnative plants, wildfire Factor E – Nonnative plants, climate change
EO 54	Hwy 74 at Steele Peak	Not known	Extirpated	Presumed extant	BLM	Conserved WR-MHCP	Factor A – Discing Factor E – Nonnative plants, climate change
EO 58	Alberhill	Extant	Extant	Extant	Riverside County	Conserved WR-MSHCP Alberhill Conservation Area	Factor A – Nonnative plants Factor E – Nonnative plants, climate change

Table A4. Occurrence Table for Riverside County. Occurrences that are Not Conserved.

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (subarea plan), preserve name	Current Threats
EO 44	I-15 at Nichols Road, Lake Elsinore	Extant	Extant*	Extant	Riverside County, Private	None WR-MHCP	Factor A – Development, nonnative plants, trampling (ORV), discing, grazing Factor E – Nonnative plants, climate change
EO 55	Diego Dr. and Liefer Rd., Temecula	Not known	Extant*	Extant	Private	None WR-MHCP	Factor A – Development, nonnative plants, mowing Factor E – Nonnative plants, climate change

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (subarea plan), preserve name	Current Threats
EO 57	Pujol St. and First St., Temecula	Not known	Extant	Extant	Private	None WR-MHCP	Factor A – Development (proposed development), nonnative plants Factor E – Nonnative plants, climate change
EO 67	Baker St, northwest of Riverside Dr., Lake Elsinore	Not known	Extant*	Extant	Private	None WR-MHCP	Factor A – Development Factor E – Climate change

Table A5. Occurrence Table for Los Angeles County. Occurrences that are Conserved.

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (subarea plan), preserve name	Current Threats
NA	Palos Verde Peninsula	Not known	Not known	Extant	Private	Conserved RPV HCP Three Sisters Reserve	Factor A – Development Factor E – Climate change

Table A6. Occurrence Table for Translocations within San Diego County.

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (subarea plan), preserve name	Current Threats
EO 23	Kumeyaay Lake	Extant	Extant	Extant	City of SD	Conserved MSCP (City of SD) Mission Trails Regional Park	Factor A – Nonnative plants, trampling, mowing Factor E – Nonnative plants, climate change
EO 39	Los Penasquitos Creek (Bainbridge)	Extirpated	Extirpated	Extant	City of SD	Conserved MSCP (City of SD) Los Penasquitos Canyon Preserve	Factor A – Nonnative plants trampling Factor E – Nonnative plants, climate change
EO 47	Railroad Ave. and Prospect Ave., El Cajon (Railroad Preserve)	Extant	Extant	Extant	County of SD, Private	Conserved MSCP (not approved) Railroad Preserve	Factor A – Development, nonnative plants Factor E – Nonnative plants, climate change
EO 59	Sweetwater River and Campo Rd., Spring Valley	Not known	Extant	Extant	USFWS	Conserved MSCP (County of SD) SDNWR	Factor A – Nonnative plants, trampling, mowing Factor E – Nonnative plants, climate change
EO 60	Mission Gorge Rd. and Fanita Dr., Santee (Forrester Mitigation Site)	Not known	Extant	Extant	Caltrans, Private	Conserved MSCP (not approved) Caltrans	Factor A – Development Factor E – Climate Change
EO 61	Prospect Ave and Atlas View Dr., Santee (Forrester Creek)	Not known	Extant	Extant	City of Santee	None MSCP (not approved) City Park	Factor A – Development, trampling Factor E – Climate change

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (subarea plan), preserve name	Current Threats
EO 63	Los Penasquitos Creek at Least Tern Court, San Diego	Not known	Extant *	Extant	City of SD	Conserved MSCP (City of SD) Los Penasquitos Canyon Preserve	Factor A – Nonnative plants Factor E – Nonnative plants, climate change
EO 65	Hwy 76 at East Vista Way, Vista	Not known	Extant *	Extant	Private	None NC-MSCP	Factor A – Nonnative plants, woody native vegetation Factor E – Nonnative plants, climate change
EO 71	I-5 at San Luis Rey River	Not known	Not known	Extant	Private, City of Oceanside	Mostly conserved MHCP (not approved) Seacliff Preserve	Factor A – Nonnative plants, trampling, mowing (brush management), erosion Factor E – Nonnative plants, climate change
EO 72	Otay Mesa Rd and Corporate Center Dr.	Not known	Not known	Extant	City of SD	Conserved MSCP (City of SD) Cal Terraces	Factor A – No information Factor E – Climate change
EO NA	El Monte Rd., Lakeside (Hanson Pond)	NA	NA	Extant	Private	Conserved MSCP (County of SD)	Factor A – Development, nonnative plants Factor E – Nonnative plants, climate change

Table A7. Occurrence Table for Baja California, Mexico.

CNDDDB EO	Name/Location	Extant at Listing	2010 Status	Current Status	Ownership	Conservation Mechanism status, HCP (subarea plan), preserve name	Current Threats
NA	Vicinity of Ensenada (2 records)	Extant*	Extant*	Presumed extant	Unknown	None	Factor A – Nonnative plants Factor E – Climate change
NA	Punta Colonet (11 records)	Extant*	Extant*	Extant	Unknown	None	Factor A – Agriculture, development, nonnative plants Factor E – Climate change
NA	Vicinity of Lago Chapala (9 records)	Extant*	Extant*	Extant	Unknown	None	Factor A – Nonnative plants, trampling Factor E – Climate change
NA	Santo Domingo (2 records)	Extant*	Presumed extant*	Presumed extant	Unknown	None	Factor A – Agriculture, development, nonnative plants , trampling Factor E – Climate change
NA	Guillermo Prieto (3 records)	Presumed extant*	Presumed extant*	Presumed extant	Unknown	None (El Vizcaino biosphere reserve)	Factor A – Agriculture, development, nonnative plants , trampling Factor E – Climate change
NA	San Jose de Gracias (1 record)	Not known	Extant*	Extant	Unknown	None	Factor E – Climate change

* Herbarium records or survey reports indicate that the occurrence was extant or presumed extant, although we reported that they were extirpated in previous documents.

FIELD OFFICE APPROVAL

Lead Field Supervisor, Fish and Wildlife Service

Approve

Scott A. Sobiech
Field Supervisor