

Interim Core Map Documentation for Sonoma Spineflower (*Chorizanthe valida*)

Version 1

Review Completed: April 2026

Core Map Developer: EPA's Office of Pesticide Programs (OPP)

Species Summary

The Sonoma spineflower (*Chorizanthe valida*) is an erect to spreading annual herb. It is endemic to the Point Reyes Peninsula along the central California coast and occurs in annual coast-prairie grassland on the 'Sirdrak sand' soil type (NRCS 2007, unpaginated; National Park Service 2018, pp. 3–4). The Sonoma spineflower grows 10 to 30 centimeters (3.9 to 11.8 inches) tall and is shaggy-haired. The basal leaves are 1 to 5 centimeter (0.4 to 2.0 inch) long and are typically wider near the tip. The flowers are white to lavender to rose in dense, ball-shaped, pinkish clusters with green bracts below that are 5 to 6 millimeters (0.20 to 0.24 inches) long; and flowering occurs from June through August (Reveal and Hardham 1989, pp. 83–88). The Sonoma spineflower was thought to be extinct for 77 years until it was rediscovered at Abbott's Lagoon in 1980 (Service 2010, p. 1). In the 1998 Recovery Plan, it was noted that Sonoma spineflower individuals protected within an enclosure in 1988 were no longer found in 1996, suggesting a grazing regime is conducive to – and necessary for – the species' survival (Service 1998, p. 28). Landcover in the area includes predominantly various land cover types, including grasslands, coastal scrub, broadleaved evergreen woodlands, and coniferous forests. These diverse habitats support a rich variety of plant and animal life, including marine and terrestrial species.

Description of Core Map

The core map for the Sonoma spineflower is based on biological information. **Figure 1** depicts the resulting interim core map for Sonoma spineflower. The size of this core map is approximately 35 square miles (22,300 acres). As the Sonoma spineflower is restricted to Point Reyes National Seashore, human-caused destruction of habitat (like development) is not occurring within the current range of the species. The grazing regime of cattle remains a threat, as over-grazing and under-grazing pose risks to the species.

The core map developed for the Sonoma spineflower is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Sonoma spineflower. This core map incorporates information developed by FWS and made available to the public; however, the core map has not been formally reviewed by FWS. This interim core map may be revised in the future to incorporate species expert feedback from FWS. This interim core map has a "limited" (2) best professional judgment classification to describe major uncertainties/limitations. There is confidence in the core map because it consists of the only known area where the species occurs, Point Reyes National Seashore. The map is based on the known location described by FWS.

This core map does not replace or revise any range or designated critical habitat developed by FWS for this species. Landcover categories within the core map area are included in **Table 1**.

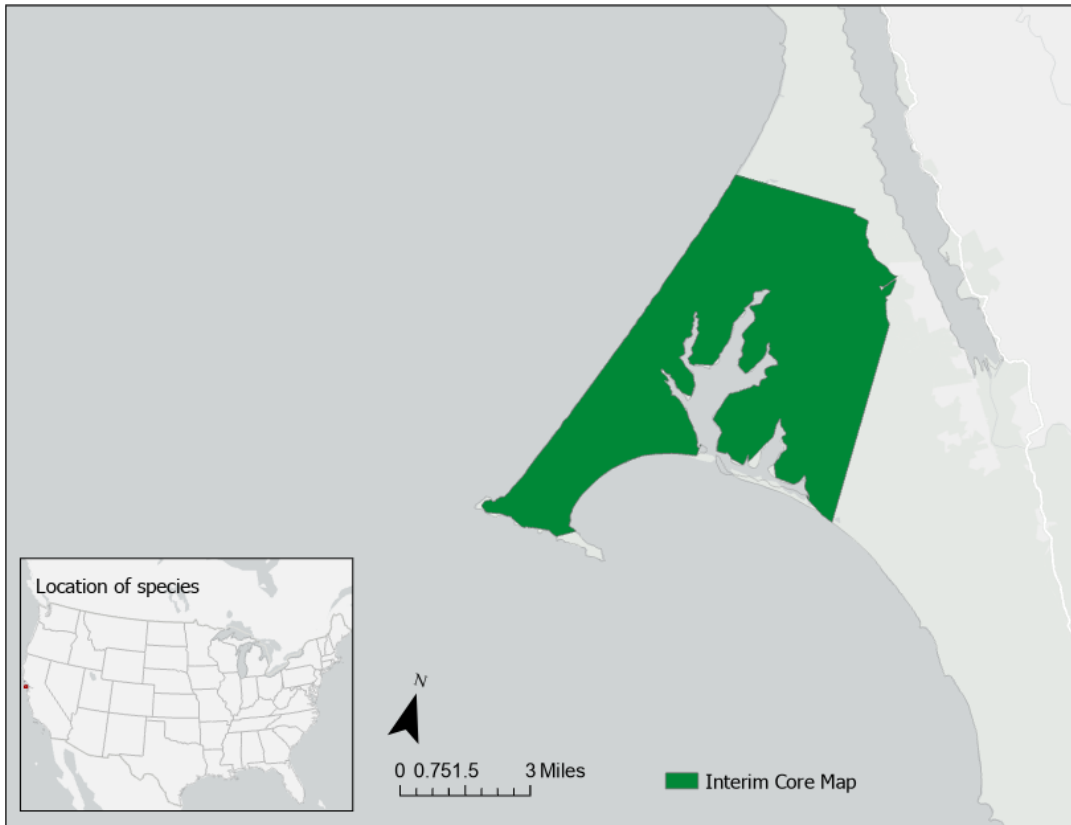


Figure 1. Interim core map for the Sonoma spineflower

Table 1. Percentage of Interim Core Map Represented by NLCD² Land Covers and Associated Example Pesticide Use Sites/Types.

Example pesticide use sites/types	NLCD Class/Value	% Area
Forestry	Deciduous Forest (41)	0%
Forestry	Evergreen Forest (42)	4%
Forestry	Mixed Forest (43)	4%
Agriculture	Pasture/Hay (81)	1%
Agriculture	Cultivated Crops (82)	4%
Mosquito adulticide, residential	Open space, developed (21)	1%
Mosquito adulticide, residential	Developed, Low intensity (22)	0%
Mosquito adulticide, residential	Developed, Medium intensity (23)	0%
Mosquito adulticide, residential	Developed, High intensity (24)	0%
Invasive species control	Woody Wetlands (90)	0%
Invasive species control	Emergent Herbaceous Wetlands (95)	0%

Example pesticide use sites/types	NLCD Class/Value	% Area
Invasive species control	Open water (11)	2%
Invasive species control	Grassland/herbaceous (71)	7%
Invasive species control	Scrub/shrub (52)	74%
Invasive species control	Barren land (rock/sand/clay; 31)	1%
Total Acres	Interim Core Map Acres	22,300 acres

Evaluation of Known Location Information

There are four datasets with known location information:

- Descriptions of locations provided by FWS
- Occurrence locations in iNaturalist
- Occurrence locations in NatureServe
- Occurrence locations in the Global Biodiversity Information Facility (GBIF)

EPA evaluated these sets of data before selecting the type of and developing the core map. FWS appeared to have the finest resolution of the location information, providing a map that depicted the current known locations all within Point Reyes National Seashore (**Figure A1-2 in Appendix 1**). Occurrences in iNaturalist, GBIF, and NatureServe did not support expanding the core map outside of these three watersheds. **Appendix 1** includes more information on the available known location information.

Approach Used to Create Core Map

The core map was developed using the “Process EPA Uses to Develop Core Maps for Draft Pesticide Use Limitation Areas for Species Listed by the U.S. Fish & Wildlife Service (FWS) and their Designated Critical Habitats”³ (referred to as “the process”), as well as observation information available from various publicly available sources (including iNaturalist, GBIF and NatureServe). EPA developed the core map using the 4 steps described in the process document:

1. Compile available information for a species
2. Identify core map type
3. Develop the core map for the species
4. Document the core map.

For step 1, EPA compiled available information for the Sonoma spineflower from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the Sonoma spineflower is included in **Appendix 1**.

Influential information that impacted the development of the core map included occurrences and known locations of Sonoma spineflower are in Point Reyes National Seashore, California.

EPA used the compiled information to identify the core map type including species range and known location information. The extant populations are in Point Reyes National Seashore as identified by FWS. The entire range of the species was not used as the core map because the range contains areas where the species does not occur.

Appendix 1. Information Compiled for Species

1. Recent FWS documents/links and other data sources

- Five Year Review (2024) (https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/19152.pdf)
- Recovery Plan (2019) (https://ecos.fws.gov/docs/recovery_plan/APG%20amendment%20Sonoma%20Spineflower_1.pdf)
- Five Year Review (2010) (https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1672.pdf)
- California Department of Fish and Wildlife (2017) (<https://wildlife.ca.gov/Conservation/Plants/Endangered/Chorizanthe-valida>)
- Nature Serve (2021) (https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.133736/Chorizanthe_valida)

2. Background information

- **Status:** Federally listed as endangered in 1992
- **Resiliency, redundancy, and representation** (the 3Rs)

Resiliency: The Sonoma spineflower was known to be distributed in one naturally occurring population at Abbott’s Lagoon in Point Reyes National Seashore following its rediscovery in 1980 (Service 1992, p. 27849). Since the species’ listing in 1992, National Park Service botanists have implemented several introductions at Point Reyes National Seashore within 2 miles of the natural population, which has led to the creation of new, self-sustaining plots. (Five Year Review 2024)

Redundancy: The number of individuals within each Sonoma spineflower population remains at or above 90,000 for 15 years. Seeds are stored in at least two Center for Plant Conservation certified facilities; seed germination, propagation, and out-planting propagation techniques are understood. The Sonoma spineflower remains an endangered species (Five Year Review 2024).

Representation: There is one naturally occurring population that has been known since its rediscovery in 1980. Additionally, seeding in uninhabited locations in the Point Reyes National Seashore has led to the creation of new, self-sustaining occurrences. Five of these seeded plots have been self-sustaining for over 20 years, and five have for over 10 years (National Park Service 2014, pp. 38–39). With that, it is unclear if all these plots would meet the definition of populations, as several are in close-proximity and may act as subpopulations of each other once they reach larger sizes. The area of each Sonoma spineflower population is maintained at or above approximately 2 acres in size. (Five Year Review 2024).

- **Habitat**

The habitat of the Sonoma spineflower (*Chorizanthe valida*) consists of well drained sandy coastal prairie grassland soils. (FWS, Five Year Review 2024). The species occurs on sandy soils of the coast-prairie grassland with Point Reyes Horkelia (*Horkelia marinensis*), and Large-flower Linanthus (*Linanthus grandiflorus*) (Nature Serve (2021).

- **Pollinator/reproduction**

Flowers, which appear June through August, are white to lavender to rose in color, are 5 to 6 millimeters (0.20 to 0.24 inches) long (Reveal and Hardham 1989) and occur in dense, ball-shaped, pinkish clusters with green bracts below

The pollinators of the Sonoma spineflower are diverse and include species of generalist bees, flies, butterflies, and flower beetles (National Park Service 2016, entire).

- **Taxonomy**

The Sonoma spineflower (*Chorizanthe valida*), a member of the buckwheat family (Polygonaceae), is an erect to spreading annual herb, 10 to 30 centimeters (3.9 to 11.8 inches) tall, shaggy-haired, with 1 to 5 centimeter (0.4 to 2.0 inch) long basal leaves that are typically wider near the tip.

Flowers, which appear June through August, are white to lavender to rose in color, are 5 to 6 millimeters (0.20 to 0.24 inches) long (Reveal and Hardham 1989) and occur in dense, ball-shaped, pinkish clusters with green bracts.

- **Relevant Pesticide Use Sites**

No information specific to pesticide uses because the Sonoma spineflower is restricted to Point Reyes National Seashore.

- **Threats**

FWS (2024) discusses the multiple threats facing the Sonoma spineflower included ongoing and threatened destruction of the species' dune systems, cattle grazing and trampling, habitat degradation by native and invasive plant species, and inadequacy of state and federal protections, and random, stochastic events.

- **Recovery Criteria/Objectives (2024 recovery plan)**

FWS (2024) discusses the Sonoma spineflower's recovery criteria based on updated strategy described in the 2019 Recovery Plan Amendment (FWS 2019). The downlisting criteria for Sonoma spineflower have not been met; thus, delisting criteria are not discussed in detail here. The downlisting criteria for the Sonoma spineflower, and the current status of the criteria, are as follows.

- Threats to the species habitat must be reduced:
 - At least six successful populations have been established. These populations will be considered self-sustaining populations after 15 years, which includes a normal precipitation cycle. **Current Status** – Partially met.
 - The area of each Sonoma spineflower population is maintained at or above approximately 2 acres in size. **Current Status** – Partially met.
 - The cover of invasive native and non-native plants, such as bush lupine, at all sites is controlled at. **Current Status** – Not met.
 - There are management measures implemented to address the threats of invasive species and other problems, including pedestrians and off-road vehicles at some sites. **Current Status** – Partially met.
 - Monitoring reveals that management actions are successful in reducing threats of invasive non-native species. **Current Status** – Partially met.
- Other natural or manmade threats must be reduced:
 - The number of individuals within each Sonoma spineflower population remains at or above 90,000 for 15 years, which includes cycles of normal precipitation. **Current Status** – Not met.
 - Seeds are stored in at least two Center for Plant Conservation certified facilities; seed germination, propagation, and out-planting propagation techniques are understood. **Current Status** – Partially met.

- **Recovery Actions (2024 recommendation)**

FWS (2024) proposes several conservation and monitoring recommendations, which the service believes will aid in the recovery of the Sonoma spineflower. Some of these recommendations have already been discussed in the 2010 5-Year Review and 2019 Recovery Plan Amendment (Service 2010, p. 15; Service 2019, pp. 8–9) and remain valid.

1. Continue annual surveys at all occupied sites.
2. Finalize the species' management plan for the Point Reyes National Seashore.
3. Manage competing vegetation:
 - a. Remove/reduce yellow bush lupine and coyote brush in all occupied areas to prevent continued habitat degradation.
 - b. Remove thatch and competing vegetation annually.
 - c. Consider the removal of other invasive species outside of occupied areas, which may be influencing cattle to graze more frequently in Sonoma spineflower habitat.
4. Research to determine what might cause population declines within the wild population, focusing on grazing intensity and pollinators.
5. Investigate the feasibility of augmenting nesting habitat for main pollinators near some of the current and future introduction sites.
6. Consider re-seeding previously seeded areas that were unsuccessful or are self-sustaining in low numbers.
7. Identify and consider permanently protecting locations within the Sonoma spineflower's historical range that contain suitable habitats for future out plantings. Page 9 of 11
8. Attempt out planting at new locations on protected private and public land within the Sonoma spineflower's historical range.

3. Description of Species Range

The only known populations of Sonoma spineflower exist on lands of California Point Reyes National Seashore, which is owned and operated by the National Park Service. The range is approximately 185,000 acres and was last updated by FWS on 10/30/2015 (**Figure. A1-1**).

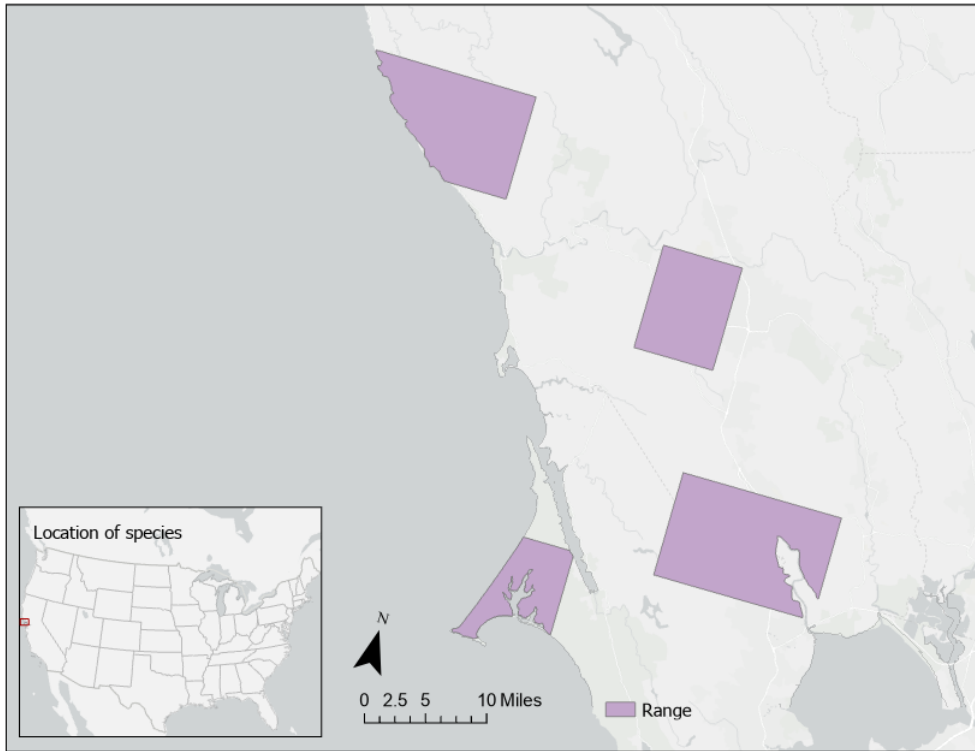


Figure A1-1. Sonoma spineflower’s range; about 185,453 acres.

4. Critical Habitat

- FWS has not designated a critical habitat for this species (<https://ecos.fws.gov/ecp/species/7698>)

5. Known Locations

- Known Locations Described in FWS Recovery Documents
- Currently found in only Point Reyes National Seashore in California (Five Year Review 2024)
- Figure A1-2 depicts the currently known locations from FWS.

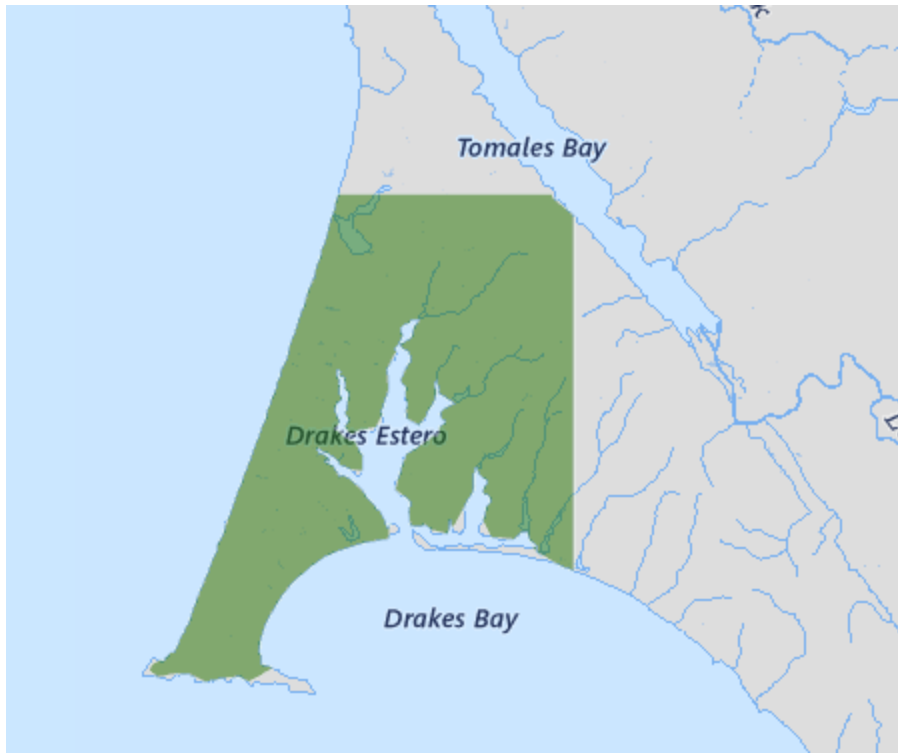


Figure A1-2. Known location map was reproduced from most recent FWS 5-year review (2024) about 22300 acres.

- **Occurrences Included in Public Databases**

EPA queried iNaturalist, GBIF, and NatureServe (searched 6/24/2025).

https://explorer.natureserve.org/pro/Map/?taxonUniqueid=ELEMENT_GLOBAL.2.133736

iNaturalist (available [here](#)) had 37 research grade observations for this species (from 2014-2025), 6 of which appear to fall outside of the Point Reyes National Seashore, but within the species range); however, the positional accuracy of the points do not allow EPA to determine if these occurrences were in or out of the occupied watersheds.

https://www.inaturalist.org/observations?quality_grade=research&taxon_id=76321

GBIF (available [here](#)) included 67 occurrences and human observations (from 1841-2024). All but 30 of these observations with GPS coordinates are in (or adjacent to) Point Reyes National Seashore and some also included in iNaturalist or NatureServe.

<https://www.gbif.org/species/2888934>

Searching in NatureServe at the time this core map was developed yielded no results for Sonoma spineflower (*Chorizanthe valida*)

Collectively, the occurrence data are consistent with the location of Point Reyes National Seashore included in the core map.

References

FWS, 1998. Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan. U.S. Fish and Wildlife Service. 151 pages. https://ecos.fws.gov/docs/recovery_plan/980930d.pdf

FWS, 2019. Recovery Plan for Seven Coastal Plants and the Myrtle's Silverspot Butterfly: *Chorizanthe valida* (Sonoma Spineflower). U.S. Fish and Wildlife Service. 17 pages. https://ecos.fws.gov/docs/recovery_plan/APG%20amendment%20Sonoma%20Spineflower_1.pdf

FWS, 2024. Sonoma spineflower (*Chorizanthe valida*). 5-year review. U.S. Fish and Wildlife Service. 11 pages. https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/19152.pdf

Appendix 2. GIS Data Review and Method to Develop Core Map

EPA developed the interim core map by refining the species range based on the geologic formations and land cover habitat requirements and combining that with the critical habitat and known locations. Further refinements using soils data was considered but ultimately determined to not be useful. GBIF, iNaturalist, and NatureServe data were considered and visually compared to the range and named locations, but not used to refine the interim core map since they were consistent with the range and named locations.

1. Dataset References and Software

- [FWS critical habitat](#)
- [FWS species range](#) last updated on 10/30/2015
- [National Land Use Cover Dataset \(NLCD\)](#)
- Software used: ArcGIS Pro 3.3.0

2. Creating the core map

2.1. Verifying known locations occurrences outside of the critical habitat

As discussed in Appendix 1, FWS documentation discusses several known locations of the Sonoma spineflower outside of its critical habitat. A comparison of the critical habitat, readily downloadable from ECOS. A review of the known locations in the FWS documentation showed that the species is known to occur outside of its critical habitat (**Appendix 1**). For this reason, the species range was used as the outer limit of the core map. The species range was readily available and able to be downloaded from ECOS.

2.2. Refining based on known locations

A review of FWS's documentation discovered several key aspects of the suitable habitat for this species, these included:

- Known populations of the Sonoma spineflower occur in annual coast-prairie grassland on the 'Sirdrak sand' soil type (NRCS 2007, unpaginated; National Park Service 2018).
- The Sonoma spineflower is only found in Point Reyes National Seashore in California (Five Year Review 2024), so other areas of the range that did not include Point Reyes National Seashore were excluded from the core map.