Interim Core Map Documentation for the Sonoma Sunshine

Version 1
Review Completed: April 2026
Core Map Developer: U.S. Environmental Protection Agency (EPA), Office of Pesticide Programs

Species Summary

The Sonoma sunshine (*Blennosperma bakeri,* Entity ID 647) is a small annual herb in the aster family. The U.S. Fish and Wildlife Service (FWS) has not designated a critical habitat for the Sonoma sunshine. This species is typically found growing in vernal pools and wet grasslands on nearly level to slightly sloping loams, clay loams, and clays, and at elevations of below 100 meters (330 feet). Pollination for this species is predominantly performed by insects including at least one specialist bee and multiple generalist bees. Currently, the Sonoma sunshine is found within Sonoma County, California, and spans the Santa Rosa Plain, with one isolated occurrence in Mendocino County. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the Sonoma sunshine is biological information type based on the species range clipped to the California Department of Fish and Wildlife (CDFW) Vernal Pools hexagons and merged with California Natural Diversity Database (CNDDB) ACE hexagons and the Jepson Prairie Reserve polygon from California Protected Areas Database (CPAD) to encapsulate areas the Sonoma sunshine is likely to occur.

Figure 1 depicts the resulting interim core map for the Sonoma sunshine. The size of this core map is approximately 66,661 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly grassland/herbaceous areas.

The core map developed for the Sonoma sunshine is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Sonoma sunshine. 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 an “average” (3) best professional judgment classification to describe uncertainties in the available data used to inform the core map. The map is based on habitat and known locations within the range.

This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

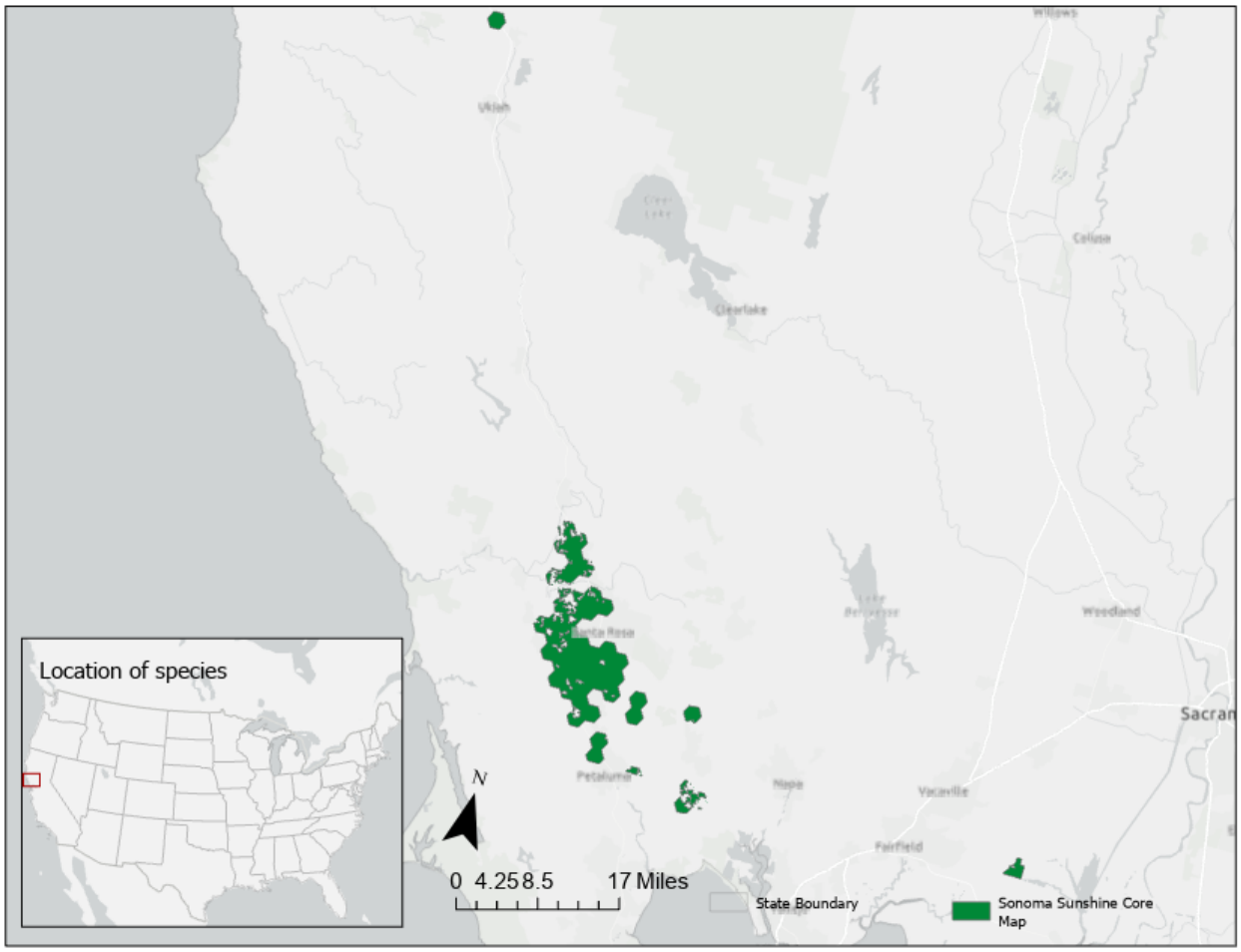

Figure 1. Interim core map for the Sonoma sunshine.

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

Example pesticide use sites/types	NLCD Landcover (Value)	% of core map represented by landcover
Forestry	Deciduous Forest (41)	0%
Forestry	Evergreen Forest (42)	3%
Forestry	Mixed Forest (43)	2%
Agriculture	Pasture/Hay (81)	11%
Agriculture	Cultivated Crops (82)	3%
Mosquito adulticide, residential	Open space, developed (21)	11%
Mosquito adulticide, residential	Developed, Low intensity (22)	12%
Mosquito adulticide, residential	Developed, Medium intensity (23)	13%
Mosquito adulticide, residential	Developed, High intensity (24)	5%
Invasive species control	Woody Wetlands (90)	0%
Invasive species control	Emergent Herbaceous Wetlands (95)	0%
Invasive species control	Open water (11)	1%
Invasive species control	Grassland/herbaceous (71)	33%
Invasive species control	Scrub/shrub (52)	6%
Invasive species control	Barren land (rock/sand/clay; 31)	0%
Total Acres	**Interim Core Map Acres**	**~ 66,661**

Evaluation of Known Location Information

There are four datasets with known location information:

- Descriptions of locations provided by FWS (ACE hexagons available through CNDDB)
- 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 table of the 24 occurrence (19 presumed extant, 2 possibly extirpated, and 3 extirpated) populations, all within Sonoma County except for one point in in Mendocino County outside the species range (**Appendix 1**). One occurrence from GBIF within the Jepson Prairie Reserve was not represented by the FWS known locations and required the addition of a polygon southeast of the core map. The remaining occurrences in iNaturalist, GBIF, and NatureServe did not support further expanding the core map. **Appendix 1** includes more information on the available known location information.

[1] Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, https://doi.org/10.5066/P9JZ7AO3

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"[2] (referred to as "the process"). EPA developed the core map using the four 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 sunshine from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the Sonoma sunshine is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- The Sonoma sunshine requires vernal pool habitat to grow and reproduce.
- Most FWS occurrences (available from CNNDB for mapping reference) of Sonoma sunshine are within the range, except for one occurrence north of the range in Mendocino County. One occurrence was to the east/southeast of the range in Jepson Prairie Reserve, which could be added to the core map.
- Occurrences identified in FWS' 5-year review and vernal pool layer were available for mapping as ACE hexagons from California Natural Diversity Database (CNDDB) and polygons from California Protected Areas Database (CPAD).

For Step 2, EPA used the compiled information to identify the core map type. EPA based the core map on vernal pool habitats from CDFW within the species' range. Since a few known locations reported by FWS were on the border or outside the range/vernal pools layer, ACE hexagons from CNDDB and a polygon from CPAD were added to encapsulate the Sonoma sunshine occurrences.

- For step 3, EPA used the best available data sources to generate the core map. Data sources are discussed in the process document and are identified in Appendix 2. For this core map, EPA used vernal pool habitats identified by CDFW that intersect within the species range. The EPA also use CNDDB ACE hexagons and CPAD polygons to include known locations identified by FWS in 2024 that are outside the range. **Appendix 2** provides more details on the Geographic Information System (GIS) analysis and data used to generate the core map.

Discussion of Approaches and Data that were Considered but not Included in Core Map

The species range was considered but was not selected as the core map because the range map includes substantial habitats in addition to vernal pools. Additionally, the range map was last updated in 2016 and

[2] Dated 2024, available online at: https://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-pesticide-use-limitation-areas

does not include some areas with known populations as of the Five-Year Review (2024). These known locations identified in the 2024 Five Year Review are included in the core map.

Appendix 1. Information Compiled for the Sonoma sunshine

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/16710.pdf
   - Five Year Review (2019) - https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3432.pdf
   - Recovery Plan (2016) - https://ecos.fws.gov/docs/recovery_plan/06012016_Final%20Santa%20Rosa_RP_signed_1.pdf

2. **Background information**
   - **Status**: Federally listed as endangered in 1991
   - **Resiliency, redundancy, and representation** (the 3Rs)
     - FWS has not formally assessed the 3Rs in the Five Year Reviews (2019 & 2024) or Recovery Plan (2016). The Recovery Plan (2016) states a general strategy for focusing on habitat preservation within the core areas and management areas to support resiliency, replication, and representation, and calls for robust and redundant occurrences within Factor E's summary. However, the recovery criteria do not explicitly reference the 3Rs.

   - **Habitat**
     - "Grows in vernal pools, the grassy margins of swales (shallow channels that connect vernal pools), and seasonally wet grasslands at elevations ranging from 9 to 101 meters (m) (30 to 330 feet (ft)) in the Sonoma Valley and between 21 to 43 m (70 to 140 ft) on the Santa Rosa Plain" (Recovery Plan, 2016).
     - "Throughout its range, Blennosperma bakeri occurs in vernal pools on nearly level to slightly sloping loams, clay loams, and clays" (Recovery Plan, 2016).

   - **Pollinator/reproduction** (Five Year Review 2024)
     - "From March through April, the species produces yellow daisy-like flowers composed of disk and ray flowers. The yellow disk flowers have white pollen and stigmas, which are the sexual structures. Sterile ray flowers, which are yellow or sometimes white, have red stigmas and help attract pollinators"
     - "Sonoma sunshine flowers are self-incompatible, meaning that they can set seed only when fertilized by pollen from a different plant".
     - "Sonoma sunshine has multiple pollinators including at least one specialist bee pollinator, and primary pollinators had higher visitation rates in natural versus created vernal pools".
     - "The pollinators of Sonoma sunshine are diverse and include the European honeybee (*Apis mellifera*), four species of generalist native bees, syrphid flies, and most abundantly, the solitary bee (*Andrena blennospermatis*)".

   - **Taxonomy**
     - FWS Category: Flowering plant, dicot (CONUS-9), *Asteraceae* family

- **Relevant Pesticide Use Sites**
    - No specific pesticide use sites were reported in FWS documents. However, the 2024 5-year review noted potential for insecticides to impact pollinators that could be important to this species (Five Year Review, 2024).

- **Recovery Criteria/Objectives** (Recovery Plan, 2016)
    - Recovery Priority Number: 5C
    - Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range (Factor A)
        - "The reduction and fragmentation of habitat due to urban development, agriculture land conversion, and habitat degradation as a result of modification to vernal pool hydrology, and competition with invasive plants are the primary threats to *Blennosperma bakeri*. In order to downlist [and delist] *B. bakeri* to threatened status, threats to the species' habitat must be reduced".
    - Other Natural or Manmade Factors Affecting Its Continued Existence (Factor E)
        - "Other natural or manmade factors that threaten *Blennosperma bakeri* include small, isolated populations and climate change. To downlist [and delist] *Blennosperma bakeri*, these threats must collectively be reduced. Because of past loss of habitat and occurrences of this species, robust and redundant (duplicate) occurrences are needed to ensure that the species persists in the event of reduced rainfall or other stochastic events".

- **Recovery Actions** (Recovery Plan, 2016)
    - Protect extant occurrences and potential habitat
    - Develop a central database for survey data from all natural and created occurrences of the three plant species including information on protection status
    - Collect and store seed from all occurrences of all three plant species covered in this recovery plan
    - Survey historical locations and other potential habitat (not previously surveyed) where the three plant species covered in this recovery plan may occur
    - Conduct research necessary to develop a population viability analysis for the three plants

3. Description of Species Range

- Figure A1-1 depicts the FWS range. The range was last updated on 2/3/2016.

Figure A1-1. FWS range for the Sonoma sunshine. Total acreage is around 333,223 acres.

4. **Critical Habitat**
   - No critical habitat designation for this species.

5. **Known Locations**
   - "The current known distribution of Sonoma sunshine is similar to as described in the previous status review (Diversity Database 2024, entire). The Diversity Database currently reports 24 occurrences (Appendix, Table A; Diversity Database 2024, entire). All of these occurrences, aside from the single occurrence in Mendocino County, are in Sonoma County" (Five Year Review, 2024).
   - Of the 24 occurrences listed in Table A, 19 are presumed extant, 2 are possibly extirpated and 3 are extirpated.

   - **Occurrences Included in Public Databases** (EPA queried iNaturalist, GBIF, and NatureServe on 09/05/2025)
     - iNaturalist (available here) had 144 research grade observations from 2011-2025 for this species. All but one data point fell within species range when accounting for positional accuracy. The one outlier was north of the range in Mendocino County.
     - GBIF (available here; filter for present occurrences in the USA) included 118 human observations from 1975-2025 with 116 observations also in in iNaturalist or

NatureServe. The remaining two data points were from Pl@ntNet. 93 of the 95 GBIF points with coordinate locations coincide with the range when accounting for the positional accuracy of the data. The remaining two points are outside the range to the north in Mendocino County and to the southeast in the Jepson Prairie Reserve.

- Occurrences in NatureServe were consistent with other occurrence data, including the one occurrence north of the species range (linked here).

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

This core map was created based on biological information, including occupied locations and species habitat.

1. **Dataset References and Software**

- FWS Species Range from Environmental Conservation Online System (ECOS) (available here) - last updated on 2/3/2016
- California Department of Fish and Wildlife (CDFW) Vernal Pools, Areas of Conservation Emphasis (ACE), version 3.0 (available here) - last updated 4/22/2025
- ACE hexagons from California Natural Diversity Database (CNDDB), 2025. California Department of Fish and Wildlife, https://wildlife.ca.gov/Data/CNDDB
- California Protected Areas Database (CPAD - www.calands.org), July 2021 (available here) - last updated 10/7/2021
- National Land Cover Database (NLCD) 2021 (available here)
- EPA's Modified Cultivated Layer (available here) - last updated 12/16/2024
- Software used: ArcGIS Pro 3.6.0

2. **Datasets Used in Core Map Development**

Datasets used in core map development are described in EPA's process document.

3. **Core Map Development**

- EPA started with the FWS species range. The species range was clipped to the CDFW Vernal Pools layer. Since a few occurrences fell on the border or outside of the range, they were not captured by the range/vernal pool map. These occurrences were added by merging the range/vernal pool layer with the CNDDB ACE hexagons and the CPAD polygon for Jepson Prairie Reserve. The developer used the following steps to create the core map:
    - Add the FWS range shapefile and Export Features for "EntityID is equal to 647" to filter for the Sonoma sunshine's range
    - Add the Vernal Pools layer and Export Features for "VernalPool is equal to Y" to filter for hexagons with vernal pool habitats
    - Clip the species range to the vernal pool layer
    - Add the CNDDB ACE hexagons for the Sonoma Sunshine. ACE hexagons representing extirpated populations were not included in the core map.
    - Add data from path for the CPAD feature layer and Export Features for "UNIT_NAME is equal to Jepson Prairie Reserve" to filter for the Jepson Prairie polygon
    - Merge the range/vernal pool clip with the CNDDB Ace Hexagons and the Jepson Prairie Reserve polygon
    - Dissolve to merged maps to create one polygon for the interim core map
    - Pairwise erase cultivated lands from the core map
    - Core map saved as "Sonoma Sunshine Core Map.shp" in Shapefile folder