Interim Core Map Documentation for the Pismo Clarkia

Version 1

Review Completed: April 2026

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

Species Summary

The Pismo clarkia (*Clarkia speciosa ssp. immaculata,* Entity ID 670) is an endangered terrestrial plant (dicot). The U.S. Fish and Wildlife Service (FWS) has not designated a critical habitat for the Pismo clarkia. This species is associated with open sites in oak woodland habitats but also has an affinity for openings in other habitat types including grasslands, coastal scrub and chaparral. While self-pollination may occur in this species, most successful reproductive events occur via outcrossing with insect pollinators–however evaluations of floral visitors and pollinators has not occurred. This species is restricted to sandy coastal hillsides within San Luis Obispo County that are less than 100 meters (m) or 328 feet (ft) above mean sea level. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the Pismo clarkia is based on biological information. The outer extent of this core map is defined by the range that FWS identified. EPA refined this area to create the core map by removing areas that are greater than 100 m or 328 ft above mean sea level, as this species is restricted to sandy coastal areas below 100 m. There is no designated critical habitat for this species.

Figure 1 depicts the resulting interim core map for the Pismo clarkia. The size of this core map is approximately 71,277 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly grasslands, scrub, and cultivated areas.

The core map developed for the Pismo clarkia is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Pismo clarkia. 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 "limited" (2) best professional judgment classification to describe major uncertainties/limitations. The map is based on the range described by FWS, and EPA removed some additional areas based on biological needs of the species. The map is consistent with FWS occurrence data.

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

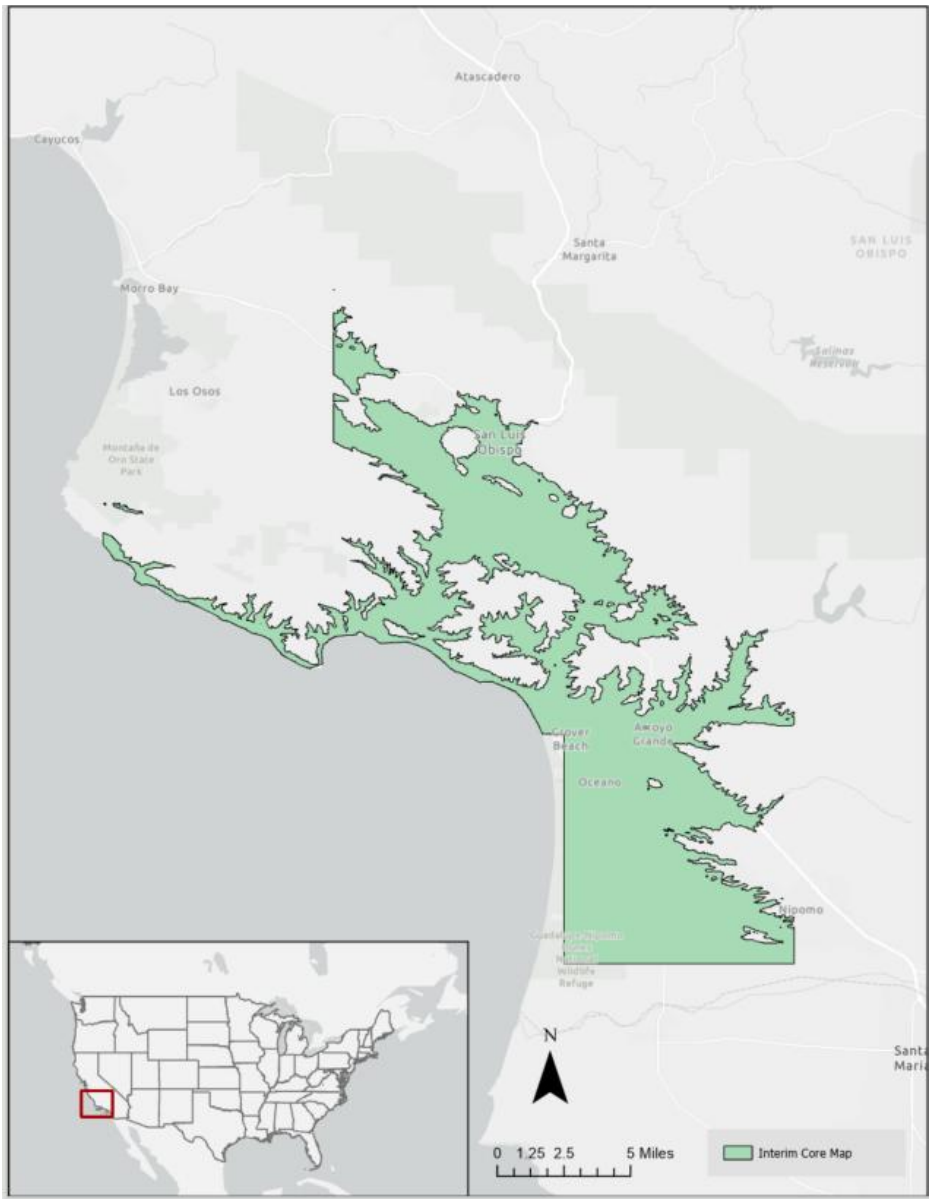

Figure 1. Interim core map for the Pismo clarkia.

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)	2
Forestry	Mixed Forest (43)	4
Agriculture	Pasture/Hay (81)	2
Agriculture	Cultivated Crops (82)	14
Mosquito adulticide, residential	Open space, developed (21)	10
Mosquito adulticide, residential	Developed, Low intensity (22)	10
Mosquito adulticide, residential	Developed, Medium intensity (23)	9
Mosquito adulticide, residential	Developed, High intensity (24)	1
Invasive species control	Woody Wetlands (90)	1
Invasive species control	Emergent Herbaceous Wetlands (95)	2
Invasive species control	Open water (11)	1
Invasive species control	Grassland/herbaceous (71)	24
Invasive species control	Scrub/shrub (52)	19
Invasive species control	Barren land (rock/sand/clay; 31)	0
Total Acres	**Interim Core Map Acres**	**~ 71,277**

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 four 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 the San Luis Obispo County (**Figure A1-2 in Appendix 1**). Occurrences in iNaturalist, GBIF, and NatureServe did not support expanding the core map further. **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

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

Habitats"[2] (referred to as "the process"). 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 Pismo clarkia from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the Pismo clarkia is included in **Appendix 1**. Influential information that impacted the development of the core map included species habitat and elevation restrictions.

For step 2, EPA used the compiled information to identify the core map type including species range and known location information. EPA based the core map on areas less than 100 m above sea level within the species range.

For step 3, EPA used the best available data sources to generate the core map. Data sources are discussed in the process document. For this core map, EPA used the Ground Surface Elevation – 30 m data to remove areas greater than 100 m above sea level as required by the species. **Appendix 2** provides more details on the GIS analysis and data used to generate the core map.

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

EPA did not explore approaches other than those described in this documentation.

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

Appendix 1. Information Compiled for the Pismo clarkia

1. **Recent FWS documents/links and other data sources**
   - Five Year Review (2023) (https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/4088.pdf)
   - Recovery Plan (2019) (https://ecos.fws.gov/docs/recovery_plan/Recovery%20Plan%20Amendment_IKMB%20CCBT%20PismoClarkia.pdf)

2. **Background information (*Five Year Review 2023*)**
   - **Status**: Federally listed as endangered in 1994
   - **Resiliency, redundancy, and representation** (the 3Rs)

     Resiliency: The Pismo clarkia is currently known from 28 occurrences. Two of these occurrences are extirpated and six are considered likely extirpated. At least some portion of six occurrences are known to be extant and the remaining 14 are presumed extant. There is little Pismo clarkia abundance data to report. Only 17 of the occurrences have any reported abundance. Four of which have zero individuals reported and are likely extirpated. Of the remaining 13, only three included observations made after 2009.

     Redundancy: Two of the 28 occurrences are extirpated and six are considered likely extirpated. It is unknown how long Pismo clarkia seed remain viable. Seeds likely persist in the soil as a seedbank based on observations by researchers which stated that Pismo clarkia plants did not appear in the same locations in consecutive years. Other research showed that Pismo clarkia seeds remained viable and ungerminated as a seed bank in any given year of monitoring. C. springvillensis seeds stored at room temperature were not viable after eight years. However, they remained viable for at least two consecutive years of study. Five of 23 element occurrences (EOs) are considered at risk of extirpation.

     Representation: It could be that the species relies on seed bank, which may remain dormant for extended periods of time until conditions are suitable. All known Pismo clarkia occurrences are on private lands, except for one newly established population described in more depth under recovery actions.

   - **Habitat (*Five Year Review 2023*)**
     - Pismo clarkia is restricted to sandy coastal hillsides within San Luis Obispo County that are less than 100 m or 328 ft above mean sea level.
     - Associated with open sites in oak woodland habitats. But also has an affinity for openings in other habitat types including grasslands, coastal scrub and chaparral.
     - Pismo clarkia is often found within the transition zones between these different vegetation communities. For example, it often occurs within marginal areas and gradients between stands of oak woodland and the other habitat types.

   - **Pollinator/reproduction (*Five Year Review 2023*)**

- flowering occurs in May through July
- produces capsule fruits that generally produce many small black seeds
- is self-compatible.
- While self-pollination may occur, most successful reproductive events occur via outcrossing with insect pollinators–however evaluations of floral visitors and pollinators has not occurred.

- **Taxonomy**
  - Terrestrial Plant
  - Flowering dicot plant

- **Relevant Pesticide Use Sites (*Five Year Review 2023*)**
  - There is a new development proposal to create a 1,289-home residential community, within an approximately 288-acre site in southwestern San Luis Obispo County. The site supports a Pismo Clarkia population, and even though an open space area will be established for the project, FWS mentions that this population could be exposed to herbicides.

- **Recovery Criteria/Objectives (*2019 Recovery Plan*)**
  - threats are reduced or eliminated so that occurrences are capable of persisting without significant human intervention or perpetual endowments are secured for management necessary to maintain the continued existence of the species; and
  - an ex-situ seedbank is established in a Center for Plant Conservation-affiliated botanic garden. While sufficient seedbank in the soil would typically provide a strategy for the taxon to persist through several years of short- or medium-term drought, it may not be sufficient to persist through long-term drought. Therefore, an ex-situ seedbank would provide assurance that an occurrences could be reseeded, should long-term drought – or other stochastic events – make it necessary; and
  - all existing occurrences are stable or increasing in the wild for at least 10 years. We expect above-ground occurrence size to fluctuate annually, based on response to amount and timing of rainfall. Therefore, a period of 10 years should be long enough to include most of the variability in rainfall that occurs in this region. Monitoring of occurrences should be undertaken and access to private properties that support the species should be pursued, which will provide a baseline for the status of these occurrences; these data should provide a basis for monitoring occurrence attributes and trends to determine the species trajectory over time.

- **Recovery Actions (*Five Year Review 2023*)**
  - Since 2009 there have been two Pismo clarkia restoration efforts conducted at separate locations.
    - Botanists conducted the first as mitigation for an oil and gas development project. These efforts occurred at the Arroyo Grande Oil Field, which is still fully operational and currently run by Sentinel Peak Resources, LLC.

- The second effort is a joint recovery project with VFWO and CDFW to create a new population of Pismo clarkia and test various management techniques for the taxon within the Pismo Preserve. The site is owned and managed by the Land Conservancy of San Luis Obispo County (LC-SLO) and is in Pismo Beach.

3. Description of Species Range

- Figure A1-1 depicts the FWS range. The range was last updated on 11/1/2023. Total acreage of range is around 203,433 acres.

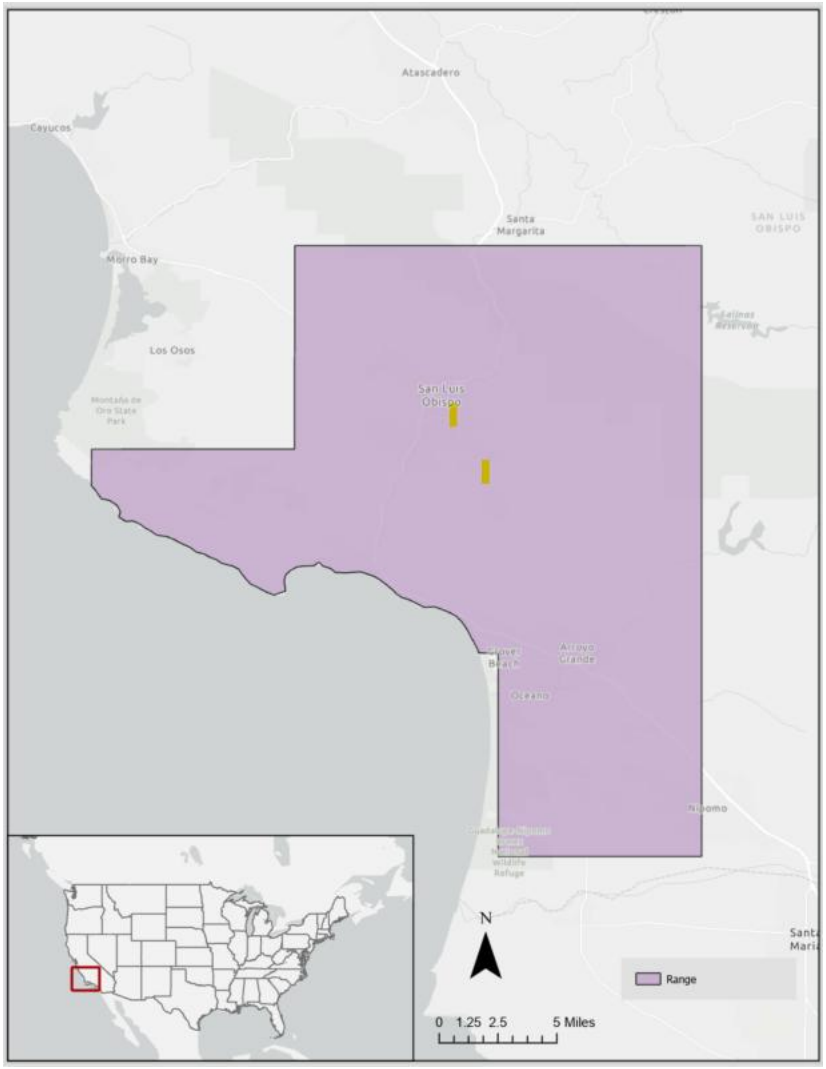

Figure A1-1. FWS range for the Pismo clarkia. The total acreage of the range is around 203,433 acres.

4. Critical Habitat

- FWS has not designated a critical habitat for this species.

5. Known Locations

- Pismo clarkia currently consists of 26 known CNDDB occurrences. Of these, two are extirpated, six are likely extirpated, four are at least partially extant, four are extant, and 14 are presumed extant.
- There are two other occurrences where development projects are proposed, and these are presumed extant.
- Lastly, there are 17 georeferenced Pismo clarkia herbarium specimens, although we do not know the status of the taxon at these locations. Due to this reason these 17 were not included in the occurrence count of the species.
    - Figure A1-2 depicts the currently known locations from FWS.

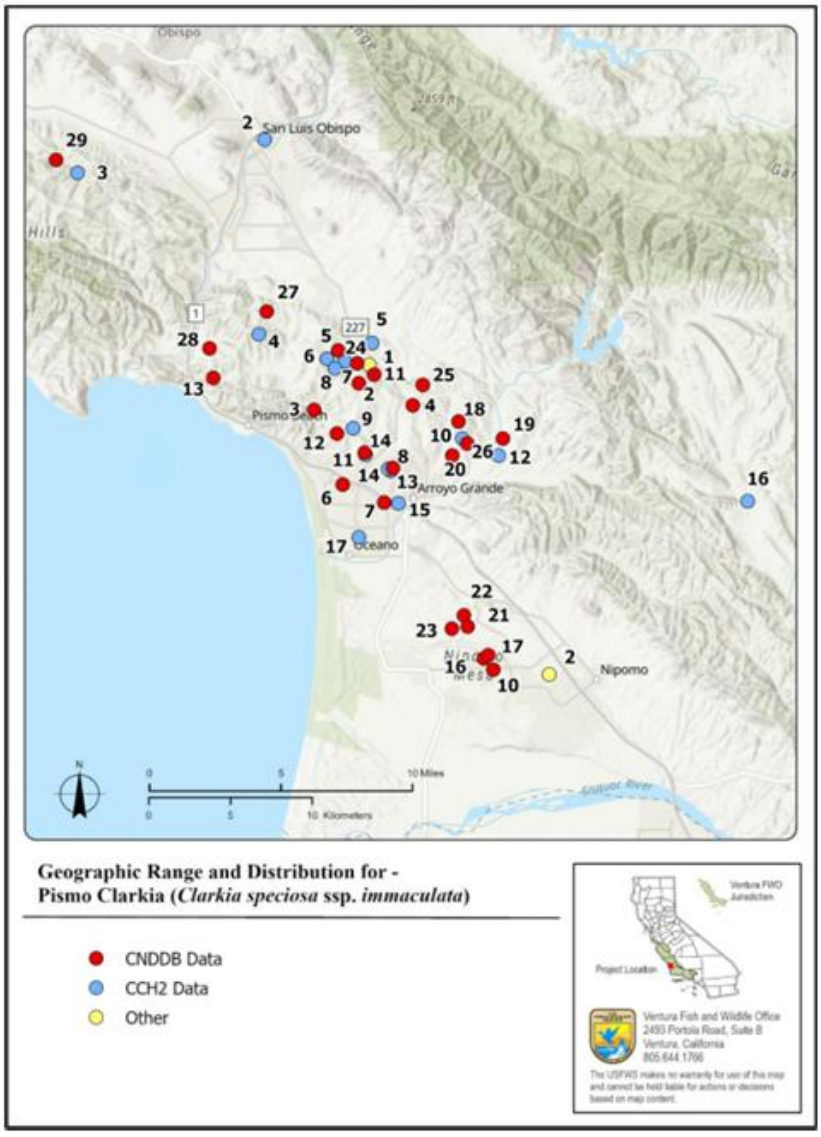

Figure 1. Current range and distribution of Pismo clarkia (*Clarkia speciosa* ssp. *immaculata*), San Luis Obispo County, California; based on data from the California Natural Diversity Database (CNDDB), Consortium of California Herbaria (CCH2) Data Portal, and other information from the California Department of Fish and Wildlife ([CDFW], CNDDB 2023b, website; CCH2 2023, website; Bahm 2023, pers comm). Numbers are for reference only within this document, and do not necessarily correlate to numbers in other data.

Figure A1-2. Known location information from FWS. Map reproduced from most recent FWS 5-year review (2023).

- **Occurrences Included in Public Databases**
  EPA queried iNaturalist, GBIF, and NatureServe. Occurrences in NatureServe were consistent with other occurrence data (linked here). Collectively, the occurrence data are consistent with the core map.

  iNaturalist (available here) had 57 research grade observations for this species. The occurrences are consistent with the species range given the positional accuracy of the occurrence data.

  GBIF (available here) included 57 occurrences with human observations (from 2005-2025). All these observations are also included in iNaturalist or NatureServe.

  Collectively, the occurrence data are consistent with the range of Pismo clarkia and do not support further expanding the core map.

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

This core map was created based on biological information, including species habitat. EPA used the range provided by FWS as the starting point (outer extent) for developing this core map. The range was further refined to remove areas greater than 100 m above sea level.

1. **Dataset References and Software**

- USGS 3DEP Elevation – 30 m[3]
  - 30 m raster dataset that contains elevation data estimates.
- Software used: ArcGIS Pro 3.2
- FWS Species Range – last updated on 11/1/2023

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

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

3. **Core Map Development**

- EPA started with the range provided by FWS to set the outer extent of the core map.

- This species is restricted to areas less than 100 m above sea level; therefore, areas greater than 100 m were considered non-habitat and were removed. These areas were removed using USGS 3DEP Elevation – 30 m.
  - anything greater than 100 m above sea level was removed using a conditional raster.
  - Raster to polygon
  - Merge features

[3] https://epa.maps.arcgis.com/home/item.html?id=0383ba18906149e3bd2a0975a0afdb8e