

# Interim Core Map Documentation for California Jewelflower

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**Interim Core Map Developer:** U.S. Environmental Protection Agency (EPA), Office of Pesticide Programs

## Species Summary

The California jewelflower (*Caulanthus californicus*, Entity ID 1078) is an endangered terrestrial plant (dicot). The U.S. Fish and Wildlife Service (FWS) has not designated a critical habitat for the California jewelflower. Extant populations of the California jewelflower occur in nonnative grasslands, upper Sonoran subshrub scrub, and cismontane juniper woodland and scrub communities at an elevation range of 70 to 1,000 meters (230 to 3,280 feet). The California jewelflower is pollinated by a wide variety of bees. Currently, there are 37 Diversity Database occurrences that are presumed extant for the California jewelflower found in California counties Fresno County, Kern County, and San Luis Obispo County. Additional information on the species is provided in **Appendix 1**.

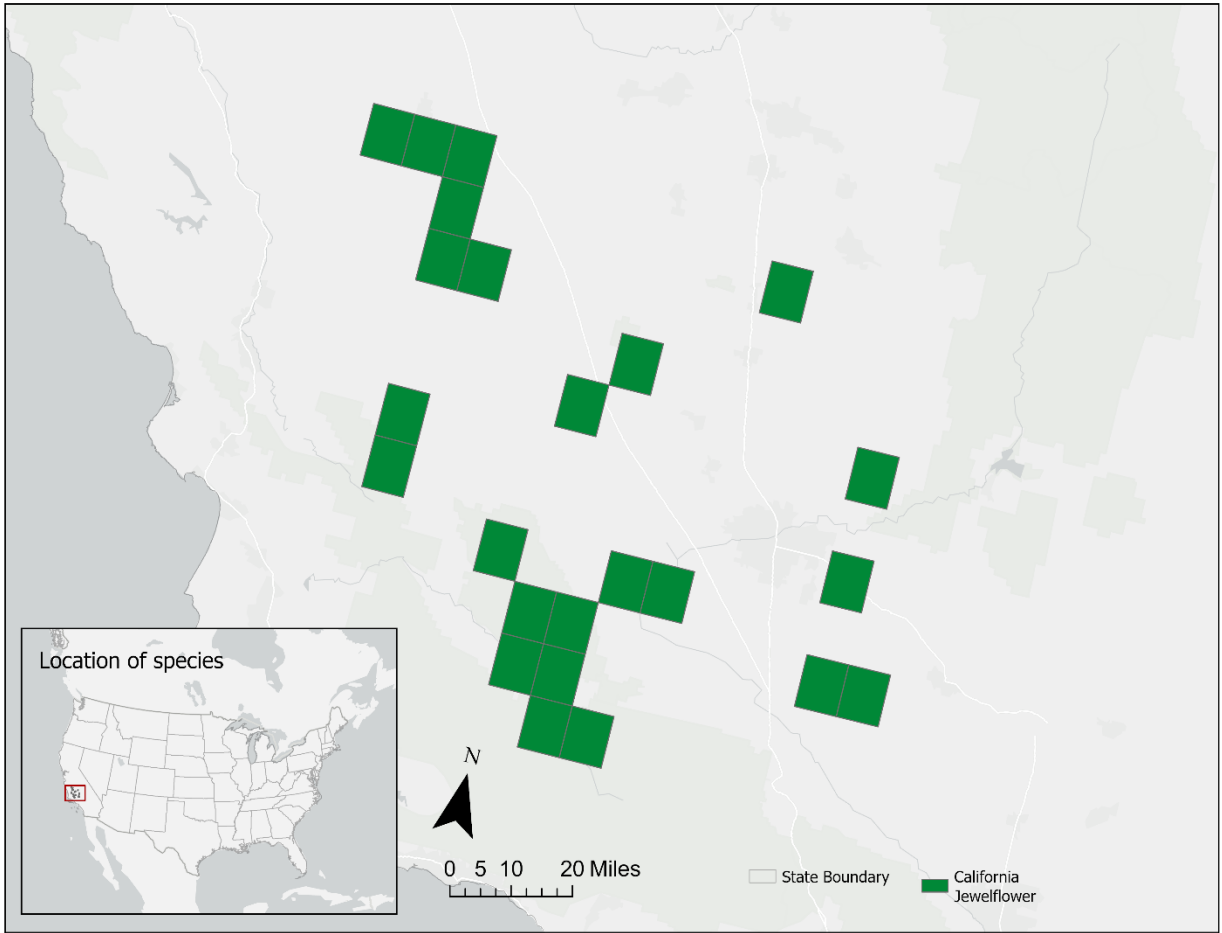
## Description of Core Map

The core map for the California jewelflower is biological information type based on areas of conservation emphasis where all 37 extant California Natural Diversity Database (CNDDDB) known locations are found.

**Figure 1** depicts the resulting interim core map for the California jewelflower. The size of this core map is approximately 933,722 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly Grassland/Herbaceous and Shrub/Scrub.

The core map developed for the California jewelflower is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the California jewelflower. 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 major uncertainties/limitations. The map is based on known locations described by FWS and areas of conservation emphasis surrounding the known locations. 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 California jewelflower.**

**Table 1. Percentage of Interim Core Map Represented by NLCD<sup>1</sup> Land Covers and Associated Example Pesticide Use Sites/Types.**

Example pesticide use sites/types	NLCD Landcover (Value)	% of core map represented by landcover	% of core map represented by example pesticide use
Forestry	Deciduous Forest (41)	<1	~1.5
Forestry	Evergreen Forest (42)	1	~1.5
Forestry	Mixed Forest (43)	<1	~1.5
Agriculture	Pasture/Hay (81)	~22	~23
Agriculture	Cultivated Crops (82)	~1	~23
Mosquito adulticide, residential	Open space, developed (21)	~3	~3.5
Mosquito adulticide, residential	Developed, Low intensity (22)	<1	~3.5
Mosquito adulticide, residential	Developed, Medium intensity (23)	<1	~3.5
Mosquito adulticide, residential	Developed, High intensity (24)	0	~3.5
Invasive species control	Woody Wetlands (90)	<1	~72
Invasive species control	Emergent Herbaceous Wetlands (95)	<1	~72
Invasive species control	Open water (11)	1	~72
Invasive species control	Grassland/herbaceous (71)	57	~72
Invasive species control	Scrub/shrub (52)	14	~72
Invasive species control	Barren land (rock/sand/clay; 31)	<1	~72
<b>Total Acres</b>	<b>Interim Core Map Acres</b>	<b>~ 933,722</b>	

## 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; and
- 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 (**Figure A1-2 in Appendix 1**).

Occurrences in iNaturalist, GBIF, and NatureServe did not support expanding the core map. **Appendix 1** includes more information on the available known location information.

<sup>1</sup> 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”<sup>2</sup> (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 California jewelflower from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the California jewelflower is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Occurrences and known locations of the California jewelflower are documented in FWS documentation
- Range is a large, contiguous area that includes unoccupied locations
- No critical habitat has been designated for this species

For step 2, EPA used the compiled information to identify the core map type including species range and known location information. The extant populations are in California counties; Fresno County, Kern County and San Luis Obispo County identified by FWS within the species’ range. Therefore, EPA based the core map on known locations 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. Known location were clipped to the areas of emphasis (ACE) from California Natural Diversity Database (CNDDB) because more precise location information was not described in FWS documentation.

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 known locations identified in FWS documentation and expanded to ACE. **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 explored using GIS datasets that describe the species’ habitat to further refine the core map. However, this approach was not used because the California jewelflower is a habitat generalist and the removal of unsuitable habitat would not meaningfully refine the core map and would have increased uncertainty in the results.

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<sup>2</sup> 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 California Jewelflower During Step 1

### 1. Recent FWS documents/links and other data sources

- Five Year Review (2025) ([https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/26907.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/26907.pdf))
- Five Year Review (2020) ([https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/3044.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3044.pdf))
- Five Year Review (2013) ([https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/2053.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2053.pdf))
- Recovery Plan for Upland Species of the San Joaquin Valley, California (1998) ([https://ecos.fws.gov/docs/recovery\\_plan/980930a.pdf](https://ecos.fws.gov/docs/recovery_plan/980930a.pdf))

### 2. Background information

- **Status:** Federally listed as endangered in 1990
- **Resiliency, redundancy, and representation** (the 3Rs)

Resiliency: Not available

Redundancy: Not available

Representation: Not available

- **Habitat**

“Extant populations of California jewelflower occur in Nonnative Grassland, Upper Sonoran Subshrub Scrub, and Cismontane Juniper Woodland and Scrub (E. Cypher unpubl. data). Historical records suggest that California jewelflower also occurred in the Valley’ Saltbush Scrub community in the past (CDFG 1995). Herbaceous cover was dense at most California jewelflower sites studied in 1993 (Cypher 1994a). Native plant species, such as annual fescue (*Vulpia microstachys*), clovers (*Trifolium* spp.), red maids (*Calandrinia ciliata*), and goldfields (*Lasthenia californica*) comprised a high proportion of the vegetation at many’ of the known locations over several years. The exotic grass red brome (*Bromus madritensis* ssp. *rubens*) was a significant component of the vegetation only at the Carrizo Plain sites (Taylor and Davilla 1986, Lewis in litt. 1993, Cypher 1994a, E. Cypher unpubl. data). On the Carrizo Plain. California jewelflower occurred primarily on the burrow systems of giant kangaroo rats (*Dipodomys ingens*), another endangered species (Cypher 1994a). Populations of California jewelflower have been reported from elevations of approximately 75 to 900 meters (240 to 2,950 feet) and from level terrain to 25 percent slopes. Soils at known sites are primarily subalkaline, sandy loams (CDFG 1995, Taylor and Davilla 1986, Lewis in litt. 1993).” Recovery Plan for Upland Species of the San Joaquin Valley, California (1998)

- **Pollinator/reproduction**

- “California jewelflower is pollinated by a wide variety of bees, which is discussed further below in Pollination study (Cusser et al. 2024, p. 22). In particular,

<sup>3</sup>solitary mining bees in the family Andrenidae are frequent and effective visitors to California jewelflowers (Cusser et al. 2024, p. 22). Additionally, Mazer and Hendrickson (1993, pp. 29–30) demonstrated that California jewelflowers typically do not self-pollinate and, instead, rely on insect pollinators for seed production.” Five Year Review (2025)

- **Taxonomy**
  - Terrestrial Plant
  - FWS Category: Flowering dicot plants with biotic pollination vectors for reproduction
  
- **Relevant Pesticide Use Sites**
  - Pesticide use sites were not described in FWS documentation
  
- **Recovery Criteria/Objectives (2006 recovery plan)**
  - “Recovery criteria for downlisting and delisting the California jewelflower are described in the Recovery Plan for Upland Species of the San Joaquin Valley (Service 1998, pp. 180, 184).
    - The recovery goal is to maintain self-sustaining populations in protected areas representative of the former geographic and topographic range of the taxon and in a variety of appropriate natural communities (Service 1998, p. 31).
    - The recovery criteria focus on three recovery sites, which 6 encompasses the known distribution at the time of recovery plan development: Kreyenhagen Hills, Carrizo Plain, and Santa Barbara Canyon.
    - The presumed extant and possibly extirpated Diversity Database occurrences for each recovery site are included below (Diversity Database 2025, entire).“ Five Year Review (2025)
  
- **Recovery Actions (Five Year Review (2025))**
  - 1. Habitat Acquisition, Management, and Restoration. All occurrences of the California jewelflower should be protected. Resource agencies and private partner groups should coordinate to ensure land protection through acquisition or conservation easement, and large unprotected areas currently occupied by the species should be given the highest priority. Protected lands must also be adequately managed or restored based on the best available science. Management on public lands should include provisions for suitable levels of sheep and cattle grazing for nonnative plant control.
  - 2. Determine Population Status and Monitor at Occupied Sites. The status of all Diversity Database occurrences should be evaluated to inform the current distribution and abundance of the species and the abundance trends of each occurrence. Surveys should include, at minimum, whether the species is present, estimated occurrence size and an in depth analysis of habitat conditions and threats at each location. Surveys should also be conducted over multiple consecutive years to determine whether populations are declining, stable or increasing, and whether

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<sup>3</sup> California Natural Diversity Database (CNDDDB) <https://wildlife.ca.gov/Data/CNDDDB>

the trends are correlated with habitat conditions. For presumed extant occurrences, surveys should be conducted continuously over multiple years with varying precipitation levels, and results should be compiled into an analysis that identifies and characterizes currently occupied sites. These results should also be used to help inform decision makers about the acquisition of appropriate sites where the California jewelflower occurs but is unprotected, to suggest sites that could be acquired for restoration, and to develop an adaptive management program that will achieve recovery for the species.

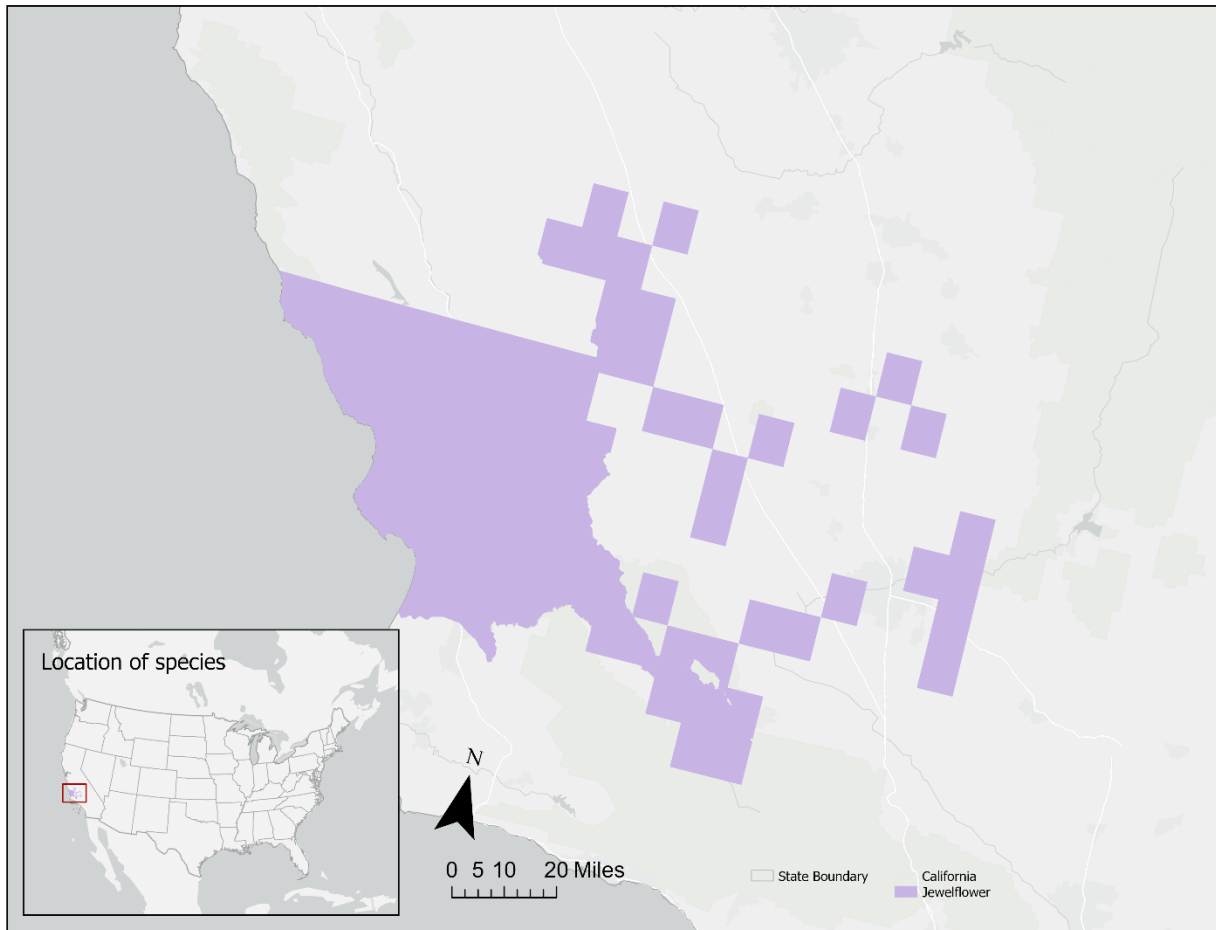
- 3. Species Studies. Studies should be conducted to understand California jewelflower propagation requirements, the physical and chemical elements of the soil required for successful re-establishment, the presence and role of mutualistic soil fungi, the species and role of pollinators, genetics and seed dispersal mechanisms. The study results may inform reintroductions and population augmentation, if appropriate. Seeds should be collected from presumed extant sites and banked at an appropriate depository for the purposes of these studies. Seeds may also be used for seed bulking, reintroduction and population augmentation.
- 4. Studying and Ameliorating Threats. Threats such as loss and degradation of habitat and nonnative plant species should be eliminated, reduced or ameliorated. Habitat degradation due to climate change and nitrogen deposition should be studied to understand how to implement measures to ameliorate the effects from these threats. Conduct studies to determine the most effective methods for nonnative vegetation management, such as herbicide, manual removal, or prescribed burning.” Five Year Review (2025)

### 3. Description of Species Range

- Figure A1-1 depicts the FWS range. The range was last updated on 03/20/2018. The total acreage<sup>4</sup> range is approximately 3,054,372 acres.

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<sup>4</sup> Areas of Conservation Emphasis (ACE) <https://wildlife.ca.gov/Data/Analysis/ACE>



**Figure A1-1. FWS range for the California jewelflower. The total acreage of the range is approximately 3,054,372 acres.**

#### 4. Critical Habitat

- FWS has not designated a critical habitat for this species (<https://ecos.fws.gov/ecp/species/4599>)

#### 5. Known Locations

- Known Locations Described in FWS Recovery Documents
  - Currently, there are 37 Diversity Database occurrences that are presumed extant located in California counties Fresno County, Kern County, and San Luis Obispo County.
  - No known location figure was created to due to sensitivity of the precise location data.
- **Occurrences Included in Public Databases**  
 EPA queried iNaturalist, GBIF, and NatureServe. Occurrences in NatureServe were also consistent with other occurrence data (linked [here](#)). Collectively, the occurrence data are consistent with the identified core map.

iNaturalist (available [here](#)) had 48 research grade observations for this species, some of the occurrences fall outside of the core map; however, the positional accuracy of the points do not allow EPA to determine if these occurrences were in or out of the occupied watersheds.

GBIF (available [here](#)) included 62 occurrences and human observations (from 2013-2024). All these observations are also included in iNaturalist or NatureServe. GBIF points largely coincide with the core map but those any data that fall outside of the core map can also be accounted for by the resolution of the location data.

Collectively, the occurrence data are consistent with the core map given the precision of the public information.

## Appendix 2. GIS Data Review and Method to Develop Core Map (Step 3)

This core map was created based on biological information, including occupied location. EPA used CNDDDB known location data and expanded it to ACE to be protective of the species. Habitat was not used as a refiner due to this species occurring in multiple habitats. Additionally, even though the California jewelflower does not occur on cultivated lands, cultivated lands were not removed from the core map to ensure nearby potential habitat was included.

### Dataset References and Software

- Software used: ArcGIS Pro 3.2
- FWS Species Range – last updated on 03/20/2018
- National Land Cover Database (NLCD)<sup>1</sup>
- CNDDDB<sup>3</sup>
- ACE<sup>4</sup>

### 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 FWS species range. The core map was next refined using FWS known locations for the species since range was unrefined. EPA used known locations defined in FWS documentation from CNDBB and what ACE the data points occurred in to refine the species core map.
- Mapped CNDDDB data and selected all ACE polygons known locations occurred in to form core map.
- National Land Cover Database (NLCD) dataset was clipped to the core map extent using export raster.
- Raster to polygon.
- Pairwise dissolve by Classname to create single polygons per landcover type.
- Calculate geometry to get acres per landcover category.
- The core map is captured in shape files named "California\_Jewelflower\_Core\_Map.shp," "California\_Jewelflower\_Core\_Map.shx," and "California\_Jewelflower\_Core\_Map.dbf."