Interim Core Map Documentation for the Spreading Navarretia

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

Species Summary

The spreading navarretia (*Navarretia fossalis,* Entity ID 972) is a threatened plant (dicot). The U.S. Fish and Wildlife Service (FWS) has designated a critical habitat for the spreading navarretia in 2010 based on areas determined to be occupied at the time and the presence of primary constituent elements. This species is typically found growing on ephemeral wetlands and seasonally flooded alkali vernal plain habitats where it depends on the inundation and drying cycles for survival. Consequently, they may occur wherever the same hydrological dynamics occur such as man-made depressions, riverine areas, etc. The pollination and seed dispersal mechanisms of the spreading navarretia are not well known. This species is capable of self-pollination but is not an obligate self-pollinator. Currently, the spreading navarretia is found in only three counties in California, Los Angeles County, Riverside County, and San Diego county. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the spreading navarretia is based on biological information. The outer extent of this core map is defined by the union between designated critical habitat, species occurrence GIS data from FWS, and the 22 addendum extant sites (areas of occurrence named by FWS in 2023 but was not part of the basis for the 2010 critical habitat designation). EPA manually located the 22 addendum extant sites. Once located, EPA used nearby vernal pool areas of conservation emphasis (ACE), if any, defined by California Department of Fish and Wildlife (CDFW). If no vernal pool ACEs were adjacent to the defined area, EPA used nearby ephemeral streams found in the National Hydrography Dataset Plus High Resolution (NHD Plus HR). If no ephemeral streams are nearby, then EPA manually drew the polygon to fit the site description as best as possible.

Figure 1 depicts the resulting interim core map for the spreading navarretia. The size of this core map is approximately 76,837 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly shrub/scrub lands, grassland/herbaceous, and developed medium intensity.

The core map developed for the spreading navarretia is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the spreading navarretia. 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 most significant source of uncertainty arises from EPA’s process for approximating the locations and areas for the 22 FWS known locations without a Geographic Information System (GIS) component.

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

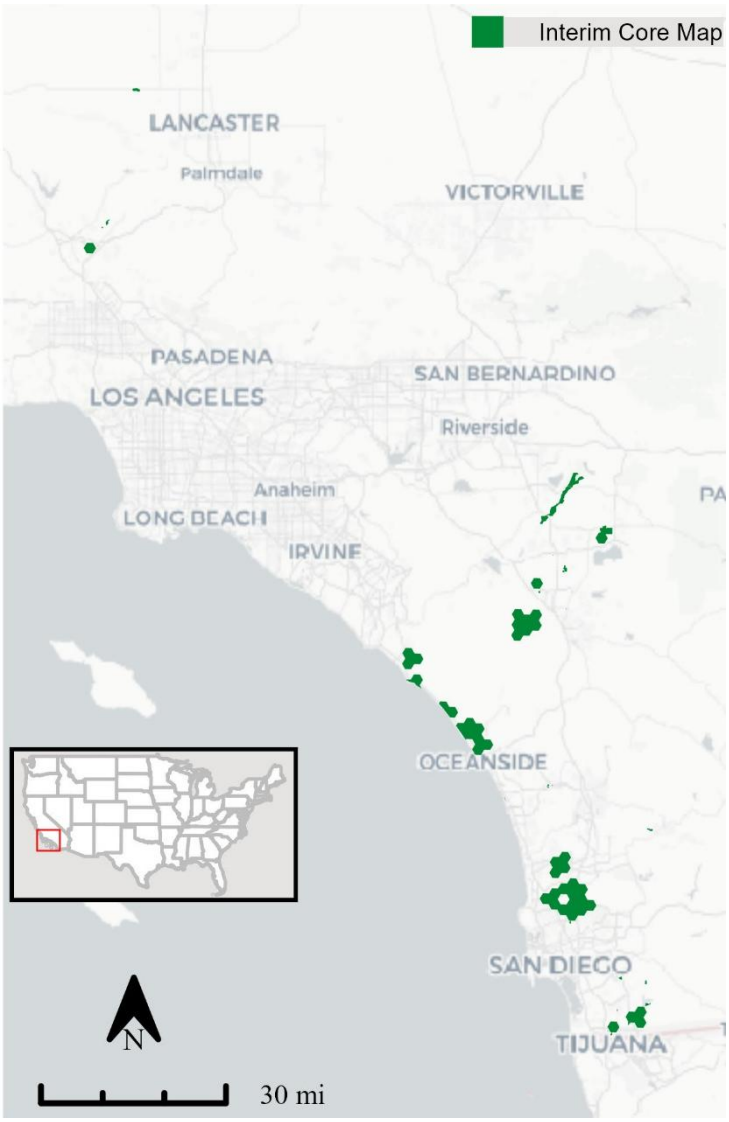

Figure 1. Interim core map for the spreading navarretia (76,837 acres).

Table 1. Percentage of Interim Core Map Represented by National Land Cover Database (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)	0
Forestry	Mixed Forest (43)	0.5
Agriculture	Pasture/Hay (81)	1
Agriculture	Cultivated Crops (82)	6
Mosquito adulticide, residential	Open space, developed (21)	7
Mosquito adulticide, residential	Developed, Low intensity (22)	8
Mosquito adulticide, residential	Developed, Medium intensity (23)	12
Mosquito adulticide, residential	Developed, High intensity (24)	6
Invasive species control	Woody Wetlands (90)	1
Invasive species control	Emergent Herbaceous Wetlands (95)	1
Invasive species control	Open water (11)	0
Invasive species control	Grassland/herbaceous (71)	16
Invasive species control	Scrub/shrub (52)	41
Invasive species control	Barren land (rock/sand/clay; 31)	0.5
Total Acres	**Interim Core Map Acres**	**~ 76,837**

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 GIS data for 15 known locations (**Figure A1-1 in Appendix 1**). Other FWS locations did not have accompanying GIS data, but detailed descriptions of the locations and rough areas were provided instead. The 74 occurrences in iNaturalist did not support further expanding the core map outside the critical habitat. GBIF did not contain any occurrences that are unique from iNaturalist and NatureServe did not contain any occurrence data. **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 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 spreading navarretia from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the spreading navarretia is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Critical habitat includes all occurrences/known locations of the spreading navarretia within the U.S. that were determined at the time (2010).
- FWS has assessed additional sites since 2010 and has determined many are extant.
- Fifteen of those additional extant sites have GIS data while 22 of them do not.
- This species requires seasonally wet habitats which include vernal pools, ephemeral streams, man-made ditches, etc. and are highly dependent on a flooding a drying cycle.

For step 2, EPA used the compiled information to identify the core map type including species range, critical habitat, habitat type, and known location information. The extant populations are not always located within the critical habitat that was designated in 2010. Therefore, EPA based the core map on the critical habitat and added additional areas that are determined extant by FWS. The locations of those additional areas were manually located based on FWS' descriptions and the areas of which are determined by habitat. The entire range of the species was not used as the core map because the range contains areas where the species does not occur, and it omits areas where it does occur.

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 FWS know locations, CDFW vernal pools ACE, and the NHD Plus HR data. **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 the option of solely using the designed critical habitat. However, this approach was not used because the critical habitat designation occurred prior to the discovery of additional extant sites by FWS. Therefore, the critical habitat areas did not fully capture all areas where the species persists.

[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 Spreading Navarretia

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/9880.pdf)
   - Five Year Review (2009) (https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1472.pdf)
   - Recovery Plan (1998) (https://ecos.fws.gov/docs/recovery_plan/980903a.pdf)
   - Final Rule – Critical Habitat Designation (2010) (https://www.govinfo.gov/content/pkg/FR-2010-10-07/pdf/2010-24763.pdf)
   - iNaturalist (https://www.inaturalist.org/observations?d1=2010-01-01&d2=2025-08-05&quality_grade=research&subview=map&taxon_id=78179)
   - FWS GIS Species Occurrence Data (https://www.fws.gov/media/gis-species-occurrence-data-updated-december-2024)
   - CDFW Vernal Pools ACE (https://gis.data.ca.gov/datasets/CDFW::vernal-pools-ace-ds2732-1/about)
   - NHD Plus HR (https://www.arcgis.com/home/item.html?id=f1f45a3ba37a4f03a5f48d7454e4b654)

2. **Background information**
   - **Status**: Federally listed as threatened in 1998
   - **Resiliency, redundancy, and representation** (the 3Rs)

     Resiliency: There are 50 extant element occurrences for this species, 16 element occurrences presumed to be extant, 6 possibly extirpated, and 14 are extirpated. Of the 50 extant element occurrences, 32 are either partially or fully conserved. There is no species recovery priority given. (Five Year Review 2023)

     Redundancy: NA

     Representation: Species is annual and germinates from seeds left in the seed bank, which may remain dormant even during suitable germination timings. (Five Year Review 2009)

     - **Habitat**
       - Ephemeral water bodies. Vernal pools, seasonally flooded alkali vernal plain habitat, ephemeral streams, etc. (Five Year Review 2023)
       - Requires an ephemeral inundation cycle.

     - **Pollinator/reproduction**
       - flowering occurs in April through June
       - is capable of self-pollination and the low pollen to ovule ratio suggests that self-pollination is frequent
       - Pollination and seed dispersal mechanisms are not well known

     - **Taxonomy**

- Terrestrial Plant

- **Relevant Pesticide Use Sites**
  - No information specific to pesticides. However, land conversion to agriculture use is a significant source for habitat destruction. (Recovery Plan, 1998)

- **Recovery Criteria/Objectives (2006 recovery plan)**
  - Existing occupied vernal pools and streams, and their associated watershed should be secured from further loss and degradation in a way that maintains habitat functions and species viability.
  - Secured vernal pools or other extant habitat areas are enhanced and restored such that population levels of existing species are stabilized or increased.
  - Population trends must be shown to be stable or increasing for a minimum of 10 consecutive years prior to consideration for reclassification. Monitoring should continue for a period of at least 10 years following reclassification to ensure population stability.

- **Recovery Actions (from 2006 recovery plan)**
  - Conduct surveys and research essential to the conservation of this species.
  - Secure the existing vernal pools and other extant habitat areas and their associated watersheds.
  - Where necessary, reestablish vernal pool or other relevant habitat to the historical structure.
  - Manage and monitor habitat and listed species.

3. Description of Species Range

- Figure A1-1 depicts the FWS range. The range was last updated on 10/21/2015. Total acreage of the range is around 4,324,402.

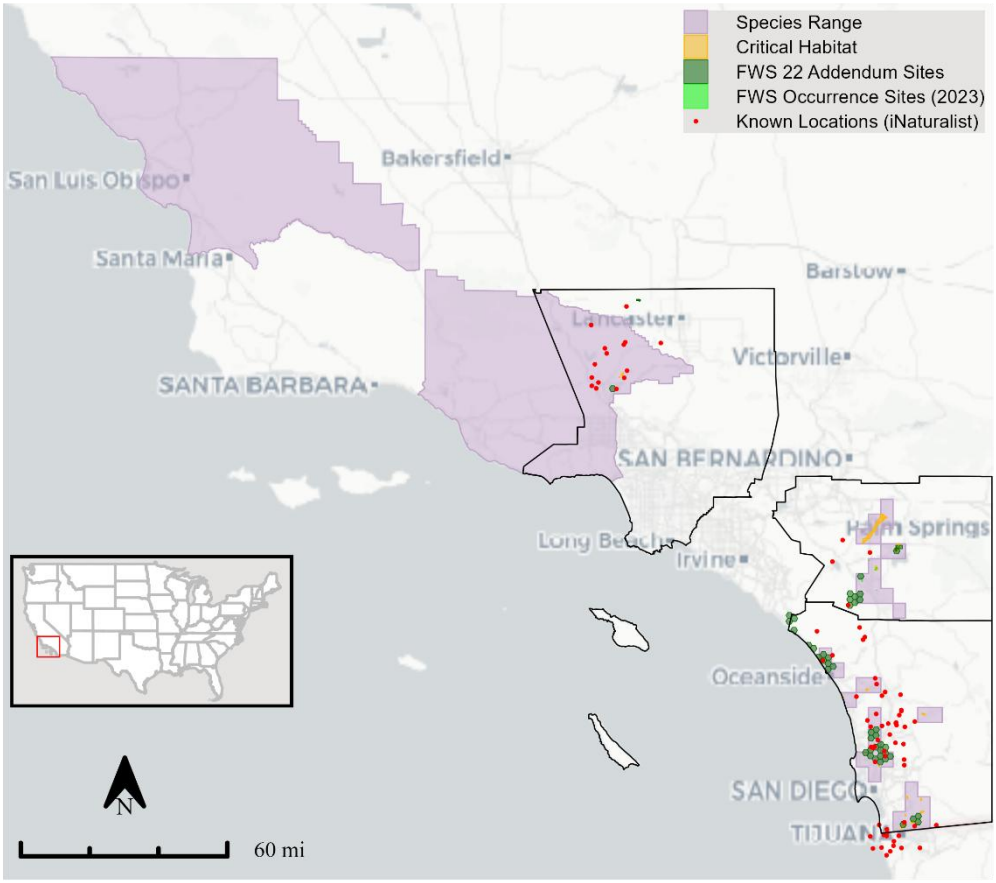

Figure A1-1. FWS range, critical habitat, and known locations for the spreading navarretia. The total acreage of the range and critical habitat are around 4.3 million and 6,727 acres.

4. **Critical Habitat**
    - FWS has designated a critical habitat for this species (https://ecos.fws.gov/ecp/species/1334)

5. **Known Locations**
    - Known Locations Described in FWS Recovery Documents
        - Currently found in only three counties in California (Los Angeles, Riverside, and San Diego). (Five Year Review 2023)
        - 15 known locations from FWS that contained GIS data.
        - 22 known locations from FWS did not contain GIS data.
        - Figure A1-1 depicts the currently known locations from FWS.

    - **Occurrences Included in Public Databases**
      EPA queried iNaturalist, GBIF, and NatureServe. No unique (from iNaturalist) occurrences were found in NatureServe and GBIF. Occurrences from iNaturalist were consistent with FWS known locations. Collectively, the occurrence data are consistent with the identified core map.

      iNaturalist (available here) had 74 research grade observations for this species, many of which appear to fall outside of the range, critical habitat, and the identified core map.

However, the positional accuracy of the points do not allow EPA to determine if these occurrences were in or out of the relevant areas.

Collectively, the occurrence data do not support further expanding or refining the core map.

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

This core map was created based on biological information, including critical habitat, occupied locations, and species habitat. EPA used the critical habitat as the starting point for developing this core map. Additional areas were joined with the critical habitat if they were in the FWS' GIS Species Occurrence Database or if they were mentioned in the 2023 Five Year Review as being extant (or presumed extant) but were not part of the 2009 assessment and hence not likely included in the designated critical habitat areas.

1. **Dataset References and Software**

- NHDPlus HR 2025
  - Lakes, ponds, streams, rivers, wetlands, and other hydrologic features of the United States from the National Hydrography Database Plus - High Resolution.
- CDFW Vernal Pools – ACE 2025
  - Vernal Pools, Areas of Conservation Emphasis (ACE), version 3.0. The Terrestrial Significant Habitats dataset is one of the four key components of the California Department of Fish and Wildlife's Areas of Conservation Emphasis (ACE) suite of terrestrial conservation information, along with Terrestrial Biodiversity, Connectivity, and Climate Change Resilience.
- FWS GIS Species Occurrence Data 2024
  - Carlsbad Fish and Wildlife Office
- Software used: R – version 4.4.2
- FWS Species Critical Habitat – last updated on 10/07/2010

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 species' designated critical habitat as the starting point for the core map.
  - The critical habitat designation was based on areas with element occurrences determined to be extant at the time (2010).
- In 2023, additional areas were discovered to have extant element occurrences. These additional sites were joined (added) to the critical habitat areas by:
  - Downloading GIS data from FWS GIS Species Occurrence Database.
  - For those without GIS data, EPA manually located them based on FWS descriptions and established the shape of such areas using either available defined areas of relevant habitats or manually defining such areas based solely on FWS' descriptions.
- The process of manually defining FWS' known locations without accompanying GIS data (22 sites total) is described below.
  - Check if there are any vernal pool ACEs at the named site. If so, add the vernal pool ACE to the core map. (18 sites)
  - If there are no vernal pool ACEs, check if there are any ephemeral streams or rivers at the site. If so, add a 1000 ft buffer (304.8 m) and add the buffered area to the core map. (2 sites)
  - If no ephemeral streams or rivers, then manually draw the area to fit FWS' description as best as possible. (2 sites: Western Salt Creek Plain and Eastern Salt Creek Plain/Hemet Ryan Airport)