Interim Core Map Documentation for Baker's Larkspur

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

Species Summary

The Baker's larkspur (*Delphinium bakeri*; Entity ID #539) is an endangered terrestrial plant (dicot) that grows in decomposed shale in a variety of habitats, including mixed woodlands of coast live oak, California bay laurel, and California buckeye in Sonoma and Marin Counties, California. This species blooms from April into May and is pollinated by hummingbirds and bumblebees. There is a designated critical habitat for this species. Additional information is provided in **Appendix 1**.

Description of Core Map

The core map for the Baker's larkspur is based on biological information. The core map is defined by using the area of conservation emphasis (ACE) polygons that overlap with the six locations that the U.S. Fish and Wildlife Service (FWS) identified from the California Natural Biodiversity Database (CNDDB) with refinement of elevation range of 295 feet (ft) (90 meter (m)) to 672 ft (205 m). The elevation refinement was based on FWS documentation of where the species occurs.

Figure 1 depicts the resulting interim core map for the Baker's larkspur. The size of this core map is approximately **8,808** acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominately evergreen forests, scrub/shrub, and grassland/herbaceous.

The core map developed for the Baker's larkspur is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Baker's larkspur. 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 ACE polygons that include known locations described by FWS, and EPA removed elevations at which this species is not known to occur. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

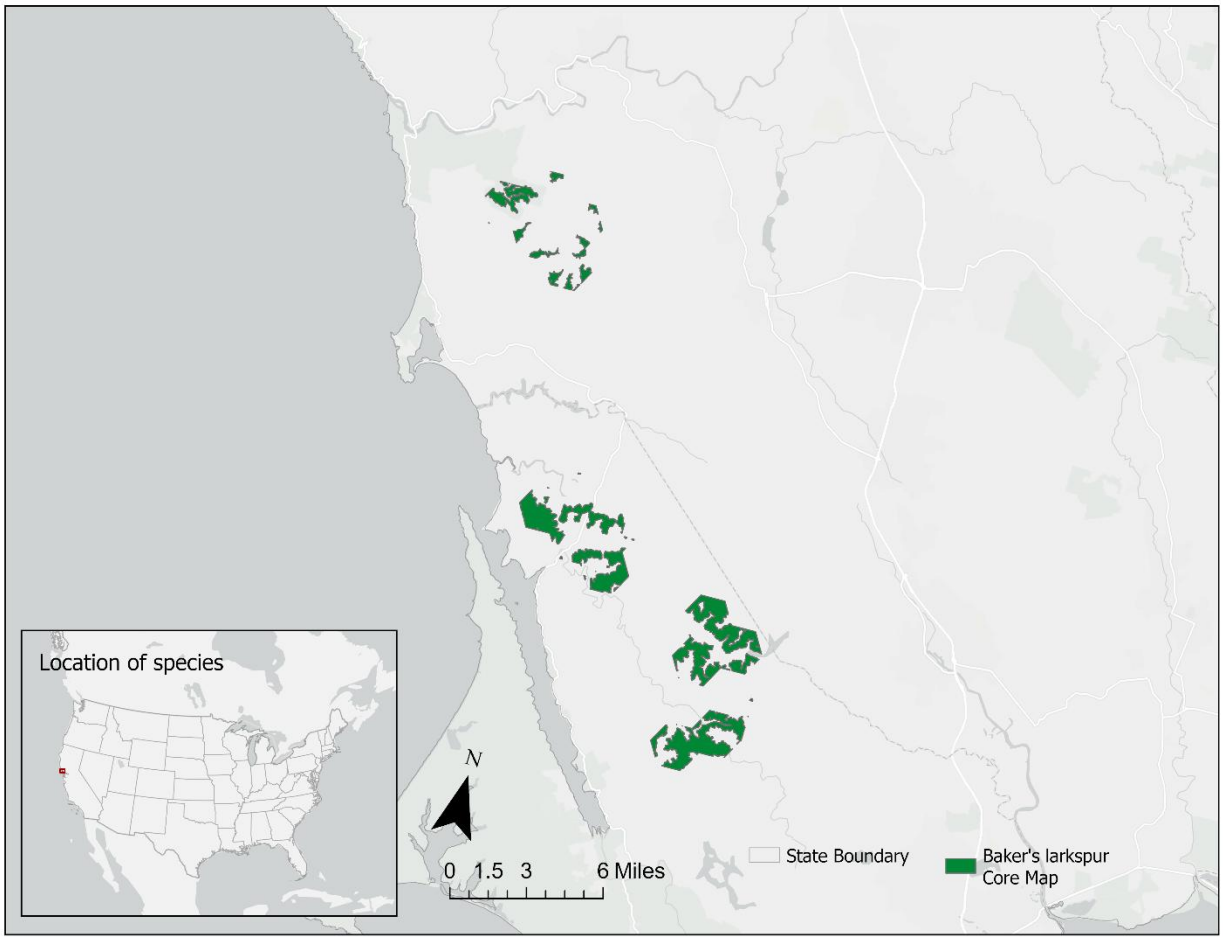

Figure 1. Interim core map for the Baker's larkspur. The total acreage of core map is approximately 8,808.

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)	1
Forestry	Evergreen Forest (42)	25
Forestry	Mixed Forest (43)	7
Agriculture	Pasture/Hay (81)	0
Agriculture	Cultivated Crops (82)	0
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
Invasive species control	Open water (11)	2
Invasive species control	Grassland/herbaceous (71)	18
Invasive species control	Scrub/shrub (52)	46
Invasive species control	Barren land (rock/sand/clay; 31)	0
Total Acres	**Interim Core Map Acres**	8,808 Acres

Evaluation of Known Location Information

There are four datasets with known location information for this species:

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

EPA evaluated these four sets of data before selecting the type of and developing the core map. FWS' most recent 5-year review (2024) detailed known locations of this species. FWS described 1 extant natural documented occurrence and three that are experimental/introduced. The extant natural population is within the critical habitat. Element occurrence data from public databases are generally consistent with the locations of the range and critical habitat given the resolution and scale of the information. **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

[2] California Natural Diversity Database, 2025. California Department of Fish and Wildlife, https://wildlife.ca.gov/Data/CNDDB

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"). This core map was developed by EPA and was developed 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 Baker's larkspur from FWS as well as observational information available from various publicly available sources (discussed in previous section). The information compiled for the Baker's larkspur` is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- California Natural Biodiversity Database identifies known locations.
- Species occurs at ranges restricted to 295 ft (90 m) to 672 ft (205 m).

For step 2, EPA used the compiled information to identify the core map type, including the species range, critical habitat, suitable habitat, and known location information. The species range follows geopolitical boundaries (*i.e.*, counties) and likely includes unoccupied areas for this species. Based on this information, EPA used known locations and further refined the core map using elevation restrictions as noted in FWS documentation (295 ft (90 m) to 672 ft (205 m)).

For step 3, EPA used known locations from CNDDB based on areas of conservation emphasis (ACE) hexagons within the species' range for the Baker's larkspur core map. The core map used areas of conservation emphasis that contained known locations refined to include only elevations where the species has been reported in FWS documents. Appendix 2 describes the data sources and process used to generate the interim core map.

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

EPA considered using the species range, but the current range includes substantial areas that are unoccupied.

EPA considered using the critical habitat, but not all documented known locations are located within critical habitat.

Appendix 1. Information Compiled for Species

1. **Recent FWS Documents/Links**

- Baker's Larkspur 5-year review 2024 – (5/22/2025)
- Recovery Plan for Baker's larkspur 2015 – (5/22/2025)
- Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for Two Larkspurs From Coastal Northern California 2003 – (5/22/2025)

2. **Background information**

- Status: Federally listed as endangered in 2000
- Resiliency, redundancy, and representation (the 3Rs)
  - The Baker's larkspur has suffered extreme range restriction and population declines resulting in low redundancy and low resiliency.
  - The one remaining historical occurrence continues to decline and to be threatened by habitat degradation from human disturbance.
  - All but one of the three reintroduced populations requires continued intense management and supplementation.
  - Because of the small size of the few remaining populations, herbivory by slugs, snails, and gophers, as well as genetic isolation, threaten the species.
  - Recovery strategy will focus on increasing redundancy by reintroducing enough populations to ensure they can withstand catastrophic events.
  - Will focus on resiliency by ensuring each of the populations is large enough to withstand stochastic events through continued supplementation and management of reintroduced populations.

- ***Habitat, Life History, and Ecology (Source: 2021 Recovery Plan)***
  - **Habitat**: Baker's larkspur grows in decomposed shale in a variety of habitats, including mixed woodlands of coast live oak, California bay laurel, and California buckeye in Sonoma and Marin Counties, California.
  - **Reproduction/pollinators**:
    - Blooms from April-May
    - Pollinators include: hummingbirds and bumblebees

- **Taxonomy**
  - Flowering dicot plants with biotic pollination vectors

- **Essential Physical Biological Features (PBFs) for Designated Critical Habitat:**
  - Decomposed shale soils
  - 295 to 672 feet in elevation
  - mesic conditions along an extensive north-facing slope under an overstory that includes *Umbellularia californica* (California bay), *Aesculus californica* (California buckeye), and *Quercus agrifolia* (coastal live oak)
  - Other native plants associated with *D. bakeri* at this site include: *Baccharis pilularis* ssp. *consanguinea* (coyotebrush), *Symphorcarpos* cf. *rivularis* (snowberry), *Rubus ursinus* (California blackberry), *Pteridium aquilinum* (braken fern), *Polystichum munitum* (sword fern), *Pityrogramma triangularis* (goldback fern), D*ryopteris arguta* (coastal woodfern), *Adiantum jordanii* (maidenhair fern), *Polypodium glycyrrhiza* (licorice fern),

Toxicodendron diversilobum (poison oak), *Ceanothus thyrsiflorus* (blueblossom ceanothus), *Lithophragma affine* (woodland star), and *Holodiscus discolor* (oceanspray).

- **Relevant Pesticide Use Sites in FWS Documents**
  - The Recovery Plan describes the significant damages to the only extant historical population at the hands of Marin County road maintenance and fires crews. While these events did not involve pesticides, utilization of pesticides can be a part of road maintenance activities.
  - The Recovery Plan also describes how a 2004 fire at the only extant historical population created conditions that encouraged the growth of invasive vegetation.
  - No specific use sites were described in FWS documents. The most recent 5-Year Review noted a potential for insecticides to reduce bee populations near the Baker's larkspur populations which could lead to reduced seed set.

- **Relevant Recovery Criteria and Actions**
  - "Due to the lack of necessary biological information, we are unable to develop delisting criteria at this time." Recovery Plan for the Baker's Larkspur (2015)
  - Habitat and ecological research recommendations listed in the 5-Year Review (2024)
    1. Monitoring- continue monitoring of the single natural and three introduced populations .
    2. Outreach to Marin County staff- Outreach and education to the Marin County road maintenance crews will help ensure that the naturally occurring Marshall-Petaluma Road occurrence will no longer be affected by road maintenance activities.
    3. Seed banking and plant propagation– Continue seed multiplication and propagation efforts at the Botanical Garden.
    4. Augment reintroduced populations with additional individuals- Conduct additional plantings and/or seeding at the three introduced sites to help bolster population numbers and improve chances of successful pollination and reproduction.
    5. Identify additional reintroduction sites- Identify additional sites within the historical range of the Baker's larkspur where suitable habitat conditions and compatible land use exist, for additional reintroduced populations.
    6. Adaptive management- Due to the difficulty experienced thus far establishing introduced populations of the Baker's larkspur, we recommend the implementation of an adaptive strategy, whereby detailed observations of successes and failures are recorded and used to evaluate and adapt methods for future introduction efforts. Research should be conducted in association with future introductions to determine what variables improve the survival of transplants.
    7. Research- Conduct research on the genetic variability of the Baker's larkspur to help inform future outplantings, as well as ecological research including the study of habitat requirements, life history parameters, and natural population fluctuations.

3. Description of the species range

- The current geographic range is restricted to four sites within Marin and Sonoma Counties (5-Year Review).

- Figure A1-1 depicts the current FWS species range (last updated 9/18/2019).
- The species current range is approximately 165,500 acres.

Figure A1-1. FWS Range of the Baker's larkspur.

4. Critical Habitat (Source: 2003 Critical Habitat)

- The Baker's larkspur's critical habitat was designated in 2003. The critical habitat is 1,828 acres in two units.
- **Figure A1-2** depicts the current critical habitat.

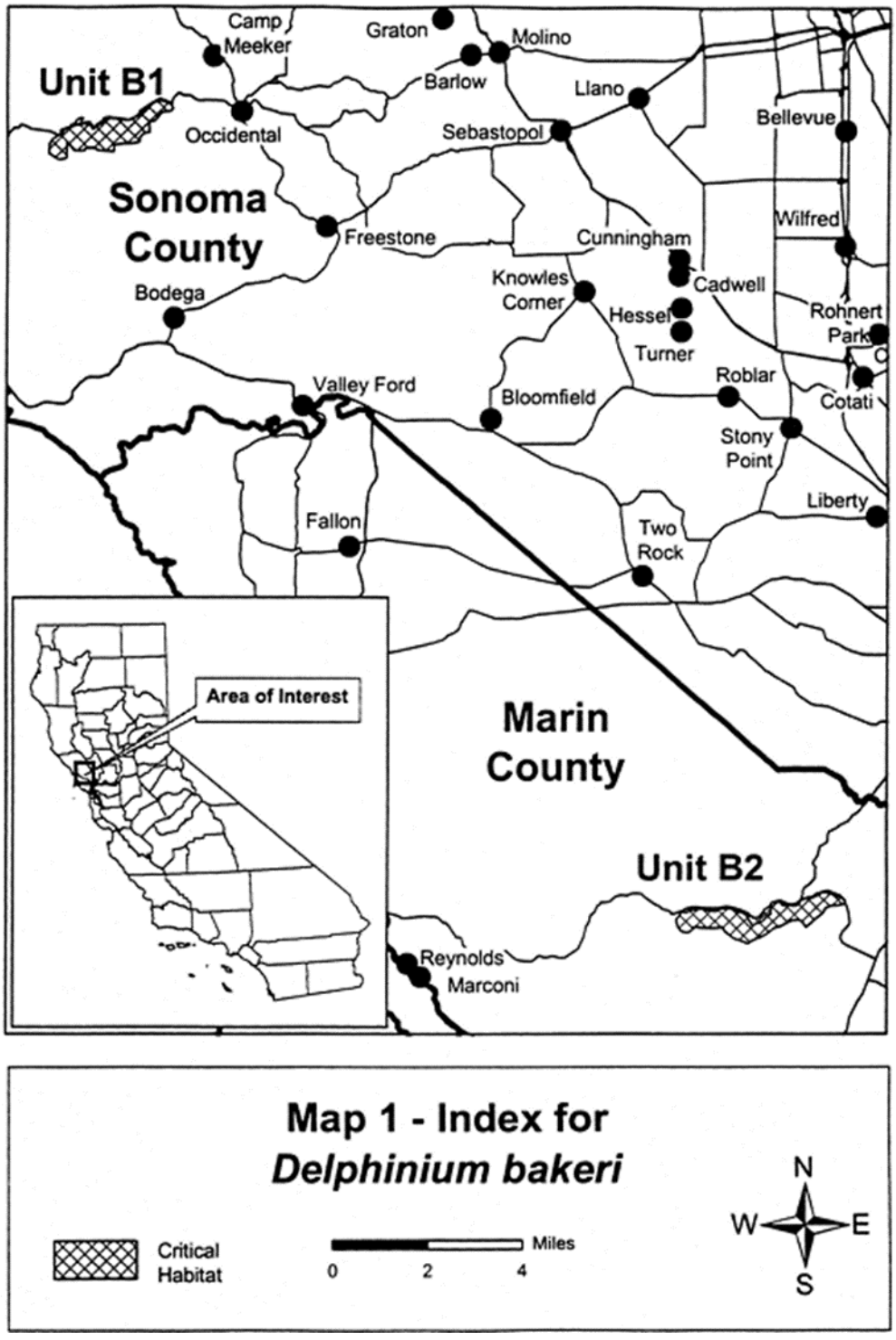

Figure A1-2. FWS critical habitat of the Baker's larkspur.

5. **Known Locations**
    - **Known Locations Described in FWS Recovery Documents**
        - The Baker's larkspur is only known from three naturally occurring populations, two of which were extirpated at the time of listing.

- There are currently 4 known occurrences of the Baker's larkspur.
- All these occurrences are currently known to be extant, three of these occurrences are introduced populations.

Occurrences in iNaturalist

- Searched on 5/22/2025
- https://www.inaturalist.org/observations?subview=table&taxon_id=70414
- There are 38 research grade observations available from 2011-2025.

Occurrences in NatureServe

- NatureServe was searched on 5/22/2025
- https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.159422/Delphinium_bakeri NatureServe has one documented location within Marin County
- NatureServe describes known extant occurrence as being "very poor quality".

Occurrences in GBIF

- GBIF was searched on 5/22/2025
- There were 30 "human observations" with location data available for this species.
- All observations were included in either iNaturalist, Naturgucker, or NatureServe. The Naturgucker observation is in Germany and is excluded from this analysis.
- https://www.gbif.org/occurrence/search?taxon_key=3033732

Collectively, the occurrence data from public databases do not support expanding the core map beyond its outer boundaries as illustrated in Figure 1 of this documentation.

Appendix 2. Geographic Information Service (GIS) Data Review and Method to Develop Core Map

This core map was created based on biological information, including occupied location designated by FWS and California Natural Biodiversity Database.

Dataset References and Software

- NLCD Landcover 2021[1]
  - 30 m raster dataset that contains percent landcover, as a continuous variable, for each pixel across all land covers and types for the conterminous US
- Software used: ArcGIS Pro 3.2
- FWS Species Range – last updated on 01/26/2000
- California Natural Biodiversity Database
- The National Map (TNM)**Error! Bookmark not defined.**

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 ("Baker's Larkspur.gdb") was refined using FWS known locations for the species from FWS and California Natural Diversity Database. All developed polygons encompass California Natural Diversity Database data points.
  - Six data points were derived from CNDDB[2], one extirpated site.
  - All ACE polygons that overlap with known locations were added and then refined to only include elevations restricted to 295 ft (90 m) to 672 ft (205 m) using TNM.
  - Export NLCD landcover to raster for merged polygon
  - Raster to polygon by classname
  - Dissolve by classname to get sum of each landcover category
  - Calculate acres for each landcover category