Interim Core Map Documentation for Springville Clarkia

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

Species Summary

The Springville clarkia (*Clarkia springvillensis*; Entity ID #1022) is a threatened terrestrial plant (dicot). There is no designated critical habitat for this species. The Springville clarkia occurs on granitic soils in sunny sites from 330 and 1,220 meters (1,080 and 4,000 feet) in elevation within the chaparral and blue oak (*Quercus douglasii*) woodland community. The species grows mostly on the uphill slope of roadbanks, on small decomposing granitic domes in the foothills of the southern Sierra Nevada foothills of Tulare County, California. Additional information is provided in **Appendix 1**.

Description of Core Map

The core map for the Springville clarkia is based on area of conservation emphasis (ACE) polygons where each ACE polygon contains one or multiple known location data via the California Natural Diversity Database (CNDDB)[1]. In addition, EPA cultivated[2] lands layer was also used for refinement since this species is not expected to occur on cultivated lands. Known locations are generally consistent with the range. A core map based on critical habitat was not selected because critical habitat has not been designated for this species. **Figure 1** depicts the interim core map for the Springville clarkia. The core map represents approximately 53,175 acres in California.

Landcover categories within the core map area are included in **Table 1.** Landcover is predominantly grassland/herbaceous and scrub/shrub, which are generally consistent with the habitat of this species.

The core map developed for the Springville clarkia is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Springville 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 expert feedback from FWS. This interim core map has an "average" (3) best professional classification because it consists of the species' known locations obscured by overlapping ACE hexagons.

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

[1]California Natural Diversity Database, 2025. California Department of Fish and Wildlife, https://wildlife.ca.gov/Data/CNDDB
[2] EPA OCSPP's Office of Pesticide Program Modified Cultivated Layer (last updated 12/16/2024)

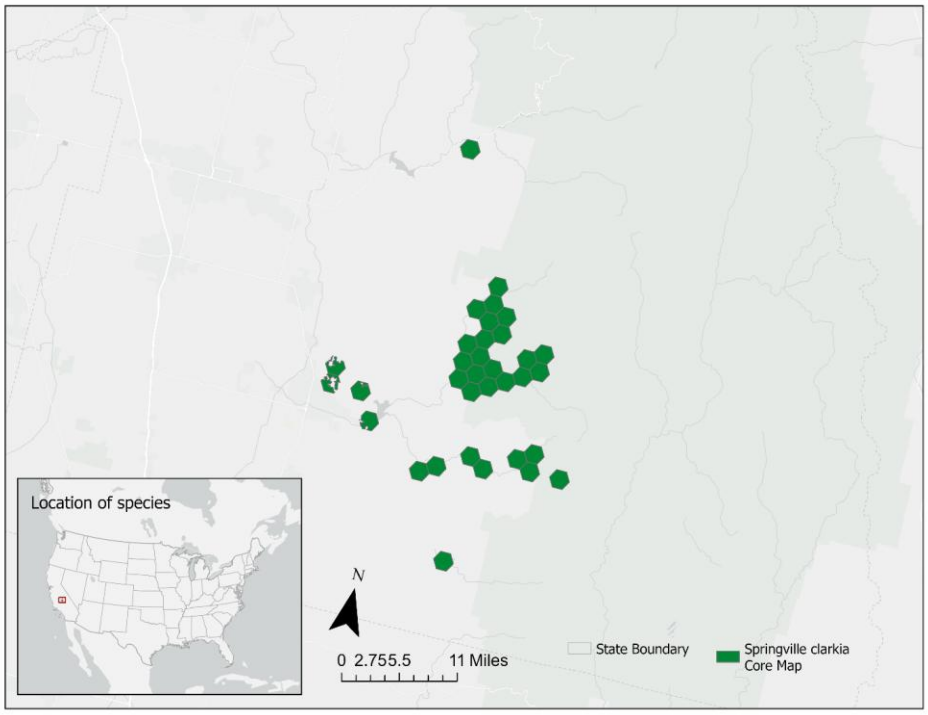

Figure 1. Interim core map for the Springville clarkia. The total acreage of the interim core map is approximately 53,175 acres.

Table 1. Percentage of Interim Core Map Represented by NLCD[3] 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)	4
Forestry	Evergreen Forest (42)	33
Forestry	Mixed Forest (43)	1
Agriculture	Pasture/Hay (81)	0
Agriculture	Cultivated Crops (82)	0
Mosquito adulticide, residential	Open space, developed (21)	2
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)	1
Invasive species control	Emergent Herbaceous Wetlands (95)	1
Invasive species control	Open water (11)	0
Invasive species control	Grassland/herbaceous (71)	31
Invasive species control	Scrub/shrub (52)	27
Invasive species control	Barren land (rock/sand/clay; 31)	0
Total Acres	**Interim Core Map Acres**	**~ 53,175**

Evaluation of Known Location Information

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

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

EPA evaluated these four sets of data to inform or support the core map. FWS provided the most refined descriptions of the occurrence information based on data available via the California Natural Diversity Database (CNDDB) and confirmed that all known locations of extant populations are located within the range. iNaturalist included 48 research-grade observations dating back to 2017, while GBIF included 34 observations with coordinates for Springville clarkia. NatureServe included five documented areas, all of which were generally consistent with the species range in California. **Appendix 1** includes more information on the available known location information.

[3] 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[4]" (referred to as "the process"). This core map was developed by EPA 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 Springville clarkia from FWS and CNDDB, as well as observation information available from various publicly available sources (including iNaturalist, GBIF and NatureServe). The information compiled for Springville clarkia is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Known locations are available from the 5-Year Review (2022); the information is up to date as of 2021 and can serve as a basis for this core map.
- Occurrence data from other sources are generally consistent with the species range location given their precision.

For step 2, EPA used the compiled information to identify the core map type. Based on the information, EPA used a biological information core map for this species based on Areas of Conservation Emphasis (ACE) polygons with known occurrences from the California Natural Diversity Database (CNDDB).

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

Habitat information was considered, but the available habitat information and elevation requirements was not as detailed as the known locations and associated ACE polygons.

[4] 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 Springville Clarkia

1. **Recent FWS Documents**
   - Springville Clarkia 5-Year Review (2022)
   - Springville Clarkia 5-Year Review (2009)

2. **Background information on Species**
   - **Status:** Federally listed as threatened in 1998
   - **Taxonomy**. FWS plant group 11: dicot flowering plants with biotic pollination vectors, other reproductive mechanisms unknown.
   - **Resiliency, Redundancy, Representation**
     The 3Rs are not specifically described in the FWS documents for the Springville clarkia.

   - **Habitat Description**
     "Springville clarkia is a narrowly distributed annual herb in the evening primrose family (Onagraceae) (Service 2009, p. 2). The species grows mostly on the slope of road banks, on small decomposing granitic domes, and in sunny openings from elevations between 330 and 1,220 meters (1,080 and 4,000 feet) within chaparral and blue oak (Quercus douglasii) woodland community. (2022 5-Year Review, 2)

   - **Relevant Life History Information:**
     "Abundance of Springville clarkia varies across colonies and across years (Diversity Database 2021). Recorded abundance data includes extremes of single plants to hundreds of thousands of plants (Diversity Database 2021). As is common in annual plants, the aboveground population size of Springville clarkia drastically fluctuates from year to year (Service 2009, p. 5). The number of plants depends on interactions between the soil seed bank and weather (Forest Service 2012, p. 12). Rainfall patterns may be the most important factor for determining abundance in the following year (Forest Service 2012, p. 12)." (2022 5-Year Review, 4)

     "Seed germination occurs in late November to early December, continuing into January (McCue and Holtsford 1998, p. 31; Forest Service 2012, p. 11). Plants usually begin flowering in May through June and are pollinated primarily by bees through cross- and self-pollination (Forest Service 2012, p. 11). Springville clarkia is believed to begin blooming earlier than elegant clarkia, although the flowering periods overlap and results in the potential for hybridization (Forest Service 2012, p. 11; Diversity Database 2021). The seeds can remain dormant for at least two years, and they form a soil seed bank that helps maintain genetic diversity (Forest Service 2012, p. 11; McCue and Holtsford 1998, p. 34)." (5-Year Review 2022, 5)

   - **Ecology**
     "There is some evidence that Springville clarkia is a disturbance-adapted species and may benefit, to some extent, from activities that result in disturbance, including road maintenance and improvements, grazing, and fire. Therefore, while described here as threats, road maintenance and improvements, grazing, and fire may negatively or positively impact Springville clarkia recovery depending on intensity, magnitude, timing, and other variables. Road maintenance and improvement activities threaten Springville clarkia when

the plants are run over by vehicles and trampled by workers. However, activities like mechanical brush removal may be beneficial to Springville clarkia when performed while the species is not actively growing (Forest Service 2012, p. 16). Removal of thatch creates more habitat for Springville clarkia (Forest Service 2012, p. 16). There is also evidence that road grading activities act as a seed vector and help establish new colonies (Colgate, pers. comm. 2021)." (2022 5-Year Review, 6)

"Similarly, the effects on plants from livestock grazing are highly variable and dependent on many factors, such as the type of livestock, timing, intensity, and duration (Service 2009, p. 8). McCue (in litt. 1997) determined that appropriate grazing regimes may benefit Springville clarkia in some situations by reducing the abundance of nonnative plants and easing competitive pressure (as cited in Service 2009, p. 8). However, inappropriate grazing activities can negatively impact Springville clarkia through excess herbivory of individuals, trampling, and soil compaction (Service 2009, p. 8)." (2022 5-Year Review, 6)

"Finally, fire may both threaten and benefit the species, depending on fire intensity, spread, duration, and timing relative to Springville clarkia life cycle. High-intensity, long-duration, and spring to early-summer fires may deplete the soil seed bank, create hydrophobic soil layers, and result in unfavorable microhabitat conditions (Anderson, in litt. 2021; Cardno, Inc. & Colgate, pp. 3-4–4-2). In contrast, low-intensity, short-duration, and late-summer to fall fires may remove thatch and benefit Springville clarkia (Forest Service 2012, p. 15; Cardno, Inc. & Colgate, pp. 3- 4–4-2). Fire and other disturbances can also control the growth of over-mature woody and perennial species such as chamise (Adenostoma fasciculatum) (Cardno, Inc. & Colgate 2021, p. 3-2). Colgate, pers. comm. 2021). Chamise is a native shrub that has been observed to grow among and compete with Springville clarkia, especially in chaparral habitat (Colgate, pers. comm. 2021). Surveys determined that the 2017 Pier Fire was generally beneficial to the occurrences in Southern California Edison's Lower Tule River Hydroelectric Project, as the cleared habitat for Springville clarkia and, as a late-summer burn, did not disrupt seed bank accumulation (Cardno, Inc. & Colgate, p. 4-2)." (2022 5-Year Review, 6)

- **Relevant Pesticide Use Sites**
  Herbicides used in road maintenance activities are mentioned as a potential threat to the Springville clarkia. (2009 5-Year Review, 7)

- **Threats**
  "Currently, the primary threats to Springville clarkia throughout its range include drought, climate change, road maintenance activities, road improvements, and competition from nonnative plants." (Recovery Plan 2022, 5)

- **Reclassification Criteria**
  Reclassification criteria are not presented in the FWS documents.

- **Delisting Criteria**
  Delisting criteria are not presented in the FWS documents.

- **Recovery Actions**
  As there is no Recovery Plan available for the Springville clarkia, no recovery actions have been developed for this species. However, the 2022 5-Year Review includes several recommendations for future action that will aid in the recovery and conservation of Springville clarkia:
    - Verify Springville clarkia occurrences recorded in the California Natural Diversity Database, especially occurrences with a currently unknown status and/or that have not been surveyed in the previous ten years.
    - Conduct further research on the Springville clarkia's reproduction parameters (e.g., seed production rate, germination rate) and their relationship to environmental conditions to better understand population dynamics and effective population size.
    - Establish reliable baseline data for monitoring Springville clarkia occurrences, including both aboveground presence and soil seed bank. Work with the U.S. Forest Service and other landowners/managers to monitor the status and trend of occurrences to (a) track any threats, (b) estimate current colony/population sizes and the number and distribution of colonies/populations, and (c) determine whether the species is stable, increasing, or declining. Annual precipitation and monitoring data should be compared to assess the impact of drought on population changes, as this may be the most significant threat to the species.
    - Conduct genetic and ecological studies to gain a better understanding of the potential for hybridization between the Springville clarkia and other clarkia species, such as elegant clarkia (*Clarkia unguiculata*). Create a species identification key based on genetic and morphological relationships. This information can then be used to help determine the status of CNDDB occurrences with an uncertain identification.
    - Conduct further research on the effect of disturbance on the Springville clarkia. Work with the U.S. Forest Service, Bureau of Land Management, and California Department of Fish and Wildlife to conduct research on (a) the value of prescribed burning and mechanical brush removal and (b) the effects of livestock grazing on Springville clarkia.
    - Provide support to the Tule River Indian Tribe of California to implement conservation actions for Springville clarkia on the Tule River Reservation. The Tribe plans to implement several conservation measures to protect occurrences on the Reservation and intends to survey for new colonies should any activities occur in suitable habitat.
    - Complete a recovery plan for the Springville clarkia. The plan would establish a framework for agencies and landowners to coordinate conservation efforts. The plan would set recovery priorities and estimate costs of various tasks necessary to accomplish them. It also would describe site-specific management actions necessary to achieve conservation and survival of the Springville clarkia.
      (2022 5-Year Review, 7-8)

3. Description of Species Range

"The range of Springville clarkia lies entirely within the Tule River watershed in the western Sierra foothills within Tulare County, California. One area is the Rancheria/Bear Creek drainage in the North Fork of the Tule River watershed, including Diversity Database occurrences #5, 7, 8, 10, 12, 13, 14, 15, and 20 (Service 2009, p. 5; Diversity Database 2021). A second area is the Siphon Canyon–Coffee Canyon area in the Middle Fork of the Tule River watershed, including Diversity Database occurrences #3, 4, 6, 18, 23, and 28 (Service 2009, p. 5; Diversity Database 2021). An 'occurrence' refers to Springville clarkia records in the Diversity Database, where an occurrence consists of individuals separated by ¼ mile or less. Other surveys group individuals as 'populations' or 'localities.'" (5-Year Review 2022, 2)

Figure A1-1 shows the distribution of the Springville clarkia presented in the 2022 FWS 5-Year Review that is based on CNDDB data. **Figure A1-2** depicts the FWS range map of the Springville clarkia. This range was last updated on 6/5/2015 and has an area of approximately 522,721 acres.

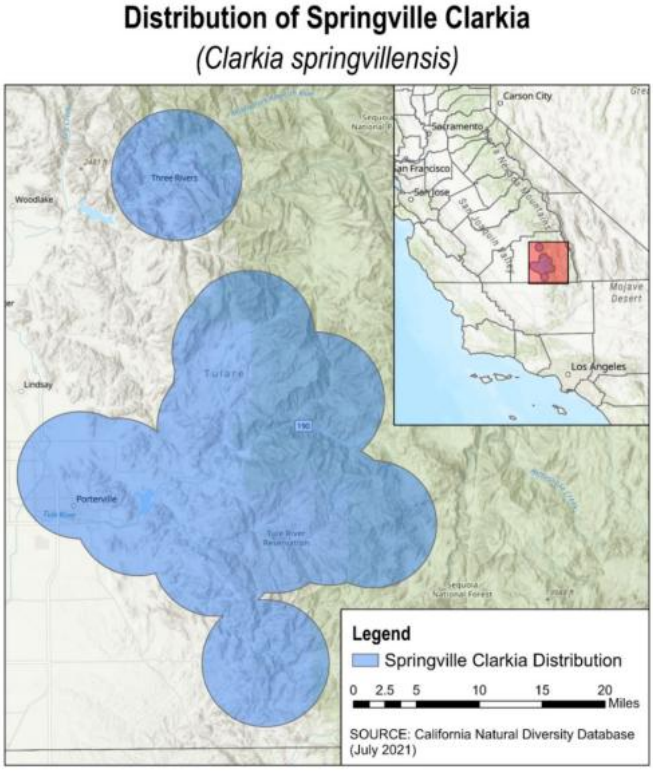

Figure A1-1. Springville clarkia occurrence map based on 2021 CNDDB data. (2022 5-Year Review, 3)

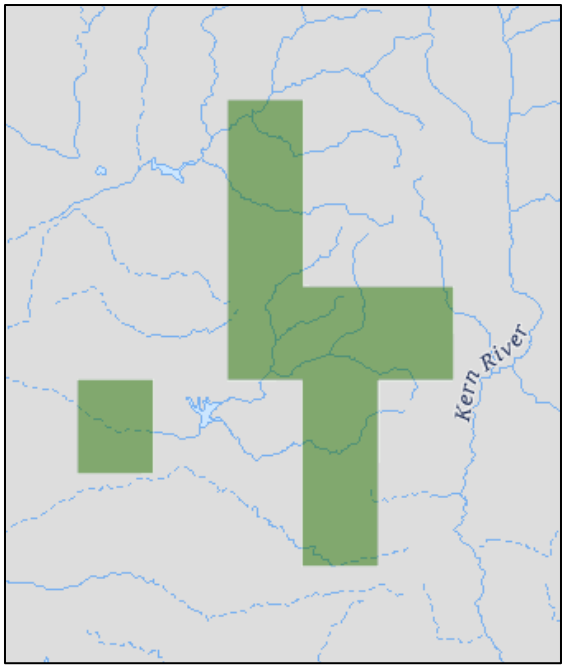

Figure A1-2. FWS range map of the Springville clarkia.

4. Critical Habitat

There is no designated critical habitat for this species.

5. Known Locations

- Occurrences Described in FWS Documents

"According to the Diversity Database [CNDDB] (2021), there are currently 28 occurrences. The type locality is possibly extirpated, while the other 27 occurrences are presumed extant (Diversity Database 2021). Of the extant occurrences, nine occurrences have not been surveyed since before 2000 (Diversity Database 2021). Collected specimen from Diversity Database occurrences #29 and #30 are thought to be an atypical outcrossing form of Kern River clarkia (*Clarkia exilis*) (U.S. Army Corps of Engineers 2021, p. 45). However, further field work is needed to confirm (Diversity Database 2021)." (5-Year Review 2022, 2-3)

"As a caveat to the presented occurrence data, several colonies have been discovered during preconstruction surveys and during other activities but have not yet been catalogued in the Diversity Database (Colgate, pers. comm. 2021; Service 2005, p. 6). Additionally, as mentioned above, several occurrences may be misidentified and require further fieldwork and genetic studies to confirm as Springville clarkia." (2022 5-Year Review, 4)

Table A-1 shows the number occurrences of Springville clarkia in the CNDDB as of 2021. (2022 5-Year Review, 11)

Table A-1. Springville clarkia occurrences in the CNDDB AS OF 2021 (2022 5-Year Review, 11).

Occurrence #	Last verified	Verified since 2009 5-year review?	Most recently available abundance (year of survey)	Owner/manager
1	1987	No	Extirpated (2002)	Private
3	2014	Yes	1,000s (2014)	U.S. Forest Service
4	2021	Yes	3 (2021)	U.S. Forest Service
5	2016	Yes	1,000+ (2014)	Private; California Department of Fish and Wildlife
6	2002	No	150 (2002)	U.S. Forest Service
7	1993	No	300 (1993)	Private; Tulare County
8	1990	No	110 (1988-1990)	U.S. Forest Service
9	1989	No	Unknown (-)	Unknown
10	1990	No	300+ (1990)	Unknown
12	1993	No	100s (1993)	U.S. Forest Service
13	1993	No	100s (1993)	U.S. Forest Service
14	1993	No	150 (1993)	U.S. Forest Service
15	1993	No	1,000s (1993)	U.S. Forest Service
16	1995	No	Unknown (-)	Bureau of Land Management
18	2003	Yes	10,000+ (2003)	U.S. Forest Service
19	2002	No	5 (2002)	U.S. Forest Service
20	2005	No	100 (2005)	Private
21	2010	New	100-200 (2010)	Unknown
22	2014	New	30+ (2014)	Bureau of Indian Affairs*
23	Unknown	New	Unknown (-)	U.S. Forest Service
24	2014	New	20 (2014)	Bureau of Indian Affairs*
25	2015	New	Unknown (-)	Bureau of Indian Affairs*
26	2013	New	Unknown (-)	Bureau of Indian Affairs*
27	2011	New	Unknown (-)	Unknown
28	2014	New	800 (2014)	U.S. Forest Service
29	2016	New	200 (2016)	U.S. Army Corps of Engineers
30	2017	New	25 (2017)	Unknown

*These lands are held in Federal trust status by the Bureau of Indian Affairs for the Tule River Indian Tribe of the Tule River Reservation, California.

- Occurrences Described in iNaturalist: https://www.inaturalist.org/observations?quality_grade=research&subview=map&taxon_id=76382&verifiable=any
    - iNaturalist includes 48 research-grade observations dating back to 2017. All observations are consistent with the species range of the Springville clarkia (all in California near Sequoia National Park and Sequoia National Forest).

- Occurrences Described in GBIF: https://www.gbif.org/occurrence/map?basis_of_record=HUMAN_OBSERVATION&taxon_key=5420955
    - GBIF includes 34 human observations with coordinates dating back to 2017. All observations are consistent with the species range of the Springville clarkia (all in California near Sequoia National Park and Sequoia National Forest).

- Occurrences Described in NatureServe: https://explorer.natureserve.org/pro/Map?taxonUniqueId=ELEMENT_GLOBAL.2.159320
    - NatureServe has several documented locations consistent with the species range in California.

Collectively, the occurrence data in public databases were useful for comparison purposes and did not support further expanding the out boundary of the core map.

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

This core map was created based on biological information provided from FWS documentation. EPA used the most recent FWS information for the core map.

1. **Dataset References and Software**

- 2021 National Land Cover Database (NLCD)
- Software used: ArcGIS Pro 3.2
- California Natural Diversity Database (CNDDB)
- FWS documentation
- 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 CNDDB known locations and then determined and included the ACE polygons which overlapped with these known locations.
- Additionally, EPA cultivated lands layer was removed from the selected ACE polygons.
- After creating the core map, NLCD land cover data was clipped to the area.
- Raster to polygon.
- Pairwise dissolve was used to condense land cover data of the same classname.
- Final core map is named "Springville Clarkia Core Map.shp"