

Interim Core Map Documentation for the DeBeque phacelia

Uploaded to EPA's GeoPlatform: November 2025

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

Species Summary

The DeBeque phacelia (*Phacelia submutica*; Entity ID #7220) is a threatened terrestrial plant (dicot). This species is a low-growing, herbaceous, spring annual plant with a tap root. The DeBeque phacelia requires a unique soil type (colorful clay soils), soil feature, soil structure and soil development requirements. The clay soil is typically on moderately steep slopes (average 14 degrees but up to 42 degrees between 5,026 and 6,424 feet) in areas surrounding the town of DeBeque in Mesa and Garfield Counties, Colorado. The DeBeque phacelia germination occurs in late March and grows/matures from April through June. The DeBeque phacelia is self-fertilized, but it is possible the plant could also reproduce sexually. 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 DeBeque phacelia is biological information type based on five representative analytical units (AUs) which are described by the U.S. Fish and Wildlife Service (FWS) in the documentation for the DeBeque phacelia. The AUs contain all known suitable and occupied habitat for the species (Species Status Assessment 2022). FWS notes that the AUs boundaries incorporate many areas of unoccupied or unsuitable habitat to define contiguous areas containing multiple element occurrences (EOs), and that the AUs likely overestimate the total range of the species (Species Status Assessment). AUs are used by FWS because the best available science cannot delineate populations for this species (Species Status Assessment 2022). The geographic extent of the AUs (214,916 acres) generally aligns with the range (approximately 275,000 acres). Within the AUs, the DeBeque phacelia is only known to occupy 568 acres (Species Status Assessment 2022). The extent of critical habitat (approximately 25,000 acres) is completely contained within the range and the AUs. However, FWS noted that multiple occupied areas were found outside of critical habitat units since the critical habitat designation (Species Status Assessment 2022).

FWS provided spatial files for the AUs and feedback regarding the core map.¹ The AUs were used as the outer extent of the core map for the DeBeque phacelia. **Figure 1** depicts the interim core map for DeBeque phacelia. The core map represents 214,916 acres.

The DeBeque phacelia inhabits clay soils of the Wasatch Formation in Mesa and Garfield Counties, Colorado. Landcover categories within the core map area are included in **Table 1**. Landcover within the core map is predominantly shrub or scrub and evergreen forest, which is consistent with the habitat of this species. Agricultural areas are also located within the core map.

¹ Personal communication from U.S. FWS to EPA, August 19, 2025.

The core map developed for the DeBeque phacelia is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the DeBeque phacelia. 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 “limited” (2) best professional judgment classification because EPA used the spatial file of DeBeque phacelia analytical units provided by FWS with no additions or subtractions. EPA recognizes that there may be unoccupied areas included in this core map (per the documentation by FWS in the Species Status Assessment). This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

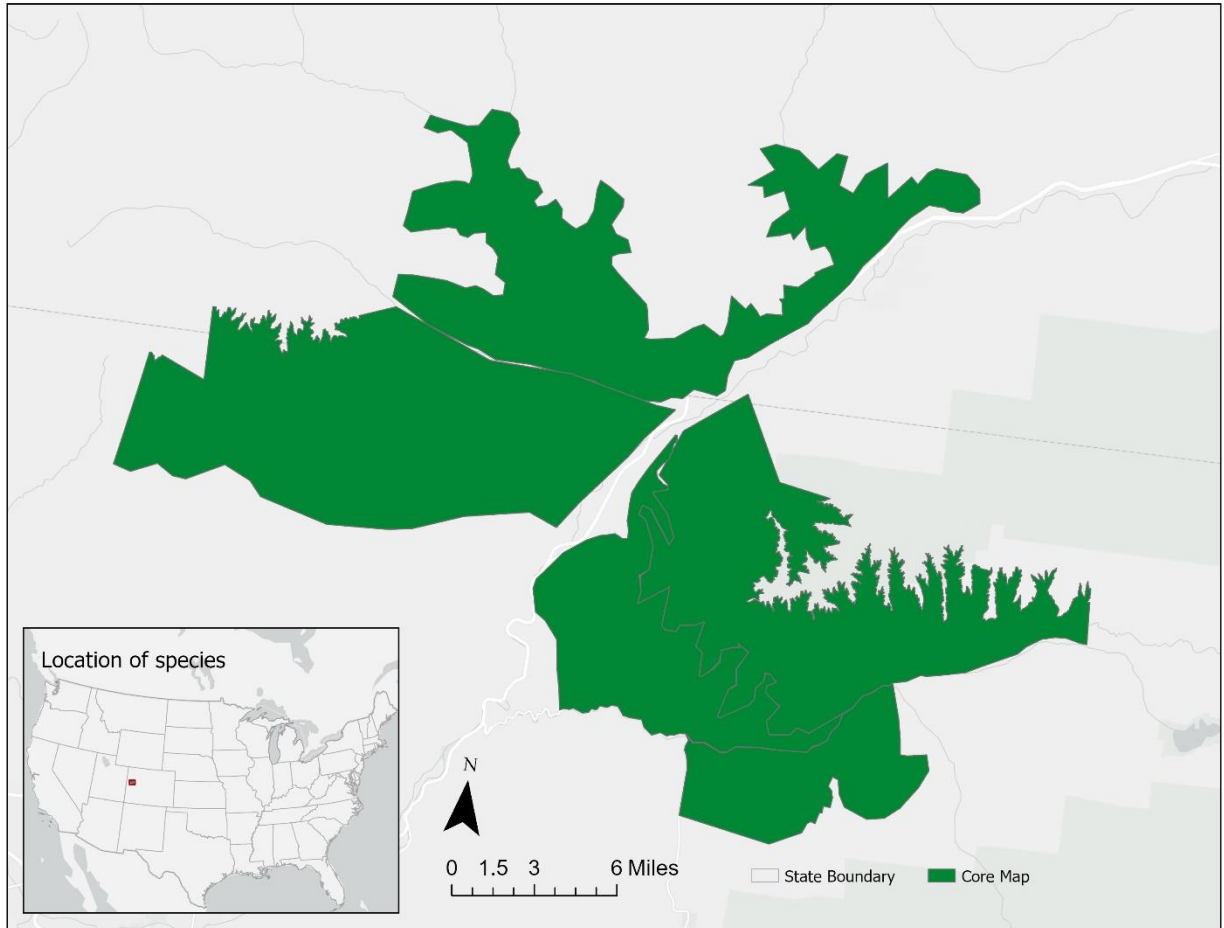


Figure 1. Interim core map for the DeBeque phacelia. The total acreage of the core map is 214,916 acres.

Table 1. Percentage of Interim Core Map Represented by NLCD² Land Covers and Associated Example Pesticide Use Sites/Types.

Example pesticide use sites/types	NLCD Class/Value	% Area	Total area for landcover type
Forestry	Deciduous Forest (41)	2%	38%
Forestry	Evergreen Forest (42)	36%	38%
Forestry	Mixed Forest (43)	0%	38%
Agriculture	Pasture/Hay (81)	1%	5%
Agriculture	Cultivated Crops (82)	4%	5%
Mosquito adulticide, residential	Developed Open Space (21)	1%	1%
Mosquito adulticide, residential	Developed Low Intensity (22)	0%	1%
Mosquito adulticide, residential	Developed Medium Intensity (23)	0%	1%
Mosquito adulticide, residential	Developed High Intensity (24)	0%	1%
Invasive species control	Woody Wetlands (90)	1%	55%
Invasive species control	Emergent Herbaceous Wetlands (95)	0%	55%
Invasive species control	Open Water (11)	0%	55%
Invasive species control	Grassland/Herbaceous (71)	0%	55%
Invasive species control	Shrub/Scrub (52)	54%	55%
Invasive species control	Barren Land (31)	0%	55%
Total Acres	Interim Core Map Acres	~ 214,916 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); and
- Occurrence locations in NatureServe.

EPA evaluated these four sets of data before selecting the type of and developing the core map. FWS' 2022 Species Status Assessment (SSA) and most recent 5-year review (2022) described AUs containing element occurrences (EOs) of this species. EOs are occupied or previously occupied habitat that contributes or potentially contributes to the persistence of the species at a location (Recovery Plan, 2024). FWS described 26 documented EOs (Recovery Plan, 2024). iNaturalist had 24 research grade observations. Most of the observations were within the core map area. Three observations were located considerable distances away from the core map and range of the species; one located north of the core map in Moffat County, CO, one located in Hinckley UT, and one in White Pine County, NV. NatureServe provided no documented observations. GBIF contained two observations with geographic data. One of the observations was consistent with the range of the species and the core map. The other observation

² Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, <https://doi.org/10.5066/P9JZ7AO3>

was a preserved specimen collected in 1965 southwest of the core map near Grand Junction, CO. **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 Habitats”³ (referred to as “the process”). This core map was developed by EPA and was developed 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; and
4. Document the core map.

For step 1, EPA compiled available information for the DeBeque phacelia from FWS as well as observational information available from various publicly available sources (discussed in previous section). The information compiled for the DeBeque phacelia is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Current existing populations occur in locations consistent with FWS’s AUs;
- the critical habitat contains some but not all known occupied areas;
- The species’ range is not highly refined.

For step 2, EPA used the compiled information to identify the core map type. The critical habitat does not contain all known occupied areas, and the range is not refined. Therefore, the core map was based on biological information. FWS provided EPA with spatial extent of the AUs, which contains all known suitable and occupied habitat for the species. The AUs were to create contiguous areas contain the EOs.

For step 3, EPA used the AUs provided by FWS for the DeBeque phacelia.⁴

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

EPA considered developing the core map by refining the range to areas containing necessary elevation (between 5,026 and 6,424 feet), slope (up to 42 degrees), and soil characteristics (clay soils) based on interpretation of FWS documentation. EPA also considered basing the core map on element occurrence data from Colorado Natural Heritage Program (CNHP), which is cited in FWS documentation. However, EPA never received CNHP data. Additionally, EPA received feedback from FWS suggesting that the AUs contain all known occupied areas and potential habitat.⁴ Therefore, EPA used the AUs as the outer extent of the core map.

³ Dated 2024, available online at: <https://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-pesticide-use-limitation-areas>

⁴ ⁴ Personal communication from FWS to EPA, August 19, 2025

Appendix 1. Information Compiled for Species During Step 1

1. Recent FWS Documents/Links

- [Species Status Assessment Report for DeBeque phacelia](#) (08/01/2022)
- [DeBeque Phacelia \(*Phacelia submutica*\) Recovery Plan](#) – (08/06/2024)
- [Designation of Critical Habitat for *Ipomopsis polyantha* \(Pagosa skyrocket\), *Penstemon debilis* \(Parachute beardtongue\), and *Phacelia submutica* \(DeBeque phacelia\); Final Rule](#) – (08/13/2012)
- [5-Year Status Review for DeBeque phacelia \(*Phacelia submutica*\)](#) – (08/26/2022)

2. Background information

- Status: Federally listed as threatened in 2011
- Resiliency, redundancy, and representation (the 3Rs) (Species Status Assessment, 2022)
 - “At the species-level scale, DeBeque phacelia requires: (1) a sufficient number and distribution of AUs to withstand catastrophic events (redundancy) and (2) a range of variation that allows the species to adapt to changing environmental conditions (representation).” (Species Status Assessment, 2022)
 - There are currently 25 extant occurrences of DeBeque phacelia (Recovery Plan, 2024), which is down from 25 known occurrences in 2022 (Species Status Assessment). DeBeque phacelia was limited dispersal capability and a specific microhabitat preference. Therefore, the redundancy of this species is reduced, and, with it, the species’ ability to survive a highly consequential event.
 - The species self-fertilizes and has limited dispersal, which limits representation. The species has low genetic diversity, and the representation does not increase under any scenario (Species Status Assessment, 2022).
- **Habitat, Life History, and Ecology (Species Status Assessment, 2022)**
 - **Habitat:** The DeBeque phacelia is very narrowly endemic, monotypic species that occurs in areas with very specific soil type, soil features, soil structure, and soil development in areas surrounding the town of DeBeque in Mesa and Garfield Counties, Colorado
 - heavy “colorful” clay soils with erosive features
 - moderately steep slopes (0-42 degrees)
 - “only on unique areas that show a different texture, color, and crack pattern than the surrounding soils”
 - Elevation is a key factor in identifying areas with the temperature and moisture; elevations ranging between 5,026 and 6,424 feet (ft)
 - prefers areas with less than 20 percent cover of other vegetation
 - **Reproduction/pollinators:**
 - Self-fertilizing
- **Taxonomy**
 - Plant
 - Flowering dicot plants low-growing, herbaceous, spring annual plant with a tap root
- **Essential Physical Biological Features (PBFs) for Designated Critical Habitat:**
 - Plant Community and Competitive Ability
 - Elevation from about 5,000 to 7,000 ft

- Topography (surface shape) ranging from almost flat to 42 degrees, with the average around 14 degrees
 - Soils— barren clay soils
 - Climate— not fully understood but they do know wetter years seem to produce more individuals. However, without the right combination of precipitation and temperature within a short window of time in the spring, the species may produce very few seedlings or mature plants, sometimes for several consecutive years.
 - FWS recognize that they are unable to identify exactly what these climatic factors encompass except that the amount of moisture and its timing is critical.
 - Reproduction and Seed Banks— FWS recognize that habitat conducive for successful reproduction is a physical or biological feature for *P. submutica*. However, FWS do not understand more specifically what features are important for this reproduction. Self-fertilization not fully understood
 - Disturbance Regime – adapted to light to moderate disturbance areas
- **Relevant Pesticide Use Sites in FWS Documents**
 - FWS documentation describes disturbance of soils in DeBeque phacelia habitat from livestock movement (Species Status Assessment, 2022). FWS documentation does not specifically discuss pesticide use on livestock. However, the presence of livestock indicates potential pesticide application in the species habitat.
- **Relevant Recovery Criteria and Actions (Source: Recovery Plan 2024)**
 - Downlisting criteria: no species downlisting criteria; species is threatened
 - De-listing criteria:
 - Presence of the DeBeque phacelia is maintained within at least 20 EOs across five AUs.
 - In at least 13 EOs, the number of aboveground plants remains at or above 500 individuals during years where aboveground growth is observed at known occurrences of DeBeque phacelia over a 15-year period.
 - Maintain habitat quality, as measured by low (less than 20 percent) vegetative cover and high soil functional integrity, within known occupied habitat for DeBeque phacelia across all five analytical units (AUs) over a 15-year period.
 - Maintain or improve existing regulatory mechanisms and associated protective measures for the nine EOs within currently designated ACECs.
 - All AUs are represented in an ex-situ seed collection.
- 3. Description of the Species Range (Species Status Assessment, 2022)**
- The range is distributed around the town of DeBeque in western Colorado.
 - At the time of listing, the range only covered 82,231 acres within a 12 mile radius of DeBeque. However, more plants have been discovered since listing, broadening the range to ~275,000 acres
 - The range roughly aligns with five AUs established by FWS (214,916 acres), which contains all known suitable and occupied habitat for the species.
 - AUs are used by FWS because the best available science cannot delineate populations for this species

- The AUs incorporate many areas of unoccupied or unsuitable habitat to define contiguous areas containing multiple Eos. FWS indicated that the AUs likely overestimate the total range of the species
- **Figure A1-1** depicts the current FWS species range (last updated Jan. 19, 2022).
- **Figure A2-1** depicts the core map and the species range .

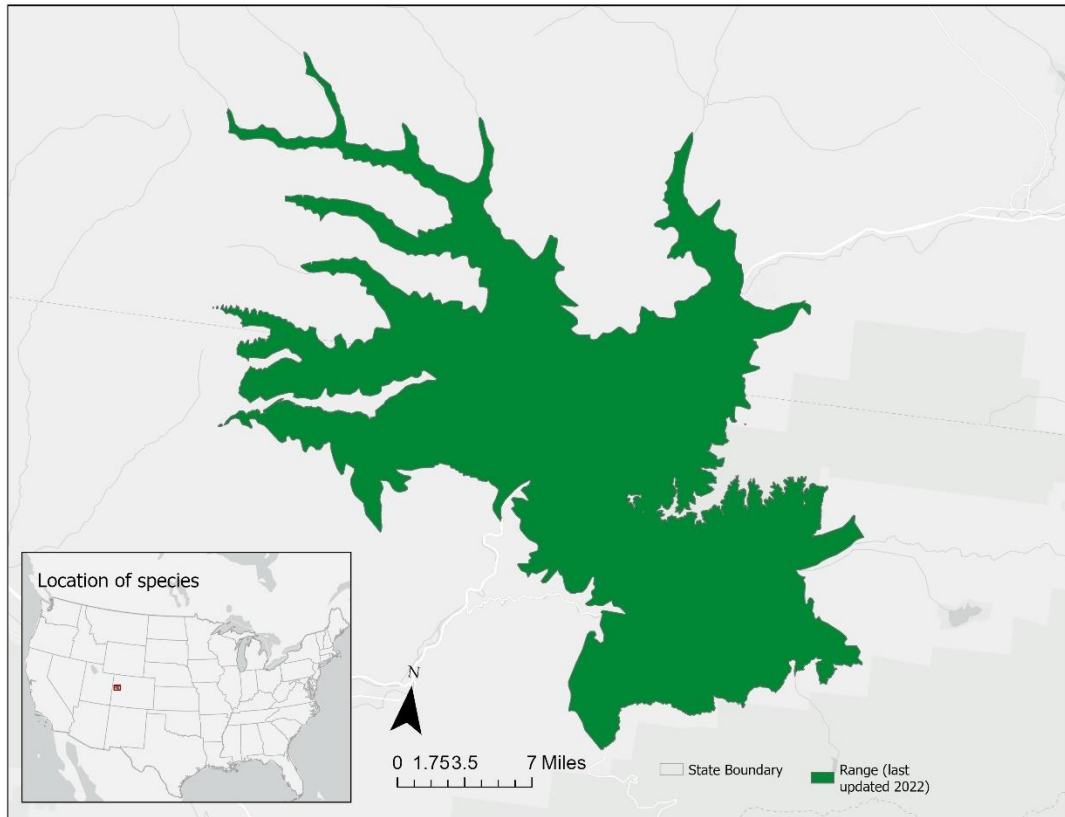


Figure A1-1. FWS Range of the DeBeque phacelia.

4. Critical Habitat

- The DeBeque phacelia critical habitat was designated in 2012 and is approximately 25,000 acres.
- However, after species and critical habitat designation, species occupation was discovered in new areas. Thus, the critical habitat does not cover all areas occupied by the species (Species Status Assessment 2022).
- **Figure A1-2** depicts the current critical habitat and **Figure A1-3** depicts the critical habitat and the range.

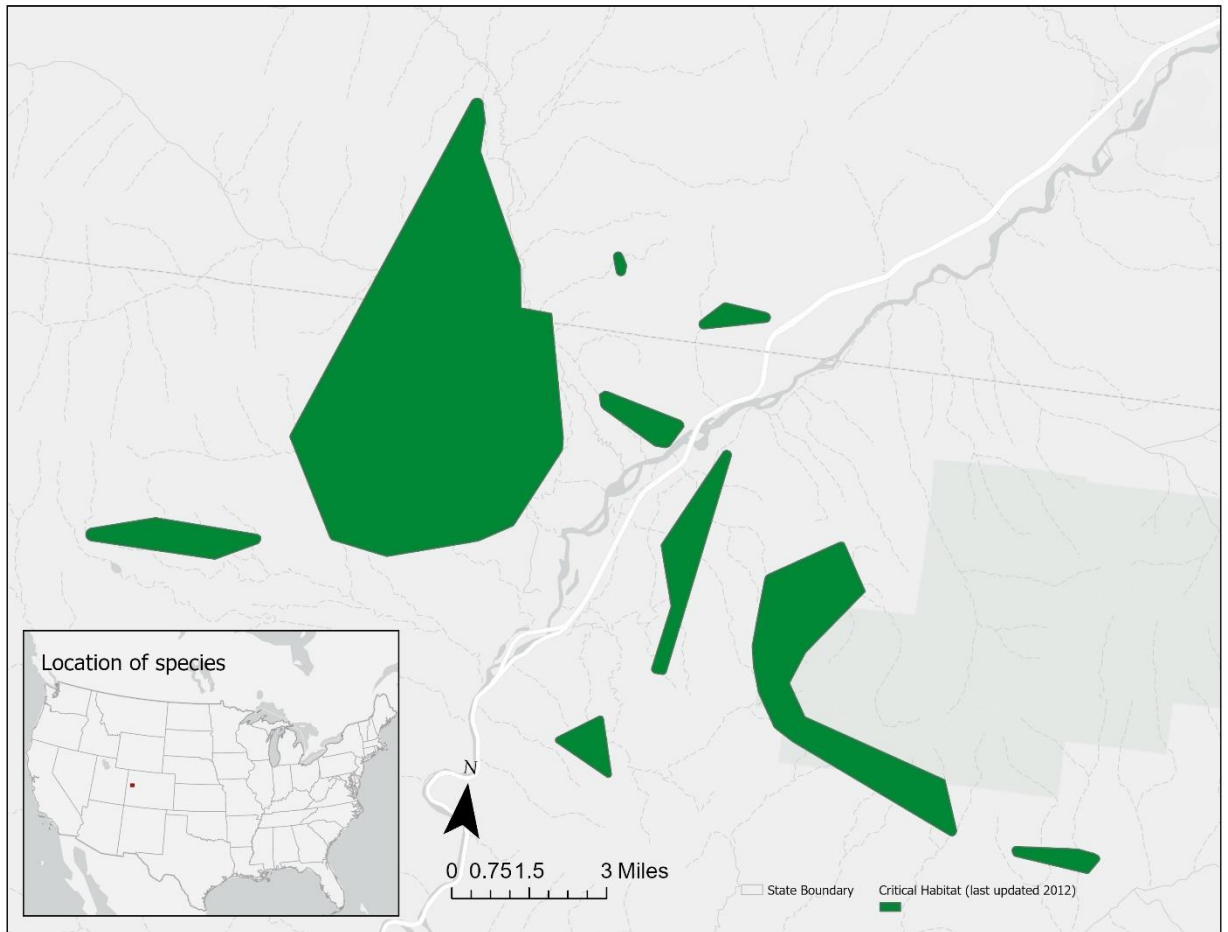


Figure A1-2. FWS critical habitat of the DeBeque phacelia.

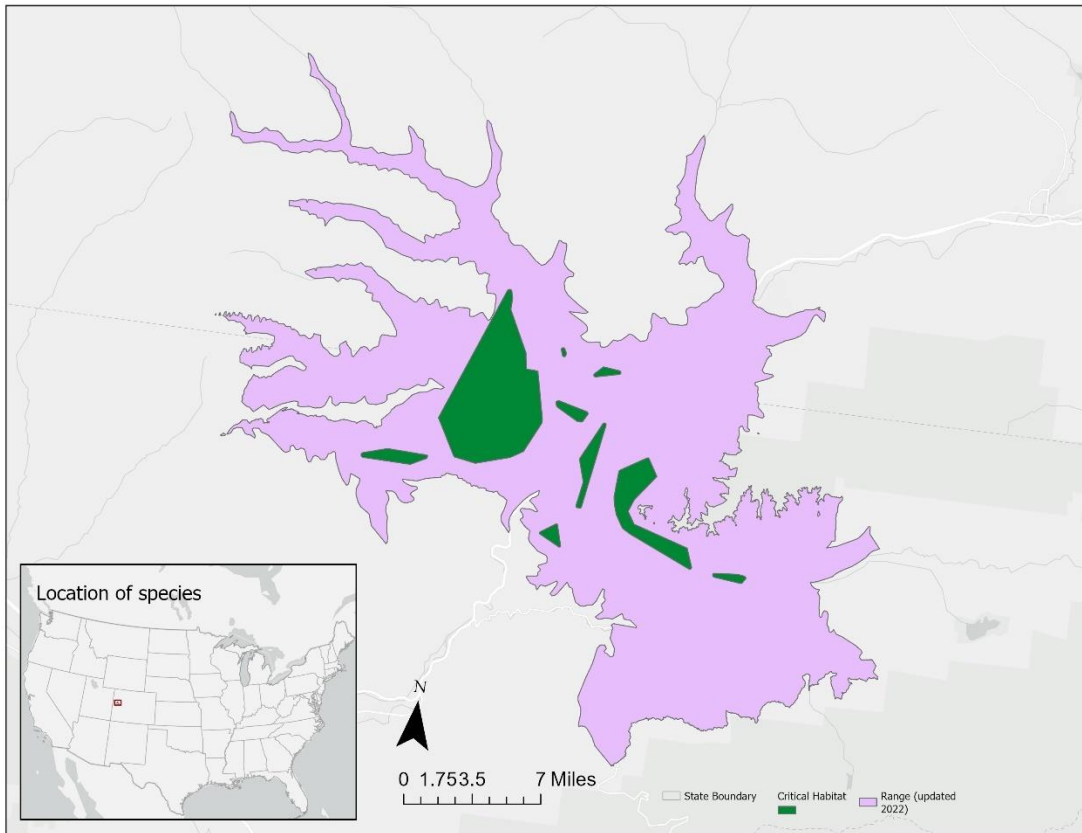


Figure A1-3. FWS critical habitat of DeBeque phacelia (green) with range (purple).

5. Known Locations

- **Known Locations Described in FWS Recovery Documents**
 - There are currently 26 known EOs of DeBeque phacelia. EOs are occupied or previously occupied habitat that contributes or potentially contributes to the persistence of the species at a location.
 - The EOs recorded in FS documentation are recorded from a 2013 Recovery Outline (RO)⁵ or from a CHNP Element Occurrence Report (EOR)⁶
 - All the EOs contained within the five established AUs for the species all known suitable and occupied habitat for the species. AUs are depicted in **Figure A1-4** and listed below:
 - South Shale Ridge
 - North Shire
 - Ashmead Draw
 - Horsethief Mountain

⁵ U.S. Fish and Wildlife Service. (2013). Recovery Outline DeBeque Phacelia (*Phacelia submutica*).

⁶ Colorado Natural Heritage Program (CNHP). (2020). Element Occurrence Reports for *Phacelia submutica*. Colorado State University, Fort Collins, Colorado. 54 pp.

- **Figure A1-5** Includes the names of 25 of the 26 known EOs and is reproduced from the 2022 Species Status Assessment. In the 2024 Recovery Plan, FWS noted that a 26th EO was discovered. However, the recovery plan did not specifically name the new EO or describe the EOs in a table, as was done in the 2022 Species Status Assessment. Therefore, EPA included the table of 25 EOs here.
- The newest EO did not impact the delineation of the AUs (Recovery Plan, 2024).
- Of the 568 occupied acres, 86% occur on Bureau of Land Management (BLM) (Species Status Assessment 2022).
 - 359 of the BLM occupied acres is within an Areas of Critical Environmental Concern (ACEC). See **Figure A1-7**.
 - ACEC is a designation that highlights an area where special management attention is needed to protect important historical, cultural, and scenic values, protect fish and wildlife, or protect other natural resources.
 - Nine of 25⁷ EOs occur within BLM ACECs, within the South Shale Ridge AU and the North Shire AU.
 - South Shale Ridge ACEC overlaps the South Shale Ridge AU.
- The remaining 14% of occupied areas occur on private, State, and other Federal agency managed lands (Species Status Assessment 2022).

⁷ this information was from a document published prior to the discovery of the 26th EO. The location of the 26th EO was not included in the 2024 Recovery Plan, so it is unknown if this number is accurate.

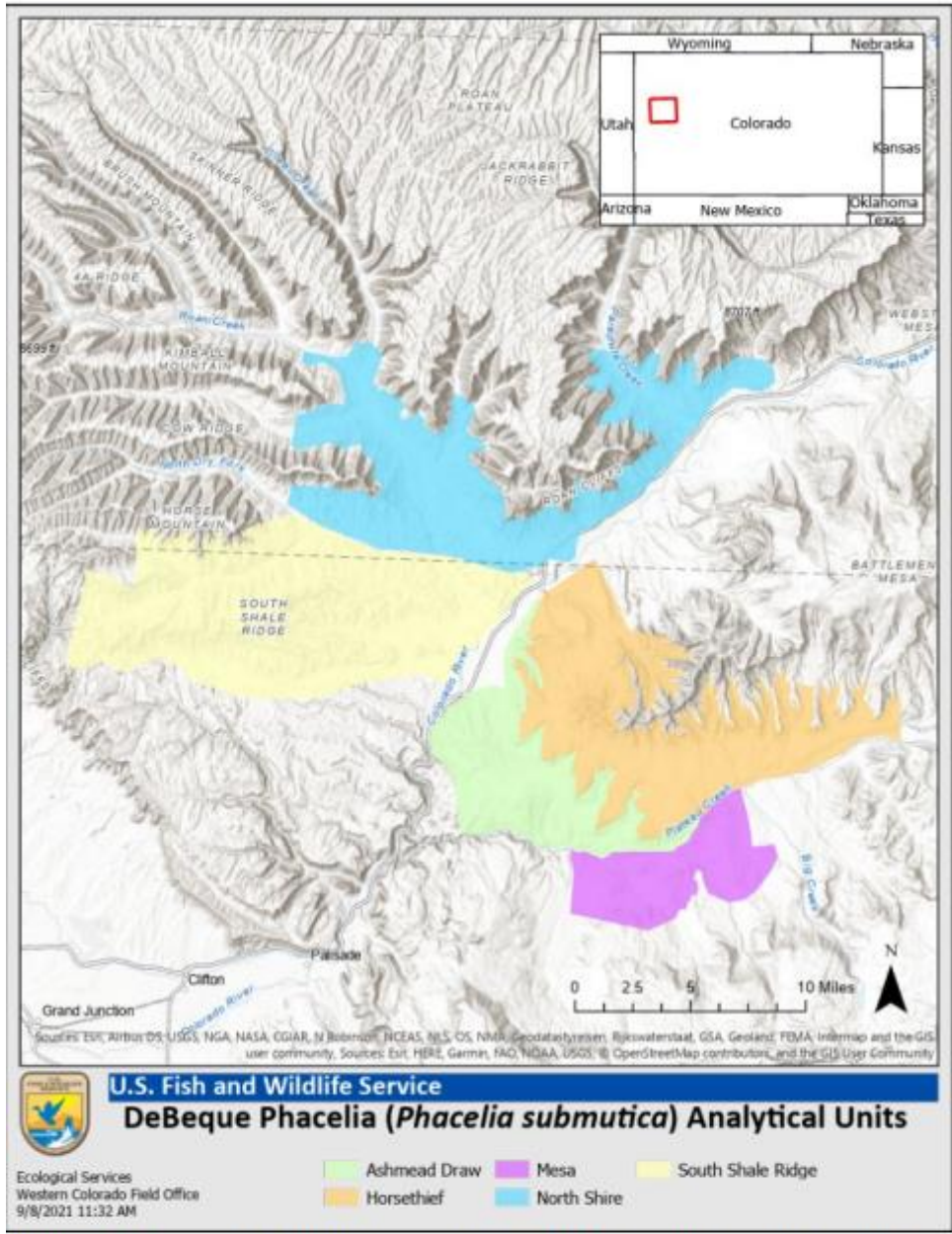


Figure 1. The five AU boundaries used to analyze DeBeque phacelia resiliency, redundancy, and representation. The five AUs are: yellow – South Shale Ridge; blue – North Shire; purple – Mesa; orange – Horsethief; green – Ashmead Draw. All AUs are located in the southern Piceance Basin near the town of DeBeque – reflected in the map insert, upper right corner, in Mesa and Garfield Counties of western Colorado.

Figure A1-5: DeBeque phacelia Analytical Units.

AU Name	EO Name	EO Number	Approximate High Count of Number of Individuals	Source: 2013 RO or EOR	Rating for "Number of Individuals" Category in Condition Evaluation in SSA
South Shale Ridge	Sulpher Gulch	9911/26	70	RO	L
South Shale Ridge	Sulpher Gulch	7168/28	10	EOR	L
South Shale Ridge	Winter Flats, Sulpher Gulch	12231/42	1600	EOR	M
South Shale Ridge	DeBeque West	10034/2	500	RO	M
South Shale Ridge	Pyramid Rock	8669/7	773	EOR	M
South Shale Ridge	Pyramid Ridge, Coon Hollow South	4167/3	1179	EOR	M
South Shale Ridge	Coon Hollow/B Wagon Track	5775/11	1800	EOR	M
South Shale Ridge	Coon Hollow	9209/25	200	RO	L
South Shale Ridge	Mount Low, West of DeBeque	8029/17	10000	RO	H
South Shale Ridge	Dry Fork, Roan Creek N. Dry Fork Road	7666/10	500	EOR	M
South Shale Ridge	DeBeque East, Cemetary Road	12232/43	50	EOR	L
North Shire	Bloat Gulch, Logan Wash Confluence of Roan & Conn Creeks	8935/15	5820	RO	H
North Shire	Dry Fork	15544/50	600	EOR	M
North Shire	Roan Creek	12236/45	195	RO	L
North Shire	Mount Logan Foothills	12237/46	50	EOR	L
Ashmead Draw	South of DeBeque	1322/30	67	RO	L
Ashmead Draw	DeBeque Reservoir, Ashmead Draw, Bluestone Valley Ditch	2911/8	210	EOR	L
Ashmead Draw	Baugh Reservoir/Horse Canyon	7667/9	1000	EOR	M
Ashmead Draw	Shire Gulch	15418/49	10	EOR	L
Horsethief Mountain	Jerry Gulch	1345/38	300	RO	L
Horsethief Mountain	Moffat Gulch	6320/31	20	EOR	L
Horsethief Mountain	Battlement Lower Badlands #2, Housetop Mtn., Jerry Gulch, Atwell Gulch	14550/48	1817	EOR	M
Horsethief Mountain	Horsethief Mtn., NW-SW-WSW, Shire Gulch, South of Horsethief Creek	10975/19	17700	EOR	H
	Anderson Gulch, Round Mtn	14549/47	15100	RO	H
Mesa	The Beehive	17646/51	1	EOR	L

Figure A1-6. Five Analytical Units and 25 Element Occurrences of DeBeque phacelia. Reproduced from FWS Species Status Assessment (2022). A 26th EO was identified after the species status assessment was released and is not included in this table.

EO Number	Analytical Unit	ACEC	Total Acres in EO	Acres of EO within ACEC
7168	South Shale Ridge AU	South Shale Ridge ACEC	1.9	1.9
9911	South Shale Ridge AU	South Shale Ridge ACEC	4.1	4.1
12231	South Shale Ridge AU	South Shale Ridge ACEC	1.1	1.1
5775	South Shale Ridge AU	South Shale Ridge ACEC	69.1	69.1
9209	South Shale Ridge AU	South Shale Ridge ACEC	2.1	2.1
4167	South Shale Ridge AU	South Shale Ridge ACEC	55.9	55.9
8029	South Shale Ridge AU	South Shale Ridge ACEC	13.6	2.0
8669	South Shale Ridge AU	Pyramid Rock ACEC	215.9	215.9
12237	Nort Shire AU	Mt Logal Foothills ACEC	7.0	7.0

Total Acres of Occupied Habitat in ACECs: 359

Figure A1-7. Element Occurrences of DeBeque phacelia occurring in Bureau of Land Management Areas of Critical Environmental Concern Reproduced from the 2022 Species Status Assessment

- **Occurrences Included in Public Databases**

EPA queried iNaturalist, GBIF, and NatureServe.

iNaturalist (available [here](#)) included 24 research grade observations from April 2013-May 2025. All but three of the observations were within the core map area. The three observations that were outside the core map area were located a considerable distance away and not co-located (see **Figure A1-7**). The three observations outside the core map area were located north of the core map in Moffat County, CO, west of the core map in Hinckley UT, and west of the core map in White Pine County, NV. These observations suggest that the species may not be isolated to the area surrounding DeBeque. However, the observations did not warrant expanding the core map.

GBIF (available [here](#)) included 2 occurrences with geographic coordinates. One observation was within the core map. The second observation was a preserved specimen collected in 1965 southwest of the core map near Grand Junction, CO, which is roughly 33 miles southwest of DeBeque. These observations did not warrant expanding the core map.

NatureServe (available [here](#)) was searched but no occurrences with georeferenced data were available but the species distribution was consistent with the core map.



Figure A1-7: iNaturalist observations of DeBeque phacelia, including three observations outside the core map area in Moffat County, CO (labeled 1), Hinckley, UT (labeled 2), and White Pine County, NV (labeled 3). Image extracted from iNaturalist [here](#)

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

This core map was created based on biological information. FWS provided EPA with the shapefile for the spatial extent of the analytical units they have established for this species. EPA used DeBeque phacelia analytical units without additions or subtractions.

1. Data Used

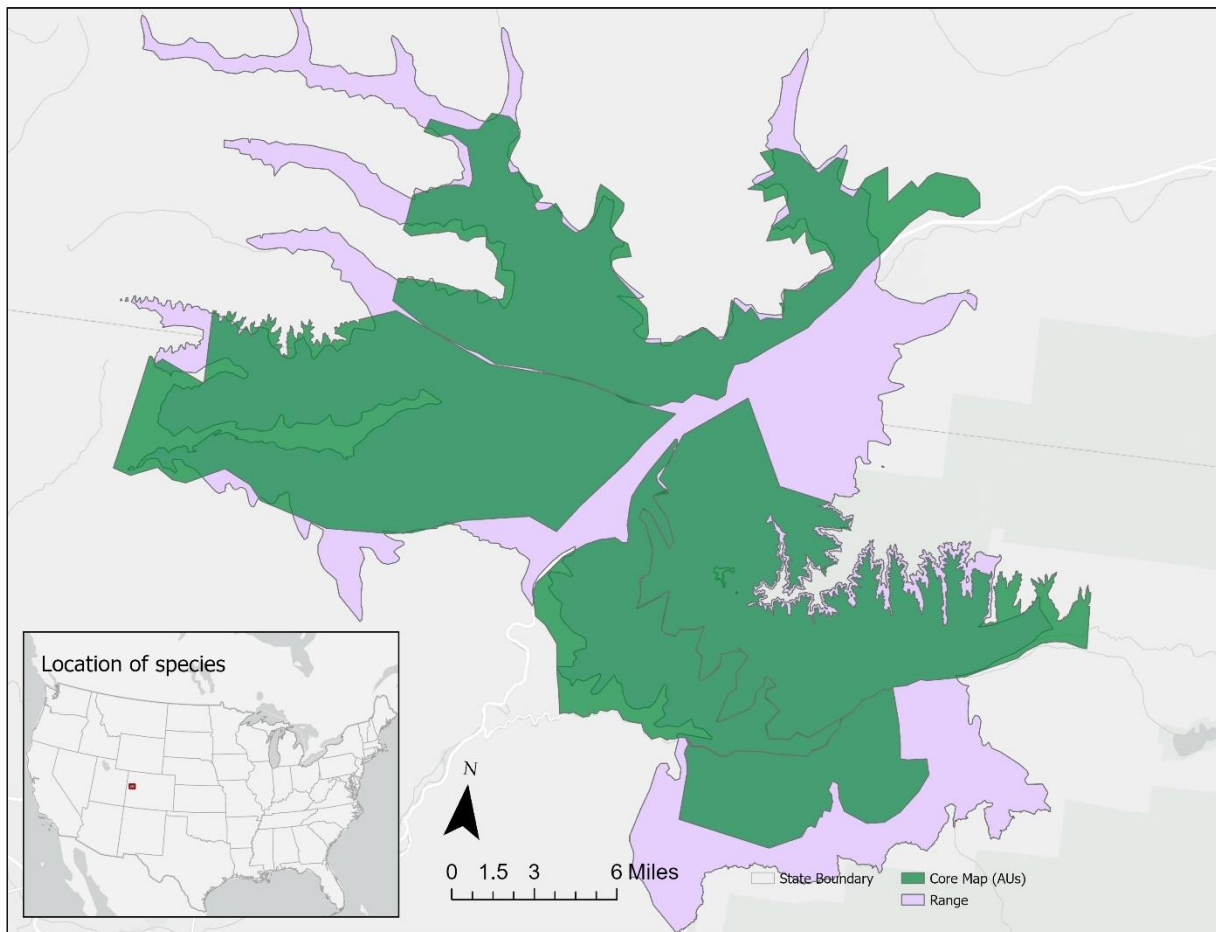
- DeBeque phacelia analytical units, received from FWS Aug. 19, 2025.

2. Software Used

- ArcGIS Pro

3. GIS Steps Taken

- EPA used the DeBeque phacelia analytical units shapefile provided by FWS as the core map (“Debeque_Phacelia_CoreMap.shp”) without any additions or subtractions. **Figure A2-1** depicts the AUs and the range.



A2-1: Comparison of DeBeque phacelia analytical units/ core map (green) and range (purple).