Interim Core Map Documentation for the Gypsum Wild Buckwheat

Date Posted to EPA's GeoPlatform: October 2025

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

Species Summary

The gypsum wild buckwheat (*Eriogonum gypsophilum*; Entity ID #709) is a threatened terrestrial plant (dicot). The U..S Fish and Wildlife Service (FWS) has designated a critical habitat for the gypsum wild buckwheat. This species is restricted to hills of hypergypsic, slightly alkaline, loose, moderately developed clay soils containing adequate soil moisture—possibly including hydrated gypsum (crystallization water)—and soil nutrients in New Mexico. This species blooms from April to May and is pollinated by a variety of insects (bees, beetles, butterflies, and flies). Currently, the gypsum wild buckwheat is only known for four populations In Eddy County, New Mexico (Seven Rivers Hills, Black River, Ben Slaughter Draw and Hay Hollow). Additional information is provided in **Appendix 1**. This species is currently included in the Herbicide Strategy.

Description of Core Map

The core map for the gypsum wild buckwheat is biological information type, based on four known populations within Eddy County in southeastern New Mexico.

Figure 1 depicts the interim core map for the gypsum wild buckwheat (green areas on map). The core map represents approximately 683 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly Scrub/shrub (81%) and Grassland/herbaceous (18%).

The core map developed for the gypsum wild buckwheat is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the gypsum wild buckwheat. This core map incorporates information developed by the U.S. Fish and Wildlife Service (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 judgment classification because it primarily used information from FWS documentation but includes some changes to the spatial extents. The map is based on known locations described by FWS. EPA manually traced population areas based on FWS maps. However, EPA created more spatially refined population boundaries using best professional judgement based on assessing contiguous land types. EPA also replaced the FWS population map for the Seven Rivers Hills population with the FWS critical habitat.

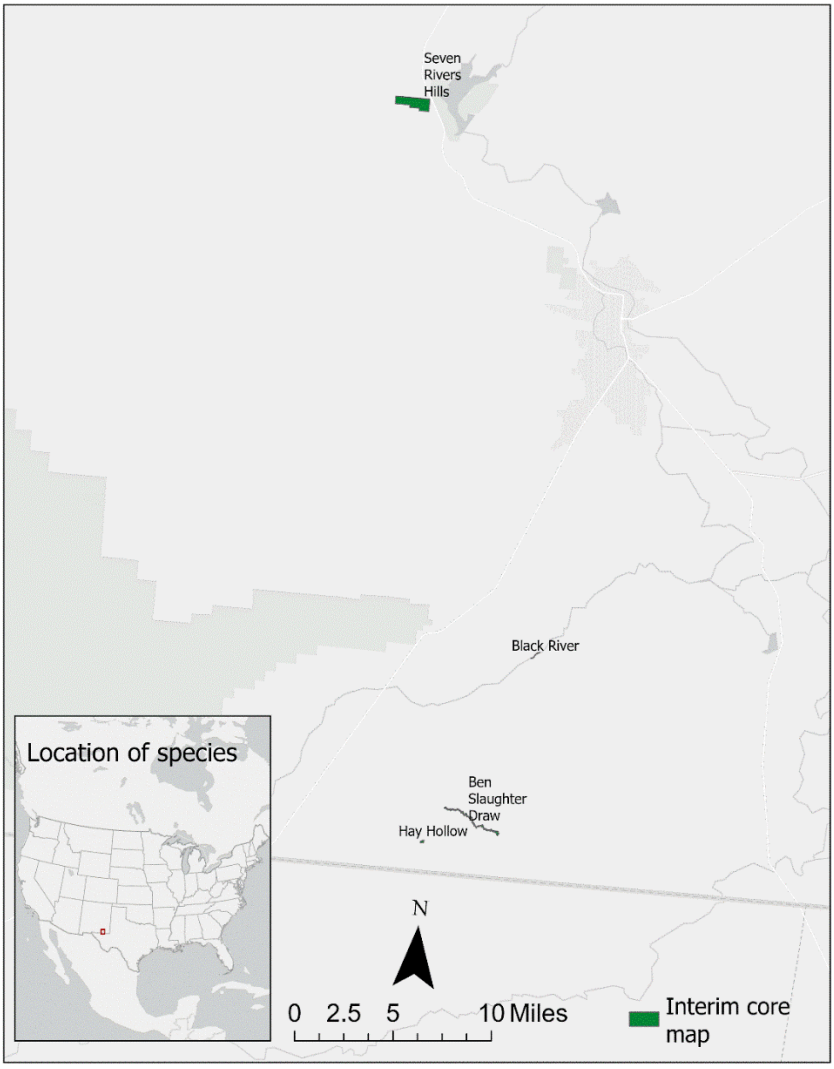

Figure 1. Interim core map for the gypsum wild buckwheat. Total acreage of core map is approximately 683 acres (https://ecos.fws.gov/ecp/species/7770).

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	% of core map represented by example pesticide use
Forestry	Deciduous Forest (41)	0	0
Forestry	Evergreen Forest (42)	0	0
Forestry	Mixed Forest (43)	0	0
Agriculture	Pasture/Hay (81)	0	0
Agriculture	Cultivated Crops (82)	0	0
Mosquito adulticide, residential	Open space, developed (21)	0	0
Mosquito adulticide, residential	Developed, Low intensity (22)	0	0
Mosquito adulticide, residential	Developed, Medium intensity (23)	0	0
Mosquito adulticide, residential	Developed, High intensity (24)	0	0
Invasive species control	Woody Wetlands (90)	1	100
Invasive species control	Emergent Herbaceous Wetlands (95)	0	100
Invasive species control	Open water (11)	0	100
Invasive species control	Grassland/herbaceous (71)	18	100
Invasive species control	Scrub/shrub (52)	81	100
Invasive species control	Barren land (rock/sand/clay; 31)	0	100
Total Acres	**Interim Core Map Acres**	683	

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 appeared to have the finest resolution of the location information, providing maps that depicted all the current known locations (**Figure A1-4**). Occurrences in iNaturalist (**Figure A1-8**), GBIF, and NatureServe (**Figure A1-9**) did not support expanding the core map outside of these four locations.

FWS' 2022 Species Status Assessment (SSA) and most recent 5-year review (2022) detailed known locations of this species. FWS described 4 documented occurrences that are extant. iNaturalist had 73 verifiable, research grade observations (**Figure A1-8**). NatureServe provided four documented locations (**Figure A1-9**). GBIF contained no additional data that were not already included in iNaturalist or NatureServe. **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://www.usgs.gov/data/national-land-cover-database-nlcd-2021-products

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"). 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.

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

- All occurrences and known locations of the gypsum wild buckwheat are in 4 small and well-refined areas in one county in southeastern New Mexico.
- Occurrence data from other sources are consistent with the species range.
- One of the four populations is consistent with the critical habitat.

EPA used the compiled information to identify the core map type, including the species range, critical habitat, and known location information. EPA compared known location data to the range and critical habitat and found that the one of the FWS known locations of currently existing (extant) populations is consistent with the location of the designated critical habitat and three of the FWS known locations are consistent with the range. The species range is not likely limited to the current areas containing habitat of the species since evolutionary history and historical distribution may be factored in (2022 SSA p. 82) and it is much larger than the areas where known locations occur. Based on this information, EPA used the designated biological information as the core map.

EPA used the designated critical habitat provided by FWS for the gypsum wild buckwheat. EPA downloaded the critical habitat from FWS's ECOS (https://ecos.fws.gov/ecp/species/7770).

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

Alternative approaches and data other than those described in this documentation were not explored in the development of this interim core map.

There are soil and elevation preferences for this species which were considered for core map refinement. However, further refinements based on those soil and elevation requirements were not used to refine the core map because when the species' elevation preferences were overlaid over the core map, it did not change the core map. When soil preferences were considered for core map refinement, it was not clear how to quantify "slightly" and "moderately" and "adequate" for the slope,

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

acidity, and moisture. The preferred soil description was too subjective to translate into geoprocessing steps.

Appendix 1. Information Compiled for Species During Step 1

1. **Recent FWS Documents/Links**
   - Gypsum Wild Buckwheat 5-year Review: Summary and Evaluation 2022 – (Aug. 31, 2022)
   - Species Status Assessment (SSA) of Gypsum Wild Buckwheat (*Eriogonum gypsophilum* Wooton & Standl.) - (Aug. 15, 2022)
   - Gypsum Wild Buckwheat (Eriogonum gypsophilum) Recovery Plan 1984 – (March 30, 1984)
   - ETWP; Determination of Two New Mexico Plants to be Endangered Species and Threatened Species with Critical Habitat. 46 FR 5730-5733.
   - iNaturalist Observations - https://www.inaturalist.org/observations?d1=2010-01-01&d2=2025-04-21&quality_grade=research&taxon_id=162612&verifiable=any
   - NatureServe Observations - https://explorer.natureserve.org/pro/Map?taxonUniqueId=ELEMENT_GLOBAL.2.135004

2. **Background information**
   - **Status**: Federally listed as threatened in 1981.
   - Resiliency, redundancy, and representation (the 3Rs) (SSA 2022)
     - **Resiliency**: The species resiliency was characterized as good as there are large, dense, recruiting, stage balance populations with a stable or increasing growth rate.
     - **Redundancy**: The species redundancy was characterized as good as there are multiple populations are distributed across the species geographic range.
     - **Representation**: The species representation was characterized as good as there is distribution across a variety of topographic positions, plant communities, soil chemistries, and climatic zones.

   - **Habitat, Life History, and Ecology (Source: SSA 2022)**
     - **Habitat**: The gypsum wild buckwheat depends on broad, gently to moderately sloping, slightly erosional escarpments or hills of hypergypsic, slightly alkaline, loose, moderately developed clay soils containing adequate soil moisture, possibly including hydrated gypsum (water of crystallization), and soil nutrients for survival and recruitment. Known populations occur at elevations between 990 to 1090 m (3,240 to 3,580 ft).

     - **Reproduction/pollinators**: **(Source: SSA 2022)**
       - Blooms from April-May
       - Pollinators include bees, beetles, butterflies and flies.

   - **Taxonomy**
     - Flowering dicot plants

   - **Relevant Pesticide Use Sites in FWS Documents (Source: SSA 2022)**
     - Herbicide exposure. Herbicides are known to be used within the species known range for landscape-scale vegetation treatments. Active ingredients used are aminopyralid, clopyralid, tebuthiuron, and triclopyr in both fluid and particulate chemical formulations. Activities that contribute to herbicide application are farming, ranching, restoration, and vegetation-clearing. Herbicides and controlled burns are used in range improvement projects to increase soil moisture and nutrient availability to desired forage plants.

- **Relevant Recovery Criteria/Objectives (Source: 1984 Recovery Plan)**
    - De-listing criteria include designation of the critical habitat as a Bureau of Land Management (BLM) Area of Critical Environmental Concern (ACEC). Maintain a population of 10,000 individuals and to have a special use designation that would secure the area from degradation due to human activities.

- **Recovery Actions (Source: 1984 Recovery Plan)**
    - Enforce existing regulations.
    - Designate the critical habitat a BLM Area of Critical Environmental Concern.
    - Develop and implement a Habitat Management Plan.
    - Regulate recreational use of area.
    - Regulate ORB use of *Eriogonum* critical habitat.
    - Monitor the effects of the raised water level with filling of the Brantley Reservoir.
    - Maintain healthy populations of *Eriogonum gypsophilum* in its natural habitat.
    - Inventory suitable habitat for new populations.
    - Develop public appreciation and support for the preservation of *Eriogonum gypsophilum.*

3. Description of the species range

- The current geographic range is restricted to four locations in Eddy County in southeastern New Mexico. (SSA 2022).
- **Figure A1-1** depicts the current FWS species range (last updated Aug. 28, 2024).
- The species range is approximately 713,825 acres.

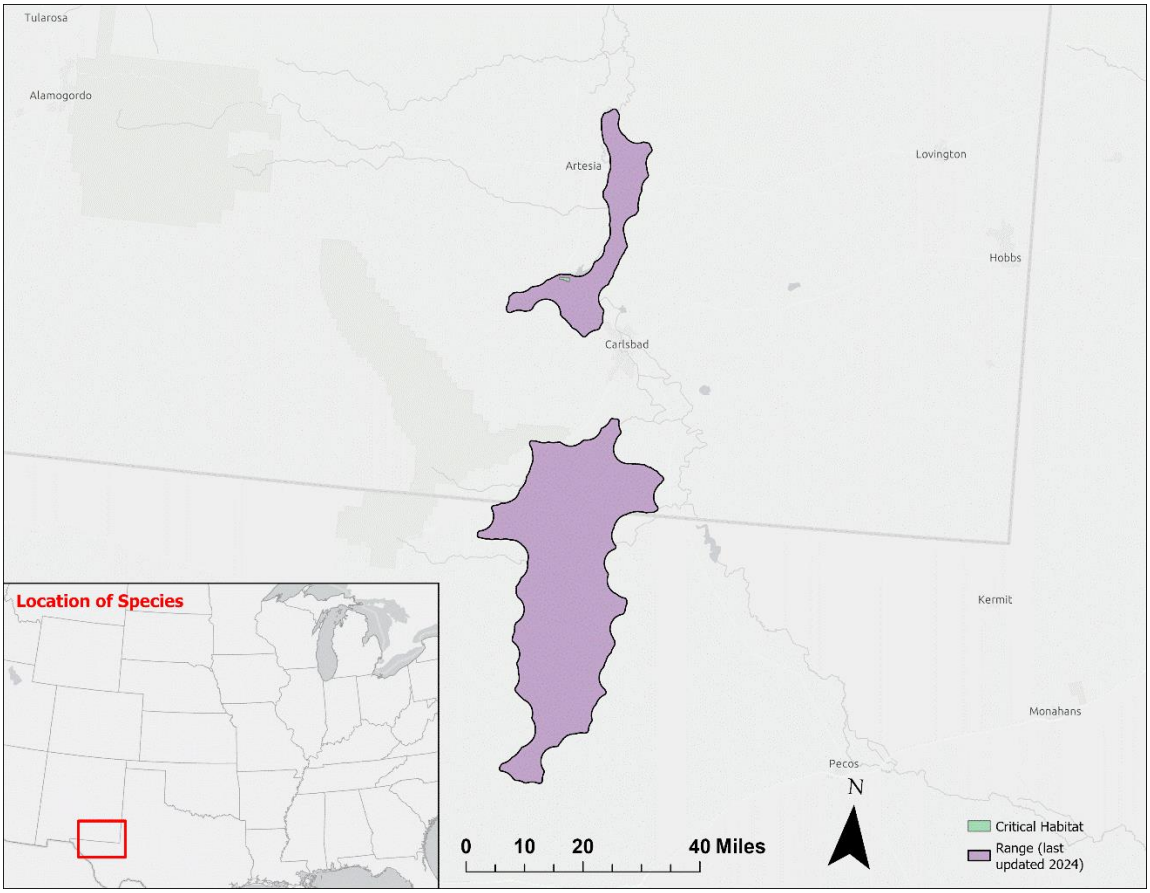

Figure A1-1. FWS Range of the gypsum wild buckwheat in New Mexico (https://ecos.fws.gov/ecp/species/7770).

4. **Critical Habitat (Source: 46 FR 5730 5733)**
   - The gypsum wild buckwheat critical habitat was designated in 1981. It included 539 acres in New Mexico where the species currently occurs.
   - The area is public land administered by the Bureau of Land Management.
   - **Figure A1-2** depicts the current critical habitat.

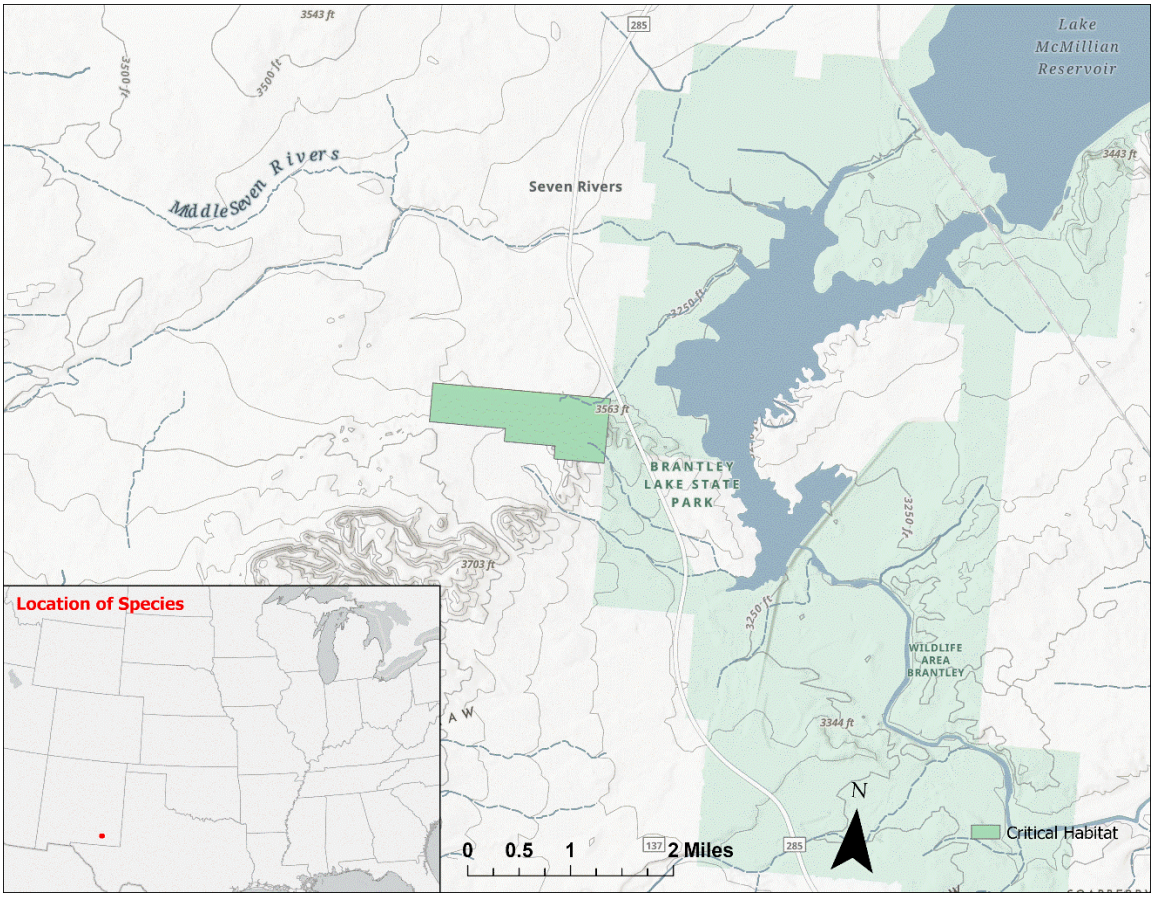

Figure A1-2. FWS critical habitat of the gypsum wild buckwheat.

5. Known Locations

- **Known Locations Described in FWS Recovery Documents**
  - There are currently four known occurrences of gypsum wild buckwheat (Seven Rivers Hills, Black River, Ben Slaughter Draw, and Hay Hollow).
  - **Figure A1-3** depicts the critical habitat/4(d) rule/Experimental population designation/Similarity of appearance listing: The critical habitat designated at the time of listing included the Seven Rivers Hills population in Eddy County, New Mexico (46 FR 5733). The written critical habitat description did not match the intended designation indicated on the map. On Dec. 21, 1984, FWS republished the written critical habitat description (49 FR 49639); however, it still failed to correspond to the mapped area. The correct written description should read: T20S R25E Section 24: N½ NE¼, N½ S½ NE¼, NE¼ NW¼, N½ SE¼ NW¼; and T20S R26E Section 19: N½, N½ N½ SE¼; gypsum soils (bold text indicates changes from 46 FR 5733. (5-year review 2022)
  - **Figure A1-4** depicts the known location data from FWS's Species Status Assessment, including extant populations.
  - When considering the locations of the current extant populations (**Figure A1-4**), they are consistent with the location of the critical habitat (**Figure A1-2, A1-3**).

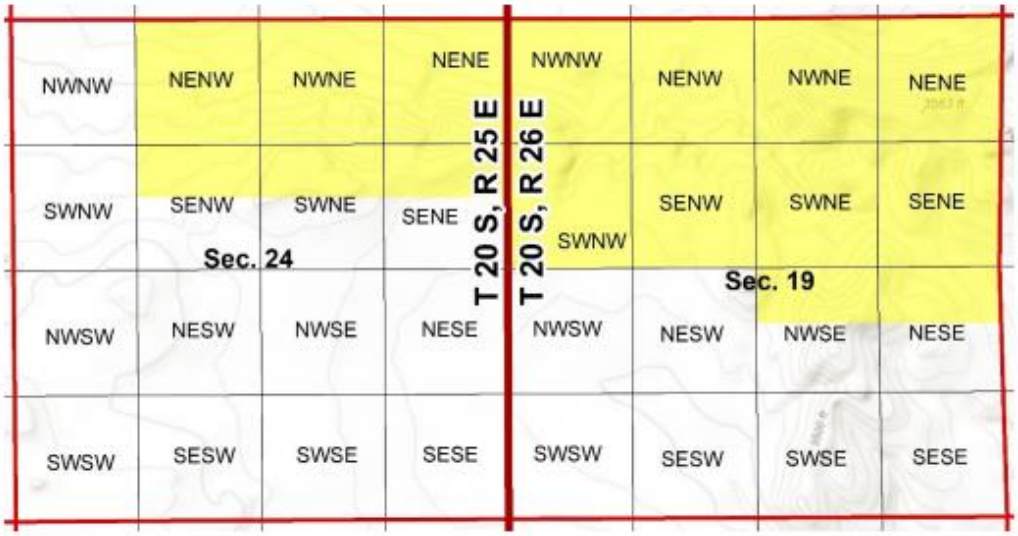

Figure A1-3. Gypsum wild buckwheat critical habitat boundaries with Public Land Survey System (PLSS) Township, Range, Section, and Quarter delineations. (5-Year Review 2022)

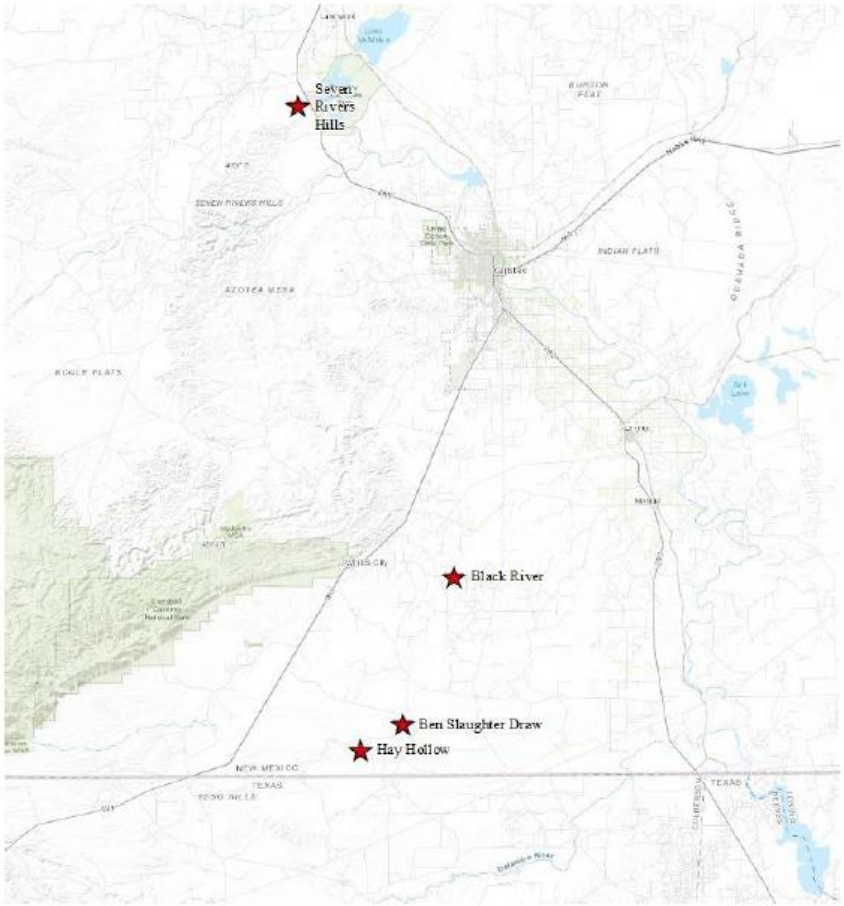

Figure A1-4. Known locations of gypsum wild buckwheat critical habitat boundaries with Public Land Survey System (PLSS) Township, Range, Section, and Quarter delineations. (5-Year Review 2022) in Eddy County in southeastern New Mexico. (SSA 2022)

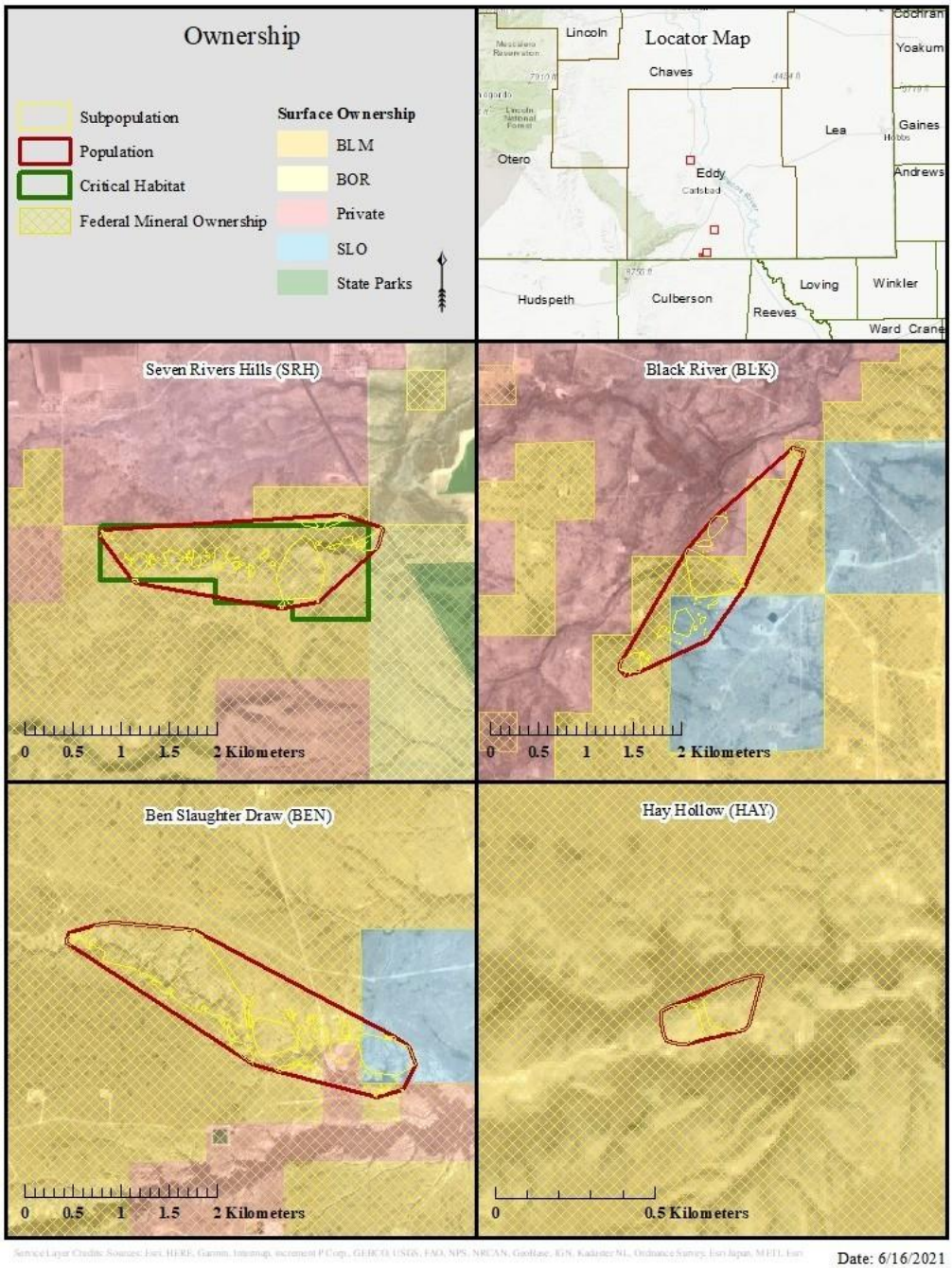

Figure A1-5. Known locations of gypsum wild buckwheat critical habitat boundaries with Public Land Survey System (PLSS) Township, Range, Section, and Quarter delineations. (5-Year Review 2022) in Eddy County in southeastern New Mexico, with land ownership. (From Figure 3-3 of SSA 2022.)

- Seven Rivers Hills Population (**Figure A1-5**).
  - Used critical habitat (FWS, **Figure A1-2**).

- Ben Slaughter Draw Population (**Figure A1-5, A1-6**).

- Manually drew boundaries based on FWS maps (**Figure A1-5, A1-6**).

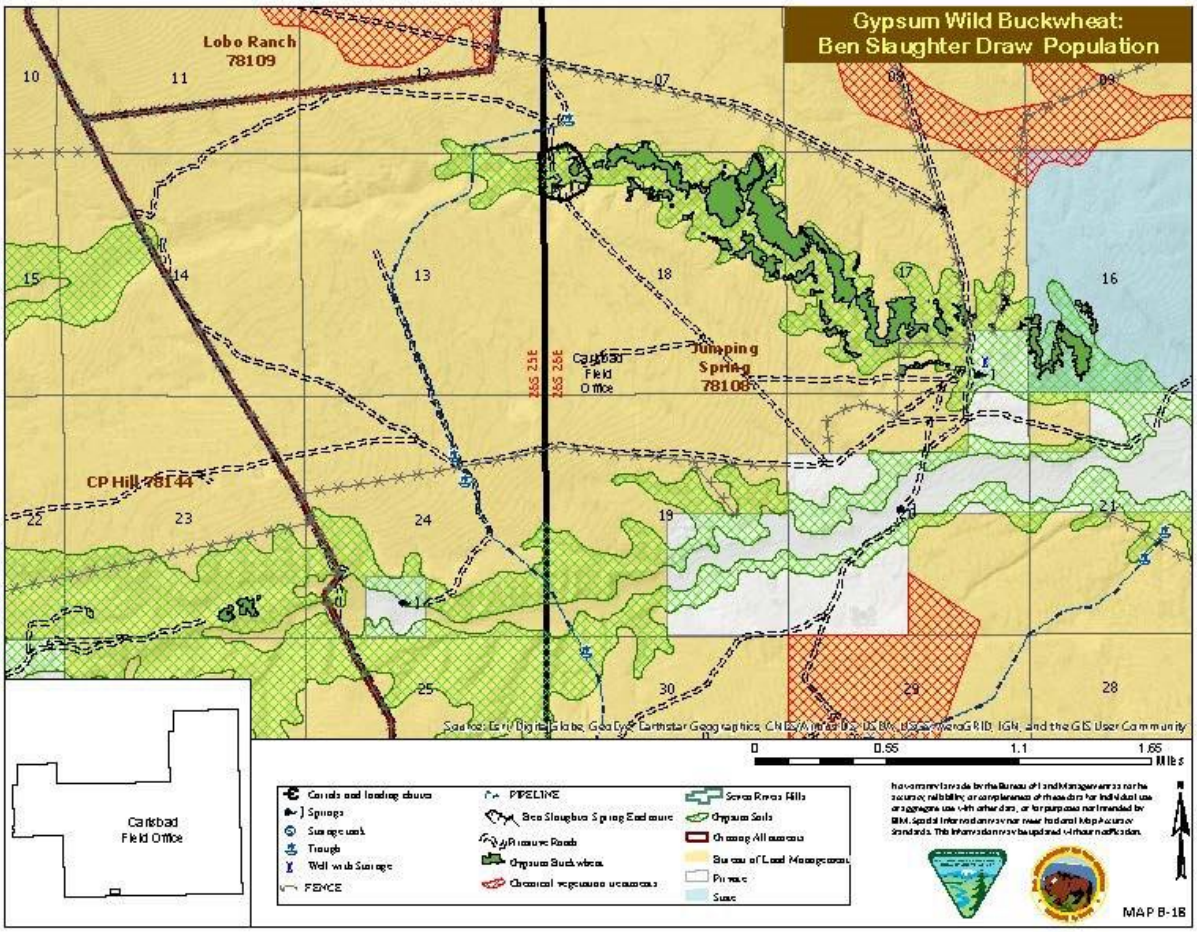

Figure A1-6. Detail of Ben Slaughter Draw location, depicting grazing and water-related features (From Figure C-5-2 of SSA 2022).

- Hay Hollow Population (**Figure A1-5, A1-7**)
  - "The HAY population was originally reported south of BEN in 1993. Knight (1993, p. 9) described HAY as "two small, disjunct pieces of occupied habitat, aligned along the drainage of Hay Hollow. …situated approximately 1.5 miles south of Ben Slaughter Draw." This description and location aligns with Spurrier's (1989, pp. 7-9) unoccupied Washington Spring comparison site and may represent a misinterpretation of Spurrier's thesis. The HAY population was not relocated by surveyors in 2000 and was reported to be an error, but a population at an alternate location in Hay Hollow was discovered and mapped in 2013 (Sivinski 2000, pp. 2-3; Sivinski 2013, no page number; BLM 2020b, no page number). See figure 2-6 for the relative locations of HAY as reported in 1993 versus as discovered in 2013."
  - Manually drew boundaries based on FWS maps (**Figure A1-7**).

Figure A1-7. Detail of Hay Hollow population, depicting original 1993 reported location (gray hatched polygons) and 2013 discovered location (red star and outlined polygon)(From Figure 2-6 of SSA 2022).

Table A1-1. Summary statistics for gypsum wild buckwheat populations. All = species range, SRH = Seven Rivers Hills population, BLK = Black River population, BEN = Ben Slaughter Draw population, and HAY = Hay Hollow population, Sub-EO = Sub-Element Occurrence (a substitute measure of a subpopulation when population genetic data is not available), ha = hectares, ac = acres, km = kilometers, mi = miles, NA = not applicable. (From Table 2.1 of SSA 2022)

Analysis Unit	SRH	BLK	BEN	HAY	All
Individual Abundance	47,858	25,433	65,400	6,186	144,878
Estimated Adult Genet Abundance	30,193	16,046	41,261	3,903	91,403
Average Population Growth Rate	0.99	0.99	0.98	0.97	0.98
Sub-EO Count	55	55	80	3	NA
Estimated Occupied Area (ha (ac))	9.56 (23.62)	4.83 (11.94)	21.17 (52.31)	0.81 (2.53)	36.6 (90.4)
East/West Distance (km (mi))	3.0 (1.8)	1.9 (1.2)	3.7 (2.3)	0.3 (0.2)	12.1 (7.5)
North/South Distance (km (mi))	1.0 (0.6)	2.4 (1.5)	1.8 (1.1)	0.2 (0.1)	60.8 (37.8)
Nearest Neighbor Distance (km (mi))	45.3 (28.1)	13.7 (8.5)	4.0 (2.5)	4.0 (2.5)	NA

- **Occurrences in iNaturalist**
  - Searched on May 9, 2025.
  - https://www.inaturalist.org/observations?d1=2005-01-01&d2=2025-04-21&order=asc&quality_grade=research&subview=map&taxon_id=162612&verifiable=any
  - There are 73 verifiable, research grade observations available from 2018-2025.
  - **Figure A1-8** depicts the locations of these observations.
  - Due to the coarse resolution of these data, it is unclear if these observations are in the core map area or not.

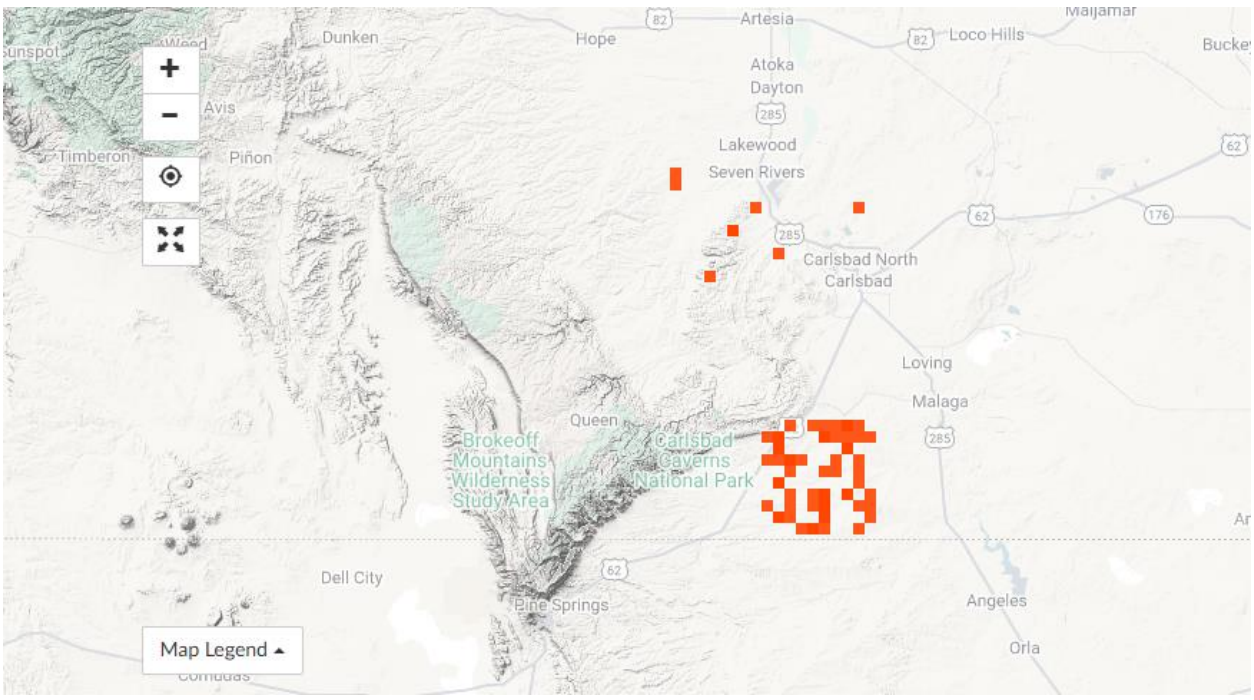

Figure A1-8. Screenshot from iNaturalist observations for the gypsum wild buckwheat. Area depicted is on similar scale and location as species range depicted in Figure A1-1.

Occurrences in NatureServe

- NatureServe was searched on April 21, 2025.
- https://explorer.natureserve.org/pro/Map?taxonUniqueId=ELEMENT_GLOBAL.2.135004
- NatureServe has four documented locations located within New Mexico.
- These locations are generally consistent with the location of the range and critical habitat.

Occurrences in GBIF

- GBIF was searched on April 21, 2025.
- https://www.gbif.org/occurrence/search?basis_of_record=HUMAN_OBSERVATION&taxon_key=2889579
- There were 68 “human observations” available for this species.
- All observations were included in either iNaturalist or NatureServe.

Collectively, the occurrence data from iNaturalist, GBIF, and NatureServe do not support expanding the core map beyond the FWS known locations plus critical habitat.

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

This core map was created based on biological information, including critical habitat and known occupied locations. Known locations (Seven Rivers Hills, Black River, Ben Slaughter Draw, and Hay Hollow) are from FWS documentation that contains maps of all four populations (SSA, 2022). EPA used ArcGIS to manually trace three of the four population areas (Black River, Ben Slaughter Draw, and Hay Hollow). EPA refined these three population boundaries using best professional judgement based on assessing contiguous land types. EPA replaced the FWS population map for the Seven Rivers Hills population with the FWS critical habitat, which was released by FWS in 1981.

1. **Dataset References and Software**
   - Software used: ArcGIS Pro 3.5.2
   - ESRI Basemaps
   - Google Maps (https://www.google.com/maps)
   - FWS Species Range – last updated on Aug. 28, 2024
   - FWS Species Critical Habitat – released in 1981
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 maps of current locations from FWS (**Figure A1-5**) (SSA, 2022). Three of the population areas were expanded as described below (**Table A-2**).
     (1) Seven Rivers Hills Population
        - Used critical habitat published by FWS in 1981 (**Figure A1-2**).
        - The critical habitat shapefile was copied into a new Core Map feature class.

     (2) Black River Population
        - Manually drew boundaries based on FWS maps (**Figure A1-5**).
        - Black River population area expanded to capture river and area immediately adjacent to river.
        - Added to Core Map feature class.

     (3) Ben Slaughter Draw Population
        - Manually drew boundaries based on FWS maps (**Figures A1-5, A1-6**).
        - Ben Slaughter population area expanded to capture river and area immediately adjacent to river.
        - Added to Core Map feature class.

     (4) Hay Hollow Population
        - Manually drew boundaries based on FWS maps (**Figures A1-5, A1-7**).
        - Hay Hollow population area expanded.
        - Added to Core Map feature class.

Table A-2. Updated Core Map Population Areas

Analysis Unit	Original Area (ha (ac))	Updated Area (ha (ac))
Black River	4.83 (11.94)	4.04 (10.00)
Hay Hollow	0.81 (2.53)	4.69 (11.60)
Seven Rivers Hills	9.56 (23.62)	217.98 (538.66)
Ben Slaughter Draw	21.17 (52.31)	48.92 (120.88)