Interim Core Map Documentation for the Wright's Marsh Thistle

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Draft Interim Core Map Developer: Compliance Services International (CSI) on Behalf of Bayer CropScience.

Species Summary

The Wright's marsh thistle (*Cirsium wrightii*; Entity ID 9965) is a dicotyledonous threatened plant found in New Mexico. The U.S. Fish and Wildlife Service (FWS) has assigned designated critical habitat for the Wright's marsh thistle. This species inhabits springs and seeps ranging from low desert up to ponderosa pine forest; it is an obligate of seeps, springs, and wetlands that have saturated soils with surface or subsurface water flow. Additional habitat information is provided in **Appendix 1**.

EPA Review Notes

The developers created this core map using the U.S. Environmental Protection Agency's (EPA) process available at: https://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-pesticide-use-limitation-areas. EPA reviewed the draft interim map and documentation and evaluated if: (1) the map and documentation are consistent with the agency's process; (2) areas included or excluded from the interim core map are consistent with the biology, habitat, and/or recovery needs of the species; (3) data sources are documented and appropriate; and (4) the GIS data and mapping process are consistent with the stated intention of the developer. EPA agrees that this map is a reasonable depiction of core areas for this species and was consistent with the agency's mapping process. This documentation was not prepared by EPA, but EPA may have edited this documentation for clarity or other purposes. Some views in this documentation may not necessarily be the views of EPA or its staff.

The core map developed for this species is considered interim and can be used to develop pesticide use limitation areas (PULAs). 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 core map does not replace or revise any range or designated critical habitat developed by FWS.

Description of Core Map

The core map for the Wright's marsh thistle is biological information type, based on critical habitat supplemented by occurrence data from one area of tribal land, the Mescalero Apache Reservation (also known as the "Mescalero Reservation" elsewhere in this document). The most recent Recovery Plan Outline from FWS includes a textual description of habitats, and the critical habitat listing document provides details on the known location sites used to develop this core map (See **Appendix 1** for more information). Other available known location information from the Global Biodiversity Information Facility (GBIF), iNaturalist, and NatureServe databases were not used for core map development, as they did not improve on the other datasets used for core map development.

The core map developed in this document for the Wright's marsh thistle spans 5,839 acres **(Figure 1)**. A summary of acreage by National Landcover Database (NLCD 2021) land use type is provided in **Table 1**.

Based on EPA's "best professional judgment classification" system, CSI has graded this core map as "limited" (2) because the core map is developed from critical habitat with limited additions from a trusted known location data source, in this case the U.S. Geological Survey (USGS) Protected Areas Database of the United States (PAD-US, USGS 2023). More information about this classification system and its definitions can be found in the core map process document (EPA 2024).

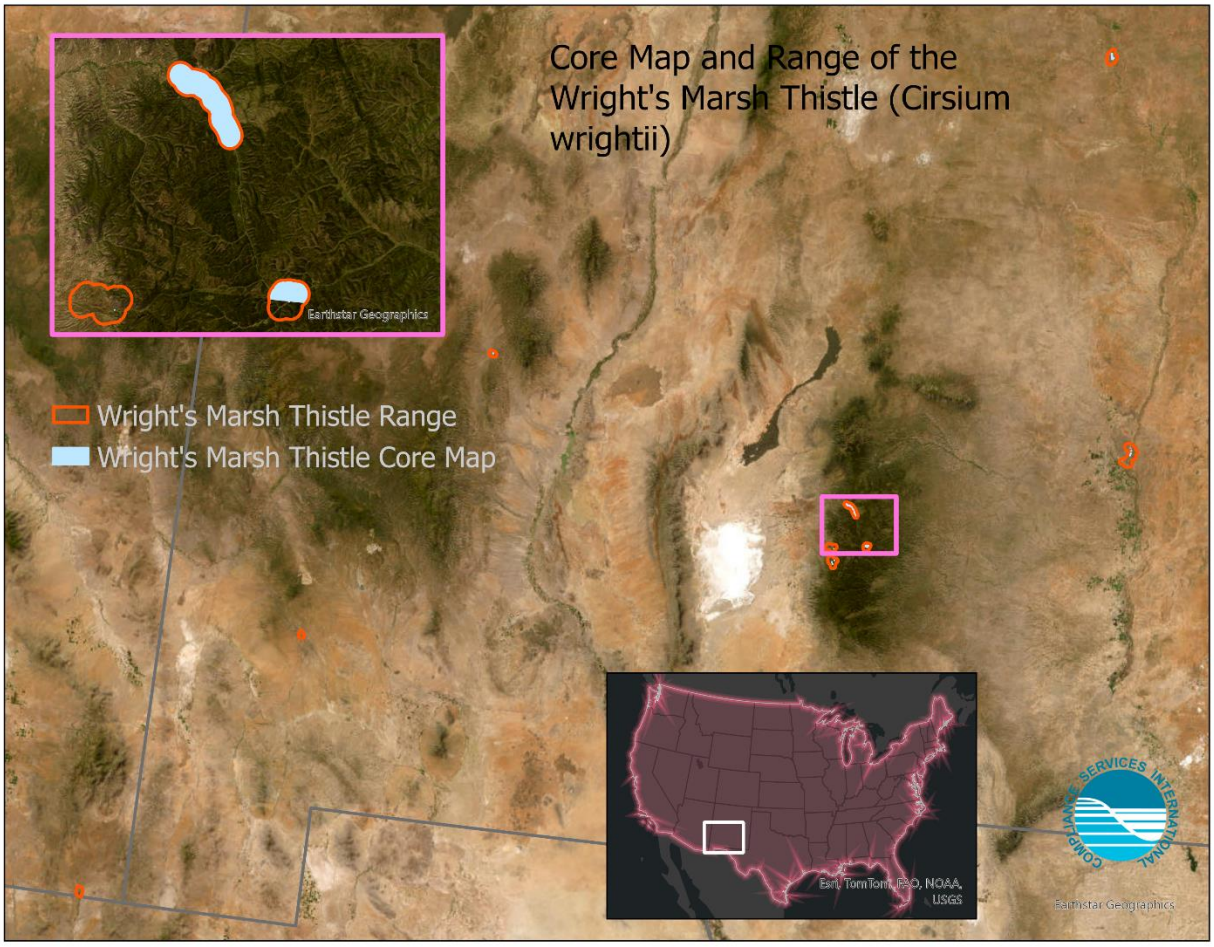

*Figure 1. Interim core map for the Wright's marsh thistle (*Cirsium wrightii*; Entity ID 9965). The core map spans 5,839 acres, while the range is 194,179 acres.*

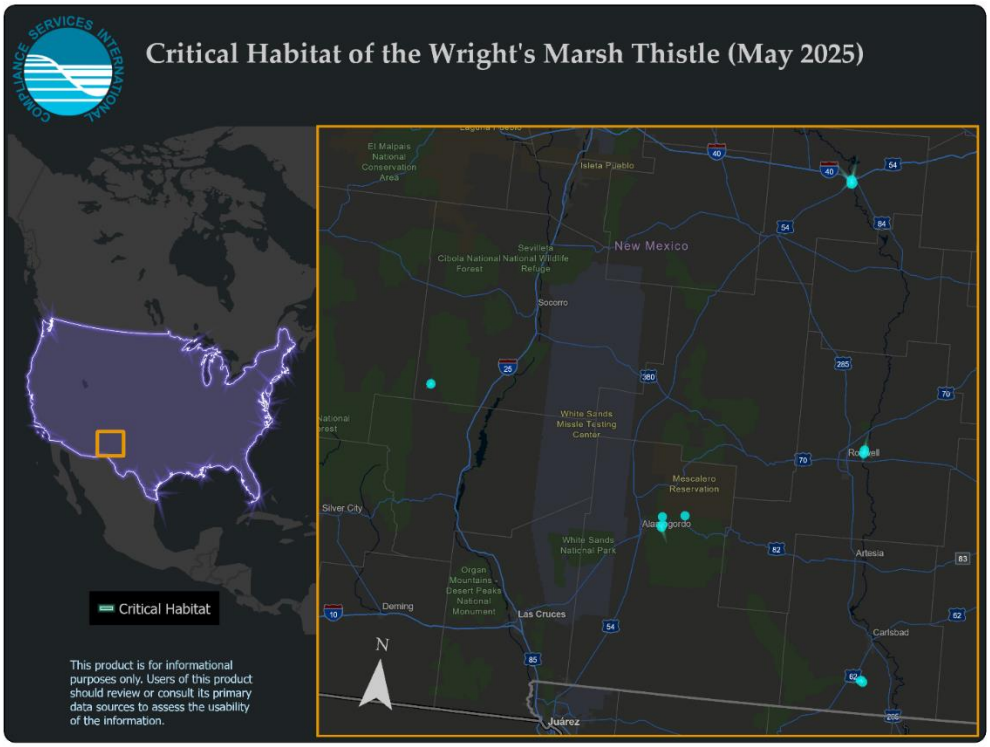

Figure 2. Critical habitat for the Wright's marsh thistle.

Table 1. Acres by National Land cover Database (NLCD 2021) class within the core map of the Wright's marsh thistle. Total core map area (based on NLCD pixel count): 5,840 acres[1].

NLCD_Land_Cover_Class	Acres
Evergreen Forest	4,946
Shrub/Scrub	483
Developed, Open Space	151
Emergent Herbaceous Wetlands	94
Developed, Low Intensity	64
Woody Wetlands	40
Herbaceous	33
Developed, Medium Intensity	20
Developed, High Intensity	4
Deciduous Forest	2
Cultivated Crops	2
Open Water	1

Evaluation of Known Location Information

There were four evaluated datasets with known location information:

- Descriptions of locations provided by FWS;
- Occurrence locations in iNaturalist;
- Occurrence locations in GBIF; and
- Occurrence locations in NatureServe.

Compliance Services International evaluated these datasets before developing the core map. Overall, there were 19 usable research-grade observations found in iNaturalist[2]. The GBIF dataset comprised 28 georeferenced observations, 16 of which were considered usable based on the criteria described below. The iNaturalist dataset was useful for comparative purposes with the Wright's marsh thistle range and other data sources. The GBIF dataset was entirely a subset of the iNaturalist data.

The FWS location information includes textual descriptions of areas of relevant occupancy that extend beyond the critical habitat boundaries; the Mescalero Reservation was easily identifiable in the U.S. Geological Survey Protected Areas Database of the United States (PAD-US) and contributed to the core map development process.

NatureServe public element occurrence (EO) data were also evaluated and are considered by CSI to be of

[1] This acreage is slightly different from the core map acreage (5,839) due to the pixelation of NLCD land cover. The core map is not developed from raster data.

[2] According to iNaturalist, an observation is designated as "research grade" if it 1) is verifiable with date, coordinates, photos/sounds, and not captive; 2) achieves community agreement defined as "more than 2/3 of identifiers needs to agree on the species level ID or lower;" and 3) "must pass a data quality assessment, which includes checks for accurate date and location, evidence of a wild organism, and clear evidence of the organism itself" (https://help.inaturalist.org/en/support/solutions/articles/151000169936-what-is-the-data-quality-assessment-and-how-do-observations-qualify-to-become-research-grade-).

good quality for this species; however, these data were not considered for use in core map development because they do not represent more accurate location information than the designated critical habitat and known locations that were used.

Approach Used to Create Core Map

The core map was developed using EPA's process for developing core maps for species listed by the FWS and their designated critical habitat (referred to as "the process"). This core map was developed by CSI using the four steps described in the process document:

1. Compile available information for a species;
2. Identify core map type from among the following defined types: critical habitat, range, and biological information. From EPA, summaries of each core map type are provided below (EPA 2024).
3. Develop the core map for the species; and
4. Document the core map.

For step 1, CSI compiled available information for the Wright's marsh thistle from FWS, as well as observation information available from various publicly available sources including iNaturalist, GBIF, and NatureServe. The information compiled for the Wright's marsh thistle is included in **Appendix 1**. Influential information that impacted the development of the core map includes:

- This species has designated critical habitat that identifies critical areas for core map development; and
- Description of the species habitat from the Recovery Plan Outline: '*Wright's marsh thistle is usually associated with alkaline springs and seeps ranging from low desert up to ponderosa pine forest… Most of the areas occupied by Wright's marsh thistle are open ciénega or boggy margins of open water or are along excavated drains.' (FWS 2023a*).

For step 2, CSI used the compiled information including the species range, known locations, and habitat location information to determine the core map type. The known location data were compared to the range and critical habitat and found that known locations from larger databases (iNaturalist and GBIF) were too limited in extent compared to the critical habitat and supplementary sites to be used for core map development. Known location information from FWS was specific enough to easily identify supplementary sites from a trusted data source, the PAD-US dataset from USGS (2023).

Although the Wright's marsh thistle would not be expected to be found on agricultural land (i.e., it is an "off-field" species), there is very little agriculture in the area (2 acres in the core map that was used); therefore, no refinement was necessary to exclude cultivated land. When weighing this information together, CSI selected a critical habitat core map type, supplemented by range on the Mescalero Reservation. The critical habitat and PAD-US datasets described above were used to derive this core map.

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For step 3, CSI used the best-available data sources to generate the core map. Data sources are discussed in the EPA's core map process document. For this interim core map, CSI followed EPA's decision framework to arrive at a core map type of critical habitat; this is because the Wright's marsh thistle has designated critical habitat that more accurately identifies critical areas for core map development, although its range is refined. **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

Other Known Observation Datasets

Datasets such as iNaturalist, GBIF, and NatureServe were considered but not used. The precision and accuracy of the public occurrence databases did not allow for additional core map refinement for this species.

National Wetlands Inventory (NWI), LANDFIRE, and other land cover datasets

For the Wright's marsh thistle, the core map extent using critical habitat and other location information was refined such that additional refinements based on national land cover datasets was not necessary.

Appendix 1. Information compiled for the Wright's marsh thistle

1. **Recent FWS documents**
   - Critical Habitat (2023b): https://www.govinfo.gov/content/pkg/FR-2023-04-25/pdf/2023-08565.pdf#page=1
   - Recovery Outline (2023a): https://ecos.fws.gov/docs/recovery_plan/Wrights%20Marsh%20Thistle%20Recovery%20Outline_ARD%20Signed.pdf
   - Species Status Assessment (2017): https://iris.fws.gov/APPS/ServCat/DownloadFile/187246

2. **Background information**

- Status: Federally listed as threatened in 2023.
- Resiliency, redundancy, and representation (the 3Rs) (FWS 2017)
  - **Current Population Resiliency** (Figure 2**,** Table 2**,** Table 3): 'Overall, of the eight extant populations in New Mexico, three are in moderate condition, two are in low condition, and three are in very low condition and at risk of extirpation. Of the populations which have the greatest habitat area, Santa Rosa Basin and Bitter Lake NWR have the largest populations of *Cirsium wrightii*. However, Blue Spring also has a large habitat area, but only a few mature plants were estimated to be present, and rosettes were not estimated in Sivinski's 2010 survey. Unlike the other population counts and estimates, the estimate of mature plants was made from an aerial map of Blue Spring, and it was not possible to estimate the number of rosettes. The eastern populations exist in spring complexes, whereas most of the western populations are located by single springs, and therefore have a much smaller habitat area in comparison. Alamosa Springs and Karr/Haynes Canyons have habitat quantity of a few acres, with moderate populations, but Tularosa Creek, Silver Springs, and La Luz Canyon each have a habitat quantity of less than a tenth of an acre, with very few plants present.'
  - **Redundancy**: 'Within the two representation areas (east and west), there are three populations extant in the east, and these have the largest habitat quantities. The five extant populations in the western representation are much smaller in both habitat quantity and population size. So while there is a greater redundancy solely in terms of number of populations in the western phenotype, the eastern is likely more stable and possibly more resistant to stochastic impacts due to the larger habitat areas, greater number of springs supporting populations, higher populations numbers, and the fairly large distance between each of the three eastern populations (approximately 100 mi (160 km) from one population to the next), as shown in Figure 3.4.'
  - **Representation**: 'We consider *Cirsium wrightii* to have representation in the form of genetic and environmental diversity resulting in two distinct phenotypes in the western and eastern populations, as described above. The Pecos River Valley representation (eastern) plants have pink flowers and dark green foliage, and the more western and southern populations in New Mexico have white or pale pink flowers and pale green foliage (Sivinski 2011, pp. 27–28). The presumed extirpated populations in Arizona and Mexico were likely of the western phenotype, and are included as such in our population maps.'

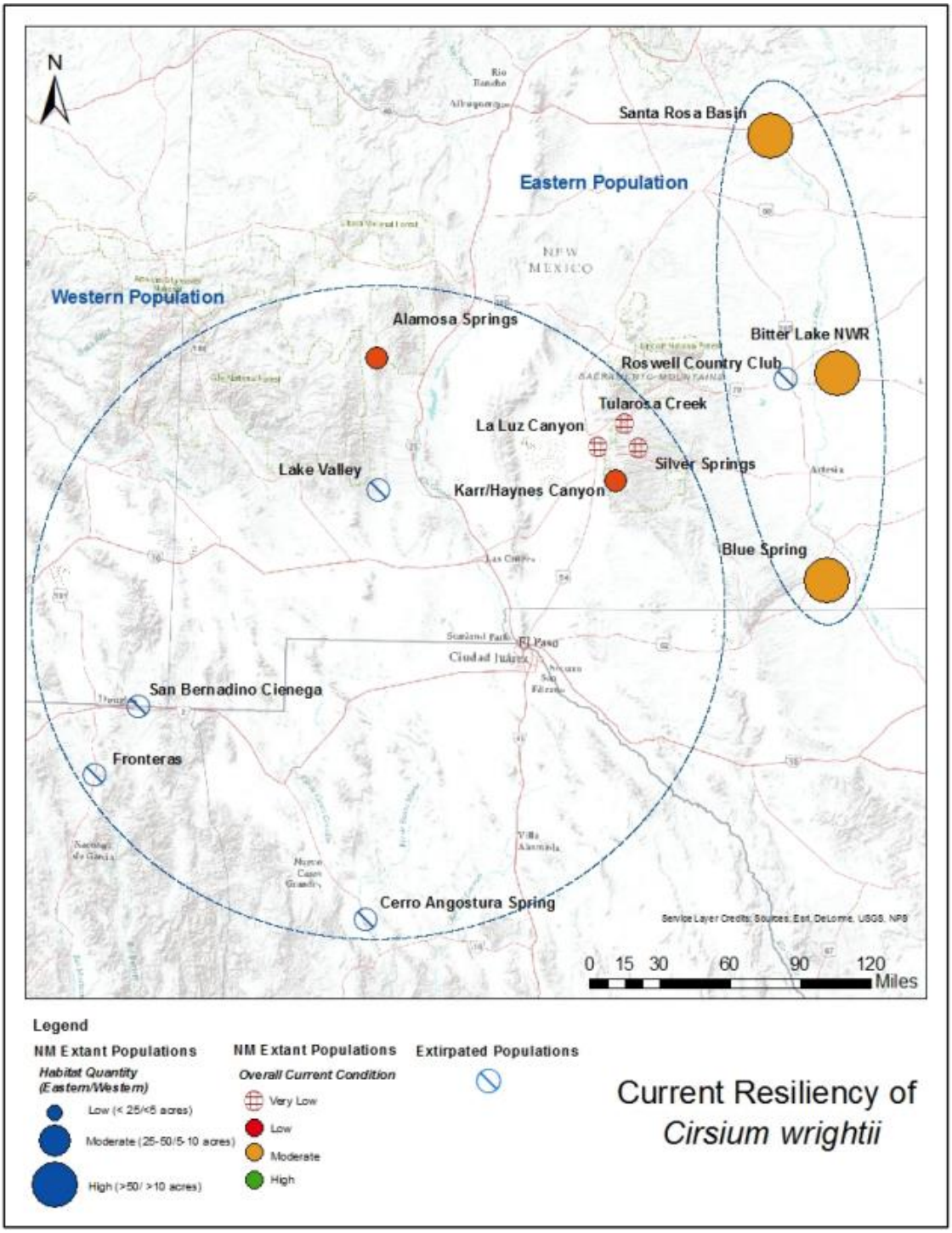

Figure 23. Current resiliency of Cirsium wrightii. Copied from the most recent Recovery Outline document (FWS 2023a).

Table 2. The six population and habitat characteristics used to create the condition categories in Table 3.4. Descriptions are provided for each factor as to how this relates to high, moderate, and low condition categories. Copied from Table ES-1 of the Species Status Assessment (FWS 2017).

	Population Factors				Habitat Factors	
Condition Category	**Habitat Quantity**	**Abundance**	**Number of Patches**	**Reproduction**	**Permanent Root Saturation**	**Habitat Factors**
High	>50 ac	>5,000 mature individuals	>10	5 or more times the number of rosettes to mature plants	Seeps, springs, cienegas, streams spreading water normally above and below ground	No obstructions during any life stage
Moderate	20-50 ac	2,500-4,999 mature individuals	5-10	2-4 times the number of rosettes to mature plants	Seeps, springs, cienegas, streams constrained by some drying, dewatering, levees, trenches or dikes	Patchy share 75% full sun
Low	<20 ac	<2,500 mature individuals	<5	<2 times the number of rosettes to mature individuals	Seeps, spring, cienegas, streams are drying or being actively dewatered or diverted	Full sun obscured by vegetation 50% or more
Extirpated	None remaining	None remaining	None	Population is presumed extirpated	Seeps, springs, cienegas, streams have dried or been dewatered or diverted	Full shade

Table 3. Cirsium wrightii population resiliency rankings under Scenario 1, based on the 6 factors affecting overall condition. Dark line separates the Eastern (top) from the Western (bottom) populations. Copied from Table 5.7 of the Species Status Assessment (FWS 2017).

Population Factors						**Habitat Factors**		**Overall Condition**	
Population	**Estimated Occupied Habitat**	**Habitat Quantity**	**Number of Patches**	**Abundance**	**Reproduction**	**Permanent Root Saturation**	**Full Sun**	**Average Current Condition**	**Final Current Condition**
Santa Rosa Basin	38.78 ac	Moderate	High	Low	Moderate	Moderate	Moderate	Moderate	Moderate
Bitter Lake NWR	22.63 ac	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Roswell Country Club	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	High	Extirpated	Extirpated
Blue Spring	39.7 ac	Moderate	Low	Low	Low*	Low	Low	Low	Low
Alamosa Springs	2.37 ac	Low	Low	Low	Moderate	Moderate	Moderate	Moderate	Low
Tularosa Creek	0.07 ac	Low	Low	Low	Low*	Low	Moderate	Low	Extirpated
Silver Springs	0.03 ac	Low	Low	Low	Moderate	Moderate	Moderate	Low	Very Low
La Luz Canyon	0.06 ac	Low	Low	Low	Moderate	Low	Moderate	Low	Very Low
Karr/Haynes Canyons	4.69 ac	Low	Moderate	Low	Moderate**	Low	Moderate	Low	Low
Lake Valley	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Moderate	Extirpated	Extirpated
San Bernardino Cienega, AZ	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Low	Moderate	Extirpated	Extirpated
Fronteras, MX	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Moderate	Extirpated	Extirpated
Cerro Angostura, MX	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Extirpated	Moderate	Extirpated	Extirpated

*For areas where cienegas have been dried out and succession to other ecosystems has begun, the assumption is made that initially sun exposure would be high, but as bushes and trees grow in these former wetlands, sunlight reaching ground will decrease to moderate and then to low exposure (except for the country club).

- Habitat, Life History, and Ecology
    - 'Wright's marsh thistle is usually associated with alkaline springs and seeps ranging from low desert up to ponderosa pine forest (Sivinski 2005a) and is an obligate of seeps, springs, and wetlands that have saturated soils with surface or subsurface water flow (Sivinski 1996; FWS 1998; Worthington 2002; NMRPTC 2009). Common associates include bulrush (*Scirpus* spp.), beaked spikerush (*Eleocharis rostellata*), Pecos sunflower (*Helianthus paradoxus*), rush (*Juncus* spp.), and cattail (*Typha* spp.) (Sivinski 1996; Worthington 2002; Sivinski and Bleakly 2004). Most of the areas occupied by Wright's marsh thistle are open ciénga or boggy margins of open water or are along excavated drains' (FWS 2023a).
    - Pollination—Species of *Cirsium* may be pollinated by a wide variety of insects, including social bees, solitary bees, flies, and beetles (Powell et al. 2010, pp. 910–911; Sivinski 2017b, pers. comm.). Bees are the primary pollinators of *C. wrightii*, especially bumble bees (*Bombus* spp.), with butterflies also being common pollinators (Sivinski 2017b, pers. comm.). Bumble bees are large, strong fliers and some species frequently travel 1 mile (mi) (1.5 kilometer (km)) or more to patches of desirable forage plants (Osborne et al. 2008, p. 406). Sivinski (2017b, pers. comm.) observed bumble bees, black swallowtails (*Papilio polyxenes*), green June beetles (*Cotinis nitida*), and oblique syrphid flies (*Allograpta obliqua*), among other insect pollinators, visiting *C. wrightii*. Hummingbirds have been observed visiting *C. wrightii* flower heads as well, but it is unknown if hummingbirds affect much pollination of the plant (Keil 2006, p. 131). The presence of other species of native flowering plants may help to attract abundant pollinators, and thus also benefit *Cirsium wrightii*. This may be more important for western populations of *C. wrightii*, where there are fewer thistles. In the larger eastern populations, there are likely enough individual *C. wrightii* to attract pollinators (FWS 2017).
    - Flowering occurs August to October (Sivinski 1996, p. 1). Flowers are white to pale pink in areas of the Sacramento Mountains of New Mexico, but are vivid pink in the Pecos Valley (FWS 2017).
- Taxonomy
    - '*Cirsium wrightii* is a wetland obligate (occurs only in water-saturated soils) that was originally collected in 1851 at San Bernardino Cienega, Cochise County, Arizona (Gray 1853, p. 101; Smithsonian 1849, p. 1). Historically, the species was found in Arizona, New Mexico, as well as Chihuahua and Sonora, Mexico (Gray 1853, p. 101; Coulter 1891, p. 244; Kearney and Peebles 1951, p. 952; Correll and Johnston 1970, p. 1719; Service 1995, p. 1), with reports from Texas as well. However, it was learned that an occurrence of another thistle, *Cirsium texanum* (Texas thistle), in Presidio County, Texas, had been incorrectly identified as *C. wrightii* (Poole 2010, p. 1). All the previously presumed specimens of *C. wrightii* from Texas have now been correctly identified as *C. texanum* (Texas thistle), rather than *C. wrightii* (Sivinski 1994a, p. 1; 1996, p. 2; 2006a, p. 1; Worthington 2002a, p. 4). These species are easily confused on herbarium sheets which often do not adequately display the growth form of *C. wrightii* (Sivinski 1996a p. 2). However, in the field, *C. wrightii* differs from *C. texanum* in physical appearance (New Mexico Rare Plant Technical Council (NMRPTC) 2009, p. 1)' (FWS 2017).

- Relevant Potential Pesticide Use Sites
    - '...the small amount of this *C. wrightii* habitat within the Highway 91 right-of-way had a few dozen mature *C. wrightii*, but approximately 1,800 small juvenile rosettes that had apparently germinated during the summer of 2012. The New Mexico Department of Transportation has responsibility for the vegetation in this right-of-way. This roadside

habitat has often been impacted by mowing and herbicide applications, which often leads to direct mortality of plants and decreased reproduction' (FWS 2017).

- Relevant Recovery Criteria and Actions (A Recovery Plan has been neither drafted nor finalized for this species)

3. Range

'The historical range of the species included 10 locations in New Mexico, 2 locations in Arizona, and 2 locations in Mexico. Wright's marsh thistle has been extirpated from all historical locations in Arizona and Mexico, as well as two locations in New Mexico. In addition, the currently extant populations have declined in population numbers over time based on comparisons between 1995 and 2012 surveys (Sivinski 1996, entire; Sivinski 2012, entire). As a result, the current extant area of the remaining eight populations has contracted in recent years and is currently approximately only 43 ha (106 ac). Of the remaining eight extant populations, three have moderate resiliency, two have low resiliency, and three have very low resiliency and are likely at risk of extirpation (FWS 2017, pp. 36). The species historically had representation in the form of two morphologically distinct and geographically separate forms (eastern and western populations); the species continues to maintain representation currently in these forms, although population sizes have decreased' (FWS 2023b). A map of the current range is provided in Figure 34.

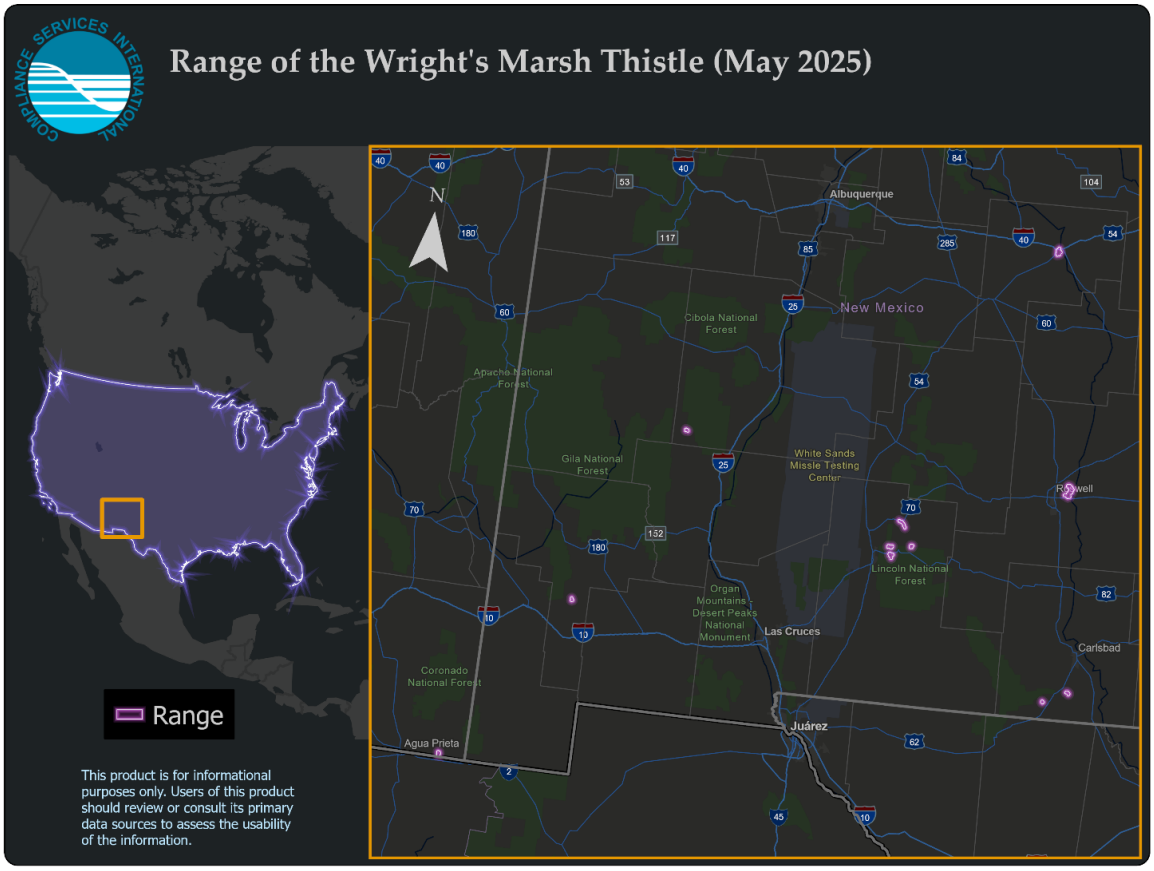

Figure 34. Range of the Wright's marsh thistle (FWS 2025).

4. Description of Critical Habitat (FWS 2023b)

- Critical habitat was designated in 2023 (Figure 4 and Figure 5).
- In total, approximately 156.8 acres (63.4 hectares) in Chaves, Eddy, Guadalupe, Otero, and Socorro Counties, New Mexico, fall within the boundaries of the critical habitat designation.
- 'We excluded approximately 0.88 ha (2.18 ac) of Mescalero Reservation land from critical habitat as identified in [Table 4] (Critical Habitat Unit 4. (Tularosa Creek) and a portion of Unit 6. (Bitter Creek).'
- The physical or biological features essential to the conservation of the Wright's marsh thistle consist of the following components:
    i. Water-saturated soils with surface or subsurface water flow that allows permanent root saturation and seed germination;
    ii. Alkaline soils;
    iii. Full sunlight;
    iv. and Diverse floral communities to attract pollinators.

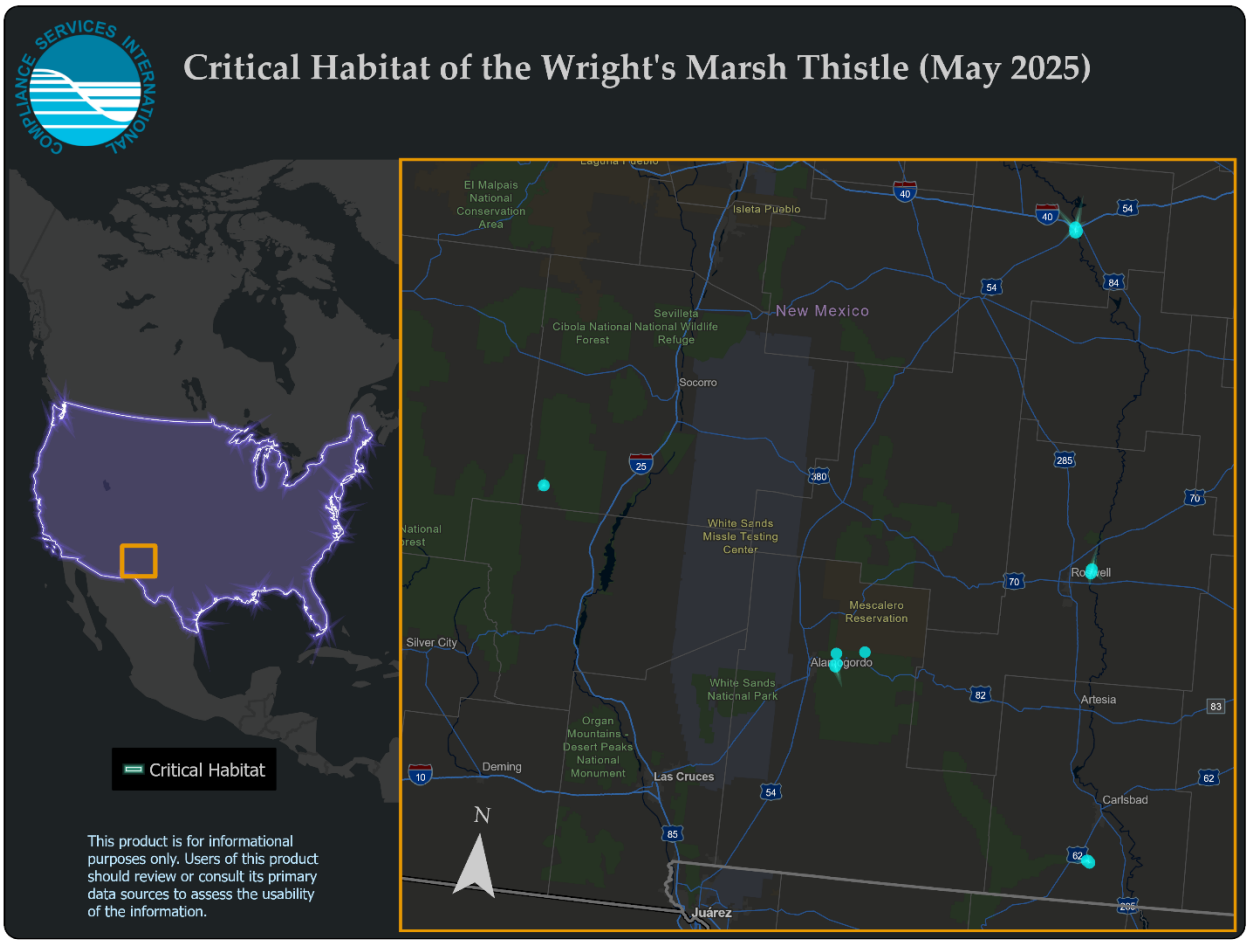

Figure 4. Critical habitat of the Wright's marsh thistle, highlighted for visibility (FWS 2025).

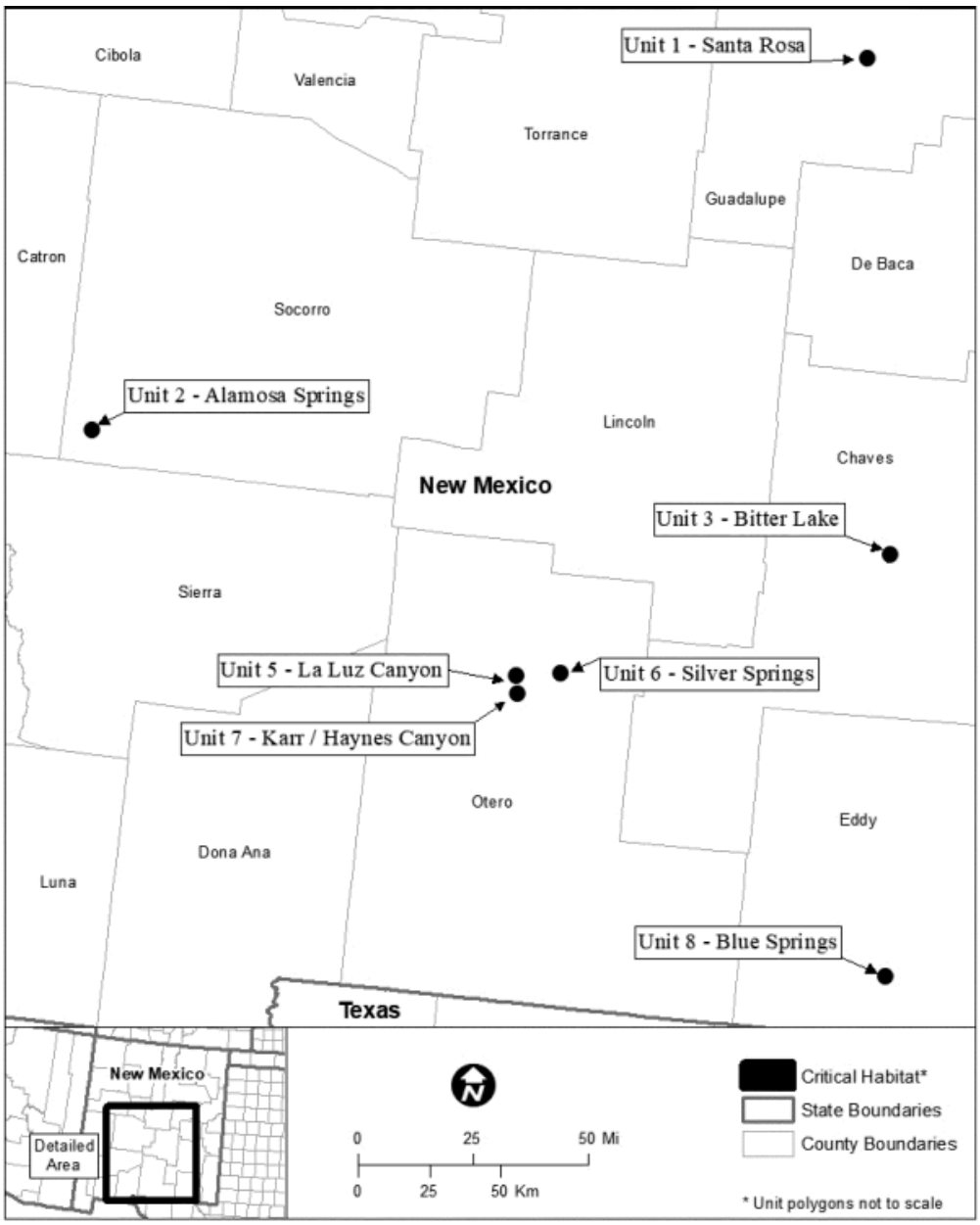

Figure 5. Critical Habitat for the Wright's marsh thistle General Unit Locations. Copied from the critical habitat designation document (FWS 2023b).

Table 4. Areas Excluded from Critical Habitat Designation by Critical Habitat Unit for the Wright's marsh thistle. Copied from Table 5 of the critical habitat designation document (FWS 2023b).

Unit/subunit	Landowner	Hectares (acres) excluded
Unit 4	Mescalero Apache Tribe	0.65 ha (1.6 ac)
Unit 6	Mescalero Apache Tribe	0.23 ha (0.58 ac)
Total excluded		0.88 ha (2.18 ac)

5. Known Locations

- Known populations by state (FWS 2023a).
    - **New Mexico**: 'In New Mexico, eight confirmed locations of Wright's marsh thistle cover an area of approximately 156 acres (63.4 hectares): Santa Rosa, in Guadalupe County; Bitter Lake National Wildlife Refuge (NWR), in Chaves County; Blue Spring, in Eddy County; La Luz Canyon, Karr/Haynes Canyon, Silver Springs, and Tularosa Creek, in Otero County; and Alamosa Creek, in Socorro County (Sivinski 1994; Sivinski 1996; FWS 1998; Bridge 2001; Worthington 2002; Sivinski and Bleakly 2004; Sivinski 2005; NMRPTC 2009; Sivinski 2009)' (Figure 6).

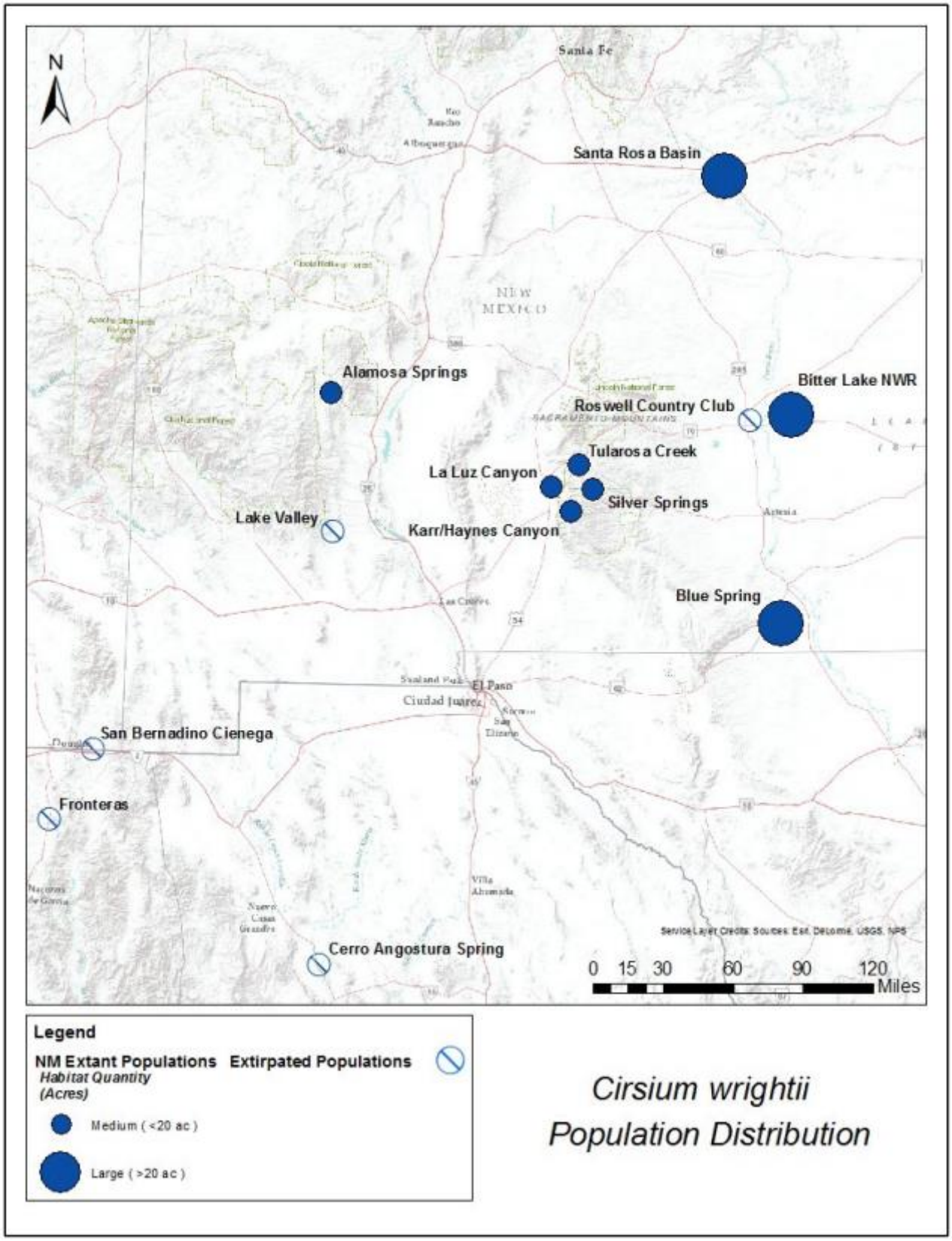

Figure 6. Cirsium wrightii range wide map, highlighting differences between sizes of populations. Copied from Figure 1 of the Recovery Outline document (FWS 2023a).

- GBIF: https://www.gbif.org/species/3113171
    - GBIF includes one-hundred eighteen occurrence records; twenty-eight of which are georeferenced. Sixteen of these had usable coordinate data based on these criteria:
        - U.S. only (excludes Canada)
        - Latitude and longitude precision were both 3+ decimal places.
        - Coordinate uncertainty values no greater than 30 km.
        - Relative recency (2010-present)
            - Must include date information.
        - No "preserved specimen" observations; only "human observation."
    - All the usable GBIF coordinates are originally sourced from iNaturalist, which also had more records. Therefore, the GBIF dataset was not used for core map development.

- iNaturalist: https://www.inaturalist.org/observations?taxon_id=160642
    - iNaturalist includes thirty-seven total observations, nineteen of which are research-grade with usable coordinate data based on these criteria:
        - U.S. only (excludes Canada)
        - Latitude and longitude precision were both 3+ decimal places
        - Relative recency (2010-present)
        - Observation description did not include the text "intentionally incorrect"
        - Public positional accuracy value no greater than 30 km [3].
            - This did not result in the exclusion of any records.
    - Locations are consistent with GBIF, which is expected because all the GBIF observations are imported from iNaturalist.
    - There are no iNaturalist locations outside of the species range of the Wright's marsh thistle, after accounting for the uncertainty associated with their locations, between 28-30 km for each point.
    - These data may provide insight into where the species is more commonly found, but were not used for core map development give the availability of more precise information for this species.

- NatureServe Explorer: https://explorer.natureserve.org/
    - Available public occurrence information from NatureServe Explorer identifies more unique areas of species presence compared to iNaturalist and GBIF.
    - Although EOs were generally consistent with species range, these observations were not usable as a meaningful refinement of the range and therefore did not factor into the development of the core map.

[3] For "obscured" observations, public positional accuracy (PPA) represents the diagonal of a 0.2 x 0.2 arc cell. See the iNaturalist geoprivacy page for more details on this and related terms What is geoprivacy? What does it mean for an observation to be obscured? : iNaturalist Help.

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

The core map for this species is based on designated critical habitat areas, expanded to include two additional areas not represented by critical habitat; in particular, the locations associated within the Mescalero Reservation. Although the species is considered "off-field," the core map extent does not include a significant amount of agricultural area (2 acres); therefore, the removal of cultivated areas > 25 acres was not necessary.

1. **References and Software**
    - U.S. Geological Survey (USGS)'s Protected Areas Database of the United States, PAD-US (2024): https://www.sciencebase.gov/catalog/item/652d4fc5d34e44db0e2ee45e.
    - Software used: ArcGIS Pro version 3.2.
    - FWS Species Range and Critical Habitat: https://ecos.fws.gov/ecp/species/8963.

2. **Datasets Used in Core Map Development**

2.1. Range and Critical Habitat

The range for this species was last updated by FWS on August 28, 2024, and its critical habitat was established April 25, 2023. Shapefiles including species range for all listed species and critical habitat for all species with critical habitat were downloaded from the FWS ECOS website on May 5, 2025. The shapefiles were converted to feature classes stored in a file geodatabase and reprojected to WKID #102008 ("North America Albers Equal Area Conic"). For both shapefiles:

1. Using an ArcGIS Web Map the species was queried based on the ECOS listed "Entity ID" of 9965 and exported as a feature class to a temporary file geodatabase as a standalone Entity ID-specific layer.
2. The areas of the range and critical habitat were calculated automatically by loading them into the software (ArcGIS Pro version 3.2) and reading its area from the attribute table ("Shape_Area"), then converting its units (square meters) into acres with a conversion factor of 0.000247105.

These shapefiles were added to an ArcGIS Pro map and compared against each other and the observation information from iNaturalist. They were additionally compared with the PAD-US shape associated with the Mescalero Reservation.

2.2. U.S. Geological Survey (USGS) Protected Areas Database of the United States (PAD-US)

According to USGS, PAD-US is "America's official national inventory of U.S. terrestrial and marine protected areas that are dedicated to the preservation of biological diversity and to other natural, recreation and cultural uses, managed for these purposes through legal or other effective means. PAD-US also includes the best available aggregation of federal land and marine areas provided directly by managing agencies, coordinated through the Federal Geographic Data Committee Federal Lands Working Group."

In the case of the Wright's marsh thistle, where known occurrences include well-defined areas such as tribal lands, the PAD-US dataset was useful in extracting areas meant to conservatively capture extant populations of the species. This dataset was used to supplement the critical habitat spatial data selected for core map development. Specifically, the range within the Mescalero Reservation was extracted from the PAD-US dataset (Figure 7). These areas of range were clipped to the Mescalero Reservation and then added to critical habitat to form the core map.

The critical habitat for this species was designated in April 2023 and represents all known occurrences of the species excluding one population unit and one population subunit, citing deference to the Tribe to manage

the occurrences on their lands (FWS 2023b). While an additional occurrence on a conservation easement in northeastern New Mexico was reported during the public comment period on the critical habitat posting, FWS was unable to verify the occurrence and the latest range shapefile does not include this potential occurrence. Additional areas in the range not included in the critical habitat reflect extirpated populations (ex: Lake Valley) as noted in the recovery plan (Figure 6) (FWS 2023a). Therefore, the critical habitat designation provides the best available data on known verified occurrences, and the core map includes all critical habitat units and subunits, in addition to range area on tribal lands.

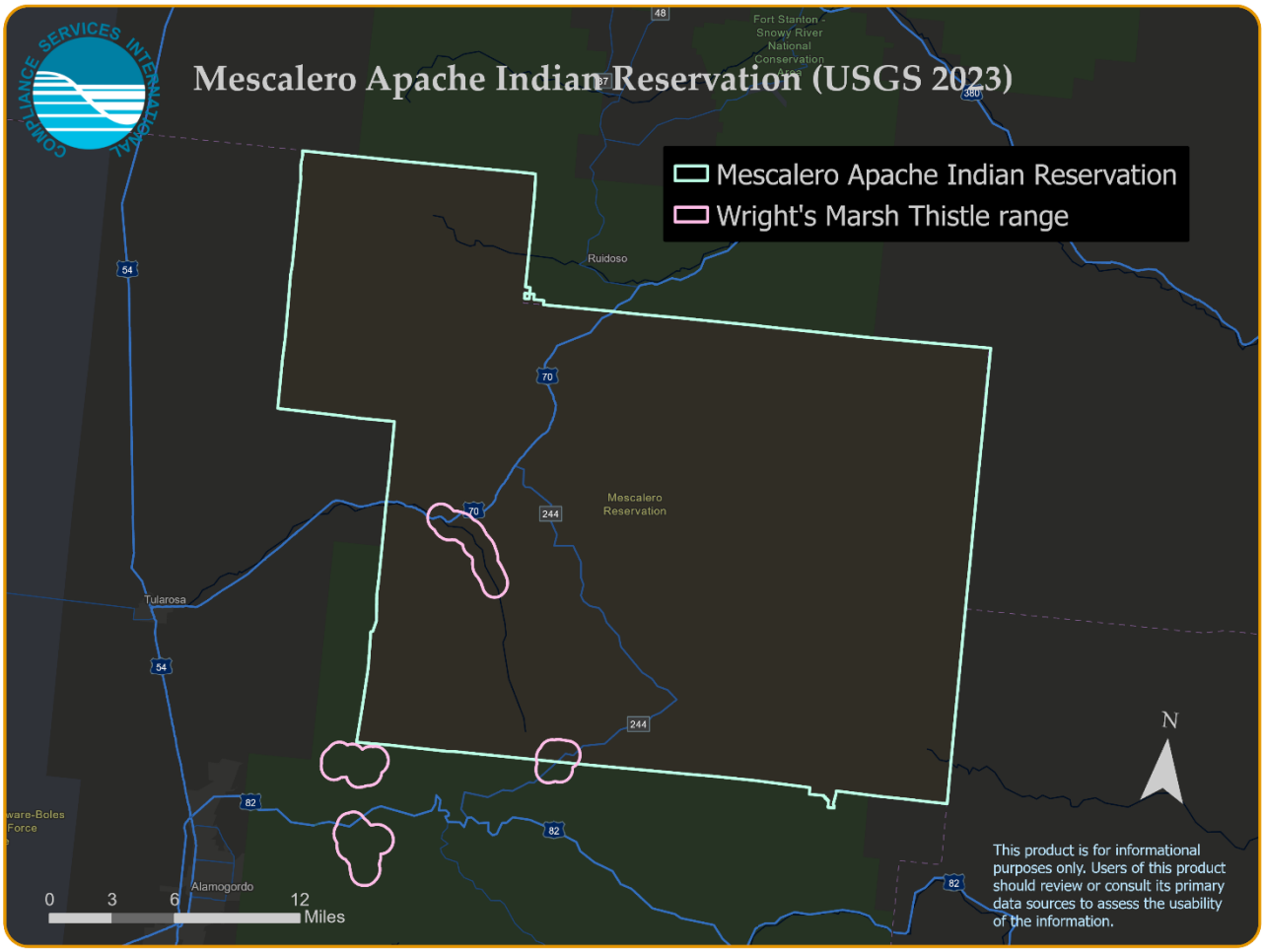

Figure 7. Mescalero Reservation (USGS PAD-US 2023).

3. Creating the Core Map

3.1. Core Map Layer Development

The Wright's marsh thistle core map is developed from critical habitat data, supplemented by range informed by known location data (the Mescalero Reservation). The layers comprising the Wright's marsh thistle core map were processed as follows:

1. Import the species critical habitat as a feature class named "WMT_CH." Choose to export this layer—and all subsequent layers—into the preferred projection (WKID #102008).
2. Import the PAD-US dataset. Use the combined "Proclamation, Marine, Fee, Designation, Easement"

layer to query for the Mescalero Reservation area (Unit_Nm = 'Mescalero Reservation'). Export as a standalone feature class named “Mescalero”.

3. Use the Pairwise Clip tool to clip the species range (“WMT_range”) by the Mescalero Reservation (“Mescalero”) and save as a new layer, “WMT_range_pcMescalero”.
4. Use the Merge tool to merge the species critical habitat (“WMT_CH”) and added range locations within the Mescalero Reservation (“WMT_range_pcMescalero”) and save as a new feature class (“WMT_extent”).
5. Use the Pairwise Dissolve tool to dissolve the previous layer (“WMT_extent”) into a single feature. Save as a new layer, “WMT_extent_pd”.
6. (Optional) Export the previous layer “WMT_extent_pd” as a new layer identifiable as the species core map (“WMT_CoreMap”).

3.2. Cultivated Lands-based Refinement

The Wright’s marsh thistle is not expected to be found in agricultural areas, so a refinement to exclude areas of agriculture would have been appropriate. However, it was observed that the output from the last geoprocessing step above (“WMT_extent_pd”) contained only 2 acres of cultivated land according to NLCD (Table 1). Therefore, the step of removing cultivated areas > 25 acres was considered unnecessary and thus was not performed.

References

Documents

- U.S. Environmental Protection Agency. 2024. Process EPA Uses to Develop Core Maps for Pesticide Use Limitation Areas. Accessed June 23, 2025. https://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-pesticide-use-limitation-areas.
- U.S. Fish and Wildlife Service. 2017. "*Species Status Assessment Report for* Cirsium wrightii *(Wright's Marsh Thistle)* Version 1.0. Albuquerque, NM. Accessed June 23, 2025. https://iris.fws.gov/APPS/ServCat/DownloadFile/187246.
- U.S. Fish and Wildlife Service. 2023a. "*Recovery Outline for Wright's Marsh Thistle (*Cirsium wrightii*)*." Albuquerque, NM. Accessed June 23, 2025. https://ecos.fws.gov/docs/recovery_plan/Wrights%20Marsh%20Thistle%20Recovery%20Outline_ARD%20Signed.pdf.
- U.S. Fish and Wildlife Service. 2023b. *Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Wright's Marsh Thistle With a Section 4(d) Rule and Designation of Critical Habitat.* Federal Register 88, no. 79 (April 25, 2023): 25208-25249. Accessed June 23, 2025. https://www.govinfo.gov/content/pkg/FR-2023-04-25/pdf/2023-08565.pdf#page=1.

Spatial Data & Software

- GBIF Secretariat. "*Cirsium wrightii* (Wright's Marsh Thistle)." *GBIF Backbone Taxonomy*. Accessed June 23, 2025. https://www.gbif.org/species/3113171.
- iNaturalist. "*Wright's Marsh Thistle (*Cirsium wrightii)." Accessed June 23, 2025. https://www.inaturalist.org/observations?taxon_id=160642.
- NatureServe. 2025. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available https://explorer.natureserve.org/. Accessed June 23, 2025.
- Software used: ArcGIS Pro version 3.2.
- U.S. Fish and Wildlife Service. 2025. "*Wright's Marsh Thistle (*Cirsium wrightii)." Environmental Conservation Online System (ECOS). Accessed June 23, 2025: https://ecos.fws.gov/ecp/species/8963.
- U.S. Geological Survey. *Protected Areas Database of the United States (PAD-US) 3.0*. Reston, VA: U.S. Geological Survey, 2021. Accessed March 1, 2025. https://catalog.data.gov/dataset/protected-areas-database-of-the-united-states-pad-us-3-0-ver-2-0-march-2023.