Interim Core Map Documentation for the Dwarf Bear-Poppy

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

Species Summary

The dwarf bear-poppy (*Arctomecon humilis,* Entity ID 631) is an endangered terrestrial plant (dicot). The U.S. Fish and Wildlife Service (FWS) has not designated a critical habitat for the dwarf bear-poppy. The dwarf bear-poppy is an endemic plant restricted to gypsum soils in semi-arid and arid environments in and around St. George, Utah. The main bottleneck for population growth is successful seedling establishment on the harsh surface conditions of gypsum soils. The species relies on its seedbank for its persistence. Seeds are dispersed when embryos are immature and need one to several years to complete development and break dormancy before they germinate. Seed recruitment is episodic. Long time intervals are common between recruitment events because of the low frequency of years with adequate winter-spring precipitation to support establishment. Even in a favorable year, most of the population remains dormant as a seedbank. In a controlled setting, this species is practically impossible to germinate or propagate. The dwarf bear-poppy is pollinated by many native bees and the non-native European and Africanized honeybee (Apis mellifera). The dwarf bear-poppy is restricted to habitat in the vicinity of St. George in Washington County, Utah. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the dwarf bear-poppy is based on biological information. The outer extent of this core map is defined by the range map that FWS identified. EPA further refined this area for gypsum soils as the species is restricted to such soils.

Figure 1 depicts the resulting interim core map for the dwarf bear-poppy. The size of this core map is approximately 30,933 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly scrub/shrub. Since this species occurs in disturbed areas, many of these areas potentially represent habitat.

The core map developed for the dwarf bear-poppy is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the dwarf bear-poppy. This core map incorporates information developed by FWS and made available to the public; however, the core map has not been formally reviewed by FWS. This interim core map may be revised in the future to incorporate species expert feedback from FWS. This interim core map has an "average" best professional judgment classification to describe major uncertainties/limitations, as occupancy within the range is patchy and non-uniform and the distribution is not well understood. The map is based on the range described by FWS, and EPA removed some additional areas based on biological needs of the species. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

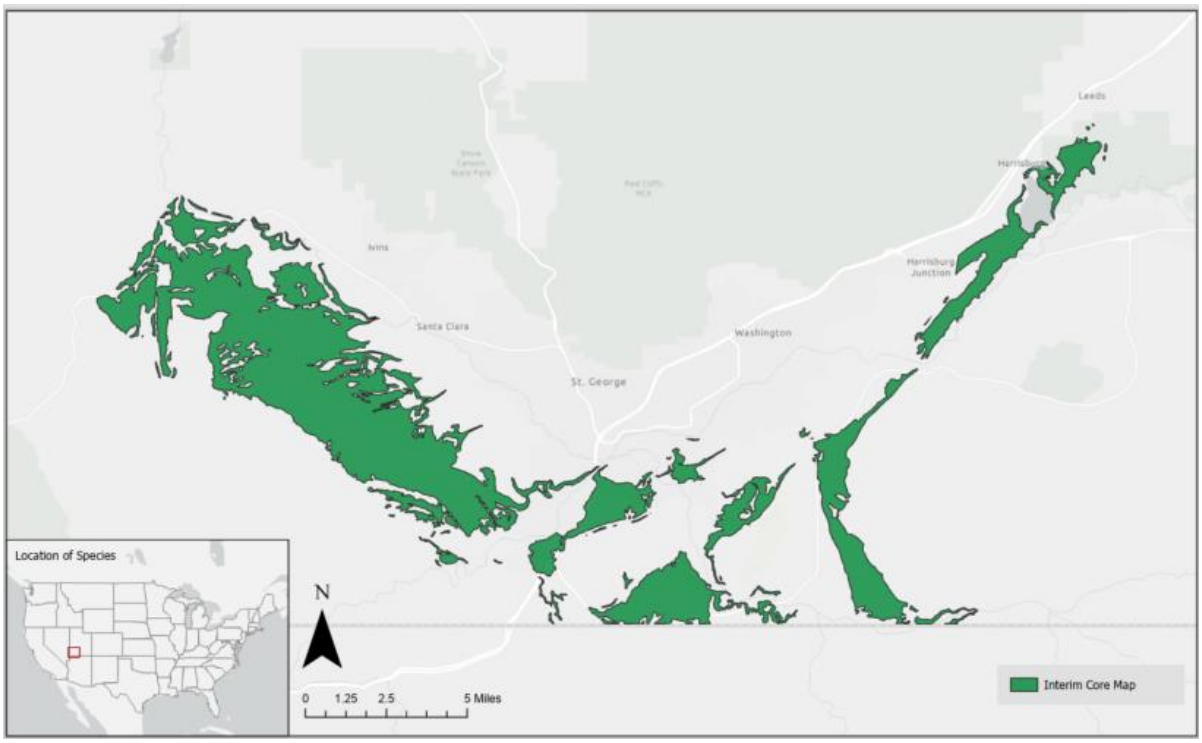

Figure 1. Interim core map for the dwarf bear-poppy.

Table 1. Percentage of Interim Core Map Represented by NLCD[2] 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	1
Forestry	Evergreen Forest (42)	1	1
Forestry	Mixed Forest (43)	0	1
Agriculture	Pasture/Hay (81)	0	0
Agriculture	Cultivated Crops (82)	0	0
Mosquito adulticide, residential	Open space, developed (21)	1	2
Mosquito adulticide, residential	Developed, Low intensity (22)	1	2
Mosquito adulticide, residential	Developed, Medium intensity (23)	1	2
Mosquito adulticide, residential	Developed, High intensity (24)	0	2
Invasive species control	Woody Wetlands (90)	0	96
Invasive species control	Emergent Herbaceous Wetlands (95)	0	96

Example pesticide use sites/types	NLCD Landcover (Value)	% of core map represented by landcover	% of core map represented by example pesticide use
Invasive species control	Open water (11)	0	96
Invasive species control	Grassland/herbaceous (71)	2	96
Invasive species control	Scrub/shrub (52)	94	96
Invasive species control	Barren land (rock/sand/clay; 31)	0	96
Total Acres	**Interim Core Map Acres**	**~ 30,933**	

Evaluation of Known Location Information

There are four datasets with known location information:

- Named populations provided by FWS;
- Occurrence locations in iNaturalist;
- Occurrence locations in NatureServe; and
- Occurrence locations in the Global Biodiversity Information Facility (GBIF).

EPA evaluated these four sets of data before selecting the type of and developing the core map. Occurrences in iNaturalist, GBIF, and NatureServe did not support expanding the core map outside of the range. **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"). EPA developed the core map 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 dwarf bear-poppy from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the dwarf bear-poppy is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Gypsum soil map in Utah; and
- FWS provided range for this species.

For step 2, EPA used the compiled information to identify the core map type including species range and gypsum soil map. The extent of the populations is identified in the range provided by FWS. A biological information core map type was chosen because the species is restricted to gypsum soils and the range could be refined using this information.

For step 3, EPA used the best available data sources to generate the core map. Data sources are discussed in the process document. For this core map, EPA used the Utah DNR Online Maps where gypsum soils are defined. EPA refined the range by removing areas outside of the gypsum soil map, as this species is restricted to gypsum soils. The entire range of the species was not used as the core map because the range contains areas where the species does not occur. **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

EPA explored using the populations table (Table 1 in Appendix 1) to further refine the core map. However, this approach was not used because the table did not include a map in the newest version of the 5-year review. The 2016 5-year review which did include a map, but did not include the new added population (Purgatory Flats), and the suitable acreage habitat had been updated (the changes are highlighted in yellow). The populations map in the 2016 5-year review are covered by the range map.

Appendix 1. Information Compiled for Species During Step 1

1. **Recent FWS Documents/Links**

- 5-Year Review Short Form 2022– (7/19/2022)
- 5-Year Review 2016 – (9/29/2016)
- Dwarf Bear-poppy Recovery Plan 1985 – (12/31/1985)

2. **Background information**
   - Status: Federally listed as endangered in 1979
   - Resiliency, redundancy, and representation (the 3Rs)
     - "Main bottleneck for population growth is successful seedling establishment on the harsh surface conditions of gypsum soils. The species relies on its seedbank for its persistence. Seeds are dispersed when embryos are immature and need one to several years to complete development and break dormancy before they germinate. Seed recruitment is episodic. Long time intervals are common between recruitment events because of the low frequency of years with adequate winter-spring precipitation to support establishment. Even in a favorable year, most of the population remains dormant as a seedbank."
     - "In a controlled setting, this species is practically impossible to germinate or propagate using tissue culture and transplanted individuals do not survive. The one population viability analysis performed for the species indicated a downward trend over a 21-year period (1992 to 2013) of the Red Bluffs population."
     - "Know of nine dwarf bear-poppy populations on Federal (BLM), Tribal, State of Utah and private lands."
     - "The recovery priority of this species is indicative of a species with a high degree of threat, imminent conflicts with land development, and a relatively low potential for recovery."

   - ***Habitat, Life History, and Ecology*** **(Source: 2022 Five Year Review)**
     - **Habitat**: "The dwarf bear-poppy is an endemic plant restricted to gypsum soils in semi-arid and arid environments in and around St. George, Utah."
     - **Reproduction/pollinators**:
       - Blooms in April or early May
       - Pollinators include native and non-native bees
       - Dispersal of seeds: wind and ants

   - **Ecology**
     - "Fruits and dry petals appear to be well-adapted for wind dispersal. Seeds have a fleshy attachment called an elaiosome, which is attractive to ants."

   - **Taxonomy**
     - Dwarf bear-poppy: terrestrial dicot plant

- **Relevant Pesticide Use Sites in FWS Documents (Source: 2016 Five Year Review)**
    - Pesticide listed in FWS documents include: "Pilot herbicide treatments to kill the brome seedbank are underway using Rejuvra (indaziflam), a new pre-emergent herbicide, which doesn't appear to negatively affect the biocrust or established dwarf bear-poppy plants."

- **Relevant Recovery Criteria and Actions (Source: 2016 Five Year Review)**
    - "The Recovery Plan was established in 1985 and is extremely out of date."
    - "Although down listing and delisting criteria were established in the Recovery Plan, they do not reflect the best available and most up-to-date information on the biology of the species and its habitat, its ecological requirements and threats."

3. **Description of the species range (Source: 2022 Five Year Review)**
    - The dwarf bear-poppy is restricted to habitat in the vicinity of St. George in Washington County, Utah.
    - Occupancy within the range is patchy and non-uniform and the distribution is not well understood.
    - There are nine known dwarf bear-poppy populations on both Federal and private lands.
    - Figure A1-1 depicts the current FWS species range (last updated September 15, 2020).The species range is approximately 51,163 acres.

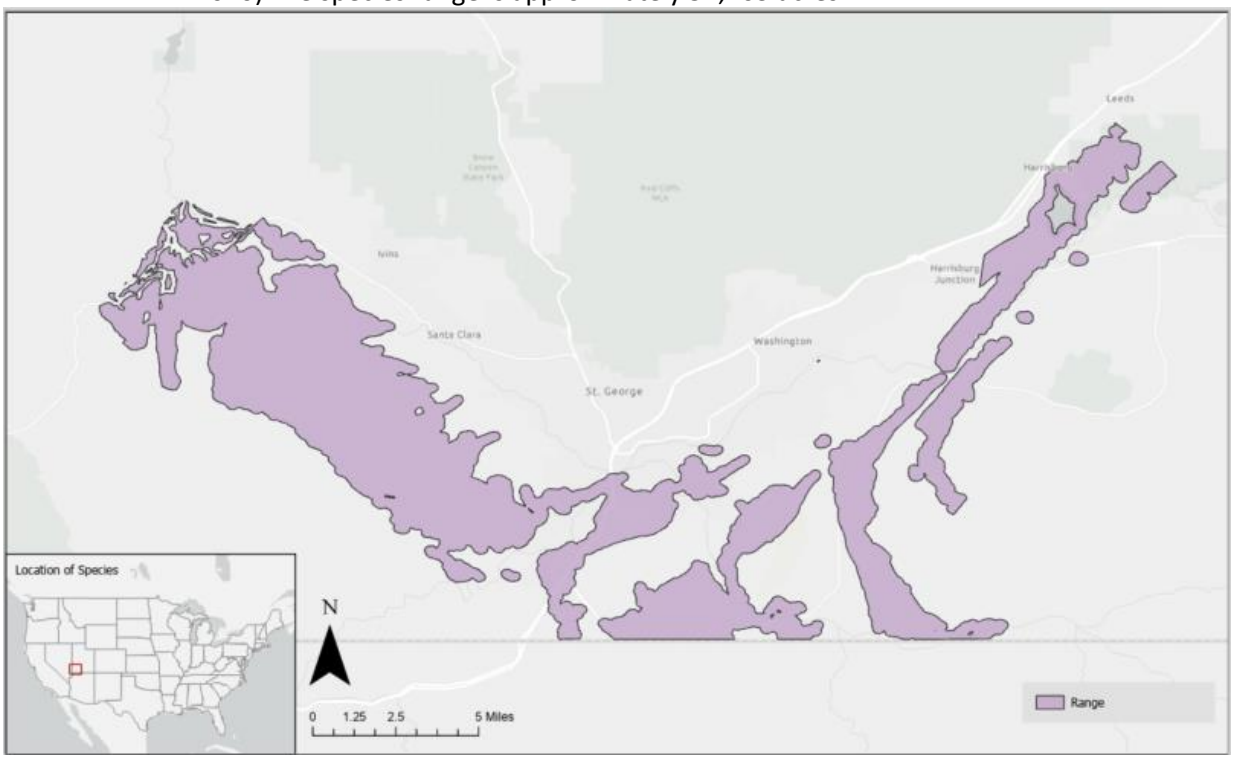

Figure A1-1. FWS range for the dwarf bear-poppy.

4. **Critical Habitat (Source: 2022 Five Year Review)**
    - Have not designated critical habitat for this species.
    - Did not designate critical habitat due to the potential for plant collection and vandalism.

5. **Known Locations (Source: 2022 Five Year Review)**
    - There are currently nine known populations of the dwarf bear-poppy.
        - **Table 1** lists out the known location data in FWS' most recent 5-year review.
        - When considering the locations of the current extant populations (**Table 1**), they are consistent with the Range (**Figure A1-2**).

Table 1. Summary of dwarf bear-poppy populations.

Population	Landownership	Suitable Habitat (Acres)	Most Recent Survey Year	Estimate of Individuals	Percent of Total Population
Red Bluff	BLM, State, Private, Tribal	8,870	2018	~3,000	12%
Webb Hill	BLM, State, Private	1,037	2019	7,414	30%
White Dome	Private (TNC), State, Utah Army National Guard	1,144	218	10,404 ± 988	41%
Beehive Dome	BLM	94	2019	3,425 ± 600	14%
North Warner Ridge	BLM	375	1979	~3,000	12%
Shinob Kibe	BLM, Private (partly TNC)	89	2020	324	1%
Val Springs	BLM	22	2020	278	1%
Warner Valley Springs	State	62	2018	454	2%
Purgatory Flats	Private	50	2016, 2017, 2018	255	1%
Total		11,649		25,129 ± 1,588	

- **Occurrences in iNaturalist**
    - Searched on April 21, 2025.
    - https://www.inaturalist.org/observations?quality_grade=research&subview=map&taxon_id=158578
    - There are 167 research grade observations available from 2011-2025.
    - **Figure A1-5** depicts the locations of these observations.
    - The observations are generally consistent with the range.

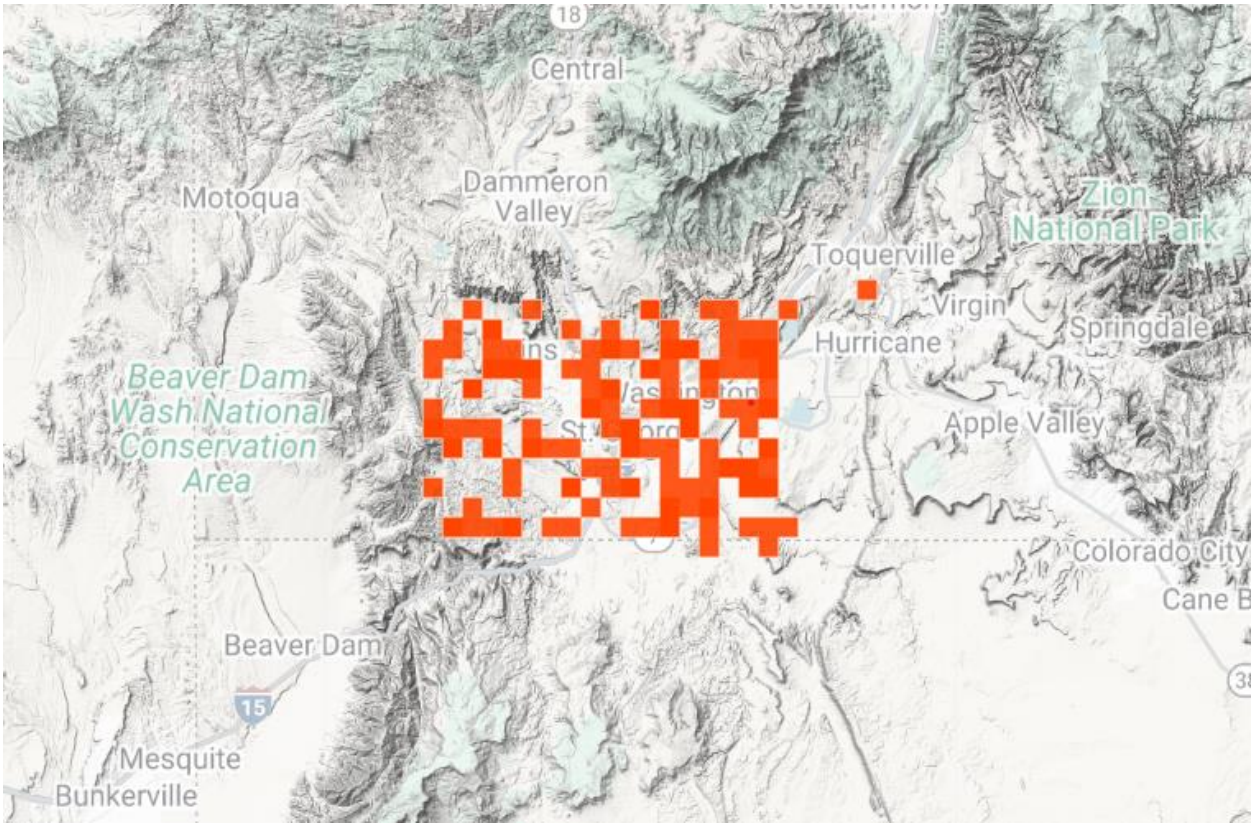

Figure A1-2. Screenshot from iNaturalist observations for the dwarf bear-poppy. The area depicted is on similar scale and location as the species range depicted in Figure A1-1.

Occurrences in NatureServe

- NatureServe was searched on April 21, 2025.
- https://explorer.natureserve.org/pro/Map?taxonUniqueId=ELEMENT_GLOBAL.2.159159
- NatureServe has 3 documented locations located within Santa Barbara County
- These locations are generally consistent with the location of the range

Occurrences in GBIF

- GBIF was searched on December 11, 2024.
- There were 223 "human observations" available for this species.
- Most observations were included in either iNaturalist or NatureServe.

https://www.gbif.org/occurrence/search?taxon_key=2888377

Collectively, the occurrence data from iNaturalist, GBIF, and NatureServe do not support expanding the core map beyond the range.

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

This core map was created based on biological information, including species habitat. EPA used the range map provided by FWS as the starting point (outer extent) for developing this core map. This map was further refined removing all areas of the map which did not include gypsum soils, which this species is restricted to.

1. **Dataset References and Software**

- Utah DNR Online Maps
    - This dataset displays mapped geologic units having gypsum resource potential in Utah and is a feature layer dataset.
- Software used: ArcGIS Pro 3.2
- FWS Species Range – last updated on September 15, 2020.

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 used the range map provided by FWS as the starting point (outer extent) for developing this core map.
- The range map for the dwarf bear-poppy was further refined removing all areas of the map which did not include gypsum soils, which this species is restricted to.
    - To do this, EPA imported the Utah DNR Online Maps, and cut down the gypsum map using pairwise clip to be within the range.
- See Figure A2-1 for comparison of the FWS species range and the Interim Core Map based on gypsum soils found within the outer extent of the range.

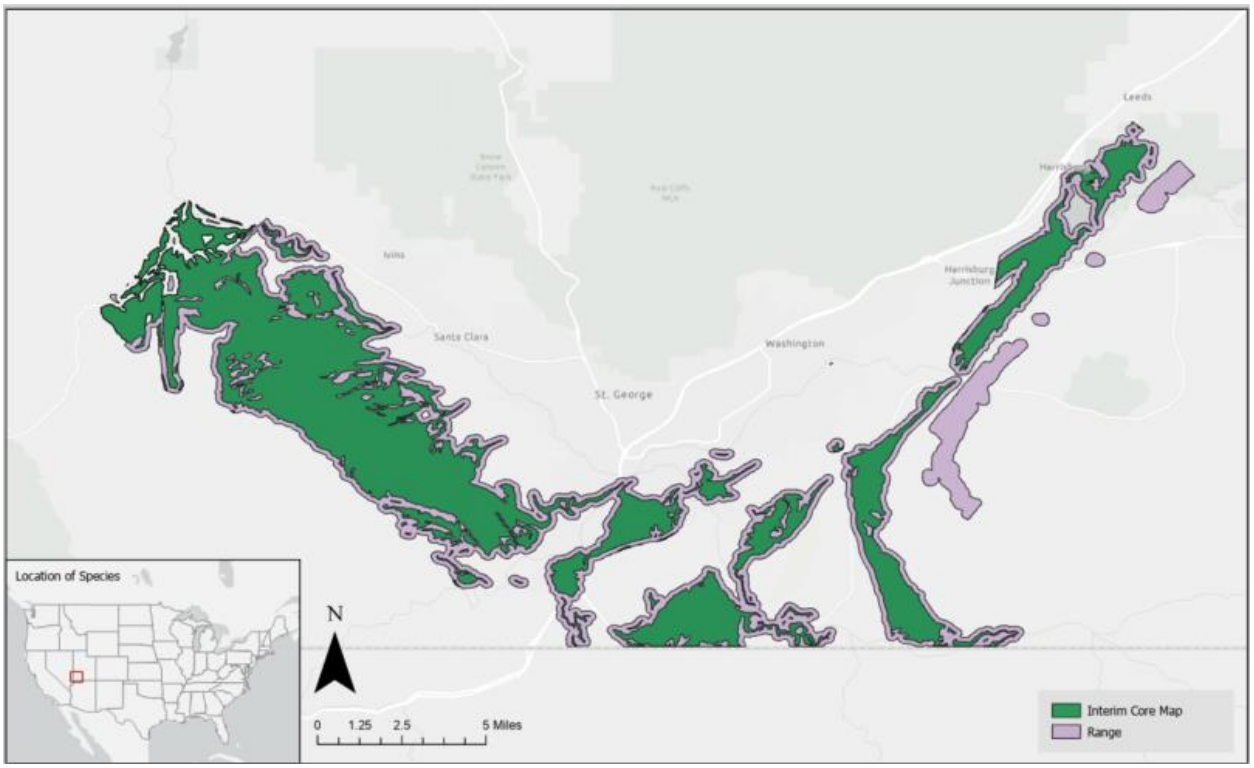

Figure A2-1. FWS species range and interim core map of the dwarf bear-poppy. The range is approximately 51,163 acres and the interim core map is approximately 30,933 acres.