

Interim Core Map Documentation for Yellow Larkspur

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Developed by the U.S. Environmental Protection Agency (EPA), Office of Pesticide Programs

Species Summary

The yellow larkspur (*Delphinium luteum*; Entity ID #540) is an endangered terrestrial plant (dicot). This species is restricted to coastal scrub land on rocky soils, generally near areas showing evidence of some level of past ground disturbance, in two counties north of San Francisco, California. This species blooms from March to May and is pollinated by hummingbirds. 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 yellow larkspur is based on critical habitat. All known occurrences of this species fall within the critical habitat. EPA did not find evidence that any key areas for this species exist outside of the designated critical habitat. The locations of the two known extant populations of this species fall within the critical habitat. **Figure 1** depicts the interim core map for the yellow larkspur (green areas on map). The final critical habitat established in 2024 is approximately 2,525 acres.

The yellow larkspur inhabits coastal scrub plant communities on sandy soils, in two counties north of San Francisco, which is captured in the species' designated critical habitat. Landcover categories within the core map area are included in **Table 1**. Landcover within the core map is predominantly scrub/shrub, which is consistent with the habitat of this species.

The core map developed for the yellow larkspur is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the yellow larkspur. 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 a "limited" best professional judgment classification because it consists of the species' critical habitat without additions or subtractions, although EPA limited the core map only to designated critical habitat based on interpretation of FWS documentation. Critical habitat represents areas important for this species' conservation and contains all the known occurrences for this species that have been found within approximately the last 40 years. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

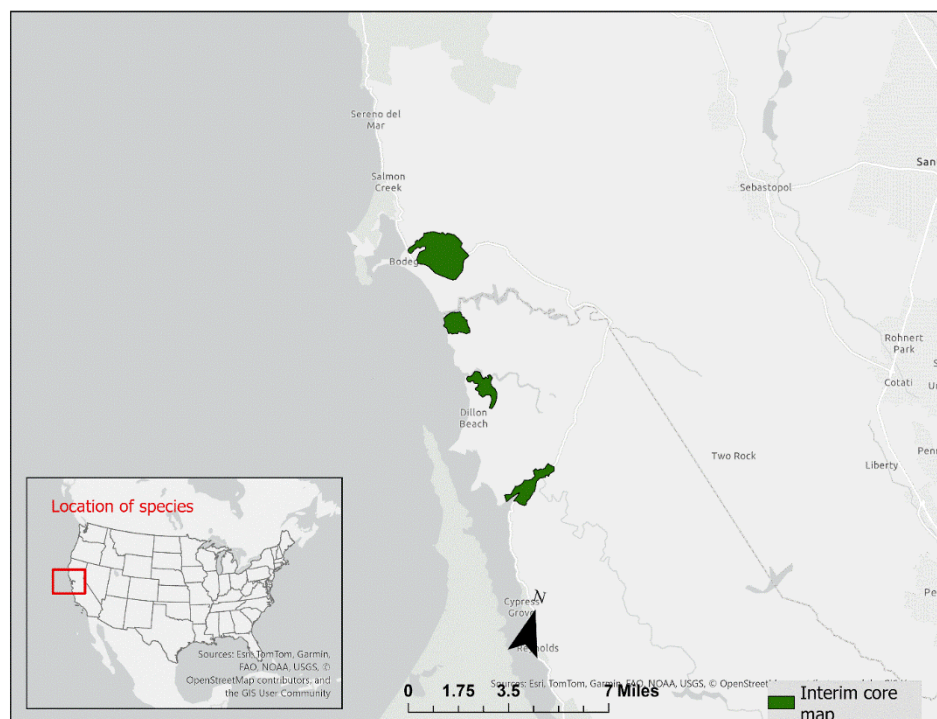


Table 1. Percentage of Interim Core Map Represented by NLCD¹ Land Covers and Associated Example Pesticide Use Sites/Types.

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	3
Forestry	Evergreen Forest (42)	1	3
Forestry	Mixed Forest (43)	2	3
Agriculture	Pasture/Hay (81)	0	0
Agriculture	Cultivated Crops (82)	0	0
Mosquito adulticide, residential	Open space, developed (21)	3	5
Mosquito adulticide, residential	Developed, Low intensity (22)	2	5
Mosquito adulticide, residential	Developed, Medium intensity (23)	0	5
Mosquito adulticide, residential	Developed, High intensity (24)	0	5
Invasive species control	Woody Wetlands (90)	1	92
Invasive species control	Emergent Herbaceous Wetlands (95)	3	92
Invasive species control	Open water (11)	1	92
Invasive species control	Grassland/herbaceous (71)	7	92
Invasive species control	Scrub/shrub (52)	80	92
Invasive species control	Barren land (rock/sand/clay; 31)	0	92
Total Acres	Interim Core Map Acres	~ 2,500	

Evaluation of Known Location Information

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

- Descriptions of locations provided by FWS,
- Occurrence locations in iNaturalist; and
- Occurrence locations in the Global Biodiversity Information Facility (GBIF).

EPA evaluated these three sets of data before selecting the type of and developing the core map. FWS' 2024 Species Status Assessment (SSA) and most recent 5-year review (2024) detailed known locations of this species. FWS described 14 documented occurrences that are extant and extirpated. Currently, there

¹ Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, <https://doi.org/10.5066/P9JZ7AO3>

are two extant populations, which have locations that are consistent with the critical habitat. iNaturalist had 26 research grade observations (using name golden larkspur (same genus species)). GBIF contained 17 observations. All currently known locations of extant members of this species have been identified by FWS in the latest Species Status Assessment. These locations are mappable and are all contained within the critical habitat. **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”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.

For step 1, EPA compiled available information for the yellow larkspur from FWS as well as observational information available from various publicly available sources (discussed in previous section). The information compiled for the yellow larkspur is included in **Appendix 1**. Influential information that impacted the development of the core map included the observation that current existing populations occur in locations consistent with the critical habitat and that the species’ critical habitat is highly refined and represents key areas for the species.

For step 2, 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 FWS known locations of currently existing (extant) populations are consistent with the location of the designated critical habitat. The species range follows geopolitical boundaries (i.e., counties) and is not likely limited to the areas containing habitat of the species. The range is also much larger than the areas where known locations occur. Based on this information, EPA used the designated critical habitat as the core map.

For step 3, EPA used the designated critical habitat provided by FWS for Yellow Larkspur. EPA downloaded the critical habitat from FWS’s ECOS (<https://ecos.fws.gov/ecp/>).

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

Alternative approaches and data not described in this document were not explored in the development of this interim core map.

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

Appendix 1. Information Compiled for Species During Step 1

1. Recent FWS Documents/Links

- Yellow Larkspur [5-year review 2024](#) – (8/28/2024)
- [Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for Two Larkspurs From Coastal Northern California \(*Delphinium bakeri*, *Delphinium luteum*\)](#) – (03/18/2003)
- [Species Status Assessment for Yellow Larkspur](#) – (7/1/2024)

2. Background information

- Status: Federally listed as endangered in 2000
- Resiliency, redundancy, and representation (the 3Rs)
 - There are currently two extant occurrences of yellow larkspur, one in moderate condition and one in unknown condition.
 - “At the species level, yellow larkspur needs to maintain multiple resilient populations, distributed throughout its historical range, that contain the species’ breadth of ecological and genetic diversity (representation and redundancy). Resilient populations throughout its historical range across will help to decrease risk from potential catastrophic events and will help to preserve representation for the species.” (SSA 2024)
 - “Recovery of yellow larkspur will likely rely on successful coordination with private landowners and recovery implementation actions, which will include increasing representation and redundancy through additional propagation and reintroductions.” (SSA 2024)

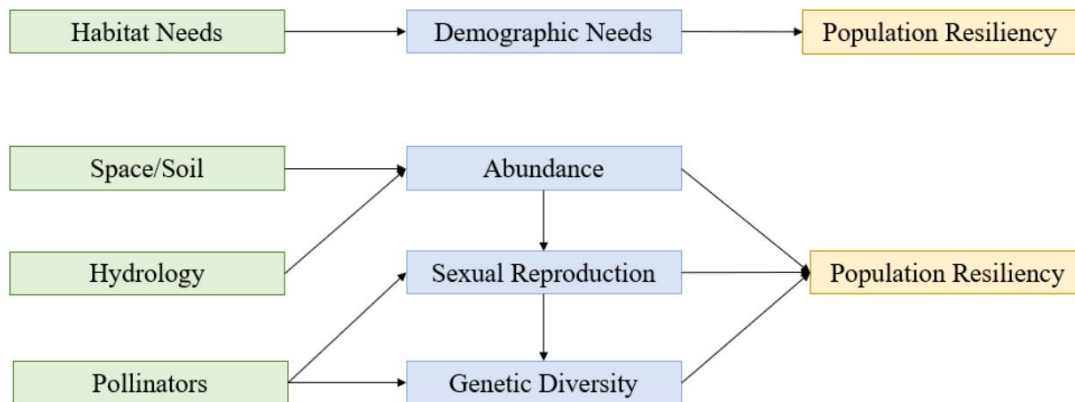


Figure 4. **Habitat** and demographic needs of yellow larkspur.

Figure A1-1: 3R's flow chart for yellow larkspur (SSA 2024)

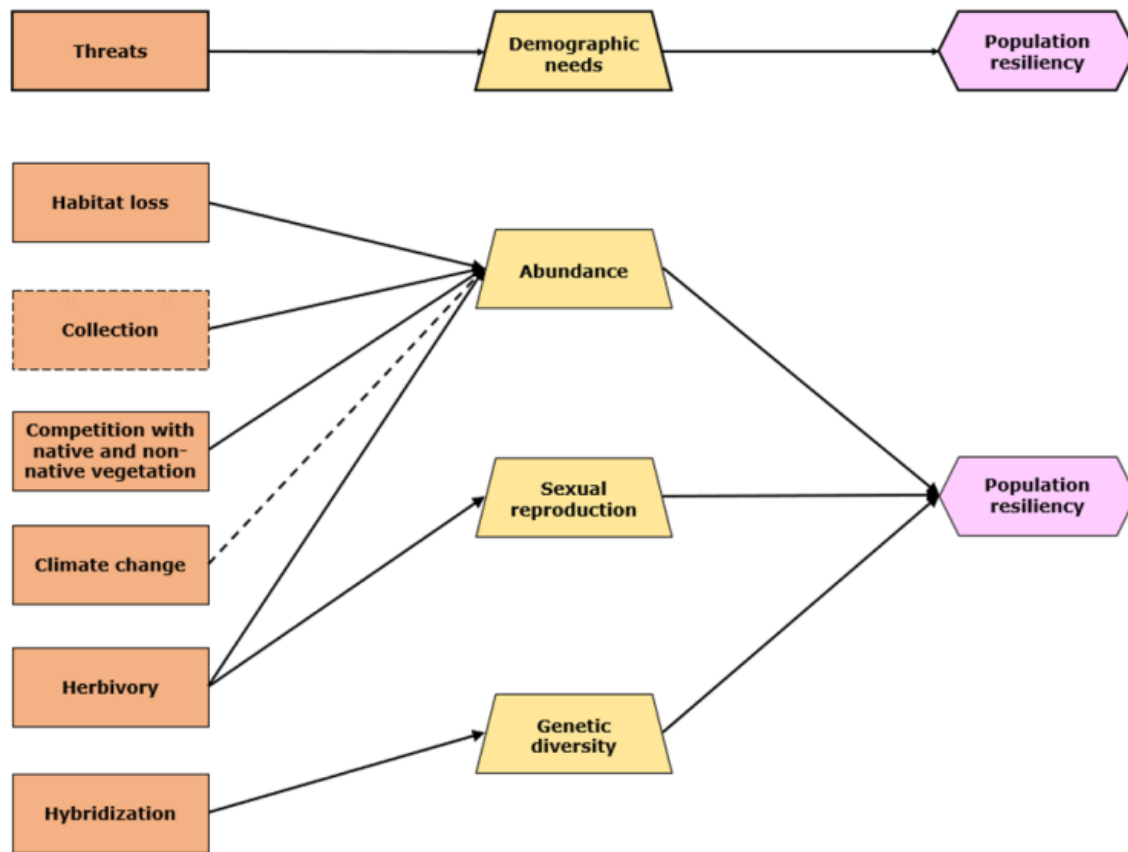


Figure 6. Factors influencing demographic needs, and ultimately population resiliency, for yellow larkspur. Dashed lines identify situations that require more information to determine the significance of the relationship.

Figure A1-2: Threats to the yellow larkspur as related to demographic needs. (SSA 2024)

Population	Habitat Quantity	Habitat Quality	Reproduction	Abundance	Overall Condition
Scenario 1- Continuation <i>Walter Creek</i>	Unknown	Unknown	Unknown	Extirpated	Extirpated
Scenario 1- Continuation <i>Larkspur Rock</i>	Low	Moderate	Low	Low	Low
Scenario 2- Increasing threats <i>Walter Creek</i>	Unknown	Unknown	Unknown	Extirpated	Extirpated
Scenario 2- Increasing threats <i>Larkspur Rock</i>	Low	Low	Low	Low	Low
Scenario 3- Continued threats and increasing conservation actions <i>Walter Creek</i>	Unknown	Unknown	Unknown	Extirpated	Extirpated
Scenario 3- Continued threats and increasing conservation actions <i>Larkspur Rock</i>	Low	High	High	Moderate	Moderate

Table A1-1: 3 R's rating depending on three scenarios

- **Habitat, Life History, and Ecology (Source: 2021 Recovery Plan)**
 - **Habitat:**
 - Grows in rocky areas within coastal scrub plant communities, generally near areas showing evidence of some level of past ground disturbance, from sea level to 100 meters (300 feet) in elevation.
 - Typically occurs on moderate to steep slopes.
 - Found in relatively steep sloped soils (30 percent or greater) derived from sandstone or shale, with rapid runoff and high erosion potential .
 - Temperatures in the region inhabited by yellow larkspur are moderated by fog, which keeps summers relatively cool and winters relatively warm compared to inland habitats. Much of the coastal prairie in this species' range has been grazed for over a century and is now characterized by a mixture of non-native annuals and forbs and native prairie plants.
 - **Reproduction/pollinators:**
 - Pollinated by hummingbirds, not honey bees
 - **Taxonomy**
 - FWS Category: Flowering dicot plants with biotic pollination vectors with other reproductive mechanisms unknown (group 11)
 - **Essential Physical Biological Features (PBFs) for Designated Critical Habitat:**
 - None found in any documents.
 - **Relevant Pesticide Use Sites in FWS Documents**
 - None found in any documents.
 - **Relevant Recovery Criteria and Actions (Source: 2024 5-year Review)**
 - Recovery criteria for downlisting the yellow larkspur focus on a minimum of six populations in moderate condition, or a minimum of four populations in high condition, as defined in the SSA report (Service 2024b, p. 3). Recovery criteria for delisting the yellow larkspur include a minimum of eight populations, six of which are in high condition, the remaining of which are at least in moderate condition (Service 2024b, p. 4).
 - There are currently two known extant populations, one of which is in moderate condition (Larkspur Rock) and the other of which is in unknown condition.
- 3. Description of the species range**
- *Delphinium luteum* inhabits coastal prairie and coastal scrub areas, which typically have no overstory vegetation, at elevations ranging from sea level to 100 m within northwestern Marin and southwest Sonoma counties.
 - **Figure A1-3** depicts the current FWS species range (last updated February 3, 2016).
 - The species range is approximately 216,758 acres.

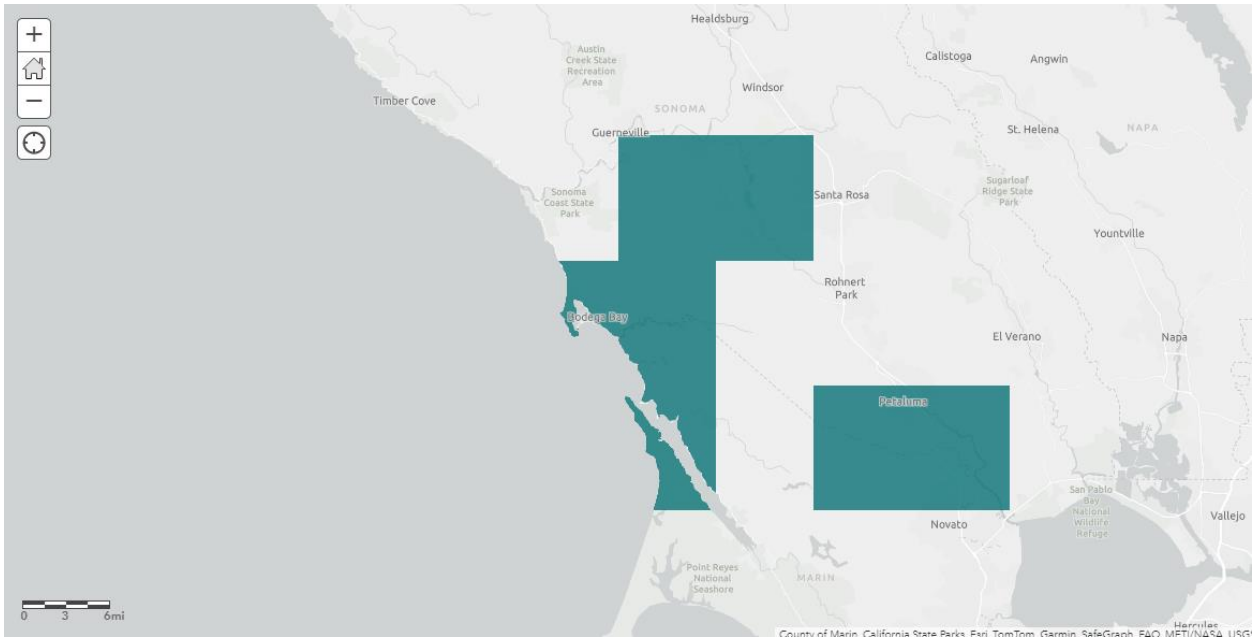


Figure A1-3. FWS Range for the yellow larkspur.

4. Critical Habitat (Source: 2024 Five Year Review)

- First designated final critical habitat in 2024
- 2024 Final Rule: Approximately 2,525 acres (1,022 hectares) in Marin and Sonoma Counties, California, fall within the boundaries of the critical habitat designation.
- The Critical habitat for *D. luteum* includes four units. These units together contain all the *D. luteum* populations documented since the 1980s. Critical habitat for *D. luteum* includes 1,022 ha (2,525 ac), with 554 ha (1,369 ac) in Sonoma County and 468 ha (1,156 ac) in Marin County.” (Designation of Critical Habitat.... 2003)
 - 4 locations: “*D. luteum* (L1) 554 ha (1,369 ac) *D. luteum* (L2) 133 ha (329 ac) *D. luteum* (L3) 142 ha (351 ac) *D. luteum* (L4) 193 ha (476 ac)” - [03-6133.pdf \(govinfo.gov\)](#) (DCH 2003).
- **Figure A1-4** depicts the current critical habitat.



Figure A1-4. FWS critical habitat for the yellow larkspur.

5. Known Locations

- **Known Locations Described in FWS Recovery Documents**

- “Larkspur Rock is located at an old rock quarry site near the city of Bodega in Sonoma County and was partially destroyed and fragmented by historical quarry activities.
- Larkspur Hill is located near Cheney Gulch, on the south side of Highway 1, about 2 miles west of Bodega Bay in Sonoma County.
- Yellow larkspur was last observed at Larkspur Rock in 2023 and at Larkspur Hill in 1999 (Diversity Database 2023). A yellow-flowered larkspur has also been documented in a roadside population near Walker Creek in Marin County (Diversity Database #14) as recently as 2023; however, it is believed to be a variety or sport
- In addition to the aforementioned three, there are eight additional yellow larkspur occurrences described in the Diversity Database (Table 1; Diversity Database 2023). One of the occurrences (Diversity Database #7) is likely the same as the Larkspur Hill occurrence (Service 2019, p. 3). Of the seven remaining occurrences, two are likely extirpated (Diversity Database #'s 2 and 3), two occur on private land and access would need to be arranged with landowners to survey (Diversity Database #'s 1 and 8), and the final three occurrences are all suspected hybrids that would require genetic and field work to confirm status (Diversity Database #'s 13, 16, and 17). More detail on each occurrence is provided in Table 1.”
- Table A1-2: Detailed status of known occurrences.
- Table A1-3: Counts of Yellow Larkspur at three locations over 40 years.
- Figure A1-5: iNaturalist 26 research grade observations (using name Golden Larkspur (same genus species)).
- Figure A1-6: GBIF 17 observations.
- All currently known locations of extant members of this species have been identified by FWS in the latest Species Status Assessment. These locations are mappable and are all contained within the critical habitat.

Table A1-2. Status of each yellow larkspur Diversity Database occurrence as described in the 2011 5-year review, updates from the 2019 5-year review, and the 2023 Diversity Database report.

Diversity Database Occurrence #	Location	2023 Status Summary
1	Stemple Creek, Marin County	Presumed extant. First and last recorded visit in 1918. Access to private property and fieldwork needed to determine status.
2	Petaluma, south Sonoma County	Presumed extant. First and last recorded visit in 1962.
3	Granton, Sonoma County	Possibly extirpated due to landscape alteration. Based on 1925 and 1927 collections.
5	Larkspur Rock, Sonoma County	Extant. Appears stable. 61 plants censused in 2023.
7	Bodega, Sonoma County	Presumed extant. Probably a duplicate of occurrence #11.
8	Salmon Creek, Sonoma County	Presumed extant. Last recorded visit in 1983. Access to private property and fieldwork needed to determine status.
11	Larkspur Hill, Sonoma County	Probably extirpated. Blooming flowers not visibly confirmed since before 2011.
13	Southwest of Tomales, Marin County	Possibly extirpated or hybridized. Fieldwork and genetic study needed to determine status.
14	Walker Creek, Marin County	Presumed extant. Last recorded visit in 2018 (1 yellow larkspur observed).
16	North of the mouth of Estero San Antonio, Marin County	Presumed extant.
17	North of Dillon Beach, Marin County	Presumed extant. First and last recorded in 1993 (3 plants observed). Fieldwork and genetic study needed to determine status.

Table A1-3. Counts at known locations across 40 years.

Year	Larkspur Rock (#5)	Larkspur (#11)	Walker Creek (#14)
1982			2-3
1983	≥60		
1984	≥60	50	0
1985	130	13	0
1986	50	8	0
1987	40	12	0
1997	83		
1998	51-100		
1999		5-10	1
2000	55		1
2010			1 ³
2011	48-52		0
2012	15 ¹		
2013	55		
2014	63		
2015			
2016	97 ²		2 ³
2017	62		
2018	60		1 ³
2019	82		
2020	75		
2021	80		1 ³
2022	57		1 ³
2023	61		1 ³

¹Count is likely low because of poor survey conditions.

²H. Forbes suspects that the count in 2016 was artificially high because clumps were counter as multiple plants (unpubl. data 2018 in Service 2019, p.3)

³Suspected of being either a hybrid between yellow larkspur and red larkspur or a sport of red larkspur.

- **Occurrences in iNaturalist**
 - <https://www.inaturalist.org/observations>:
 - There are 26 research grade observations available from 2019-2024.
 - Due to the coarse resolution of these data, many of the observations are mapped in the ocean. Therefore, it is unclear if these observations are in the core map area or not.
- **Occurrences in GBIF**
 - <https://www.gbif.org/>
 - There are 17 observations available for this species.
- Collectively, the occurrence data from iNaturalist and GBIF do not support expanding the core map beyond the designated critical habitat.