

Interim Core Map Documentation for the Nipomo Mesa Lupine

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Draft Interim Core Map Developer: Bayer Crop Science

Species Summary

The Nipomo Mesa lupine (*Lupinus nipomensis*; Entity ID #573) is an endangered dicotyledonous plant. It has no designated critical habitat. This narrowly endemic annual herb, a member of the Fabaceae family, is restricted to a specific set of stabilized back dunes associated with the Nipomo Mesa landform within the Guadalupe-Nipomo Dunes complex in southwestern San Luis Obispo County, California. These stabilized coastal dunes are located behind the active Callendar dune sheet—the northernmost of the three dune sheets comprising the complex. The Nipomo Mesa lupine grows on dry, sandy flats within coastal dune scrub habitat, situated behind the open, unvegetated, active dune sands. Additional 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, and EPA may have edited this documentation for clarity or other purposes. This documentation may include some viewpoints not necessarily held by 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 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 "none" best professional classification because it consists of the species' range without additions or subtractions.

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 Nipomo Mesa lupine is based on its known species range. *Lupinus nipomensis* is a small, annual member of the Fabaceae family (legumes; peas and beans), restricted to stabilized coastal dune scrub habitat associated with the Nipomo Mesa in southwestern San Luis Obispo County, California. Its range lies behind the Callendar Dune sheet, one of three major dune formations comprising the Guadalupe-Nipomo Dunes Complex. This narrow endemic is found exclusively in

stabilized, vegetated dune scrub areas located behind the open sands of the Callender Dune sheet and has never been documented elsewhere within the complex. The species' range is highly restricted and represents areas considered critical for its conservation.

The Nipomo Mesa lupine is currently known from three Element Occurrences with fewer than 4,000 individuals, all confined within this limited range. No critical habitat has been designated for the species. **Figure 1** shows the interim core map, which encompasses approximately 2,350 acres. EPA's modified cultivated layer was erased from the range to develop core map, as this species does not occur on cultivated lands.

Land cover types within the core area are summarized in **Table 1**. The landscape is predominantly composed of shrubland and grassland/herbaceous cover types, which generally align with the species' habitat requirements.

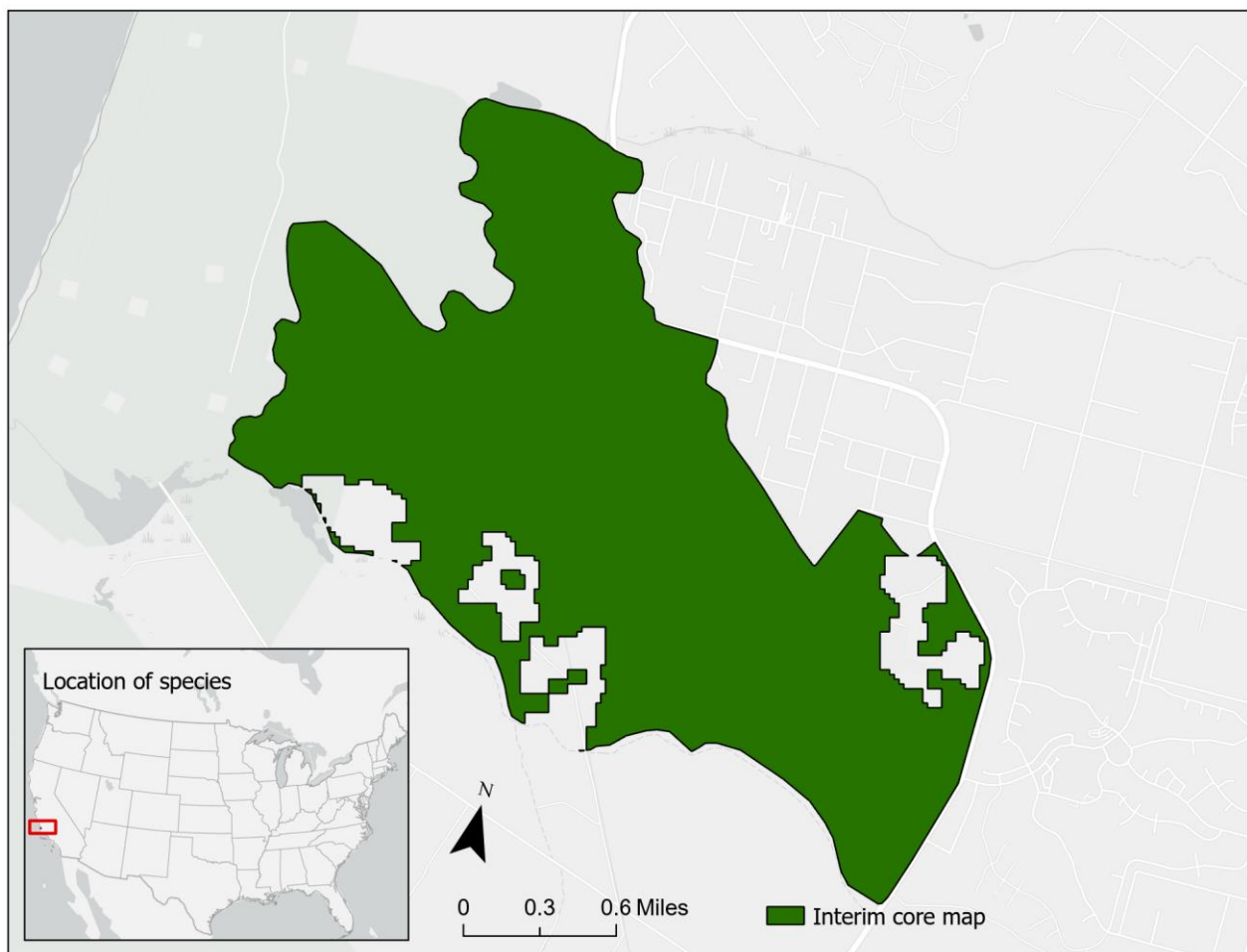


Figure 1. Interim core map for the Nipomo Mesa Lupine (*Lupinus nipomensis*).

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 Class/Value	% Area	Total area for landcover type
Forestry	Deciduous Forest (41)	0%	0%
Forestry	Evergreen Forest (42)	0%	0%
Forestry	Mixed Forest (43)	0%	0%
Agriculture	Pasture/Hay (81)	3%	11%
Agriculture	Cultivated Crops (82)	7%	11%
Mosquito adulticide, residential	Developed Open Space (21)	2%	10%
Mosquito adulticide, residential	Developed Low Intensity (22)	3%	10%
Mosquito adulticide, residential	Developed Medium Intensity (23)	4%	10%
Mosquito adulticide, residential	Developed High Intensity (24)	0%	10%
Invasive species control	Woody Wetlands (90)	2%	79%
Invasive species control	Emergent Herbaceous Wetlands (95)	1%	79%
Invasive species control	Open Water (11)	1%	79%
Invasive species control	Grassland/Herbaceous (71)	40%	79%
Invasive species control	Shrub/Scrub (52)	36%	79%
Invasive species control	Barren Land (31)	0%	79%
Total Acres	Interim Core Map Acres	~ 2350	

Evaluation of Known Location Information

There are four datasets with known location information:

- Descriptions of locations provided FWS recovery documents
- Occurrence locations in iNaturalist,
- Occurrence locations in the Global Biodiversity Information Facility (GBIF), and
- Element Occurrence locations from NatureServe

Bayer evaluated these four sets of data for potential utility in informing the interim core map. There are 16-research grade iNaturalist occurrences that correspond to known populations and range maps in FWS recovery documents for this species. These 16 locations were generally consistent with the locations available through GBIF, and NatureServe. Occurrences in iNaturalist, GBIF, and NatureServe did not support expanding the core map outside of the species range.

Approach Used to Create the 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

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

Critical Habitats”² (referred to as “the process”). This core map was developed by Bayer 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, Bayer compiled available information for the Nipomo Mesa lupine from the FWS and various publicly accessible sources, including FWS documentation, iNaturalist, and the GBIF. In addition, NatureServe element occurrence data were reviewed internally for confirmation purposes only. All compiled information and associated data sources are provided in Appendix 1. Key sources that influenced the development of the core map include:

- The species range is highly refined, restricted to stabilized coastal dune scrub habitat that is associated with the Nipomo Mesa, in southwestern San Luis Obispo County California. Its current geographic range is restricted to an area that is approximately 5.2 square kilometers (two square miles). The species range is situated behind the Callender Dune sheet, which is one of three dune formations that comprise the Guadalupe-Nipomo Dunes Complex (Recovery Plan).
- There is only single known population in FWS documentation, comprised of less than a thousand individuals and they are all located within the range.
- Occurrence data from other sources are generally consistent with the species range.

For step 2, Bayer used the compiled information to determine the appropriate core map type. Known location data were compared to the species range, and it was found that these locations align closely with the established range. Given the species’ narrow distribution—which encompasses all occurrence data identified by FWS—Bayer selected the species range as the core map. [EPA’s modified cultivated](#) layer was erased from the core map, as this species does not occur on cultivated lands.

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

Alternative approaches and data were not considered 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-mapshttps://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-pesticide-use-limitation-areaspesticide-use-limitation-areas>

Appendix 1. Information compiled for the Nipomo Mesa Lupine During Step 1

Recent FWS documents

- Nipomo Mesa Lupine (*Lupinus nipomensis*) 5-year Review (2024) https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/18954.pdf
- Recovery Plan for Nipomo Mesa Lupine (*Lupinus nipomensis*) (2021) https://ecos.fws.gov/docs/recovery_plan/Nipomo%20Lupine%20Recovery%20Plan.pdf
- Nipomo Mesa Lupine (*Lupinus nipomensis*) Species Report (2020) https://ecos.fws.gov/docs/recovery_plan/Nipomo%20lupine%20Species%20Report_1.pdf

Background Information

- **Status:** Federally listed as Endangered in 2000.
- **Taxonomy:** Terrestrial plant; dicot; member of the pea family (Fabaceae)
- **Species Overview:** The Nipomo Mesa lupine (*Lupinus nipomensis*) is a narrowly endemic, annual herb in the Fabaceae family.
- **Habitat (5-Year Review):** The Nipomo Mesa lupine only occurs on a specific set of stabilized back dunes, associated with the Nipomo Mesa landform, within the Guadalupe-Nipomo Dunes complex, located in southwestern San Luis Obispo County. These stabilized coastal sand dunes occur behind the active Callendar dune sheet, which is the northern-most dune sheet (of three) that compose the complex. The Nipomo Mesa lupine occurs on dry, sandy flats in coastal dune scrub habitat, behind the open, unvegetated, active dune sand.
- **Habitat (Recovery Plan):** “Nipomo lupine is a narrow endemic that occurs in the stabilized, vegetated dune scrub areas behind the open sand of the Callender Dune sheet. It has never been found anywhere else throughout the Guadalupe-Nipomo Dunes. The stabilized back dunes within this habitat type are dominated by mock heather (*Ericameria ericoides*), which is the primary indicator species of coastal dune scrub vegetation throughout the region. This habitat supports a high diversity of native annual forbs and a few other prominent non-native grasses and forbs. The coastal dune scrub habitat type is extremely dynamic and diverse, and the species composition is highly variable. This variability depends on the amount of annual rainfall, level of disturbance, current land use and/or management regimes, successional stage of development and degree of infestation from non-native invasive species, especially perennial veldt grass (*Ehrharta calycina*).” It requires open, sandy areas within stabilized coastal dune scrub vegetation communities.
- **Pollination:** There is limited information about the Nipomo Mesa lupine reproductive biology. Researchers agree that it is likely capable of both selfing and outcrossing, and that outcrossing most likely occurs via insect pollinators (5-year Review). Adult: Sexual: self-pollination, cross-pollination (Malathion BiOp, Appendix C). (FWS, 2009)
- **Threats:** The primary threats to the Nipomo Mesa lupine include: displacement and habitat loss from invasive species (especially perennial veldt grass), development activities, seed predation, stochastic loss and extinction, and climate change (Recovery Plan 2021)

- **Resiliency: low**
“Nipomo lupine currently has low resiliency, meaning that the population has a reduced ability to withstand stochastic (random) events. The population is currently comprised of less than a thousand individuals and has shown no signs of increasing, making it highly vulnerable to stochastic events.”
- **Redundancy – low**
“The species has low redundancy because it is such a narrow endemic with only a single population. Therefore, its overall ability to survive catastrophic events is low.”
- **Representation - Low**
“It also likely has low representation, which means that it has reduced adaptive capacity to changes in the environment (whether they are human induced or naturally caused). It was indicated that while no genetic studies on Nipomo lupine have been conducted, it was assumed the species to have reduced genetic diversity because of its small population size and because it is a self-pollinated, annual species. Similarly, it only occurs in one, limited habitat type or distinct ecological setting. Given its current condition, Nipomo lupine is at high risk of extinction.”

- **Summary of Relevant Life History Information obtained from Gopher**

<i>Reproductive Strategy</i>	Sexual: self-pollination, cross-pollination (FWS, 2009)
<i>Number of Reproductive Events</i>	One per year (inferred from FWS, 2009) Clutch Size/Fecundity: Up to 1,000 seeds per plant; < 30 fruits per plant observed (FWS, 2009)
<i>Reproductive Capacity</i>	High (inferred from FWS, 2009)
<i>Lifespan</i>	One Year (FWS, 2009)
<i>Breeding Season</i>	March - May (NatureServe, 2015)
<i>Key Resources Needed for Breeding</i>	Insect pollinators, based on closely related species (FWS, 2009)
<i>Reproduction Narrative</i>	This is an annual species. Potentially, seed production could reach on the order of 1,000 seeds; however, based on 2 years of sampling, observed seed production per plant ranged from 1 to over 200, with most plants producing less than 30 fruits (Walters and Walters 1988). Flowers are self-compatible if manipulated; however, they may require insect visitation for full complements of seeds (Center for Plant Conservation (CPC, 2009). While pollination ecology has not been specifically studied for <i>L. nipomensis</i> , other lupine taxa are known to be pollinated by butterflies and a variety of bee taxa, especially from the genera <i>Bombus</i> , <i>Osmia</i> , <i>Synhalonia</i> , and <i>Anthidium</i> (Moldenke

	1976) (FWS, 2009). It blooms from March to May (NatureServe, 2015).
Habitat Type	Terrestrial (NatureServe, 2015)
Habitat Vegetation or Surface Water Classification	Coastal dune scrub (FWS, 2009)
Dependencies on Specific Environmental Elements	Natural disturbance (FWS, 2009)
Geographic or Habitat Restraints or Barriers	Occurs < 50 m elevation (NatureServe, 2015)
Environmental Specificity	Very narrow (inferred from FWS, 2009)
Key Resources Needed for Habitat	Stabilized coastal sand dunes (NatureServe, 2015); Callender Dune Sheet soils, open areas (FWS, 2009)
Habitat Narrative	Inhabits stabilized coastal sand dunes at < 50 m elevation (NatureServe, 2015). It is restricted to sandy soils associated with the Callender Dune Sheet (Cooper 1967). Habitat for <i>Lupinus nipomensis</i> is comprised of stabilized back dunes supporting a central coastal dune scrub community. <i>Lupinus nipomensis</i> needs open habitat to persist. Sandy soils along the coast typically undergo a certain amount of natural disturbance from coastal winds and from the activity of wildlife (FWS, 2009).
Dispersal/Migration Narrative	"Nipomo Mesa lupine has an explosive seed dispersal mechanism caused by the drying out of the seed pods (Walters and Walters 1989, p. 12). Like many other lupine species, it likely has a persistent seed bank (FWS, 2024)"

REFERENCES

NatureServe. 2015. NatureServe Central Databases. Arlington, Virginia, U.S.A
FWS 2009. *Lupinus nipomensis* (Nipomo Lupine) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Ventura Fish and Wildlife Office Ventura, California.
FWS. 2024. NIPOMO MESA LUPINE (*Lupinus nipomensis*) 5-Year Review: Evaluation and Summary. Ventura Fish and Wildlife Office Ventura, California. 20 pp.

- **Recovery Strategy:** "The recovery objectives are to systematically increase the species' resiliency, redundancy, and representation to a viable and self-sustaining state suitable for this narrow endemic. The recovery objectives will be accomplished through implementation of a series of recovery actions that, over time, will restore species viability. Recovery will be signified by a consistent increase in the population over time and establishment of new self-sustaining (or resilient) occurrences. Annual monitoring data will demonstrate that resiliency is improved, with ample ecological representation across the range of available suitable habitat, and sufficient redundancy to ensure survival in the face of catastrophic events."

- **Recovery Actions for the Nipomo Lupine**
 - **Habitat Protection**
 - Secure conservation easements or agreements for all unprotected habitats.
 - Work with partners to protect coastal dune scrub habitat.
 - **Population Expansion**
 - Conduct outplanting in suitable sites across the Guadalupe-Nipomo Dunes.
 - **Habitat Management**
 - Control invasive species to reduce threats and promote natural regeneration.
 - **Seed Conservation**
 - Collect and store seeds in conservation seedbanks (Santa Barbara Botanic Garden & USDA seed vault).
 - **Monitoring & Research**
 - Conduct annual monitoring and research to address data gaps.
 - Study factors affecting seed survival, germination, and establishment.
 - Investigate genetic variability, seedbank longevity, and population resilience.
 - **Education & Outreach**
 - Develop programs to engage local and regional communities in conservation efforts.

Description of the Nipomo Mesa lupine's Range

The Nipomo Mesa lupine is a small, annual species in the Fabaceae (legume; pea and bean) family restricted to stabilized coastal dune scrub habitat that is associated with the Nipomo Mesa, in southwestern San Luis Obispo County California. Its current geographic range is restricted to an area that is approximately 5.2 square kilometers (two square miles). The species range is situated behind the Callender Dune sheet, which is one of three dune formations that comprise the Guadalupe-Nipomo Dunes Complex. (Recovery Plan)

- The shapefile was obtained from FWS's ECOS webpage. Information was accessed on March 3, 2025. ECOS indicates this range was last updated on March 10, 2022. This data can be accessed <https://ecos.fws.gov/ecp/species/5480>
- The range is depicted in **Figure A1-1**.
- The range size is approximately 2,603 Acres.



Figure A1-1. FWS range map for the Nipomo Mesa lupine (*Lupinus nipomensis*). Species range image was taken from <https://ecos.fws.gov/ecp/species/5480>

Designated Critical Habitat

No Critical Habitat Documents are currently available for this species.

Species Status Assessments

No Species Status Assessments (SSA's) are currently available for this species

Known Locations

1. Known locations described in FWS' 5-Year Review 2024 (Figure A1-2)

According to the Ventura Fish and Wildlife Office (VFWO), there are currently three known extant occurrences of the Nipomo Mesa lupine, as documented in the California Natural Diversity Database (CNDDDB) and shown in **Figure A1-2**. These occurrences include: Santa Maria Oil Refinery/Phillips 66 Petroleum Company (EO 1), Kathleen's Overlook Canyon (KCO; EO 3), and BLEA (EO 10). VFWO staff, along with partner organizations, visited areas within each occurrence during the peak Nipomo Mesa lupine blooming season in April 2024. Portions of EO 1 located on the east side of the Southern Pacific Railroad at the Phillips 66 site were not accessible during the visit.

Although the CNDDDB continues to classify the KCO occurrence as extirpated (CNDDDB 2024b, website), it is considered extant for the purposes of this status review due to recent outplanting efforts at the site. These restoration efforts were supported by Traditional Section 6 Grant funding awarded to the Cheadle Center for Biodiversity and Ecological Restoration (CCBER). Phillips 66 provided VFWO and the California Department of Fish and Wildlife (CDFW) with a property tour on July 11, 2023; however, this visit occurred outside the species' blooming period.

The 5-year review also include a total of 15 geo-referenceable herbarium specimens for the Nipomo Mesa lupine from the Consortium of California Herbaria (CCH2) Data Portal (**see Figure A1-2**). The CCH2 herbarium specimens were not considered occurrences, however, they were

included in the status review for completeness, and to help characterize the historical and current range of the species. Most of these CCH2 data overlap with the CNDDb occurrence data and are within the FWS range.

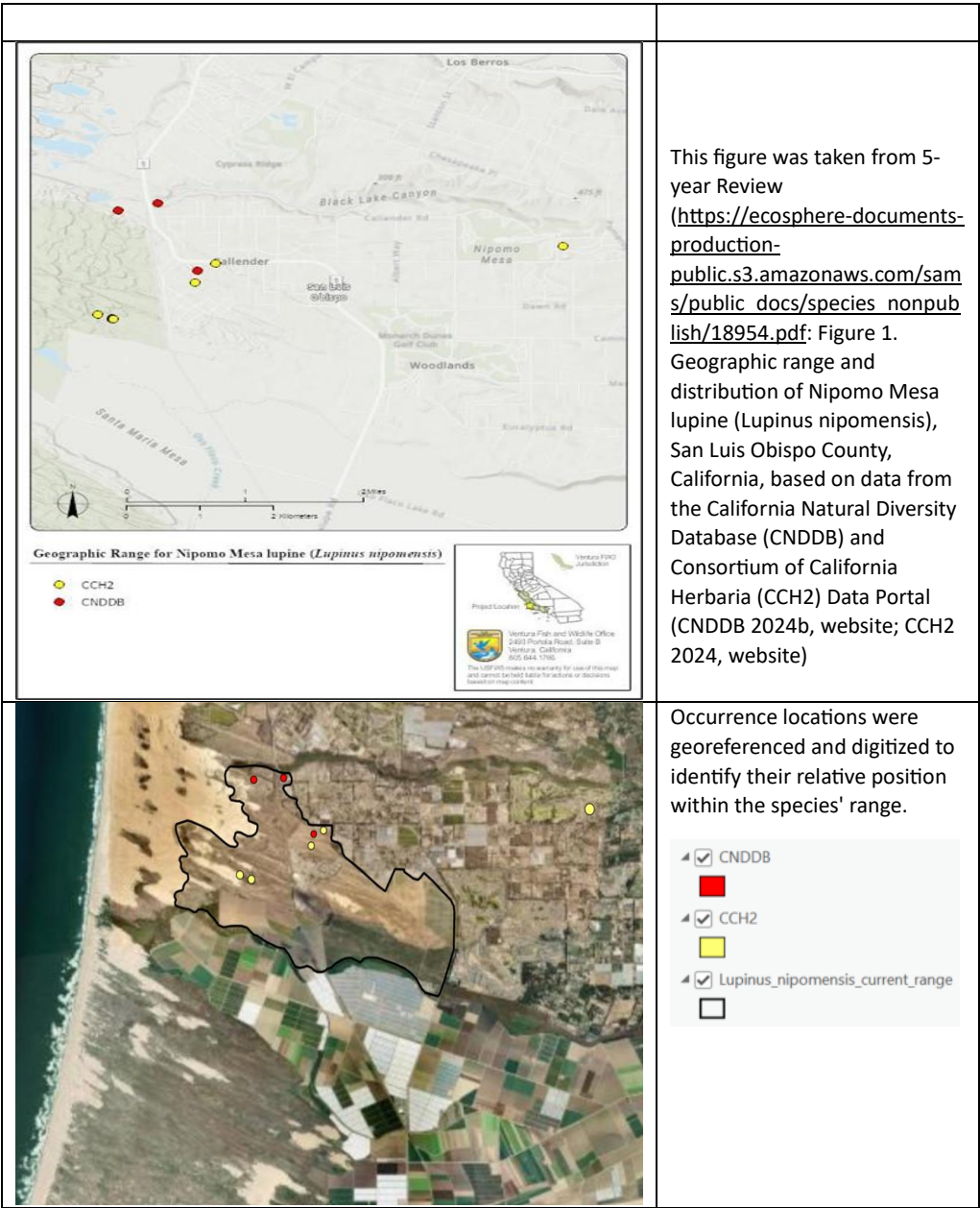


Figure A1-2. Known location information taken and reproduced from FWS’s 5-year and species range map representing areas where species believed to occur.

2. Known locations described in FWS’ Recovery Plan 2021 (Figures A1-3)

The Nipomo Mesa lupine is a small, annual species in the Fabaceae (legume; pea and bean) family, restricted to stabilized coastal dune scrub habitat associated with the Nipomo Mesa in

southwestern San Luis Obispo County, California. The species' current geographic range is limited to an area of approximately 5.2 square kilometers (two square miles). This range is situated behind the Callender Dune sheet, one of three dune formations that make up the Guadalupe-Nipomo Dunes Complex.

The species is represented by a single population, currently recognized as three distinct occurrences in the California Natural Diversity Database (CNDDDB; CDFW 2019). For this assessment, the definition of an occurrence follows the California Department of Fish and Wildlife (CDFW): populations, individuals, or colonies separated from other conspecifics by at least 0.40 kilometers (0.25 mile). Of the three occurrences, two are considered extant (Occurrences 1 and 2). Occurrence 2, the smaller of the two, was re-established through experimental outplanting efforts. The third occurrence is considered extirpated. The location and distribution of the population are shown in **Figure A1-3**.

3. Known locations described in FWS' Species Report 2020 (Figure A1-4)

Known species locations documented in the FWS Species Report (2020) are consistent with more recent observations, with three occurrences identified (see **Figure A1-4**).

Occurrence 1 is located on the privately owned, 1,780-acre Santa Maria Oil Refinery, which is owned and operated by the Phillips 66 Company.

Occurrence 2 corresponds to Occurrence 10 in the California Natural Diversity Database (CNDDDB; CDFW 2019, website). This site represents the result of successful outplanting efforts and experimental work conducted by the Land Conservancy of San Luis Obispo County (LC-SLO) and the Cheadle Center for Biodiversity and Ecological Restoration (CCBER), in collaboration with the Ventura Fish and Wildlife Office (VFWO). The outplanted colony is located on a 160-acre site owned and managed by LC-SLO for conservation purposes, specifically to support local wildlife and rare, endemic plant species.

Occurrence 3 is considered extirpated due to uncertainty surrounding the accuracy of the original mapped location. Despite numerous botanical surveys conducted in the area, the species has not been detected (CDFW 2019, website). Recent surveys have also failed to locate any Nipomo Mesa lupine individuals at this site. The area is currently dominated by mature mock heather shrubs and is relatively overgrown. LC-SLO has recently acquired 55 acres of coastal dune scrub habitat encompassing the mapped area for Occurrence 3 and plans to undertake restoration and outplanting efforts for the Nipomo Mesa lupine at this location.

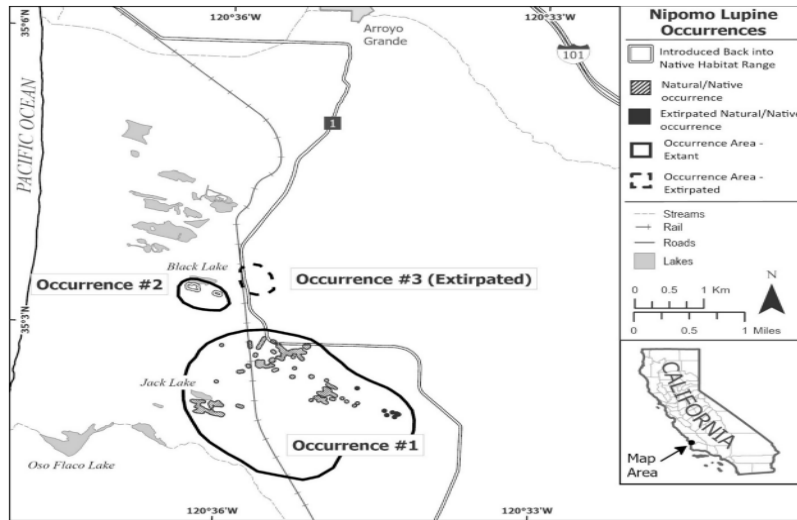


Figure A1-3. Nipomo Mesa lupine occurrences described in FWS' Recovery Plan 2021.
 (A figure obtained from Recovery plan document
https://ecos.fws.gov/docs/recovery_plan/Nipomo%20Lupine%20Recovery%20Plan.pdf:
 Figure 1 The location and distribution of the Nipomo Mesa lupine population)

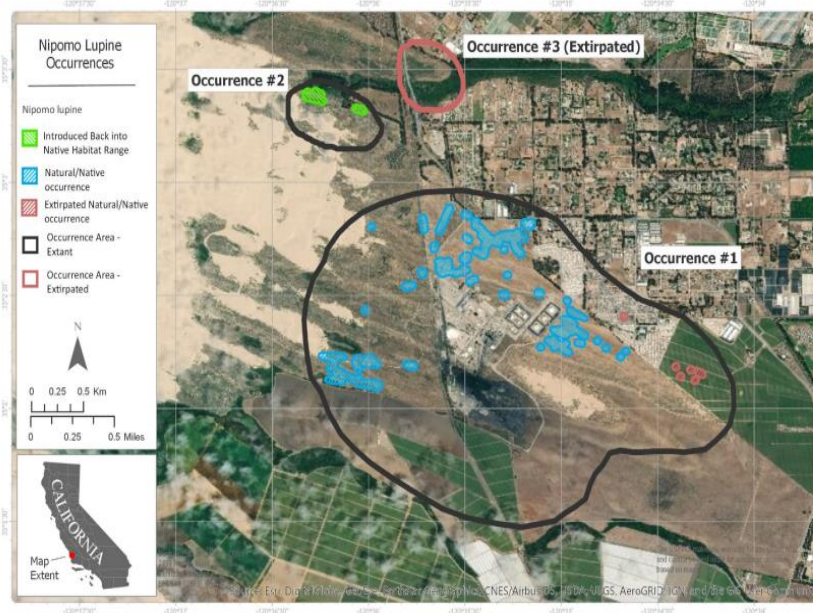


Figure A1-4 . A map showing occurrences of the Nipomo Mesa lupine.
 (This map was taken from Species Report for Recovery plan document
https://ecos.fws.gov/docs/recovery_plan/Nipomo%20lupine%20Species%20Report_1.pdf
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4. Occurrence Data in iNaturalist

There are 16-research grade iNaturalist occurrences that correspond to known populations and range maps in FWS recovery documents for this species (**Figure A1-5**). The dates of these observations ranged from March 2019 to April 2024. Data are found in this link (https://www.inaturalist.org/observations?quality_grade=research&subview=map&taxon_id=77879).

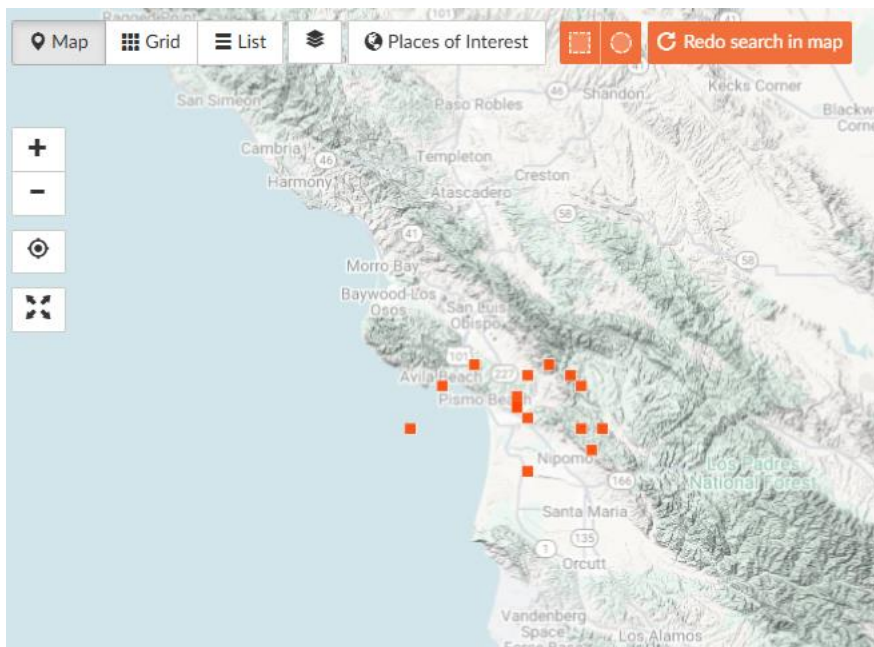


Figure A1-5. Nipomo Mesa Lupine known locations available from iNaturalist.

5. Occurrence data in GBIF

Known observations of the Nipomo Mesa lupine from the GBIF were obtained from the publicly available website (https://www.gbif.org/occurrence/map?taxon_key=2963855). These GBIF records closely align with known locations and range maps provided by FWS and iNaturalist (**Figure A1-6**). One observation located south of the primary cluster originates from a vascular plant collection held by the University of California, Santa Barbara Herbarium. This particular record appears to represent a preserved specimen rather than a field observation or verified occurrence.

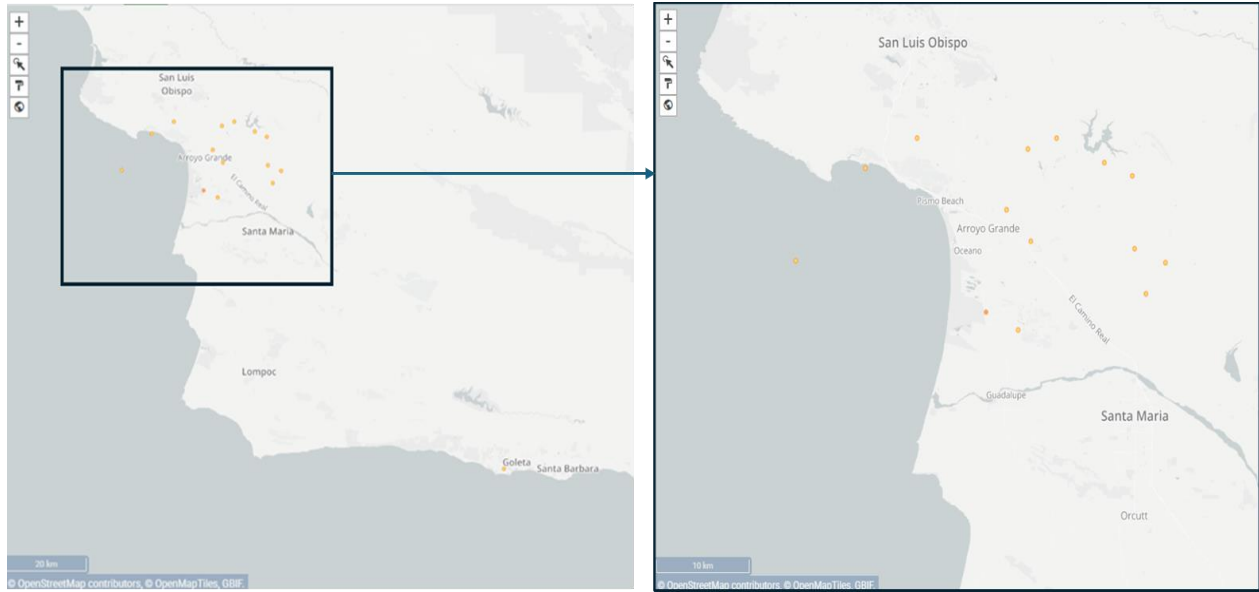


Figure A1-6. Nipomo Mesa Lupine known locations available from GBIF (reviewed March 3, 2025) (available at https://www.gbif.org/occurrence/map?taxon_key=2963855) .

6.Element Occurrence data from NatureServe

Element Occurrence (EO) data for the Nipomo Mesa lupine from the NatureServe database were reviewed (www.natureserve.org). The EOs did not support expanding the core map beyond the species range.