

Interim Core Map Documentation for Jesup's Milk-Vetch

Version 1

Review Completed: December 2024

Core Map Developer: EPA's Office of Pesticide Programs (OPP)

Species Summary

The Jesup's milk-vetch (*Astragalus robbinsii* var. *jesupii*; Entity ID #642) is an endangered terrestrial plant (dicot). There is no designated critical habitat for this species. This species inhabits bedrock outcrops of chlorite or phyllite schist that are periodically scoured by flooding and ice-rafting along the banks of the Connecticut River in Vermont and New Hampshire. Jesup's milk vetch flowers in late May - early June and may be pollinated by insects or self-fertilized. Additional information is provided in **Appendix 1**. This species is currently included in the Herbicide Strategy.

Description of Core Map

The core map for the Jesup's milk-vetch is based on species range, which includes two distinct segments along the Connecticut River between New Hampshire and Vermont. The species range is highly refined and represents areas important for this species' conservation. There are only four known populations of this species, and they are all located within the range. There is no designated critical habitat. **Figure 1** depicts the interim core map for the Jesup's milk-vetch. The core map represents approximately 4,600 acres spread out along the banks of the Connecticut River in Vermont and New Hampshire.

Jesup's milk-vetch plants occupy a narrow band between a lower bound determined by typical water levels during the growing season and an upper bound defined by the deep shade of long-lived woody vegetation that is at a high enough elevation to survive the occasional severe scouring by ice. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly shrub, herbaceous wetland, and grassland/herbaceous, which are generally consistent with the habitat of this species.

The core map developed for the Jesup's milk-vetch is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Jesup's milk-vetch. 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. There is confidence in the core map because the species' range is highly refined, represents areas important for this species' conservation, and contains all four known populations of this species. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

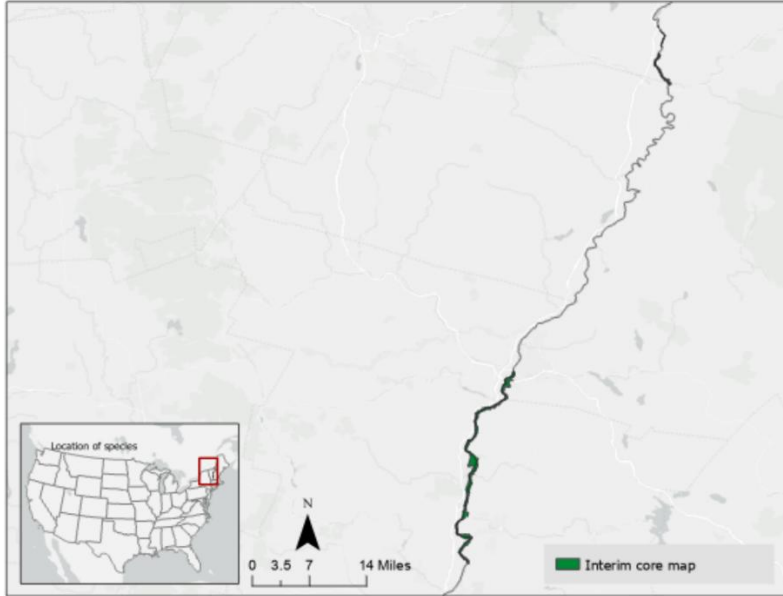


Figure 1. Interim core map for the Jesup's milk-vetch. The total acreage of the interim core map is approximately 4,600 acres.

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
Forestry	Deciduous Forest (41)	5
Forestry	Evergreen Forest (42)	6
Forestry	Mixed Forest (43)	3
Agriculture	Pasture/Hay (81)	9
Agriculture	Cultivated Crops (82)	8
Mosquito adulticide, residential	Open space, developed (21)	2
Mosquito adulticide, residential	Developed, Low intensity (22)	3
Mosquito adulticide, residential	Developed, Medium intensity (23)	3
Mosquito adulticide, residential	Developed, High intensity (24)	3
Invasive species control	Woody Wetlands (90)	5
Invasive species control	Emergent Herbaceous Wetlands (95)	2
Invasive species control	Open water (11)	49
Invasive species control	Grassland/herbaceous (71)	1
Invasive species control	Scrub/shrub (52)	0
Invasive species control	Barren land (rock/sand/clay; 31)	1
Total Acres	Interim Core Map Acres	~4,600

Evaluation of Known Location Information

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

- Descriptions of locations provided by FWS
- Occurrence locations included in iNaturalist
- Occurrence locations included in the Global Biodiversity Information Facility (GBIF)
- Occurrence locations included in NatureServe

EPA evaluated these four sets of data to inform or support the core map. FWS provided the most refined descriptions of the occurrence information and confirmed that all known locations of extant populations are located within the range.

- EPA queried iNaturalist, GBIF, and NatureServe. Collectively, the occurrence data are consistent with the FWS location data used to identify the core map.
- iNaturalist (available [here](#)) had 17 research grade observations for this species. Location data for these observations are consistent with the core map given the positional accuracy of the information.

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

- GBIF (available [here](#)) included no additional occurrences and human observations. Location data for these observations are consistent with the core map given the positional accuracy of the information.
- NatureServe (available [here](#)) included five occurrences that are consistent with other occurrence data. Location data for these observations were also consistent with the core map given the positional accuracy of the information.

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 Habitats²” (referred to as “the process”). This core map was developed by EPA 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
4. Document the core map

For step 1, EPA compiled available information for the Jesup’s milk-vetch from FWS, as well as observation information available from various publicly available sources (including iNaturalist, GBIF and NatureServe). The information compiled for the Jesup’s milk-vetch is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- The species range is highly refined, following the rivers where the species is known to occur.
- There are four known populations in FWS documentation, all of which are within the species’ range.
- Occurrence data from other sources are generally consistent with the species range location.

For step 2, EPA used the compiled information to identify the core map type. EPA compared known location data to the range and found that these known locations are consistent with the species range. Based on the narrow range that includes all occurrence data identified by FWS, EPA selected the range to use as the species core map. For step 3, EPA used the ECOS species range for the Jesup’s milk-vetch.

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

EPA did not explore approaches other than those described in this documentation.

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

1. Recent FWS Documents

- [Jesup's milk-vetch \(*Astragalus robbinsii* var. *jesupii*\) 5-Year Review 2021](#)
- [Determination of *Astragalus robbinsii* var. *jesupi* \(Jesup's milk-vetch\) to be End. Species; 52 FR 21481-21484 \(1987\)](#)
- [Jesup's milk-vetch Revised Recovery Plan \(2019\)](#)
- [Jesup's milk vetch 5-Year Review 2009](#)

2. Background information on Species

- **Status:** Federally listed as endangered in 1987
- **Taxonomy.** FWS plant group 9: dicot flowering plants that require outcrossing with biotic pollination vectors
- **Resiliency** - Medium
“For the Jesup’s milk-vetch, resiliency is measured by the median number of inflorescences produced per plant and a site-specific median number of plants computed over 8 consecutive years” (Recovery Plan 2019, 33).
See Known Locations section of this document for population counts.
- **Redundancy** - Low
“Generally, the greater the number of populations a species has distributed over a larger landscape, the better it can withstand catastrophic events. The Jesup’s milk-vetch is a naturally rare species, known to occur at only three locations within 16 mi (25 km) of each other on the Connecticut River. The species has never been found outside of the historically known range. To date, a single catastrophic event has not equally affected all three populations. For example, in 2011 Tropical Storm Irene decimated the two smaller populations (Sumner Falls and Hartland Ledges) but had a lesser impact on the larger Jarvis Hill population. However, the species’ current redundancy is considered to be tenuous at best” (Recovery Plan 2019, 33).
- **Representation** - Low
“The Jesup’s milk-vetch has an extremely limited distribution, reducing the likelihood of significant ecological diversity among the three populations and a low probability of consistent genetic exchange between populations since seed are not easily dispersed between the populations” (Recovery Plan 2019, 33).
- **Habitat Description**
“Jesup’s milk-vetch inhabits bedrock outcrops of chlorite or phyllite schist that are periodically scoured by flooding and ice-rafting along the banks of the Connecticut River in Vermont and New Hampshire (**Figure A1-1**). As such, these riparian ledges are sparsely vegetated... Jesup’s milk-vetch plants occupy a narrow band between a lower bound determined by typical water levels during the growing season and an upper bound defined by the deep shade of long-lived woody vegetation that is at a high enough elevation to survive the occasional severe scouring by ice” (5-Year Review 2021, 8).



Figure A1-1. Jesup’s milk-vetch habitat, bedrock outcrops of chlorite or phyllite schist that are periodically scoured by flooding and ice-rafting along the banks of the Connecticut River in Vermont and New Hampshire

- **Relevant Life History Information:**

“Jesup’s milk-vetch plants emerge in April (or as soon as ice cover and temperature permits), and bloom in early- to mid-May. Flowering times are variable year to year (Dunlop 1994). Dunlop (1994) observed that the plants closest to the water’s edge at all three sites are the last to flower, possibly reflecting longer periods of spring inundation or a cooling effect on the lower slope. Flowering generally lasts to early July, and seed set occurs from late June to mid-July (Brumback 2009). Most fruits have dehisced by early July. Some fruiting stems have typically withered by mid-August, but vegetative stems usually remain green until September or October (Brumback and Piantedosi 2018a). Seed germination is delayed until the following year (or later) (Brumback 2009). This latter group typically includes depauperate individuals that have not previously flowered or produced very sparse blooms” (Recovery Plan 2019, 13).

“The Jesup’s milk-vetch life cycle consists of seed germination and growth to seedling in year one; emerging as a small, generally nonflowering plant in year two, flowering and dying after flowering in year three” (Recovery Plan 2019, 14).

“Seed dispersal appears to be very local in general, and gene flow among the populations appears to be minimal” (Habitat and Ecology in the 2019 recovery plan, iv).

“Seed dispersal mechanisms are unknown for this species, although there is evidence that long distance dispersal is extremely unusual. Given the proximity of the populations to water, it is reasonable to expect that flooding, especially spring freshets, would play a role in transporting overwintering seeds among sites. However, seed dispersal may be naturally limited since mature seeds readily sink in water (Kane 2011a)” (Recovery Plan 2019, 14).

Seedlings are often observed directly down slope of plants known to have flowered the previous season, new plants have not been documented up- or downstream of areas immediately

adjacent to known sites, and no additional populations have been discovered despite extensive searches (Kane 2011a). However, plants have occasionally become naturally established at the upper elevations of the sites. (Recovery Plan 2019, 14).

Blooms in late May – early June

Pollinated by insects or self-fertilized

- **Ecology**

“Jesup’s milk-vetch occurs in the context of a riverbank ecosystem that is periodically subjected to flood- and ice-related scouring and silt deposition. This community type, ranked G2 (Globally imperiled), is classified as a Northern Riverside Rock Outcrop Community” (Recovery Plan 2019, 8).

- **Relevant Pesticide Use Sites**

No available information on pesticide use sites is included in FWS documents.

- **Threats**

“Immediate threats to the populations include encroachment of competing native and nonnative invasive vegetation, problems intrinsic to small populations subject to extreme demographic and environmental stochasticity, hydrological alterations as a result of hydropower management, and the potential effects of climate change on the natural river dynamics and the species’ life history. Herbivory and trampling (at one location) by recreational users of the Connecticut River are deemed to be lesser threats to the species” (Recovery Plan 2019, iv)

- **Reclassification Criteria**

A minimum of four persisting populations occurring within the historically known and/or expanded ranges that conserve the genetic diversity of the species.

A persisting population is defined as having a site-specific median number of total plants (excluding transplants) over five consecutive years (based on a minimum of one generation) as described below.

- Sumner Falls: A median of 113 natural plants
- Hartland Ledges: A median of 132 natural plants
- Jarvis Hill: A median of 477 natural plants

Expanded range populations:

- sites similar in area to the Sumner Falls population: a median of 100 plants, and
- sites similar in area to the Jarvis Hill population: a median of 400 plants.

- **Delisting Criteria**

A minimum of six resilient populations occurring within the historically known and/or expanded ranges that conserves the genetic diversity of the species.

A resilient population is defined as having a site-specific median number of plants and a median number of total inflorescences (excluding transplants) over 8 consecutive years (based on a minimum of three generations) as described below for extant populations:

Sumner Falls: A median of 113 natural plants and a median of 193 inflorescences;
Hartland Ledges: A median of 132 natural plants and a median of 507 inflorescences; 3. Jarvis Hill: A median of 477 natural plants and a median of 4337 inflorescences; ii. expanded range populations:

Sites similar in area to the Sumner Falls population: A median of 100 plants and a median of 193 inflorescences; and 2. sites similar in area to the Jarvis Hill population: a median of 400 plants and a median of 4,337 inflorescences.

- **Recovery Actions**

- Protect extant and introduced populations

- Establish additional populations

- Evaluate status of existing populations

- Manage habitat

- Bank seeds and perfect propagation and transplantation techniques (Recovery Plan 2019, vi)

3. Description of Species Range

“The community is restricted to calcareous or basic bedrock outcrops along ice-scoured upper reaches of major rivers such as the Connecticut River in NH and VT and the Kennebec River in Maine; it may also occur in Massachusetts, Connecticut, and New York. Individual occurrences tend to be small; there are probably fewer than 20 known occurrences distributed over 500 ac (202 ha) of this vegetation type range wide. Currently, 5 occurrences are documented in NH, with a total area of less than 20 ac (9 ha) (NatureServe 2018b). The extent of the community reported from VT, Maine, and New York remains to be confirmed.” (Recovery Plan 2019, 8)

“All populations are surveyed annually, and total number of plants and inflorescences are recorded. The Hartland Ledges and Sumner Falls populations are periodically augmented (reinforced) to maintain population stability. The conservation introduction on Bath-SI (NH) is no longer augmented (the last seedlings were planted in 2016) and is determined to be self-sustaining. Invasive plant species control is implemented at all indigenous populations (5-Year Review 2021, 7).”

Figure A1-2 depicts the FWS range map of the Jesup’s milk-vetch. This range was last updated 3/2/2022 and has an area of approximately 4,600 acres.

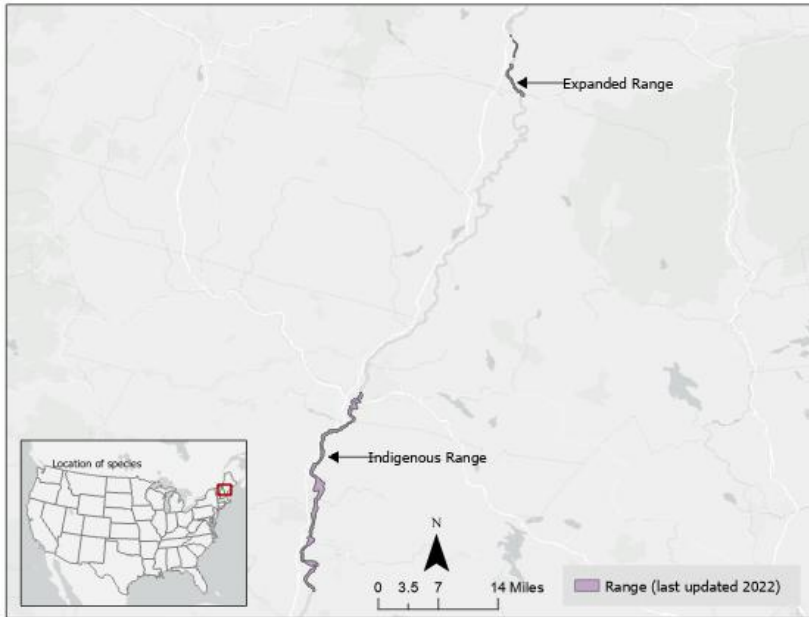


Figure A1-2. Map of the Jesup's milk-vetch range.

4. Critical Habitat

There is no designated critical habitat for this species.

5. Known Locations

- Occurrences Described in FWS Documents

“There are three known populations in the indigenous range: Jarvis Hill (NH), Hartland Ledges (VT), and Sumner Falls (NH) located within a 25-kilometer (16-mile) stretch of the Connecticut River, and one population in the expanded range in Bath-SI (NH) approximately 72 kilometers (45 miles) north of the Sumner Falls population (approximately 95 kilometers [59 river miles])” (5-Year Review 2021, 7).

Extant populations:

- Sumner Falls: a median of 113 natural plants and a median of 193 inflorescences
- Hartland Ledges: a median of 132 natural plants and a median of 507 inflorescences
- Jarvis Hill: a median of 477 natural plants and a median of 4,337 inflorescences

Expanded range populations (Bath-SI):

- sites similar in area to the Sumner Falls population: a median of 100 plants and a median of 193 inflorescences, and
- sites similar in area to the Jarvis Hill population: a median of 400 plants and a median of 4,337 inflorescences.” (5-Year Review 2021, 4)

- Occurrences Described in iNaturalist:

https://www.inaturalist.org/observations?place_id=any&subview=map&taxon_id=209194

 - iNaturalist includes 17 observations consistent with the indigenous range (all between Chester, NH, and Montcalm, NH)

- Occurrences Described in GBIF: <https://www.gbif.org/>
 - All observations listed are also included in iNaturalist
- Occurrences Described in NatureServe: <https://explorer.natureserve.org/pro/Welcome>
 - NatureServe has several documented locations consistent with the indigenous range (all between Chester, NH and Montcalm, NH)