Interim Core Map Documentation for the Showy Stickseed

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

Species Summary

The showy stickseed (*Hackelia venusta*; Entity ID #556) is an endangered terrestrial plant (dicot). The U.S. Fish and Wildlife Service (FWS) has not designated a critical habitat for the showy stickseed. This species is typically found growing on well-drained soils in open, unstable areas, with other vascular plants and low canopy cover. Showy Stickseed appears to be dependent upon the maintenance of open habitat. The species is predominantly outcrossing, relying on insects, such as bees, flies, possibly thrips and other small insects. The showy stickseed is endemic to the state of Washington and located in Chelan County, Central Washington, on Federal land. The pesticide use risk for the species is related to highway maintenance activities. The species core map is based on the biological information available and recent identified known locations. The certainty of the map is limited because of limited additions and no recent updates. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the showy stickseed is based on biological information available on FWS documentation (FWS 2007) and recently identified research grade known locations. The outer extent of this core habitat is defined by habitat suitability mapping based on the biological information and the known locations identified. There is no designated critical habitat for this species. The species is endemic, and its range is small (1 county) but not highly refined. One recent observation falls outside the FWS range. This point satisfies all the habitat requirements.

Figure 1 depicts the resulting interim core map for the showy stickseed. The size of this core map is approximately 180,060 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly evergreen forest, with some grassland/herbaceous and scrub/shrub areas. More highly managed lands, such as pasture/hay and open space/developed, and developed/low intensity, each make up about 1% of the total core map.

The core map developed for the showy stickseed is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the showy stickseed. 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 a "moderate" best professional judgment classification to describe major uncertainties/limitations. The map is based on known locations 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.

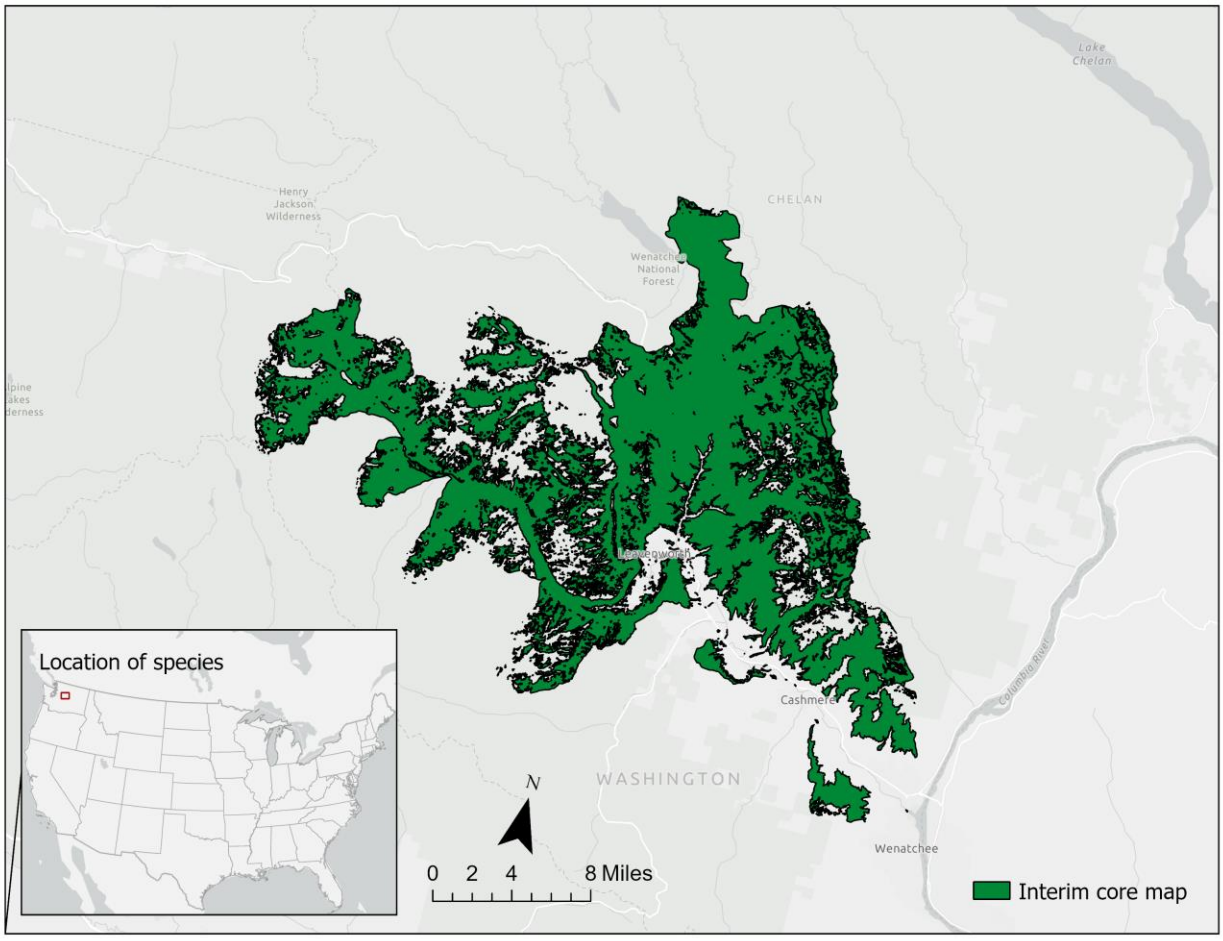

Figure 1. Interim core map for the showy stickseed.

Table 1. Percentage of Interim Core Map Represented by NLCD[1] 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	81
Forestry	Evergreen Forest (42)	80	81
Forestry	Mixed Forest (43)	0	81
Agriculture	Pasture/Hay (81)	1	1
Agriculture	Cultivated Crops (82)	0	1
Mosquito adulticide, residential	Open space, developed (21)	1	3
Mosquito adulticide, residential	Developed, Low intensity (22)	1	3
Mosquito adulticide, residential	Developed, Medium intensity (23)	0	3
Mosquito adulticide, residential	Developed, High intensity (24)	0	3
Invasive species control	Woody Wetlands (90)	1	16
Invasive species control	Emergent Herbaceous Wetlands (95)	0	16
Invasive species control	Open water (11)	1	16
Invasive species control	Grassland/herbaceous (71)	8	16
Invasive species control	Scrub/shrub (52)	7	16
Invasive species control	Barren land (rock/sand/clay; 31)	0	16
Total Acres	**Interim Core Map Acres**	**180,060**	

[1] Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, https://www.usgs.gov/data/national-land-cover-database-nlcd-2021-products

Evaluation of Known Location Information

There are four datasets with known location information:

- Descriptions of locations 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. The FWS sources describe all populations as within the originally identified Tumwater Canyon location but do not provide exact latitude/longitude coordinates. GBIF and iNaturalist provide the coordinates for the same seven occurrences (**Figure A1-2 in Appendix 1**). NatureServe displays the entire WA state for the distribution. Therefore, occurrences in iNaturalist, GBIF, and NatureServe did not support expanding the core map outside of Tumwater Canyon Botanical Area. **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"). 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 showy stickseed from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the showy stickseed is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Occurrences and known locations of showy stickseed are in one county in Washington State;
- The showy stickseed occurs where the elevation ranges from 472 to 823 m.; and
- The showy stickseed requires forest land cover; and
- The showy stickseed requires well drained soil.

For step 2, EPA used the compiled information to identify the core map type including species range, known occurrences, and habitat suitability information. The extant populations are located on well-drained soil in forest openings from 472 to 823 m elevation. Therefore, EPA based the core map on elevation, forest cover, and soil type. The entire range of the species was not used as the core map because the range contains areas where the species does not occur.

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

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 elevation data from USGS, land cover data from NLCD, and soil data from SSURGO. **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

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

Appendix 1. Information Compiled for the Showy Stickseed During Step 1

1. **Recent FWS documents/links and other data sources**
   - FWS, Five Year Review (2020): https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3202.pdf
   - FWS, Amended Recovery Plan (2019): https://ecos.fws.gov/docs/recovery_plan/Hackelia_venusta_Final_Recovery_Plan_Amendment_20190820.pdf
   - FWS, Recovery Plan (2007): https://ecos.fws.gov/docs/recovery_plan/071212.pdf
   - SSA: N/A
   - Critical Habitat: N/A

2. **Background information**
   - **Status**: Federally listed as endangered in 2002
   - **Resiliency, redundancy, and representation** (the 3Rs)

     Resiliency: Low
     - "Reproductive vigor may be depressed because of the species' small population size, a limited gene pool, and loss of pollinators. A single natural or human-caused environmental disturbance could destroy a significant percentage of the population or the entire population, leading to the extinction of the species" (FWS 2007).
     - "[El Nino/Southern Oscillation and Pacific Decadal Oscillation]…could impact the stability of rare species with extremely limited ranges and habitat requirements such as *H. venusta"* (FWS 2019).

     Redundancy: Low
     - "The species occurs in a single population that occurs primarily on Federal land" (FWS 2007).

     Representation: Low
     - Requires an early successional habitat of unstable granitic sand or rocky slopes (FWS 2007).
     - Known life history characteristics of *H. venusta*: outcrossing, herbaceous, low fecundity, low survivorship, ruderal successional status, no known ramet production, and unknown seed duration (FWS 2019).

   - **Habitat**
     - "*Hackelia venusta* is restricted to 1 small population of roughly 600 plants scattered over approximately 16 hectares (40 acres) of unstable, granitic sand and granite cliffs on the middle and lower slopes of Tumwater Canyon, Chelan County, Washington. Clusters of plants are concentrated in open, unstable areas of granitic sand and talus, and on ledges and cracks of vertical granite cliffs. The feature common to the variety of habitats where the species is found is the relatively sparse cover of other vascular plants and low canopy cover. The species appears to be dependent upon the maintenance of open habitat" (FWS 2007).

- **Pollinator/reproduction**
    - Flowering timing is not described in FWS documentation.
    - Outcrossing is the primary mechanism of pollination, with the possibility of geitonogamous/autogamous selfing (FWS 2007).
    - On a field site, 2 bees (*Andrena nigrocaerulea* and *Protosmia rubifloris*) and one fly were verified pollinators (FWS 2007).
    - Thrips have been observed on H. venusta where they breed inside parts of the corolla and commonly pollinate plants (FWS 2007).

- **Taxonomy**
    - Terrestrial Plant
    - *Hackelia venusta* (Piper) St. John
    - Plantae Anthophyta Dicotyledonae Lamiales Boraginaceae Hackelia

- **Relevant Pesticide Use Sites**
    - Highway Rights of Way
        - "Highway maintenance activities also threaten portions of the population" (FWS 2007).
            - "To reduce the threat of nonnative weeds to *Hackelia venusta*, the Wenatchee River Ranger District staff, Wenatchee National Forest, have both removed weeds by hand and carefully applied herbicides to weeds near *H. venusta* habitat...emphasizing treatment to the habitat directly adjacent to the State highway where invasive species tend to become established and then spread into the remainder of the population" (FWS 2007).
        - "Implement BMPs from the WSDOT rare plant management plan for application of de-icer and herbicide application near *H. venusta"* (FWS 2019).

- **Recovery Criteria/Objectives (Amended Recovery Plan 2019)**
    - Criterion A/1: The primary threats are removed or adequately managed in all five populations counted toward recovery in delisting criteria (see also Criterion E/1).
    - Criterion B/1: Threats to the species through visitation should be removed.
    - Factor C: Disease or Predation: In order to ensure the long-term recovery needs of *H. venusta*, threats to the species through predation by the biocontrol agent, *Mogulones crucifer* (formerly known as *Mogulones cruciger*), should be removed. This will have been accomplished if the two recovery criteria for downlisting under Factor C have been met (FWS 2007). Additional delisting recovery criteria beyond those for downlisting will not be required under Factor C.
    - Factor D: Inadequacy of Existing Regulatory Mechanisms: The inadequacy of existing regulatory mechanisms beyond those addressed by the three recovery criteria for downlisting under Factor D (FWS 2007) or by the MOUs (or other agreements) to manage habitat threats addressed above under Factor A (see also Criterion A/1) is not known to hinder the recovery of *Hackelia venusta* at this time. Therefore, no additional delisting criteria have been developed for this factor.
    - Factor E: Other Natural or Manmade Factors Affecting Its Continued Existence
        - Criterion E/1: There are at least five stable, self-sustaining populations typically separated by 1.5 miles (W Fertig pers. comm., April 20, 2018; NatureServe 2018)

or by a geographical barrier such as the Wenatchee River on protected sites where protection of the species is a priority.

- Criterion E/2: To be deemed stable and self-sustaining, a population should maintain a 20- year running average of at least 2,000 adult plants, show evidence of positive or neutral population growth over the same 20-year period, and be sustained through natural regeneration.

3. Description of Species Range

- "The species occurs in a single population that occurs primarily on Federal land" (FWS 2009).
- "…approximately 16 hectares (40 acres) of unstable, granitic sand and granite cliffs on the middle and lower slopes of Tumwater Canyon, Chelan County, Washington" (FWS 2009).
- As of 2019, "the only known population is in Tumwater Canyon where it was originally discovered" (FWS 2019).
- **Figure A1-1** depicts the FWS range. The range was last updated on Nov. 8, 2021. The total acreage of the range is around 284,494 acres.

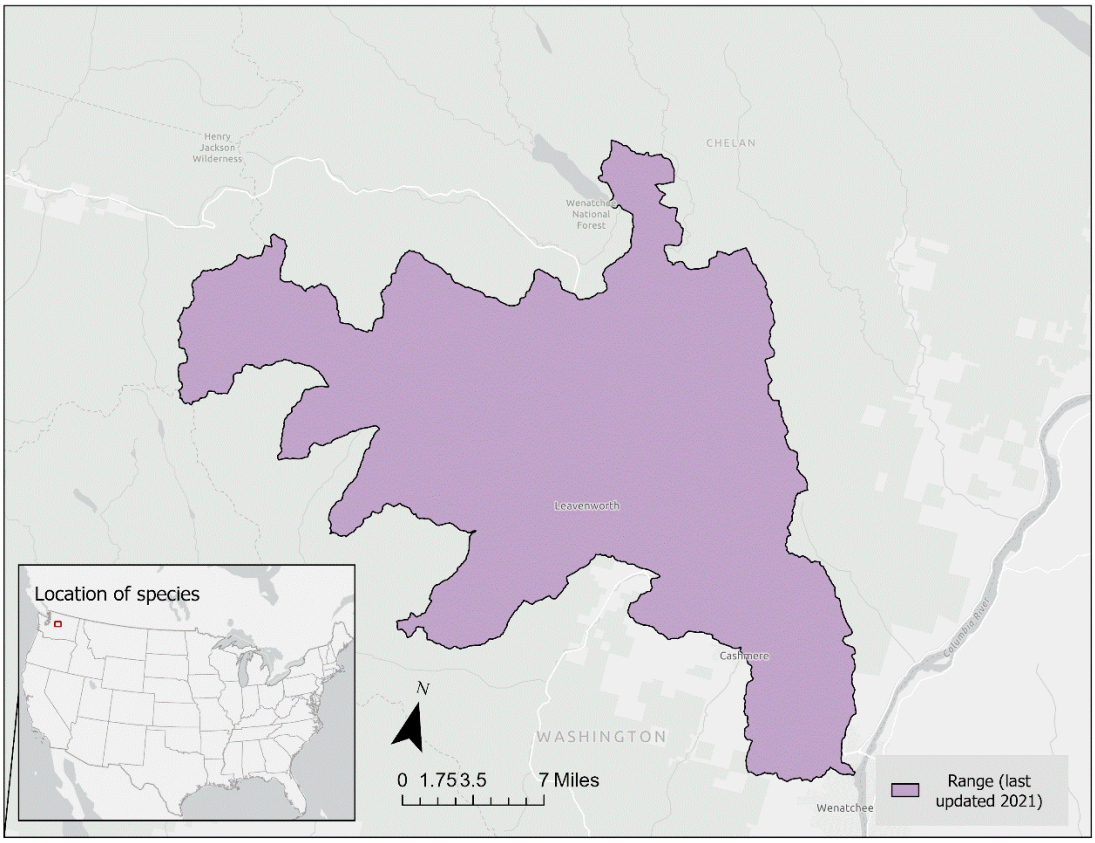

Figure A1-1. FWS range for the showy stickseed. The total acreage of the range is around 284,494 acres.

4. Critical Habitat

- FWS has not designated a critical habitat for this species (https://ecos.fws.gov/ecp/species/5210)

5. **Occurrences included in Public Databases**
   - EPA queried iNaturalist, GBIF, and NatureServe.
   - Collectively, the occurrence data are consistent with the habitat information used to identify the core map.

Occurrences in iNaturalist

- Searched on April 21, 2005.
- **Table A1-1** and **Figure A1-2** depict the currently known locations from iNaturalist.

Table A1-1. Observations of the showy stickseed (iNaturalist).

ID	Date Observed	Place Guess	Latitude	Longitude
25928645	5/16/2019			
79832050	5/21/2021			
117725336	5/18/2022	Chelan County, US-WA, US	47.71342	-120.711
117794603	5/19/2022	Chelan County, US-WA, US	47.78907	-120.617
163002635	5/18/2023	Chelan County, US-WA, US	47.66738	-120.639
221253955	6/7/2024	Tumwater Canyon, Chelan County, WA, USA	47.62973	-120.727

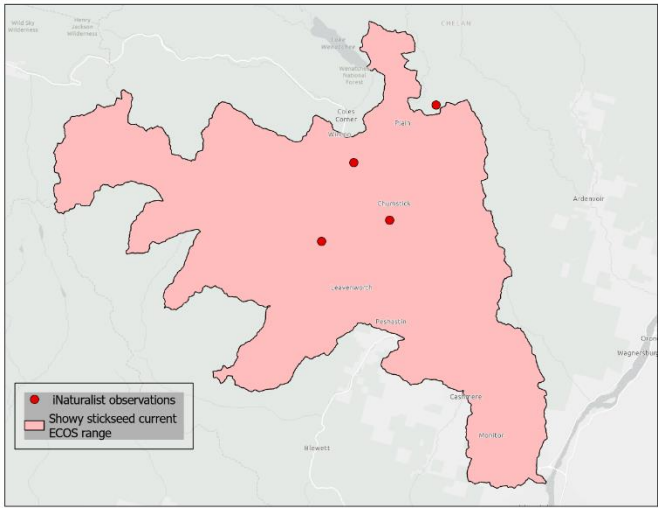

Figure A1-2. Known location information from iNaturalist (red dots). Current ECOS species range (red shading) shown for comparison.

Occurrences in GBIF

- Searched on Aug. 11, 2024 (https://doi.org/10.15468/dl.yupc9f)
- Same locations as iNaturalist (**Figure A1-2**)

Occurrences in NatureServe

- Searched on April 21, 2025
- NatureServe displays entire WA state for the distribution (https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.128463/Hackelia_venusta). Additional comments say that the population of *Hackelia venusta* occurs on Federal land owned by the U.S. Forest Service and Washington State Dept. of

Transportation and is protected within the Tumwater Canyon Botanical Area. *Hackelia venusta* occurs in the western United States where it is endemic to Chelan County, Washington along the Tumwater Canyon of the Wenatchee River (**Figure A1-3**).

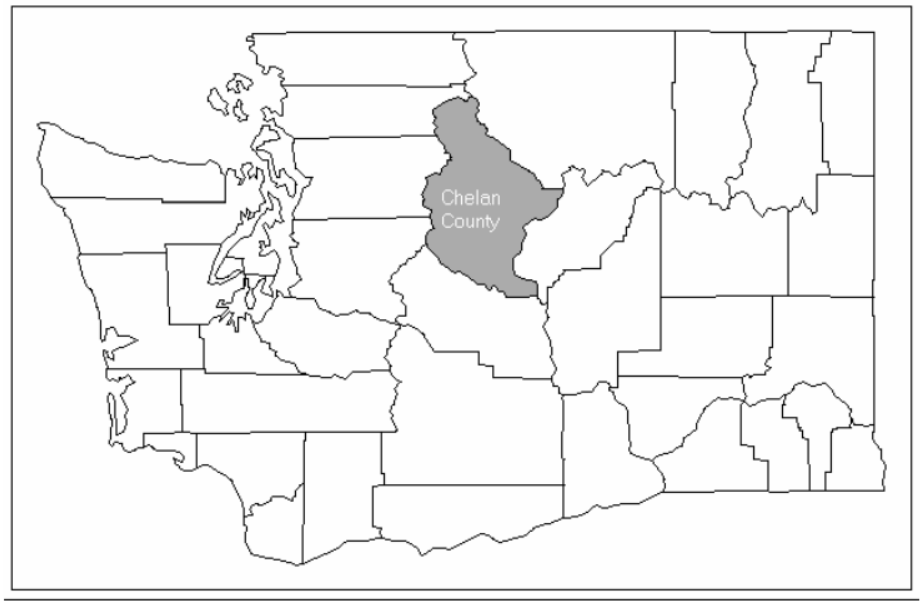

Figure 1. Location of Chelan County in the State of Washington.

Figure A1-3. Known location information from FWS (FWS 2007).

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

This core map was created based on biological information, including occupied location and species habitat. Based on NatureServe and FWS recovery plan (FWS 2007) *Hackelia venusta* grows in sparsely vegetated openings within ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) forests on loose, well-drained, granitic rocky or sandy soils. It is found on unstable talus slopes, and ledges or cracks on cliff faces at lower elevations (472-823 meters) (FWS 2007). The habitat area was identified where the elevation ranges from 472 to 823 m, has forest land cover and well-drained soil.

Dataset References and Software

- **ArcGIS Pro**
  - Software used: ArcGIS Pro 3.4.2

- **FWS Species Range**
  - From ECOS (https://ecos.fws.gov/ecp/species/5210)
  - Last updated on 11/8/2021

- **Elevation**
  - Elevation was downloaded from USGS's National Map Download Application (https://apps.nationalmap.gov/downloader/). The elevation ranges from 472 to 823 m were selected.

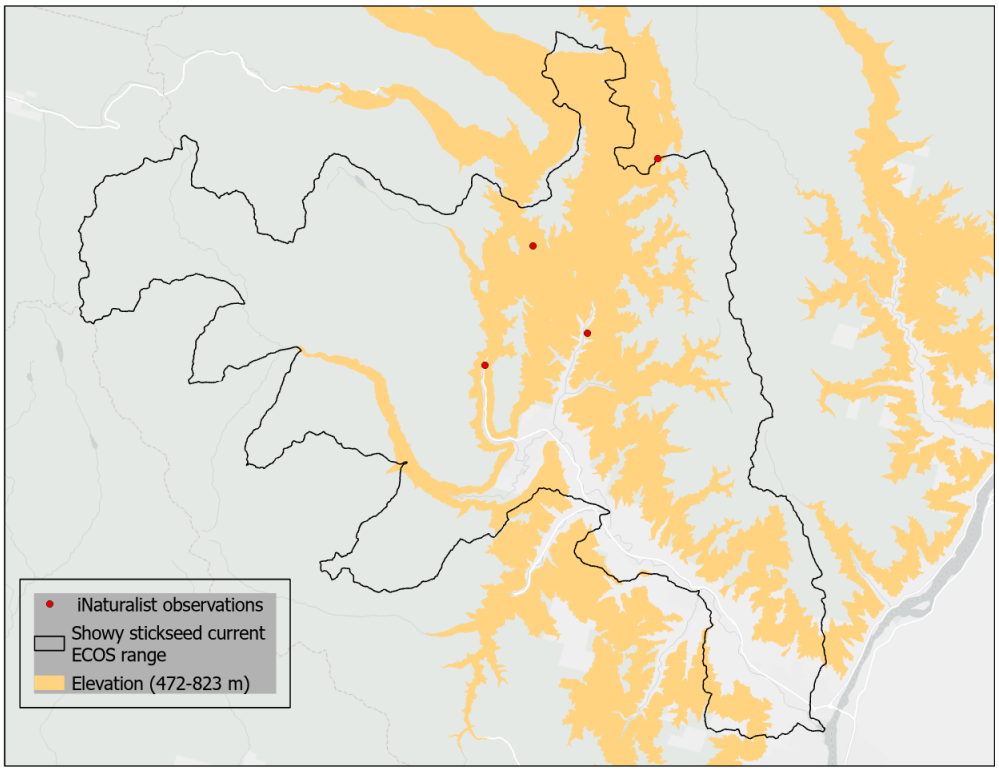

Figure A2-1. Preferred elevation (472-823 m) within the range of the showy stickseed.

- **Landcover**

- Forest areas were selected from NLCD 2021 (https://www.usgs.gov/data/national-land-cover-database-nlcd-2021-products).

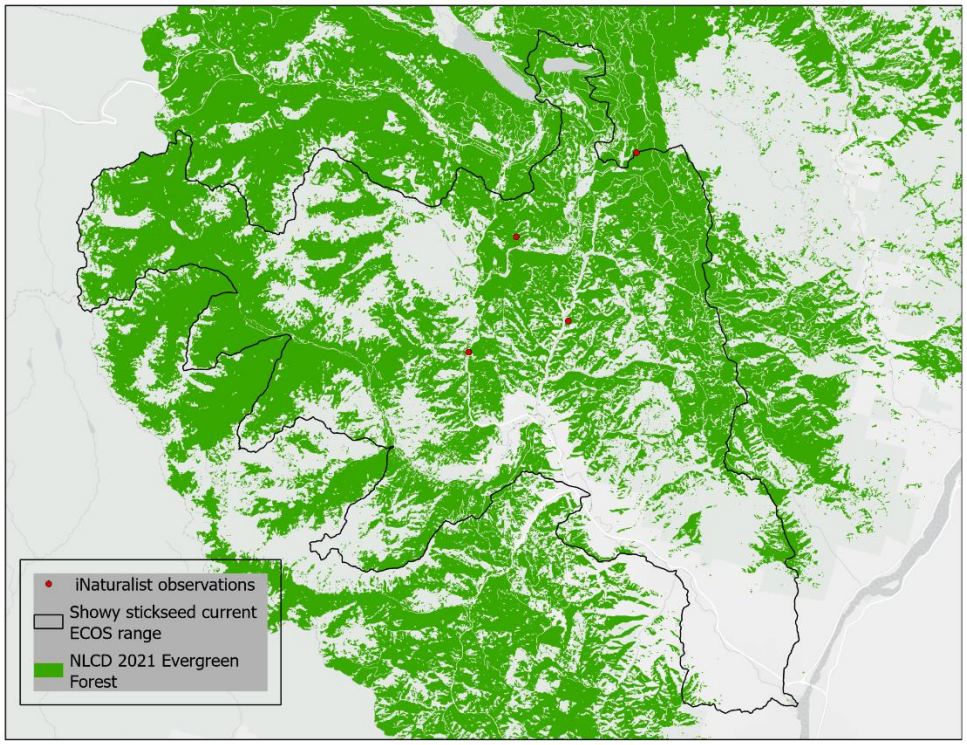

Figure A2-2. Forested areas within the range of the showy stickseed.

- **Soil**
  - The well drained area was identified using SSURGO data available through ArcGIS Online.

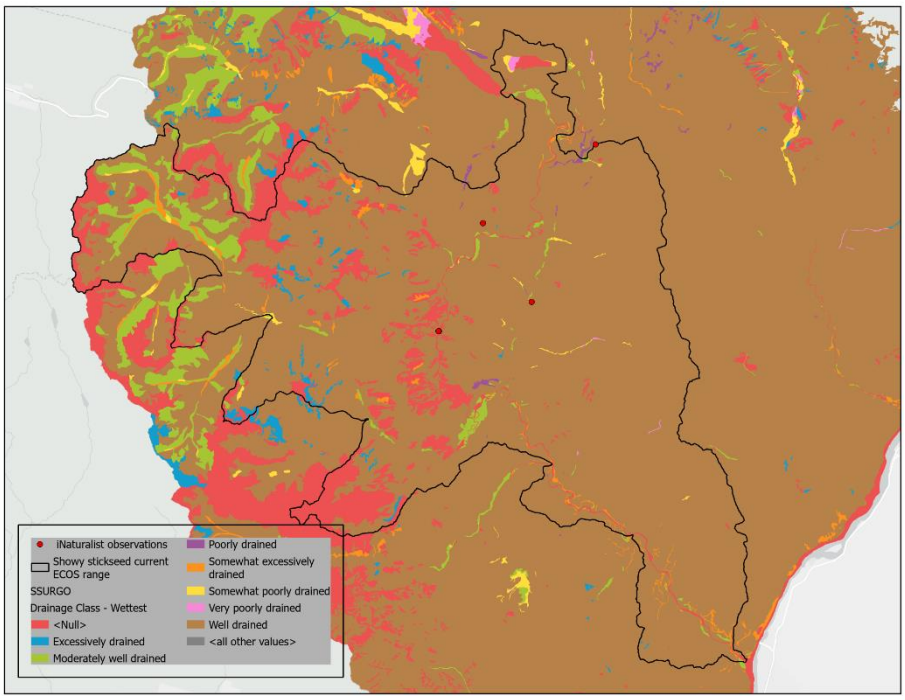

Figure A2-3. Areas within showy stickseed range with well-drained soil.

- The area under elevation criteria, soil, and landcover was identified by merging all the layers. Since most of the area is well drained and as there is much missing soil information, the entire range was considered as well drained area.

- One iNaturalist occurrence was outside the FWS current range. This point is closer to (around 120 m) a FWS owned federal land. Since all the conditions (elevation, soil, and land cover) were satisfied at that location, the current range was slightly modified to include that occurrence and a nearby federal land parcel.

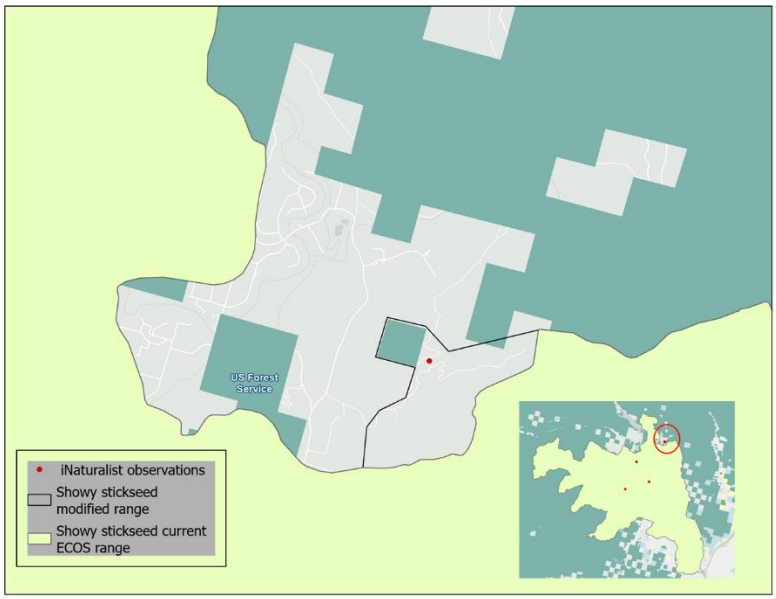

Figure A2-4. iNaturalist occurrence outside of the species range. The range was modified to encompass it in the final core map.