Interim Core Map Documentation for the Hartweg's Golden Sunburst

Date Uploaded to EPA's GeoPlatform: August 2025

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

Species Summary

The Hartweg's golden sunburst (*Pseudobahia bahiifolia,* Entity ID 599) is an endangered terrestrial plant (dicot). The U.S. Fish and Wildlife Service (FWS) has not designated a critical habitat for the Hartweg's Golden Sunburst. The known occurrences of the Hartweg's golden sunburst are concentrated in the eastern San Joaquin Valley in Stanislaus, Madera, Merced, and Fresno Counties. Extant occurrences are found at elevations ranging from 90–140 meters (295–460 feet). The Hartweg's golden sunburst occurs almost entirely in non-native grasslands within specific soil types largely derived from the Valley Springs formation. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the Hartweg's golden sunburst is based on biological information. The outer extent of this core map is defined by the species range, which was last updated in 2015. EPA refined the core map by removing areas where the species has been extirpated including relevant elevation requirements for the species (see Appendix 1).

Figure 1 depicts the resulting interim core map for the Hartweg's golden sunburst. The size of this core map is approximately 115,500 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly grassland/herbaceous areas.

The core map developed for the Hartweg's Golden Sunburst is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Hartweg's Golden Sunburst. 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 "limited" best professional judgment classification to describe uncertainties/limitations inherent in modifying the FWS range to include a particular elevation. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

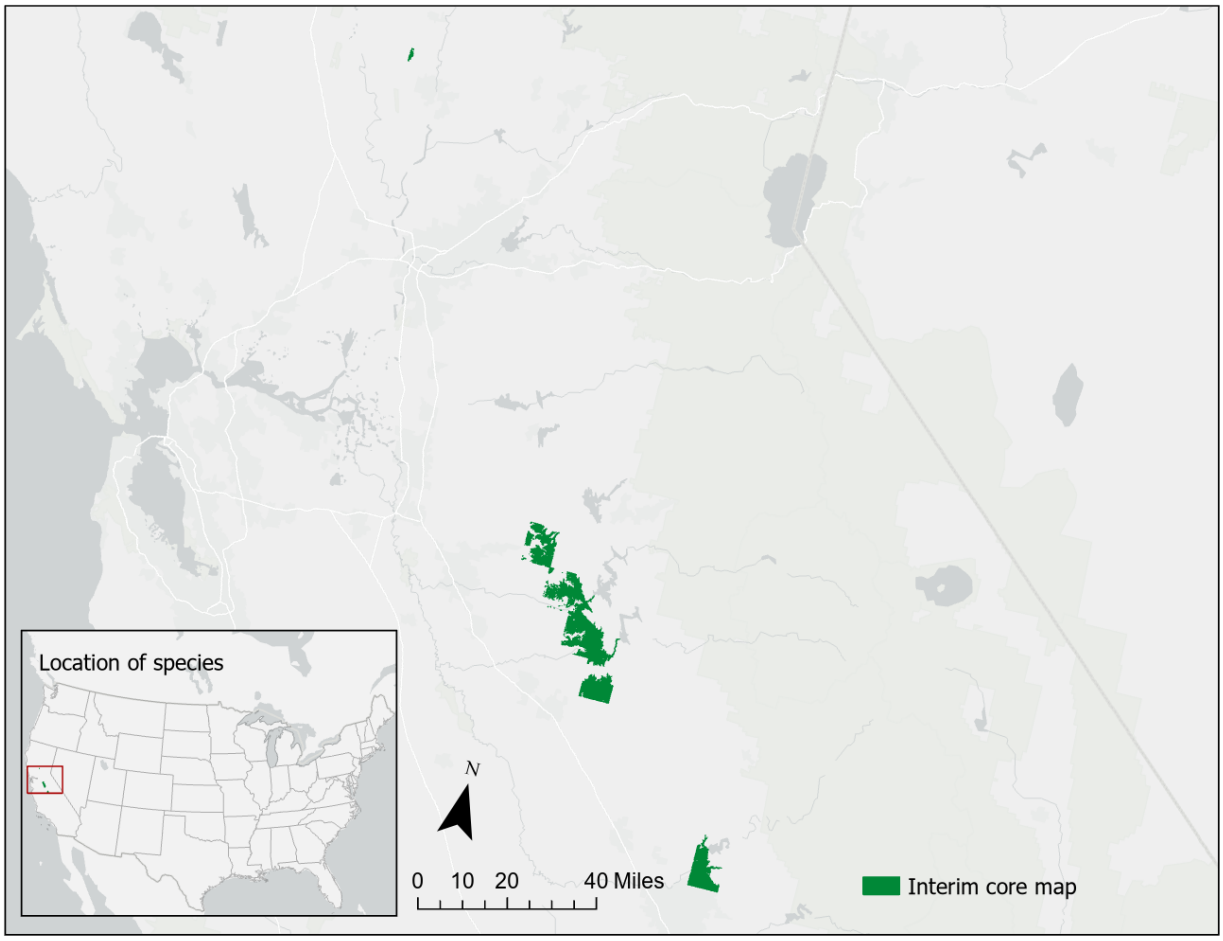

Figure 1. Interim core map for the Hartweg's golden sunburst.

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	0
Forestry	Evergreen Forest (42)	0	0
Forestry	Mixed Forest (43)	0	0
Agriculture	Pasture/Hay (81)	1	5
Agriculture	Cultivated Crops (82)	4	5
Mosquito adulticide, residential	Open space, developed (21)	2	2
Mosquito adulticide, residential	Developed, Low intensity (22)	0	2
Mosquito adulticide, residential	Developed, Medium intensity (23)	0	2
Mosquito adulticide, residential	Developed, High intensity (24)	0	2
Invasive species control	Woody Wetlands (90)	1	92
Invasive species control	Emergent Herbaceous Wetlands (95)	0	92
Invasive species control	Open water (11)	1	92
Invasive species control	Grassland/herbaceous (71)	88	92
Invasive species control	Scrub/shrub (52)	3	92
Invasive species control	Barren land (rock/sand/clay; 31)	0	92
Total Acres	**Interim Core Map Acres**	**~ 116,000**	

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).

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

EPA evaluated these four sets of data before selecting the type of and developing the core map. FWS appeared to have the finest resolution of the location information, providing a map that depicted the current known locations within Stanislaus, Madera, Merced, and Fresno Counties (**Figure A1-2 in Appendix 1**). Occurrences in iNaturalist, GBIF, and NatureServe did not support expanding the core map outside of the refined 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"[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 Hartweg's golden sunburst from FWS, as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for the Hartweg's golden sunburst is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- Occurrences and known locations of the Hartweg's golden sunburst are limited to 4 counties in the eastern San Joaquin Valley; and
- FWS documents indicate that extant populations have been observed only between elevations of 90 and 140 m.

For step 2, EPA used the compiled information to identify the core map type including species range and known location information. Recent FWS documents indicate that extant populations of the species are located in regions of the eastern San Joaquin Valley within the species' range. Therefore, EPA based the outer extent of the core map on the species range. EPA further refined this area by removing areas with elevations below 90 m and above 140 m. The entire range of the species was not used as the core map because the range contains areas where the species does not occur.

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 FWS range as a starting point. EPA used the "USGS 3DEP elevation – 30 m" data to obtain ground surface elevation values for refinement. **Appendix 2** provides more details on the GIS analysis and data used to generate the core map.

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

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

EPA explored using GIS datasets that describe the species' habitat to further refine the core map (in addition to removing areas with elevation outside of the 90 – 140 m range). However, this approach was not used because while the most recent 5-year review describes certain common characteristics of the Hartweg's golden sunburst's habitat (e.g. mima mounds), it also describes extant populations in areas without these characteristics.

Appendix 1. Information Compiled for the Hartweg's golden sunburst During Step 1

1. **Recent FWS documents/links and other data sources**
   - Five Year Review (2023) (https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/8922.pdf)
   - Five Year Review (2008) (https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1205.pdf)

2. **Background information**
   - **Status**: Federally listed as endangered in 1997
   - **Resiliency, redundancy, and representation** (the 3Rs)
     - There is no species status assessment prepared by FWS. However, in the conclusion of their last 5-year review, FWS stated that "[…] the species has small population sizes that fluctuate greatly due to precipitation levels with relatively few occurrences growing in very specific micro-environments. Furthermore, the current status of many of these occurrences is unknown as they are not regularly monitored, and threats such as development and climate change are increasing throughout the species' range."
   - **Habitat**
     - Extant occurances are found at elevations between 90-140 meters (295-460 feet).
     - The soils are usually thin and are derived from the Valley Springs formation.
     - Non-native grasslands where grass cover is minimal on the upper slopes.
     - The majority occur on the north/northeast-facing slopes of mima mounds (small hillocks a few feet in height that are formed in dense concentrations). Non-mima mount occurrences are found in similar microhabitat.
   - **Pollinator/reproduction**
     - Timing of flowering not described in FWS documentation
   - **Taxonomy**
     - Terrestrial plant in the sunflower family, *Asteraceae*. Genus is *pseudobahia*.
   - **Relevant Pesticide Use Sites**
     - No specific pesticide use sites are described in the available FWS documentation.
   - **Recovery Criteria/Objectives**
     - No published recovery plan is currently available for the Hartweg's golden sunburst.

3. **Description of Species Range**
   - **Figure A1-1** depicted the FWS range. The range was last updated on May 26, 2015. The species range covers an area of around 450,000 acres.

Figure A1-1. FWS range for the Hartweg's golden sunburst. Total area of range is approximately 452,000 acres.

4. **Critical Habitat**
    - FWS has not designated a critical habitat for this species. (https://ecos.fws.gov/ecp/species/1704)

5. **Known Locations**
    - Known locations described in FWS:
        - Extant populations of the Hartweg's golden sunburst are concentrated in the eastern San Joaquin Valley in Stanislaus, Madera, Merced, and Fresno Counties. (5-year review, 2023)
        - At the time of the [2008] 5-year review, the distribution of the majority of Hartweg's golden sunburst occurred in two isolated clusters, including six extant occurrences near the community of Friant along both sides of the San Joaquin River in high pumice content soils (Fresno and Madera Counties) and six extant occurrences near Cooperstown in Stanislaus County…The surveys completed since the [2008] 5-year review do not alter our understanding of the species' current distribution or abundance and population estimates or trends have not been determined. (5-year review, 2023).
        - **Table A1-1** reproduces information from the Diversity Database occurrence table from the 2023 5-year review.

Occurrence Number	Presence	County
1	Possibly Extirpated	Madera
3	Presumed Extant	Stanislaus
5	Possibly Extirpated	Stanislaus
6	Presumed Extant	Stanislaus
7	Presumed Extant	Stanislaus
8	Presumed Extant	Stanislaus
10	Extirpated	Sutter, Yuba
11	Possibly Extirpated	Stanislaus
15	Presumed Extant	Stanislaus
17	Presumed Extant	Stanislaus
21	Presumed Extant	Fresno
23	Presumed Extant	Fresno
24	Presumed Extant	Fresno
25	Presumed Extant	Madera
27	Presumed Extant	Stanislaus
28	Presumed Extant	Stanislaus
29	Presumed Extant	Merced
30	Presumed Extant	Merced
31	Presumed Extant	Merced
32	Presumed Extant	Merced
33	Presumed Extant	Merced
34	Presumed Extant	Stanislaus, Tuolumne
37	Presumed Extant	Merced
38	Presumed Extant	Merced
39	Presumed Extant	Merced
40	Presumed Extant	Merced
41	Presumed Extant	Stanislaus

Table A1-1. Known location information from FWS. Table reproduced from most recent 5-year review (2023).

- Occurrences Included in Public Databases
    - EPA queried iNaturalist, GBIF, and NatureServe. Collectively the occurrence data are consistent with the FWS range map and altitude range used to generate the core map.
        - iNaturalist (available here) had nine research grade observations, all of which appear to fall within the FWS range and specified elevation range.
        - GBIF (available here) had 175 occurrences. GBIF points largely coincide with the FWS data used to generate the core map, and those data which fall outside of this area can be accounted for by the resolution of the location data.
        - Occurrences in NatureServe (available here) were consistent with occurrence data from other sources and fall within the area

described in FWS documents used for the development of the core map.

- Collectively the occurrence data are consistent with the species range and elevation range described in the FWS documentation used for core map development.

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

This core map was created based on biological information, including FWS range and species habitat. The initial PULA consists of the 2015 species range layer, which represents the most current range available from FWS. The range was further refined to remove areas that fall outside of the elevation range of 90-140 m in which the most recent 5-year review describes as a characteristic of all known extant populations.

1. Dataset References and Software
    - FWS species range – last updated on May 26, 2015.
    - USGS 3DEP Elevation – 30 m (available here)
    - Software used: Arc GIS Pro 3.3.0
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 started with the FWS species range layer to set the outer extent of the core map.
    - The most recent 5-year review describes the elevation range for all extant populations as 90-140m.
        - Loaded "USGS 3DEP Elevation – 30 m" dataset
        - Exported raster using the clipping extent of the species range.
        - Used extract by mask (with the range layer used as the mask) to remove box around exported elevation map.
        - Casted elevation values to int using the "Int" function.
        - Opened elevation int raster attribute table
        - Selected subset of rows between 90 and 140 m (inclusive)
        - Ran extract by mask on the subset to get a raster covering the region of interest for the core map
        - Removed remaining portions of the map in Yuba county because the species is extirpated there
        - Used the "Raster to Polygon" tool to obtain the final core map as a polygon.
        - Saved as a shapefile using the "Feature Class to Shapefile" tool.
    - The resulting core map contains regions of the original FWS range layer that fall within the 90-140m elevation range characteristic of the species. This area is also representative of other available occurrence data sources.