

Interim Core Map Documentation for the Smooth Coneflower

Version 1

Review Completed: April 2026

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

Species Summary

The smooth coneflower (*Echinacea laevigata*; Entity ID 924) is a threatened terrestrial plant (dicot). The U.S. Fish and Wildlife Service (FWS) has not designated a critical habitat for the smooth coneflower. This species' natural ecosystem includes habitats such as open woodlands, glades, cedar barrens, and other habitat that is usually (but not always) found on magnesium- and calcium-rich soil. The species is currently known to survive only in Virginia, North Carolina, South Carolina, and Georgia. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the smooth coneflower is biological information based on occupied Hydrologic Unit Code (HUC) 12 locations refined to exclude areas that are not this species' habitat. The extent of this core map is confined to HUC12s in Virginia, North Carolina, South Carolina, and Georgia which contained documented occurrences of the species obtained from iNaturalist and GBIF. This area was further refined to remove locations inconsistent with the species' habitat, i.e., within open water, low, medium, and high density developed land; woody wetlands; and herbaceous wetlands. Cultivated land was also removed from the core map because this species does not occur on cultivated lands.

Figure 1 depicts the resulting interim core map for the smooth coneflower. The size of this core map is approximately 879,486 acres. Landcover categories within the core map area are included in **Table 1**. Landcover is predominantly forested areas and pasture.

The core map developed for the smooth coneflower is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the smooth coneflower. 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 or other relevant information. This interim core map has an "average" (3) 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 the 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.

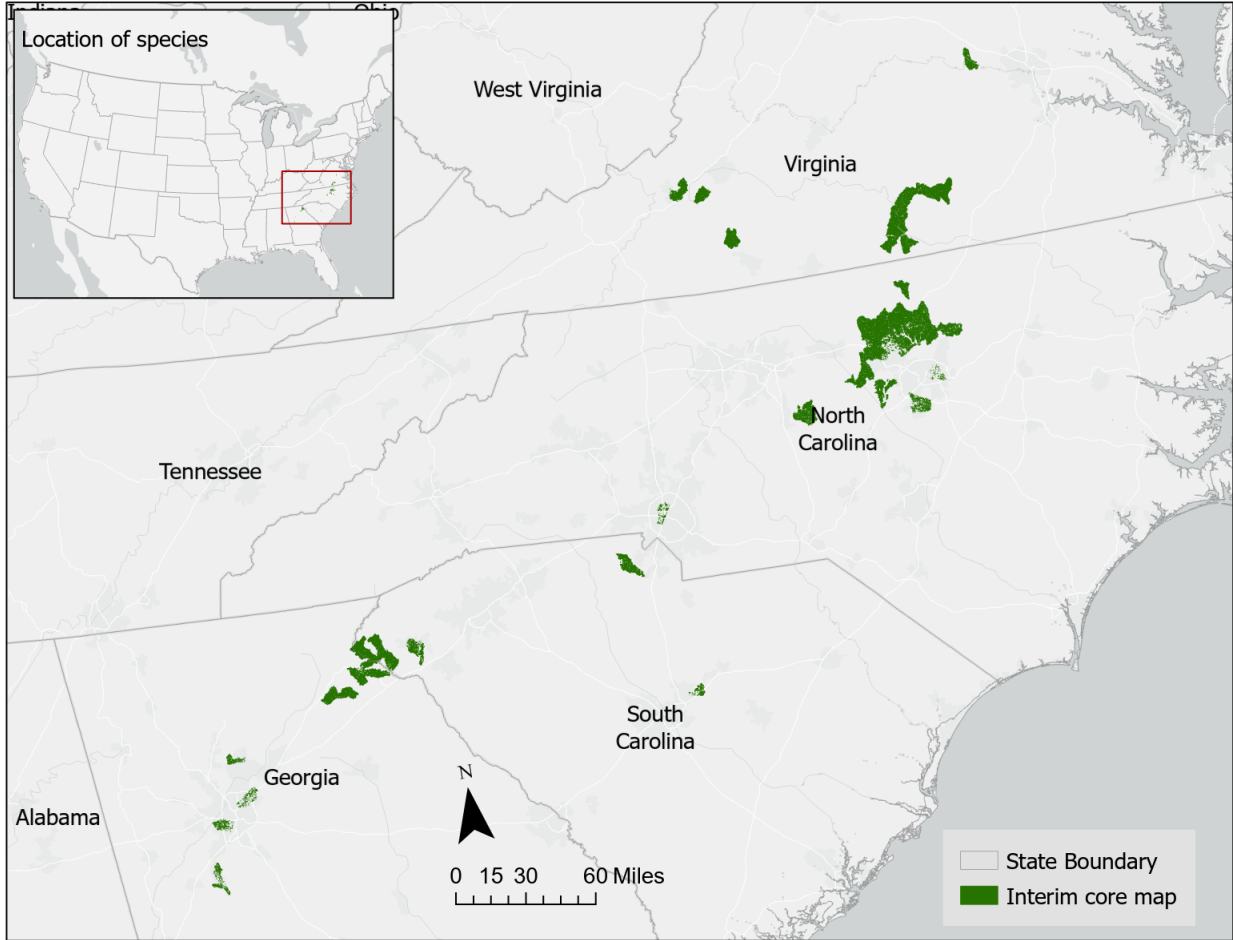


Figure 1. Interim core map for the smooth coneflower.

Table 1. Percentage of Interim Core Map Represented by National Land Cover Database (NLCD)¹ Land Covers and Associated Example Pesticide Use Sites/Types.

Example pesticide use sites/types	NLCD Class/Value	% Area
Forestry	Deciduous Forest (41)	36%
Forestry	Evergreen Forest (42)	16%
Forestry	Mixed Forest (43)	21%
Agriculture	Pasture/Hay (81)	16%
Agriculture	Cultivated Crops (82)	0%
Mosquito adulticide, residential	Developed Open Space (21)	2%
Mosquito adulticide, residential	Developed Low Intensity (22)	1%
Mosquito adulticide, residential	Developed Medium Intensity (23)	0%
Mosquito adulticide, residential	Developed High Intensity (24)	1%
Invasive species control	Woody Wetlands (90)	0%
Invasive species control	Emergent Herbaceous Wetlands (95)	0%
Invasive species control	Open Water (11)	0%
Invasive species control	Grassland/Herbaceous (71)	3%
Invasive species control	Shrub/Scrub (52)	2%
Invasive species control	Barren Land (31)	0%
Total Acres	Interim Core Map Acres	~ 879,486

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
- 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. Occurrence data were robust and were useful to refine the core map (**Figures A1-2 & A1-3 in Appendix 1**). **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

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

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
4. Document the core map

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

- Occurrences and known locations of the smooth coneflower;
- Habitat descriptions for this species, which includes open woodlands, glades, cedar barrens, and other habitat that is usually (but not always) found on magnesium- and calcium-rich soil.

For step 2, EPA used the compiled information to identify the core map type including species range and known location information. The extant populations are in dry, woodland areas within the species’ range. Therefore, EPA based the core map on specific land cover types from the known locations identified by iNaturalist and GBIF and refined this area by removing aquatic areas and low to high density developments. The entire range of the species was not used as the core map because the range contains areas where the species does not occur. NatureServe was also accessed and used for comparison purposes.

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 National Land Cover Database and deleted observations located on land cover types in which the smooth coneflower does not occur. **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

EPA explored using the Soil Survey Geographic Database (SSURGO) to further refine the core map. However, the smooth coneflower’s habitat is not confined to a specific soil type.

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 the smooth coneflower

1. Recent FWS documents/links and other data sources

- [Species Status Assessment \(2022\)](#)
- [Five Year Review \(2018\)](#)
- [Recovery Plan \(1995\)](#)
- [Reclassifying Smooth Coneflower \(2021\)](#)

2. Background information

- Status: Federally listed as threatened in 2022.

3. Resiliency, redundancy, and representation (the 3Rs)

- Resiliency
 - "...based on our analysis of monitoring data and recent observations, we conclude that all of the 16 A-, AB-, and B- ranked (good to excellent resiliency) protected populations have been stable or increasing for more than 10 years" (Species Status Assessment, 40104).
 - "The remaining 28 extant populations are ranked C (fair viability), D (poor viability), or E (extant, but their viability has not been assessed). A rank of X is given to sites considered to be extirpated, where evidence indicates that the species no longer exists in that location. A rank of H is given to sites considered to be historical, where recent field information verifying the continued existence of the population is lacking. We estimated that C-, D-, and E ranked populations have low resiliency, and sites ranked H or X were not evaluated for resiliency because plants have not been found at those sites in recent years" (Species Status Assessment, 40103).
- Redundancy
 - "Based on the redundancy and representation of the species, we conclude that potential impacts associated with stochastic events are not a threat to smooth coneflower" (Reclassifying the smooth coneflower, 33159).
 - "Our understanding of the species' redundancy has improved as a result of increased survey efforts; the species is now known from 44 populations (up from 21 populations at the time of listing), 16 of which currently have high to medium resiliency" (Reclassifying the smooth coneflower, 33159).
 - "The number of resilient smooth coneflower populations has improved the species' redundancy "(Reclassifying the smooth coneflower, 33159).
- Representation
 - "The species' geographic representation is good, given the distribution of [16] highly resilient populations over a four-State area (Species Status Assessment, 40111)."
 - "...since the species' 1992 listing under the Act, smooth coneflower representation has increased with the discovery of new occurrences throughout the range of the species, especially with the new sites in the coastal plain of GA and SC" (Reclassifying the smooth coneflower, 33159).
- Habitat
 - "These [16] populations span mountain, piedmont, and coastal plain physiographic provinces. All of these populations occur in the species' natural

ecosystem, which includes habitats such as open woodlands, glades, cedar barrens, and other habitat that is usually (but not always) found on magnesium- and calcium-rich soil (Species Status Assessment, 40103).”

- **Life History**

- “Flowering occurs from May through July, and fruits develop from late June to September (Gaddy 1991). The fruit is a gray-brown, oblong-prismatic achene, usually four-angled, and 4 to 4.5 mm long; seeds are 0.5 cm long (Kral 1983, Gaddy 1991). Gaddy (1991) stated that reproduction was apparently only by sexual means and that no vegetative reproduction had been observed. However, vegetative reproduction has been reported from the Chattahoochee National Forest in Georgia (Robert Joslin, U.S. Forest Service, personal communication, 1994) and from the Sumter National Forest in South Carolina (Lionette Edwards, U.S. Forest Service, personal communication, 1995)” (Recovery Plan, 4).
- “[The] smooth coneflower appears to need bare soil that is rich in magnesium and/or calcium for seedling germination and growth. Some form of disturbance (such as fire) is also essential” (Recovery Plan, 5).

- **Ecology**

- “Pollinators for this species are unknown; however, Edwards and Madsen (1993) have documented a preliminary list of insect visitors to South Carolina populations of the smooth coneflower (see Appendix A). Seeds are probably dispersed by seed-eating birds or small mammals. Although data are unavailable regarding the smooth coneflower, goldfinches, as well as white-tailed deer, have been observed feeding on the seed heads of the endangered Tennessee coneflower (*Echinacea tennesseensis*) (Currie and Somers 1989)” (Recovery Plan, 4-5).

- **Taxonomy**

- Terrestrial Plant (dicot)

- **Relevant Pesticide Use Sites**

- No information on specific pesticide use sites relevant for this species was included in FWS documents.

4. Recovery Criteria/Objectives

- “Management techniques include the use of prescribed fire, well-timed mowing, mechanical clearing (including the use of chain saws to cut trees), and herbicides (selectively applied to cut stumps to prevent regrowth)” (Species Status Assessment, 40103).
- “The recovery plan identifies five downlisting criteria for the smooth coneflower (Service 1995, p. 12): 1. Twelve (12) geographically distinct, self-sustaining populations are protected across the species’ range, including populations in at least two counties in VA, two counties in NC, two counties in SC, and one county in GA; 2. At least nine of these populations must be in areas within the species’ native ecosystem (not in gardens or similar artificial settings) that are in permanent conservation ownership and management; 3. Managers have been designated for each protected population; 4. Management plans have been developed and implemented for each protected population; and 5. Populations

have been maintained at stable or increasing levels for 5 years” (Species Status Assessment 40102).

- “The recovery plan also identifies the following five delisting criteria for the smooth coneflower (Service 1995, p. 12): 1. Fifteen (15) geographically distinct, self-sustaining populations are protected across the species’ range, including populations in at least two counties in VA, two counties in NC, two counties in SC, and one county in GA; 2. At least nine of these populations must be in areas within the species’ native ecosystem (not in gardens or similar artificial settings) that are in permanent conservation ownership and management; 3. Managers have been designated for each protected population; 4. Management plans have been developed and implemented for each protected population; and 5. Populations have been maintained at stable or increasing levels for 10 years” (Species Status Assessment 40102).
- Recovery Actions
 - “1. Implement protection management for extant populations.... 2. Survey suitable habitat for additional populations and potential reintroduction sites; reestablish populations within the species’ historic range. ... 3. Protect viable populations through a range of protection tools (management agreements, acquisition, registry, cooperative agreements, etc.). ... 4. Monitor existing populations. ... 5. Conduct research on the biology of the species and on suitable management tools for maintaining the natural ecosystem in which it occurs. ... 6. Maintain cultivated sources for the species and provide for long-term maintenance of selected populations in cultivation. ... 7. Enforce laws protecting the species and its habitat. ... 8. Develop materials to inform the public about the status of the species and the recovery plan objectives. ... 8.1 Prepare and distribute news releases and informational brochures. ... 8.2 Prepare articles for popular and scientific publications. ... 9. Annually assess success of recovery efforts for the species” (Recovery Plan 13-16).

5. Description of Species Range

- Figure A1-1 depicts the FWS range. “The reported historical range of the smooth coneflower included Pennsylvania, Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, and Arkansas. The species is now known to survive only in Virginia, North Carolina, South Carolina, and Georgia.” (Recovery Plan, 1). The species range is approximately 5,300,000 acres.



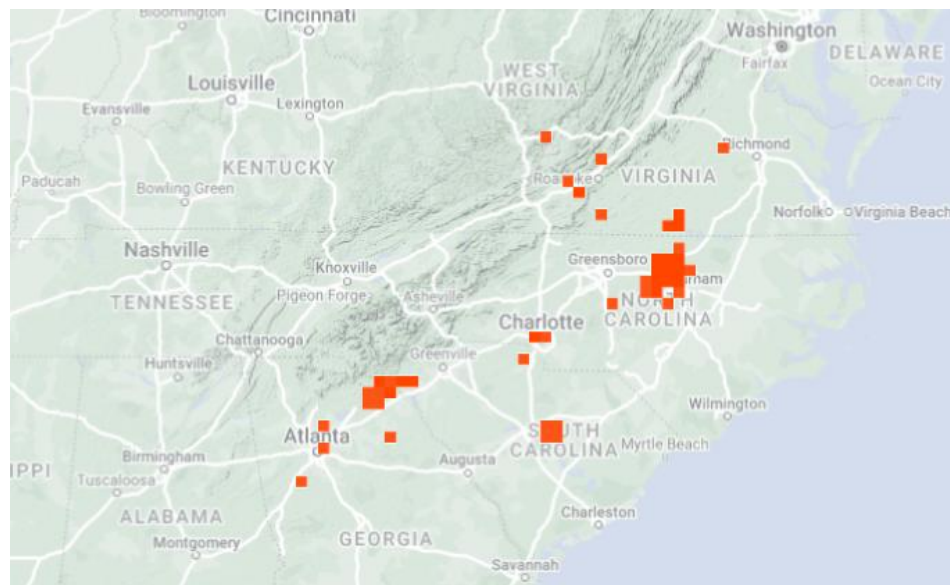
Figure A1-1. FWS range for the smooth coneflower.

6. Critical Habitat

- FWS has not designated a critical habitat for this species.

7. Known Locations

- "...the species is now known from 44 populations (up from 21 populations at the time of listing), 16 of which currently have high to medium resiliency" (Species Status Assessment, 40111).
 - Figures A1-2 and A1-3 depicts the currently known locations from iNaturalist and GBIF, respectively.



- **Figure A1-2. iNaturalist known locations. 185 observations from 2011 to 2024.**
<https://www.inaturalist.org/observations>

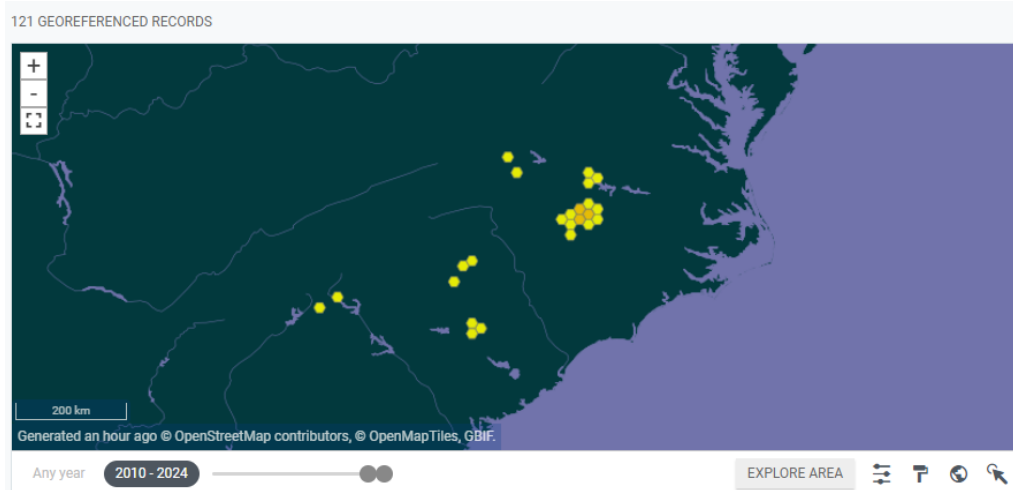


Figure A1-3. GBIF known locations. 121 observations with geo-tags. <https://www.gbif.org/>

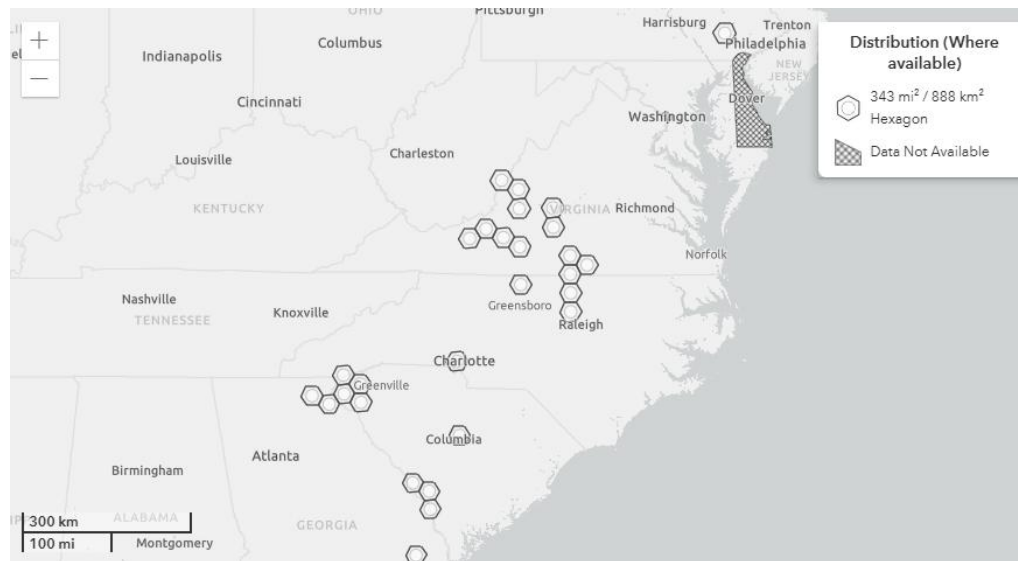


Figure A1-4. NatureServe data for the smooth coneflower. https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.147692/Echinacea_laevigata

NatureServe 2025. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available at <https://explorer.natureserve.org>. Accessed April 2025. NatureServe notes that if ground-disturbing activities are proposed on a site, the appropriate NatureServe network program should be contacted for a site-specific review of the project area. For contact information, go to the NatureServe network directory at: <https://www.natureserve.org/ns-network-directory>.

Appendix 2. GIS Data Review and Method to Develop Core Map

This core map was created based on biological information, including occupied location. The core map was further refined to remove points falling within open water, low, medium, and high density developed land, woody wetlands, and herbaceous wetlands.

1. Dataset References and Software

- NLCD 2021
 - 30 m raster dataset comprised of 20 land cover classes. Classes include vegetation type, development intensity, and agricultural use.
- Software used: ArcGIS Pro 3.2
- Watershed Boundary Dataset HUC12s (Esri Online):
https://services.arcgis.com/P3ePLMYs2RVChkIx/arcgis/rest/services/Watershed_Boundary_Dataset_HUC_12s/FeatureServer

2. Datasets Used in Core Map Development

- GBIF and iNaturalist occurrence data.
- HUC12 watersheds
- All datasets used in core map development are described in EPA's process document.

3. Core Map Development

- All populations are found in the species' natural ecosystem, which includes habitats such as open woodlands, glades, cedar barrens, and other habitat that is usually (but not always) found on magnesium- and calcium-rich soil (Species Status Assessment, 40103). The most current species range is in Virginia, North Carolina, South Carolina, and Georgia.
- EPA overlaid occurrence data from GBIF and iNaturalist on top of NLCD raster data, as well as HUC12 watershed polygons.
- Occurrences were filtered to only display those within the following land cover classes which represent the species' habitat using the 'Extract Values to Points' tool:
 - Developed open space
 - Deciduous forest
 - Evergreen forest
 - Mixed forest
 - Shrub/scrub
 - Grassland herbaceous
- *Example query (sql): RASTERVALU IN (21, 41, 42, 43, 52, 71, 82)*
- This new layer was named 'Smooth Coneflower Known Locations' (198 obs.)
- Remaining area in West Virginia was removed because the species does not occur in West Virginia based on FWS documentation.
- The core map was then further refined by filtering HUC12 watershed polygons to only those containing 'smooth coneflower Known Locations' data using the 'Select Layer by Location' tool (53 polygons).
- This area was further refined to remove locations falling outside of the species' habitat, i.e., within open water, low, medium, and high density developed land; woody wetlands; and herbaceous wetlands.
- The EPA's modified cultivated layer was erased from the range to develop core map, as this species does not occur on cultivated lands.

- The core map is in “Smooth_Coneflower_Core_map.shp”, “Smooth_Coneflower_Core_map.shx”, and “Smooth_Coneflower_Core_map.dbf”