

Interim Core Map Documentation for the Frosted Flatwoods Salamander (*Ambystoma cingulatum*)

Version 1

Review Completed: July 2025

Core Map Developer: Center for Biological Diversity

Species Summary

Listed as threatened in 1999, the frosted flatwoods salamander (Entity ID: 119) is endemic to longleaf pine forest and savannah areas from the Florida panhandle to South Carolina. Flatwood forests tend to be poorly drained with mosaic wetland habitat that the frosted flatwoods salamander relies on for breeding and development. They spend most of their lives in and around wetlands eating aquatic and terrestrial invertebrates. The species is threatened by habitat loss from hydrologic alterations and disruption to fire cycles that have resulted in canopy closure and changes in the vegetation community. Analyses and surveys for the 2020 Species Status Assessment indicate a decline to 4 general sites with 9 populations. The frosted flatwoods salamander currently occupies four counties, Liberty GA, Liberty FL, Wakulla FL, and Berkeley SC. In Florida, the species is present in the Apalachicola National Forest and at St. Mark's National Wildlife Refuge. In Georgia, the frosted flatwoods salamander is present at Fort Stewart, and in South Carolina, the species is of unknown status in the Francis Marion National Forest. Eight Previously known sites on private land in Jasper County, South Carolina, have not been surveyed and are of unknown status.

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, but EPA may have edited this documentation for clarity or other purposes. Some views expressed in this documentation may not necessarily reflect the viewpoints of 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 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 frosted flatwoods salamander is biological information core map type, based on the critical habitat and one known location outside the critical habitat. Specifically, it is based on a 2008 critical habitat designation that encompasses land in Florida and South Carolina, with the remaining location identified by referencing narrative descriptions of the Fort Steward Military Installation breeding ponds, range maps, and georeferenced maps of precise locations listed in a 2020 Species Status Assessment.

Based on EPA’s “best professional judgement classification” system, CBD has graded this core map as “limited” (2), with a critical habitat or range core map with limited additions or subtractions from robust occurrences data sources or removal of unsuitable habitat; FWS documents include occurrence information but have not been updated recently.

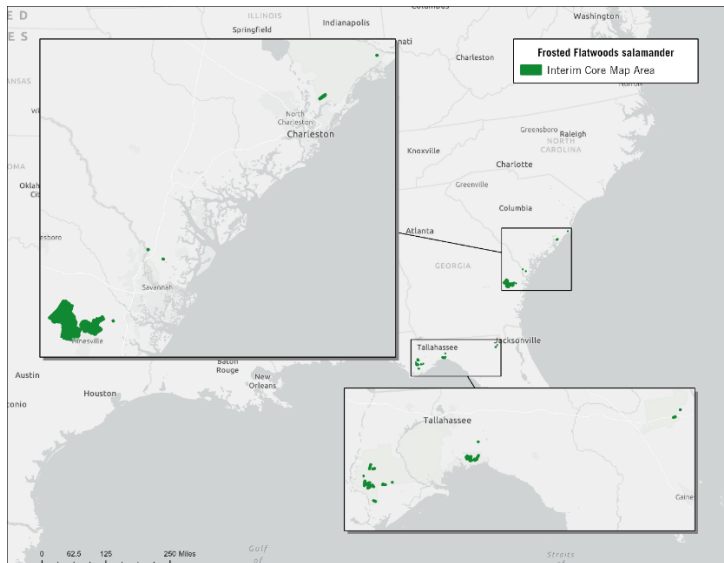


Figure 1. Frosted flatwoods salamander interim core map (99,535 acres).

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)	0
Forestry	Evergreen Forest (42)	54.2
Forestry	Mixed Forest (43)	0
Agriculture	Pasture/Hay (81)	.1
Agriculture	Cultivated Crops (82)	.2
Mosquito adulticide, residential	Open space, developed (21)	4
Mosquito adulticide, residential	Developed, Low intensity (22)	1.6
Mosquito adulticide, residential	Developed, Medium intensity (23)	.2
Mosquito adulticide, residential	Developed, High intensity (24)	.2
Invasive species control	Woody Wetlands (90)	35.5
Invasive species control	Emergent Herbaceous Wetlands (95)	.5
Invasive species control	Open water (11)	.2
Invasive species control	Grassland/herbaceous (71)	1.1
Invasive species control	Scrub/shrub (52)	.6
Invasive species control	Barren land (rock/sand/clay; 31)	1.3

Evaluation of Known Location Information

Only one confirmed extant population occurs outside of the critical habitat, which happens to be the only extant location in the Atlantic Coastal Plain Management Unit, and therefore critical to the survival and recovery of these species. (See Appendix 1 for more information). Given this designation, the areas adjacent to Fort Stewart in Liberty County were included in the core map.

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” (referred to as “the process”). This core map was developed by EPA using the four 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, CBD compiled available information for the frosted flatwoods salamander from FWS.

Appendix 1 provides the compiled information for the salamander, and influential information includes:

- The 2009 critical habitat, which covers nearly all occupied habitat at that time as well as previously occupied areas slated for reintroduction is critical recovery management units.
- The 2021 recovery plan, which includes additional details about captive rearing and recovery management units.
- The 2020 Species Status Assessment, which included more details on life history and a narrative description of a site not covered by critical habitat.
- The 2019 5 Year Review, which includes additional information about life history and status of occupied habitat.

For step 2, CBD used the compiled information to identify the core map type. The extant populations identified by FWS were located within the species critical habitat. Previously occupied critical habitat encompasses the best-known, even if potentially degraded, habitat in the range of the species and was therefore included, except for critical habitat outside the range in Florida, which is specifically called out in the Species Status Assessment (SSA) as uninhabitable for frosted flatwoods salamander (SSA, 2020). A single population outside of the critical habitat was occupied, through it remains under military control and relatively secure. Based on this information, CBD selected the biological information core map type consisting of the critical habitat supplemented by a single location identified by reference to narrative and range. The range of the species was not selected as the core map because it contains currently unoccupied habitat and is overbroad, but it was used to confirm that extent of the single extant breeding pool that occurred outside the critical habitat.

For step 3, CBD used the best available data sources to generate the core map. All GIS data sources used for the frosted flatwoods salamander are discussed in process documents, with the primary dataset being the critical habitat layer. Appendix 2 provides more details on the GIS data and analyses used to generate the interim core map.

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

We did not consider any outside data sources including iNaturalist, the Global Biodiversity Information Facility (GBIF), NatureServe, or otherwise, since critical habitat and narrative were robust enough to identify occupied habitat. The only occurrence information from GBIF within the last two decades (far outside the lifespan of the salamander) are centralized to Florida critical habitat and appear to be fuzzed. One iNaturalist observation from 2019 (see known location information) was used to confirm the general location of the frosted flatwoods salamander in Georgia.

We considered searching for a proposed critical habitat layer that was at one point considered for the salamander locations on Department of Defense lands. However, those polygons were not incorporated into the proposed rule and were thus not considered in the final core map development.

Appendix 1. Information compiled for species

1. Recent FWS documents

- 2021 Recovery plan
https://ecos.fws.gov/docs/recovery_plan/20210615_Frosted_Flatwoods%20salamander_RP.pdf
- 2020 species assessment
<https://iris.fws.gov/APPS/ServCat/DownloadFile/196953>
- 2019 5 YR Review
https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2813.pdf
- 2009 Critical habitat/proposed status
<E9-2403.pdf>

2. Background information

Status: Threatened

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

Resiliency – Low to moderate. 101 metapopulations are required across the range to ensure that the risk of extinction is low enough to allow the species to persist into the foreseeable future (SSA, 2020).

Redundancy – In terms of redundancy, flatwoods salamanders currently exist only as isolated metapopulations in a few locations within their historical range. Roughly 25 metapopulations per each of the four Recovery Management Units (RMUs) is necessary to provide redundancy across the historic range. Nearly all frosted flatwoods salamanders are found in 1 RMU (SSA, 2020).

Representation – Remaining populations of the frosted flatwoods salamander are distributed between two out of the four representation units – the Eastern Panhandle Unit and the Atlantic Coastal Plain Unit (SSA, 2020).

Habitat, Life History, and Ecology

Habitat:

Frosted flatwoods salamanders live within mesic (moderate moisture) to intermediate-mesic pine-dominated flatwoods/savanna communities. The dominant overstory species is generally longleaf pine (*Pinus palustris*) but this may differ in some localities dominated by other *Pinus* subspecies. Pine flatwoods/savannas are characterized by low flat topography and relatively poorly drained, acidic, sandy soil that becomes seasonally saturated. In the past, this ecosystem was characterized by open pine woodlands maintained by frequent fires.

The frosted flatwoods salamander typically breeds and deposits eggs in dry, ephemeral wetlands prior to water inundation that can be anywhere between 1 and 30 acres. Ponds typically fill in late fall or early winter, and dry in late spring, or early summer. Summer thunderstorms may refill some ponds but most of these dry again before early fall, which performs the critical function of eliminating aquatic predator and competitor species, prior to the breeding season. Following hatching, larval frosted flatwoods salamanders generally occupy shallow (<0.5 m) areas of wetlands that are dominated by emergent wetland grasses.

Suitable wetlands tend to be distributed on the landscape in a clumped fashion. Occupied wetlands have an average of 6 (at least 2) suitable wetlands within a 0.5 km radius, and an average of 15 (at least 7) suitable wetlands within a 1.5 km radius (SSA, 2020).

Diet:

Because of its complex life cycle, the diet of the frosted flatwoods salamander consists of aquatic prey consumed by larvae as well as terrestrial prey consumed by adults and juveniles.

Freshwater crustaceans comprised 96% of all invertebrates consumed by larval flatwoods salamanders. Prey consisted mostly of isopods (Caecidotea), amphipods (Crangonyx), cyclopoid copepods, and cladocerans (primarily *Simocephalus* and other daphnids). Vertebrate prey consists of rare consumption of larval dwarf salamanders.

Terrestrial juvenile and adult flatwoods salamanders are primarily fossorial and spend much of their time in crayfish burrows and root channels, where they are known to consume earthworms. Although it has not been documented, it is likely that juveniles and adults also feed opportunistically on other terrestrial invertebrates (larval and adult insects, spiders, centipedes, isopods, and snails). Larvae seek refuge within the dense matrix formed by submerged grasses during the day and emerge at night to forage on zooplankton (SSA, 2020).

Taxonomy:

The currently accepted classification for the frosted flatwoods salamander is (Integrated Taxonomic Information System, 2016):

Phylum: Chordata

Class: Amphibia

Order: Caudata

Family: Ambystomatidae

Genus: *Ambystoma*

Species: *Ambystoma cingulatum*

Relevant Pesticide Use Sites:

FWS' 2009 critical habitat/proposed status for the frosted flatwoods salamander ([E9-2403.pdf](#)) notes that "Pesticides (including herbicides) may pose a threat to amphibians, such as the frosted flatwoods salamander." While herbicide use may be necessary to control woody vegetation and fire ants when prescribed burning cannot exist, the latest 5YR lists hot water as an alternative for controlling invasive

fire ants, which may prey on the frosted flatwoods salamander (2009 Critical Habitat/Proposed Status, 5YR 2019). FWS “Nevertheless,” states that “pesticides should not be used in flatwoods salamander habitat unless no other habitat management tool is available, herbicide label directions should be followed closely.” (2009 Critical Habitat/Proposed Status).

Pesticides are further denoted not as a historic threat to the species, but a specific potential threat to localized populations, with areas adjacent to breeding ponds in greatest need of protection (2009 Critical Habitat/Proposed Status).

The primary threats currently affecting flatwoods salamanders are changes in habitat (loss, fragmentation, and degradation, invasive species, **pesticide use**, hydrologic changes). (SSA, 2020). The frosted flatwoods salamander’s recovery plan also lists “improper or overuse of pesticides and herbicides” as a threat to this species (Recovery Plan, 2021).

Currently, critical habitat is fragmented by cultivated crop land, managed plantations, harvested forest, and other types of fragmentation associated with anthropogenic disturbance including pesticide use.

Relevant Recovery Criteria and Actions:

Objective:

The recovery objectives over the next 20 years are to 1) determine if the species is progressing toward the overall objective of restoring adequate redundant populations to representative portions throughout its historic range where possible (see Figure 2), and 2) Determine whether the extant populations demonstrate resiliency to the extent that the species no longer requires the protection of the Endangered Species Act. Four Recovery Management Areas are pictured in Figure 1 below.

Criteria:

(1) At least 101 resilient metapopulations exhibiting a stable or increasing trend are extant or re-established as evidenced by natural recruitment and multiple age classes.

(2) Approximately 25 resilient metapopulations are present in each of the four Recovery Management Units (RMUs; Figure 2) that represent the spatial distribution of historic range: RMU 1 (St Marks/Apalachicola Complex), RMU 2 (Southeastern Georgia/North Florida Complex), RMU 3 (Fort Stewart Complex), and RMU 4 (South Carolina Complex). The precise number in each RMU is dependent on habitat suitability and availability, but an approximate equal distribution will allow for sufficient redundancy across the historic range. Recovery management areas are shown below.

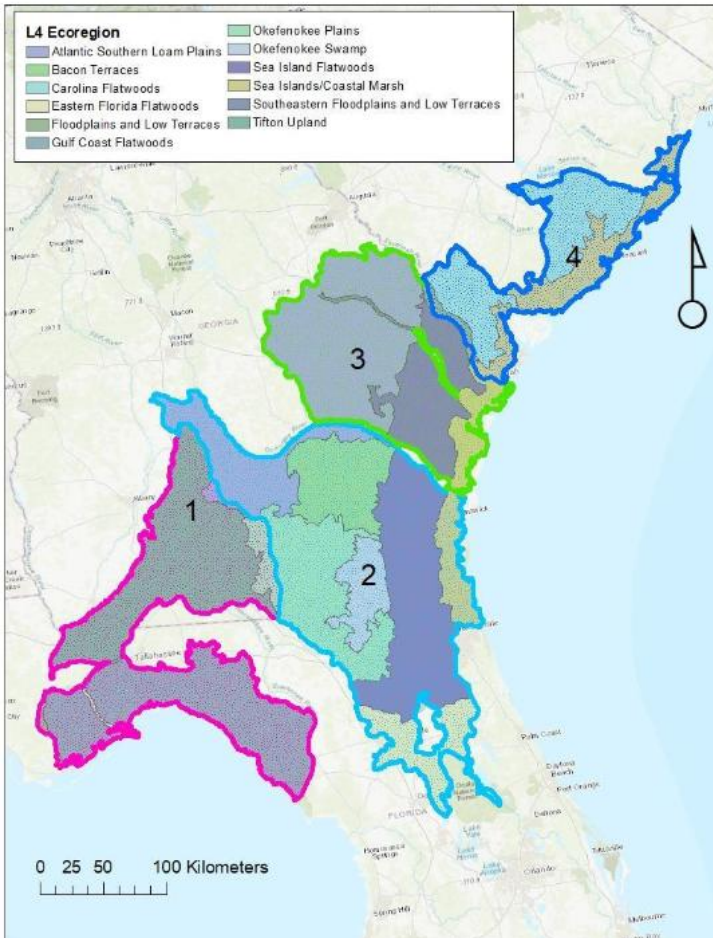


Figure 1. Recovery management units (RMU) for the frosted flatwoods salamander (courtesy of J. Barichivich, USGS). The RMU delineations illustrated are not precise lines, but bubbles based the ecoregions containing currently occupied sites and historic range.

(3) Threats have been addressed and/or managed to the extent that the species will remain viable into the foreseeable future. Breeding and adjacent upland habitats within the resilient metapopulations are protected long-term through management agreements, public ownership, or other means, in sufficient quantity and quality to support growing populations.

Recovery Actions:

Ensure adequate, high-quality habitat is available to support resilient frosted flatwoods salamander populations.

Increase the number of resilient frosted flatwoods salamander populations to the extent possible within the four RMUs.

Improve knowledge needed to increase the number of resilient frosted flatwoods salamander populations through research and adaptive management.

Recommendations for Future Actions:

Recovery actions are listed in order of priority. However, it is worth noting that no successful reintroductions have occurred. No progress has been made yet in getting frosted flatwoods salamanders to breed in captivity; thus, to date no animals have been produced that could be used for reintroduction purposes. By releasing metamorphosed salamanders at their site of origin, the near-term objective of this effort is to build up resiliency of natural populations and to eventually release head-started individuals at other sites to increase representation and redundancy throughout their historic range. It is not known, however, how many metamorphs are needed for release—and over how many years—to see an increase in abundance and, thus, resilience at release sites.

3. Description of Species Range:

Last updated on February 28, 2023, the species range is a relatively targeted buffer around wetlands and watersheds with both current and historical occupancy. Large swaths of forestland are covered in Florida, while in South Carolina and Georgia, the range is narrower. Current range encompasses most, but not all the designated critical habitat.

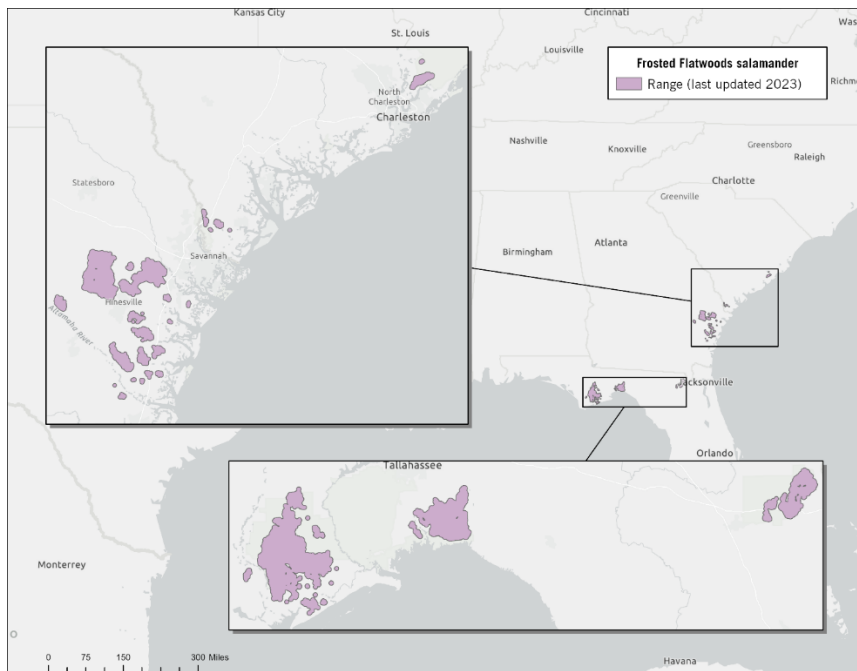


Figure 2. FWS-designated species range for the frosted flatwoods salamander.

4. Critical Habitat:

In 2009, the Service designated 19 critical habitat units (CHUs) for the frosted flatwoods salamander (74 FR 6700), omitting military lands. Unfortunately, designated critical habitat in Florida is fragmented by cultivated cropland, developed lands, managed plantations, harvested forests, and other types of land use that is consistent with anthropogenic disturbance, and adjacent breeding sites are generally outside the range of likely dispersal. Some critical habitat no longer offers acceptable habitat for the salamander and is therefore outside the updated range of the species. However, given that critical habitat is much more targeted below range and offers a better sense of the salamander core habitat, it serves as a much stronger basis for a core map in absence of specific location data (SSA, 2020).

Critical habitat in South Carolina, though potentially unoccupied, is additionally considered in the core map. Recent assessments (SSA, 2020) are limited to public lands and do not account for potential remaining populations on private lands covered by critical habitat. Nonetheless, the last observation of the frosted flatwoods salamander in South Carolina was in 2010 in Francis Marion National Forest. These sites are potentially still occupied, though the timing would suggest that there has not been an observation over the natural life of these salamanders – which can live up to nine years.

Since the range is updated, critical habitat outside the range of the species was removed:

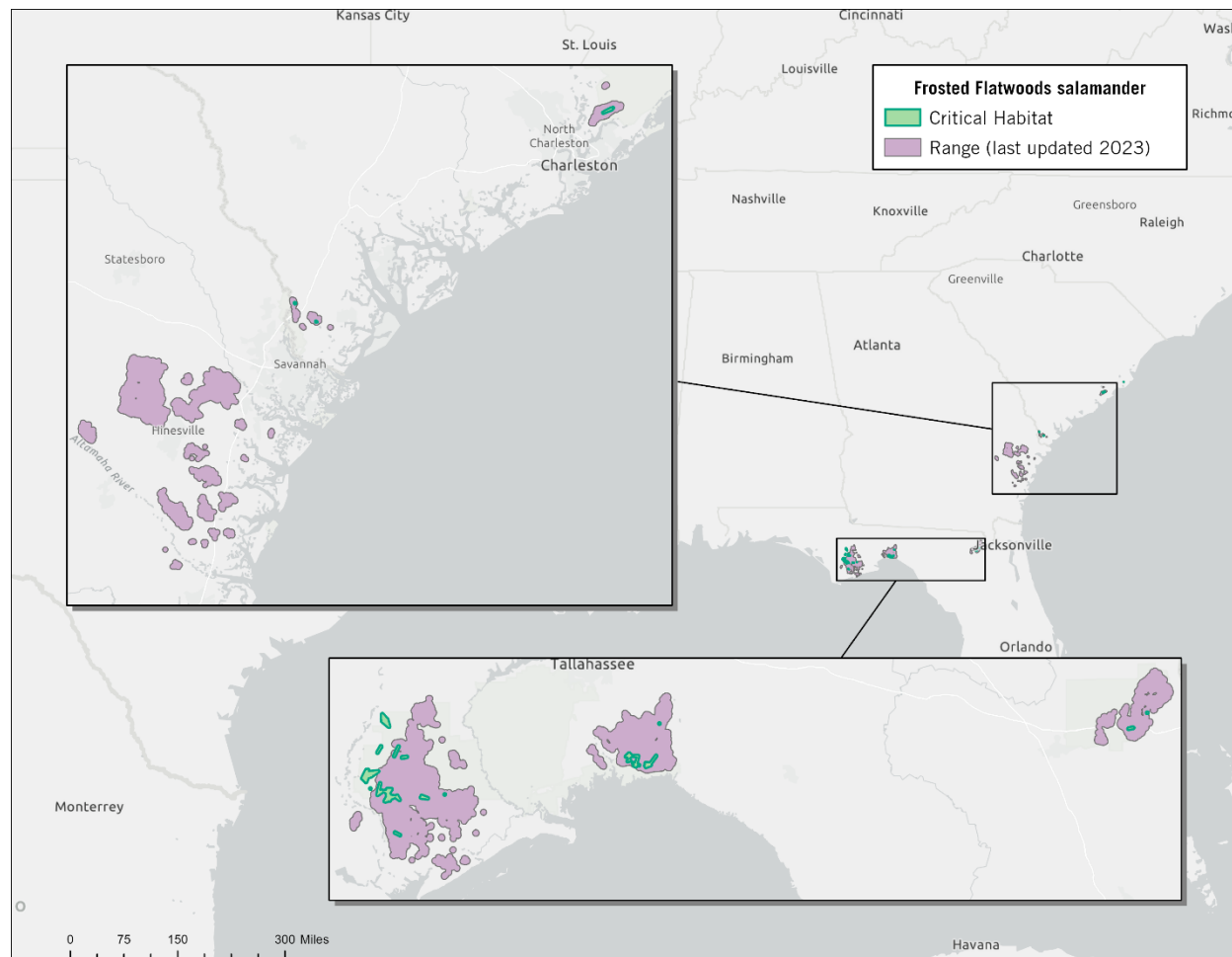


Figure 3. FWS-designated critical habitat and range of the frosted flatwoods salamander.

5. Known Locations

Only one extant population exists outside of the frosted flatwoods salamander’s critical habitat – albeit a small, isolated population at Fort Stewart Army Base in Liberty County, Georgia, in the Atlantic Coastal Plain on the eastern portion of the range. This location includes only one known breeding pond.

This location is not precisely identified but can be deduced through reference to both range maps and georeferenced locations. Overlapping the range of the species with land occupied by Fort Stewart creates a targeted area that could be impacted by adjacent agricultural development. Recent larvae identification has occurred on pond (5YR 2019). Including this area within the core map is helpful to encapsulate all known occupied locations of the species. Protection of this known population is

extremely important, especially given that this is the only pond in the RMU now that the Townsend Bombing Range populations appears extirpated.

The latest SSA also indicates that despite the range of the species occurring in multiple counties, it only is found in Liberty County (SSA, 2020).

Although iNaturalist Data is scrubbed, one location from 2019 and two from 2020 both indicate presence in the general vicinity of Fort Stewart.

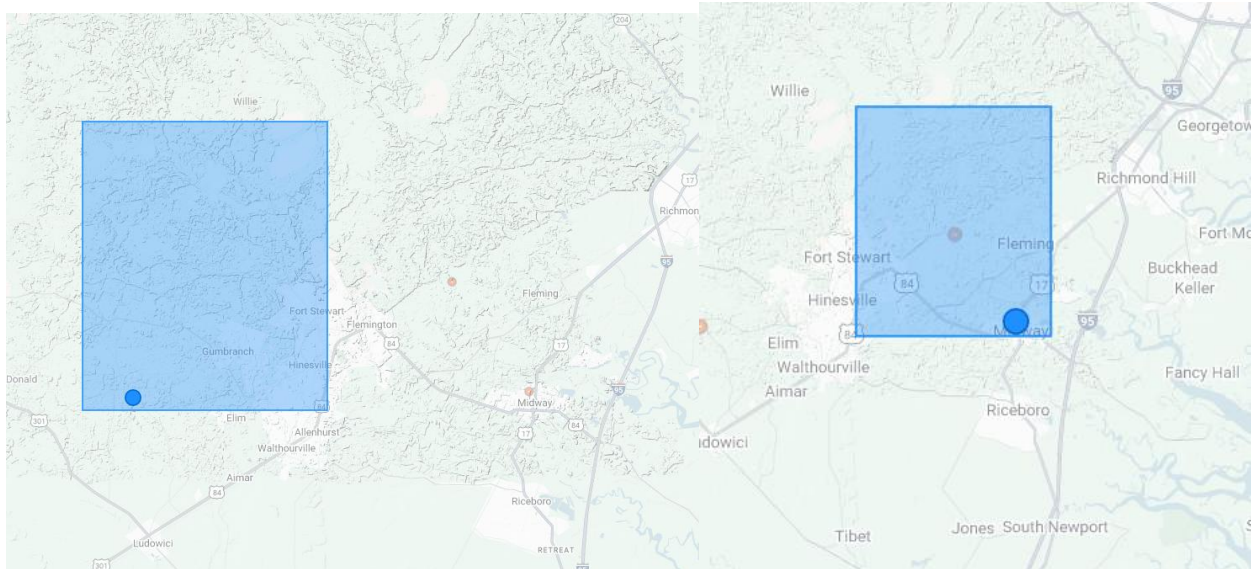


Figure 4. iNaturalist occurrence results for the frosted flatwoods salamander.

(iNaturalist, 2019), (iNaturalist, 2020).

NatureServe was also accessed, but the data were not geospatially specific enough to assist in the development of the core map.

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

The core map type for this species is based on 2009 FWS frosted flatwoods salamander critical habitat and one known location (Fort Stewart, GA) reported in the 2019 FWS 5YR review in table 1.

This section details the data and steps used to create the core map for the frosted flatwoods salamander based on this known location information.

1. References and Software

- World UTM Grid:
https://services.arcgis.com/P3ePLMys2RVChkJx/arcgis/rest/services/World_UTM_Grid/FeatureServer
- FWS Species critical habitat:
https://ecos.fws.gov/docs/crithab/zip/FCH_Ambystoma_cingulatum_20090210.zip
- FWS Species range:
https://ecos.fws.gov/docs/species/shapefiles/usfws_D013_V01_Ambystoma_cingulatum_current_range.zip

- USGS (Protected Areas Database US) PAD-US file Version 4.0
<https://www.usgs.gov/programs/gap-analysis-project/science/pad-us-data-download>
- USA county/parish boundaries of United States in the 50 states and the District of Columbia
https://services.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/services/USA_Census_Counties/FeatureServer
- National Hydrography Dataset Plus Version 2.0 file geodatabase with flowline, waterbodies and sinks feature classes
<https://services.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/services/NHDPlusV21/FeatureServer>
- Software used: ArcGIS Pro version 3.2

2. Datasets and Procedures Used in Core Map Development

2.1. Create copy of template EPA polygon, copy and paste critical habitats

1. In ArcPro, create a copy of the template EPA polygon feature class for Frosted Flatwoods salamander, named "EPA_Frosted_Flatwoods_salamander_Poly".
2. Export a copy of the 2009 FWS critical habitat "FCH_Ambystoma_cingulatum_20090210" shapefile as a feature class.
3. Go to the field view of "EPA_Frosted_Flatwoods_salamander_Poly". Right click on "EPA_Frosted_Flatwoods_salamander_Poly" → Data Design → Fields. Right click on the "Descriptio" → Left click on "Copy". Go to the field view of "FCH_Ambystoma_cingulatum_20090210" → Right click on "Click here to add a new field" → Left click on "Paste". **(Figure A2-1) (Figure A2-2)**

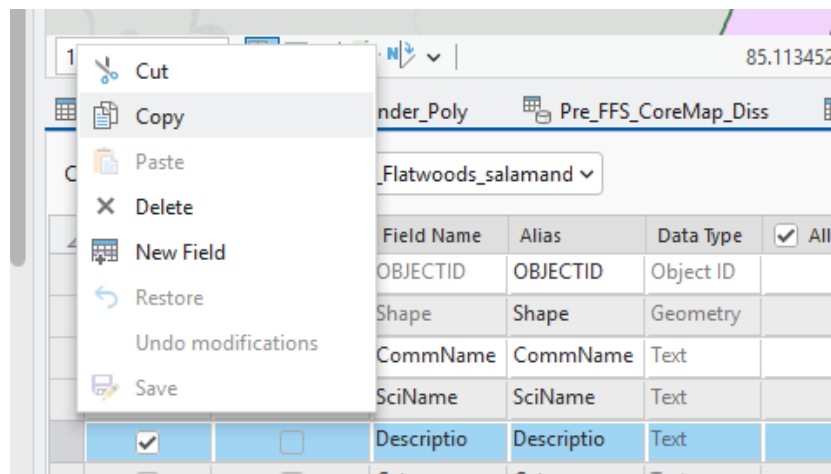


Figure A2-1. Screenshot of "Copy" field

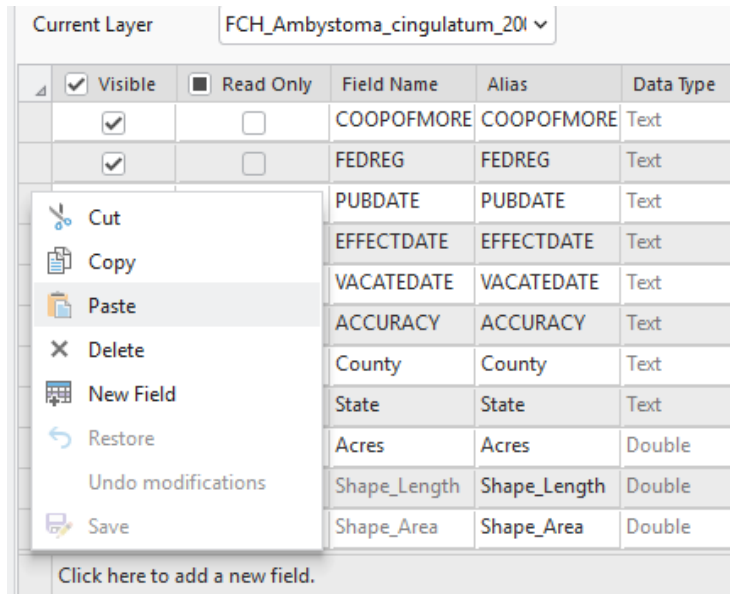


Figure A2-2. Screenshot of “Paste” field

- Use “Calculate Field” in the “Descriptio” field in the FWS Critical Habitat exported feature class. Click on “Descriptio” field à Select “Calculate Field” à Type 'Frosted Flatwoods salamander critical habitat. Unit name is ' + !UNITNAME! , as the expression à Click Apply (Figure A2-3)

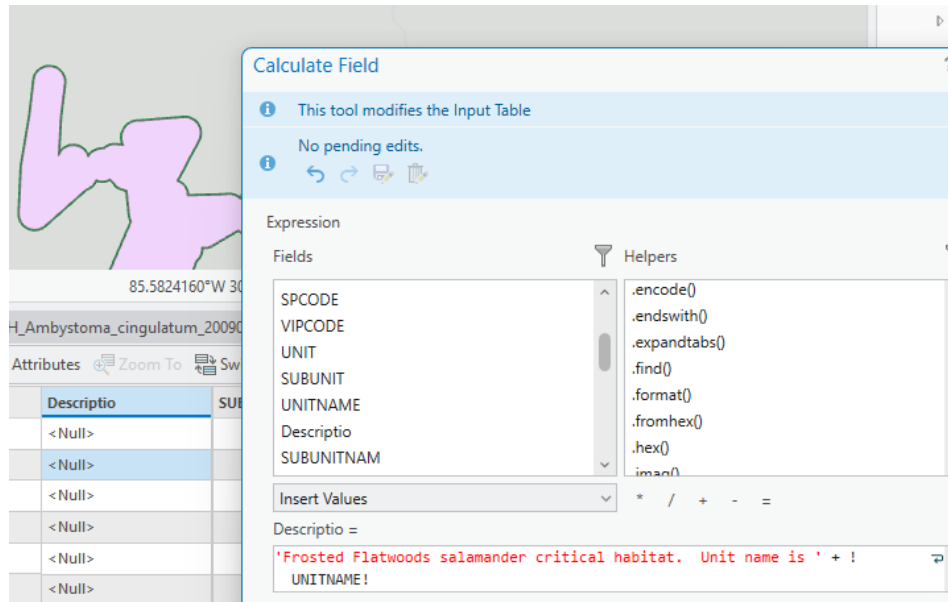


Figure A2-3. Screenshot of “Calculate Field”

- Use “Locate” tool to zoom to “Wewahitchka, FL”. Ensure that the “Range” and “Critical Habitat” layers are turned on. Zoom out to a scale of 1:500,000. Center the map area so

that Apalachicola Wildlife Management Area is in view. Use the “Select by Polygon” the three critical habitat polygons that are outside and west of the range is selected. These will not be included in the final core map area. **(Figure A2-4) (Figure A2-5)**. Switch the selection and copy and paste them into “EPA_Frosted_Flatwoods_salamander_Poly”.

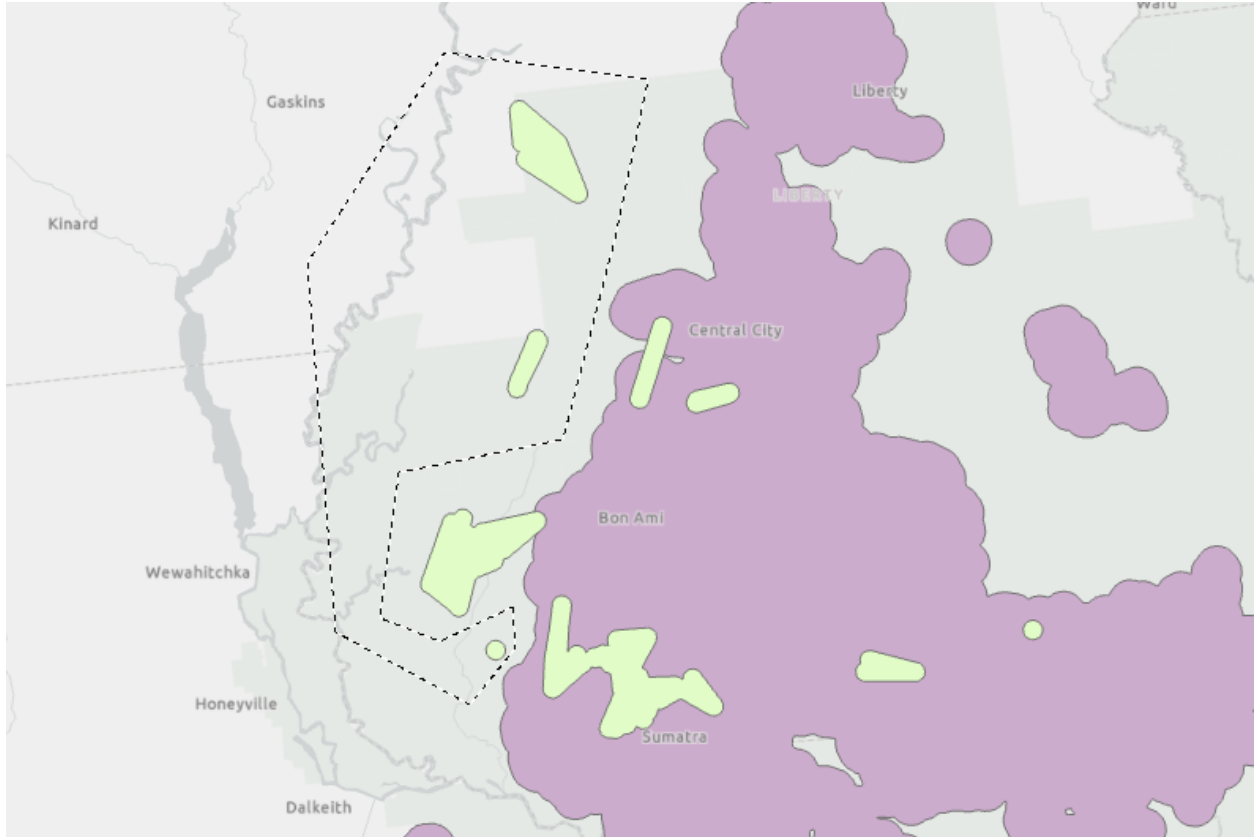


Figure A2-4. Screenshot of “Select by Polygon” tool on Critical Habitats (green hatched fill)

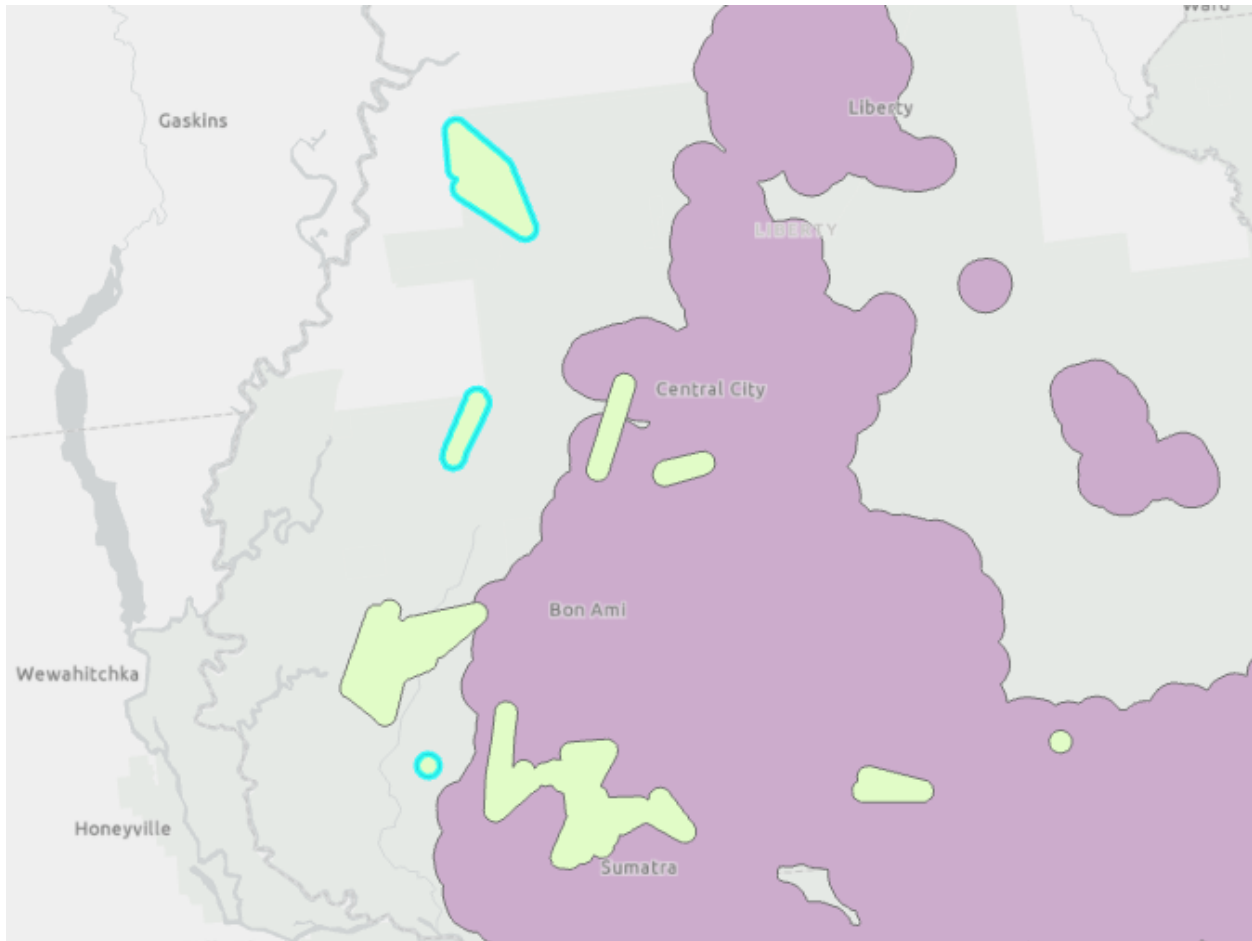


Figure A2-5. Screenshot of Switched Selected Critical Habitats

6. Critical Habitat with a unit name of FFS-1, Subunit E is going to be clipped by the range. "Edit" à Click "Modify" à Click "Clip" à Use the "Select by Rectangle" tool to select features from the "Range" and "EPA_Frosted_Flatwoods_salamander_Poly" feature classes. à Move "EPA_Frosted_Flatwoods_salamander_Poly" to be the "target" feature. à Select the "Preserve" option under "When clipping features" à Click "Clip". Update the "description" field to describe the clip method by on the Range.

2.2. Create a polygon for Fort Stewart

1. Create a definition query to filter records from PAD-US 4 4.0, for "Unit Name" = 'Fort Stewart'. **(Figure A2-6)** Create a definition query to filter records from dtl_cnty, for "Name" = 'Liberty County' and "STATE_NAME" = "Georgia" **(Figure A2-7)**

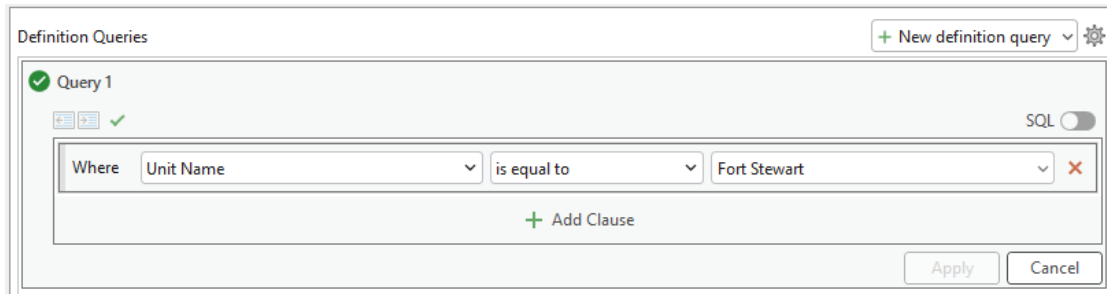


Figure A2-6. Screenshot of “Definition Query”

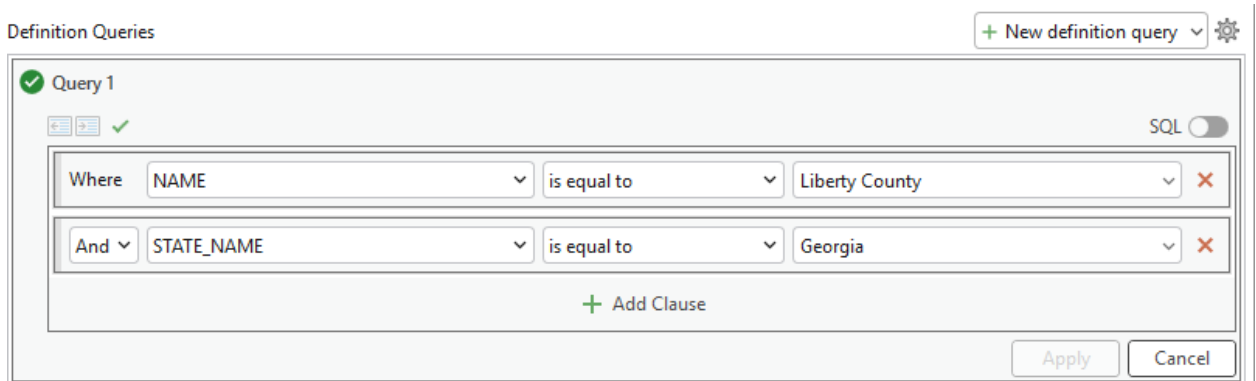


Figure A2-7. Screenshot of “Definition Query”

2. The newly pasted PAD-US polygon for “Fort Stewart” is going to be clipped by the County. “Edit” à Click “Modify”àClick “Clip”à Use the “Select by Rectangle” tool to select features from the “dtl_cnty” and “EPA_Frosted_Flatwoods_salamander_Poly” feature classes. à Move “EPA_Frosted_Flatwoods_salamander_Poly” to be the “target” feature. àSelect the “Preserve” option under “When clipping features”à Click “Clip”. **(Figure A2-8)**

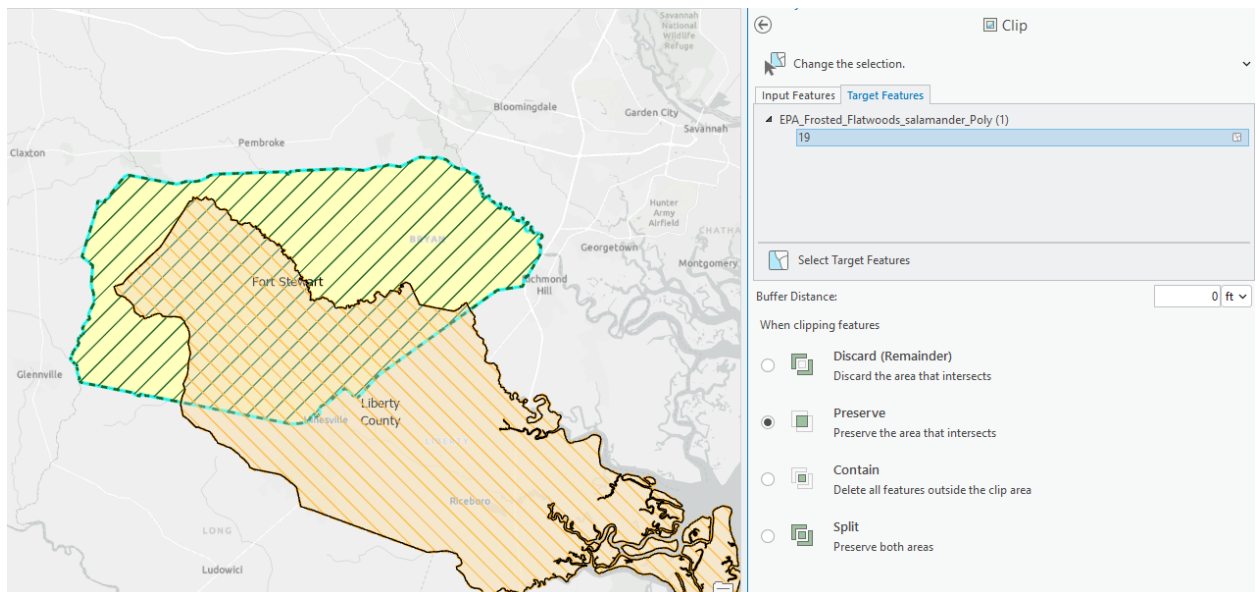


Figure A2-8. Screenshot of “Clip” tool in Modify Features

3. The recently clipped PAD-US polygon for “Fort Stewart” is going to be clipped again, this time by the Range. Click “Edit” à Click “Modify”àClick “Clip”à Use the “Select by Rectangle” tool to select features from the “Range” and “EPA_Frosted_Flatwoods_salamander_Poly” feature classes. à Move “EPA_Frosted_Flatwoods_salamander_Poly” to be the “target” feature. àSelect the “Preserve” option under “When clipping features”à Click “Clip”. Update the “Descriptio” field with “PADUS V 4.0 Fort Stewart first clipped by Liberty County and then by FWS Frosted flatwoods salamander range.”

2.3. Update the “CommName”, “SciName”, “Category”, “EPA_Code”, “FWS_Code”, “CBD_Code”, “Heritage”, and “ECOS_WebPg” field with Field Calculator. Calculate Geometry acres of Polygon Layer.

1. Update the “CommName” field with Field Calculator. Right clicked on “CommName” àSelect “Calculate Field” à Enter "Frosted Flatwoods salamander" below the field name à Set “Enable Undo” à Click “Apply” **(Figure A2-9)**

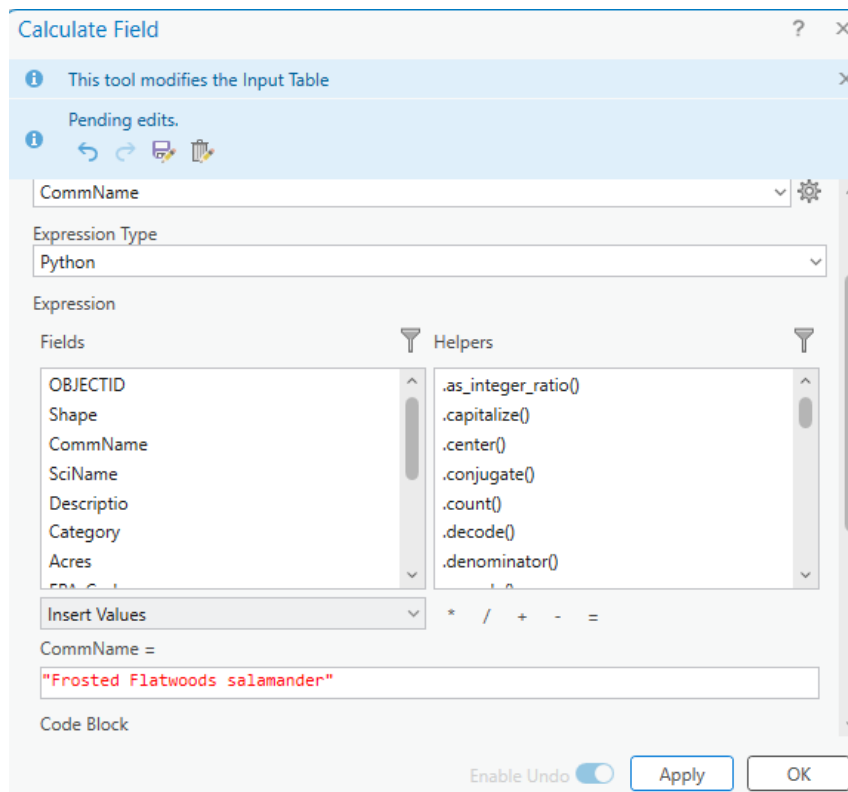


Figure A2-9. Screenshot of “Calculate Field” tool

2. Update the “SciName” field with Field Calculator. Right clicked on “SciName” àSelect “Calculate Field” à Enter "Ambystoma cingulatum" below the field name à Click “Apply” **(Figure A2-10)**

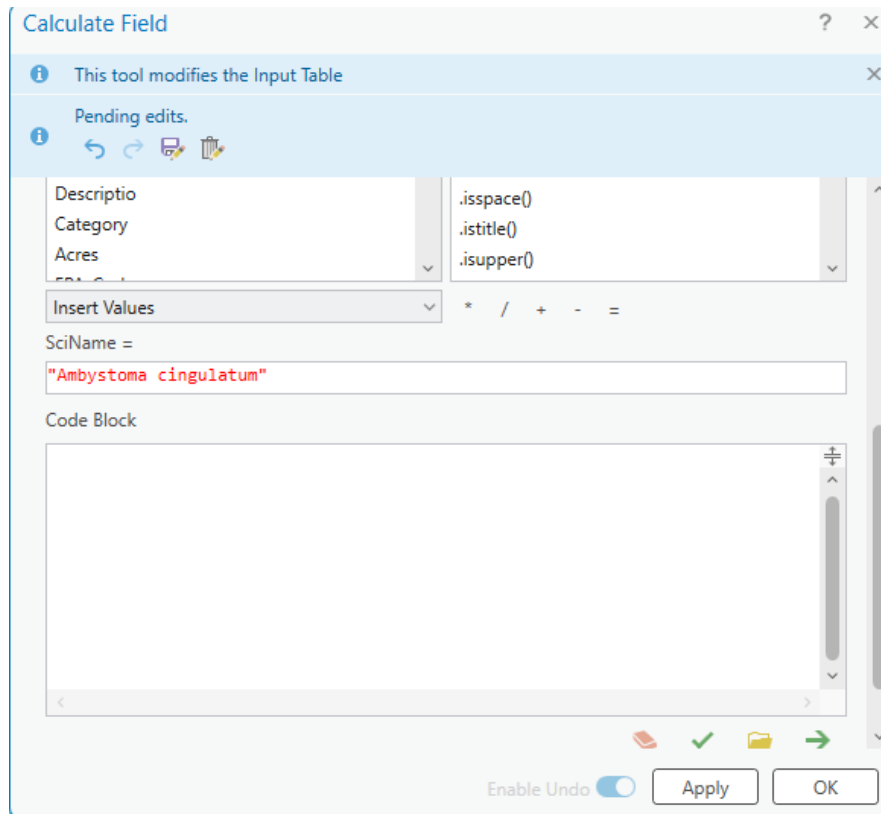


Figure A2-10. Screenshot of “Calculate Field” tool

3. Update the “Category” field with Field Calculator. Right clicked on “Category” à Select “Calculate Field” à Enter "Area of Occupancy" below the field name à Click “Apply” (**Figure A2-11**)

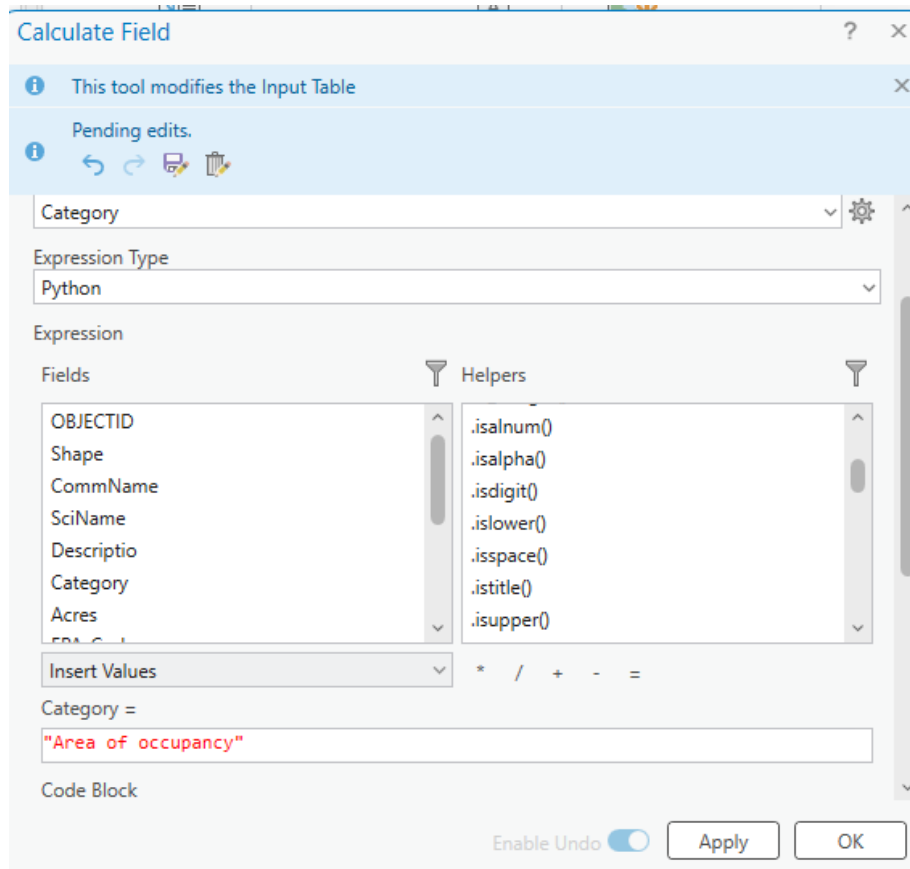


Figure A2-11. Screenshot of “Calculate Field” tool

4. Update the “EPA_Code” field with Field Calculator. Right clicked on “EPA_Code” à Select “Calculate Field” à Enter "199" below the field name à Click “Apply” **(Figure A2-12)**

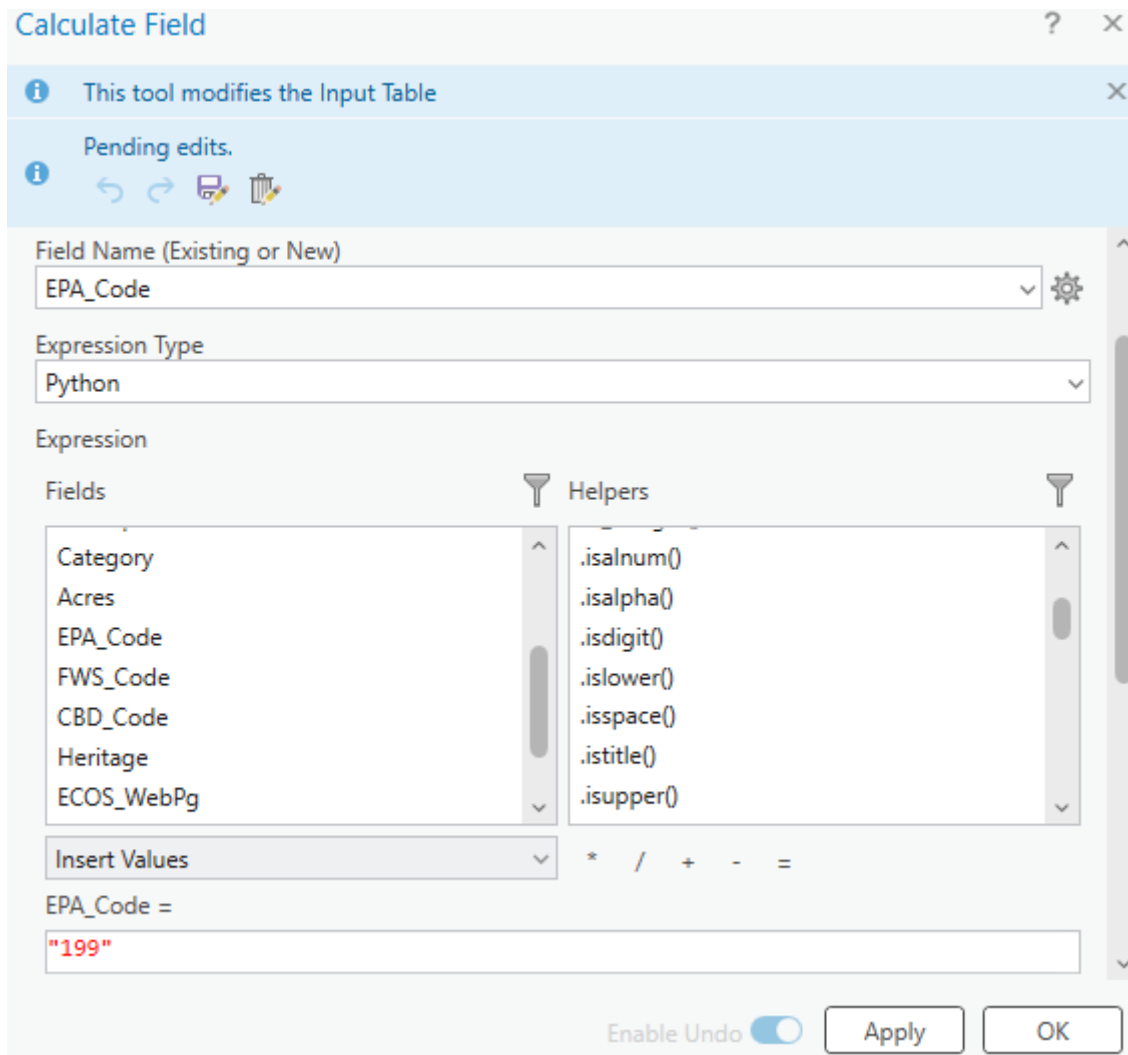


Figure A2-12. Screenshot of “Calculate Field” tool

5. Update the “FWS_Code” field with Field Calculator. Right clicked on “FWS_Code” à Select “Calculate Field” à Enter “D013” below the field name à Click “Apply” (**Figure A2-13**)

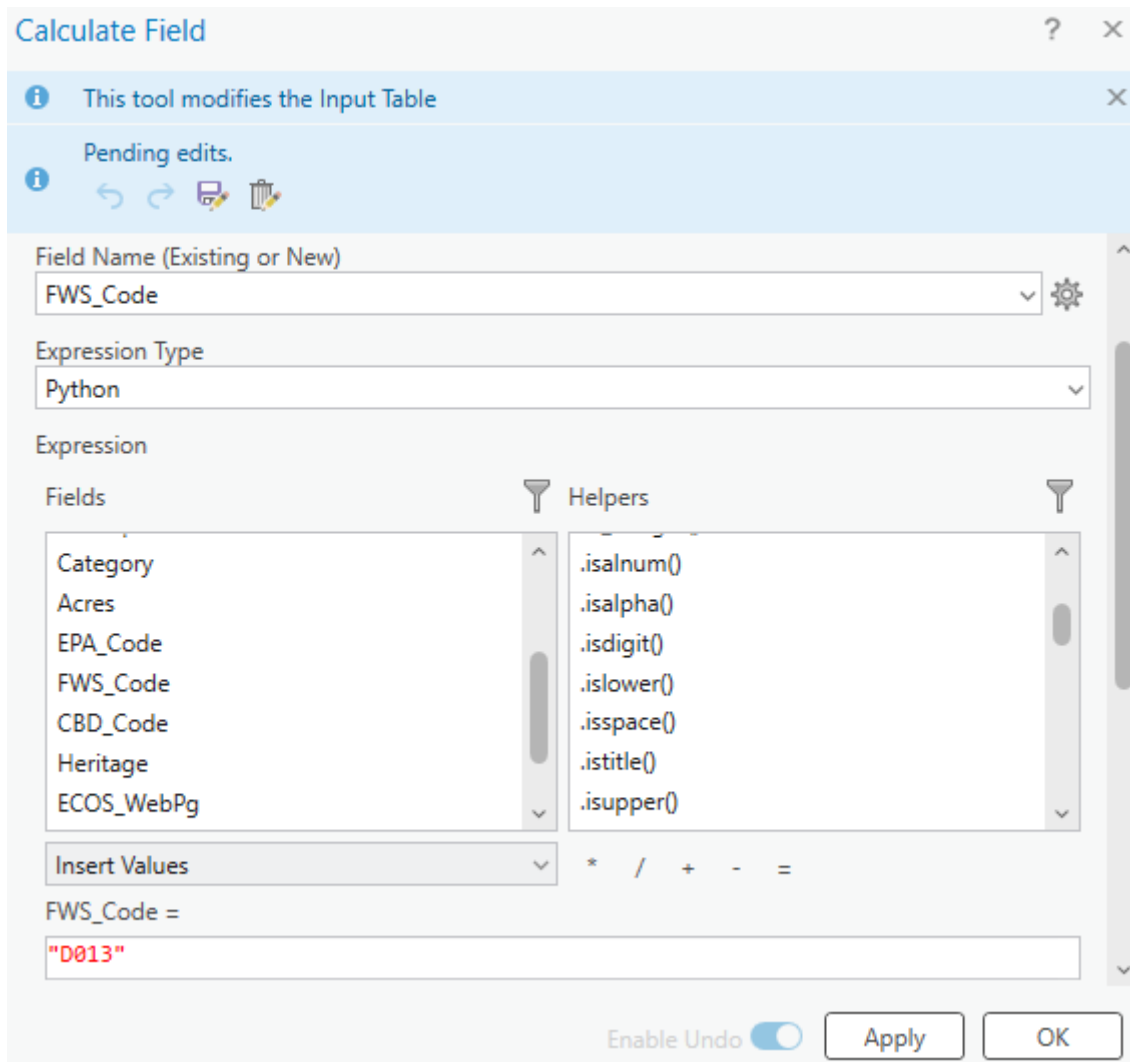


Figure A2-13. Screenshot of “Calculate Field” tool

6. Update the “CBD_Code” field with Field Calculator. Right clicked on “CBD_Code” à Select “Calculate Field” à Enter “1446” below the field name à Click “Apply” (**Figure A2-14**)

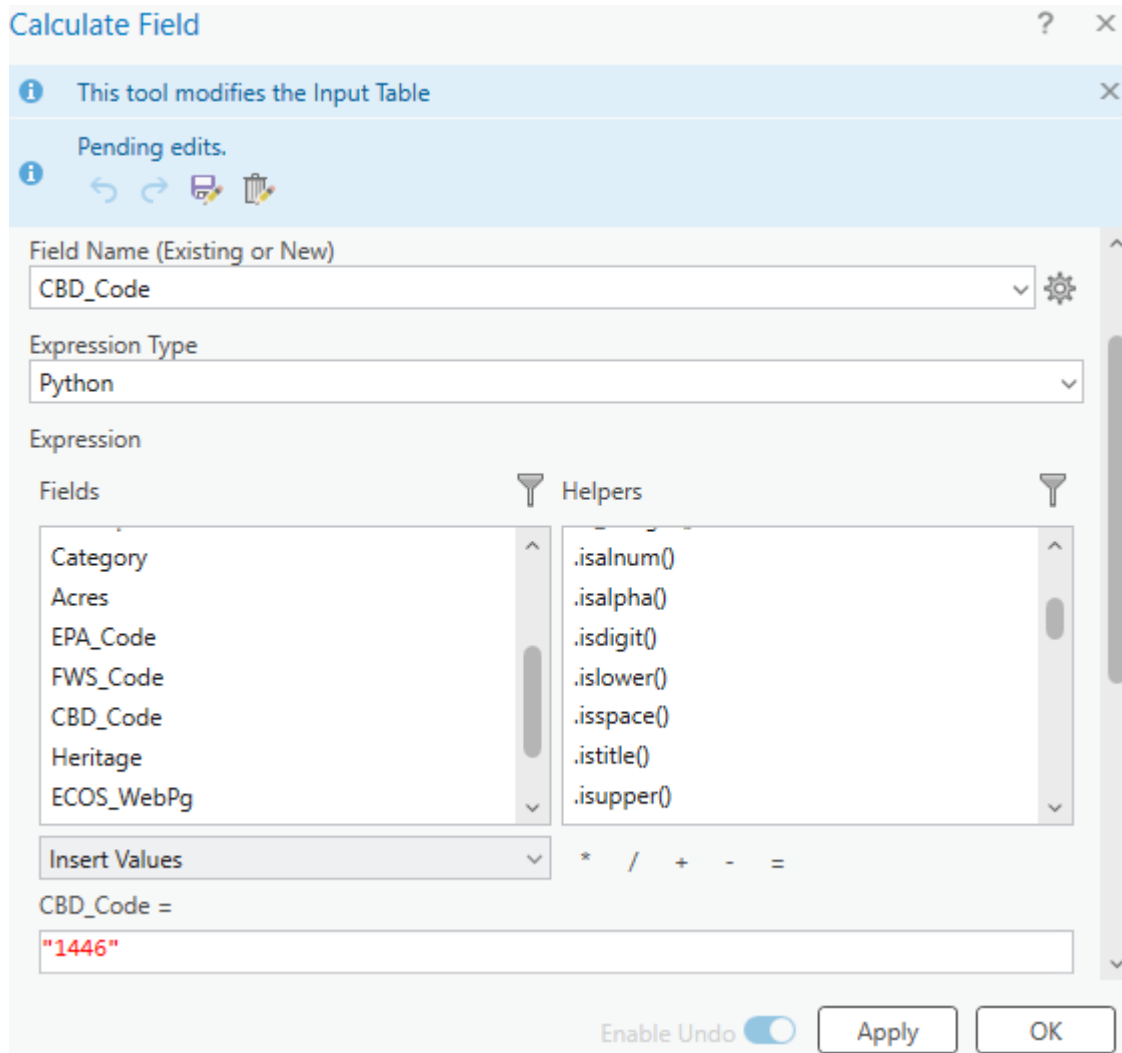


Figure A2-14. Screenshot of “Calculate Field” tool

7. Update the “Heritage” field with Field Calculator. Right clicked on “Heritage” à Select “Calculate Field” à Enter "0" below the field name à Click “Apply” **(Figure A2-15)**

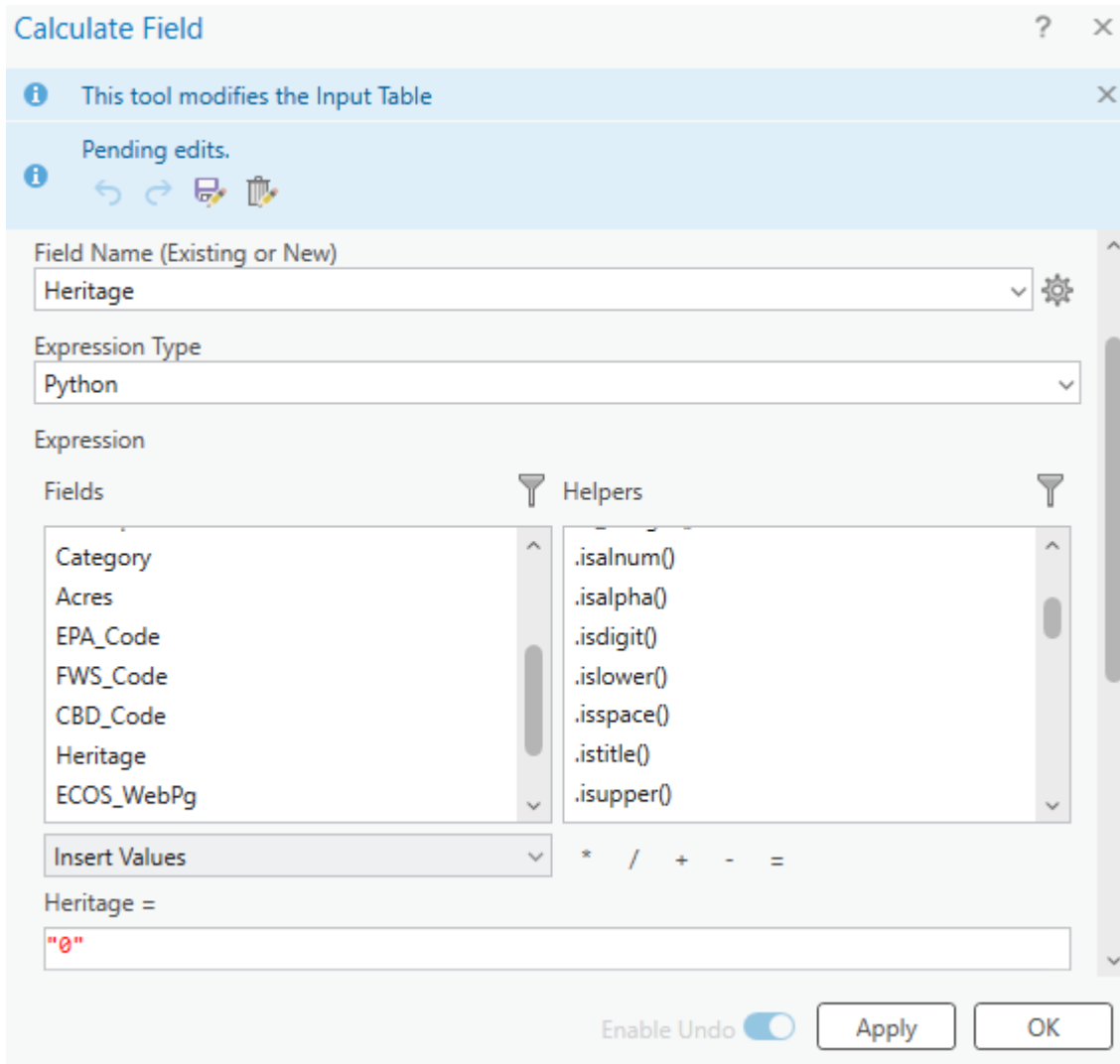


Figure A2-15. Screenshot of “Calculate Field” tool

8. Update the “ECOS_WebPg” field with Field Calculator. Right clicked on “ECOS_WebPg” à Select “Calculate Field” à Enter " <https://ecos.fws.gov/ecp/species/4981>" below the field name à Click “Apply” (**Figure A2-16**)

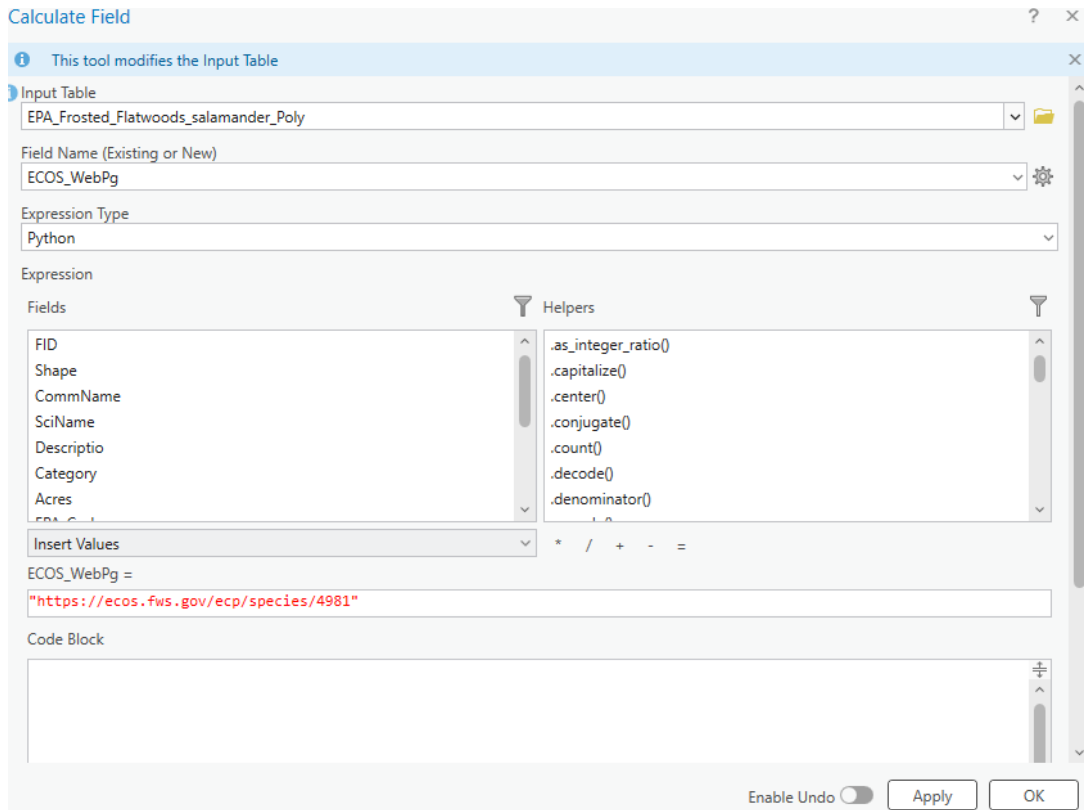


Figure A2-16. Screenshot of “Calculate Field” tool

9. Turn on the “World UTM Grid” layer and identify the UTM zone as “16” and “17”. For each UTM zone, “Select by Location” the polygons that intersect the zone. Right-click on the “Acres” field left-click on “Calculate Geometry”. “Calculate Geometry” dialog box appears. Select “Area” under “Property”, “US Survey Acres” in “Area Unit” and “NAD_1983_UTM_Zone_17N” or “NAD_1983_UTM_Zone_17N” in the Coordinate System” boxes. Click Apply. Click OK. **(Figure A2-56)**

**2.4. Check if EPA’s “CultivateAreas_Over25acres” overlaps
“EPA_Frosted_Flatwoods_salamander_Poly” feature class**

1. Use “Select by Location” tool with “EPA_Frosted_Flatwoods_salamander_Poly” as the input feature and “CultivateAreas_Over25acres” as the selecting Features. **(Figure A2-17)**

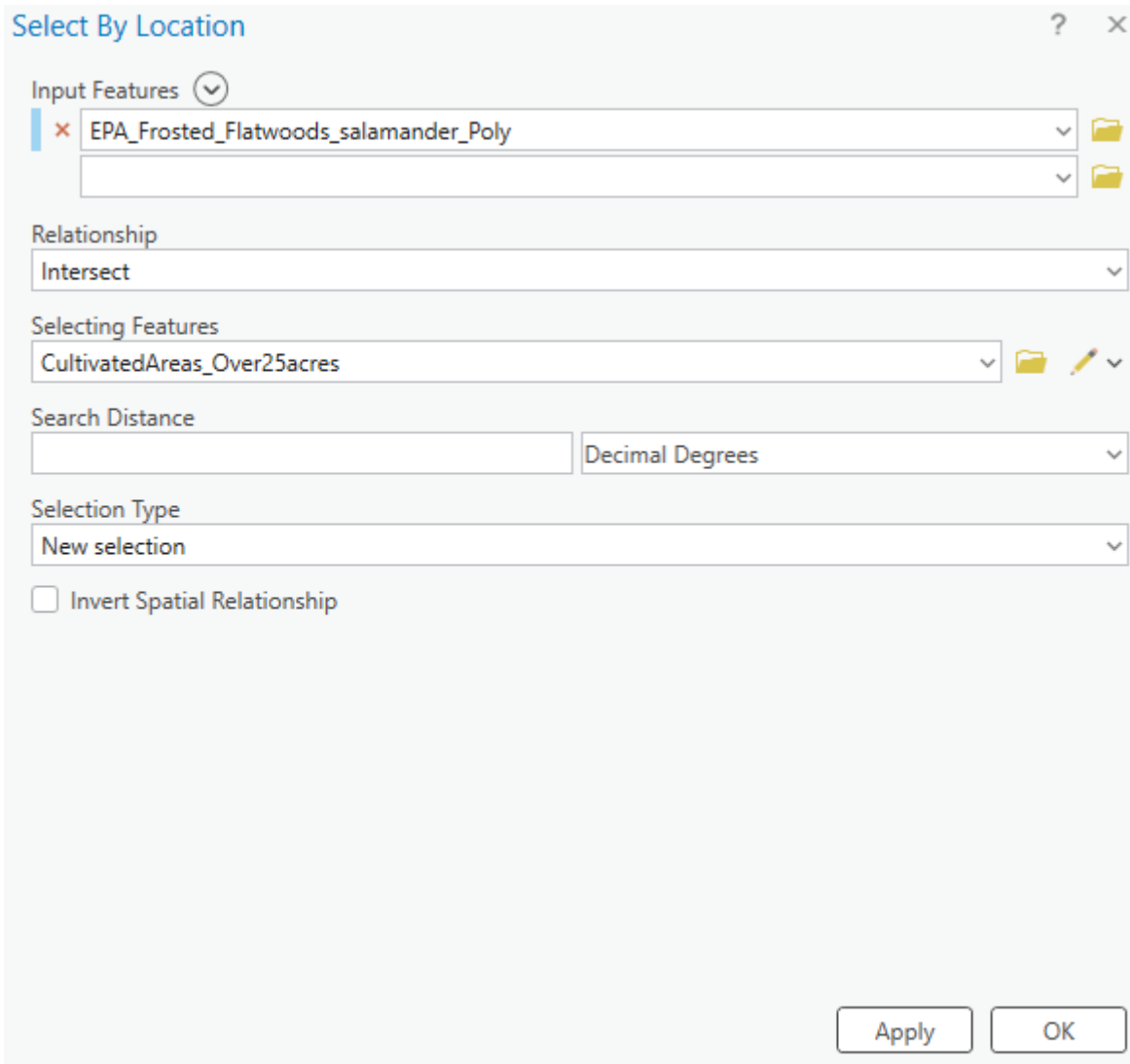


Figure A2-17. Screenshot of “Select by Location” tool

2. One polygon in the “EPA_Frosted_Flatwoods_salamander_Poly” is selected. Zoom to the selected polygon (with 50% transparency) and it shows that the overlap is very minimal. **(Figure A2-18)** The method to remove “CultivateAreas_Over25acres” from the “EPA_Frosted_Flatwoods_salamander_Poly” is insignificant and will not be done.

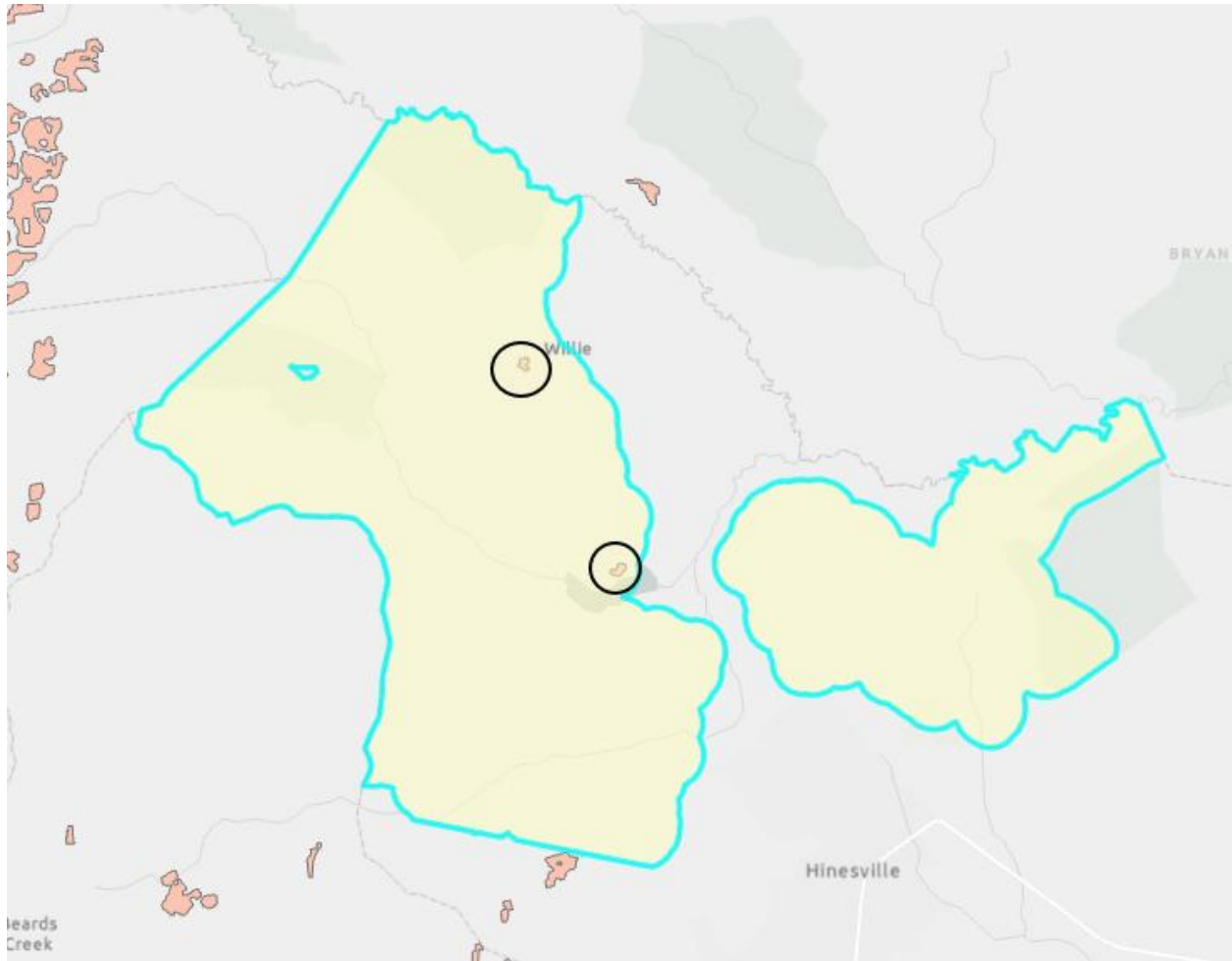


Figure A2-18. Screenshot of Results from “Select by Location” tool

2.5. Use Download USA NLCD Land Cover raster process to determine Percentage of Interim Core Map Represented by NLCD Land Covers

1. Use the MRLC viewer (<https://www.mrlc.gov/viewer/>) and upload shapefile of area to use as an extent to download the NLCD that covers all the “EPA_Frosted_Flatwoods_salamander_Poly” records. **(Figure A2-19)** Downloaded the file and add it to ArcPro and name it, “NLCD_FFS_Area1.tiff”.

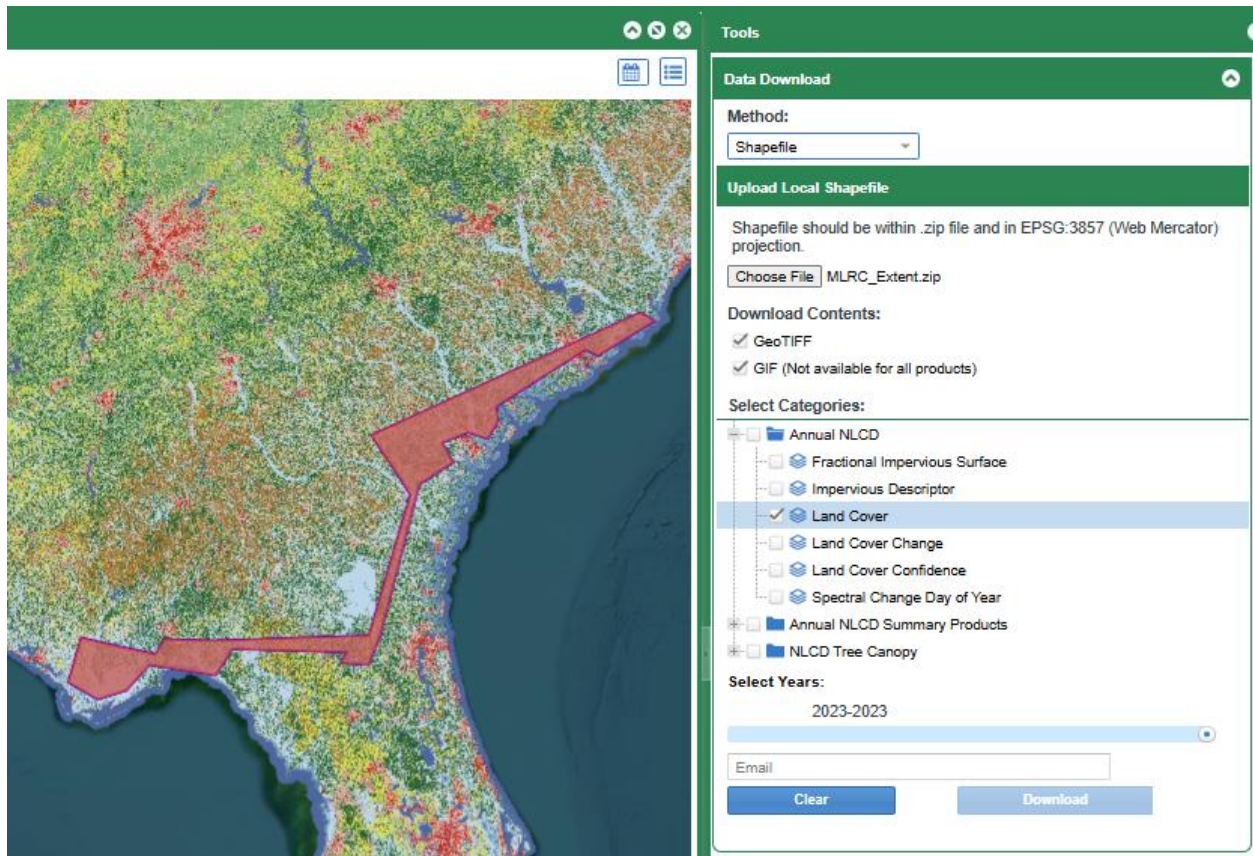


Figure A2-19. Screenshot MRLC Viewer with Shapefile Extent

2. Use the “Extract by Mask” tool with “NLCD_FFS_Area1.tiff” filtered by the same area within “EPA_Frosted_Flatwoods_salamander_Poly” as the extent. In the “Environments” tab, change the output coordinate system to match “EPA_Frosted_Flatwoods_salamander_Poly”, which in this case is “USA_Contiguous_Albers_Equals_Area_Conic_USGS_version”. The output is named, “NLCD_MaskArea1”. **(Figure A2-20) (Figure A2-21)**

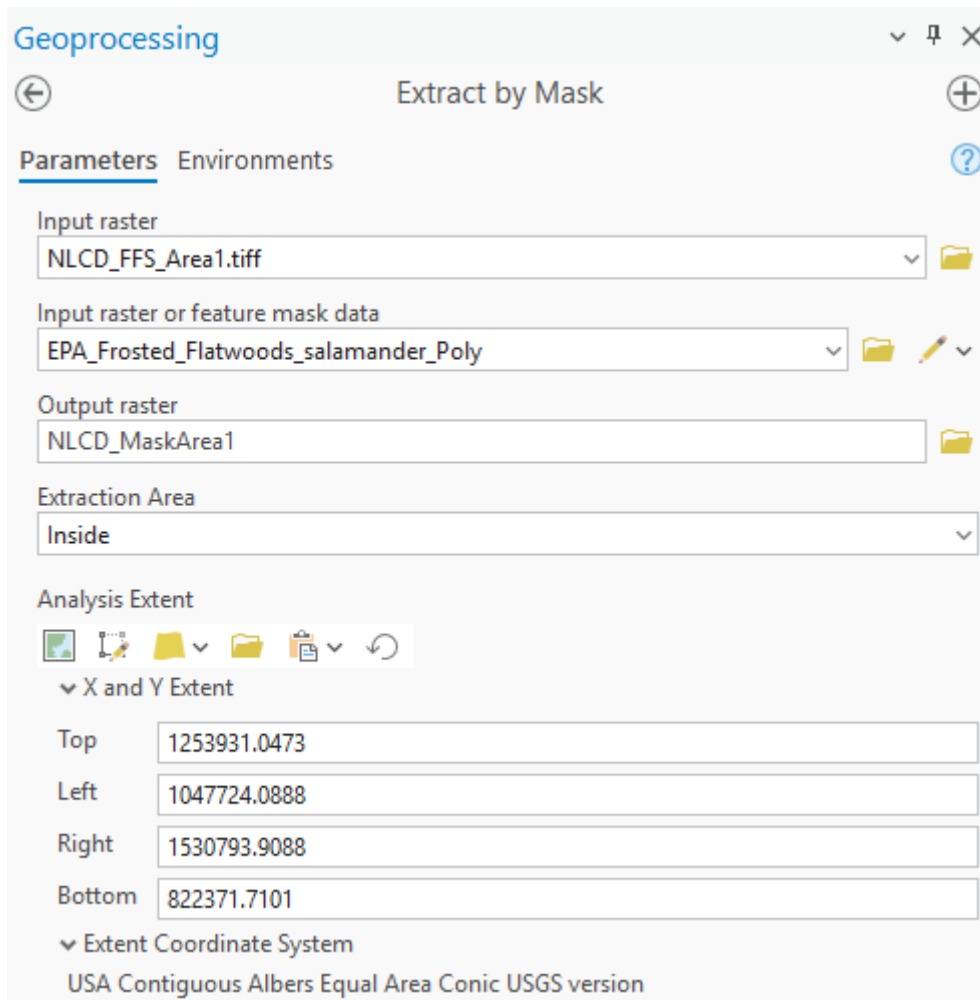


Figure A2-20. Screenshot “Extract By Mask” Tool Parameters

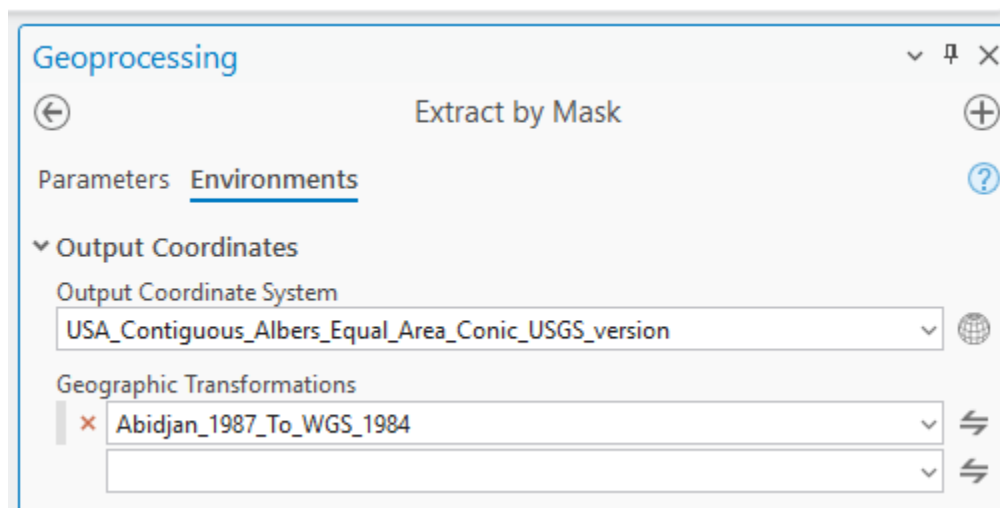


Figure A2-21. Screenshot “Extract By Mask” Tool Environments

3. Use the “Tabulate Area” tool to determine the count of area for each NLCD code. **(Figure A2-22)**

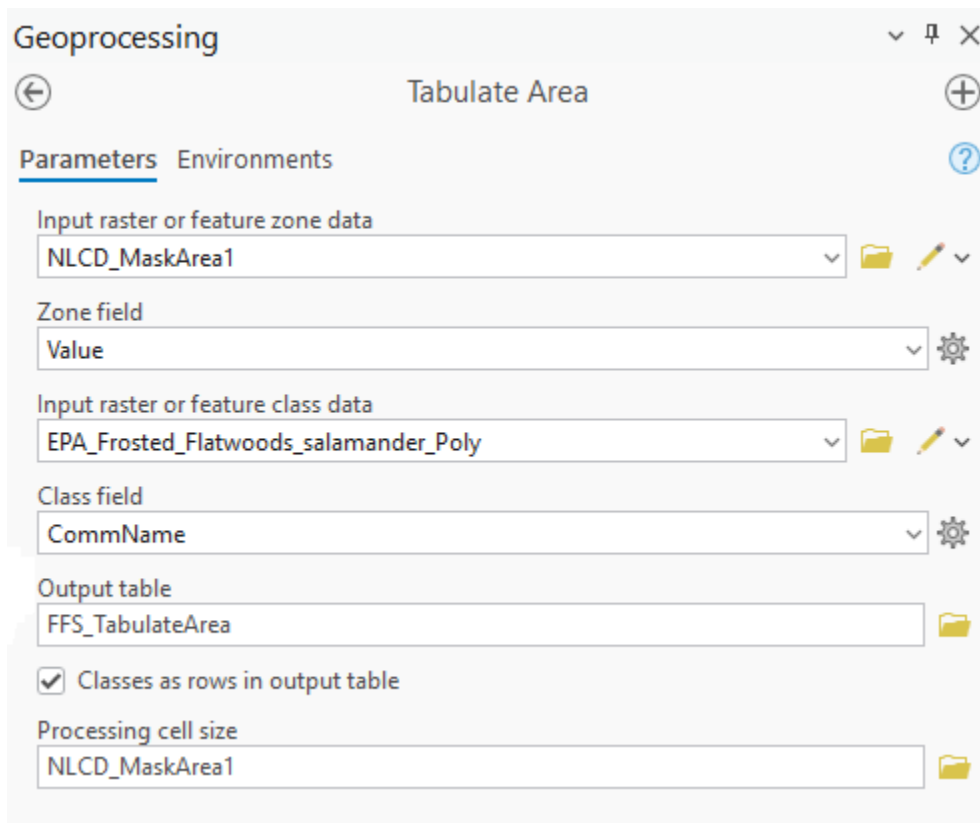


Figure A2-22. Screenshot “Tabulate Area” Tool

4. Add a double field named, “Per” to the “FFS_TabulateArea” table. Right clicked on field and select “Calculate Field”. Entered the formula “(!Count!/ 447744)*100”. This calculates the percentage of NLCD within the core map area. **(Figure A2-23)** Review results and input into (Table 1. Percentage of Interim Core Map Represented by NLCD Land Covers and Associated Example Pesticide Use Sites/Types.)

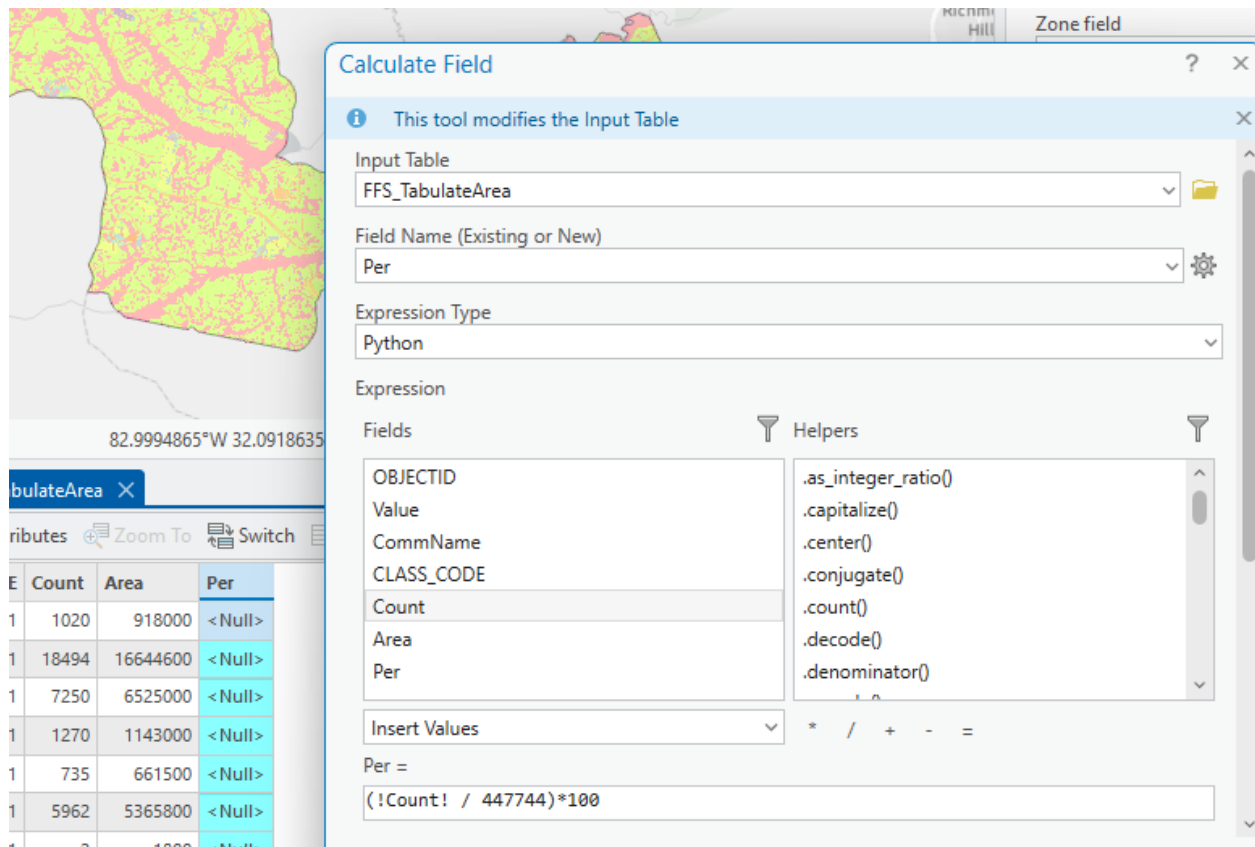


Figure A2-23. Screenshot of “Calculate Field” tool