

Core Map Documentation for the Dusky gopher frog (*Rana sevosa*)

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Draft Interim Core Map Developer: Center for Biological Diversity

Species Summary

The Dusky gopher frog (EntityID#208) is an amphibian endemic to the longleaf pine ecosystems of Mississippi. While the frog was once found in Louisiana and Alabama, currently there is one known wild population, and seven reintroduced populations (up from two reintroduced populations in 2015) confined to the state of Mississippi. It is estimated that 249 adult Dusky gopher frogs breed in the wild, with the majority found at a single location named Glen's Pond. Dusky gopher frogs are sensitive to pesticides used in habitat management and invasive species control.

EPA Review Notes

The developers created this core map using EPA's 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 EPA'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 EPA'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 be 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 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 is based on the critical habitat of the Dusky gopher frog designated in 2012. As discussed in greater detail below, all known locations of the frog are encompassed within the critical habitat designation, as well as several locations that are either targeted for translocations or currently undergoing translocations. Given that this map is based solely on critical habitat that is relatively recent and targeted, our best professional judgement of uncertainty is ranked as a 1 out of 5 (none), indicating the lowest level of uncertainty.

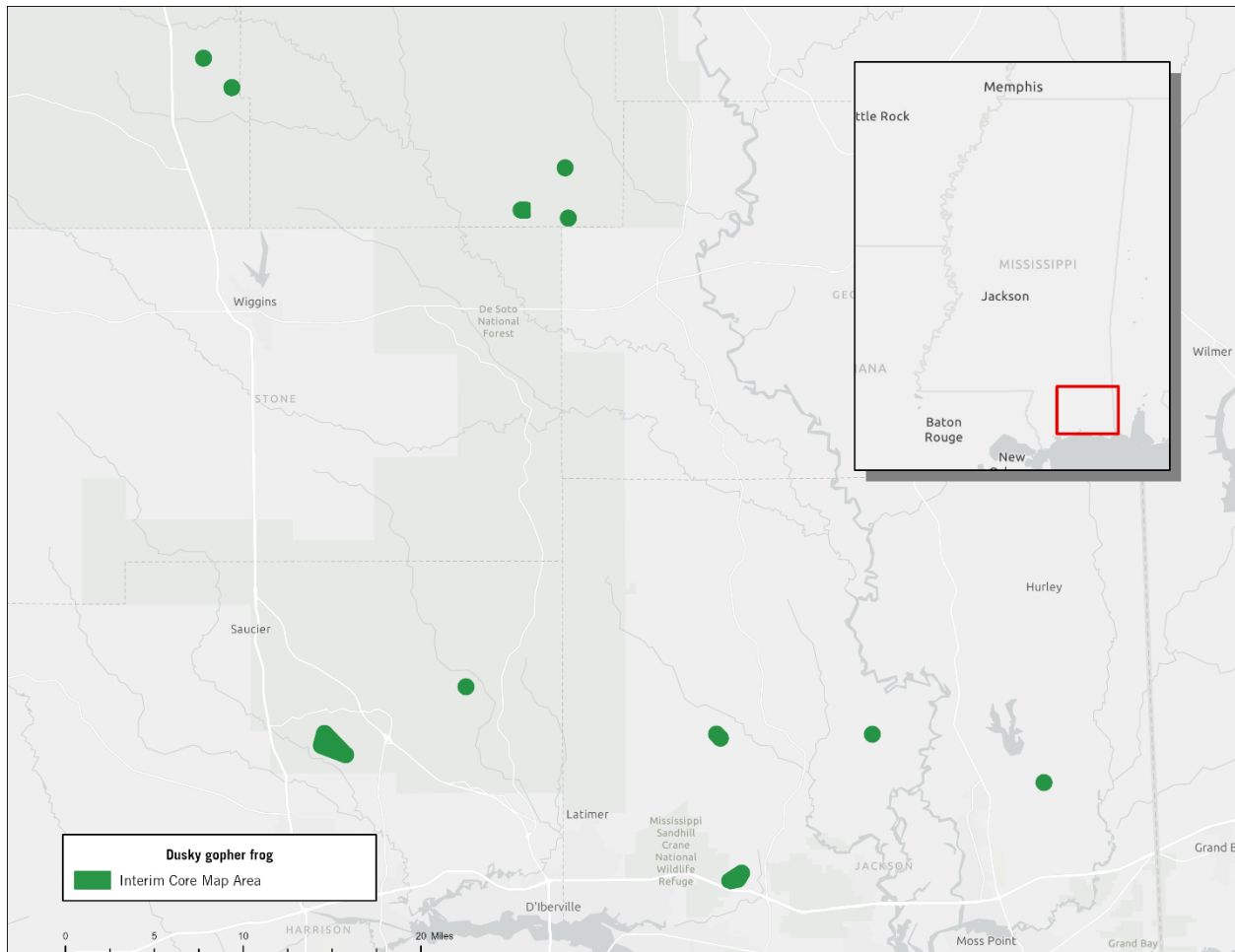


Figure 1. Dusky gopher frog interim core map. (approximately 4,933 acres)

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	% of core map represented by example pesticide use
Forestry	Deciduous Forest (41)	0	64.5
	Evergreen Forest (42)	64.4	
	Mixed Forest (43)	.1	
Agriculture	Pasture/Hay (81)	.8	.8
	Cultivated Crops (82)	0	
Mosquito adulticide, residential	Open space, developed (21)	3.9	4.5
	Developed, Low intensity (22)	.6	
	Developed, Medium intensity (23)	0	
	Developed, High intensity (24)	0	
Invasive species control	Woody Wetlands (90)	26.8	30.1
	Emergent Herbaceous Wetlands (95)	.3	
	Open water (11)	.1	
	Grassland/herbaceous (71)	1.3	
	Scrub/shrub (52)	1.6	
	Barren land (rock/sand/clay; 31)	0	

¹ NLCD 2024 Year

Evaluation of Known Location Information

We reviewed the specific place names of each location site listed within the latest 2021 5-YR. We then compared this list to the 2012 critical habitat to ensure that all known locations were covered under the currently designated critical habitat. We further compared obscured iNaturalist data to confirm that all occurrences are in Mississippi, though, as discussed below, did not use these data in our ultimate core map.

Approach Used to Create Core Map

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; and
4. Document the core map

For step 1, CBD compiled available information for the Dusky gopher frog from Fish and Wildlife Service (FWS). Appendix 1 provides the compiled list of information, but the 2015 critical habitat and 2015 recovery plan were the most influential in creating the core map.

For step 2, CBD used the compiled information to create the core map, selecting a critical habitat core map type with no supplementation. The range of the species was not targeted enough to serve as a core map, and known locations were redundant to the critical habitat after further review.

For step 3, CBD used the best available data sources to generate the core map, which in this case was the critical habitat polygon provided by FWS. All GIS data sources used for the Dusky gopher frog were discussed in the process document and further described in Appendix 2. For the core map, CBD confirmed that all known locations were within the critical habitat and subsequently used the critical habitat polygons as the core map.

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

We opted against using specific location data in narratives as well as any data from iNaturalist, though these data were used to confirm that a critical habitat core map was justified.

We reviewed the specific place names of each location site listed within the six viable metapopulations of Dusky gopher frog in the 2021 5-Year Review, which we compared to the corresponding lists in the 2012 critical habitat designation. This cross-referencing determined

that the critical habitats overlapped every known location in the 5-Year Review, but included a few additional locations that were ultimately included. We further compared obscured iNaturalist data to confirm that all occurrences are in Mississippi.

We further considered including prior locations flagged in Louisiana, but since those areas remain unoccupied and have not had reintroductions since the re-designation of critical habitat in 2012, we opted not to include the Louisiana locations.

Appendix 1. Information compiled for species during Step 1

1. Recent FWS documents

2015 & 2021 5 Year Review, 2015 Recovery Plan, 2019 Recovery Plan Amendment, Critical Habitat Designation, 2012.

- 5-Year Review (2015): https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2325.pdf
- 5-Year Review (2021): https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3504.pdf
- Recovery Plan (2015): https://ecos.fws.gov/docs/recovery_plan/Dusky%20Gopher%20Frog%20Recovery%20Plan%20Amendment_1.pdf
- Recovery Plan Amendment (2019): https://ecos.fws.gov/docs/recovery_plan/Dusky%20Gopher%20Frog%20Recovery%20Plan%20Amendment_1.pdf
- Critical Habitat Designation (2012): <https://www.govinfo.gov/content/pkg/FR-2012-06-12/pdf/2012-13488.pdf>

2. Background information

Status: Endangered

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

Resiliency – FWS has not assessed; likely low, as the gopher frog is highly dependent on a niche habitat type surrounded by long leaf pine. Only a few locations with known breeding still remain, with only the original breeding site supporting a naturally viable population.

Redundancy – FWS has not assesses; likely low, as the gopher frog is clustered in a limited range of remaining habitat. However, recovery efforts have begun to address low redundancy.

Representation – FWS has not assessed; though all populations are in Mississippi, they are distributed through several recovery blocks. Historical, suitable, yet unoccupied breeding ponds have been identified in Louisiana.

However, it is worth noting that in 2015 FWS assessed that the species is “improving overall”

Habitat, Life History, and Ecology

Habitat: The Dusky gopher frog is an endemic of the longleaf pine ecosystem. Dusky gopher frog habitat includes both upland sandy and sandy loam habitats—historically forest dominated by longleaf pine—and wetland breeding sites embedded within the forested landscape. Breeding sites are ephemeral (seasonally flooded) ponds not connected to other water bodies (isolated) with an open canopy (5-Year Review, 2021). Tadpoles require at least three months of standing water to metamorphize, and upon emerging, move to the upland habitat, only to return **in the winter** to breed. Prescribed fire is being used at those sites occupied by the Dusky gopher frog to create optimal habitat, and at sites being managed as potential translocation sites, to maintain the open canopy and groundcover vegetation of the frog’s aquatic and terrestrial habitat. The connectivity of Dusky gopher frog breeding and nonbreeding habitat within the geographic area occupied by the species must be maintained to support the species’ survival. (5-Year Review, 2015).

Adult and subadult dusky gopher frogs spend the majority of their lives underground, generally in stump holes or small mammal burrows within forested habitat. A unique aspect of the frog’s life history is its tendency to seek out gopher tortoise burrows – which are listed as threatened within the range of the Dusky gopher frog – as an important refuge, meaning any actions to protect the gopher tortoise may have an incidental benefit to the frog. (5-Year Review, 2015)

Life History: Dusky gopher frogs are amphibians with a complex life cycle that consists of aquatic eggs/larvae and terrestrial adults. While adult Dusky gopher frogs spend most of their lives underground, during breeding season, frogs leave their subterranean retreats in the uplands and migrate to their breeding sites during rains associated with passing cold fronts. (Recovery Plan, 2015). Breeding typically occurs from December through March, reproduction has been documented in all months **except May, June and July**. Males spend around 17 days at the pond calling for females, while females spend approximately 9 days and leave before the males. Eggs take approximately 9 to 21 days to hatch, and tadpoles may metamorphize as early as 94 days after hatching. (Recovery Plan, 2015). After breeding, adult Dusky gopher frogs leave pond sites during rainfall events and move to terrestrial belowground refugia. Metamorphic frogs follow, once their development is complete. The farthest movement ever recorded from a breeding pond was 981 feet by a frog tracked for 63 days. (Recovery Plan, 2015). The estimated

maximum longevity, based on mark-recapture data, for male Dusky gopher frogs is 9 years and 12 years for females.

Diet: Adult Dusky gopher frogs are carnivorous and likely have a diet similar to that reported for other species of gopher frogs which includes frogs, toads, small mammals, beetles, hemipterans, grasshoppers, spiders, roaches, and earthworms (Recovery Plan, 2015). Published accounts on the diet of an adult Dusky gopher frog describe finding carabid (*Pasimachus* sp.) and scarabaeid (genera *Canthon* sp. and *Ligryus* sp.) beetles in the gut of one specimen. (Recovery Plan, 2015).

Dusky gopher frog tadpoles eat periphyton (microscopic algae, bacteria, and protozoans) from surfaces of emergent vegetation or along the pond bottom, as is typical of pond-type tadpoles. (Critical Habitat Designation, 2012)

Taxonomy:

Domain:	Eukaryota
Kingdom:	Animalia
Phylum:	Chordata
Class:	Amphibia
Order:	Anura
Family:	Ranidae

While the specific taxonomic history of Dusky gopher frog is complex, the species is part of the Genus *Rana* and is considered a distinct species of gopher frog (*servosa*). While there is a proposed removal of the Genus *Rana*, to be replaced with *Lithobates*, FWS continues to use the common scientific name *Rana servosa*.

Relevant Pesticide Use Sites:

According to the Recovery Plan, pesticides and herbicides commonly used in habitat management and invasive species control may pose a threat to amphibians such as the Dusky gopher frog from direct toxicity or impacts to its habitat.

In addition to pesticide use for habitat management and invasive species control, silviculture and timber production are present in areas adjacent to the occupied habitat of the frog, which is both mentioned in the recovery plan and confirmed overlap analysis.

Relevant Recovery Criteria and Actions:

Objective: The primary objective of this recovery plan is to prevent the extinction of the Dusky gopher frog. The long-term recovery objective is to downlist the Dusky gopher frog from endangered to threatened.

Criteria:

- The establishment of six viable metapopulations documented within blocks of recovery focus areas, broken up into blocks, that are widely distributed across the range of the species. The six metapopulations would include a minimum of 12 breeding ponds distributed within the species' historic range. Block #1 (Louisiana) must contain 1 metapopulation; Block #2 (South-Central Mississippi) must contain two metapopulations; Block #3 (South Mississippi) must contain two metapopulations; and one metapopulation must occur in either Block #4 (Eastern Mississippi) or Block #5 (Alabama)
- Long-term monitoring of at least 10 years
- Breeding and adjacent upland habitat within the six metapopulation are protected long-term through management agreements, public ownership, or other means, in sufficient quantity and quality to support growing populations.
- Studies of Dusky gopher frog's biological and ecological requirements have been completed and measurements necessary for recovery.

Recommended Recovery Actions:

1. Protect existing wild Dusky gopher frog populations through habitat restoration, management and other conservation techniques.
2. Monitor Dusky gopher frog populations and their habitat.
3. Continue searches for additional Dusky gopher frog populations.
4. Conduct a population and habitat viability analysis (PHVA) and develop the necessary supporting research.
5. Formulate and implement guidelines for using translocations to establish Dusky gopher frog populations.
6. Revise and implement a controlled propagation and reintroduction plan to facilitate use of captive Dusky gopher frogs in translocation efforts.
7. Develop and distribute public educational and informational materials/programs to solicit and promote voluntary stewardship.

Future and Completed Recovery Actions:

1. Development of habitat restoration and management techniques to protect Dusky gopher frog habitat.

2. Completion of surveys throughout the historical range of the Dusky gopher frog for potential suitable habitat and additional populations.
3. Initiation of a translocation/reintroduction program.
4. Completion of a PHVA for the Glen's Pond population.
5. Evaluation of the effectiveness of the translocation/reintroduction program.
6. Selection of additional reintroduction sites, if needed, and development and implementation of an updated release program.
7. Revision of the Dusky Gopher Frog Recovery Plan using the SSA framework to evaluate new information for determining updated actions, costs, and criteria for delisting.

3. Description of Species Range:

The species' historical range included Alabama, Louisiana, and Mississippi. See below for information about where the species is known or believed to occur. Last updated 9/30/22, the FWS range map is based on the historical range, created by attributing sub-watershed polygons with information of the species presence, origin, seasonal and reproductive use.

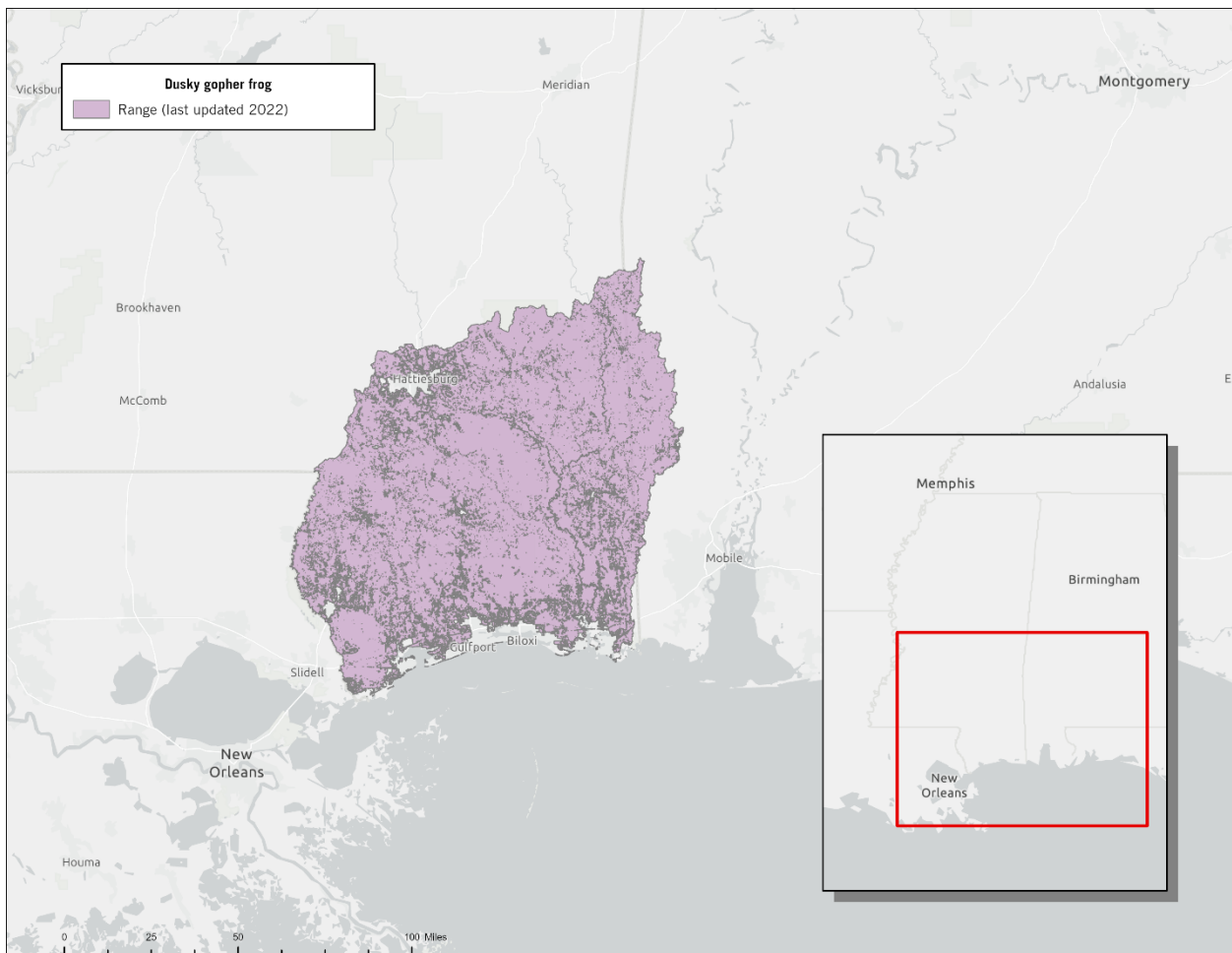
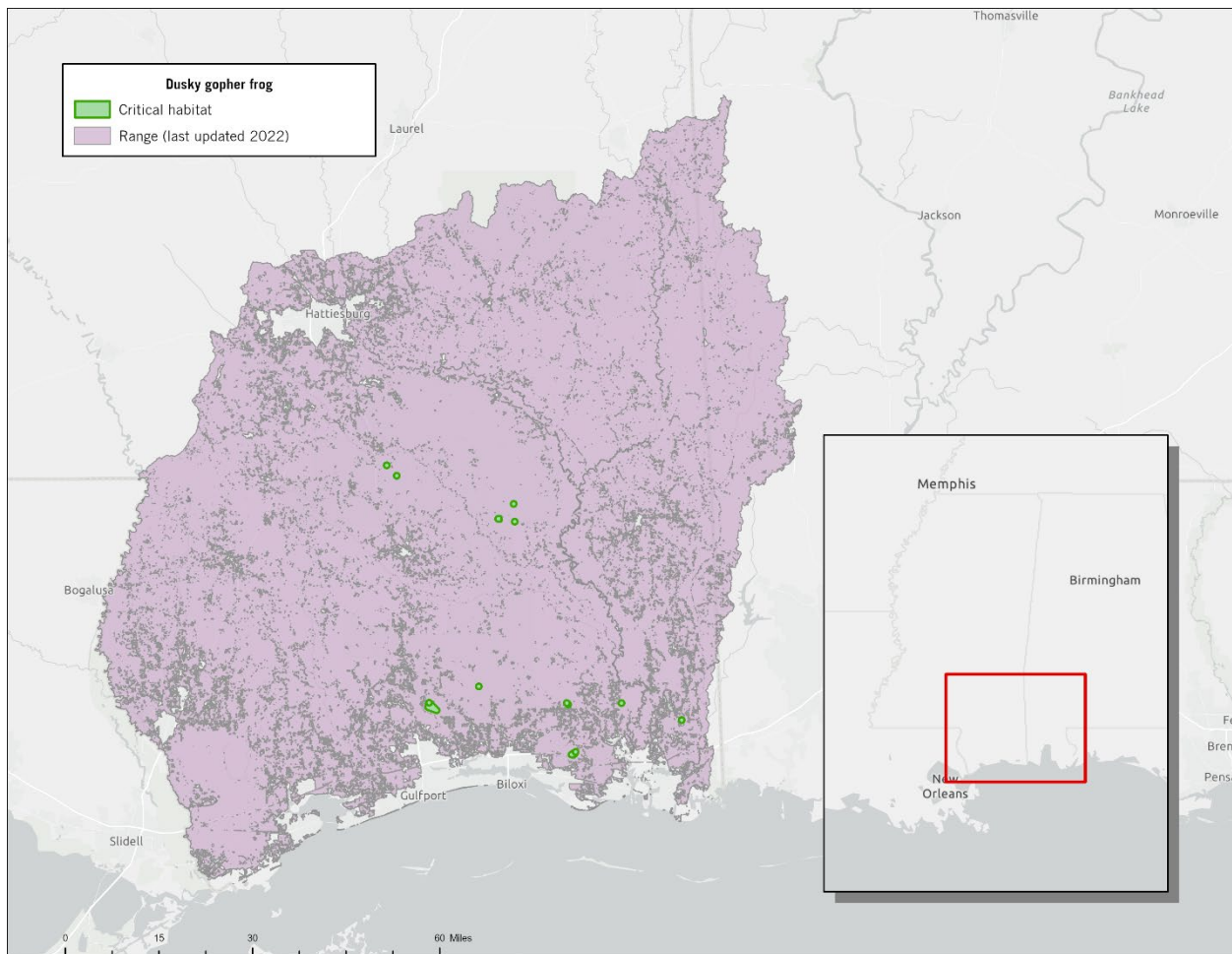


Figure A1-2. FWS range for the Dusky gopher frog from last updated on 09-30-2022². (Area of range is approximately 3,795,737 acres)

4. Critical Habitat:

Originally, approximately 6,477 acres (ac) (2,621 hectares (ha)) in Louisiana and Mississippi were designated as critical habitat for the Dusky gopher frog, but the Louisiana habitat designations were removed as a result of the Supreme Court case *Weyerhaeuser v. Costle*. The critical habitat is now located in Forrest, Harrison, Jackson, and Perry Counties, Mississippi, and now covers 4,933 acres. Physical and biological features (“PBFs”) essential to the conservation of Dusky gopher frog include longleaf pine ecosystem (both forested uplands and ephemeral wetland breeding ponds) and subterranean retreats in upland habitat; wetland water quality to ensure an abundant food supply for both tadpole and adult frogs; and “unpolluted wetland with water free of predaceous fish, suspended sediment, **pesticides**, and chemicals with road runoff” to ensure frog and tadpole development.



² <https://ecos.fws.gov/ecp/species/5600#rangeInfo>

Figure A1-3. Critical Habitat for the Dusky gopher frog overlayed to its range³. Total acreage of Critical Habitat is approximately 4,933 acres.

5. Known Locations

The 2015 5-Year Review and 2015 Recovery Plan include specific information on known locations, which reference place names but also mapped out points. There are five areas named “recovery blocks” that were developed as focus areas for the 2015 US Fish and Wildlife Service Mississippi Field Office recovery plan for the Dusky gopher frog and is shown in figure 10.⁴ These areas are referenced in the 2021 5-Year Review Dusky gopher frog review⁵ under the Biology and Habitat heading. Three of the five blocks, blocks 2, 3 and 4, have known named locations. In recovery block 2, the named locations are Ashe Pond South, Upper Mars Hill Pond, Steve’s Pond and Scaphiopus Pond. In recovery block 3, the named locations are Glen’s Pond, Pony Ranch Pond, New Pond, Old Fort Bayou Mitigation Bank (OFBMB) owned by the The Nature Conservancy, Mississippi Sandhill Crane National Wildlife Refuge (MSCNWR), Mike’s Pond and Powerline Pond. In recovery block 4, the named location is McCoy’s Pond. We compared these known locations to critical habitat designations to ensure that there were no new populations between 2015 and now that existed outside of the critical habitat. We confirmed that critical habitat encompassed all known occupied habitats of the Dusky gopher frog.

Additionally, we referenced publicly available iNaturalist occurrences but recognizing that each occurrence was significantly obscured to protect location information, we used this information simply to confirm that all recent locations are in Mississippi.

³ <https://ecos.fws.gov/ecp/species/5600#crithab>

⁴ [https://ecos.fws.gov/docs/recovery_plan/2015_07_16_Final%20RP_R_sevosa_08212015%20\(1\).pdf](https://ecos.fws.gov/docs/recovery_plan/2015_07_16_Final%20RP_R_sevosa_08212015%20(1).pdf)

⁵ https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3504.pdf

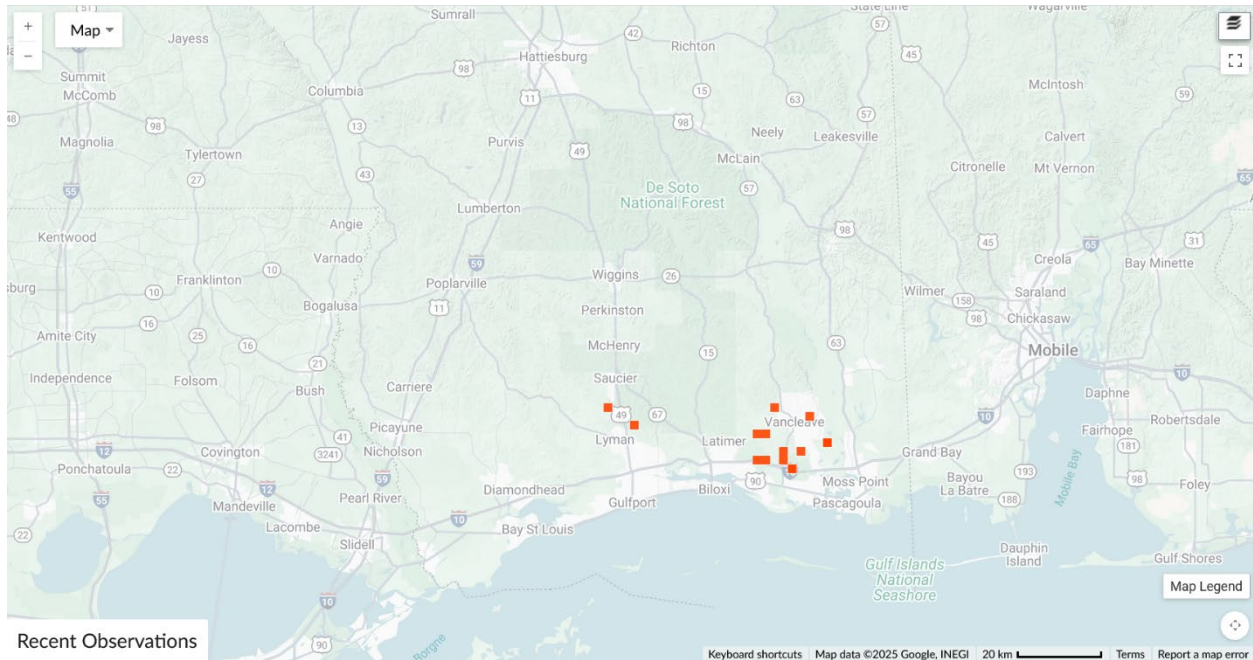


Figure A1-3. iNaturalist Occurrence Data Map

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

The core map type for this species is based on critical habitat for the Dusky gopher reported in its 2012 final critical habitat GIS shapefile.

This section details the data and steps used to create the core map for the Dusky gopher frog based on this biological information.

1. References and Software

- World UTM Grid:
https://services.arcgis.com/P3ePLMYs2RVChkXj/arcgis/rest/services/World_UTM_Grid/FeatureServer
- FWS Species critical habitat:
- https://ecos.fws.gov/docs/crithab/zip/FCH_Rana_sevosa_20120612.zip
- Software used: ArcGIS Pro version 3.2

2. Datasets and Procedures Used in Core Map Development

1.1. Export Create a copy of the 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_Dusky_gopher_frog_Poly".
2. Export a copy of the 2012 FWS critical habitat "FCH_Rana_sevosa_20120612" shapefile as a feature class.

- Go to the field view of "EPA_Dusky_gopher_frog_Poly". Right click on "EPA_Dusky_gopher_frog_Poly" → Data Design → Fields. Right click on the "Descriptio" → Left click on "Copy". Go to the field view of "FCH_Rana_sevosa_20120612" → Right click on "Click here to add a new field" → Left click on "Paste". **(Figure A2-1) (Figure A2-2)**

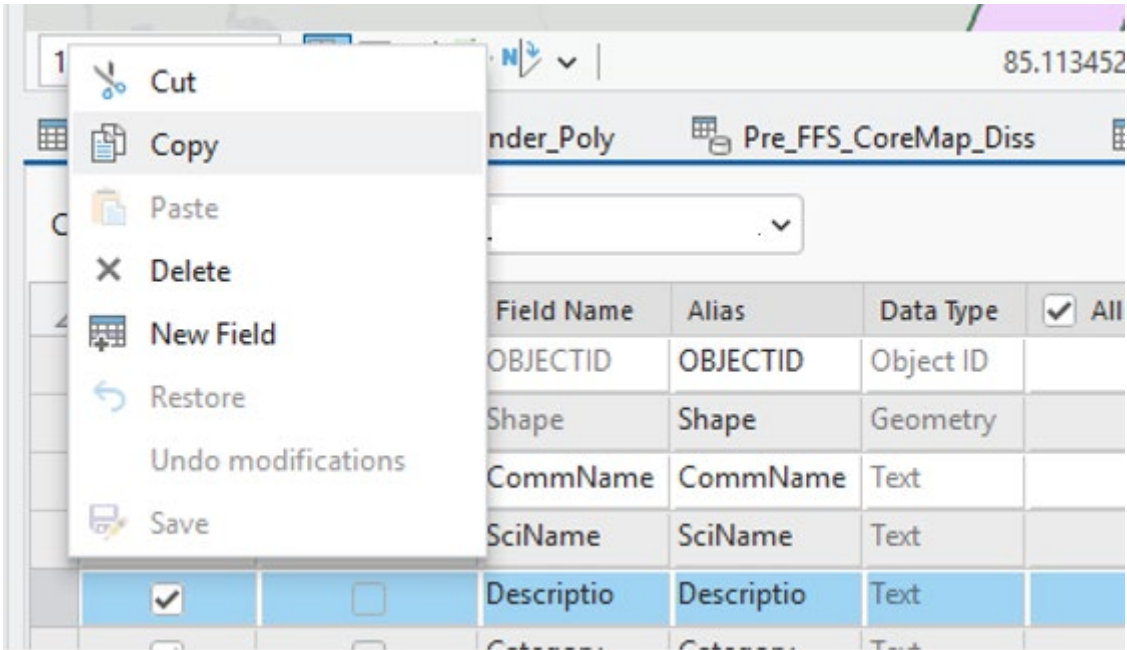


Figure A2-1. Screenshot of "Copy" field

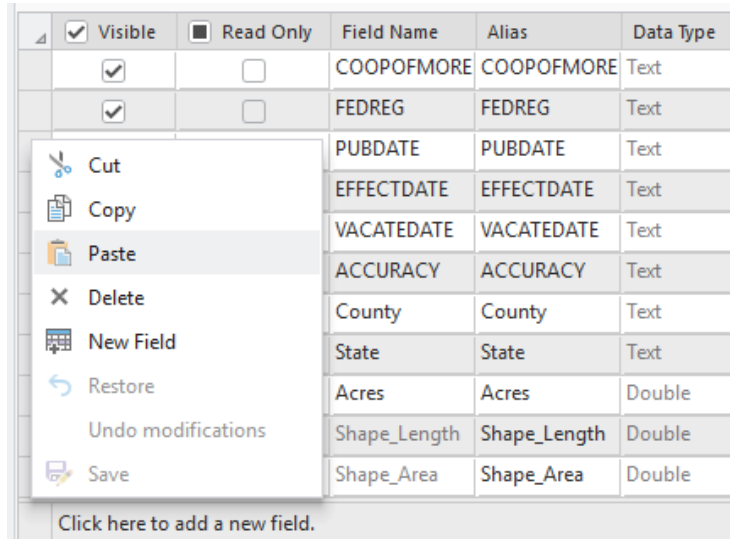


Figure A2-2. Screenshot of "Paste" field

- Select all critical habitat records except where the "Unit" field equals "5".

5. Use "Calculate Field" in the "Descriptio" field in "FCH_Rana_sevosa_20120612" feature class. Click on "Descriptio" field à Select "Calculate Field" à Type "Dusky gopher frog critical habitat. Unit Name is " + !UNITNAME! + ". Unit Number is " + !UNIT! + "." as the expression à Click Apply **(Figure A2-3)**

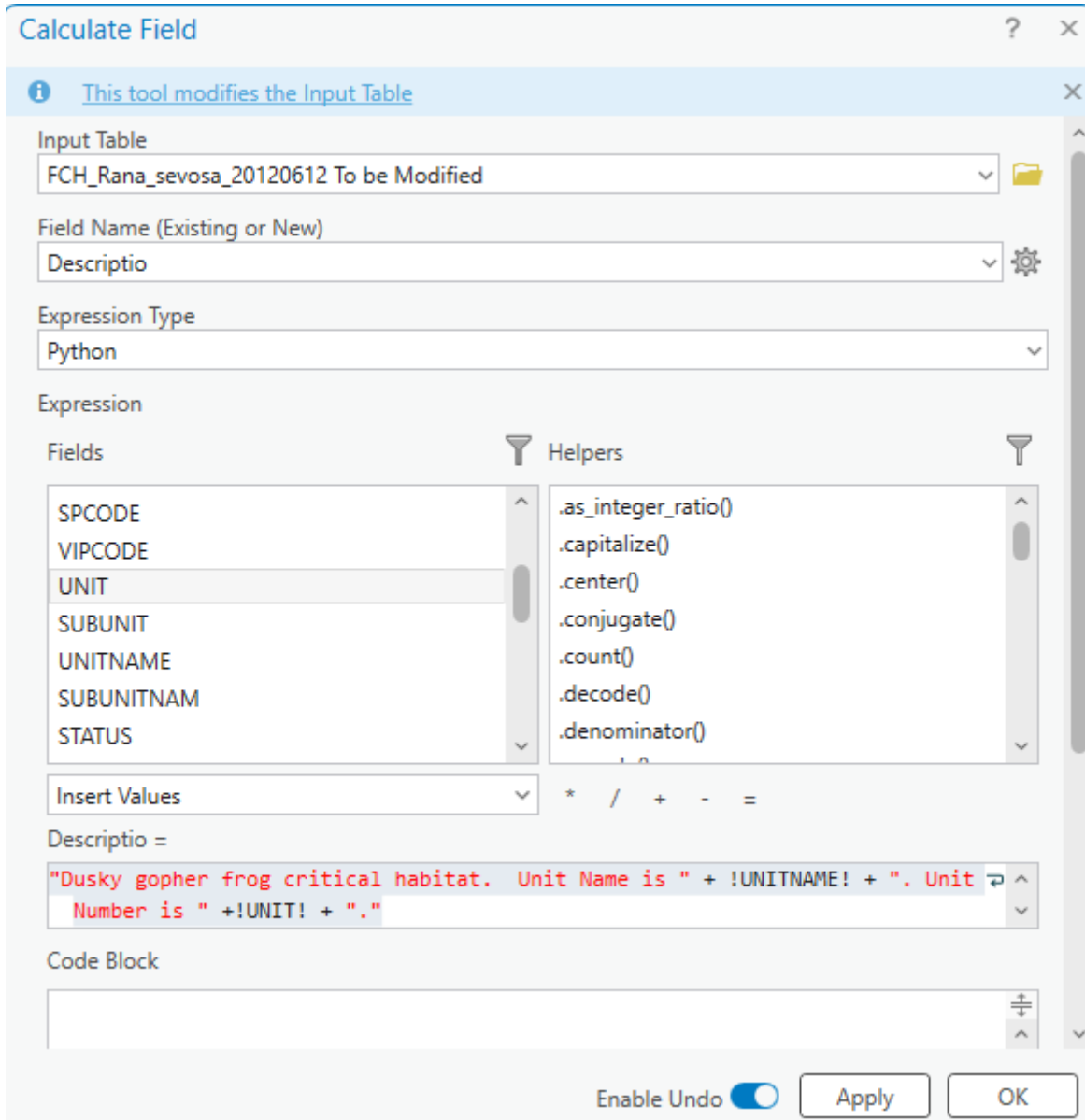


Figure A2-3. Screenshot of "Calculate Field"

6. Select the record in the critical habit feature class where "Unit" equals "5".

7. Use "Calculate Field" in the "Descriptio" field in "FCH_Rana_sevosa_20120612" feature class. Click on "Descriptio" field à Select "Calculate Field" à Type "Dusky gopher frog critical habitat. Unit Number is " +!UNIT! + "." as the expression à Click Apply (Figure A2-4)

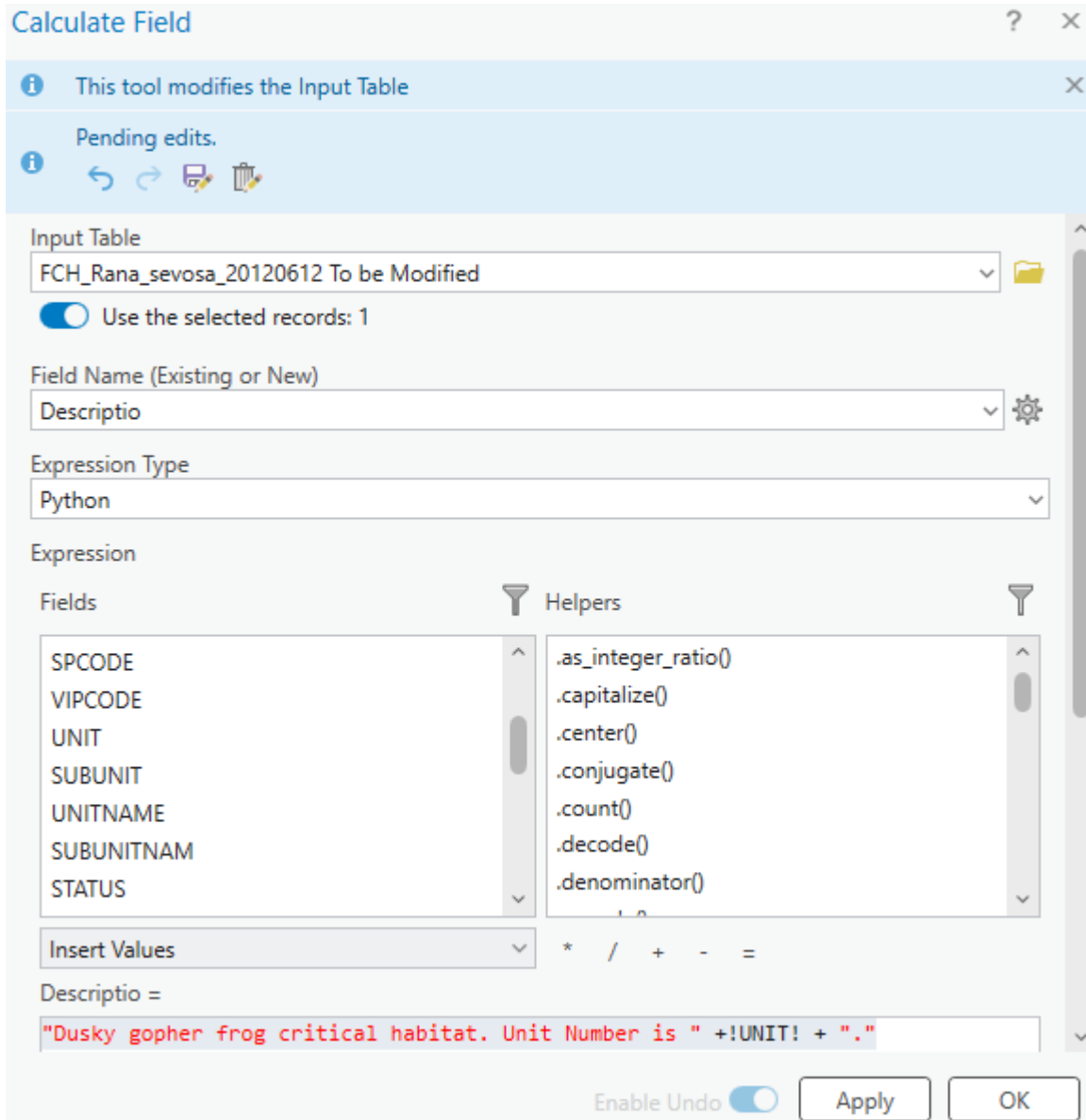


Figure A2-4. Screenshot of "Calculate Field"

8. Copy and paste all the records from the "FCH_Rana_sevosa_20120612" feature class to "EPA_Dusky_gopher_frog_Poly".

2.2. Check if EPA's "CultivateAreas_Over25acres" overlaps "EPA_Dusky_gopher_frog_Poly" feature class

1. Use the "Select by Location" tool to check if any recently copied critical habitat areas intersect the "CultivateAreas_Over25acres". **(Figure A2-5)** One core map area intersects the "CultivateAreas_Over25acres".

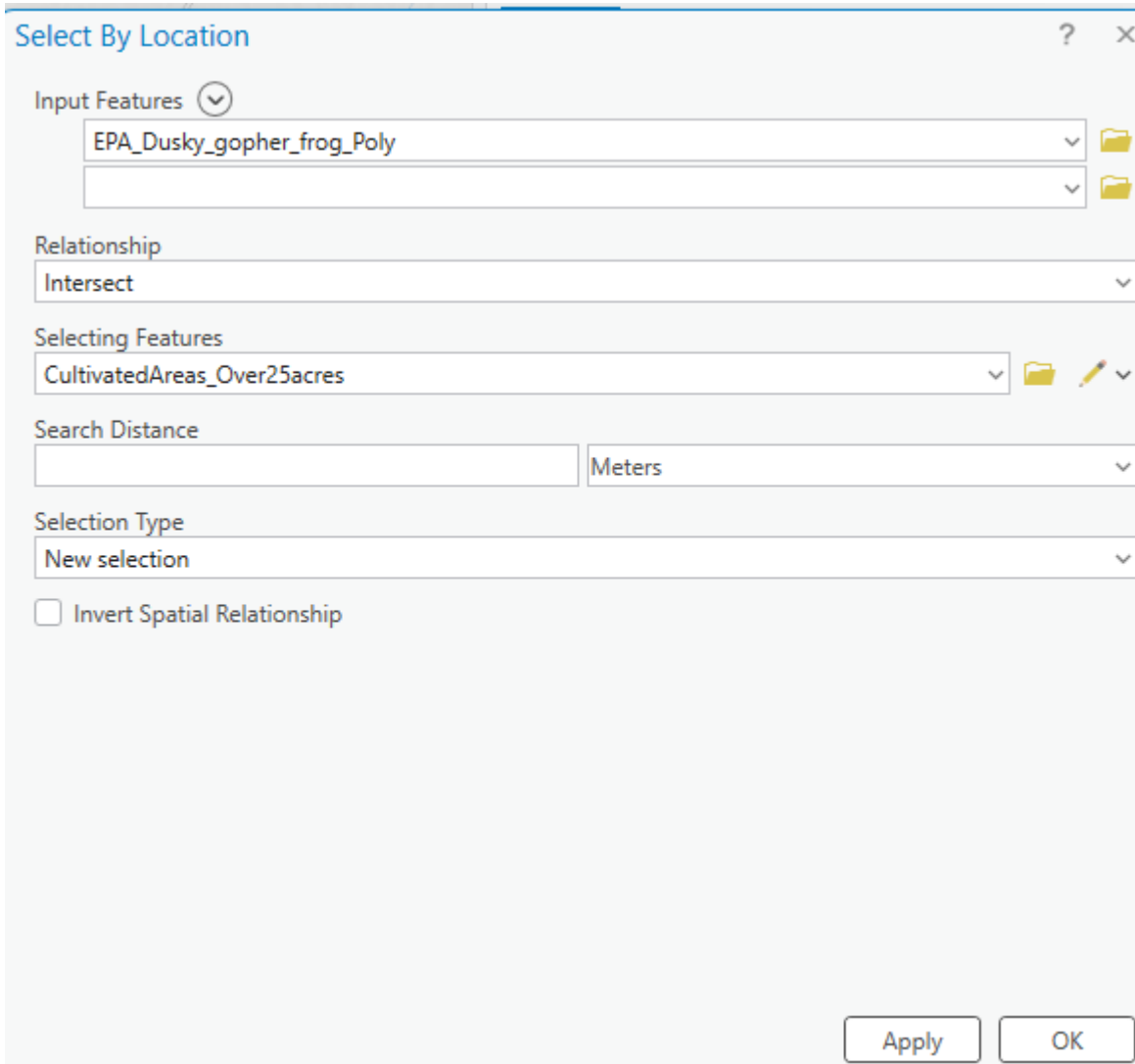


Figure A2-5. Screenshot of "Select by Location" tool

2. Zoom to the one critical habitat area that intersects. **(Figure A2-6)** When the layer is transparent, the overlap is minimal and will not significantly change the selected polygon. It is determined that this process is not necessary.

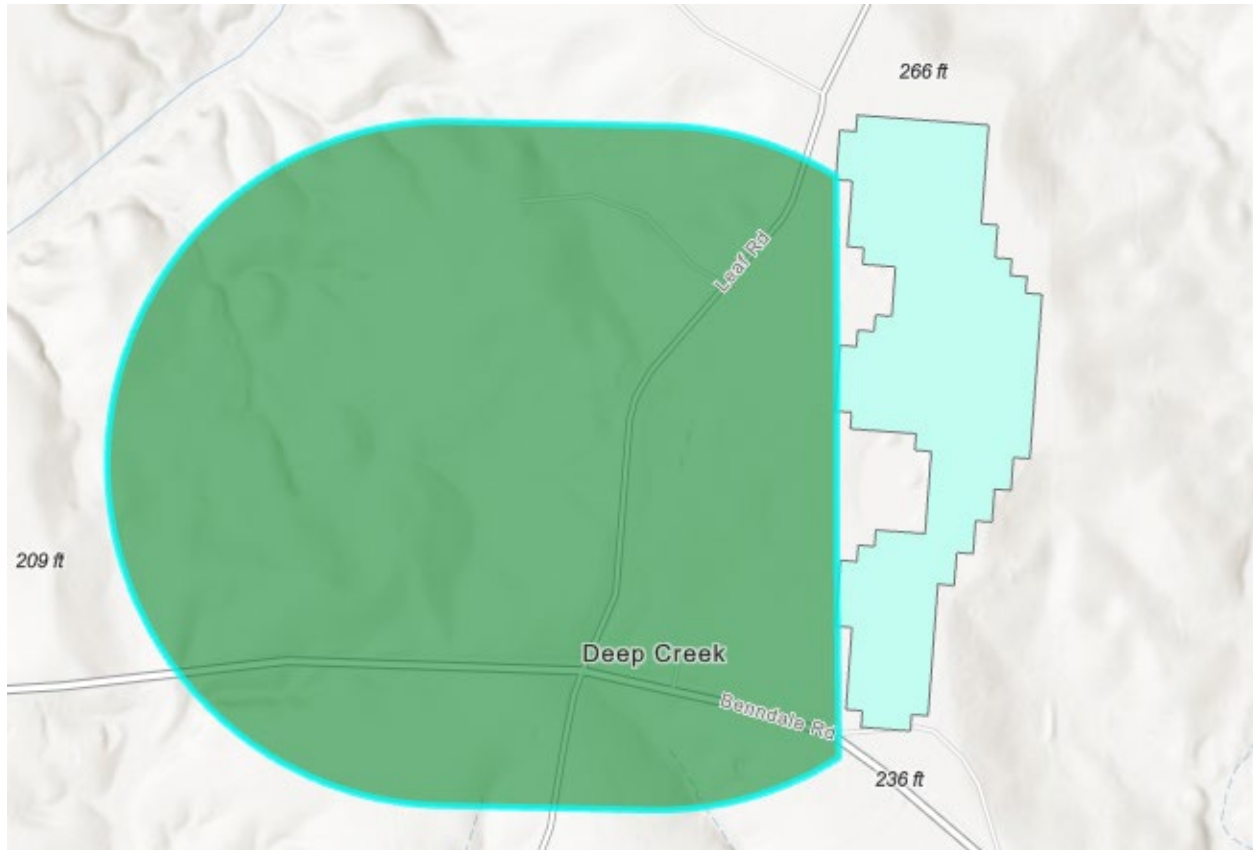


Figure A2-6. Screenshot of “Select by Location” tool

2.3. Use EPA’s QA/QC process to remove small, disconnected patches less than 2 acres

1. Upon reviewing all fourteen critical habit polygons, it is determined that there are no small, disconnected patches less than 2 acres. This process was not done.

2.4. Use EPA’s QA/QC process to “smooth” by filling in gaps or holes

1. Upon reviewing all fourteen critical habitat polygons, it is determined that there are no gaps or holes to “smooth”. This process was not done.

2.5. Update Attributes and “Calculate Geometry”

1. Since the three processes of removing overlapping cultivated areas, removing small, disconnected patches less than 2 acres and filling in gaps or holes was not necessary, the result is a layer with multiple individual records. The following is the process to update “CommName”, “SciName”, “Category”, “EPA_Code”, “FWS_Code”, “CBD_Code”, “Heritage”, and “ECOS_WebPg” field with Field Calculator. Calculate Geometry acres of Polygon Layer.

2. Update the “CommName” field with Field Calculator. Right clicked on “CommName”
à Select “Calculate Field” à Enter "Dusky gopher frog" below the field name à Set
“Enable Undo” à Click “Apply” (**Figure A2-7**)

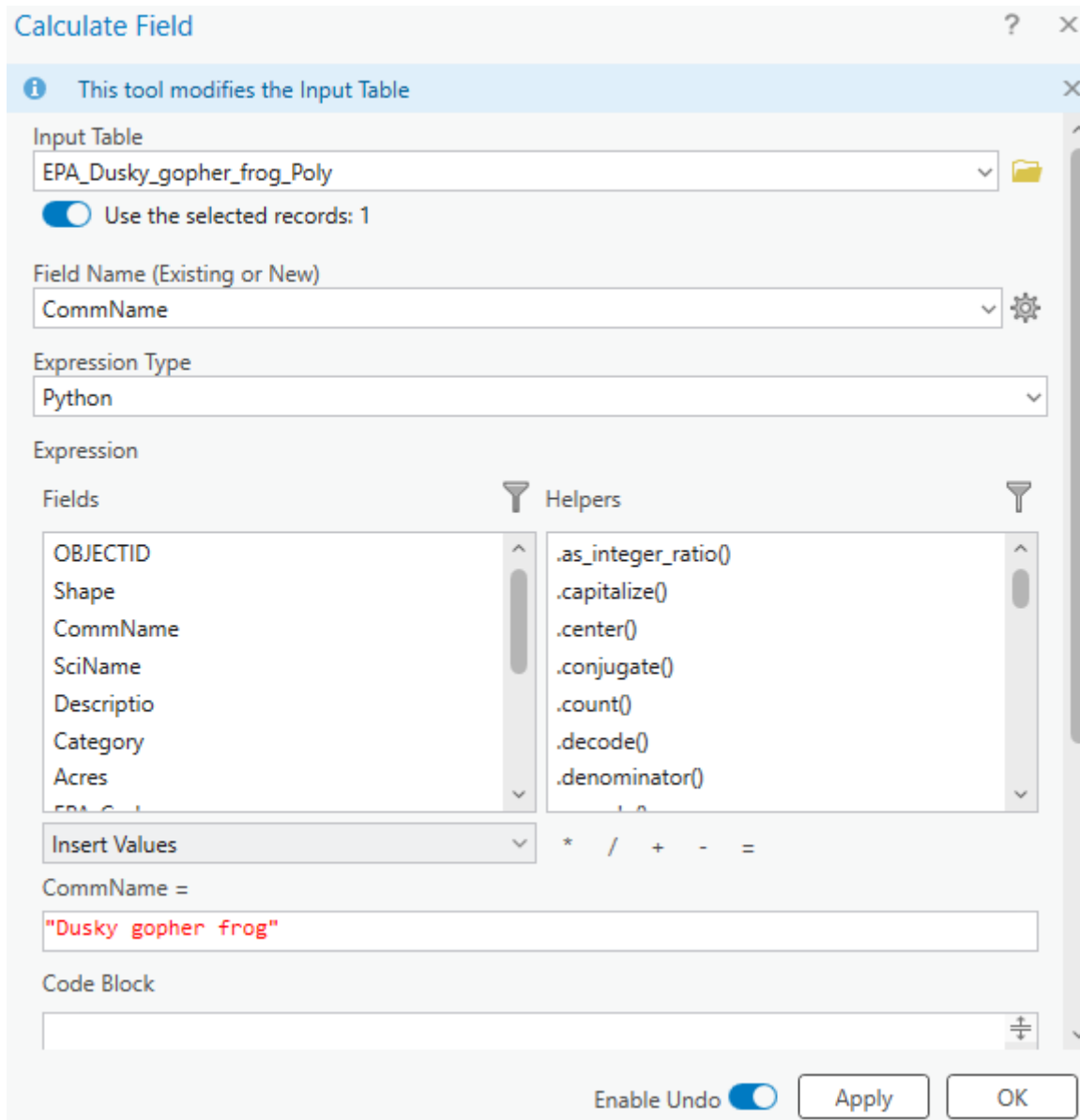


Figure A2-7. Screenshot of “Calculate Field” tool

3. Update the “SciName” field with Field Calculator. Right clicked on “SciName”
→ Select “Calculate Field” → Enter “Rana sevososa” below the field name → Click
“Apply” (**Figure A2-8**)

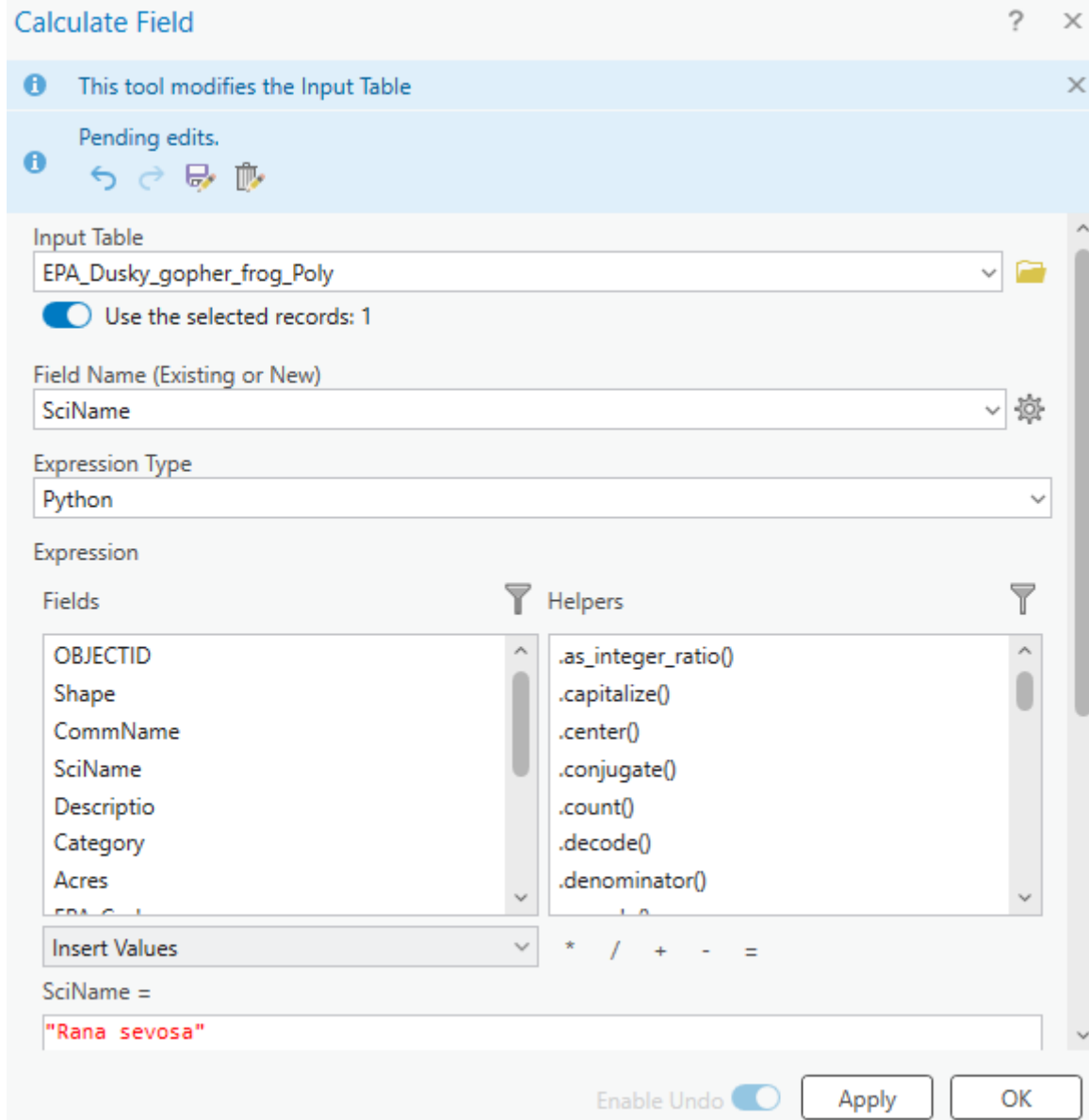


Figure A2-8. Screenshot of “Calculate Field” tool

4. Update the “Category” field with Field Calculator. Right clicked on “Category” → Select “Calculate Field” → Enter "Area of occupancy" below the field name → Click “Apply” **(Figure A2-9)**

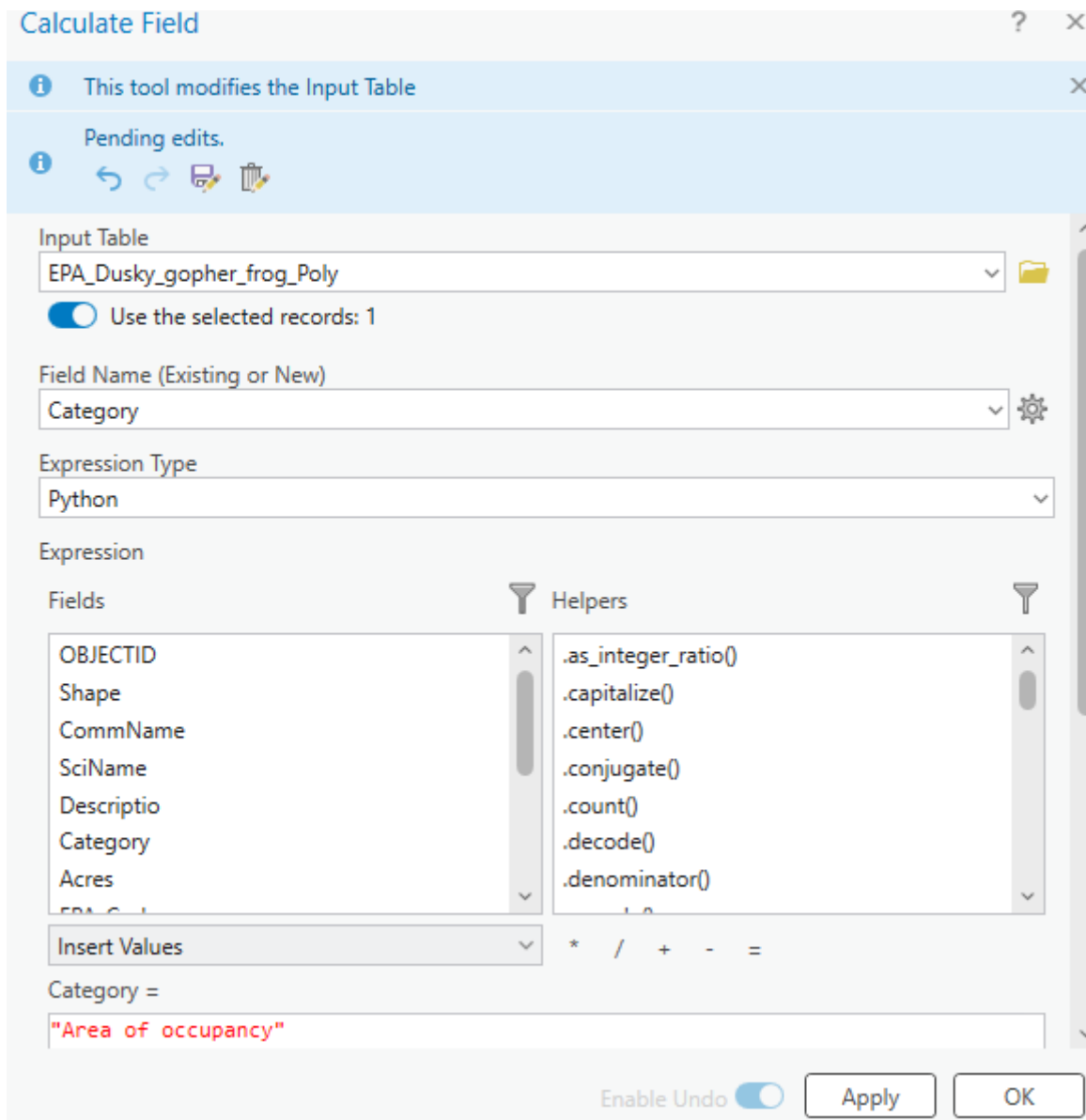


Figure A2-9. Screenshot of “Calculate Field” tool

5. Update the “EPA_Code” field with Field Calculator. Right clicked on “EPA_Code” → Select “Calculate Field” → Enter “208” below the field name → Click “Apply” (Figure A2-10)

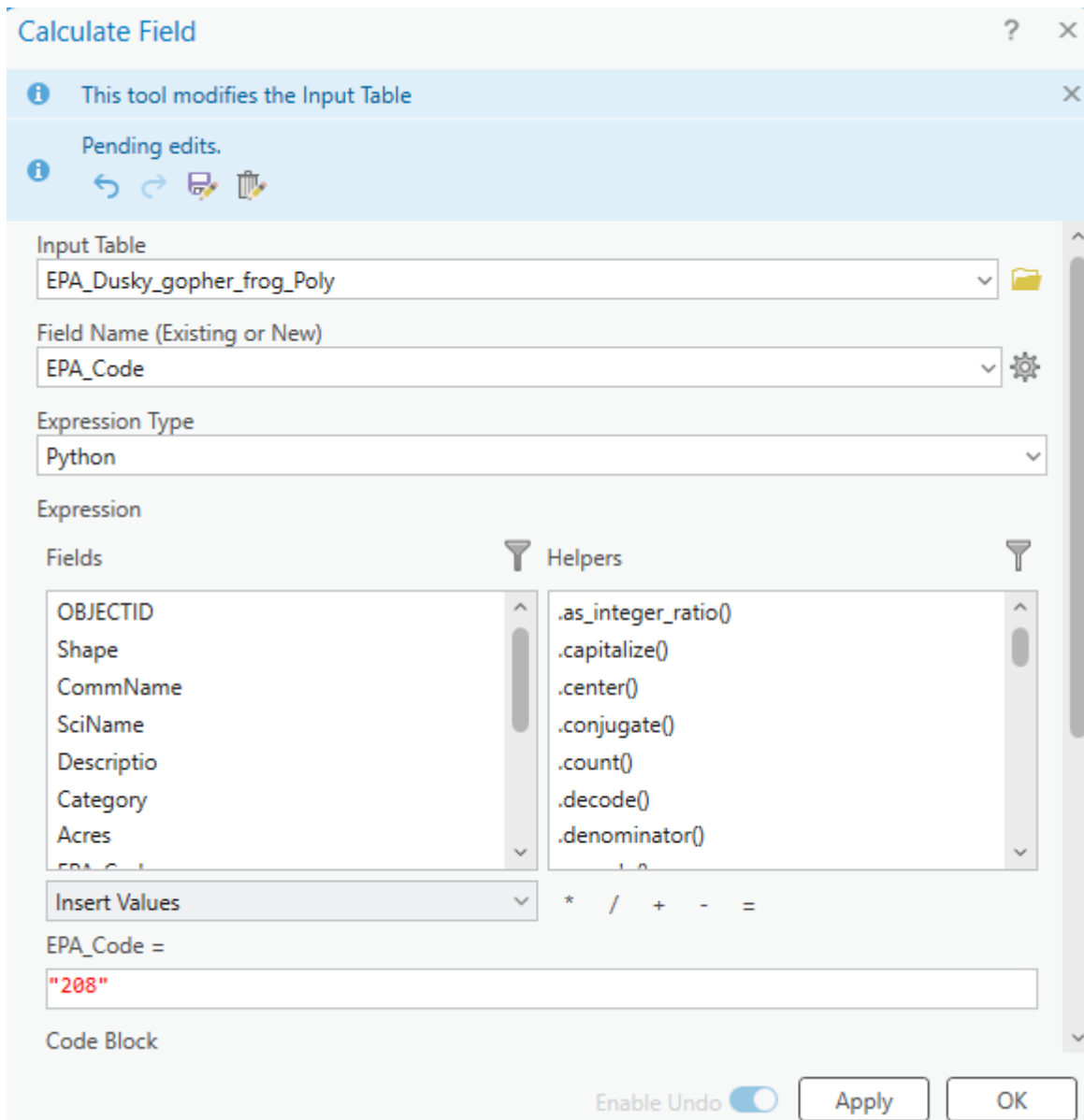


Figure A2-10. Screenshot of "Calculate Field" tool

6. Update the "FWS_Code" field with Field Calculator. Right clicked on "FWS_Code" → Select "Calculate Field" → Enter "D031" below the field name → Click "Apply" (Figure A2-11)

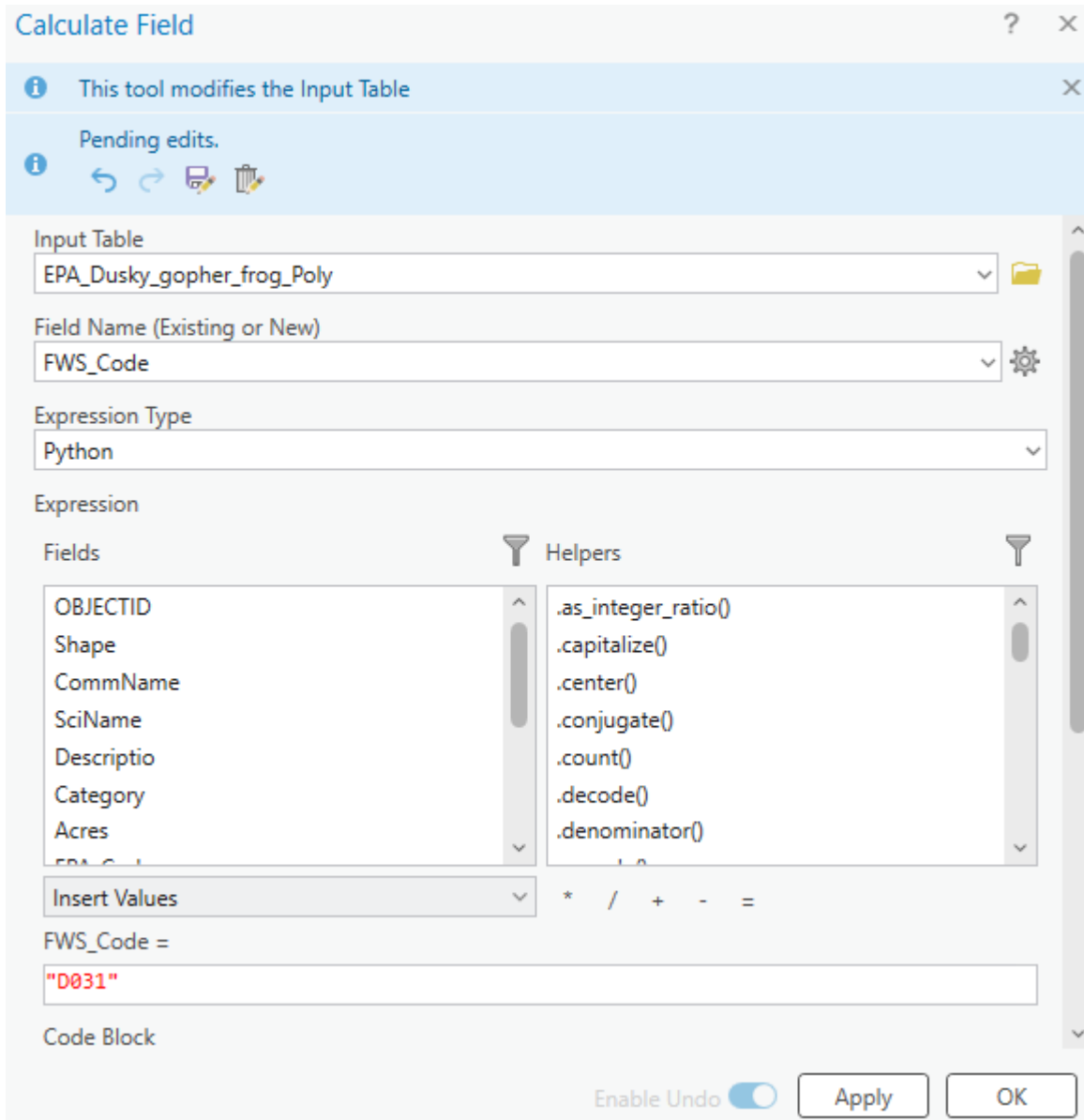


Figure A2-11. Screenshot of "Calculate Field" tool

7. Update the "CBD_Code" field with Field Calculator. Right clicked on "CBD_Code" → Select "Calculate Field" → Enter "16619" below the field name → Click "Apply" (Figure A2-12)

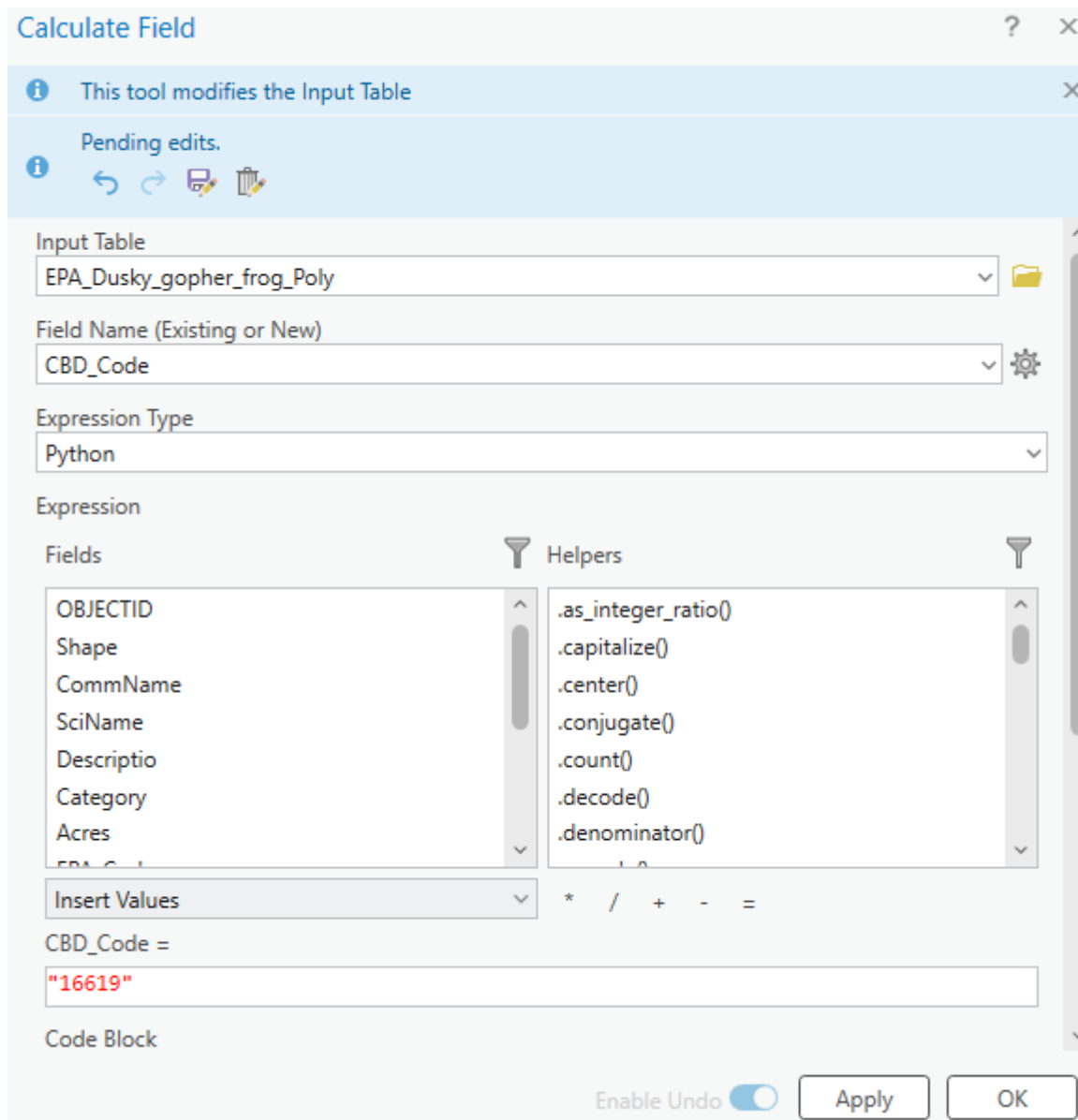


Figure A2-12. Screenshot of “Calculate Field” tool

8. Update the “Heritage” field with Field Calculator. Right clicked on “Heritage”
→ Select “Calculate Field” → Enter “0” below the field name → Click “Apply” (**Figure A2-13**)

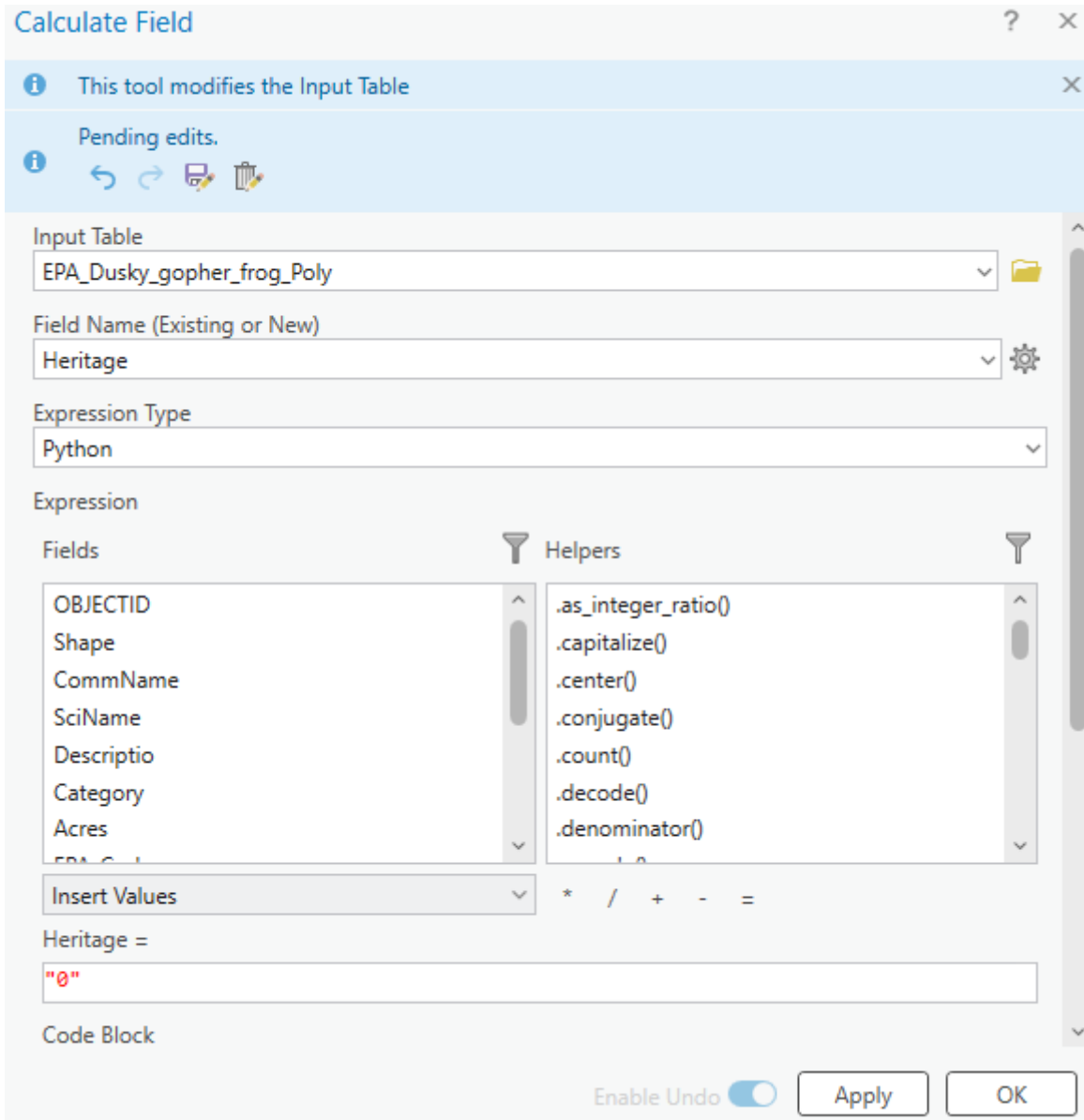


Figure A2-13. Screenshot of “Calculate Field” tool

9. Update the “ECOS_WebPg” field with Field Calculator. Right clicked on “ECOS_WebPg” → Select “Calculate Field” → Enter
 “https://ecos.fws.gov/ecp/species/5600” below the field name → Click “Apply”
(Figure A2-14)

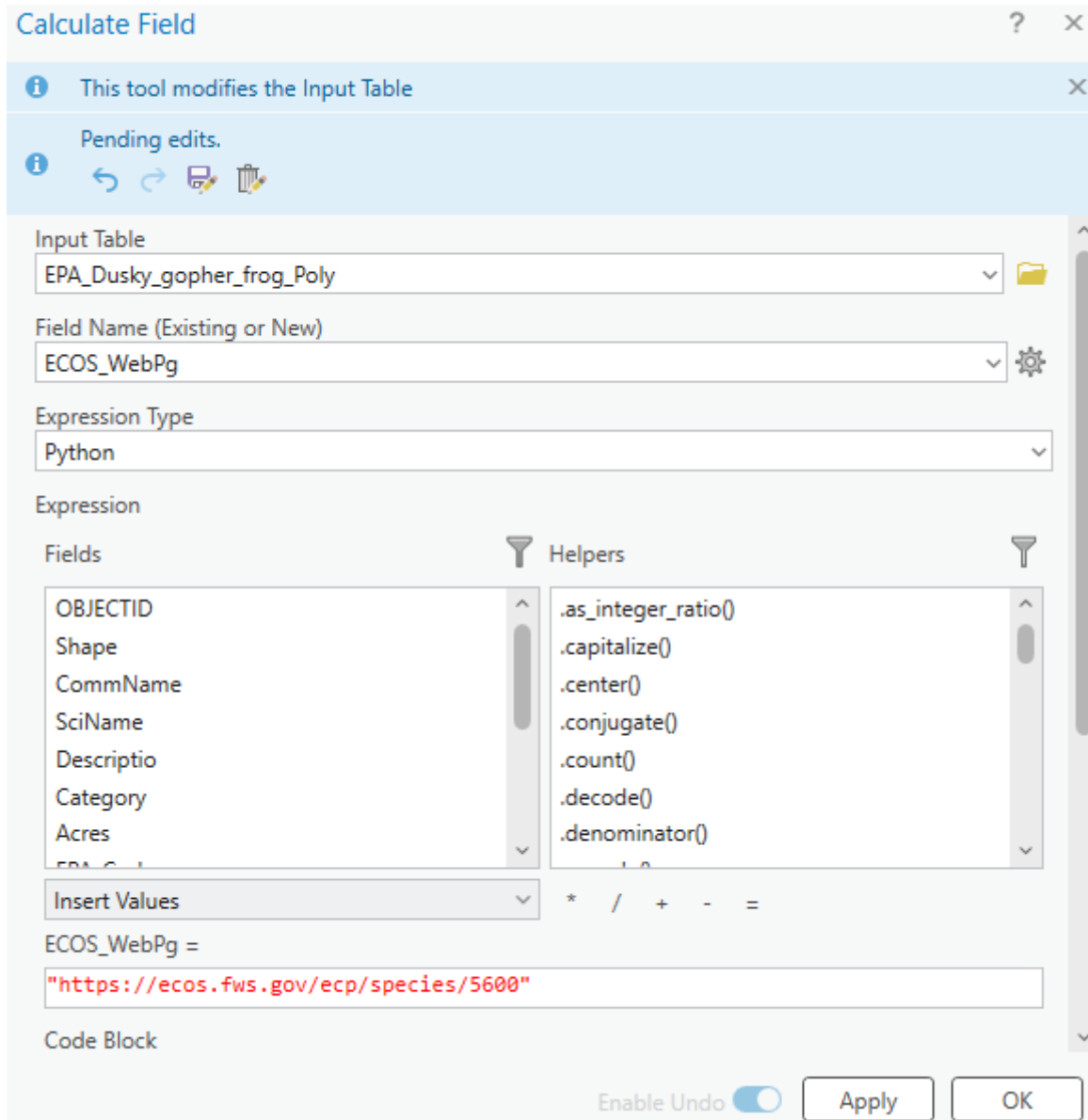


Figure A2-14. Screenshot of “Calculate Field” tool

10. “World UTM Grid” layer and identify the UTM zone as “16”. 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_16N” in the Coordinate System” boxes. Click Apply. Click OK. **(Figure A2-15)**

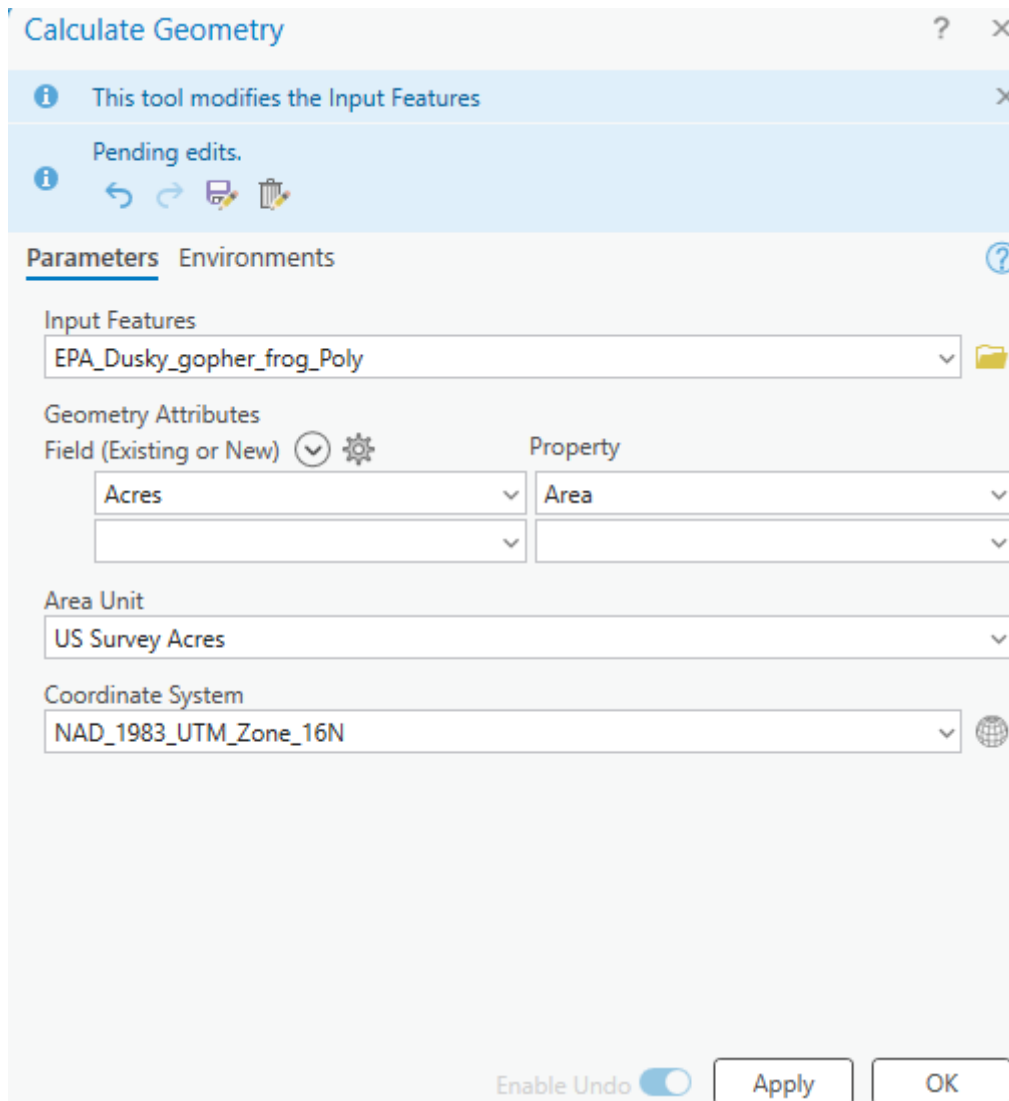


Figure A2-15. Screenshot of “Calculate Geometry” tool

2.6. 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_Dusky_gopher_frog_Poly” records. **(Figure A2-16)** Downloaded the file and add it to ArcPro and name it, “NLCD_DGF_Area1.tiff”.

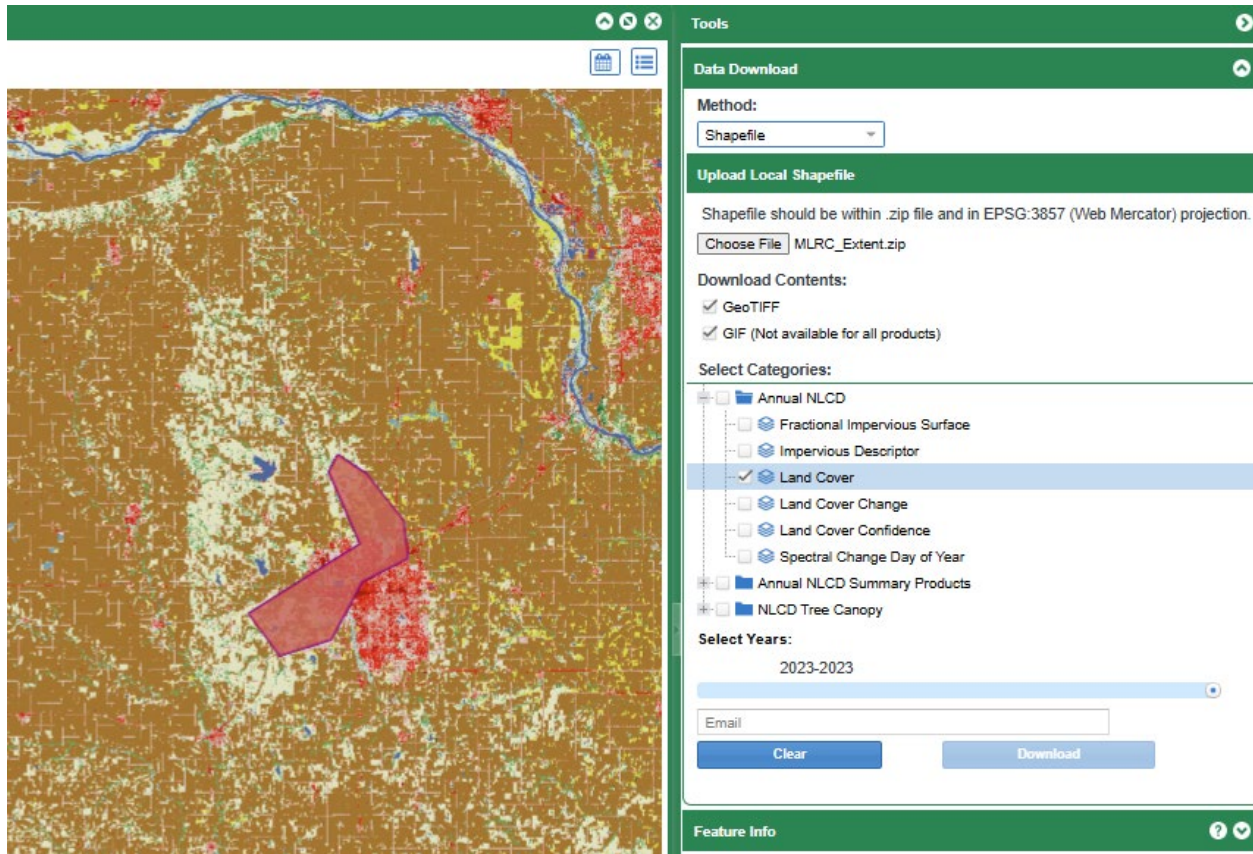


Figure A2-16. Screenshot MRLC Viewer with Shapefile Extent

2. Use the “Extract by Mask” tool with “NLCD_DGF_Area1.tiff” filtered by the same area within “EPA_Dusky_gopher_frog_Poly” as the extent. In the “Environments” tab, change the output coordinate system to match “EPA_Dusky_gopher_frog_Poly”, which in this case is “USA_Contiguous_Albers_Equals_Area_Conic_USGS_version”. The output is named, “NLCD_MaskArea1”. **(Figure A2-17) (Figure A2-18)**

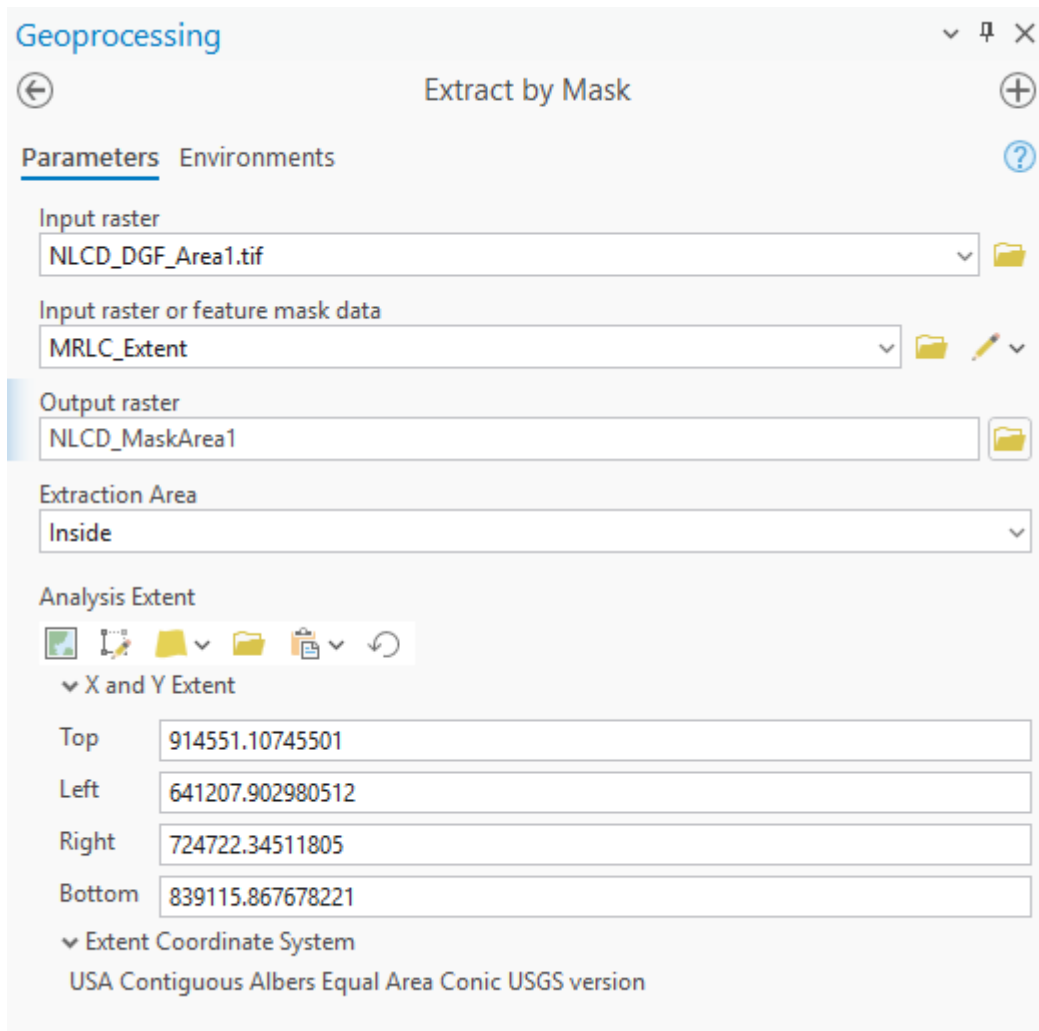


Figure A2-17. Screenshot “Extract By Mask” Tool Parameters

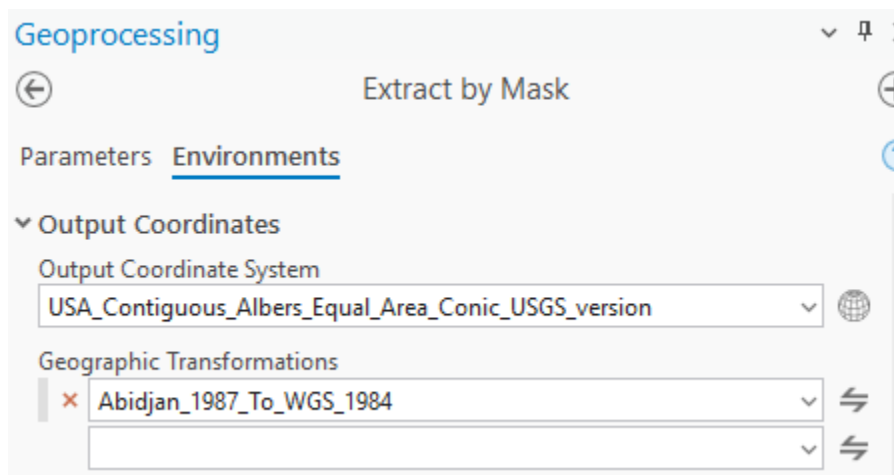


Figure A2-18. Screenshot “Extract By Mask” Tool Environments

3. Use “Tabulate Area” tool to determine the count of area for each NLCD code. **(Figure A2-16)**

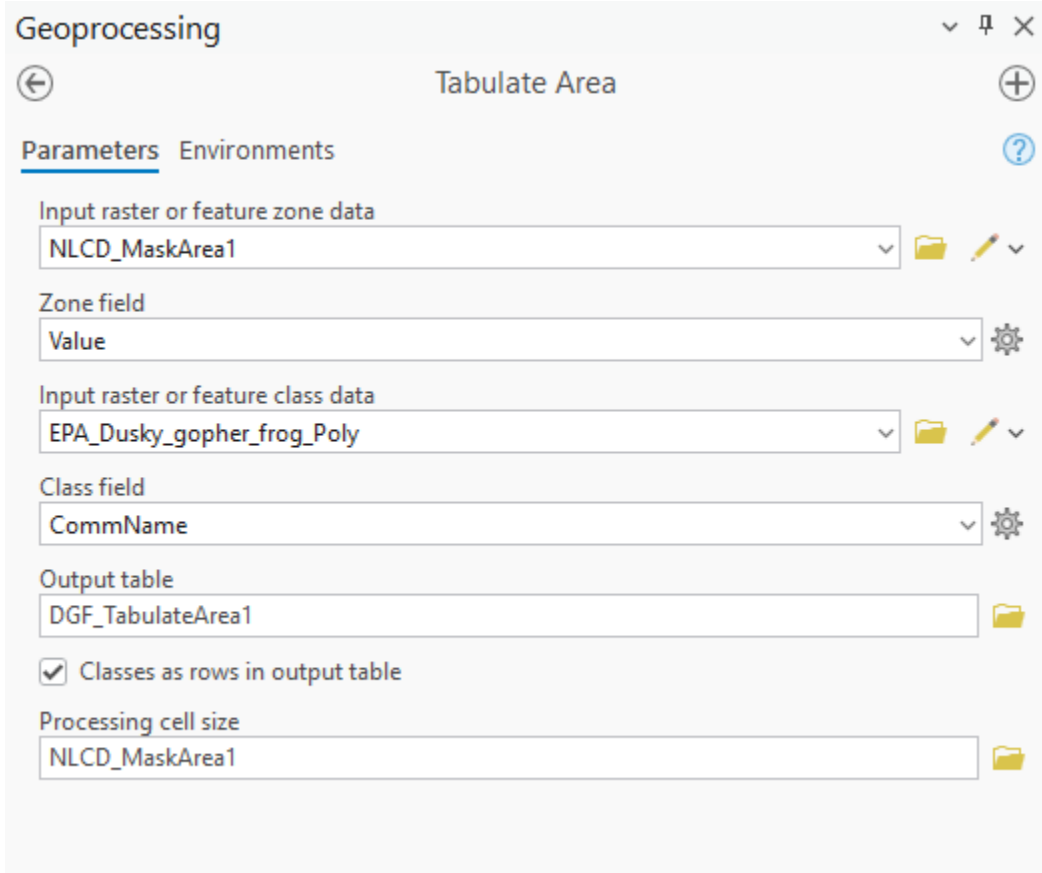


Figure A2-16. Screenshot “Tabulate Area” Tool

4. Add a double field named, “Per” to the “DGF_TabulateArea1” table. Right click on field and select “Calculate Field”. Enter the formula “(!Count!/ 22190)*100”. This calculates the percentage of NLCD within the core map area. **(Figure A2-17)** Review results and input into (Table 1. Percentage of Interim Core Map Represented by NLCD Land Covers and Associated Example Pesticide Use Sites/Types.)

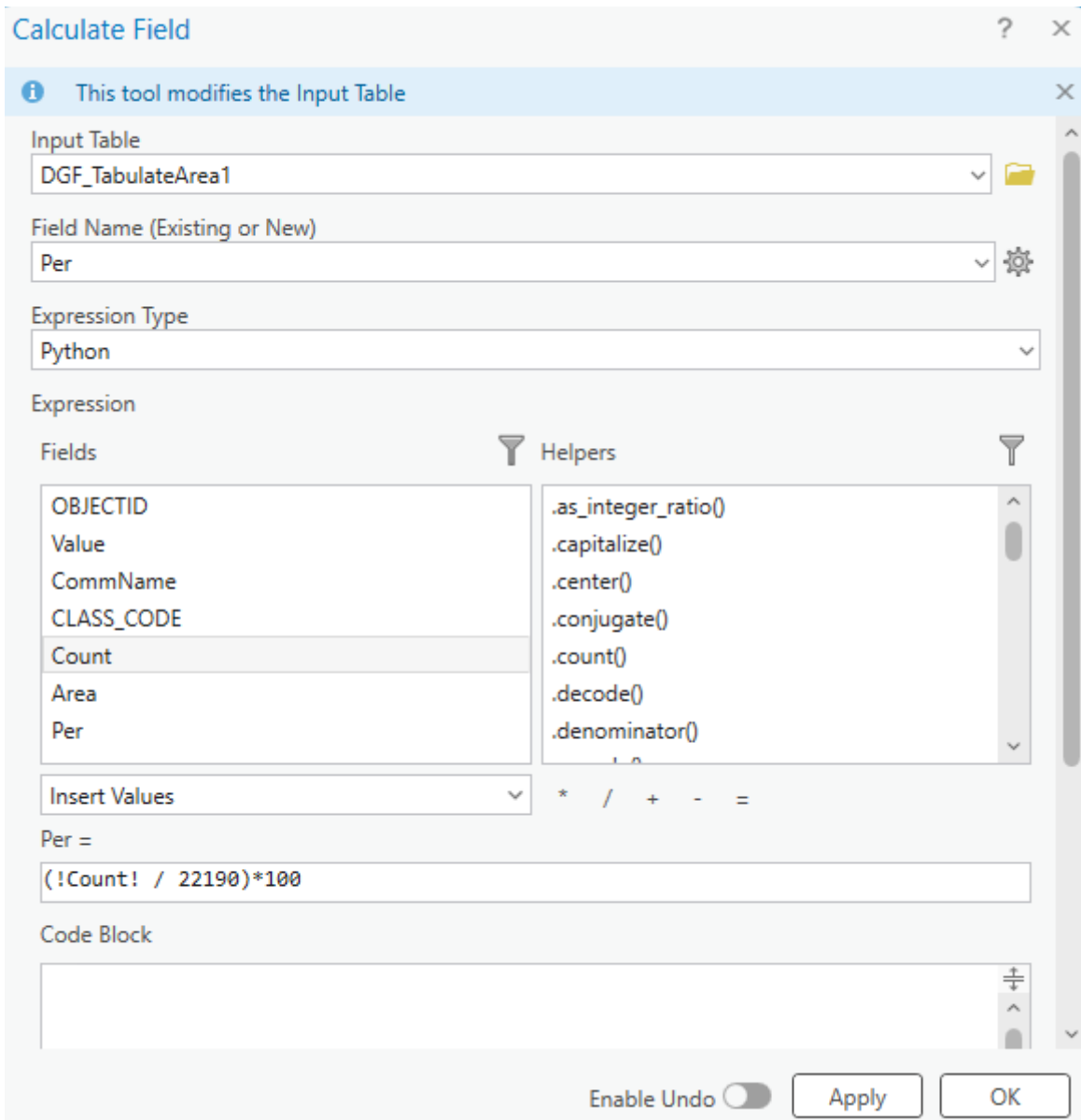


Figure A2-17. Screenshot of "Calculate Field" tool