Interim Core Map Documentation for the Florida Scrub-Jay

Version 1
Review Completed: April 2026
Core Map Developer: U.S. Environmental Protection Agency (EPA), Office of Pesticide Programs

Species Summary

The Florida scrub-jay (*Aphelocoma coerulescens*; Entity ID #140) is a threatened bird species listed in 1987. There is no designated critical habitat for this species. This species inhabits only scrub and scrubby flatwoods habitats of Florida. Additional information is provided in **Appendix 1**.

Description of Core Map

The core map for the Florida scrub-jay is biological information type based on species range with cultivated areas, developed areas, and open water removed because the species does not live in those areas. Counties listed as extirpated according to the 2025 Five-Year Review were also removed. The range of the species is refined, as the species is endemic to the oak scrub habitat of peninsular Florida. The known occurrences/occupied areas of this species fall within the range. EPA did not find evidence that any key areas for this species exist outside of the designated range. The delisting criteria require that each of the seven focal landscapes within six genetic units show a stable or increasing trend with natural recruitment and multiple age classes, subpopulations are sufficiently connected to maintain genetic diversity naturally without translocations, and threats such as habitat loss, degradation, and inadequate management are reduced, ensuring enough habitat remains for the species' long-term viability. **Figure 1** depicts the interim core map for the Florida scrub-jay.

Landcover categories within the core map area are included in **Table 1**. Landcover within the core map is predominantly woody wetlands and evergreen forest, which is consistent with the habitat of this species. Cultivated areas are not located within the core map.

The core map developed for the Florida scrub-jay is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include the Florida scrub-jay. 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 interim core map has “average” (3) best professional judgment classification because EPA refined the core map to remove extirpated counties and unsuitable habitat. EPA recognizes that the process used to create this core map may have resulted in unoccupied areas being included (per the documentation by FWS in the Species Status Assessment).

This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

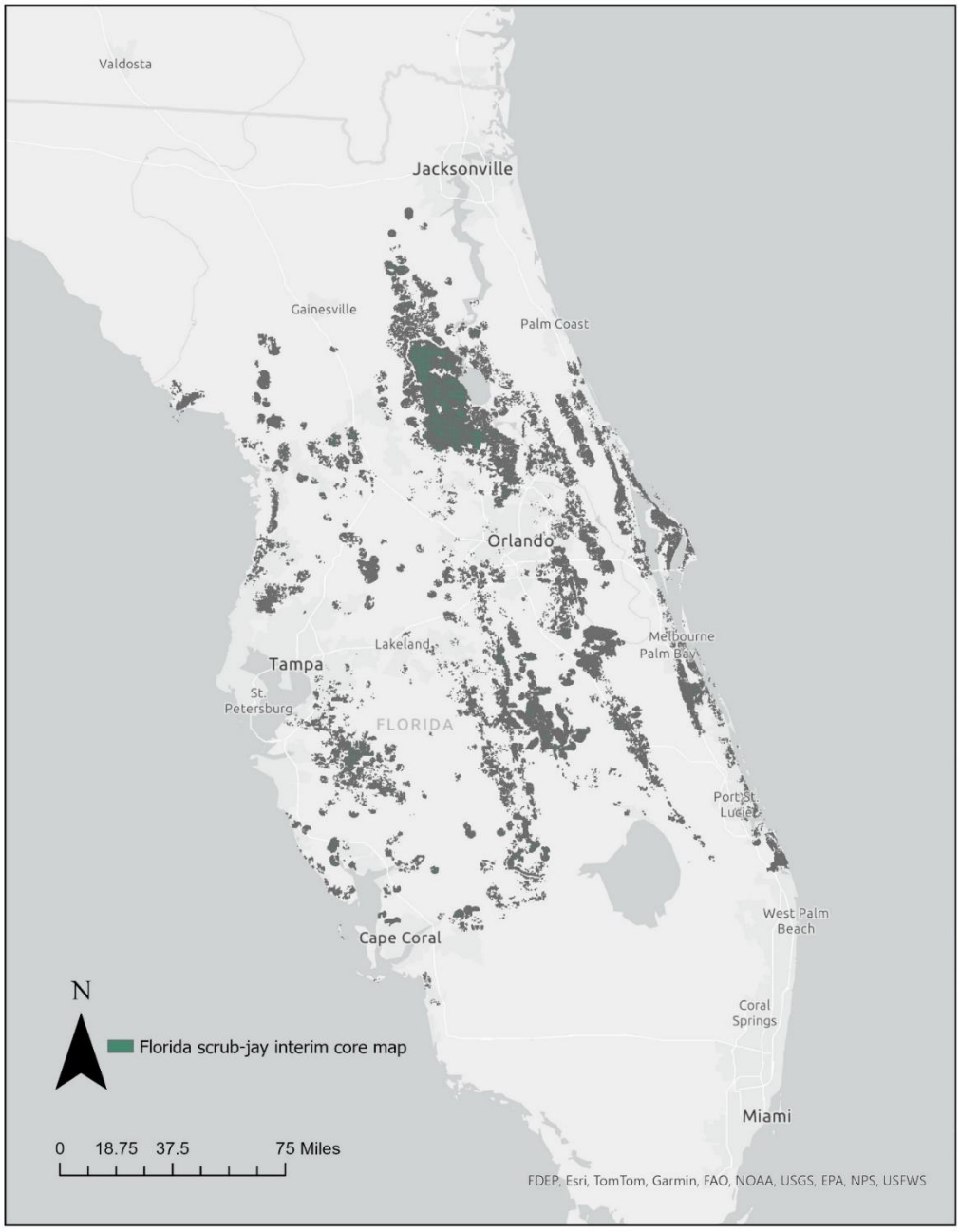


Figure 1. Interim core map for the Florida scrub-jay. The total acreage of the core map is approximately 1.1 million acres.

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 Class/Value	% Area
Forestry	Deciduous Forest (41)	<1%
Forestry	Evergreen Forest (42)	33%
Forestry	Mixed Forest (43)	2%
Invasive species control	Woody Wetlands (90)	34%
Invasive species control	Emergent Herbaceous Wetlands (95)	16%
Invasive species control	Grassland/herbaceous (71)	2%
Invasive species control	Scrub/shrub (52)	13%
Invasive species control	Barren land (rock/sand/clay; 31)	<1%
Total Acres	Interim Core Map Acres	**~1,100,000**

Evaluation of Known Location Information

There are four datasets with known location information for this species:

- Descriptions of locations provided by FWS
- Occurrence locations included in iNaturalist
- Occurrence locations included in the Global Biodiversity Information Facility
- Occurrence locations included in NatureServe

EPA evaluated these four sets of data to inform or support the core map. FWS provided the most refined descriptions of the occurrence information and confirmed that all known locations of extant populations are located within the range. iNaturalist had 3,808 research grade observations, which are consistent with the species range. GBIF's occurrence dataset included 44,124 observations. NatureServe also included several documented locations consistent with the indigenous 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"). 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

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

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

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

- There are 10 genetic units in FWS documentation, all of which are within the species' range.
- Occurrence data from other sources are generally consistent with the species range location.
- Mappable habitats that are unlikely to support the species were identified and could be removed from the core map.

For step 2, EPA used the compiled information to identify the core map type. EPA selected the range to use as the outer extent of the core map. Given that the species has mappable habitat preferences, EPA removed landcover that is inconsistent with this species suitable habitat. For step 3, EPA used the ECOS species range as the outer extent of the Florida scrub-jay core map and removed extirpated counties and landcover that is not scrub or flatwoods (see Appendix 2).

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

EPA did not explore approaches other than those described in this documentation.

Appendix 1. Information Compiled for Species

1. **Recent FWS Documents**
   - 2025 Five-Year Review
   - 2019 Recovery Plan
   - 2019 Species Status Assessment

2. **Background information on Species**
   - **Status:** Federally listed as threatened in 1987
   - **Taxonomy**. Bird (*Corvidae* Family – Crows, Jays, Magpies, corneilles, geais, pies)
   - **Resiliency** - Medium
     "…four very highly resilient populations support 73% of known family groups on conservation lands (1,580 out of 2,160). The two remaining populations classified with high resiliency have roughly 50 to 45 family groups each (Avon Park Air Force Range and St. Sebastian River Preserve State Park respectively). There are 16 populations (roughly 25%) with moderate resiliency (10 - 39 family groups), and greater than 65% of the assessed populations (42 out of 65) have low resiliency and currently support fewer than 10 family groups. The total number of family groups on conservation lands, based on the 2009-2010 surveys, represent a > 25% decline in abundance since the 1992-1993 surveys" (Species Status Assessment, 27)
   - **Redundancy** – Low
     "The majority of the local populations are small, highly fragmented, and have poor connectivity. This is exacerbated by the relatively low dispersal distances of Florida Scrub-Jays" (Species Status Assessment, 28).
   - **Representation** – Medium
     "Genetically diverse species have a higher evolutionary potential and are better able to adapt to changes in their environment over time. Despite the presumed loss of genetic variability that has occurred since pre-settlement times, the variation that still exist is robust. A significant component of this genetic variation occurs across genetic units, several of which exhibit a high degree of differentiation from one another. Of the 10 genetic units, only 4 genetic units currently have populations with high resiliency and redundancy, which will certainly affect the species' future representation outside of these 4 genetic units" (Species Status Assessment, 28).
   - **Habitat Description**
     "The Florida scrub-jay lives only in the scrub and scrubby flatwoods habitats of Florida. This type of habitat grows only on nearly pure, excessively well-drained sandy soils, and occurs along present coastlines in Florida, on paleodunes of the high central ridges and other ancient shorelines of the Florida Peninsula, and inland on scattered alluvial deposits bordering several major rivers. This species' habitat is dominated by a layer of evergreen oaks [myrtle oak (Quercus myrtifolia) and/or Archbold oak (Q. inopina), sand live oak (Q. geminata), Chapman oak (Q. chapmanii), and runner oak (Q. minima)], rusty lyonia (Lyonia ferruginea), and Florida rosemary (Ceratiola ericoides). This layer is rarely greater than two meters in height, except where fire has been suppressed. Ground cover is sparse, dominated by saw palmetto (Serenoa repens) and sand palmetto (Sabal etonia). Bare sand patches are essential for foraging and acorn-caching. Slash pines (Pinus elliottii) and sand pines (P. clausa) are widely scattered with usually less than 15 percent cover (Woolfenden and Fitzpatrick 1996a)" (https://ecos.fws.gov/ecp/species/6174#lifeHistory).

- **Relevant Life History Information:**
  "Scrub-jays are omnivorous, eating almost anything they can catch. Insects comprise the majority of the animal diet throughout most of the year (Woolfenden and Fitzpatrick 1984). Acorns are by far the most important plant food (Fitzpatrick et al. 1991); surplus acorns are frequently cached in the ground (DeGange et al. 1989)" (https://ecos.fws.gov/ecp/species/6174#lifeHistory).

  The Florida scrub-jay exhibits a unique social structure characterized by cooperative breeding, a trait not found in other scrub-jay species in western North America. These birds live in family groups ranging from a single mated pair to larger extended families, where offspring often delay breeding and stay in their natal territory as helpers for up to three years. Helpers participate in various activities, including sentinel duties, territorial defense, and feeding nestlings and fledglings. The Florida scrub-jay's cooperative behavior and well-developed dominance hierarchy, with breeder males at the top, play a crucial role in their survival and reproductive success.

  Florida scrub-jay occupy year-round territories averaging 9 to 10 hectares, with territory availability being a limiting factor for their populations. Non-breeding males may remain as helpers for extended periods, waiting for a mate or territory to become available. The establishment of new territories can occur through various means, such as replacing a lost breeder, territorial budding, or inheriting a natal territory. The species is generally monogamous, although instances of bigamy and polygamy have been documented. Nesting typically occurs in scrub oaks, with the timing influenced by resource availability, climate, and other factors. Predation is the primary cause of nesting failures, with clutch sizes ranging from one to six eggs.

  The survival of Florida scrub-jay is heavily dependent on their cooperative social structure, which enhances fledgling success and overall reproductive output. Fledglings rely on adult care for about 10 weeks, and the presence of helpers significantly improves their chances of survival. In optimal conditions, fledgling survival to yearling age is about 33%, with higher survival rates for males who stay in their natal territory. The annual survival rate for breeding adults is around 78%. Maintaining a stable population requires an average productivity of at least two young fledged per pair annually, highlighting the importance of their social dynamics and habitat conservation for long-term stability (Species Status Assessment, 3-5).

  Florida scrub-jays are nonmigratory and highly sedentary birds that remain in their natal territories for extended periods, with males sometimes staying as helpers for up to seven years before dispersing to become breeders. Dispersal is influenced by factors such as sex, age, and breeding opportunities, with females tending to disperse farther than males. The surrounding landscape plays a crucial role in their dispersal behavior, as protected scrub habitats within a matrix of traversable environments, like brushy pastures and scrubby corridors, support subpopulation connectivity. Dispersal distances are generally short, with most movements occurring within two territories of their natal area, and long-distance dispersers rarely become breeders. In fragmented habitats, dispersal distances increase but often result in lower breeding success. The biological maximum dispersal distance is around 8 km, with occupancy of suitable habitats dropping significantly beyond 12 km. Suburban environments see greater dispersal distances, though habitat degradation can limit successful movement between preserves and suburban territories (Species Status Assessment, 6-7).

- **Ecology**
  Florida scrub-jays are endemic to the oak scrub habitat of peninsular Florida, sharing this environment with numerous other species, including at least 21 federally listed plants on the Lake Wales Ridge. This habitat also supports threatened species like the blue-tailed mole skink, sand skink, eastern indigo snake, and the state-listed gopher tortoise. While Florida scrub-jays occasionally interact with blue jays, they tend to dominate on or near the ground, whereas blue jays dominate in trees. Although blue jays might limit the Florida scrub-jays' use of woodland areas, successful nesting of both species in close proximity has been observed. Predation on adult Florida scrub-jays is relatively rare, with the primary threats being birds of prey such as Cooper's hawk and sharp-shinned hawk, as well as house cats and bobcats. Eggs and young are more vulnerable to a variety of predators, including snakes, owls, crows, and raccoons, with yellow rat snakes being particularly dangerous nocturnal predators at places like Merritt Island National Wildlife Refuge (Species Status Assessment, 8).
- **Relevant Pesticide Use Sites**
  No available information on pesticide use sites is included in FWS documents.
- **Threats**
  "Infrequent fire is one of the greatest threats to population persistence making restoration and prescribed fire management one of the most important components of Florida Scrub-Jay recovery" (Species Status Assessment, 17).

  Other threats include direct habitat loss and habitat fragmentation.

- **Delisting Criteria (Recovery Plan, 5)**
  The Florida scrub-jay should be considered for delisting when the following criteria are met:
  - Criterion 1: Each of the seven focal landscapes (East Coastal, North Central, Northeast Coastal, Lake Wales Ridge North, Lake Wales Ridge South, Southwest Inland, and Southeast Coastal) within six of the genetic unit's exhibit a stable or increasing trend including natural recruitment and multiple age classes.
  - Criterion 2: Subpopulations are connected to the extent that genetic diversity can be naturally maintained without translocations.
  - Criterion 3: When in addition to the above criteria, it can be demonstrated that the threats particularly habitat loss and degradation associated with sea level rise, development, and inadequate habitat management are diminished such that sufficient habitat remains for the species to remain viable for the foreseeable future.

- **Recovery Actions (Recovery Plan, 6)**

Actions Needed:

The recovery actions identified below are those that, based on the best scientific data available, are necessary to bring about the recovery of the Florida Scrub-Jay. Included with the recovery action is an estimated cost to complete the action and a priority number[1].
Table 1. Recovery Actions with Estimated Cost and Priority Number.

Recovery Action	Priority
1. Habitat Management and Restoration – appropriate fire return intervals, optimal vegetative structure, sufficient sandy openings, increasing connectivity, eliminating dispersal barriers, promoting mosaic within habitat.	1
2. Habitat Protection and Acquisition – protect existing public lands, conservation easements on private lands, limited acquisitions to promote connectivity of landscapes, optimum boundaries, eliminate inholdings.	1
3. Population Management – translocations: population augmentations, genetic rescues, maintenance of genetic diversity, re-introductions.	1
4. Population Monitoring – annual post-breeding surveys range-wide, surveys and long-term monitoring in all large population centers and following any restoration/translocation operations.	1
5. Research – population viability analyses, demographic monitoring in response to habitat management, translocation effects on populations, allee effects, genetic studies to investigate degrees of and inbreeding in all populations and its effects on fitness and viability.	1
6. Regulatory – incorporate conservation strategy in conservation measures, mitigation, mitigation banking, safe harbor agreements.	2
7. Incentives – Partners for Fish and Wildlife, Legacy Landowners Program, Working Lands for Wildlife Program.	3
8. Outreach – promote large connected landscapes, facilitate scrub working groups, educate public and increase public support for prescribed fire applications, engage partners and stakeholders in strategic conservation.	3

3. Description of Species Range

"The Florida scrub jay is endemic to peninsular Florida. The estimated population is between 7,000 to 11,000 individuals (Breininger 1989; Fitzpatrick et al. 1991; Fitzpatrick et al. 1994). Scrub has been significantly reduced by development activity and now typically occurs only in scattered and often small patches in peninsular Florida (Fitzpatrick et al. 1991). Florida scrub-jay populations formerly inhabited 39 of 40 peninsular Florida counties, from Levy, Gilchrist, Alachua, Clay, and Duval Counties southward. Its range currently occurs from Flagler, Marion, and Citrus counties south to Collier, Glades, and Palm Beach Counties, with the largest remaining populations in Brevard County (especially coastal scrubs of Merritt Island National Wildlife Refuge and Kennedy Space Center), Highlands County (near Sebring, Lake Placid, and Venus, and on Avon Park Air Force Range), and in Marion County (at Ocala National Forest)" (https://ecos.fws.gov/ecp/species/6174#lifeHistory).

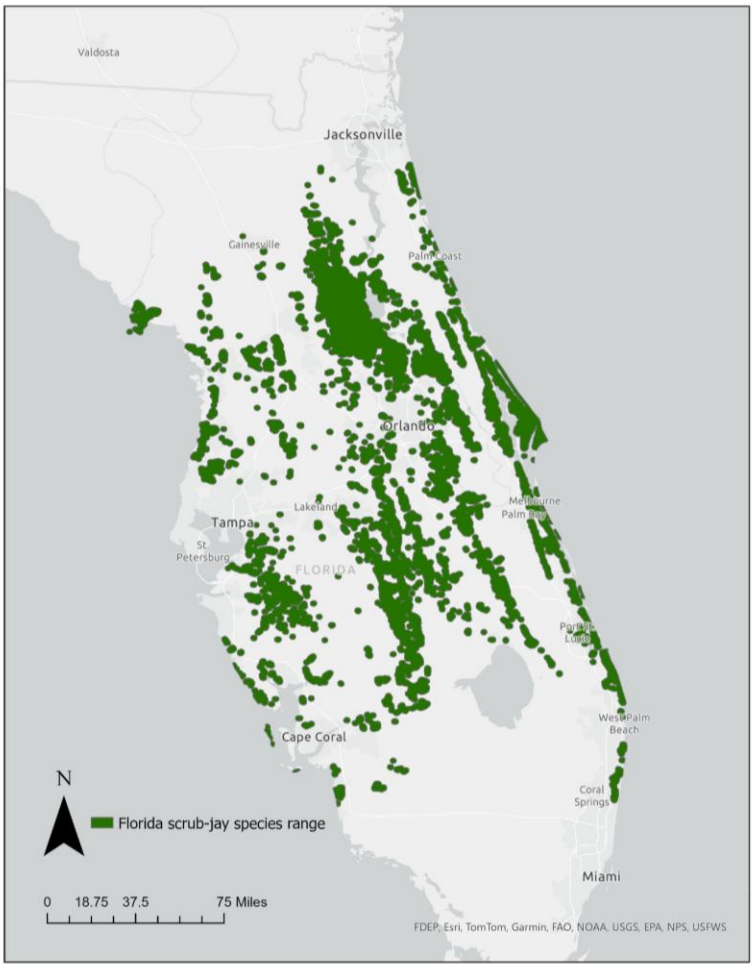


Figure A1-1. Map of the Florida scrub-jay range.

4. Critical Habitat

There is no designated critical habitat for this species.

5. Known Locations

- Occurrences Described in FWS Documents (5-Year Review, 7-8):
  "An updated range-wide Florida Scrub-Jay survey is not currently available; however, the previous habitat estimate for Ocala National Forest's roughly 225,000 acres (91,000 hectares) 7 of scrub and sand pine (Pinus clausa) plant communities has been refined using a new approach. A recent study (July 2021 through January 2023) conducted by Florida Fish and Wildlife Conservation Commission updated the population estimate based on modeling a sample replicated dataset of land management categories under different scenarios (Miller et al., 2023 Florida Scrub-Jay Population Estimate for Ocala National Forest under Different Management Scenarios). Regression models were developed describing how forest timber stands vegetative structure influenced Florida Scrub-Jay densities. The two statistically highest supported models were then applied across the whole Ocala National Forest timber stands and yielded current population estimates of 1,907 (+ 124) Florida Scrub-Jay family groups or 1,973 (+ 124) Florida Scrub-Jay family groups. These estimates are nearly double the previous 2017 metric estimates for Ocala National Forest.

The 2024 metrics (tables below) are estimates based on reported Florida Scrub-Jay family groups in focal landscape populations, and the population trends are a comparison from the previous 5-Year Status Review (2020). A current range-wide survey is not available at this time, so these are not all known family groups on conservation lands. The number of family groups on private lands is also unknown so those metrics are not included in these estimates.

There are approximately 978 Florida Scrub-Jay family groups on conservation lands within the focal landscape populations – excluding Ocala National Forest's population. This is an increase of 11 Florida Scrub-Jay Family groups since the 2020 reporting. Currently our estimates show:

- Four of the genetic unit's focal landscapes (Genetic Unit A, Genetic Unit B, Genetic Unit D*, and Genetic Unit I) increased (Lake Wales North and Lake Wales South Focal Landscapes were combined in table),
- One remained stable (Genetic Unit F) and
- One of the genetic unit's focal landscapes decreased (Genetic Unit C).
- The population in Ocala National Forest (*Genetic Unit D Focal Landscape) was excluded from the trend assessment because recent efforts represent the first robust estimate of Florida Scrub-Jays in the forest. The actual baseline is unknown and previous and current data is based on different modeling techniques. However, it is likely that this population has increased with addition of suitable habitat in Genetic Unit D Focal Landscape in Ocala National Forest."

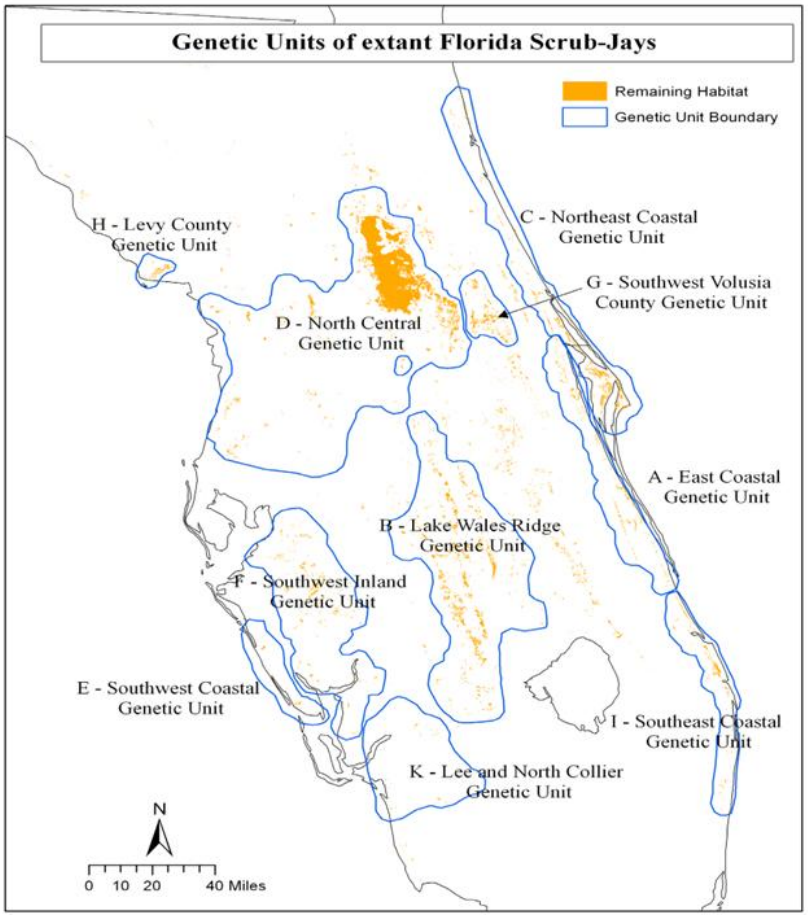


Figure A1-2. Genetic units of Florida scrub-jays (2019 Species Status Assessment, adapted from Coulon et al. 2008).

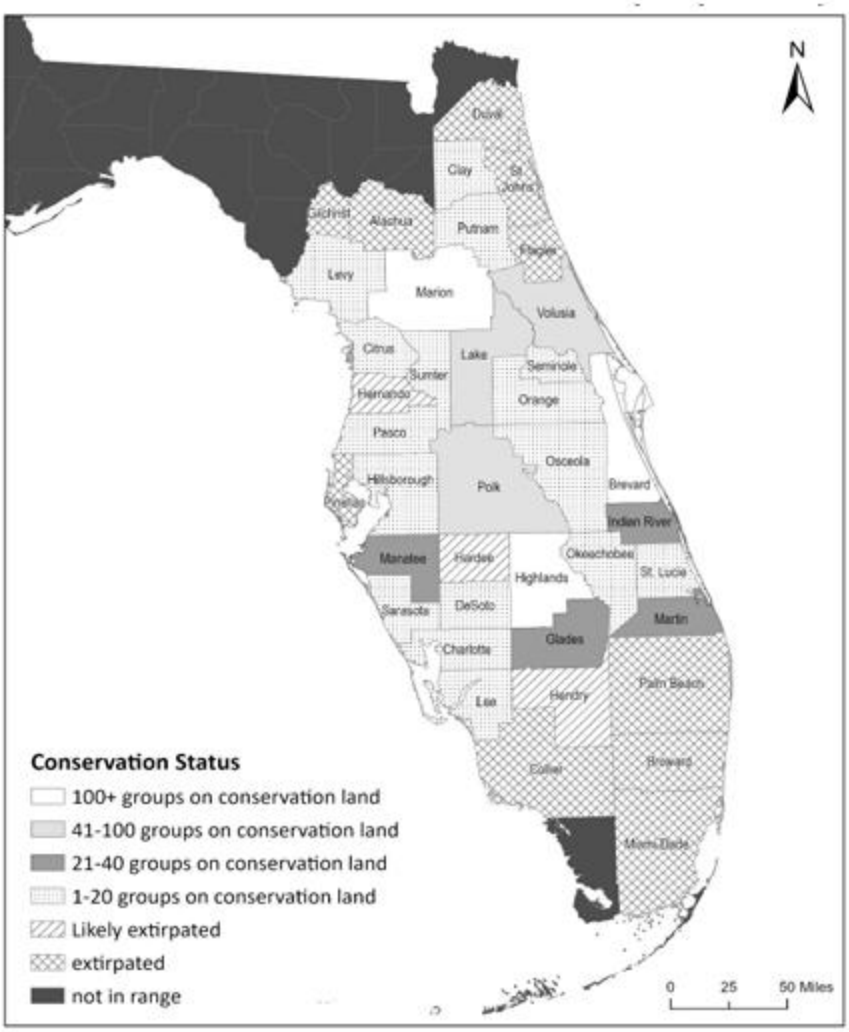


Figure A1-3. Known Florida scrub-jay population estimates by county on conservation lands throughout the species range, Florida (2025 Five-Year Review).

- Occurrences Described in iNaturalist: https://www.inaturalist.org/observations?d1=2010&d2=2025-10-23&quality_grade=research&subview=map&taxon_id=7829
    - iNaturalist includes 3,808 observations consistent with the indigenous range within the last 15 years.

- Occurrences Described in GBIF: https://www.gbif.org/
    - 44,124 observations with coordinates in the last 15 years

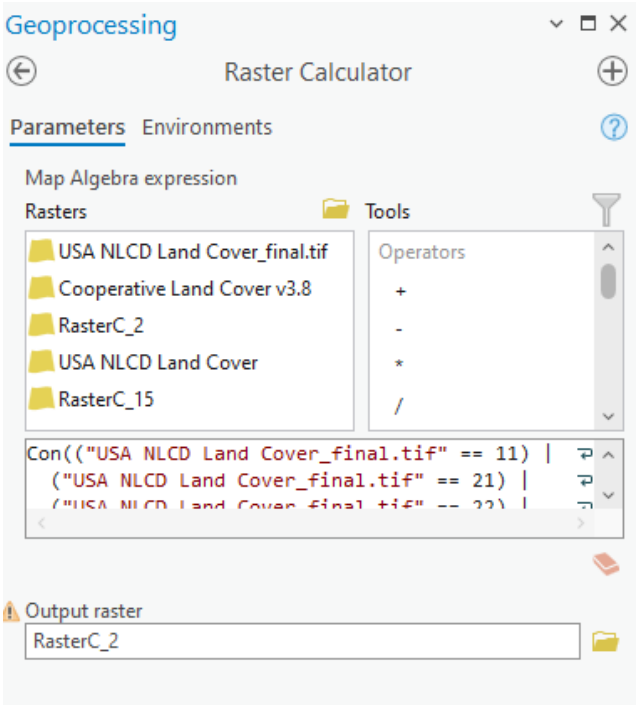
- Occurrences Described in NatureServe: https://explorer.natureserve.org/pro/Welcome
    - NatureServe has several documented locations consistent with the indigenous range

Taken together, the occurrence data from public data sources did not support expanding the core map beyond the outer boundary of the species range.

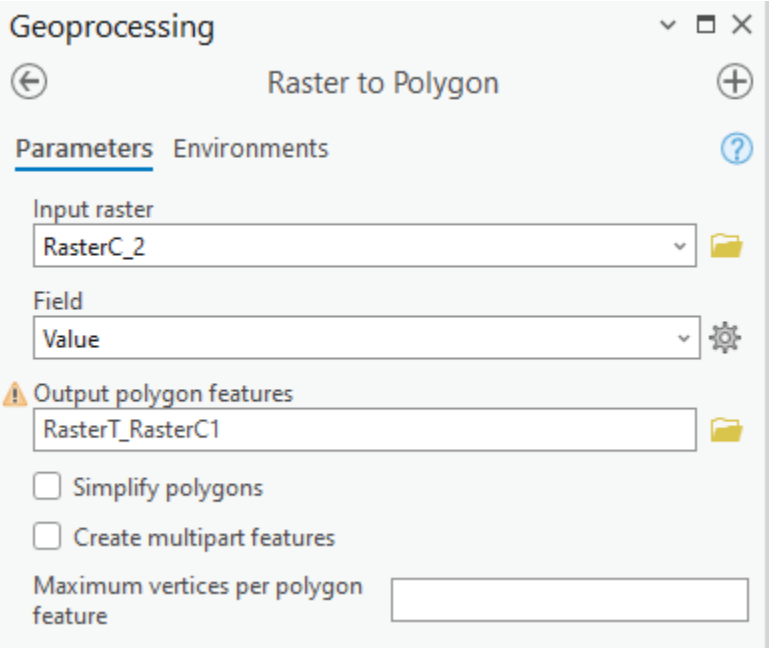
Appendix 2: GIS Data Review and Method to Develop Core Map

This core map ("Florida scrub-jay interim core map.lpkx") was created based on biological information. FWS provided EPA with the shapefile for the Florida scrub-jay species range. EPA subtracted counties in which the species was listed as 'extirpated' according to the 2025 Five-Year Plan. EPA also subtracted land cover types that are not scrub or flatwoods, including open water, developed areas, and cultivated areas because the species does not utilize such habitats.

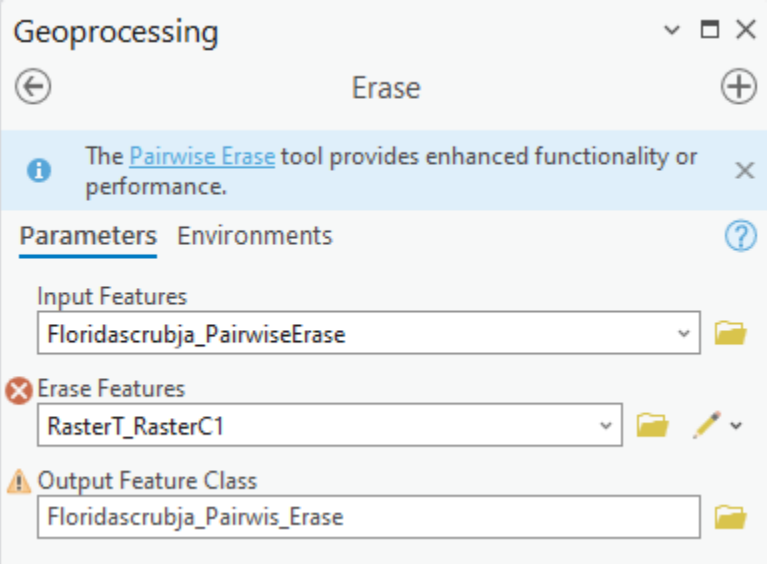
1. **Data Used**
    - FWS species range, updated 01/28/2022
    - NLCD 2021
    - Florida Cooperative Land Cover v3.8, Florida Fish and Wildlife Conservation Commission, published 12/2024
    - Florida Counties, Florida Department of Commerce, updated 04/18/2025
    - Modified Cultivated Layer, EPA-OCSPP-OPP, updated 12/16/2024
2. **Software Used**
    - ArcGIS Pro
3. **GIS Steps Taken**
    - EPA used the Florida scrub-jay species range shapefile provided by FWS
    - EPA used the "Pairwise Erase" tool and the modified cultivated layer developed by EPA's Office of Pesticide Programs to remove cultivated areas from the map.
    - EPA used the "Raster Calculator" tool to select open water and developed areas from the NLCD



- …then converted the selected rasters to polygons using the “Raster to Polygon” tool



- …and erased said polygons using the “Erase” tool.



- Per Figure A1-3, several counties in Florida list an 'extirpated' conservation status for the Florida scrub-jay. EPA selected 'extirpated' counties from the Florida Counties data attribute table.

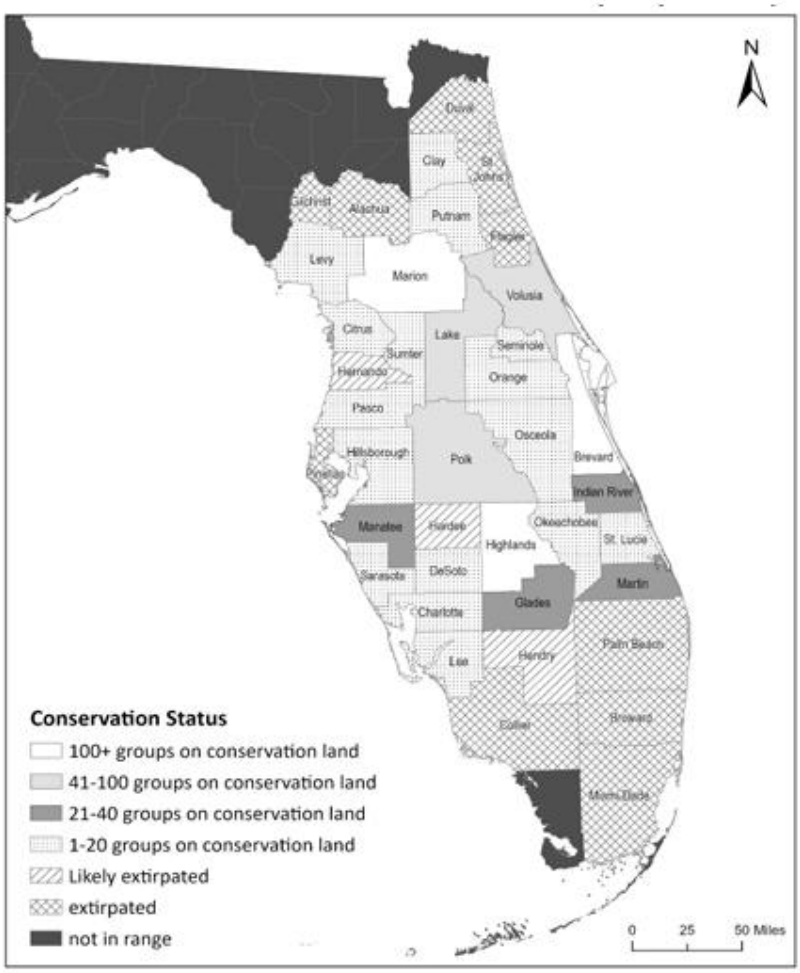


Figure A1-3. Conservation status for the Florida scrub-jay in Florida counties.

- …then erased said counties using the "Erase" tool.

- EPA then used the Florida Cooperative Land Cover data to remove additional land cover types that are not considered part of the Florida scrub-jay scrub/flatwoods habitat by converting these data from raster to polygon using the "Raster to Polygon" tool.

- …and selecting all polygons associated with land cover types that are part of the Florida scrub-jay habitat and clipping the core map shapefile to these land cover types to produce the final interim core map shapefile ("Florida scrub-jay interim core map.shp").