

Florida Fish and Wildlife Conservation Commission



Endangered and Threatened Species Management and Conservation Plan

Progress Report

Fiscal Year 2023-24

January 2025

TABLE OF CONTENTS

TABLE OF CONTENTS..... **ii**

EXECUTIVE SUMMARY **vii**

SUMMARY OF PROTECTED WILDLIFE LISTS **8**

STATUTORY REQUIREMENTS..... **10**

 Criteria for Research and Management Priorities..... 10

 Statewide Policies Pertaining to Listed Species 10

Listing Actions 10

Status Changes 10

 Imperiled Species Management Program Species Guidelines..... 11

 The Florida Endangered and Threatened Species List and State Listing Actions 11

Funding Request..... 11

PROGRESS REPORT **12**

MAMMALS..... **13**

 Beach Mice 13

Atlantic Coast Beach Mice..... 13

Gulf Coast Beach Mouse 15

 Florida Bats 16

Bonneted Bat..... 17

Gray Bat..... 19

Tricolored Bat..... 20

 Everglades Mink 24

 Florida Manatee..... 25

 Florida Panther..... 29

 North Atlantic Right Whale 31

BIRDS **33**

 Eastern Black Rail 33

 Everglade Snail Kite 33

 Florida Burrowing Owl..... 34

Florida Grasshopper Sparrow	35
Florida Sandhill Crane.....	36
Florida Scrub-jay	37
Red-cockaded Woodpecker	40
Salt Marsh Songbirds.....	43
Shorebirds.....	44
Southeastern American Kestrel	45
Whooping Crane.....	48
Wood Stork	48
AMPHIBIANS.....	50
Flatwoods Salamanders	50
<i>Frosted Flatwoods Salamander.....</i>	<i>50</i>
<i>Reticulated Flatwoods Salamander</i>	<i>50</i>
Florida Bog Frog.....	51
Gopher Frog.....	52
Gulf Hammock Dwarf Siren.....	52
Striped Newt.....	53
REPTILES	55
American Crocodile.....	55
Cedar Key Mole Skink.....	56
Florida Snakes	57
<i>Eastern Indigo Snake.....</i>	<i>57</i>
<i>Florida Pine Snakes & Southern Hog-nosed Snakes.....</i>	<i>58</i>
<i>Short-tailed Kingsnake</i>	<i>58</i>
Florida Reef Gecko.....	59
Florida Scrub Lizard.....	59
Gopher Tortoise	59
Map Turtles.....	63
<i>Barbour’s Map Turtle.....</i>	<i>63</i>
<i>Escambia Map Turtle</i>	<i>63</i>
Suwannee Alligator Snapping Turtle	64

INVERTEBRATES65

- Black Creek Crayfish 65
- Coral..... 67
- Blue Calamintha Bee..... 67
- Freshwater Mussels 68
 - Chipola Slabshell* 68
 - Choctaw Bean* 68
 - Fat Threeridge*..... 69
 - Flatwoods Creekshell*..... 69
 - Fuzzy Pigtoe*..... 69
 - Gulf Moccasinshell* 69
 - Narrow Pigtoe* 69
 - Ochlockonee Moccasinshell* 70
 - Oval Pigtoe* 70
 - Purple Bankclimber* 70
 - Rayed Creekshell*..... 70
 - Round Ebonyshell*..... 71
 - Shinyrayed Pocketbook* 71
 - Southern Elktoe*..... 71
 - Southern Kidneyshell*..... 71
 - Southern Sandshell*..... 71
 - Suwannee Moccasinshell* 72
 - Tapered Pigtoe*..... 72
- Frosted Elfin..... 74
- Miami Tiger Beetle 74
- Panama City Crayfish..... 75

OTHER WORK..... 76

- Citizen Awareness Program..... 76
 - Media Relations*..... 76
 - Social Media*..... 76
 - GovDelivery and Websites* 77
 - Fairs, Festivals and Events* 77

<i>Volunteer Opportunities.....</i>	<i>78</i>
<i>Community Meetings, Workshops and Presentations.....</i>	<i>79</i>
<i>Other Educational and Outreach Programs and Presentations.....</i>	<i>80</i>
Coordination and Assistance.....	81
<i>Reviews And Assistance for Transportation Projects</i>	<i>81</i>
<i>Land Use Planning Activities.....</i>	<i>81</i>
<i>Landowner Assistance Program</i>	<i>82</i>
<i>Center for Biostatistics and Modeling</i>	<i>83</i>
Critical Wildlife Areas.....	84

APPENDIX A. FLORIDA'S LISTED WILDLIFE SPECIES AS OF JUNE 30, 2024	88
APPENDIX B. LIST OF ACRONYMS USED IN THIS REPORT	95
APPENDIX C. FWC'S FISH AND WILDLIFE RESEARCH INSTITUTE'S PUBLICATIONS DURING FY 2023-24	97
APPENDIX D. COMMON AND SCIENTIFIC NAMES OF NON-LISTED SPECIES MENTIONED IN THIS REPORT	99
APPENDIX E. GLOSSARY OF TERMS	102
APPENDIX F. MAP OF FWC REGIONS.....	105
APPENDIX G. MAP OF FWC MANAGED AREAS.....	106

LIST OF EXHIBITS

Exhibit 1. Summary of Florida’s Listed Species List as of June 30, 2023.....	9
Exhibit 2. FWC Endangered/Threatened Species Budget Request for FY 2025-26.....	11
Exhibit 3. Percentage of Southeastern beach mouse detections at track tubes across six sites in the species’ range for FY 2023-24.....	14
Exhibit 4. Percentage of Anastasia Island beach mouse detections at track tubes across three sites in the species’ range for FY2023-24.....	14
Exhibit 5. Capture and PIT Tagging Data for Florida Bonneted Bats on Babcock-Webb WMA (FY 2023-24)	17
Exhibit 6. Roost Data for Florida Bonneted Bats on Babcock-Webb WMA (FY 2023-24)	19
Exhibit 7. Summary of Everglades mink diet analysis completed by the National Genomics Center for Wildlife and Fish Conservation in FY 2023-24. A total of 57 scats were collected during detection dog surveys in FY 2022-23 from 8 sites in FSPSP, 32 of which were of high enough quality for diet analysis.....	25
Exhibit 8. Trail camera panther detections (FY 2023-24)	29
Exhibit 9. Confirmed and probable FLM cases. (FY2023-24).....	30
Exhibit 10. Right Whale Mortality and FWRI Involvement in UME Cases (2023/2024 Season)	32
Exhibit 11. Florida Scrub-jay WMA/WEA Habitat Mangement Data (FY2023-24).....	39
Exhibit 12. Red-Cockaded Woodpecker WEA/WMA Habitat Management Data (FY2023-24)	42
Exhibit 13. South America Kestrel Nesting Box Data (FY2023-24)	47
Exhibit 14. Striped Newt and Gopher Frog pond dipnet summary for FY 23-24.....	54
Exhibit 15. Summary of gopher tortoise population survey results for FY 2023-24.	61
Exhibit 16. Gopher Tortoise WMA/WEA Habitat Management Data (FY2023-24)	62
Exhibit 17. Freshwater mussel surveys conducted in FY 2023-24. Number of surveys is in parentheses after the basin name. Dashes indicate the species is not known to occur in that basin. “NS” denotes a basin where the species occurs but where the basin was not surveyed in FY 2023-24.....	73
Exhibit 18. Total interactions with each FWC social media account obtained in 2023-24.	76
Exhibit 19. Total view with each FWC YouTube account obtained in 2023-24.....	77
Exhibit 20. Number of subscribers in FY 2023-24 for select GovDelivery topics.	77
Exhibit 21. Critical Wildlife Areas (CWAs) In Florida During FY 2023-24	85

EXECUTIVE SUMMARY

This report covers Fiscal Year (FY) 2023-24 and constitutes the 46th progress report and updated plan submitted by the Florida Fish and Wildlife Conservation Commission (FWC) for the Florida Endangered and Threatened Species Management and Conservation Plan. This report is required by the Florida Endangered and Threatened Species Act of 1977 in section 379.2291(5), *Florida Statutes*. The Act required the preparation of an initial plan for submission to the 1978 Florida Legislature, and the annual preparation of a revised and updated plan for management and conservation of Florida's Endangered and Threatened species. Federal- and State-designated Endangered and Threatened species, as well as State-designated Species of Special Concern, are referred to as listed species in this report. The initial plan submitted in March 1978 remains the basic reference document for annual updates. Subsequent annual reports may be consulted regarding a chronological history of listed species activities and may be obtained at <https://myfwc.com/wildlifehabitats/wildlife/reports/>.

This report includes a description of FWC's criteria for research and management priorities, statewide policies pertaining to listed species, a progress report providing a description of agency actions for listed species, and a description of FWC's citizen awareness program as it relates to listed species. In addition, it includes progress reports of staff activities relating to listed mammals, birds, amphibians, reptiles, fish and invertebrates; as well as updates on agency actions to provide coordination and assistance, Critical Wildlife Areas (CWA), incentive-based conservation programs, law enforcement activities and permitting for listed species.

SUMMARY OF PROTECTED WILDLIFE LISTS

The first Florida Endangered Species List for wildlife was created in 1972 and consisted of 23 species. Listing was expanded in 1973 to include Threatened species, and again in 1979 to include Species of Special Concern (SSC). Updated Threatened species rules approved by FWC Commissioners went into effect on November 8, 2010, creating the Florida Endangered and Threatened Species List. Species listed through FWC's listing process are now in a single-category, State-designated Threatened (ST), which is designed to eliminate controversy on what a species is called and focus on the conservation actions needed to improve the species' status. The SSC List was temporarily retained to allow time to assess species under FWC's listing process to determine whether they should be listed as ST or removed from the list. All Florida species listed under the Endangered Species Act by the U. S. Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Administration's Marine Fisheries Service (NOAA-Fisheries) are included in the Florida Endangered and Threatened Species List as Federally designated-Endangered (FE), Federally-designated Threatened (FT), Federally-designated Threatened Due to Similarity of Appearance [FT(S/A)], or Federally-designated Nonessential Experimental Population (FXN) species.

Rules 68A-27.003 and 68A-27.0031, Florida Administrative Code (F.A.C.), contain the official Florida Endangered and Threatened Species List. Rule 68A-27.005, F.A.C., contains the SSC List. Currently, FWC lists 133 fish and wildlife species (Exhibit 1) as ST (39), SSC (1), FE (50), FT (38), FT(S/A) (4) and FXN (1). The list is unchanged since June 30, 2021. There is no duplication between lists. Collectively, these 133 species are referred to as Florida's listed species. FWC did not conduct management or research activities on all listed species this year; therefore, this report does not contain discussion of all listed species. Appendix A contains all of Florida's listed species as of June 30, 2022. Changes to the list may occur throughout the year.

A compiled list of Florida's currently listed species is available at:

<https://myfwc.com/media/1945/threatened-endangered-species.pdf>

Rules noted above are available at:

<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27>

At the federal level, NOAA-Fisheries is responsible for listing most marine species and the USFWS is responsible for other species. The federal list of animals and plants is administered by USFWS and published in Chapter 50 of the Code of Federal Regulations (CFR): animals in 50 CFR 17 and plants in 50 CFR 23. Additional information on federal listings is available at:



NOAA-Fisheries Federal Listings	http://www.nmfs.noaa.gov/pr/species/index.htm
USFWS Federal Listings	https://ecos.fws.gov/ecp/
Florida Department of Agriculture and Consumer Services: Florida Statewide Endangered and Threatened Plant Conservation Program-includes federally listed plant species	https://www.fdacs.gov/Forest-Wildfire/Our-Forests/Forest-Health/Florida-Statewide-Endangered-and-Threatened-Plant-Conservation-Program

Exhibit 1. Summary of Florida’s Listed Species List as of June 30, 2023.

STATUS DESIGNATION	MAMMALS	BIRDS	AMPHIBIANS	REPTILES	FISH	INVERTEBRATES	TOTAL
Federally-designated Endangered (FE)	22(5) ²	8	1	3(3)	3(1) ¹	13	50(9)
Federally-designated Threatened (FT)	2(1)	7	1	7(2)	4(1)	18	39(4)
Federally-designated Threatened due to Similarity of Appearance [FT(S/A)]	0	0	0	1	0	3	4
Federally-designated Nonessential Experimental Population (FXN)	0	1	0	0	0	0	1
State-designated Threatened (ST)	4	16	3	9	6	2	40
State Species of Special Concern (SSC)	0	0	0	0	0	0	0
TOTAL	28(6)	32	5	20(5)	13(2)	36	134 (13)

¹ Numbers in the parentheses are the number of species for which FWC does not have constitutional authority. The status in Rule 68A-27.0031, F.A.C. is the Federal status these species had when FWC was created by amendment to the Florida Constitution, adopted in 1998. The status of these species listed in this report is their current Federal status as of June 2023.

² There is one additional species included in Rule 68A-27.0031, F.A.C as a species for which FWC does not have constitutional authority that is not included here because it has been determined to be extinct.



STATUTORY REQUIREMENTS

Criteria for Research and Management Priorities

FWC uses a variety of tools to evaluate and prioritize research and management needs for State listed species. One tool used is the State listing process described in Rule 68A-27.0012, F.A.C. This process uses a quantitative system to identify Florida's most at-risk species and directs the development of a management plan for each species undergoing a state listing action. In addition to the listing process, FWC uses a species ranking process that was developed by FWC and published in Wildlife Monographs (Millsap, B. M., J. A. Gore, D. E. Runde, and S. I. Cerulean. 1990. Setting priorities for the conservation of fish and wildlife species in Florida. Wildlife Monographs 111). This ranking process provides a biological score that ranks species based on their biological vulnerability; an action score that ranks a species based on the amount of available information and ongoing management actions; and a supplemental score that looks at variables not included in the biological or action scores. These scores serve as one of the multiple tools used to help identify species most in need of conservation and the amount of effort previously expended on them, which can be used to help prioritize agency resources. FWC also maintains a list of Species of Greatest Conservation Need (SGCN), which uses a set of scientific core criteria and identifies the broad range of Florida's species in decline or those at the greatest risk of becoming imperiled in the future. In addition, FWC also considers available funding sources, legislation, court rulings, grant agreements and approved management plans when setting priorities for allocating resources for managing and conserving Florida's State listed species.

Statewide Policies Pertaining to Listed Species

Listing Actions - In May 2024, FWC Commissioners approved the staff recommendation to add the Florida reef gecko (*Sphaerodactylus notatus notatus*) as a Candidate Species in Rule 68A-27.0021, F.A.C. Staff are developing a Species Action Plan and Species Conservation Measures and Permitting Guidelines for this species.

Status Changes - In accordance with Florida's listing process outlined in Rule 68A-27.0012, F.A.C., species that are reclassified, removed from, or added to the federal Endangered and Threatened Species list are updated in state rule to maintain consistency. In FY 2023-24, there were no changes to the Florida's Endangered and Threatened Species list.



Imperiled Species Management Program Species Guidelines

From July 2023 to June 2024, no new Species Conservation Measures and Permitting Guidelines (Guidelines) were completed. These Guidelines outline the species’ biological background and define activities likely to impair essential behavior patterns. They also provide voluntary conservation measures that may benefit the species and outline options for avoidance, minimization, and mitigation for State-Threatened species.

The Florida Endangered and Threatened Species List and State Listing Actions

In accordance with the listing process outlined in Rule 68A-27, in December 2023 FWC Commissioners approved three Biological Review Groups consisting of species experts to evaluate the alligator gar (*Atractosteus spatula*), blackbanded sunfish (*Enneacanthus chaetodon*), and southern dusky salamander (*Desmognathus auriculatus*) against state listing criteria, Biological Review Group members will receive International Union for Conservation of Nature training shortly. No new listing actions were received in FY 2023 - 24.

Funding Request

The recommended level of funding for FWC endangered species programs in FY 2025-26 is \$40,243,339 (Exhibit 2). This includes funding to maintain and enhance current programs and continuation of awards from federal grants designed to assist in development of recovery programs.

Exhibit 2. FWC Endangered/Threatened Species Budget Request for FY 2025-26.

FUNDING SOURCE	AMOUNT (\$)
Federal Grants Trust Fund (FGTF)	\$ 6,251,770
Florida Panther Research and Management Trust Fund (FPRMTF)	\$ 911,544
General Revenue Fund (GR)	\$ 4,232,916
Grants and Donations Trust Fund (GDTF)	\$ 5,549,870
Land Acquisition (LATF)	\$ 2,413,235
Marine Resources Conservation Trust Fund (MRCTF)	\$ 10,198,144
Nongame Wildlife Trust Fund (NWTF)	\$ 6,426,320
Save the Manatees Trust Fund (STMTF)	\$ 2,281,272
State Game Trust Fund (SGTF)	\$ 1,978,268
TOTAL	\$ 40,243,339



PROGRESS REPORT

FWC’s mission is “managing fish and wildlife resources for their long-term well-being and the benefit of people.” Management of listed species includes surveying and monitoring of species, habitat improvement and restoration, development and implementation of management plans, conservation planning, agency commenting on potential impacts to species and citizen awareness.

Research is a systematic means of generating the scientific information necessary to support and guide management. Research also leads to a better understanding of how wildlife managers may alter populations through management actions, as well as leading to management actions that have aided in species stabilization and conservation.

This section briefly describes the progress of ongoing listed species management and research by FWC. Appendix A contains a complete list of listed species’ scientific and common names and Appendix D provides the same information for non-listed species mentioned in this report.



MAMMALS

Beach Mice

Several subspecies of the Old-Field Mouse, collectively known as Beach Mice, inhabit coastal dunes along the Atlantic Coast and northwest Gulf Coast of Florida. In Florida, all subspecies except the Santa Rosa Beach Mouse, are Federally listed, including the Choctawhatchee Beach Mouse, Anastasia Island Beach Mouse, St. Andrew Beach Mouse, Perdido Key Beach Mouse (all Endangered) and the Southeastern Beach Mouse (Threatened).

Atlantic Coast Beach Mice

There are currently two subspecies of beach mice along the Atlantic coast of Florida: the Southeastern beach mouse and the Anastasia Island beach mouse. The Southeastern beach mouse historically occurred from Volusia County to Broward County, and possibly as far south as Miami Beach. The current distribution of this subspecies is thought to be restricted to Volusia and Brevard counties, with some populations possibly scattered through Indian River County. The Anastasia Island beach mouse was historically found in Duval and St. Johns County but is currently limited to Anastasia Island in St. Johns County. In FY2023-24, FWC entered the final year of the 5-year project “Assessing habitat restoration and management activities and benefits for Atlantic Coast Beach Mouse recovery through long-term monitoring,” funded through the USFWS Coastal Program. The monitoring data from this project improves the conservation of both subspecies by assisting in developing strategic management recommendations, prioritizing restoration actions, and supporting the translocation of beach mice. To monitor beach mouse presence, FWC used track tube stations and bucket camera stations. Track tube stations consisted of a polyvinyl chloride (PVC) tube placed horizontally above the ground with an end cap on one end and an open 90-degree elbow on the other that faced down. The tube was baited with sunflower seeds and lined with paper and an inkpad that recorded footprints as mice entered the tube. Bucket cameras were also used at some sites, consisting of a trail camera attached to the lid of a baited 7-gallon bucket with entry holes cut into the side that allow mice to enter and be captured on camera.

Monitoring for Southeastern beach mice occurred at 138 stations across six sites: Smyrna Dunes Park, Canaveral National Seashore, Cape Canaveral Space Force Station, Sebastian Inlet State Park, Pelican Island National Wildlife Refuge, and Treasure Shores Beach Park. Monitoring at Smyrna Dunes Park and Canaveral National Seashore focused on assessing beach mouse habitat use and the effects of erosion. Monitoring at Cape Canaveral Space Force Station generally focused on areas that had similar vegetation composition and structure to Sebastian Inlet State Park to understand the potential of the latter as a



future translocation site. The Southeastern beach mouse has not been detected south of Cape Canaveral Space Force Station since 2012. One bucket camera was established at Canaveral National Seashore but recorded zero beach mouse detections. Four more cameras were placed around the museum at Cape Canaveral Space Force Center, all of which recorded detections. An additional 17 bucket cameras were placed out at two active launch sites at Cape Canaveral Space Force Center at the end of June 2024 to determine what effect launches have on beach mouse presence and activity.

Exhibit 3. *Percentage of Southeastern beach mouse detections at track tubes across six sites in the species’ range for FY 2023-24.*

Study Site	Number of Track Tubes	Detections	Total Surveys	Percent Detections
Smyrna Dunes Park	14	82	144	56.94
Canaveral National Seashore	49	162	331	48.94
Cape Canaveral Space Force Station	42	315	499	63.13
Sebastian Inlet State Park	10	0	70	0
Pelican Island NWR	15	0	100	0
Treasure Shores Beach Park	8	0	60	0

The Anastasia Island beach mouse is currently limited to Anastasia State Park, Ft. Matanzas National Monument, and scattered locations along the coast in-between these sites. At Fort Matanzas National Monument one bucket camera was placed along a hand cut corridor and another in dune habitat near trapping grids; both buckets had detections.

Exhibit 4. *Percentage of Anastasia Island beach mouse detections at track tubes across three sites in the species’ range for FY2023-24.*

Study Site	Number of Track Tubes	Detections	Total Surveys	Percent Detections
Anastasia State Park	9	84	124	67.74
Ocean Hammock Park	2	6	8	75
Fort Matanzas National Monument	18	180	250	72

In October 2023, FWC began a trapping project at Ft. Matanzas to estimate the Anastasia Island beach mouse population and has continued it quarterly. The trapping efforts occurred on two trapping grids,



each with 98 Sherman live traps placed at 49 stations arranged in a 7x7 grid roughly a hectare in area. Captured mice were marked with a uniquely numbered eartag and released in place. These efforts will continue into the first quarter of FY24-25 with the goal of determining a population estimate as well as potentially determining the influence of certain habitat variables on beach mouse presence and population density.

Gulf Coast Beach Mouse

There are several isolated sub-species of beach mice that range along the barrier islands and gulf coast of the Florida Panhandle from Perdido Key to St. Joseph Peninsula. The presence of these mice serves as a positive indicator for coastal dune ecosystem health and quality. To monitor beach mouse presence, FWC established track tube stations placed parallel to the coastal dunes at 15 sites from Escambia to Gulf Counties. Each station consisted of a polyvinyl chloride (PVC) tube placed horizontally above the ground with one end capped and an open, 90-degree elbow at the other side angled with the opening facing down. The floor of the tube was lined with paper, an inkpad with black mineral oil-based ink was placed just inside the open end, and sunflower seeds were placed at the closed end. When beach mice entered the tubes to access the sunflower seed bait, they would walk across the inkpad and leave tracks on the strip of paper. These tracks were how monitors determined beach mouse presence. FWC biologists and partners from the Florida Park Service, Gulf Islands National Seashore (GINS), US Fish and Wildlife Service, and Tyndall Air Force Base regularly checked the stations for tracks. The data from these track tube stations do not provide population estimates. Instead, they indicate beach mouse presence at a given site, which FWC uses to monitor large-scale changes in beach mouse distribution over time.

In FY 2023-24, monitoring continued at 13 sites on public lands and at 2 privately-owned sites. For each location, staff calculated the detection rate, or the percentage of stations that detected tracks during each sampling period. In FY 2023-24, the average detection rate varied from 0% at Deer Lake State Park and the Gulfarium to 93% at the Perdido Key unit of GINS. The total mean detection rate across all sites was 70%. Just under half the surveyed sites had mean detection rates above 80%, indicating beach mice were present on most of the available dune habitat. Only the two sites listed above yielded no detections. In February 2024, funding for FWC beach mouse monitoring ended and monitoring efforts of these sites were then taken over by our partners.



Florida Bats

Blackwater River Wildlife Management Area (BWWMA) in Okaloosa and Santa Rosa Counties; Perdido River Wildlife Management Area (PRWMA) in Escambia County; Apalachicola River Wildlife Environmental Area (ARWEA) in Gulf and Franklin Counties; Escribano Point Wildlife Management Area (EPWMA) in Santa Rosa County; Carter Tract of Econfinia Creek (CT) in Washington County; Pine Log Wildlife Management Area (PLWMA) in Bay and Washington Counties; and Point Washington Wildlife Management Area (PWWMA) in Walton County - Florida bat acoustical surveys were conducted within these areas following NABat protocols. Stationary acoustic surveys were conducted from July to December 2023, and from January to June 2024, for species abundance, diversity, and response to management. Seven sites were chosen for BWWMA, ten for ARWEA, two for both EPWMA and PLWMA, and 4 for PWWMA. A mobile route was conducted on BWWMA within one NABat GRTS cell totaling 15 miles. A mobile route was also conducted on ARWEA totaling ~23 miles.

BWWMA stationary acoustic surveys, a total of 64,007 files from 112 survey nights were analyzed. Species identified included the northern yellow bat (*Lasiurus intermedius*), Seminole bat (*Lasiurus seminolus*), Eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), southeastern myotis, (*Myotis austroriparius*), tri-colored bat (*Perimyotis subflavus*), evening bat (*Nycticeius humeralis*), big brown bat (*Eptesicus fuscus*), and the Brazilian free-tailed bat (*Tadarida brasiliensis*). BWWMA mobile acoustic surveys, a total of 269 files from four survey nights were analyzed. Species identified included the northern yellow bat, big brown bat, red bat, Seminole bat, evening bat, tri-colored bat, and Brazilian free-tailed bat. PRWMA stationary acoustic surveys, a total of 22,285 files from 48 survey nights were analyzed. Species identified included the big brown bat, red bat, hoary bat, northern yellow bat, Seminole bat, southeastern myotis, evening bat, tri-colored bat, and Brazilian free-tailed bat. ARWEA stationary acoustic surveys, a total of 121,889 files from 320 survey nights were analyzed. Species identified included the Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), big brown bat, red bat, hoary bat, northern yellow bat, Seminole bat, southeastern myotis, evening bat, tri-colored bat, and Brazilian free-tailed bat. ARWEA mobile acoustic surveys, a total of 288 files from two survey nights were analyzed. Species identified included the northern yellow bat, big brown bat, red bat, Seminole bat, hoary bat, evening bat, tri-colored bat, and Brazilian free-tailed bat. CT stationary acoustic surveys, a total of 16,041 files from 32 survey nights were analyzed. Species identified included the big brown bat, red bat, hoary bat, northern yellow bat, Seminole bat, southeastern myotis, evening bat, tri-colored bat, and Brazilian free-tailed bat. EPWMA stationary acoustic surveys, a total of 2,183 files from 46 survey nights were analyzed. Species identified included the big brown bat, red bat, hoary bat, northern yellow bat, Seminole bat, southeastern myotis, evening bat, tri-colored bat, and Brazilian free-tailed bat. PLWMA stationary acoustic surveys, a total of 4,966 files from 64 survey nights were analyzed. Species identified included the Rafinesque's big-eared bat, red bat, Seminole bat, hoary bat, northern yellow bat, tri-colored bat, southeastern myotis, evening



bat, big brown bat, and Brazilian free-tailed bat. PWWMA stationary acoustic surveys, a total of 2,736 files from 96 survey nights were analyzed. Species identified included the big brown bat, red bat, Seminole bat, hoary bat, northern yellow bat, southeastern myotis, tri-colored bat, evening bat, and Brazilian free-tailed bat. Yearly surveys may be continued for NABat purposes and developing a species list; determining their relative abundance; and noting their changes in occurrence over time.

BIG BEND WMA (ALL UNITS-TAYLOR & DIXIE COUNTY) - Big Bend WMA Staff continue to contribute to the statewide acoustic bat monitoring initiative. During Fiscal Year 2023-2024, staff monitored 8 sites for a total of 32 nights. Selected sites were along ecotones to maximize detection. Of the several threatened or endangered species of bats found in Florida, only the tri-colored bat was detected on Big Bend WMA.

Bonneted Bat

The federally endangered Florida Bonneted Bat is endemic to Florida. In FY 2023-24, all 11 artificial bat roosts (1 roost is 2 houses) and 1 of the known natural roosts were occupied for at least one night on Babcock-Webb Wildlife Management Area (WMA; Charlotte County). FWC observed pups in seven roosts throughout the FY across various survey types - pup counts, occupancy counts, and following emergence surveys. FWC continued capture and PIT (passive integrated transponders) tagging events this year, the details of which can be found in the following table.

Exhibit 5. Capture and PIT Tagging Data for Florida Bonneted Bats on Babcock-Webb WMA (FY 2023-24)

Month Year	New PIT Tag	Recapture	Pups	Total Individuals captured
Sept 2023	27	68	14	102
Jan 2024	15	114	0	131
May 2024	4	116	59	179

FWC maintained 11 bat roosts and one bat condo on Babcock-Webb WMA during FY 2023-24. FWC also maintained eight automatic PIT tag readers on Florida Bonneted Bat roosts in Babcock Webb WMA. Each reader collects data on when PIT tagged bats enter and exit a roost. Two detectors are non-functional as of the end of the fiscal year.

In FY 2023-24, Babcock-Webb WMA began to participate in acoustic monitoring for the Florida Long-term Bat Monitoring Program. Surveys will be conducted twice yearly in quarter two and quarter 4, with data being submitted to the NABat database. In December 2023, six acoustic detectors were deployed across the management area. In June 2024, the number of detectors was increased to ten in order to better



survey the management area and include the Yucca Pens unit. On September 27th, 2023, FWC conducted mist netting for bats in one location (three net sites) on Babcock-Webb WMA to confirm presence of species detected in acoustic surveys. All bats caught were northern yellow bats (*Lasiurus intermedius*).

Since FY2015-16, FWC and University of Florida have worked together to locate, monitor and characterize natural roosts and the surrounding habitat using acoustic surveys, mist net surveys and radio telemetry. As part of a multi-year project funded by the U.S. Army Corps of Engineers to investigate the effects of large-scale hydrologic restoration of the Everglades on Florida bonneted bats, comprehensive acoustic and mist net surveys have been conducted to document foraging and roosting habitat use by the species from 2020-2024. In FY2023-24, no acoustic surveys were conducted in these other areas. FWC conducted mist net surveys at 6 net sites over 2 nights in Avon Park Air Force Range where no Florida bonneted bats were captured but 17 bats of other species were captured: 13 evening bats (*Nycticeius humeralis*), 3 Brazilian free-tailed bats (*Tadarida brasiliensis*), and 1 big brown bat (*Eptesicus fuscus*). FWC conducted mist net surveys at 30 net sites over 10 nights in Fakahatchee Strand Preserve State Park where 19 bats were captured: 7 Florida bonneted bats, 5 evening bats, 2 Brazilian free-tailed bats, 2 big brown bat, 2 northern yellow bat, and 1 Seminole bat (*Lasiurus seminolus*). All 7 Florida bonneted bats captured were fitted with VHF radio transmitters. Radio telemetry was used to track those 7 bats back to 6 new roost trees located in Fakahatchee Strand Preserve State Park. Emergence counts were conducted on all 6 newly identified roost trees and also on 3 previously identified roost trees to document occupancy and roost use. Two manuscripts describing site specific and landscape scale roost selection compiling all discovered natural roosts across the species' range are in preparation and will be submitted for publication in FY24-25. Another manuscript from previous work assessing diet of Florida bonneted bats in Avon Park, Babcock-Webb and Miami-Dade County was completed and reviewed internally by FWC in FY23-24; it will be submitted to Journal of Mammalogy in FY24-25. Finally, a manuscript assessing the effects of Everglades hydrological restoration on Florida bonneted bat foraging habitat was published in FY23-24 in the Journal Restoration Ecology: Nicholson, L.P., Braun de Torrez, E.C. and Ober, H.K. (2024), Wetland restoration enhances habitat for an endangered bat, *Eumops floridanus*. Restoration Ecology e14200. <https://doi.org/10.1111/rec.14200>



Exhibit 6. Roost Data for Florida Bonneted Bats (FY 2023-24)

Location	County	Acoustic Survey Nights	Bats Detected?	Mist net survey sites	Bats Captured?	New Roost Discovered?	Roost Occupancy
Fred C. Babcock/Cecil M. Webb WMA	Charlotte	33	Yes	3	No	No	1 roost occupied for 1 night, 5 unoccupied or destroyed
Big Cypress National Preserve	Collier/Monroe	0	N/A	0	N/A	No	1 roost unoccupied, 5 roosts not checked
Fakahatchee Strand Preserve State Park	Collier	0	N/A	10 survey nights - 30 nets	7	6	7 roosts occupied, 2 roosts unoccupied, 3 roosts destroyed, 11 roosts not checked
Avon Park Air Force Range	Highlands	0	N/A	2 survey nights - 6 nets	No	No	N/A

Gray Bat

ABUNDANCE OF BATS AT WINTER ROOST CAVES IN FLORIDA - The gray bat is a Federally-designated Endangered species that roosts almost exclusively in caves throughout much of the south-central US. Gray bats occupy different caves in summer and winter based upon temperature, and historically some bats migrated out of Florida during winter. Gray bat populations previously suffered severe declines due to human disturbance of their roost caves. In Florida, the gray bat is known from only a few caves in Jackson County, and the population has declined even though these caves are protected. This decline began prior to the emergence of white-nose syndrome, a disease decimating hibernating bats in North America. White-nose syndrome is not believed to be adversely affecting Florida’s gray bats at this time. No gray bats have been observed or captured at summer roosts in Florida during survey attempts since 1990.

Gray bats formerly roosted in two Florida caves during winter, and these hibernating bats could be readily counted at both sites. During the most recent winter count on January 25, 2024, FWC biologists again found no gray bats in Old Indian Cave, the former primary wintering cave in Florida Caverns State Park, or in Dugong Cave, a smaller cave adjacent to the state park where gray bats roosted in some winters. In addition, FWC biologists did not observe gray bats in any of the other 17 caves in northwest Florida visited during FY 2023-24 as part of a broader study of the use of caves by wintering bats. Although thousands of gray bats previously wintered in Florida’s caves, no gray bats have been found hibernating in the state in winter since 2011.



More frequent or intensive surveys might provide evidence that gray bats are still present in Florida, but winter cave surveys are limited to once annually to minimize disturbance to hibernating bats. Currently, the number of gray bats in Florida remains, at best, critically low, and the species may well already be absent from the state. Because the roost caves are protected, factors other than human disturbance of roosts are likely responsible for the decline. Interestingly, in other parts of their range, gray bat numbers are increasing, and very large colonies are present in caves in northern Alabama, northern Georgia, Tennessee, and other locations in the Southeast. Because some gray bats in Florida were previously known to migrate to northern caves each winter to hibernate, it is possible that protection and stabilization of the large summer colonies of gray bats in northern caves have led to bats no longer migrating to Florida.

ACOUSTIC MONITORING OF BATS IN FLORIDA THROUGH THE LONG-TERM BAT MONITORING PROGRAM - Bats in Florida face numerous threats from climate change, habitat loss and disturbance, and emerging infectious diseases, such as WNS. To better understand the impact these threats may have, FWC biologists have established the Long-term Bat Monitoring Program (LTBMP) to improve our knowledge of bats in the state and to monitor population trends. The LTBMP provides data on species presence, relative abundance, critical habitat, and activity patterns of our state's bat populations. Protocols were adapted from the North American Bat Monitoring Program (NABat) so that FWC can address Florida-specific goals while contributing to bat conservation at the national level. Even though gray bats have not been physically documented in Florida since 2011, the LTBMP continuously monitors for gray bats by recording ultrasonic echolocation calls. Since the start of the LTBMP, FWC biologists have partnered with external partners from the Florida Park Service, National Park Service, Florida Forest Service, Florida National Guard, and more to established over 192 stationary acoustic data collection points across the state. In FY 2023-24, FWC biologists and partners collected 995,114 acoustic files with 379,475 identified to bat species. Unfortunately, none of these have been confirmed as gray bats.

Tricolored Bat

DEVELOPING A MORE COMPREHENSIVE MANAGEMENT STRATEGY FOR WNS-SUSCEPTIBLE BATS IN FLORIDA - The tricolored bat was historically one of the most common bats in eastern North America, but it is now a candidate for Federal listing under the Endangered Species Act. Tricolored bats have experienced severe declines throughout their range due to white-nose syndrome (WNS), a fungal disease that has killed millions of hibernating bats in North America since its emergence in winter 2006-2007. Although WNS has not yet reached Florida, the disease is now present in Georgia and Alabama, which places Florida's tricolored bats at high risk.



Due to the threat of WNS on Florida's cave-hibernating bats, a large-scale study was initiated in 2014 to aid in the development of conservation and management guidelines. The study aims to better understand trends in distribution and abundance of cave bats, quantify ideal roosting habitat, determine the susceptibility of caves and other roost types to WNS infection, and identify WNS transmission routes. During this study, FWC biologists identified 126 tricolored bat hibernacula caves, but bats at these caves usually occurred in small numbers (<10 individuals). Only 8 caves contained more than 40 tricolored bats, and only two caves had over 100 bats.

In FY 2023-24, as part of long-term monitoring, FWC biologists resurveyed 40 important bat caves, 18 in northwest Florida and 26 in north central Florida and observed 283 tricolored bats in 29 (73%) of the caves surveyed. FWC biologists swabbed the skin of bats at 5 caves, 2 bridges, and 1 culvert and submitted samples to the United States Geological Survey Wildlife Health Center to test for the fungus that causes WNS. As in previous years, no evidence of the fungus was found, and Florida remains the only state east of the Mississippi River that is free of WNS. However, statewide counts suggest that tricolored bats are experiencing a strongly decreasing trend (>60% over the 10-year study period) for unknown reasons. It is possible that WNS is causing declines in Florida and has yet to be detected or that Florida is experiencing indirect losses from WNS in nearby areas.

Following anecdotal reports of tricolored bats in culverts under roads, FWC biologists began surveying roadway culverts in winter 2017-18 to determine their importance to cave-roosting bat species. In FY 2023-24, FWC biologists surveyed 22 roadway culverts in north Florida. Biologists detected two species including the tricolored bat and the more common southeastern myotis and counted 106 tricolored bats in 11 (50%) of the culverts surveyed. FWC biologists surveyed a highway culvert in Gadsden County with 61 tricolored bats, making it the largest known hibernacula of any type in the state. Although tricolored bats occupied only a small percentage of culverts, Florida has thousands of roadway culverts which may cumulatively provide roosting habitat for many tricolored bats. FWC biologists also surveyed two known tricolored bat bridge hibernacula which together contained 74 tricolored bats. Further research is needed to investigate bat use of bridges to determine their importance to tricolored bats. Culverts and bridges may be ideal sites to administer or test potential WNS treatments because collateral impacts to sensitive non-target cave fauna could be avoided. Despite the potential roosting habitat culverts and bridges provide, the use of these structures as a winter roost may put hibernating bats at risk of disturbance, injury, or death from roadway construction, maintenance, and flooding. More research is necessary to develop adequate management guidelines to protect bats that roost in culverts and bridges.

Lastly, because Florida's mild winters are unique relative to other states with WNS, biologists need to develop a better understanding of tricolored bat winter roost use to be able to monitor and manage



populations on the landscape that may not be present or easily monitored in hibernacula. In FY2021-22, FWC biologists began a project using radio telemetry to track the winter movements of tricolored bats. In FY2023-24, biologists continued this work and tracked 20 tricolored bats for an average of 10.9 days. During all three winters of tracking, FWC biologists identified 59 tree roosts, predominantly in sabal palm, sweetgum, oak, and cypress trees. Tricolored bats also roosted in culvert and cave roosts. Biologists found that tricolored bats frequently move between roosts in winter and may remain in tree roosts during near freezing temperatures. Further research is needed to determine the significance of tree roosts in Florida and how this may potentially act as refugia for tricolored bats from WNS.

ACOUSTIC MONITORING OF BATS IN FLORIDA THROUGH THE LONG-TERM BAT MONITORING PROGRAM - Bats in Florida, including tricolored bats, face numerous threats from climate change, habitat loss and disturbance, and emerging infectious diseases, such as WNS. To better understand the impact these threats may have, FWC biologists have established the Long-term Bat Monitoring Program (LTBMP) to improve our knowledge of bats in the state and to monitor population trends. The LTBMP provides data on species presence, relative abundance, critical habitat, and activity patterns of our state's bat populations. Protocols were adapted from the North American Bat Monitoring Program (NABat) so that FWC can address Florida-specific goals while contributing to bat conservation at the national level. Since the start of the LTBMP in November 2018, FWC biologists and external partners, including Florida Park Service, National Park Service, Florida Forest Service, Florida National Guard, and more, have established over 192 stationary points across the state to record the ultrasonic echolocation calls of bats. From the data received so far for FY 2023-24, FWC biologists and partners collected 995,114 acoustic files with 379,475 identified to bat species. Of these calls, 52,225 (13.8%) have been automatically identified as tricolored bats. Tricolored bats were detected across the state as far northwest as Pensacola and as far south as Miami.

Acoustic monitoring structured through the LTBMP is also being used to complement ongoing winter bat research to better address WNS management issues. Building on insight that bats are active on the landscape all winter and using tree and culvert roosts, analyses were conducted using the statewide acoustic dataset to understand which combination of temporal, habitat, and landscape variables best predict the activity patterns of tricolored bats in Florida. Acoustic results confirmed previous findings that tricolored bats were active all year round, including the winter months. However, tricolored bats were most active during the spring and summer months (April - September). Specifically, July through September had the highest detections overall. This result was likely due to the influx of volant young on the landscape. Results also indicated that in all seasons, tricolored bat activity increased as the diversity of habitats around an acoustic detector increased. This finding was noteworthy because it



suggests that increasing habitat diversity on a broader scale, rather than focusing on habitat type alone, could be a key strategy for conserving tricolored bats in Florida. Lastly, this analysis found that proximity to water varied in importance based on the time of year. Specifically, a closer distance to water was important for tricolored bats during the spring (April - June). There may be multiple reasons for this result, including that April through June is early maternity season when female tricolored bats are most likely to be pregnant and lactating. The high energetic cost of pregnancy and lactation may increase the need for tricolored bats to be closer to water and food resources. Other explanations could include reactions to wet and dry seasons in Florida. Spring is typically a dry season in Florida and bats may move to be closer to more permanent water resources during this time until the wet season begins in the summer. In addition to analyses such as this one, acoustic monitoring can help confirm other important trends like population decline seen in Florida's caves and evaluate changes in activity on site-specific and state-wide geographic scales.

TRICOLORED BAT CAPTURES AND ACOUSTICS IN SOUTH FLORIDA - As part of roost location efforts for endangered Florida bonneted bats, FWC biologists have been conducting mist net surveys in conservation areas throughout the bonneted bat range in south Florida since FY2014-15. During these surveys, only 14 tricolored bats have been captured between 2015-2024. In FY2023-24, FWC conducted mist net surveys at 30 net sites over 13 nights in Fakahatchee Strand Preserve State Park, Avon Park Air Force Range, and Babcock-Webb WMA; however no tricolored bats were captured. It important to note that these mist net surveys were conducted in open areas targeting Florida bonneted bats and not in more forested areas where tricolored bats would be expected to more commonly occur.

As part of a multi-year project to investigate the effects of large-scale hydrologic restoration of the Everglades on bats (Picayune Strand Restoration Project), FWC biologists conducted comprehensive acoustic surveys in South Florida from 2020-2023. in the following sites: Picayune Strand State Forest, Fakahatchee Strand Preserve State Park, Florida Panther National Wildlife Refuge, Collier-Seminole State Park, Ten Thousand Islands National Wildlife Refuge and Big Cypress National Preserve. Tricolored bats were detected at 100% of the survey sites but had a very low proportion of call files recorded relative to other bat species (<1% of total bat call files). Across the restoration project, tricolored bats were most active within restored and reference areas, in freshwater forested wetlands and were positively associated with the percent of freshwater forested wetland, suggesting the species may benefit from hydrological restoration. Acoustic surveys were not conducted during FY2023-24. Results from this study are currently being prepared for publication.



Everglades Mink

The Everglades mink is a State-Threatened subspecies of the American mink, endemic to south Florida. Historically, the Everglades mink occurred in the freshwater marshes and swamps of the Everglades, Big Cypress, and Lake Okeechobee. However, recent mink sightings predominately occur in Fakahatchee Strand Preserve State Park (FSPSP) and the surrounding areas. The cause of this range restriction is hypothesized to be habitat loss, fragmentation, hydrological changes, and declines in water quality. Effective conservation actions are necessary for the continued persistence of Everglades mink; however, they are hampered by significant knowledge gaps in distribution, monitoring protocols, and life history.

DETERMINING BEST MONITORING PROTOCOLS AND DIET OF THE EVERGLADES MINK - In FY 2023-24, FWC biologists continued a study to develop best monitoring protocols for the Everglades mink using camera traps and four different attractants. After successfully detecting the Everglades mink on camera in FSPSP in FY 2022-23, surveys were expanded to include 10 additional sites in Big Cypress National Park (BCNP; 6) and Florida Panther National Wildlife Refuge (FPNWR; 4). Biologists placed four trail cameras approximately 330 yards apart along a transect and paired with either bait (raw chicken), scent (Dunlap's Hell Fire Long Call Smear), visual (feather boa), or an audio lure (Kill Squeak Trap Call; plays mouse squeaks). Cameras were set for 14 days, refreshed if necessary and set for an additional 14 days. Everglades mink were not detected on any cameras in BCNP or FPNWR. Formal analyses of camera trap data from FY 2022-23 and FY 2023-24 will be conducted in FY 2024-25 to determine best monitoring protocols and potential habitat associations.

Additionally, a detection dog and handler team surveyed each transect in BCNP and FPNWR on ≥ 2 occasions during the study period. The team also conducted informal surveys in FSPSP along transects where the Everglades mink was detected in previous surveys. The detection dog located 15 scats from 3 sites in FSPSP and 3 scats from 2 sites in BCNP. All scat samples have been sent to the National Genomics Center for Wildlife and Fish Conservation for species identification and diet analysis.

In FY2023-24, biologists received results of the diet analysis from the previous year (Table 1). Crayfish were the primary prey item identified in the fecal contents. However, their diet was diverse and contained prey items from numerous other groups, including fish, other invertebrates, amphibians, mammals, and birds.

By improving existing knowledge gaps in monitoring protocols and ecology of the Everglades mink, FWC biologists will be able to begin standardized monitoring of the Everglades mink and gather insight on what factors (e.g., habitat, prey availability, etc.) may be limiting the range of the Everglades mink in south Florida.



Exhibit 7. Summary of Everglades mink diet analysis completed by the National Genomics Center for Wildlife and Fish Conservation in FY 2023-24. A total of 57 scats were collected during detection dog surveys in FY 2022-23 from 8 sites in FSPSP, 32 of which were of high enough quality for diet analysis.

	Crayfish	Fish	Other invertebrates (not crayfish)	Amphibians	Mammals	Avian	Total scat samples
Scats containing diet component	20 (63%)	8 (25%)	8 (25%)	7 (22%)	2 (6%)	2 (6%)	32

*Percentages do not equal 100% because scats could contain more than one diet component.

Florida Manatee

The Federally Threatened Florida Manatee (also known as West Indian Manatee) occurs in Florida’s coastal estuaries and riverine waters. Florida’s efforts to conserve the manatee are funded primarily by the Save the Manatee Trust Fund that derives approximately one-third of its funds from the sale of specialty license plates. Conservation efforts are guided by the Florida Manatee Sanctuary Act, the [Florida Manatee Management Plan](#) and the [USFWS Florida Manatee Recovery Plan](#).

MORTALITY AND RESCUE - FWC researchers and law enforcement officers respond to statewide reports of manatee carcasses and injured manatees. In FY 2023-24, 573 carcasses were documented in Florida. Additionally, four carcasses were documented in Georgia, two in Alabama, one in Mississippi, one in North Carolina, one in South Carolina, and one in Texas. An Unusual Mortality Event (UME) within the Atlantic Management Unit was declared in March 2021 and the FWC and the USFWS continue to investigate. More information can be found at Carcass examinations in the Atlantic Unusual Mortality Event | FWC (myfwc.com). An interactive searchable web-based database with manatee mortality information is available at <https://myfwc.com/research/manatee/rescue-mortality-response/statistics/>. Mortality of non-perinatal carcasses during FY 2023-24 were at baseline numbers and no starvation-related deaths were documented. The UME coordinators will apply for closure of the event and transition into the post-UME monitoring phase for longterm health effects and other manatee population concerns. The number of verified perinatal carcasses in the Indian River Lagoon increased significantly over the past year (July - June, n=54) compared to the previous annual period (n=1). This increase is attributed to a return to calving after several years of reproductive suppression by malnutrition and starvation, and was expected with improved health condition since perinatal mortality occurs in any reproducing manatee population. During 2023-24 statewide FWC staff and cooperators rescued 129 sick or injured manatees under the Federally permitted statewide rescue program. Various oceanaria (Homosassa Springs Wildlife State Park,



Jacksonville Zoo and Gardens, Sea World Orlando, and ZooTampa at Lowry Park) participate in the state-funded rehabilitation program and are partially reimbursed by the FWC for their costs. In FY 2023-24, 20 of these rescued manatees were released, 24 died, and 48 are still being treated. FWC staff participated in almost every rescue, transport to rehabilitation facilities, pre-release health assessment, and release of rehabilitated manatees in various parts of the state.

POPULATION ASSESSMENT - Population assessments include information from aerial surveys, photoidentification, and genetic markers to determine regional distribution and abundance of manatees and estimates of survival, reproductive, and growth rates. When applying advanced aerial survey methods, the latest published (2021-2022) estimate of statewide abundance was between 8,350-11,730 manatees. More information can be found at FWC's Third Update to the Statewide Florida Manatee Abundance Estimate | FWC (myfwc.com). FWC staff conducted smaller-scale distributional surveys in the Indian River Lagoon region in response to the above-mentioned UME. Surveys were also conducted in upper Tampa Bay since September 2023. The FWC maintains an image-based, computerized database called the Manatee Individual Photo-Identification System. These data assist in estimating important population vital rates and life history information. Survival rate information from photo-identification efforts in the southwest and Atlantic regions were recently updated and included in ongoing efforts to advance applications of Integrated Population Models (IPM) for both regions. Genetic testing offers an additional means of identifying individual manatees; its application could greatly enhance existing monitoring and assessment studies. The manatee genetic-ID database currently includes at least 3,379 unique individuals identified by skin samples collected from live manatees in the southwest and expanded Atlantic coast Florida pilot study areas.

BEHAVIORAL ECOLOGY - Warm-water habitat is of interest to the FWC and partners because the predicted future loss of this habitat is a key, long-term threat to manatees. In FY 2023-24, FWC staff continued to monitor wintering sites on the Florida west coast undergoing restoration or mitigation. Monitoring of water temperature of manatee warm-water habitats statewide was continued via deployment of temperature probes at key sites as well as the management and interpretation of these data.

In 2021, FWRI received a National Oceanic and Atmospheric Administration (NOAA)-funded actionable science grant for a project entitled, "Creating Secure Warm-water Habitat Networks for Manatees along Florida's Gulf Coast: Developing a Vision, Identifying Gaps, and Prioritizing Restoration Sites." The goal of this multi-year interagency project is for state and federal managers and researchers to jointly develop plans to identify and address the highest research priorities to meet management needs regarding the creation, enhancement, or protection of warm-water habitats for manatees. Priority plans were



successfully developed by the team and a summary report from this warm-water work is expected by the end of 2024.

As part of the above-mentioned UME investigation, FWC again collaborated with the U.S. Geological Survey (USGS) to tag and track manatees with satellite-linked GPS tags, and to evaluate submerged aquatic vegetation used by tagged manatees in the northern Indian River Lagoon. A team of scientists and veterinarians from FWC, USGS, University of Florida, and other partners assessed the health and body condition of each animal to further understand the health of the wild population.

[MANATEE FORUM](#) - In FY 2023-24, the Manatee Forum, a diverse stakeholder group hosted by the FWC, met in November 2023 and remotely through teleconference in May 2024. Presentation topics in both meetings were focused on manatee habitat restoration, with updates on agency efforts to implement the Warm-water Habitat Action Plan, submerged aquatic vegetation in the Indian River and Mosquito lagoons, and restoration activities in the St. Johns River. Other presentations topics included a review of the thermal quality of thermal refuges based on a recent US Geological Survey publication, FWC Division of Law Enforcement updates, and coordination efforts and a summary of the results from the 2021-22 Abundance Estimate recently published by FWRI. The forum also reviewed governance updates to encourage continued participation and attendance. Both meetings included updates and discussion on FWC and USFWS research and management activities.

[MANAGEMENT ACTIVITIES](#) - For more information on manatee conservation efforts, see the annual Save the Manatee Trust Fund report provided to the President of the Florida Senate and the Speaker of the Florida House of Representatives (<http://www.myfwc.com/research/manatee/trustfund/annual-reports>), which describes progress and activities of the Manatee Management Plan. This report covers programs such as Manatee Protection Plans (MPPs), Manatee Protection Zones, permit reviews, habitat-related concerns, population assessment, and behavioral ecology. FWC's Florida Manatee Management Plan directs management activities and focuses on five program areas: MPP, Manatee Protection Zones, permit reviews, habitat-related concerns, and outreach.

[MANATEE PROTECTION PLANS AND ZONES](#) - In FY 2023-24, FWC staff coordinated regularly with USFWS and county representatives to best enact individual Manatee Protection Plans (MPP) throughout sixteen counties. FWC staff corresponded with Volusia County and USFWS to issue a Letter of Concurrence regarding an Addendum to the Volusia County MPP to provide clarification and relevance for the MPP's implementation. FWC staff also worked with Brevard County and USFWS to provide guidance for data-driven criteria assessments of the MPP. There have been discussions with numerous counties about the process and data requirements



to update MPPs and continued efforts with Miami-Dade County Staff and the USFWS to revise the Miami-Dade MPP.

In March 2024, FWC staff led an in-person Interagency Manatee Protection Plan Meeting at the Stetson Aquatic Center in Deland. This was the first of these meetings hosted since 2017 and there was attendance from representatives across 16 counties, 14 of which have existing MPPs and attendance from a further two counties that contain important manatee habitat. This opportunity enabled all parties to provide updates, discuss common themes and issues, and explore ways to continue best promoting waterway interests while conserving manatees in the State of Florida.

In FY 2023-24, sign posting of the newly established temporary No Entry Zone in Brevard County was completed. Staff continued to review and monitor available data for several of the county manatee protection zone rules, including Indian River County, and began discussion on prioritization of protection zone evaluations at warm-water sites in the Upper St Johns River. Staff coordinated with Levy County staff and FWC Division of Law Enforcement to initiate rulemaking activities to amend a portion of the existing zones at the mouth of the Withlacoochee River. Staff formally notified Levy County of the rulemaking activities in June 2023. In FY 2023-24, FWC staff continued coordination with representatives from Citrus County government on issues related to a potential local manatee protection ordinance in Crystal River. Additionally, FWC continues to coordinate with representatives from Hernando County in regard to the establishment of a local manatee protection ordinance in the Mud River.

PERMIT REVIEWS - FWC staff produced 366 final comments or assistance letters for proposed projects reviewed in FY 2023-24 with potential for adverse impacts to manatees. Reported manatee entrapment incidents in culverts, ponds, and stormwater drains were investigated for ownership and recommendations were provided for installing grates and pilings to preclude future manatee access. Educational outreach is also completed through these comments, as facilities are required to post informational signs and distribute written materials to vessel operators.

MANATEE HABITAT - In FY 2023-24, FWC staff participated in various intergovernmental groups and task forces regarding minimum flows and levels at springs, invasive aquatic plant control, seagrass monitoring and protection, and other habitat-related concerns.

In fall of 2021, the Florida legislature provided \$8 million for the 2021-22 fiscal year to the FWC to help restore manatee access to springs and restore habitat in other areas important to manatees. In FY 2023-24, the Warm Mineral Springs warm-water enhancement project was completed by FWC and partners. FWC also continued collaborative efforts such as shoreline stabilization construction at Blue Spring in Volusia



County and the implementation of the Indian River Lagoon seagrass nursery network to aid in growth of forage donor material.

In FY 2023-24, FWC, USFWS, and Florida Power & Light staff began planning efforts to establish two Regional Partnership Teams (RPTs) along the Atlantic coast. These two teams are the first of five planned RPTs that are aligned with the regional focus of the Florida manatee Management Units. RPTs will consist of various stakeholders whose role is to provide practical and technical on warm-water efforts to the Steering Committee, made up of FWC and USFWS representatives.

Florida Panther

SURVEYS - The Federally-designated Endangered Florida panther is a subspecies of puma (also called cougar or mountain lion). FWC biologists typically capture a sample of panthers annually between November and February and fit them with collars containing either VHF or GPS transmitters. The VHF radiocollared panthers are monitored two times a week via aircraft and their locations are recorded. Panthers fitted with GPS radiocollars transmit location data directly to FWC biologists. Since 1981, 271 panthers have been radiocollared. Location data was collected on nine panthers in FY 2023-24. In addition to monitoring the locations and movements of adults and subadults with radiocollars, biologists visit dens of radiocollared female panthers to collect data on and mark newborn kittens with passive integrated transponder (PIT) tags. Since 1992, 521 kittens have been handled at dens, however, no dens were visited in FY 2023-24. During FY 2023-24, 22 wild panthers are known to have died, including two (1 male, 1 female) radiocollared panthers and 20 (13 males, 6 females, 1 unknown) uncollared panthers. Nineteen panthers died after being hit by vehicles, 1 was hit by a freight train, and 2 died of unknown causes.

FWC maintained 79 unique trail camera locations producing 204 independent panther detections (Table 1). North of the Caloosahatchee River, panthers were detected in Charlotte County (Babcock Ranch Preserve), Glades County (Fisheating Creek Wildlife Management Area (WMA), and Lee County (Bob Janes Preserve). Additional photos submitted to the [FWC Panther Sightings website](#) or otherwise communicated directly to FWC included 18 additional independent panther detections north of the Caloosahatchee River.

Exhibit 8. Trail camera panther detections (FY 2023-24)

Region	Cameras	Trap-days	Panther Detections	Comments
South of Caloosahatchee River	40	5114	156	
North of Caloosahatchee River	39	8142	48	1 adult female with a dependent aged kitten in Charlotte County



COLLABORATIVE RESEARCH ACTIVITIES - FWC is involved in multiple research projects focusing on population analyses and models; mortality factors; the efficacy of rehabilitation; benefits of genetic restoration; and assessing the application of artificial intelligence to classify trail camera videos and photos by species. In FY 2023-24, FWC staff assisted with the completion of research projects including: an assessment of pathogen transmission in panthers and a compilation of information on the rescue and reintroduction of large felids. Agency staff served as lead or as co-authors on three peer-reviewed publications.

NEUROMUSCULAR DISORDER IN PANTHERS AND BOBCATS - Feline leukomyelopathy (FLM) is a neuromuscular disorder affecting Florida panthers and bobcats. The condition causes damage to the spinal cord resulting in weakness and incoordination and impairs the ability of affected felids to survive in the wild. Since first documented in 2017, FLM has been diagnosed in 94 panthers and bobcats (Table 2), including confirmed cases by histology and probable cases based on remote video. Cases were in Alachua, Broward, Charlotte, Collier, Hendry, Lee, Manatee, Orange, Pasco, Sarasota and St. Johns counties, and appeared to be concentrated in Southwest Florida between Naples and Tampa.

Exhibit 9. Confirmed and probable FLM cases. (FY2023-24)

	Probable	Confirmed	Total
Bobcat	40	12	52
Panther	32	10	42
Total	72	22	94

FLM appears to be primarily a disease of the nerve fibers rather than the nerves sheaths. Florida panthers seem to be affected at approximately four months of age, and in this species it neither progresses nor improves, while bobcats appear to be affected at any age or the condition is progressive. Numerous camera traps were deployed to monitor for signs and symptoms of FLM. We also compiled citizen reports with video that added to our database of probable cases. FWC performed necropsies on road-killed bobcats, in addition to panthers, and performed viral, nutritional, bacterial, and fungal testing. Additional testing for toxins, including rodenticides, pesticides, herbicides, and heavy metals were conducted. Despite the extensive testing, a cause has yet to be determined. There have been no reports of FLM in domestic felids or other wildlife. However, due to concern over this potential, FWC was in contact with regional wildlife rehabilitators, veterinarians, animal shelters, and more to monitor other species.

PANTHER SIGHTINGS - FWC launched a website in August 2012 where the public can report panther sightings (<http://www.myfwc.com/panthersightings>). By the end of FY 2023-24, over 12,000 panther sightings were submitted. Most records (72%) did not include evidence that would permit verification by FWC that



the animal observed was a panther. Of the records containing photographs, FWC verified 30% as panthers and 30% as bobcats. Other purported sightings were determined to be house cats, dogs, coyotes, bears, foxes, otters, raccoon and a monkey (Rhesus macaque).

North Atlantic Right Whale

The North Atlantic right whale is a Federally-designated Endangered species in Florida. The primary calving grounds for this species are off the Atlantic coast of Florida and Georgia. The calving season for the North Atlantic right whale is approximately November 15-April 15. During the calving season, FWC collaborates with Federal, State, and non-governmental partners to carry out field research, including aerial surveys, biopsy sampling, disentanglement, and response to stranding events. Most of this work is supported by funds from the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA-Fisheries) and is aimed at documenting the seasonal presence of right whales, mitigating vessel-whale collisions, and assessing population dynamics. FWC is one of a handful of major contributors to the North [Atlantic Right Whale Photographic Database](#). Photographs are used to identify individual whales based on the callosity (a natural growth of cornified skin) pattern on their head as well as scars caused by vessel strikes and entanglement in fishing gear. Over time, population demographics, reproductive success, mortality, and trends in health and scarring are monitored, in part, through this photo-identification research.

FWC has also worked closely with partners to compile years of southeastern U.S. aerial survey data into a geographic information system (GIS). Analyses of these spatial data help scientists and managers to evaluate right whale residency patterns and distribution in the calving area in relation to environmental factors such as sea surface temperatures and water depth, and human activities such as vessel traffic and fishing activity. FWC analyzes ship traffic data to help monitor compliance with vessel speed regulations and conduct risk assessments. Staff published a report summarizing mariner use of shipping lanes (Neyman, LN, Crum, NJ, Adams, JD, Patterson, EM, Good, CP. 2023. [Mariner cooperation with recommended lanes in two critical habitats of the North Atlantic right whale, *Eubalaena glacialis*](#). Fish and Wildlife Research Institute Technical Report TR-24). Staff continued work on a recruitment model that takes maternal body condition into account and models that forecast near-term movements and density of right whales. Staff published a manuscript describing a spatial capture-recapture model that can be used to forecast individual right whale movements and population density. (Crum, NJ, Gowan, TA, Ramachandran, KM. 2023. Forecasting wildlife movement with spatial capture-recapture. *Methods in Ecology and Evolution* 14, 2844-2855. <https://doi.org/10.1111/2041-210X.14222>) Additionally they co-authored a paper on density



surface estimates (Roberts JJ, Yack TM, Fujioka E, Halpin PN and others (2024) North Atlantic right whale density surface model for the US Atlantic evaluated with passive acoustic monitoring. *Mar Ecol Prog Ser* 732:167-192. doi.org/10.3354/meps14547).

During the 2023-2024 calving season, FWC conducted 59 aerial surveys and 18 vessel cruises (under permit #26929 issued to GDNR DNR and disentanglement activities are conducted under permit #24359 issued to the Marine Mammal Health and Stranding Response Program). FWC aerial surveys resulted in 80 right whale sightings and seven humpback whale sightings. Based on preliminary photo analysis, 52 individual right whales (including 17 calves) were documented by FWC. FWRI carried out 18 photo ID/biopsy collection cruises, photographed 22 sightings, and obtained 14 right whale samples for genetics and other health assessment analyses. Photo-ID and biopsy were a collaborative effort with Georgia DNR and NOAA Fisheries.

Right whales are part of an ongoing Unusual Mortality Event (UME) declared in 2017 by NOAA Fisheries. The UME declaration results from elevated mortality for this species and, while the investigation is ongoing, vessel strikes and entanglement are the leading causes of death for the right whales examined. During the 2023/2024 season, three dead right whales were detected in the SEUS and Mid-Atlantic, and four additional calves are presumed to have died. FWRI was involved in all the cases, including documentation, sampling, reporting, wound analysis, species confirmation, individual identification, carcass relocation, recovery, necropsy, and disposal.

Exhibit 10. Right Whale Mortality and FWRI Involvement in UME Cases (2023/2024 Season)

- **Calf of Catalog #1612-** sustained vessel propeller strike injuries to the head, between 09 December and 03 January. Carcass washed ashore on Cumberland Island, GA on 03 March. Necropsy found that the lacerations had penetrated deep soft tissue and bone, leading to multiple sites of necrosis.
- **Calf of Catalog #3780-** very small/young calf, first sighted on 31 December. Mother sighted without the calf on 05 January.
- **Calf of Catalog #1301-** calf noticeably thin at first sighting on 11 January. Mother sighted without the calf on 14 January.
- **Yearling, 2023 calf of Catalog #4340-** floating dead off Savannah, GA on 13 February. Necropsy found fractures of the skull consistent with blunt force trauma from a vessel strike.
- **Calf of Catalog #3260-** calf appeared a little thin when sighted on 12 March. Mother sighted without the calf on 21 March.
- **Adult female, Catalog #1950-** floating dead off Virginia on 30 March. Necropsy found catastrophic injuries to the vertebrae consistent with blunt force trauma from a vessel strike.
- **Calf of Catalog #1950-** dependent calf unlikely to survive after the death of its mother.



BIRDS

Eastern Black Rail

SALT LAKE WMA, BREVARD COUNTY - With over 2,000 acres of basin marsh and previous eastern black rail detections, Salt Lake Wildlife Management Area (WMA) was identified as having an important role in the conservation of the subspecies. Annual surveys were implemented on the area in 2017. During the FY 2023-24 survey black rails were detected at 4 of the 9 survey stations. Habitat management on the area during FY 2023-24 included herbicide treatment of non-native plants on 93.7 acres of potential black rail habitat.

Everglade Snail Kite

SNAIL KITE POPULATION MONITORING - The Everglade Snail Kite is a Federally Endangered bird that inhabits freshwater marshes and lakes in Florida. Core Snail Kite habitat includes the Everglades, Lake Okeechobee, the Kissimmee Chain of Lakes, and the upper St. Johns marsh. Since the population crash in the 2000s, the population had been steadily increasing, reaching a post-crash high of roughly 3,100 birds in 2019. The population has hovered around 3,000 birds since then. However, 3000 birds is still less than half of what it was less than 20 years ago before the population crashed. Snail Kite population declines are primarily caused by low levels of reproduction and too few young surviving to breeding age.

The primary focus of management in the past several years has been to increase nesting success and juvenile survival through a suite of habitat management and conservation activities. Nesting sites in primary lake habitats are managed annually to reduce predator access by isolating nest patches from shorelines and working with water managers to maintain flooded conditions under nests throughout the nesting season. Invasive and exotic plant management is closely coordinated around nesting habitats to eliminate potential disturbances and improve nesting and foraging habitats through proactive plant management. Nesting sites are marked with signs if they occur in areas with high recreational use or near residential areas. Tourism, angling, and hunting activities are coordinated to reduce disturbances.

FWC works closely with partners to improve Everglades habitats, lake marshes and watersheds, water regulation schedules, and to improve connectivity between large water bodies. Although habitat conditions have improved for Snail Kites since their population crash, it is clear at least some of the recent population increase has been due to the presence of an exotic Apple Snail, which reproduces in large numbers and can tolerate a wide range of habitat conditions. There are risks involved with relying on an exotic species to assist in achieving recovery goals. Therefore, FWC and partners continue to conserve and restore native Apple Snail habitat, and more information is needed on the long-term impact exotic snails



may have on Snail Kites and their habitat. FWC and partners are conducting multiple studies on the impact of habitat management and water level control on the Snail Kite prey populations and nesting.

FWC funded Snail Kite nest monitoring conducted by the University of Florida in FY 2015-16, FY 2016-17, FY 2018-19, FY 2019-20, FY 2021-2022 and FY 2023-2024 for all areas of Snail Kite habitat except Lake Okeechobee and the Everglades. Please note, although the focal Snail Kite nesting season is March through June, in most years at least some nesting activity occurs outside of this time at multiple areas across the state and does not align with the traditional FWC 2023-2024 fiscal year. The 2024 Snail Kite breeding season was still ongoing past the 2023-2024 FY; therefore, this section refers to the 2023 Snail Kite nesting season, December 2022 through November 2023. There were 339 active Snail Kite nests recorded throughout Florida in 2023, a decrease in nests compared to 2022 (444 nests) and slightly below the 10-year average (432 nests) for total nests. Majority of nests in 2023 were found on Lake Okeechobee. The second highest contributor of nests was flooded cattle fields at Pierce Cattle Company (Hendry County).

Florida Burrowing Owl

STATE-WIDE SURVEY FOR THE RURAL POPULATION OF FLORIDA BURROWING OWL - The Florida burrowing owl is listed as State Threatened, but the population estimate for the species remains unknown. This data gap is driven primarily by difficulties associated with surveying the rural population which is patchily distributed in open habitats across the state. In 2019, FWC initiated a two-year survey of the rural population of Florida burrowing owls. On Year 1, FWC used replicated roadside point-count surveys within Florida Breeding Bird Atlas blocks that had recent Florida burrowing owl detections (2011 and 2018). Records of owls detected in 2019 were used to create a habitat suitability model. The locations that had appropriate owl habitat across the state, based on the suitability model, were then surveyed on year 2. This produced a total of about 800 potential survey locations. We were able to access and conduct surveys at about half of these (402) locations, other locations were in private properties or otherwise inaccessible. A second survey (a replicate survey) was performed at 75% of these (304) locations. More than two (and up to six) replicate surveys were performed at 75 locations to improve our detection probability model which allows us to determine the probability that an owl was present but not detected. Additionally, 688 surveys were performed opportunistically and at sites with historic records of burrowing owl. In total, 1604 survey events across the state were performed, during which FWC detected owls during 258 surveys (including repeated observations). Where owls were detected, between 1 and 15 individuals per detection event were observed. In 2023, preliminary statistical results had large confidence intervals, due in part to the large number of locations on private properties that could not be surveyed, and an estimated population size



may not be achievable. For the upcoming fiscal year, documents will be produced that illustrate where owls were detected in rural areas, which has not been previously described.

Florida Grasshopper Sparrow

HABITAT MANAGEMENT - To restore and maintain the Florida Dry Prairie habitat for sparrows, Three Lakes Wildlife Management Area (TLWMA) staff in Osceola County have performed several management actions. Florida Grasshopper Sparrows rely on prescribed fire to maintain vertical structure at a minimal height and allow for maintenance of bare ground. Staff treated 2,289 acres of sparrow habitat with prescribed fire. Herbicide treatments were minimal, focused spot treatments of invasive species that total less than 2 acres.

DEMOGRAPHIC MONITORING AND NEST PROTECTION - The twelfth season of Florida grasshopper sparrow demographic research by FWC was conducted during FY 2023-24 and the beginning of FY 2024-25 (March-August 2024). This project has been a cooperative effort involving staff and support from FWC, the U.S. Fish and Wildlife Service (USFWS), and members of the Florida Grasshopper Sparrow Working Group. As part of FWC's continued effort to color-band the entire population at TLWMA to be able to identify all individuals, 3 adult males, 1 female, and 113 nestlings were newly captured and color-banded in the 2023 season. In addition to these new captures, 67 males and 35 females banded prior to 2024 were resighted. Together, the number of color-banded individuals observed at least once at TLWMA in 2023 was 67 adult males, 35 adult females, and at least 72 fledged nestlings of unknown sex. All known adult males and females in the Three Lakes WMA population have been color-banded in 2024.

In the 2024 season, FWC biologists located and monitored 69 Florida grasshopper sparrow nests. Of these nests, at least 25 survived to fledge young (10 of which were partially depredated but fledged at least one young), 22 were depredated by snakes, two were depredated by red imported fire ants, one due to flooding, and seven for unknown reasons. Biologist confirmed the mortality of one female by a snake at the nest, and one female from an aerial predator. Eight of the nests that failed were nests that did not have a predator deflection fence. Miniature nest cameras were placed at the entrance of 30 grasshopper sparrow nests to confirm nest success or identify predators. The combined data provided by the nest camera project (2014-2024) has been invaluable to understanding the predator community at Three Lakes WMA and will be critical when planning future predation management strategies. In 2024, Florida grasshopper sparrow nests (n=45) were protected using predator deflection fencing developed and tested in 2015. Results from analyses in previous years (2015-2018) revealed that fence installation substantially increases nest survival (up to 5.75 times) and FWC continues to observe this positive impact on productivity since 2019. FWC estimates that 124 additional fledglings were added to the population between 2015 and



2018 because of predator fence installations. Fence installation is labor-intensive, and fences only protect the subset of nests located prior to predation. Even when installed, fences are not entirely effective against snakes. Nevertheless, fences help boost local productivity and can protect incubating females, providing biologists more time to investigate long-term habitat management solutions to historic population declines.

CONSERVATION BREEDING AND RELEASE PROGRAM - In 2019 staff started releasing into the wild Florida grasshopper sparrows that were bred at White Oak Conservation, a conservation breeding facility. Since then, FWC continues releasing captive-bred sparrows into the wild. In 2020 the program partnered with the Avian Preservation and Education Conservancy to expand conservation breeding efforts and in 2022 Brevard Zoo also started producing birds. The purpose of these releases is to augment the wild sparrow population and to assure the population is genetically diverse. In 2021, the program added an additional release site and split the birds produced between the two locations. As of August 26, 2024, staff have released 670 Florida grasshopper sparrows at TLWMA, Osceola County, including 116 adults and 554 juveniles. Birds released per-year: 105 in 2019, 148 in 2020, 146 in 2021, 65 in 2022, 117 in 2023, and 89 in 2024. Releases in 2024 are ongoing.

To monitor efficacy of the release program, biologists gave each individual bird a unique combination of color leg-bands. FWC obtained data on the survival of released birds via re-sights of their color leg-bands during the 2024 breeding seasons. Nearly 30% of the released birds survive and stay in the population. Most importantly, many of these released birds have also bred successfully in the wild; of the released birds detected, around 70% were breeding either with a wild partner or another captive-bred bird. These numbers compare favorably with other captive-breeding and release programs. The adult Florida grasshopper sparrow population at TLWMA between 2020 and 2023 ranged between 31 - 45% conservation-bred and released sparrows, and 2024 51% were conservation-bred and released. Around 79% of the nests in the wild had at least one released parent and these pairs produced over 60% of the successfully fledged young. These results make evident that the captive-breeding and release program is having a positive impact on the wild Florida grasshopper sparrow population.

Florida Sandhill Crane

FALL SURVEYS - The Florida sandhill crane is State-designated as Threatened. In FY 2013-14, FWC began range-wide road surveys and established 12 routes totaling approximately 640 miles through 16 counties. Surveys occur from September–November and all cranes are counted along the routes.



Cranes build nests in wetlands and when these areas lack sufficient water, productivity will be below average. The drought index in Florida was classified as abnormally dry to moderate drought during the 2023 breeding season. Staff identified 276 adults and 39 juveniles during the 2023 surveys. Adult numbers were the lowest observed among all survey years, and the number of juveniles was the third lowest. Road survey routes in Osceola County indicate this area remains a regional crane stronghold.

SUBURBAN AND CONSERVATION LAND USE MONITORING - FWC continued monitoring marked cranes during FY 2023-24 as part of a project aimed at understanding habitat use, movements, and survival of cranes in suburban areas and conservation lands. To date, 161 cranes have been radio-tagged and/or color-banded throughout central Florida. Staff used resighted marked bird locations to estimate adult survival and utilized radio-tagged locations to assess the influence of a wildland-to-urban gradient on survival. The estimated annual survival rate was 79%. In long-lived species like cranes, survival rates below approximately 90% raise concerns about population persistence. Staff found no significant influence of urbanization on the annual survival rate of cranes. During the study, 15 cranes died, with vehicle strikes (n = 9) being the most common identified cause of mortality.

Overall, the adult survival rate was lower than has been reported for other populations of sandhill cranes in North America that are considered stable or growing. Although staff did not find significant influences of some urbanization on the survival rates of radio-tagged birds, movement data show that most cranes relied heavily on undeveloped and natural habitats during daytime hours in the breeding season. These areas remain vitally important for crane survival, and conservation efforts should focus on preserving natural wetland crane habitats throughout our study area. Vehicle strikes were the leading cause of adult mortalities. Staff recommends identifying road segments with regular vehicle strikes to help understand and reduce this source of Florida sandhill crane mortality.

Florida Scrub-jay

CONSERVATION COORDINATION - The Florida scrub-jay is a Federally designated-Threatened species endemic to Florida, meaning it is only found in Florida. Three quarters of remaining scrubby habitats are protected through land under public or private ownership that is committed to conservation. Despite this, Florida scrub-jay populations have continued to decline on conservation lands largely due to habitat degradation caused by decades of fire suppression and inadequate habitat management. Conserving this species requires the efforts of multiple local, state, and federal agencies as well as non-governmental organizations and private landowners. Project staff assist these efforts by facilitating communication among partners through regional Florida scrub working groups and by engaging with the public through outreach.



PUBLIC AND PARTNER ENGAGEMENT - During FY 2023-2024, FWC staff assisted in organizing and planning the 15th annual Florida Scrub-jay Festival. The Florida Scrub-jay Festival serves as an outreach opportunity to educate the public about the Florida scrub-jay, other species that depend on scrub ecosystems, and the importance of scrub ecosystems across the wider landscape. Jonathan Dickinson State Park hosted the Florida Scrub-Jay Festival on March 16th, 2024, in conjunction with Jonathan Dickison State Park's 4th Annual SpringFest. A total of 1202 campers and visitors of all ages attended. The festival offered guided hikes, an educational presentation series featuring park staff and agency representatives, local craft vendors, educational booths and displays, and an obstacle course to simulate the challenges of a Florida scrub-jay's daily life. Staff are currently assisting in planning and coordinating the next Florida Scrub-Jay Festival, which is anticipated to be held at Merritt Island National Wildlife Refuge in Spring of 2025.

ARBUCKLE AND WALK-IN-THE-WATER WILDLIFE MANAGEMENT AREAS - The Arbuckle WMA and the Walk-In-The-Water WMA are part of the Lake Wales Ridge Sate Forest and encompass nearly 20,000 acres of various habitat types, including scrub and sandhill. Scrub habitat contains a mix of oak trees and scrubs, herbaceous plants, and bare patches of sand, while sandhill habitat contains a mix of vegetation types, including wiregrass and native pines. The Florida Department of Agriculture and Consumer Services (FDACS) is the lead management agency on these areas, and FWC is a cooperating agency. FDACS and FWC manage both tracts using prescribed fire and nearly half of these areas are potentially suitable for Florida scrub-jays.

During FY 2023-24, 24 scrub-jay groups were located on Arbuckle WMA. While the number of groups (24) was slightly down from last year (26), the total number of birds (104) and the number of juveniles per group (1.8) both increased over the composition of 86 birds and .92 juveniles per group from the previous year. The mean group size (4.3) increased from the previous year (3.3).

During FY 2023-24, two scrub-jay groups with five adults were located on Walk-In-The-Water WMA. The total number of groups (2) and the total number of birds (5) both increased from the composition of one group and two adults from the previous year. The mean group size (2.5) increased from the previous year (2.0). The number of juveniles per group (0.0) stayed the same.

LAKE WALES RIDGE WEA - Lake Wales Ridge WEA consists of 20 tracts with 14 retaining Scrub-Jay groups which are monitored by FWC, Archbold Biological Station, and Jay Watch. Group numbers increased at the Lake Placid Scrub, Royce/Lake Apthorpe, Carter Creek, Gould Rd., Highlands Ridge, and Highland Park Estates tracts. Group numbers remained the same at the Sunray, Henscratch, and McJunkin tracts. Group numbers decreased at the Jack Creek, Holmes Ave., Silver Lake, and Sun N Lakes tracts. Prescribed fires occurred on 463 acres, 300 acres were mechanically treated, and wildfires occurred on 42 acres.



Hickey Creek WEA - Scrub-jay monitoring at Hickey Creek WEA in Lee County revealed 3 groups of scrub-jays and a total 8 birds on the site matching the recent high number of groups from last season and adding one additional bird plus 2 juveniles were confirmed after the nesting season. Four additional scrub jays from 2 groups, including one juvenile were located off site within 1 mile in a residential area. Long term persistence of jays in this region is tenuous but targeted management actions remain and include 94 acres of burning, 113 acres of strategic mechanical mowing within oak scrub along with chemical treatment exotics also occurs on 20 acres within their habitat.

The Platt Branch WEA in Highlands County was monitored by FWC and has a scrub-jay population that consists of 9 groups with 28 individuals. Group numbers remained the same and individuals decreased slightly over last year, and all remain within the long-term average. Seven of the scrub-jays were juveniles which was up which was down 3 from the previous year. Management efforts included burning 495 acres at the site including some scrub habitats. Mechanical treatments included mowing 60 acres.

The Moody Branch Wildlife and Environmental Area had 11 family groups documented on the area during the 2023 - 2024 fiscal year. This is one group more than the previous fiscal year. The mean group size was 3.5 and the average number of juveniles per group was 1.2. There were 39 individual Florida Scrub Jays observed during the 2023 - 2024 fiscal year. Management efforts included prescribed fire on 161 acres, mechanical treatments on 318 acres, and chemical treatments of non-native invasive plants on 160 acres.

Exhibit 11. Florida Scrub-jay WMA/WEA Habitat Management Data (FY2023-24)



WMA/WEA	County	Number of Groups	Number of Birds	Mean Group Size	Juveniles per Group	Habitat Management (acres)
Carter Creek tract	Highlands	27	106	4	1.1	Prescribed fire (8), Mechanical (33)
Clements tract	Highlands	7	23	3.3	1.1	Prescribed fire (82)
Gould Road tract	Highlands	12	43	4.2	1	0
Henscratch 27 tract	Highlands	0	0	0	0	0
Henscratch tract	Highlands	4	18	3.8	1.8	Mechanical (40)
Highlands Park Estates tract	Highlands	7	27	3	0.7	Prescribed fire (7)
Highlands Ridge	Highlands	8	23	2.9	0.6	Prescribed fire (6), Wildfire (33)
Holmes Ave tract	Highlands	9	35	3.9	1.8	0
Jack Creek tract	Highlands	2	7	2.3	0.7	Wildfire (6)
Lake Placid Scrub tract	Highlands	38	107	3.9	1.6	Prescribed fire (173)
McJunkin tract	Highlands	14	57	3.1	0.79	Prescribed fire (58), Mechanical (156)
Platt Branch	Highlands	9	28	3.1	0.8	Prescribed Fire (495), Mechanical (60)
Royce Ranch tract	Highlands	9	30	3.3	1.3	Prescribed fire (23), Wildfire (4)
Silver Lake tract	Highlands	9	30	3.3	0.6	Prescribed fire (39), Mechanical (3)
Sun 'N Lakes tract	Highlands	7	16	2.2	0	0
Hickey Creek	Lee	3	8	2.7	0.7	Prescribed Fire (94), Mechanical (113), Chemical (20)
Moody Branch	Manatee	11	39	3.5	1.2	Prescribed Fire (161), Mechanical (318), Chemical (160)
Arbuckle	Polk	24	104	4.3	1.8	0
Sunray	Polk	1	3	3	0	Prescribed fire (69), Mechanical (66)
Walk-in-the-Water	Polk	2	5	2.5	0.0	0

Red-cockaded Woodpecker



HABITAT MANAGEMENT AND CONSERVATION PLANNING - The red-cockaded woodpecker (RCW) is a Federally-designated Endangered bird species native to the southeastern United States. Fire suppression, reliance on dormant season prescribed fire, and low availability of old growth pines remain the greatest threats to RCW recovery in Florida. In FY 2023-24, FWC continued conducting habitat management activities (Exhibit X).

Ongoing conservation actions identified in Florida's Red-cockaded Woodpecker Management Plan (<https://myfwc.com/media/2046/rcw-plan-only.pdf>), such as an RCW working group meeting and the Safe Harbor program, continued in FY 2023-24. Staff helped organize the statewide RCW working group and the Southern Range Translocation Cooperative meeting in August. FWC staff continues to enroll landowners in the statewide Red-cockaded Woodpecker Safe Harbor program, which was established in November 2006 through an agreement between USFWS and FWC under the Endangered Species Act. Safe Harbor agreements allow landowners to restore or enhance habitats to benefit the species without incurring additional regulatory restrictions on the use of their land. By the end of FY 2023-24, there were 17 signed agreements that comprised of 17 properties in the program with a total of 85272 acres committed for habitat management by the landowners. The 2023 breeding season concluded with populations remaining on track to achieve, or in many cases exceed, the 2020 population and metapopulation goals outlined in Florida's RCW Management Plan(table below.)



Exhibit 12. Red-Cockaded Woodpecker WEA/WMA Habitat Management Data (FY2023-24)

Location	County	Active Clusters	Potential Breeding Groups	Solitary Birds	Nest Attempts	Bandings	Fledglings	Cavity Maintenance	Habitat Management (acres)
Apalachicola River WEA	Franklin	11	11		11	0	20	cavities inspected	Prescribed fire (2,700), Mowing (30)
Tate's Hell WMA	Franklin, Liberty	83	81	1	79	0	54	Installed 30 cavities (5 cavities were installed near 2 new cavity trees to create a cluster of 4, 25 cavities to augment 11 existing clusters); 15 cavities cleaned of debris	Mechanical treatment (80), prescribed fire
Apalachicola WMA	Liberty, Franklin / Leon Wakulla	647 / 312	125 / 151	0 / 4	114 / NA	190 / 0	175 / NA	Installed 45 inserts in 14 clusters	Prescribed Fire (221,668)
Babcock Ranch Preserve	Charlotte	23	22	1	17 (2 failures)	23	14	Trees prepped before burns	Prescribed fire (7,024), roller chopped (112), forestry mulching (72)
Babcock/Webb and Yucca Pens Unit WMA	Charlotte, Lee	44	41	3	38 (15 failures)	32	29	Trees prepped before burns	Prescribed fire (30,630), roller chopped (1,241), chemically treated (28,062)
Croom WMA	Hernando, Sumter	46	42	N/A	N/A	N/A	N/A	Trees prepped before burns, added 6 new artificial cavities, replaced 2 preexisting artificial cavities	Prescribed fire (7,756), chemically treated (480)
Platt Branch WEA	Highlands	6	5	N/A	5 (1 failure)	6	5	4 artificial cavities replaced	Prescribed fire (495), mechanical (94)



[BABCOCK/WEBB WMA](#) - The Fred C. Babcock/Cecil M. Webb WMA located in Charlotte County covers approximately 65,758 ac. Red-cockaded woodpecker (RCW) monitoring began in 1998, and intensive monitoring of clusters, including group size and fledge counts, began in 2001. All clusters are checked prior to March for activity. Cavity maintenance is also completed during this time. In mid-April, active clusters are checked once a week for nests, and then every 7 days once a nest has been located. Nestlings are banded on day 8/9 and checked for fledge status after 31 days.

The annual tree cavity survey conducted in FY 2023-24 revealed 44 active RCW clusters. Annual roost checks confirmed 41 potential breeding pairs, with three solitary bird clusters. Thirty-two potential breeding pairs attempted nesting; 15 nest attempts failed with 2 clusters successful in re-nesting. Thirty-two nestlings were banded with 29 confirmed fledglings. FWC completed controlled burns on 30,630 acres, roller chopped 1,241 acres, and chemically treated 28,062 acres.

[BABCOCK RANCH PRESERVE](#) - The Babcock Ranch Preserve in Charlotte County covers 67,619 acres. The ranch was purchased by the state in 2006 and was placed under management of the Florida Forest Service in 2016. Red-cockaded woodpecker monitoring began in 2008, but intensive monitoring of clusters, including fledge counts and potential breeding group counts, began in 2012.

Twenty-three clusters were active during the 2043 breeding season, of which 22 were potential breeding groups and 1 contained a solitary male. Seventeen of these groups attempted nesting for a total of 17 attempts; 15 were successful, 2 failed. A total of 23 nestlings were banded, 14 of which were confirmed to fledge. An additional 4 chicks were alive at the 19-day sex check, but a fledge check was not able to be completed, due to weather. FWC assisted partners with 7,024 acres of prescribed fire and contracted 112 acres of roller chopping plus 72 acres of forestry mulching around suitable trees.

[PLATT BRANCH WEA](#) - Platt Branch WEA in Highlands County covers 1,971 acres. The population consisted of six active clusters in FY2023-24 being stable with the previous year. Five of these represented potential breeding groups this year. An additional three active clusters occur on adjacent lands. Nesting success was monitored during the spring of 2024, with 4 successful nests, 1 failed nest and six nestlings banded. Five birds were confirmed to have fledged which is the same as the previous year. Controlled burns were conducted on 495 acres and mechanical habitat enhancement strategically targeted 94 acres. Fuel reduction was completed around all active clusters and 4 insert cavity boxes were replaced.

Salt Marsh Songbirds



[SURVEYS](#) - Since 2015, staff on the Apalachicola River (WEA) in Gulf and Franklin counties have recorded observations of Marian's marsh wrens while conducting annual marsh bird surveys according to the Standardized North American Protocol. In FY 2023-24, surveys were unable to be completed. Surveys are scheduled to resume in FY 2024-25.

Shorebirds

[SHOREBIRD PROGRAM](#) - Twenty species of shorebirds and seabirds breed in Florida, four of which are currently listed as State-designated Threatened (American oystercatcher, black skimmer, least tern, and snowy plover), one of which is Federally designated Threatened (roseate tern), and eight that are Species of Greatest Conservation Need. In addition, more than 40 species of shorebirds and seabirds winter in Florida. Two species of non-breeding shorebirds are Federally listed, the red knot (threatened) and piping plover (endangered).

A species action plan for listed shorebirds was completed in November 2013 <http://flshorebirdalliance.org/media/1013/imperiled-beach-nesting-birds-species-action-plan.pdf>. The goal of the multi-species action plan is to improve the conservation status of the four State-Threatened species to a point that they can be removed from the Florida Endangered and Threatened Species List and not again need to be listed. To build upon the species action plan, in 2016 the Florida Fish and Wildlife Conservation Commission (FWC) and partners completed the Florida Beach-nesting Bird Plan that includes specific population goals, metrics, timelines, funding needs, and a conceptual framework consistent with national shorebird recovery plans.

<http://flshorebirdalliance.org/media/1007/floridabeachnestingbirdplan.pdf>

To implement the Beach-nesting Bird Plan, the FWC inaugurated a dedicated Shorebird Program for the State of Florida. The program expands upon foundational shorebird conservation work and is supported by a grant through the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund. Working with its key partner, Audubon Florida, FWC continues to recover shorebird populations using five strategies: reduce human disturbance, manage habitat, manage predation, inform management & track outcomes, and improve regulatory coordination. The project area encompasses a variety of habitats used by breeding, wintering, and migrating shorebirds. These habitats include rooftops, beaches/dunes, emergent flats, dredge spoil islands, marine and freshwater sand bars, oyster reefs, freshwater/estuarine wetlands, and upland construction and industrial sites.

Shorebird Program staff also assisted with preparation for the implementation of the Species Conservation and Permitting Guidelines for Imperiled Beach-nesting Birds. The approved Guidelines will take effect



October 2024. Data provided from the Florida Shorebird Database was essential to developing ShoreMapper, an online resource intended to support these Guidelines and assist in determining whether project activities will take place in an area important for imperiled beach-nesting birds.

[FLORIDA SHOREBIRD ALLIANCE](#) - To achieve the goals of the Beach-nesting Bird Plan and the Shorebird Program, FWC leads a unique statewide partnership effort through the Florida Shorebird Alliance (FSA). The FSA is a network of 12 regional partnerships that work locally to ensure important shorebird and seabird sites are surveyed, monitored, posted, and stewarded. During the 2023 nesting season, FSA partners collectively monitored 888 miles of coastline and protected 6,216 State-Threatened seabird nests and 496 State-Threatened shorebird nests with posting.

The FSA publishes a monthly e-newsletter (the Wrack Line) that reaches over 32,600 subscribers. Through the FSA, FWC also coordinates breeding bird protocol training and data quality control for the statewide shorebird monitoring program. Additionally, the FWC manages the Alliance website (www.FLShorebirdAlliance.org). This website functions as a principal online resource for information and materials on Florida's shorebirds and seabirds, and as a tool to improve coordination and information sharing between regional partnerships.

[FLORIDA SHOREBIRD DATABASE](#) - The Florida Shorebird Database, which may be accessed at www.flshorebirddatabase.org, was launched in the spring 2011 to serve as the central repository for data collected on shorebirds and seabirds in Florida. Over 1,800 monitoring partners throughout the state have registered accounts in the Database and many of these partners collect and report breeding data. During the 2023 nesting season, partners entered 16,485 data records in the Database. Monitoring data are available online to anyone with an account, thereby allowing researchers, managers, conservationists, and permit reviewers to use the information to help manage and conserve shorebirds and seabirds.

Southeastern American Kestrel

[KESTREL NEST BOX PROGRAM](#) - The southeastern American kestrel is a non-migratory subspecies of the American kestrel that has experienced a widespread population decline throughout its range in recent decades. Loss and degradation of nesting and foraging habitat are leading contributors to current declines in kestrel populations. Habitat for the southeastern American kestrel includes sandhills, scrub, pasture, and prairies across the Southeastern U.S. Currently, the southeastern American kestrel is listed as State designated-Threatened in Florida.



In 2008, the FWC established a strategy to collaborate within and across agencies through a regional southeastern American kestrel conservation partnership. The following steps contributed to developing the partnership: 1) Identifying suitable but unoccupied kestrel habitat; 2) Establishing population targets for kestrels on FWC's Wildlife Management Areas (WMAs) and other public lands; 3) Building and installing new nest boxes and repairing old nest boxes; 4) Providing standardized data collection protocols to monitor kestrels and establishing a database to manage annual monitoring data on public lands; 5) Monitoring nest boxes during the breeding season; 6) Educating biologists, land managers, birdwatchers, and others through talks, websites, and printed media; and 7) Conducting additional research on southeastern American kestrel breeding habitat requirements

Staff and FWC volunteers performed annual maintenance on southeastern American kestrel (kestrel) boxes in January - February. The annual Box Building Day event occurred in early December where volunteers made more than 80 boxes. Some prep work, such as kestrel box repairs and replacements, was conducted from December to February as well. Kestrel box monitoring occurred from March through June with some early checks in February. FWC staff manage and monitor boxes on WMAs and WEAs (Exhibit X). In FY 2023-24, kestrel nest box monitoring was intensified in targeted areas in collaboration with an FWRI study.

Additionally, the partnership includes 88 boxes on utility Right-Of-Ways, private property, or city parks in Marion County (46), Hernando County (4), and Levy County (45) that are monitored by the FWC's volunteer program (Exhibit below). Of the 39 boxes on rights-of-way in Marion County, 18 boxes were used by kestrels and at least 4 were confirmed successful with 6 assumed successful for an estimated total of 10 fledged nests. As of June, 2024 three of the Marion County rights-of-way kestrel boxes were still actively housing nests. FWC staff and volunteers monitored the 45 existing boxes in Levy County, of which 36 were used by kestrels, at least 11 were successful with 3 assumed to have successfully fledged, and 4 were still active as of June 2024. Due to staffing constraints, the kestrel boxes of Hernando County were not monitored this season.

In Marion County, volunteers monitored 7 kestrel nest boxes placed across 5 parks throughout the city in partnership with the City of Ocala. Kestrels used 3 of these boxes, at least one of which was successful and one that seems likely to have fledged. No boxes were active as of June 2024.



Exhibit 13. South America Kestrel Nesting Box Data (FY2023-24)

WMA/WEA	County	Boxes Managed	Boxes Utilized	Nest Success	Other Species Found in Boxes
N/A	Marion*	46	21	12	Eastern bluebird, eastern gray squirrel, eastern screech owl, southern flying squirrel
N/A	Levy	45	36	14	Eastern bluebird, eastern gray squirrel, eastern screech owl, gray crested flycatcher
N/A	Hernando	N/A	N/A	N/A	N/A
Blackwater and Yellow River WMAs	Okaloosa, Santa Rosa	27	2	Yes, Five Chicks	Eastern screech owl, eastern bluebird
Chassahowitzka WMA	Hernando	9	6	Yes, 12 chicks	Eastern Screech-Owl, Unknown Bird Species
Chinsegut WEA	Hernando	2	0	N/A	Eastern Bluebird, Eastern Screech-Owl
Janet Butterfield Brooks WEA	Hernando	1	0	N/A	Eastern Screech-Owl
Perry Oldenburg WEA	Hernando	3	2	Yes, 2 chicks	Tufted Titmouse
Lake Wales Ridge WEA	Highlands, Polk	8	2	No	Eastern Screech-Owl, Unknown Bird Species
Platt Branch WEA	Highlands	4	0	N/A	Eastern Screech-Owl
Moody Branch WEA	Manatee	2	0	N/A	Eastern Screech-Owl
Crooked Lake	Polk	3	0	N/A	Eastern Screech-Owl, Great Crested Flycatcher
Hilochee WMA	Polk	7	1	Yes, 2 chicks	Eastern Screech-Owl, Great Crested Flycatcher
Tenoroc Public Use Area	Polk	1	1	Yes, 4 chicks	Eastern Screech-Owl

*Includes boxes on Rights-Of-Way and boxes on City of Ocala parks



Whooping Crane

NON-MIGRATORY POPULATION - Whooping cranes were released in Florida from 1993 to 2004, with the goal of establishing a non-migratory population. Unfortunately, low productivity and high mortality prevented cranes from becoming a self-sustaining population. FWC ended intensive monitoring of the remaining 18 non-migratory cranes in June 2012; the 2023 population estimate is 5 birds.

In hopes of aiding the species' conservation, from January 2019 - October 2022, staff transferred 5 of the remaining Florida birds to Louisiana where a similar project had recently begun. The transferred birds included 3 females and 2 males, ranging in age from 2.5 to 21 years old. All but one were wild-hatched and reared. After being quarantined and undergoing a medical exam, the birds were translocated to Louisiana where researchers marked each crane with a transmitter and a unique combination of color bands. All individuals were then released on White Lake Wetlands Conservation Area property, either on the same day or the day following their transfer. During FY 2023-24, one male and one female died. All of the females have mates and have attempted nesting, though none have succeeded in hatching their own chicks. One wild-hatched crane remains in Florida, and its capture will mark the conclusion of the non-migratory adult translocation experiment.

EASTERN MIGRATORY POPULATION - Another reintroduction of whooping cranes is taking place in the Eastern U.S. These birds are released and breed in Wisconsin and migrate to Florida (and other southeastern states) in the winter. There are currently 68 birds in this population. Like the non-migratory flock, the migratory flock is encountering reproductive challenges and research is underway to identify the limiting factors. FWC's involvement with this project consists only of occasional field monitoring of 1 to 2 wintering cranes.

Wood Stork

BREEDING COLONY SURVEYS IN SOUTH AND CENTRAL FLORIDA - The Wood Stork was listed as endangered in 1984 following a 75% decline since the 1930s. Fortunately, storks have rebounded and expanded their range during the last thirty years and were down-listed in 2014. Storks nest in colonies that are often remote or surrounded by water which makes monitoring difficult. From 2008 to 2022, FWC annually surveyed up to 20 breeding colonies in central and south Florida via a small plane.

During the last two years, the U.S. Fish and Wildlife Service (USFWS) has coordinated with various agencies, groups, and staff to survey active colonies. In FY2023-24, the survey took place in June at the end of the breeding season at a few southwest colonies and found only a few active nests. Moving forward, coordination between staff and USFWS will focus on future surveys occurring in May.



LITTLE GATOR CREEK WILDLIFE AND ENVIRONMENTAL AREA - Little Gator Creek WEA (LGCWEA) in Pasco County has a ten-acre wood stork and wading bird nesting colony. FWC uses water control structures and pumps to manage water levels in the basin swamp that contains the colony. This maintains suitable conditions for wood storks and wading bird nesting, and allows the colony to persist, even during drought years. Wood storks have nested intermittently in the colony, although they have not nested at LGCWEA in the last five years.

In 2012, a monitoring protocol was developed and implemented on the WEA to assess wood stork nesting success. Using this protocol, FWC conducted periodic site visits during the breeding season (January to April) in FY 2023-24. Wood storks were not observed nesting in the colony during FY 2023-24.



AMPHIBIANS

Flatwoods Salamanders

Frosted Flatwoods Salamander

FWRI biologists analyzed 6 years of data collected while headstarting Frosted Flatwoods Salamanders (*Ambystoma cingulatum*) and conducting mark-recapture in the Apalachicola National Forest. A scientific manuscript describing the results of their research was prepared for publication. FWRI biologists also collaborated with geneticists at the University of Florida to begin analyzing nearly 1600 tissue samples collected over the course of the project. Genetic samples were collected from both wild and headstarted individuals, and the results of the genetic analyses are anticipated to be received by FWC in FY24-25 which will potentially inform various aspects of the species population dynamics and the impacts of headstarting on local gene pools.

FWC completed restoration and management on 6.2 acres of wetland breeding habitats for Frosted Flatwoods Salamander within the Apalachicola National Forest, and 7.5 acres in the Apalachicola River Wildlife and Environmental Area.

FWC staff met with federal partners and other representatives to discuss habitat management and continued to participate in the federal flatwoods salamander recovery team, a multi-institutional group of stakeholders focused on the conservation of the species. A new population was discovered on private lands nearby to known occupied habitat on federal lands. Various managers from FWC, the U.S. Forest Service, the U.S. Fish and Wildlife Service and its National Wildlife Refuge System, and others, provided guidance and technical support to the landowner on salamander management.

Apalachicola River WEA continues to conduct restoration efforts on ephemeral ponds for future frosted flatwoods salamander and ornate chorus frog (*Pseudacris ornata*) reintroduction. During FY 2023-24, five ponds totaling approximately 11.1 acres were chemically treated. Two of the five ponds were additionally treated with prescribed fire.

Reticulated Flatwoods Salamander

Beginning in November 2018, a five-year Reticulated Flatwoods Salamander recovery project was initiated on Escribano Point WMA, Santa Rosa County. The project is a cooperative agreement among FWC, Department of Defense (DOD), United States Fish and Wildlife Service, and The Longleaf Alliance (TLA) utilizing funds from the DOD Readiness and Environmental Protection Integration program. This funding significantly enhances FWC's existing resources to accomplish habitat restoration and monitoring, and



enabled implementation of a headstarting program to further aid recovery of the species. This process collects eggs or larvae from wetlands and raises them in cattle tanks until they can be released back into the wetlands as either late-stage larvae or metamorphs. Ensuring that the larvae survive to metamorphosis increases the chances that they will contribute to the population as breeding adults. During FY 2023-24, TLA staff, with assistance from FWC, collected a combined 362 eggs and larvae from 5 wetlands. Of these eggs, 334 individuals survived to be released as late-stage larvae (92% success rate). In addition to headstarting, TLA and FWC monitored wetlands using a standardized dip netting protocol and determined larval occupancy in 49 wetlands, capturing a total of 107 larvae. TLA also monitored 2 drift fences for 7 trap nights at 2 separate wetlands and captured 3 adults at fences. Additionally, 9 adults were detected during Visual Encounter Surveys in several wetlands. In total, staff documented Reticulated Flatwoods Salamanders in 19 wetlands this fiscal year. A total of 440 tissue samples were collected from captured individuals for genetic analysis. Habitat restoration this fiscal year included 7.5 acres of hand clearing, 52.29 acres received mulching treatments, and 100 acres of chemical treatment of woody regrowth on previously cleared acreage.

On Garcon Point WMA, Santa Rosa County two wetlands were surveyed, and no reticulated flatwood salamanders were captured or observed.

Surveys conducted by FWC and partners on newly acquired conservation properties in Santa Rosa County (SRC) detected 3 distinct breeding groups or populations of flatwoods salamanders, two of which were previously unknown. Coordination with SRC and partners on restoration and management plans for these habitats, known as the Santa Rosa County soccer field wetlands, was initiated this fiscal year and are ongoing. Surveys on two additional, newly acquired properties known as the Creet's Landing parcels, failed to locate additional populations of flatwoods salamander. Surveys will continue in the coming years.

Restoration and management to improve breeding habitat for Reticulated Flatwoods Salamander was completed on 36.3 acres of wetlands on Eglin Air Force Base, and 2.3 acres of wetlands on Hurlburt Field.

Florida Bog Frog

In FY 2023-24, FWC conducted surveys for the Florida Bog Frog along two creeks on Yellow River WMA in Santa Rosa and Okaloosa counties. Surveys were conducted monthly from May to August at points established in FY 2018-19: ten on Garnier Creek and eight on Julian Mill Creek. On Garnier Creek, staff detected at least 5 Florida Bog Frogs at the powerline right-of-way (ROW) and a maximum of 7 Florida Bog Frogs at three survey points downstream from the ROW that had received previous habitat restoration. Outside of the ROW, Florida Bog Frogs were only detected at points where habitat restoration has



occurred. Florida Bog Frogs were not detected during surveys on Julian Mill Creek. Florida Bog Frogs have not been detected on Julian Mill Creek since June 2022.

In FY 2023-24, 7.6 acres of Florida Bog Frog habitat on Eglin Air Force Base was restored through targeted herbicide application and manual removal of invasive, woody vegetation. Also, 2.7 acres of previously restored habitat on Garnier Creek was re-treated using a foliar application of herbicide to control woody regrowth.

Gopher Frog

SURVEYS - Gopher Frog tadpoles were detected during dipnet surveys in 45 known breeding ponds on 10 public conservation lands (Exhibit 1). Three new breeding ponds were found on the Spring Creek Unit of Big Bend WMA, two new ponds on Camp Blanding Military Reservation, one new pond in Ocala National Forest, and two new ponds on private property in Putnam County (Exhibit 1). FWC staff helped Tangled Bank Conservation collect genetic samples from Avon Park Air Force Range.

MANAGEMENT - In order to increase resiliency in the local population, FWC has begun releasing head-started Gopher Frogs on the Econfinia Creek WMA. Tadpoles collected from Eglin AFB are being raised to metamorphosis in plastic tanks before being placed into a 50-acre Gopher Tortoise reintroduction pen that includes suitable habitat for all life stages of the Gopher Frog, including a suitable breeding pond. Releases began in May 2024.

Gulf Hammock Dwarf Siren

This subspecies was described in 1951 based on 11 specimens collected from three localities in Citrus and Levy counties. Since then, efforts to collect similar-looking specimens in the area have been unsuccessful. This is one of three described subspecies of the Northern Dwarf Siren (*Pseudobranchius striatus*), and its validity has been questioned. FWC staff conducted morphological and genetic analyses of Dwarf Sirens and determined that the other two subspecies should be elevated to species and that the Gulf Hammock Dwarf Siren is not a valid subspecies and should be included with the new species, *Pseudobranchius spheniscus*. Results of these analyses were published in a final report and will be published in a future manuscript evaluating siren taxonomy.



Striped Newt

The Striped Newt is endemic to northern Florida and southern Georgia, where it is patchily distributed and has been extirpated from many parts of its former range. It spends most of its life in xeric uplands but migrates to temporary wetlands lacking predatory fish species to lay eggs. It was listed as state Threatened in November 2022.

SURVEYS - In FY 2023-24, FWC staff surveyed potential, historical, and occupied ponds as part of a monitoring program to determine trends of occupancy and distribution. Staff detected newts in 50 known breeding ponds with water (some were dry) plus one new pond on Guana River WMA and in the Spring Creek Unit of Big Bend WMA, two new ponds in Ocala National Forest and Livingston Place, and two new ponds on private properties in Putnam County (Exhibit 1). Striped newts were not detected in the nine breeding ponds on Triple N Ranch WMA during the past two years, and the last detections at Goethe State Forest and Rock Springs Run State Reserve were in 2010. Despite good survey conditions, no striped newts were detected during surveys of 15 of 20 historical ponds in the Apalachicola National Forest (five ponds were unsuitable for surveys). FWC and Tall Timbers Land Conservancy received a Conserve Wildlife Tag Grant from the Fish and Wildlife Foundation of Florida to complete a full population assessment of Striped Newts on Livingston Place.

The probability of detecting Striped Newts is thought to be low but has never been quantified. Two ponds with dense populations of paedomorphs (gilled adults) in Ocala National Forest were dipnetted by two people for three consecutive weeks in March–April 2024. All adults and large larvae were marked by clipping a toe off the left hind foot during the first survey and the right hind foot during the second survey. During these two surveys, 91 adults and four large larvae were marked in the first pond and 288 adults and 222 larvae in the second pond. The final survey recaptured 7.4% of 95 marked newts in the first pond and 5.7% of 510 marked newts in the second pond (three newts were captured during all three surveys).

MULTI-STATE COORDINATION - FWC and Tall Timbers Research Station hosted a Striped Newt Working Group meeting in January 2024. The focus of this meeting was on reintroduction strategies. The meeting was attended by several state agencies from Georgia and Florida, non-governmental organizations, as well as several captive breeding institutions including the Jacksonville Zoo and Botanical Gardens, the Detroit Zoo, the Central Florida Zoo's Orianne Center for Indigo Conservation, the Atlanta Botanical Gardens, and the Amphibian Foundation, among other partners.

RESTORATION - Several known breeding ponds were restored by AHRES at Jennings State Forest and Camp Blanding Military Reservation, primarily by removing trees and encroaching shrubs from wetland basins.



Exhibit 14. Striped Newt and Gopher Frog pond dipnet summary for FY 23-24

Location	County	No. Ponds	Striped Newt	Gopher Frog
Apalachicola National Forest	Leon	15	0	9
Avon Park Air Force Range	Polk/Highlands	7	0	2 new
Big Bend WMA - Spring Creek Unit	Taylor	10	3 (1 new)	3 new
Blackwater River State Forest	Okaloosa, Santa Rosa	31	0	2
Camp Blanding Military Reservation	Clay	13	5	6 (2 new)
Faver-Dykes State Park	St. Johns	3	1	0
Goethe State Forest	Levy	3	0	3
Guana River WMA	St. Johns	8	3 (1 new)	0
Jennings State Forest	Clay	11	9	2
Lafayette Forest WEA	Lafayette	26	0	0
Livingston Place	Jefferson	6	4 (2 new)	0
Ocala National Forest	Marion, Putnam	45	29 (2 new)	22 (1 new)
Pumpkin Hill Creek Preserve State Park	Duval	1	1	0
Rainbow Springs State Park	Marion	1	0	0
Rock Springs Run State Reserve	Lake, Orange	4	0	2
Seminole State Forest	Lake	1	0	0
Triple N Ranch WMA	Osceola	9	0	3
Private property	Putnam	7	3 (2 new)	2 new



REPTILES

American Crocodile

The American crocodile (*Crocodylus acutus*) was listed as Endangered under the Federal Endangered Species Act in 1975, but since 2007 has been federally designated as Threatened in the United States. The population has experienced considerable growth as a result of the combined conservation efforts of managing agencies and partners (e.g. Florida Fish and Wildlife Conservation Commission (FWC), University of Florida, Florida Power & Light, U.S. National Park Service, and U.S. Fish and Wildlife Service (USFWS)). The American crocodile's range includes the coast of South Florida and extends to the Florida Keys with historical records reaching as far north as Cocoa Beach in Brevard County on the east coast and Lake Tarpon in Pinellas County on the west coast. An increasing crocodile population (currently estimated between 1,160 and 2,800, not including hatchlings) paired with a commensurate population increase of approximately 3 million people in the state over the last decade has led to a logical increase in human-crocodile interactions. FWC manages these conflicts on a case-by-case basis, prioritizing human safety while also taking the needs of a recovering species into consideration.

HUNTING & GAME MANAGEMENT DIVISION - FWC's Crocodile Response Coordinator supervises a network of Crocodile Response Agents. Together they evaluate and respond to crocodile calls following guidance outlined in the *American Crocodile-Human Interaction Response Plan (2020)* to execute the best management solutions for the public and the American crocodile. Occasionally, the capture of a crocodile is required for it to be relocated, translocated, or, in exceedingly rare cases, placed in captivity or euthanized. During FY 2023–24, FWC received approximately 283 calls regarding the American crocodile which consisted mainly of complaints and reported sightings. Most of the complaints were resolved by educating the public by way of telephone calls, site visits, and outreach materials. From the calls that were received this fiscal year, 17 crocodiles were captured. Captured animals ranged from 3.1ft to 11.7ft in length with the average individual measuring 7.0ft. Two individuals were captured and translocated further from the sites of capture and released into suitable habitat and 15 were captured and relocated nearby.

During FY 2023–24, FWC was involved in the recovery of nine American crocodile carcasses. Their sizes ranged from 2.0ft to 11.3ft in length with the average individual measuring 7.1ft. Six of the mortalities were caused by vehicle strikes, one mistakenly by a permitted statewide alligator hunter, and the causes of death of the remaining two were unable to be determined.



[FISH AND WILDLIFE RESEARCH INSTITUTE](#) - During FY 2023-24, FWRI researchers concluded a social science study among residents living within the range of American crocodiles. Findings showed a large awareness gap among residents living within crocodile range with 23% of respondents being unaware that there are both alligators and crocodiles in Florida. A majority of respondents want the crocodile population to stay the same (47%) or increase (36%). Only 17% wanted the population to decrease. There was tremendous disapproval for euthanizing (88% unacceptable or highly unacceptable) or placing a crocodile in captivity (73% unacceptable or highly unacceptable) as a management action to resolve human-crocodile conflict. Most respondents agreed humans and crocodiles can safely co-exist (69%) while only 11% disagreed. A small minority held negative views of FWC. A peer-reviewed manuscript on the study will be published in the Journal of Wildlife Management, likely in early 2025.

A tracking study of American crocodiles living in urbanized environments is underway with all capturing and tagging having been completed in February 2024. Fifteen GPS tags were deployed on crocodiles (12 in Miami-Dade County, 2 in Palm Beach County, 1 in Brevard County). This study will use satellite/GPS telemetry to learn about the movements and behaviors of crocodiles in urbanized areas. Specifically, how human activities affect crocodile movements, factors involved in road crossings, and habitats that are utilized by crocodiles in urban environments will be evaluated. Information gathered from this study can be used by state, federal, and local governments to improve management of crocodiles by incorporating land management designs and practices that would promote the safe and sustainable coexistence of crocodiles and humans in South Florida.

Cedar Key Mole Skink

The USFWS is proposing to list the Cedar Key Mole Skink as Endangered in 2024. In FY 2023-24, FWC provided updated survey data to the USFWS. Two months after Hurricane Idalia impacted the Cedar Keys area on 30 August 2023, FWC and UF staff unsuccessfully searched for Mole Skinks on North, Snake, and Seahorse keys. Another search of Cedar Point and North, Scale, and Seahorse keys on 25 January 2024 found one Mole Skink on North Key. A preserved specimen and photographs from coastal areas of Pinellas, Hillsborough, and Manatee counties resemble this subspecies, so FWC staff unsuccessfully searched on 22 February 2024 for Mole Skinks in Pinellas County at Fort De Soto Park and Honeymoon Island State Park trying to collect a genetic sample. FWC staff published a note on reproduction that documented a record clutch size of 13 eggs. They submitted a manuscript redescribing the Cedar Key Mole Skink after collecting data from 237 preserved specimens of three subspecies in the UF museum collection. They also submitted a manuscript on the distribution and natural history of this subspecies.



Florida Snakes

Eastern Indigo Snake

MONITORING & CONSERVATION - The Florida Rare Snake Sightings webpage received 22 verified Indigo Snake reports that were provided to the USFWS, along with sightings from other sources. Staff established a long-term monitoring program for wild populations in northern Florida that included occupancy surveys at 20 sites on public land and a baseline survey for population monitoring at Camp Blanding Military Reservation and the adjoining Mike Roess Gold Head Branch State Park in Clay County. No Indigo Snakes were detected during these surveys.

RESEARCH - FWC staff published scientific papers detailing growth rates of captive, wild, and introduced snakes and disease prevalence in a South Florida population. They are drafting a manuscript based on an analysis quantifying the movements, habitat use, and survival of reintroduced snakes.

RECOVERY - FWC continued a partnership with the South Florida Water Management District to obtain Indigo Snakes from Hendry County and added them to the breeding colony at the Orianne Center for Indigo Conservation (OCIC). Staff completed a multi-year Competitive State Wildlife Grant (C-SWG) with The Nature Conservancy and OCIC. FWC staff participated in a meeting of the Eastern Indigo Snake Reintroduction Committee, and presented findings at the annual meeting of the Gopher Tortoise Council. In FY23-24, 41 snakes were released at the reintroduction site in Liberty County. The total number of snakes released at the site is 167. For the first time ever at the Florida release location, two hatchling snakes were detected over the winter, signifying reproduction of snakes previously released at the site. A film crew from Crawford Entertainment filmed a segment about the release for 'Protect Our Paradise', which aired in 2023. Staff are collaborating with OCIC to enhance monitoring at the release site by using a system of camera traps, portable microchip readers, and pedestrian surveys to quantify reintroduction success. There have been 51 successful detections of previously released snakes through pedestrian survey efforts, which are important to monitor snake health and growth rates. The microchip reader documented 6 unique snakes since deployment, and OCIC used grant funds to purchase a second unit. Staff spent time developing a community-science project to help review the millions of photos collected at the site, which will launch in August 2024. Staff continued to partner with Auburn University on a Traditional Section 6 Grant to study the genetics of captive broodstock and wild Indigo Snakes. Year 2 of this project has been completed, and the project is successfully on track to be completed in early 2025 after an extension was awarded.



Florida Pine Snakes & Southern Hog-nosed Snakes

Forty-seven verified Florida Pine Snake observations were reported on the Florida Rare Snake Sightings webpage.

SURVEYS - Trapping for at-risk snake species continued in FY 2023-24 at three locations on Yellow River WMA, with southern hog-nosed snakes as a primary target. FWC had 64 individual captures comprising 9 snake species, including three Florida pine snakes and no southern hog-nosed snakes. Trapping for Florida pine snakes and southern hog-nosed snakes will not continue in FY 2024-25, though staff will continue to document incidental observations of the species.

Monitoring also resumed in FY 2023-24 at three locations on the Carter Tract. Three trap arrays were repaired and opened between April and May of 2024. Traps were monitored continuously until 6 June 2024, at which point they were closed for the remainder of the fiscal year. Between the three traps, 38 individual snakes representing seven species were captured. Four captures were Florida pine snakes, all of which were measured and had photos of patterning and unique marks taken for future identification of potential recaptures. Three other Florida pine snakes were encountered crossing roads on the property, and a fourth individual was located dead on the road crossing the paved road between the Carter Tract and private property to the south. A single Florida pine snake was located in February 2024 at Pine Log WMA while conducting gopher tortoise surveys.

The current three trap arrays at the Carter Tract will continue to be monitored in FY 2024-25. A fourth permanent array will be opened in sandhill habitat to target additional species, including the Eastern diamondback rattlesnake (*Crotalus adamanteus*). FWC staff will implement a modified trap design at all current and future snake trap arrays to improve detection of small/secretive species and juvenile individuals of target species. During the winter of FY 2024-25, the remaining four permanent arrays at the Carter Tract will be moved to four new locations in previously unsampled habitats (flatwoods and wet prairie). These new arrays will primarily target Eastern king snakes (*Lampropeltis getula*) and mimic glass lizards (*Ophisaurus mimicus*). Arrays will also be installed at Pine Log WMA and Pt. Washington, at which point all three properties will be surveyed for snakes on a three-year rotation.

Short-tailed Kingsnake

Three verified observations were reported on the Florida Rare Snake Sightings webpage. FWC staff worked on revising a manuscript on the status and distribution of this species.



Florida Reef Gecko

In 2019, FWC received a species evaluation request for the Florida Reef Gecko. Florida Reef Geckos have a small area of occupancy in four South Florida counties and their primary threats are habitat loss and competition with nonnative species. In June 2023, FWC convened a Biological Status Review Group to further evaluate the species. At the May 2024 Commission Meeting, staff recommended that the species warranted listing and protection under Florida's endangered and threatened species rule. The species was placed on the Candidate Species list, and staff began development of the management plan.

Florida Scrub Lizard

In 2012, the Florida Scrub Lizard was petitioned for federal listing as Threatened, and FWC completed a status survey in FY 2017-18 that showed its range along the Atlantic coast had contracted 48 miles northward in the past 30 years. FWC staff helped translocate 102 lizards to Hypoluxo Scrub Natural Area in Palm Beach County in March 2019 and published a paper on this effort last FY. Subsequent quarterly surveys of this new population indicate that it is slowly declining, and only one lizard was detected in FY 2023-24. In the future, surveys will be conducted only twice annually.

Gopher Tortoise

MANAGEMENT - The gopher tortoise is listed as a Threatened species in Florida. Gopher tortoises are keystone species as their burrows are home to over 350 other species. To conserve the species and its habitat, the FWC published its first Gopher Tortoise Management Plan in 2007 and revised it in 2012. The [Gopher Tortoise Management Plan](#) is currently undergoing a full revision and the final draft will be brought to the Commission for approval in FY 2024-25. The revised Management Plan will guide the continued conservation of the gopher tortoise in Florida through 2034. FWC also continues to coordinate with the stakeholder Gopher Tortoise Technical Assistance Group. The continued participation of stakeholders is vital to the long-term conservation of gopher tortoises.

CITIZEN SCIENCE - FWC maintains a web-based Gopher Tortoise Sighting platform (<https://app.myfwc.com/HSC/GopherTortoise/>) allows community scientists to document tortoise sightings and burrow locations, as well as sick, injured, or dead tortoises. It provides biologists with more detailed and reliable data while also promoting community involvement in conservation. The FWC has collected gopher tortoise sighting data since 2014, and 3,468 sightings were submitted during FY 2023-24 alone.



INTERNSHIP - The FWC has hosted interns from Florida State University since 2011 to help implement gopher tortoise conservation actions. Two interns participated in this program in FY 2023-24.

EDUCATION AND OUTREACH - FWC distributes fact sheets, brochures, and other educational materials to increase knowledge of gopher tortoises in Florida. Over 13,750 gopher tortoise educational materials were distributed in FY 2023-24. Publications are available at FWC's regional offices and electronic versions are available for download at www.MyFWC.com/GopherTortoise. The FWC also hosted or participated in 15 outreach events related to gopher tortoises in FY 2023-24.

TRANSLOCATION - Since the implementation of the recipient site permit program in 2008 (a voluntary program in which landowners may use their lands with suitable habitat to receive gopher tortoises from development sites), approximately 48,070 acres of gopher tortoise habitat have been protected through permanent conservation easements, of which 3,348 acres were permitted in FY 2023-24. Additionally, a total of 1,213 acres of gopher tortoise habitat were put under short-term (30-50 year) conservation easements with FWC in FY 2023-24. Under these permits, private landowners can accept gopher tortoises relocated from development sites and assess a monetary charge to the developer for accepting the tortoise(s). In exchange, the recipient site landowners agree to manage and protect the habitat for gopher tortoises. As of the end of FY 2023-24, 89 recipient sites with an available capacity of 23,163 tortoises are permitted. During FY 2023-24, 8,028 tortoises were relocated under FWC-issued permits.

To humanely relocate tortoises from incidental take permitted development sites and restock tortoises on conservation lands where tortoise populations have been depleted, FWC has approved Incidental Take Permit (ITP) recipient sites on several properties in northern Florida. There are currently 4,272 acres of suitable tortoise habitat associated with this effort. During FY 2023-24, 686 gopher tortoises were relocated to ITP recipient sites.

WAIF TORTOISES - During FY 2023-24, FWC continued efforts to identify solutions for waif tortoises. Waifs are gopher tortoises that have been removed from the wild (either by unauthorized means or due to injury), and whose origin cannot be determined. One solution includes identifying willing landowners to care for waifs on their property and designating the land as a "waif tortoise recipient site." Thirty-eight tortoises were placed at waif recipient sites within FY 2023-24.

MEMORANDUMS OF AGREEMENT - The FWC also works closely with public agencies, non-profit organizations, and private landowners to identify and provide incentives for gopher tortoise conservation. To address special situations that provide more flexibility and further the objectives of the Gopher Tortoise Management Plan, the FWC has entered into two MOAs. The US Department of Defense and Eglin AFB added an additional



233 acres of gopher tortoise habitat for a total of 7,469 acres to their previously permitted recipient site within the Eglin AFB in Walton County. The public conservation lands recipient site was established to receive gopher tortoises from renewable energy projects (e.g., solar fields) and public roadway projects that occur in Florida and to restock lands on Eglin AFB.

RESEARCH - In FY 2023-24, the FWC funded three scientific research projects with a total financial support of over \$71,000. Research funding is intended to promote actionable science that provides the information needed to achieve the conservation goals of the Gopher Tortoise Management Plan. In FY 2023-24.

SURVEYS - In FY 2023-24, FWC contracted with Florida Natural Areas Inventory to conduct a series of surveys on public conservation lands (Table 1). Of the 8 sites, 6 met the criteria for a viable population (at least 250 adult tortoises, at least 0.16 tortoises/acre, and at least 250 acres of continuous gopher tortoise habitat). Future monitoring will focus on surveying additional lands to locate viable populations and locate populations that may become viable with increased management.

Exhibit 15. Summary of gopher tortoise population survey results for FY 2023-24.

Survey Location	County	Population Estimate	Density (tortoises/acre)	Suitable Habitat (acres)
Torreya State Park	Liberty	168	0.14	1,203
Cayo Costa State Park	Lee	349	0.86	404
Goethe State Forest	Levy	1,670	0.40	4,218
Goldhead Branch State Park	Clay	862	0.50	1,722
Hilochee Wildlife Management Area (WMA)	Lake & Polk	496	0.32	1,541
Lake Wales Ridge Wildlife and Environmental Area (WEA) – Lake Placid Scrub & McJunckin Tracts	Highlands	1,102	0.72	1,525
Lake Wales Ridge WEA – Silver Lakes Tract	Highlands	234	0.77	302
Triple N Ranch WMA & Herky Huffman/Bull Creek WMA	Osceola	1,193	0.30	4,030

HABITAT MANAGEMENT - During FY 2023-24, the Habitat Management Assistance Funding program provided over \$65,000 to assist local governments with gopher tortoise habitat management activities on more than 140 acres of their conservation lands.



Exhibit 16. Gopher Tortoise WMA/WEA Habitat Management Data (FY2023-24)

Location	County	Management Activities (acres)
Aucilla WMA	Jefferson	Ground Cover Restoration (5)
L. Kirk Edwards WEA	Leon	Prescribed fire (145); Ground Cover Restoration (17); Exotic Control (3)
Perry Oldenburg WEA	Hernando	Prescribed Fire (183), Chemical (368), Mechanical (1)
Janet Butterfield Brooks WEA	Hernando	Prescribed Fire (96), Chemical (170), Mechanical (11)
Platt Branch WEA	Highlands	Prescribed Fire (495), Chemical (96), Mechanical (60)
Bullfrog Creek WEA	Hillsborough	Prescribed Fire (157), Chemical (401), Mechanical (113)
Hickey Creek WEA	Lee	Prescribed Fire (94), Chemical (20), Mechanical (8)
Moody Branch WEA	Manatee	Prescribed Fire (161), Mechanical (318), Chemical (160)
Crooked Lake WEA	Polk	Prescribed Fire (134), Chemical (480), Mechanical (304)

MITIGATION PARKS - In southwest Florida at Hickey Creek WEA gopher tortoise (*Gopherus polyphemus*) monitoring was conducted the previous year so no specific monitoring occurred in 2023 24. Nine-four acres of upland habitat was burned, 8 acres of mature oak scrub were mechanically treated, and 20 acres were chemically treated for exotic plants. In south-central Florida at Platt Branch WEA in Highlands County habitat improvements include controlled burns of 495 acres, herbicide was used on 96 acres of exotic vegetation, and 60 acres were mechanically treated. No tortoise monitoring was conducted on either site this fiscal year.

In Central Florida, gopher tortoise habitat improvements were made at the Bullfrog Creek WEA in Hillsborough County, with prescribed fire conducted on 157 acres, 113 acres treated mechanically, and 401 acres treated chemically for invasive plant species. At the Crooked Lake WEA in Polk County, 134 acres were burned, 304 acres were mechanically treated, and 480 acres were treated chemically. At the Moody Branch WEA in Manatee County, 161 acres were burned, 318 acres received mechanical treatments and 160 acres were treated chemically. No gopher tortoise monitoring occurred on these 3 WEAs during the 2022-2023 fiscal year.

In Hernando County at the Perry Oldenburg WEA habitat management actions include 183 acres of habitat that was burned, 26% in the growing season. Chemical treatments were conducted on 368 acres total for cogon grass. Contractors improved 0.5 miles of firebreaks, and staff hand pulled 0.41 acres of showy rattlebox. Gopher tortoise management at Janet Butterfield Brooks WEA in Hernando County included a burrow count tortoise survey which was conducted in May 2023. This survey found 142 potentially occupied burrows (up 38% from 2018) and 53 abandoned burrows (up 77% from 2018). Habitat management included



74 acres that were burned with 39% of that in the growing season, 0.8 miles and 0.62 acres mechanically treated, and 86 acres chemically treated at the site.

Map Turtles

The Barbour's map turtle and Escambia map turtle are expected to be federally listed as threatened by the U.S. Fish and Wildlife in FY 24-25. They will be listed with 4(d) protective regulations due to similarity of appearance to the Pearl River map turtle, which is native to the Pearl River drainage in Mississippi and Louisiana. Outside of Florida, the Alabama map turtle and Pascagoula will also be listed due to similarity of appearance. In Florida, the Barbour's map turtle is currently protected as a state threatened species, and Escambia map turtles may not be removed from the wild unless permitted by the FWC.

Barbour's Map Turtle

Staff of Apalachicola River WEA (Gulf and Franklin counties) conduct surveys for basking Barbour's Map Turtles in the fall of each year, usually between October to early November. Surveyed waterways differ across years to determine distribution of map turtles within the WEA. The 2023 Barbour's Map Turtle survey was conducted on Saul Creek, Saul Creek Cut-off and Johnson Creek. Staff surveyed 5.4 miles of waterway on October 4th, 10th and 18th, counting all observed Barbour's Map Turtles. Staff observed a total of 20 Barbour's Map Turtles within the surveyed area and timeframe. The number of turtle observations this year was 4 times greater than the previous year when Double Bayou and Cypress Creek were surveyed, however were still significantly lower when compared to the main survey area of the Chipola and Apalachicola River junction. The low observation count suggests that Barbour's map turtles prefer the main survey area habitat with environmental suitability and population density decreasing further south of the junction.

Escambia Map Turtle

FWRI biologists completed the field component of distributional surveys for the Escambia Map Turtle initiated in 2022. Biologists kayaked 261 km of the Escambia, Yellow, Shoal, and Blackwater Rivers and counted basking turtles using binoculars. A total of 2,576 total turtles were observed, including 1,507 Escambia Map Turtles (58% of total turtle observations), making them the most abundant turtle species on large rivers within their range. Escambia Map Turtles were most abundant on the Escambia River (69% of observations), moderately abundant on the Yellow River (30%), and uncommon on the Shoal River (1%). No map turtles were observed on the Blackwater River, where they have not been previously recorded. FWRI biologists also completed five repeated transects on each the Escambia and Yellow Rivers to get relative abundance estimates. This data will be analyzed in FY24-25.



Suwannee Alligator Snapping Turtle

The Suwannee Alligator Snapping Turtle was listed as State Threatened in November 2018, and Federal listing as Threatened went into effect on 29 July 2024. As part of a SWG grant, FWC and UF staff conducted research to 1) estimate bush hook and trotline fishing effort (incidental capture and drowning of turtles from bush hooks has been identified as a major threat to the species) on the Suwannee River, 2) identify nesting sites, 3) determine existence of populations upstream of White Springs and in the estuary, and 4) use mark-recapture techniques to model population size, apparent survival, and overall population status at three long-term monitoring sites. A Conserve Wildlife Tag grant was awarded to establish two long-term monitoring sites on the Santa Fe River and one site on the Withlacoochee River, which are major tributaries of the Suwannee River, and further study nest-site selection and hook ingestion rates. Nests laid on 1 April and 10 April in a yard along a tributary of the Santa Fe River had 26 and 38 eggs, respectively, that were removed and incubated in captivity. Ultrasound of a female trapped on 2 April in the Santa Fe River revealed 25 eggs. We attached GPS tags to adult females, and after recapturing one of them in the Suwannee River near White Springs, found that it nested in upland pine forest for more than 8 hours on 26 April. A paper on home range and habitat selection of turtles at two sites on the Suwannee River was published. Staff assisted two film crews producing segments on the Suwannee Alligator Snapper and gave five presentations on the species to various audiences.

SURVEYS - The six long-term monitoring sites were trapped using 12 traps in July 2023, October 2023, and March 2024. An 83-lb male trapped in the upper Santa Fe River had not grown since it was first trapped 20 years ago. In October on the lower Santa Fe River, we caught a record nine turtles weighing 510 lb in one trap, and the other 11 traps had eight more turtles. FWC and DEP staff and volunteers continued studying the alligator snapping turtle population in Pepper Creek, a tributary of the Homosassa River in Citrus Co., which is outside the known range of the species. In June 2023, October 2023, and March 2024, we trapped or hand captured 12 turtles, four of which were recaptures. Mark-recapture data, including the nine turtles captured and marked in April 2023, yielded a population estimate of 33 turtles in a 1.2-mi-long section of this dredged stream, but the 95% confidence interval was wide (21 to 77 turtles). Eighteen genetic samples were sent to Tangled Bank Conservation in Asheville, NC, to confirm our suspicion that this population consists of the Suwannee species, but the results are not back yet. We suspect this population resulted from escaped turtles before the Ellie Schiller Homosassa Springs Wildlife State Park was purchased by the State. Bay News 9 in St. Petersburg produced a segment on the June survey, and a manuscript is in preparation.



INVERTEBRATES

Black Creek Crayfish

EVALUATION OF BLACK CREEK CRAYFISH POPULATION STATUS- The Black Creek crayfish (BCC) is a State Threatened species endemic to northeast Florida, where much of its known range is in the Black Creek drainage. It inhabits cool, unpolluted streams with constant flow and high oxygen content. All documented occurrences have been within the Lower St. Johns River watershed basin in St. Johns, Duval, Clay, and Putnam counties. The USFWS ruled that federal listing was not warranted in September 2021. However, the USFWS decided to reevaluate this. In 2008, the White-Tuberclcd Crayfish (WTC), was first recorded within the Lower St. Johns watershed at two nearby sites in the Lower South Fork Black Creek sub-basin. WTC is native to the parts of Florida but is not native to the St. Johns River basin. Surveys from 2019 to 2024 have found that white-tuberclcd crayfish (WTC) have replaced BCC at the majority of historically occupied sites within the Black Creek Basin. Of the 108 sites surveyed in the Black Creek Basin between October 2018 - July 2024, 45 sites were occupied by only WTC or by WTC and FPS. Of these, five sites transitioned from having both WTC and BCC (with BCC at low relative abundances) earlier in the study period to having only WTC later in the study period.

As of the most recent sampling event, 22 sites in the Black Creek Basin were occupied by both BCC and WTC. Of these, two sites were occupied by only BCC during earlier sampling events but were occupied by both BCC and WTC later in the sampling period. Both of these sites were located in a tributary that has many small waterfalls that act as temporary barriers to WTC expansion upstream. At lower water levels, there is a substantial vertical drop on the downstream end of the waterfall. However, when water levels are high (after high precipitation events) these waterfalls become passable. At 17 sites within the Black Creek Basin, BCC were present without WTC. All of these sites were found in one of five reaches that are located upstream of a natural or artificial barrier that is preventing the movement of WTC. Two reaches are upstream of culverts, one is upstream of a small waterfalls, one is upstream of a lake chain, and one is upstream of an area with high salinities. Some of these barriers are likely temporary. For instance, small waterfalls appear to act as a barrier to WTC movement for a few years but are eventually passable. The culverts are also temporary structures that will eventually require replacement and can be compromised during extreme weather events. Four of these uninvaded reaches occupied by BCC are on Camp Blanding, composing roughly 7000 m of stream habitat. The remainder are within the Peter's Creek sub-basin, which is upstream of an area with elevated salinities, and where no WTC have been recorded. In addition, 24 sites in the Black Creek Basin had neither BCC nor WTC; Of these, 15 sites had only native crayfish species



(Slough Crayfish, Seminole Crayfish, and Peninsula Crayfish) while two sites had no crayfish present, and seven sites were dry when sampled. Thirty-nine sites in watersheds outside of the Black Creek Basin were sampled between October 2018 and June 2024. WTC were not found at any of these sites. BCC were present at 19 sites, and absent at 20 sites. The sites where BCC was absent were either occupied by native crayfish with more generalist habitat requirements than BCC or did not have any crayfish species present. In FY 23-24, intensive trapping of WTC occurred from early April to mid-July within a 1.7 km stream reach. From April to July 2024, a total of 1443 WTC were removed from the trapping reach.

Additionally, BCC face threats from microsporidian parasites that infect muscle and connective tissues and ultimately are fatal. From June 2023 to present, researchers at UF have been conducting quarterly surveys to monitor the prevalence of microsporidian infections at a site network that includes BCC sites uninvaded by WTC, sites where both BCC and WTC are present, and sites where WTC has replaced BCC. The prevalence of visually apparent infections is recorded during field surveys. Tissue samples were collected from individuals with visually apparent infections, and from a randomly selected subset of individuals without visually-apparent infections. Infections do not become visually apparent until later in the progression of the disease. FWC has assisted these efforts by recording observations of visually apparent infections during field surveys and providing tissue samples from infected individuals to UF.

In FY 23-24, FWC biologists received a Conserve Wildlife Tag grant to construct an in-stream barrier, for the purpose of preventing the spread of WTC upstream in one of the non-invaded tributaries. The barrier will be constricted at a site located upstream of the waterfall currently serving as a temporary barrier to WTC expansion and expected to be complete in 2025. On 13 June 2024, FWC surveyed fish, crayfish, and stream geomorphology upstream and downstream of the planned barrier site using electrofishing and seine netting. Since then, FWC has been conducting regular monitoring of the stream upstream and downstream of the planned barrier location, and removal of WTC from the downstream reach (where WTC are present at low abundances relative to BCC). Monitoring and WTC removal has occurred approximately every other week, using a combination of dip-netting, backpack electroshocking, and seine-netting. Between 13 June 2024 and 23 August 2024, 85 WTC have been removed from the reach downstream of Waterfall #4. Only BCC have been detected upstream of Waterfall #4. WTC removals and monitoring of crayfish, fish, and stream geomorphology will continue before and after the construction of the barrier as needed. In the future, FWC will continue regularly monitoring BCC sites both inside and outside of the Black Creek Basin and will expand surveys to sites located outside of the basin. FWC will also conduct research to better understand the habitat preferences, tolerances, and life history of BCC, to inform future conservation efforts.



Coral

FLORIDA CORAL RESCUE & PROPAGATION - In response to stony coral tissue loss disease (SCTLD), FWC and NOAA Fisheries co-lead the Florida Coral Rescue effort. The goal of the project is to preserve the genetic diversity of Florida's Coral Reef in the face of this unprecedented disease outbreak. This was accomplished prior to FY23-24 by collecting healthy corals from reef areas prior to the arrival of SCTLD in previous years and ongoing collections of corals that survived SCTLD and placing (them into land-based facilities for gene-banking to prevent them from becoming infected. During FY 2023-24, these corals were used in breeding and propagation programs to aid in the restoration of Florida's Coral Reef. Out of the 20 species targeted for rescue, five are Federally-designated as Threatened (Exhibit A). FWC staff continued to be heavily involved in the development of Florida's Coral Propagation Strategy.

Florida's Coral Propagation Strategy incorporates the genetic information of the Rescue broodstock to create breeding plans. The breeding plans are designed to maximize the genetic diversity of the propagated offspring and have been developed for multiple species, including *Dendrogyra cylindrus*, with plans for other species in development. Five in-state facilities will be focusing efforts on Propagation of Rescue broodstock: The Florida Aquarium, Florida Coral Rescue Center, the Reef Institute, Nova Southeastern University and Mote Gene Bank. Many of these facilities will be focusing on the propagation of *Orbicella annularis*, *Orbicella faveolata*, *Orbicella franksi* and *Dendrogyra cylindrus*. In FY 2023-24, the Florida Coral Rescue Center had *Mycetophyllia ferox*, *Orbicella faveolata*, and *Orbicella franksi* spawn. Sexual recruits of *Mycetophyllia ferox* are being grown at the Florida Coral Rescue Center while the *Orbicella* larvae were given to the Reef Institute for settlement and grow out. In addition, rescue broodstock are being sent to five out-of-state facilities that are expanding their infrastructure to prepare for propagation. The species and the individual corals selected for these facilities will be based upon the breeding plans and the technical expertise and resources available at these facilities.

Blue Calaminta Bee

DISTRIBUTION, LIFE HISTORY, AND HABITAT MANAGEMENT - The blue calaminta bee was originally described in 2011 from Highlands County, Florida and was thought to be endemic to sand pine scrub habitat within the southern portion of the Lake Wales Ridge. In 2015, the USFWS was petitioned to evaluate the blue calaminta bee for possible listing. With matching support from FWC, in 2019 researchers from the University of Florida began conducting a State Wildlife Grant (SWG) to study the distribution, ecology, and habitat requirements of the blue calaminta bee. This research has greatly expanded the known range of the species in Highlands, Polk, and Marion counties, and determined that, besides its main host plant,



Ashe's calamint, it also uses at least one other host plant, false rosemary. Researchers were greatly surprised to discover that the blue calamintha bee nests in the ground rather than in above-ground stems or wood, as had been originally presumed. That first project ended in 2022, but a follow-up SWG project began that year and ended September 2023. Besides expanding on blue calamintha bee research, this latter project also covered two additional poorly known species - the scrub plasterer bee and giant plasterer bee. Over the course of the projects, there has been extensive outreach to draw public attention to the rarity of the blue calamintha bee and its scrub habitat. This media campaign reached a height in June 2023 with the launch of a new conservation-oriented beer that used yeast obtained from bees in the brewing process for "Calamintha Hibiscus Wit, in celebration of Florida's rare blue bee." These projects have provided a better understanding of the habitat management practices needed to conserve the blue calamintha bee on the landscape. Both the bee and its host plant, Ashe's calamint, occur in more open, sandy areas; the researchers hypothesize that burning, when conducted at low intensities, provides the best and most varied habitat. On the other hand, management that disturbs the topsoil layer, such as roller chopping, can threaten the shallow nests of the bee and may encourage oak regeneration that crowds out the open areas needed by the bee and its host plant.

Freshwater Mussels

Chipola Slabshell

The Federally Threatened Chipola Slabshell is found in the Apalachicola River basin. In FY 2023-24, FWC performed two surveys for this species and six live individuals were found from the two localities (Exhibit X). None of the six individuals checked were brooding larvae. The Chipola Slabshell is a short-term brooder and is gravid from May–August.

Choctaw Bean

The Federally Endangered Choctaw Bean is found in the Escambia, Yellow, and Choctawhatchee River basins. One of the main threats to this species is livestock grazing. Sedimentation can cause mussel mortality by suffocation and suspended sediment can also affect filter feeding. In FY 2023-24, FWC performed 24 surveys for this species and found 38 live individuals among nine localities (Exhibit X); 35 individuals were checked for larvae, and only one was brooding. The host fishes for this species, topminnow, darter, and lamprey species, were identified by FWC biologists in 2022 (Publication in preparation).



Fat Threeridge

The Federally Endangered Fat Threeridge is found only in the Apalachicola and Chipola Rivers. Threats to freshwater mussels in the Apalachicola River basin include changes in water quality and habitat degradation through sedimentation, pollution, development, impoundments, and water withdrawal. In FY 2023-24, FWC conducted two surveys within this range, but no individuals were found (Exhibit X). This species broods from May–June and is a generalist, parasitizing five fish species.

Flatwoods Creekshell

The Flatwoods Creekshell is restricted to the Escambia and Choctawhatchee River watersheds. This species is gravid from autumn to the following summer. In the Escambia and Choctawhatchee basins, 22 surveys were conducted during FY 2023-24, but no individuals of Flatwoods Creekshell were located (Exhibit X).

Fuzzy Pigtoe

The Federally Threatened Fuzzy Pigtoe is found in the Escambia, Yellow, and Choctawhatchee River basins. Threats to this species include water quality changes due to nitrogen pollution and habitat alteration through sedimentation. In FY 2023-24, FWC performed 24 surveys for this species and found 39 live individuals at five locations (Exhibit X). All individuals were checked for larvae, and 15 were brooding. This bivalve broods from March–August, although it has been observed brooding in October. This mussel is a specialist and can only parasitize the Blacktail Shiner.

Gulf Moccasinshell

The Federally Endangered Gulf Moccasinshell is found in upper tributaries of the Chipola River and Econfina Creek. Impacts to populations of this species may include changes in water quality (e.g., Deer Point Reservoir in Econfina Creek) and isolation by impoundments in the Apalachicola River basin. In FY 2023-24, no individuals were found during the two surveys in this species' range (Exhibit X). Since 2013, only eight individuals have been sampled at one site on Baker Creek. The Gulf Moccasinshell broods from March to late summer or early fall, but observations suggest the brooding period may be longer. This species is a specialist, parasitizing three darter species.

Narrow Pigtoe

The Federally Threatened Narrow Pigtoe is found in the Escambia and Yellow Rivers. Water quality changes due to increased nitrogen pollution is a common threat for this species. In FY 2023-24, FWC performed 16 surveys for this species and found 11 live individuals among four localities (Exhibit X). Ten individuals were checked for larvae, and only one was brooding. This bivalve broods from March–



June although it has been observed brooding in July. The host fishes for this species, Blacktail and Weed Shiners, were identified by FWC biologists (Holcomb et al., 2020).

Ochlockonee Moccasinshell

The Federally Endangered Ochlockonee Moccasinshell is found only in the lower reaches of the Ochlockonee River. In FY 2023-24, FWC conducted 13 surveys within this range and found 15 individuals (Exhibit X). All were checked for larvae, and five were brooding. Localities of the Ochlockonee Moccasinshell are dependent on the availability of necessary host fish, which may be lacking because of migratory restrictions caused by the Jackson Bluff Dam that forms Talquin Reservoir. This species broods from June–October. Blackbanded darters are a viable host fish species for the Ochlockonee Moccasinshell.

Oval Pigtoe

The Federally Endangered Oval Pigtoe is found in the Econfina Creek, Apalachicola, Ochlockonee, and Suwannee River basins. In FY 2023-24, FWC performed 21 surveys for Oval Pigtoe and found five live, non-brooding individuals (Exhibit X). This species broods from March–August. The Oval Pigtoe only parasitizes Sailfin Shiners and Eastern Mosquitofish.

Purple Bankclimber

The Federally Threatened Purple Bankclimber is found in the Apalachicola, Lower Chipola, and Ochlockonee River basins. In FY 2023-24, FWC performed 15 surveys and found 87 of the Purple Bankclimber (Exhibit X). Eleven individuals were checked for gravidity status, but none were brooding larvae. This bivalve broods from February–April, although it has been observed brooding in May. This species parasitizes two fish species, the Federally Threatened Gulf Sturgeon and the Blackbanded Darter. Isolated populations of Purple Bankclimber have resulted from impoundments on the Apalachicola and Ochlockonee Rivers.

Rayed Creekshell

The Rayed Creekshell occurs in the Apalachicola and Mobile basins. This species is gravid from autumn to the following summer. In FY 2023-24, FWC conducted two surveys in the Apalachicola basin but did not locate any individuals of the Rayed Creekshell (Exhibit X). The species complex is still considered at-risk.



Round Ebonyshell

The Federally Endangered Round Ebonyshell is endemic to the Escambia River basin. Water quality changes due to increased nitrogen pollution is a common threat for this species. In FY 2023-24, FWC performed 14 surveys but did not locate any live individuals (Exhibit X). This mussel is presumably a short-term brooder, gravid in spring and summer. The fish host is unknown, but this species is hypothesized to parasitize migratory shad species due to host fish use of a closely related species.

Shinyrayed Pocketbook

The Federally Endangered Shinyrayed Pocketbook is found in the Econfina Creek, Apalachicola, and Ochlockonee River basins in Florida. In FY 2023-24, FWC performed 15 surveys for the Shinyrayed Pocketbook and found 26 live individuals among two localities, of which 14 individuals were checked for larvae and one was brooding (Exhibit X). This bivalve broods from November–August and parasitizes Spotted Bass.

Southern Elktoe

The Southern Elktoe occurs only in the Apalachicola basin in Florida and Georgia. In the two surveys FWC conducted in the basin in the last fiscal year, no individuals were collected (Exhibit X). The Southern Elktoe is a rare species; since 2000, only 66 live individuals and 10 shells have been observed. In June of 2023, this species was proposed for federal listing as an Endangered species and for critical habitat designation (88 FR 40160). Hosts of the Southern Elktoe are currently members of the sucker family, Catostomidae (Fobian et al., 2018).

Southern Kidneyshell

The Federally Endangered Southern Kidneyshell is restricted to the Choctawhatchee basin in Florida. Water quality changes due to increased nitrogen pollution is a common threat for this species. In FY 2023-24, FWC performed eight surveys but did not find any individuals (Exhibit X). This bivalve broods from September–May and host fish utilized by the Southern Kidneyshell include the Blackbanded Darter, Brown Darter, and the Swamp Darter.

Southern Sandshell

The Federally Endangered Southern Sandshell is restricted to the Yellow and Choctawhatchee River basins. In FY 2023-24, FWC performed 10 surveys for the Southern Sandshell and found one live, larval-brooding individual (Exhibit X). This bivalve broods from May–August, although brooding has been observed in January and April as well as September and November. The fish host is unknown, but it is thought to utilize various bass species like the Shinyrayed Pocketbook.



Suwannee Moccasinshell

The Federally Threatened Suwannee Moccasinshell is a rare mussel endemic to the Suwannee River basin. FWC performed six surveys for the Suwannee Moccasinshell during FY 2023-24 and found four live individuals at one locality (Exhibit X). All individuals were checked for larvae, and two were observed to be brooding. This bivalve broods from January–March, though it has been observed brooding in April, May, October, and December. Blackbanded Darters and Brown Darters were identified as primary hosts by FWC biologists (Johnson et al., 2016).

Tapered Pigtoe

The Federally Threatened Tapered Pigtoe is restricted to the Choctawhatchee River basin. In FY 2023-24, FWC performed eight surveys for the Tapered Pigtoe and located 20 live individuals among four localities (Exhibit 17, next page). Eleven individuals were checked for larvae, and four were observed brooding larvae. This bivalve broods from March–June and is a host specialist only parasitizing the Blacktail Shiner.



Exhibit 17. Freshwater mussel surveys conducted in FY 2023-24. Number of surveys is in parentheses after the basin name. Dashes indicate the species is not known to occur in that basin. “NS” denotes a basin where the species occurs but where the basin was not surveyed in FY 2023-24.

Species	Apalachicola (2)	Choctawhatchee (8)	Escambia (14)	Econfina Creek (0)	Ochlockonee (13)	Suwannee (6)	Yellow (2)	Total (45)
Chipola Slabshell	6	-	-	-	-	-	-	6
Choctaw Bean	-	19	19	-	-	-	0	38
Fat Threeridge	0	-	-	-	-	-	-	0
Flatwoods Creekshell	-	0	0	-	-	-	-	0
Fuzzy Pigtoe	-	39	0	-	-	-	0	39
Gulf Moccasinshell	0	-	-	NS	-	-	-	0
Narrow Pigtoe	-	-	11	-	-	-	0	11
Ochlockonee Moccasinshell	-	-	-	-	15	-	-	15
Oval Pigtoe	5	-	-	NS	0	0	-	5
Purple Bankclimber	0	-	-	-	87	-	-	87
Rayed Creekshell	0	-	-	-	-	-	-	0
Round Ebonyshell	-	-	0	-	-	-	-	0
Shinyrayed Pocketbook	26	-	-	NS	0	-	-	26
Southern Elktoe	0	-	-	-	-	-	-	0
Southern Kidneyshell	-	0	-	-	-	-	-	0
Southern Sandshell	-	1	-	-	-	-	0	1
Suwannee Moccasinshell	-	-	-	-	-	4	-	4
Tapered Pigtoe	-	20	-	-	-	-	-	20
Totals	37	79	30	0	102	4	0	252



Frosted Elfin

EFFORTS TO REPATRIATE FROSTED ELFINS IN FLORIDA - The frosted elfin butterfly occurs in scattered populations from New Hampshire to Florida and west to Wisconsin and Texas, but it has declined throughout most of its range and is under consideration for federal listing under the Endangered Species Act. Threats to the frosted elfin include habitat loss, degradation, and incompatible management, exacerbated by disjunct and small population size. In Florida, its host plant - upon which the caterpillars feed - is the sundial lupine, a legume with bright green palmately compound leaves and spikes of blue to purple flowers. In 2023 FWC received USFWS funding support for a Section 6 grant to initiate a three-year project to repatriate the frosted elfin onto conservation lands across North Florida. The long-term goal is to establish or enhance elfin populations so there are at least three self-sustaining populations in each of western, central and eastern subregions. Over the last FY, Tall Timbers Research Station staff coordinated surveys to map locations of sundial lupine and monitor for frosted elfins across multiple conservation lands, working to identify potential repatriation sites in addition to the two already being targeted - Big Bend WMA and Ichetucknee Springs State Park. Partners involved in survey efforts included several state agencies (FWC, Florida Forest Service, FL Department of Environmental Protection, Florida Natural Areas Inventory), US Forest Service, research stations (Tall Timbers, Jones Center at Ichauway/Georgia), a private conservation land (Nokuse Plantation), and the University of Florida. In addition to surveys, sundial lupine was also planted to augment populations at Big Bend WMA. Tall Timbers also began testing whether the use of drones and specialized imaging software could effectively recognize sundial lupine remotely; if so, these could represent another tool in the frosted elfin conservation “toolbox.”

Over the last FY, a frosted elfin captive population was established at the McGuire Center for Lepidoptera and Biodiversity (Florida Museum of Natural History, University of Florida) in Gainesville. Wild frosted elfin caterpillars provided the initial stock; upon pupation, the pupae were overwintered in the lab for expected emergence in the spring. Although there was some unexpected early emergence of adults from pupae, this provided the opportunity for captive pairing and reproduction, which were successful. Nearly 200 pupae are currently available from the captive colony to serve as source stock for those that will be used in initial repatriation attempts in Big Bend WMA and Ichetucknee Springs SP in 2025.

Miami Tiger Beetle

STATUS, CONSERVATION AND RECOVERY OF THE MIAMI TIGER BEETLE AND ITS PINE ROCKLAND HABITAT- After going undetected for nearly 85 years and losing greater than 98% of its fire dependent pine-rockland habitat, the Miami Tiger Beetle was presumed extinct. In 2007, the species was rediscovered within the Richmond



Tract of South Miami, where a population had persisted among a handful of scattered, open patches being maintained by fire among an ever-encroaching urban landscape.

Endemic to Florida and known only from critically rare pine rockland habitats in southern Miami-Dade County, the small, iridescent copper-green Miami Tiger Beetle was listed as Federally Endangered in 2016. A cooperative effort between county, state, and federal partners began in 2015 and has worked to inventory other potential sites, monitor known populations, and explore various habitat management options to benefit Miami Tiger Beetles.

As of June 2024, 25 pine rockland sites have been surveyed, but Miami Tiger Beetles have only been detected at 5 properties, mostly within the Richmond Tract. With a total occupied area of less than 30 acres, four of the 5 sites are contiguous and likely represent a single population.

Prescribed fire is the primary mechanism utilized in healthy habitat management within the pine rockland ecosystem. However, fire is a challenging endeavor to apply within an urban landscape due to smoke management, containment, and other concerns. Therefore, alternative mechanical and manual options are being explored to help abate succession and maintain open patches of sand and rock which comprise the preferred habitat for both larvae and adults of this endangered beetle. Multiple habitat restoration projects are underway that include both pre- and post-monitoring of the Miami tiger beetle to gauge response to various treatments and monitor population trends. Continued multi-agency cooperation and sound management decisions are required for both this beetle and its imperiled pine-rockland habitat to persist.

Panama City Crayfish

MONITORING AND MANAGEMENT - FWC staff and partners began monitoring Panama City crayfish (PCC) populations using methods developed in the 2022-2023 fiscal year. The 2023-2024 fiscal year efforts represent the first of a multi-year effort to track populations over time. Also, vegetation management through mowing and herbicide application was conducted on 37 acres of occupied PCC habitat on three conservation properties. Finally, FWC and USFWS continued working towards acquiring PCC habitat by contacting landowners to find willing sellers and evaluating potential properties. Though two offers to landowners within the last year were rejected, FWC will likely close on one or more properties within the 2024-2025 fiscal year.



OTHER WORK

Citizen Awareness Program

Section 379.2291(5), Florida Statutes, requires the FWC to provide a revised and updated plan for management and conservation of Endangered and Threatened species, including a description of relevant educational programs. FWC staff regularly provide information to and interact with the public about listed species by conducting citizen awareness programs to fulfill the statutory requirement. The FWC engaged in major efforts promoting citizen awareness of listed or at-risk species and their habitats in FY 2022-23.

Media Relations

FWC press releases reach substantial regional and statewide audiences, with some national media reach as well. They are sent via email to individual reporters, editors, and producers at daily and weekly newspapers, magazines, online publications, radio and TV stations who have signed up to receive FWC press releases (Exhibit 28). Regional media receive regional-only news and information as well as statewide releases. In FY 2023-24, the FWC issued many press releases on listed species. FWC press releases are posted online at [MyFWC.com/News](https://myfwc.com/news).

Social Media

The FWC’s social media accounts are growing in popularity every day, enabling the agency to reach a wider audience and a diverse group of stakeholders (Exhibit 29). The FWC’s social media is meant to be exciting and engaging as well as educational to get audiences interested in stories about Florida wildlife and conservation.

Exhibit 18. Total interactions with each FWC social media account obtained in 2023-24.

Social Media Platform	Quantity
@MyFWC Facebook	368.6K Followers
@MyFWC Twitter	46,898 Followers
@MyFWC Instagram	115.6K Followers
MyFWC Florida Fish and Wildlife Vimeo	43.6K Views
MyFWCMedia Flickr	36,209,421 Views
@FloridaBirdingTrail Facebook	22K Followers
@FWCResearch Facebook	117K Followers
@FWCvolunteers	2.4K Followers



Within the 2024 fiscal year, FWC has deactivated one of its YouTube accounts (@FWCNOTINUSE) and is now active on only the @MyFWCvideos account. The analytics below reflect the 2024 fiscal year for both accounts.

Exhibit 19. Total view with each FWC YouTube account obtained in 2023-24.

Social Media Platform	Quantity
@MyFWCvideos	2,165,582 views
@FWCNOTINUSE	87,002 views

GovDelivery and Websites

In today’s world, the public turns to email and the internet for instant information on Florida’s listed species and their habitats. GovDelivery allows us to directly and instantly connect with thousands of stakeholders with important information on topics they care about. Exhibit 20 shows some examples of topics that members of the public can subscribe to. GovDelivery also gives the public the opportunity to subscribe to several newsletters related to listed species.

Exhibit 20. Number of subscribers in FY 2023-24 for select GovDelivery topics.

Topic	Subscribers
Imperiled Species Management Plan	44,433
Florida Panther	46,902
Manatee	47,155
Sea Turtles	47,386
Landowner Assistance Program	30,588
Coral Reefs	32,787
Gopher Tortoises	44,866
Volunteer Programs	40,096

Fairs, Festivals and Events

FLORIDA SCRUB-JAY FESTIVAL - During FY 2023-2024, FWC staff assisted in organizing and planning the 15th annual Florida Scrub-jay Festival. The Florida Scrub-jay Festival serves as an outreach opportunity to educate the public about the Florida scrub-jay, other species that depend on scrub ecosystems, and the importance of scrub ecosystems across the wider landscape. Jonathan Dickinson State Park hosted the Florida Scrub-Jay Festival on March 16th, 2024, in conjunction with Jonathan Dickison State Park’s 4th



Annual SpringFest. A total of 1,202 campers and visitors of all ages attended. The festival offered guided hikes, an educational presentation series featuring park staff and agency representatives, local craft vendors, educational booths and displays, and an obstacle course to simulate the challenges of a Florida scrub-jay's daily life. Staff are currently assisting in planning and coordinating the next Florida Scrub-Jay Festival, which is anticipated to be held at Merritt Island National Wildlife Refuge in Spring of 2025.

[FLORIDA PANTHER FESTIVAL](#) - The Florida Panther Festival, hosted by the Naples Zoo was held on November 4, 2023, in conjunction with the zoo's free admission day for Collier County residents which occurs on the first Saturday of each month. This year's event was attended by 3,497 people. The Swamp Cabbage Festival is an annual event in LaBelle attracting an estimated 30,000 attendees. Panther staff shared a booth with Defenders of Wildlife to educate festival goers about protecting livestock from panthers. Staff also educated smaller crowds with a presentation at the Save The Panther Day festival at Florida Panther National Wildlife Refuge.

Volunteer Opportunities

FWC volunteers make valuable contributions to the state's conservation of listed species through participatory science initiatives and hands-on applied management activities. The Regional Volunteer Program Biologists and Ridge Rangers Coordinator develop projects that engage volunteers aligned with strategic objectives. Engaging volunteers enhances agency capacity and promotes public involvement in conservation.

Listed species conservation is one of the key focal issues for the regional program. Volunteers assisted with monitoring imperiled shorebirds, imperiled wading birds, near-threatened scrub lizards, state and federally threatened Florida Scrub-jays, and state-threatened southeastern American Kestrels, gathering data on nesting, reproduction, and populations. They conducted monitoring for diamondback terrapins, a state species of concern, leading to the identification of a nesting location used by multiple individuals. Volunteers also monitored for the federally threatened Panama City Crayfish and conducted monitoring for the vulnerable horseshoe crab across the state, independently collecting, marking, measuring, and releasing horseshoe crabs during high-activity periods.

Volunteer involvement included protecting native species by assisting staff in the control and removal of nonnative wildlife such as Burmese pythons and Argentine black and white tegus. Volunteers managed invasive exotic vegetation from scrub habitats by removing hardwoods to allow for more listed plant species growth as well as restoration plantings of endangered species. Volunteers also assisted with the construction of chick shelters and chick fence installation to benefit least terns, cutting and painting shorebird decoys to attract nesting pairs to a specific area, and posting shorebird and seabird



nesting areas to protect the nests, eggs, chicks and habitat from disturbances.

From December to March, volunteers provided support at the Temporary Field Response Station for the Manatee Unusual Mortality Event. Furthermore, volunteers reviewed footage from game cameras distributed throughout certain Wildlife Management Areas to identify wildlife species, worked with partners to maintain Red-cockaded Woodpecker nest sites, participated in coastal cleanups to benefit wildlife, as well as some public outreach.

FWC Staff and FWC volunteers also assisted with Jay Watch, which is a citizen-science program organized by Audubon Florida that annually gathers information on public lands regarding Florida scrub-jay populations and serves to educate the public about Florida scrub-jays.

Community Meetings, Workshops and Presentations

The FWC interacts with homeowners, private landowners, businesses, and stakeholders on an array of issues involving living with Florida's listed species.

The FWC's Wildlife Assistance Biologists provide help and guidance to individuals and groups throughout the state on how to avoid conflicts with wildlife. In FY 2023-24, FWC Wildlife Assistance Biologists conducted three site visits to assist individuals with concerns regarding Threatened or Endangered species including Florida Panthers and Florida Sandhill Cranes.

HUMAN-CROCODILE INTERACTIONS - In FY 2023-24, FWC's Crocodile Response Coordinator and agents handled approximately 283 calls about the American crocodile, mostly involving complaints and sightings. Most cases were resolved through public education via phone, site visits, and outreach materials. Seventeen crocodiles, ranging from 3.1ft to 11.7ft in length, were captured; two were translocated to distant habitats, and 15 were relocated nearby. Additionally, FWC recovered nine crocodile carcasses, with vehicle strikes being the leading cause of death.

HUMAN-PANTHER INTERACTIONS - FWC verified panthers were responsible for preying upon domestic animals (depredations) in 4 separate events in FY 2023-2024. Panthers preyed on 1 goat, 2 sheep, 2 domestic white-tailed deer, and a donkey (injured). These events occurred in Collier and Glades Counties. During depredation and interaction investigations, FWC provides advice and assists affected residents on how to reduce the human safety risk and prevent domestic animal attacks by panthers.

FWC launched a pilot depredation compensation program to offset economic losses by providing payment to commercial cattle producers for calf deaths due to panthers. The program provides prompt payment at fair market value. FWC is developing a payment for ecosystem services program. The goals of these



programs are to reward landowners who maintain or restore high-quality panther habitat, to mitigate panther-livestock conflict, and to increase tolerance for panther presence and range expansion.

FLORIDA SCRUB-JAY OUTREACH - Staff aid in facilitating communication and information exchange among partners within the regional Florida scrub working groups. These working groups focus on the conservation of scrub habitat and scrub species, including the Florida scrub-jay. The working group partnerships consist of public land managers such as county officials and municipalities, non-governmental organizations, university staff, and private individuals. In FY23-24, two of the three FWC-maintained regional Florida scrub working groups met in-person. On March 18th, the Southeast Regional Florida Scrub Working Group met at the Vero Beach Intergenerational Recreation Center with a field tour across several county-owned properties. On March 22nd, the Northeast Regional Florida Scrub Working Group met at the Brevard Zoo with a field tour at Helen & Allan Cruickshank Sanctuary. Due to staff and steering committee capacity constraints, the Southwest Regional Florida Scrub Working Group did not meet during FY 23-24. The FWC staff are working to organize an in-person event for the Southwest Scrub Working Group anticipated in Fall of 2024. Staff continue to update the Florida scrub-jay website (<https://fsjconservation.org/>) with notes, events, conservation news and updates, publications, and appropriate resource documents from the FWC and working group members. Additionally, the Florida scrub-jay website provides technical assistance to stakeholders regarding scrub and Florida scrub-jay habitat management, development planning, permitting guidance, and general inquiries.

MANATEE OUTREACH - Staff participated in several in-person outreach events, with audience members ranging from elementary school students to adults. Staff represented the FWC at the annual Manatee Festival in Crystal River, the Right Whale Festival in St. Augustine, and the Tallahassee Science Festival in Tallahassee. Outreach efforts focused on distributing educational materials through mail services and via partner working groups, including NGOs, community centers, and marine facilities. In addition to this outreach, staff worked to develop a new outreach sticker, titled “Please help protect manatees” which provides awareness to boaters and other water users of manatee conservation guidelines. Several existing publications were reprinted for distribution. FWC’s permit reviews for manatees also included key educational efforts. Facilities were required to post signs and distribute materials to vessel operators, raising awareness about manatee protection. These measures complemented our recommendations for installing grates and pilings to prevent manatee entrapments.

PANTHER OUTREACH - Staff provided presentations to NGOs, Boy Scouts, school classes, HOAs, and other interested organizations, reaching an estimated 800 people.

Other Educational and Outreach Programs and Presentations



The FWC works to engage the public in learning about listed species through various initiatives, including partnerships with educators to reach young people and interactive programs that promote wildlife viewing. Project WILD provides teachers and educators with standards-aligned materials across a broad range of topics related to Florida's wildlife, including threatened and endangered species, making it a valuable resource for classroom instruction.

The Wings Over Florida birding and butterfly listing recognition program aims to increase the number of diverse Floridians and visitors who are wildlife viewers and conservationists. Wings Over Florida issued 339 certificates for FY 2022-23 to program participants, recognizing their bird and butterfly listing achievements, including their sightings of endangered and threatened species.

Coordination and Assistance

Reviews And Assistance for Transportation Projects

FWC performed 112 reviews of highway projects during FY 2023-24, which included projects reviewed through the Florida Department of Transportation's Efficient Transportation Decision Making (ETDM) Process, and assistance letters outside of the ETDM Process, including 59 written letters. Each review included a biological assessment of the direct and indirect effects of the transportation project on listed bird, mammal, amphibian, and reptile species and their habitats. Recommendations were provided to the Florida Department of Transportation's seven districts and the Turnpike Enterprise on methods to avoid, minimize, or mitigate these effects on listed species. Recommendations were related to road design issues, locations and design of Florida black bear and Florida Panther wildlife underpasses, wildlife species occurrence information and field survey methodologies, wetland and upland habitat restoration strategies and techniques, and suitability evaluations of a moderate number of land parcels for mitigation through public land acquisition. This assistance was designed to reduce the adverse effects of specific highway projects on listed fish and wildlife species.

Land Use Planning Activities

FWC provided a review of 1,878 projects and provided written assistance on 704 of those projects for public and private land and water use planning activities that had the potential to impact listed fish and wildlife species and their habitats during FY 2023-24. The types of projects reviewed and commented on included: State 404 Permit applications, environmental resource permit applications, county comprehensive plan proposed amendments and sector plans, environmental assessments, environmental impact statements, power plant site applications, and ten-year plan reviews. The content of consultations was based on established best management practices, species management guidelines, and GIS analysis.



In addition, FWC contributed to the development of comprehensive habitat-based management plans, and coordinated landscape-level planning with local, state, and federal agencies to provide benefits to species and habitats of greatest conservation need.

Landowner Assistance Program

Florida's Landowner Assistance Program (LAP), in cooperation with the USFWS, promotes stewardship on private lands while also playing a fundamental role in the conservation of listed species. Florida's LAP is a voluntary program designed to provide wildlife-related assistance with land-use planning and habitat management to private landowners, as well as financial support to those interested in improving habitat conditions on their property for the benefit of listed species. LAP's emphasis is on priority habitats located primarily in focal areas, thus ensuring that federal dollars are being targeted in the most efficient and equitable manner to properties with the greatest potential benefits for listed species.

During FY 2023-24, FWC's LAP assisted more than 726 private landowners, including providing written evaluations of effects from proposed agricultural practices to listed species on 539 projects. Many of the landowners also received financial assistance through state or federal cost-share or easement programs such as the U.S.D.A. Farm Bill and USFWS Partners for Fish and Wildlife Programs. LAP worked in cooperation with the U.S. Department of Agriculture's Natural Resources Conservation Service, USFWS, Florida Department of Agriculture and Consumer Services, the University of Florida's Institute of Food and Agriculture Sciences, Florida Natural Areas Inventory, and various other conservation organizations to assist Florida's private landowners. While private landowners represent the majority assisted by LAP during FY 2023-24, public conservation land managers including the U.S. Department of Defense, water management districts, and county governments received assistance with development or review of management plans for their conservation lands. In total, LAP biologists delivered 1,043 assists to more than 775 landowners on 227,848 acres.



Center for Biostatistics and Modeling

Staff from the Fish and Wildlife Research Institute’s Center for Biostatistics and Modeling provided statistical and data management support for numerous projects focused on threatened and endangered species. We performed population trend analyses, estimated species occurrence, examined human-animal interactions, prepared monitoring plans, and developed long-term monitoring databases, for the various species listed below.

American Alligators	Florida Scrub jay	Purple bankclimber
American burying beetle	Frosted flatwoods salamander	Red-cockaded woodpecker
American Crocodiles	Fuzzy pigtoe	Red wolf
American Oystercatcher	Gopher Tortoise	Reddish Egret
Anastasia Island beach mouse	Gray wolf	Reticulated flatwoods salamander
Atlantic sturgeon	Green sea turtle	Roseate Spoonbill
Audubon’s crested caracara	Gulf moccasinshell	Roseate tern
Barbour’s map turtle	Gulf sturgeon	Rough cactus coral
Black Skimmer	Hawksbill sea turtle	Round ebonyshell
Boulder star coral	Kemp’s Ridley Sea Turtle	Rufa red knot
Chipola slabshell	Key deer	Sand skink
Choctaw bean	Key Largo woodrat	Shinyrayed pocketbook
Diamond back terrapin	Key ringneck snake	Smalltooth sawfish
Eastern indigo snake	Least Tern	Snowy Plover
Elkhorn coral	Leatherback sea turtle	Southeastern American kestrel
Everglades mink	Little Blue Heron	Southeastern beach mouse
Everglade snail kite	Lobed star coral	Southern kidneyshell
Fat threeridge	Loggerhead Turtle	Southern sandshell
Florida black bear	Marian’s marsh wren	St. Andrew beach mouse
Florida bog frog	Mountainous star coral	Staghorn coral
Florida bonneted bat	Narrow pigtoe	Striped newt
Florida burrowing owl	Nassau grouper	Suwannee Moccasinshell
Florida grasshopper sparrow	Ochlockonee moccasinshell	Tapered pigtoe
Florida Keys mole skink	Osprey	Tricolored Heron
Florida Panther	Oval pigtoe	Wakulla seaside sparrow
Florida Manatee	Perdido Key beach mouse	White-crowned pigeon
Florida pine snake	Pillar coral	Whooping crane
Florida Sandhill Crane	Piping Plover	Wood stork



Critical Wildlife Areas

Critical Wildlife Areas (CWAs) are established by the Commission under rules 68A-14.001 and 68A-19.005, F.A.C., to protect important concentrations of wildlife from human disturbance during essential life activities, including breeding, roosting and migratory stopover. For each CWA, the area closed to public access and the duration of the closure are approved by the Commissioners and defined in the CWA establishment order. FWC evaluates the need for potential CWAs, produces or revises establishment orders, and coordinates annual management and monitoring activities with other state agencies, local governments, and nongovernmental organizations.

Thirty-two CWAs are currently established statewide: sixteen support wading and diving birds, fourteen support beach (or ground) nesting birds, one supports gopher tortoises, and one is established for the protection of bats. Twenty-seven CWAs provided breeding habitat for federally- or state-listed imperiled species in FY 2023-24. The total peak nest count for breeding birds on CWAs statewide was 12,627 in FY 2023-24, as compared 19,624 in FY 2022-23, and 11,124 in FY 2021-22.

In addition to monitoring CWAs for use in FY 2023-24, staff and partners collected disturbance and predation data and stewarded regularly. FWC regional biological staff also coordinated with FWCs Division of Law Enforcement to implement targeted patrols to increase public awareness and reduce human disturbance. Management efforts outside of the breeding season in FY 2023-24 were largely focused on habitat enhancement through the removal of non-native vegetation and debris, planting of native vegetation, and development of restoration projects. Efforts to improve habitat and increase resiliency of coastal CWAs are ongoing and will continue into FY 2024-25.



Exhibit 21. Critical Wildlife Areas (CWAs) In Florida During FY 2023-24

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES (<i>Imperiled Species in Bold</i>)	STATUS ^a	MANAGED AREA
NORTHWEST REGION (5 CWAs)					
Tyndall ^b	Bay	Year-round	Black Skimmer, Least Tern, Snowy Plover, American Oystercatcher , Gull-Billed Tern, Wilson's Plover, Willet	41, 50, 11, 1, 3, 19, 7 nests	200 ac
Flag Island ^b	Franklin	Year-round	Black Skimmer, Least Tern, American Oystercatcher , Caspian Tern, Gull-Billed Tern, Royal Tern, Sandwich Tern	131, 2, 4, 35, 9, 286, 55 nests	35 ac
St. George Causeway	Franklin	1 Mar - 30 Sept	American Oystercatcher , Brown Pelican, Caspian Tern, Royal Tern, Sandwich Tern, Laughing Gull	6, 725, 119, 759, 793, 859 nests	32 ac
Lanark Reef ^b	Franklin	Year-round	Black Skimmer, American Oystercatcher , Brown Pelican, Gull-Billed Tern, Laughing Gull, Great Egret	19, 9, 342, 9, 142, 8 nests	34 ac
Alligator Point	Franklin	15 Feb - 31 Aug	Black Skimmer, Least Tern, American Oystercatcher , Wilson's Plover, Gull-Billed Tern	15, 2, 2, 8, 1 nests	66 ac
NORTH CENTRAL (4 CWAs)					
Amelia Island	Nassau	1 Mar - 1 Sept	Least Tern , Wilson's Plover, Willet	192, 19, 4 nests	250 ac
Nassau Sound Islands ^b	Duval	Year-round	Black Skimmer, Least Tern , Gull-Billed Tern	128, 3, 116 nests	18 ac
Fort George Inlet	Duval	1 May - 31 Aug	Least Tern, American Oystercatcher , Brown Pelican, Royal Tern, Laughing Gull, Sandwich Tern, Wilson's Plover	49, 4, 240, 1920, 1332, 10, 27 nests	82 ac
Withlacoochee Caves	Citrus	15 Apr - 15 Aug and 15 Dec - 15 Mar	Southeastern Myotis, Tricolored Bat	352, 33 (wintering); 13, 0 (breeding)	3 ac
NORTHEAST (4 CWAs)					
Port Orange	Volusia	1 Jan - 31 Aug	American oystercatcher, Least Tern	1, 7 nests	4 ac
Matanzas Inlet	St. Johns	1 Apr - 15 Aug	Least Tern , Wilson's Plover	41, 4 nests	28 ac

BC49	Brevard	1 Jan - 31 Aug	Wood Stork, Roseate Spoonbill, Little Blue Heron, Tricolored Heron, American Oystercatcher , Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Cattle Egret, White Ibis, Black-Crowned Night Heron, Anhinga, Double-Crested Cormorant	73, 8, 1, 31, 1, 72, 4, 12, 6, 57, 30, 6, 9, 21 nests	6 ac
Stick Marsh	Brevard	1 Jan - 31 Jul	Roseate Spoonbill, Tricolored Heron , Great Egret, Snowy Egret, Cattle Egret, Anhinga	57, 5, 134, 8, 35, 39 nests	2 ac
SOUTHWEST (10 CWAs)					
Alafia Banks	Hillsborough	Year-round	Roseate Spoonbill, Reddish Egret, Little Blue Heron, Tricolored Heron, American Oystercatcher , Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, White Ibis, Glossy Ibis, Black-Crowned Night Heron, Yellow-Crowned Night Heron, Double-Crested Cormorant	40, 2, 3, 10, 3, 187, 20, 50, 12, 45, 6, 12, 3, 32 nests	92 ac
Dot Dash Dit	Manatee	1 Jan - 31 Aug	Double-Crested Cormorant, Great Blue Heron	30, 9 nests	5 ac
Roberts Bay	Sarasota	Year-round	Roseate Spoonbill, Little Blue Heron, Tricolored Heron , Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Anhinga, Double-Crested Cormorant	13, 1, 2, 122, 26, 91, 8, 4, 2, 62 nests	5 ac
Myakka River	Sarasota	1 Jan - 31 Aug	Wood stork , Great Blue Heron, Great Egret, Anhinga, Snowy Egret	15, 3, 15, 6, 1 nests	1 ac
Broken Islands	Lee	1 Mar - 31 Aug	Roseate Spoonbill, Reddish Egret, Tricolored Heron, Little Blue Heron , Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Cattle Egret, White Ibis, Black-Crowned Night Heron, Yellow-crowned Night Heron, Double-Crested Cormorant, Green Heron, Anhinga	2, 6, 62, 1, 203, 9, 6, 19, 5, 282, 4, 2, 218, 4, 4 nests	13 ac
Hemp Key	Lee	Year-round	Reddish Egret , Brown Pelican, Great Blue Heron, Black-Crowned Night Heron, Great Egret, Snowy Egret, Double-Crested Cormorant, Green Heron	2, 60, 17, 3, 11, 3, 159, 1 nests	7 ac
Matanzas Pass Island	Lee	Year-round	Reddish Egret, Tricolored Heron, Little Blue Heron , Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Double-Crested Cormorant	8, 26, 1, 49, 8, 12, 22, 11, 57 nests	4 ac

Coconut Point	Lee	Year-round	Tricolored Heron, Reddish Egret, Roseate Spoonbill, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Brown Pelican, Double-Crested Cormorant, Anhinga	10, 3, 1, 4, 28, 20, 9, 26, 18, 1 nests	4 ac
Big Carlos Pass	Lee	Year-round	American Oystercatcher, Tricolored Heron, Reddish Egret, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Double-Crested Cormorant	1, 5, 1, 11, 3, 7, 4, 7, 1 nests	2 ac
Little Estero Island	Lee	1 Apr - 31 Aug	Snowy Plover, Wilson's Plover, Common Nighthawk	2, 3, 1 nests	6 ac
SOUTH (9 CWAs)					
Bird Island	Martin	Year-round	Wood Stork, Roseate Spoonbill, American Oystercatcher, Brown Pelican, Great Egret, Snowy Egret, Black-Crowned Night Heron, Double-Crested Cormorant	127, 7, 2, 44, 44, 3, 1, 7 nests	8 ac
Deerfield Island	Broward	Year-round	Gopher Tortoise	29 burrows	56 ac
Bill Sadowski ^b	Dade	Year-round	<i>Supports foraging and roosting shorebirds and wading birds.</i>	<i>not surveyed</i>	700 ac
Rookery Islands	Collier	Year-round	<i>Not surveyed FY 23-24.</i>	<i>not surveyed</i>	1 ac
Caxambas Pass	Collier	1 Apr - 31 Aug	Black Skimmer	64 nests	1 ac
Big Marco Pass ^b	Collier	Year-round	Black Skimmer, Least Tern, Wilson's Plover	9, 113, 16 nests	9 ac
ABC Islands	Collier	Year-round	Reddish Egret, Tricolored Heron, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Anhinga, Double-Crested Cormorant	3, 6, 58, 9, 16, 12, 3, 3, 25 nests	67.5 ac
Second Chance	Collier	1 Mar - 31 Aug	Black Skimmer, Least Tern, Wilson's Plover	481, 168, 14 nests	3 ac
Pelican Shoal	Monroe	1 Apr - 31 Aug	Least Tern	10 roosting	1 ac

^aCount or estimate of peak number of nests per breeding species at each site during the closure period in FY 2023-24. Numbers correspond in order of species listed in previous column.

^bSite also supports migrating and wintering species such as the federally listed piping plover and red knot.

Law Enforcement

FWC's Division of Law Enforcement continued statewide enforcement activities to protect specific Endangered and Threatened species during FY 2023-24. These activities included:

- Regular patrols of the Florida Panther reduced-speed zones. Officers statewide documented 3,714.75 patrol hours towards the protection of the Florida Panther and its prey species and to provide public safety within the Panther speed zones
- Regular patrols in Monroe County as part of a multi-agency task force enforcing the Key deer speed zone on Big Pine Key
- Patrol efforts targeting coastal nesting areas of Sea Turtles, to reduce nest destruction and unlawful egg removal or theft
- Patrol efforts directed toward the enforcement of specific gear requirements [i.e., Turtle Excluder Devices (TED)] to protect Sea Turtles from becoming entrapped in shrimp trawl nets. A total of 246 vessel patrol hours were focused on TED enforcement during the year resulting in 58 TED inspections observing for possible federal TED violations
- Patrol efforts targeting coastal nesting areas of protected shore birds to reduce nest disturbance, nest destruction, and incidental take
- Investigations by the Internet Crimes Unit targeting the unlawful sale and possession of protected species on the internet
- Enhanced statewide enforcement efforts directed towards utilizing radar and the manatee cam surveillance technology to ensure compliance with boat speed zones to prevent manatee vessel strikes and manatee harassment; 64,315.05 officer water patrol hours were dedicated to manatee zone enforcement, resulting in 3,440 citations and 5,049 warnings
- In addition, 85 citations and 175 warnings were issued separate from manatee citations, involving Endangered species, Threatened species, and Species of Special Concern
- Continued partnering with other governmental agencies and citizen groups to work through issues concerning the Florida Panther in southwest Florida
- Assisting with increasing public awareness of Gopher Tortoises, Perdido Key Beach Mice, Sea Turtles, and other species
- The Commission currently has five investigative teams that target illegal shipments of wildlife, marine life, and freshwater aquatic life in and out of our air and seaports and many common carrier facilities. The teams are comprised of an investigator and a specially trained Port K-9 team. The Port K-9 teams are trained to detect certain turtle, snake, and other potentially concealed Endangered/Threatened species as they arrive in or depart from Florida's ports. The five teams completed 272 proactive deployments resulting in 20 arrests.





APPENDIX A. FLORIDA’S LISTED WILDLIFE SPECIES AS OF JUNE 30, 2024

Exhibits A-1 through A-9 contain all of Florida’s listed species as of June 30, 2023, including their status: Federally-designated Endangered (FE), Federally-designated Threatened (FT), Federally-designated Threatened Due to Similarity of Appearance [FT(S/A)], Federally-designated Nonessential Experimental species (FXN), State-designated Threatened (ST), or Species of Special Concern (SSC).

EXHIBIT A-1: Listed Mammals in Florida as of June 30, 2024.

Common Name	Scientific Name	Status
Anastasia Island Beach Mouse	<i>Peromyscus polionotus phasma</i>	FE
Big Cypress Fox Squirrel	<i>Sciurus niger avicennia</i>	ST
Bryde’s Whale (Gulf of Mexico subspecies)	<i>Balaenoptera edeni [unnamed subspecies]</i>	FE
Choctawhatchee Beach Mouse	<i>Peromyscus polionotus allophrys</i>	FE
Everglades Mink	<i>Neovison vison evergladensis</i>	ST
Finback Whale	<i>Balaenoptera physalus</i>	FE ¹
Florida Bonneted Bat	<i>Eumpos floridanus</i>	FE
Florida Panther	<i>Puma concolor coryi</i>	FE
Florida Salt Marsh Vole	<i>Microtus pennsylvanicus dukecampbelli</i>	FE
Gray Bat	<i>Myotis grisescens</i>	FE
Gray Wolf	<i>Canis lupus</i>	FE ²
Humpback Whale	<i>Megaptera novaeangliae</i>	FE ¹
Indiana Bat	<i>Myotis sodalist</i>	FE
Key Deer	<i>Odocoileus virginianus clavium</i>	FE
Key Largo Cotton Mouse	<i>Peromyscus gossypinus allapaticola</i>	FE
Key Largo Woodrat	<i>Neotoma floridana smalli</i>	FE
Lower Keys Marsh Rabbit	<i>Sylvilagus palustris hefneri</i>	FE
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	FE ¹
Perdido Key Beach Mouse	<i>Peromyscus polionotus trissyllepsis</i>	FE
Red Wolf	<i>Canis rufus</i>	FE
Rice Rat	<i>Oryzomys palustris natator</i>	FE ³
Sanibel Island Rice Rat	<i>Oryzomys palustris sanibeli</i>	ST
Sei Whale	<i>Balaenoptera borealis</i>	FE ¹
Sherman’s Short-tailed Shrew	<i>Blarina shermani</i>	ST
Southeastern Beach Mouse	<i>Peromyscus polionotus niveiventris</i>	FT
Sperm Whale	<i>Physeter catodon [=macrocephalus]</i>	FE ¹
St. Andrew’s Beach Mouse	<i>Peromyscus polionotus peninsularis</i>	FE
West Indian Manatee (Florida Manatee)	<i>Trichechus manatus (Trichechus manatus latirostris)</i>	FT ¹



EXHIBIT A-2: Listed Birds in Florida as of June 30, 2024.

Common Name	Scientific Name	Status
American Osytercatcher	<i>Haematopus palliates</i>	ST
Audobon’s Crested Caracara	<i>Polyborus plancus audubonii</i>	FT
Bachman’s Wood Warbler	<i>Vermivora bachmanii</i>	FE
Black Skimmer	<i>Rynchops niger</i>	ST
Cape Sable Seaside Sparrow	<i>Ammodramus maritimus mirabilis</i>	FE
Eastern Black Rail	<i>Laterallus jamaicensis jamaicensis</i>	FT
Eskimo Curlew	<i>Numerius borealis</i>	FE
Everglade Snail Kite	<i>Rostrhamus sociabilis plumbeus</i>	FE
Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	ST
Florida Grasshopper Sparrow	<i>Ammodramus svannarum floridanus</i>	FE
Florida Sandhill Crane	<i>Antigone canadensis pratensis</i>	ST
Florida Scrub–jay	<i>Aphelocoma coerulescens</i>	FT
Ivory–billed Woodpecker	<i>Campephilus principales</i>	FE
Kirtland’s Warbler (Kirkland’s Wood Warbler)	<i>Setophaga kirtlandii (Dendroica kirtlandii)</i>	FE
Least Tern	<i>Sternula antillarum</i>	ST
Little Blue Heron	<i>Egretta caerulea</i>	ST
Marian’s Marsh Wren	<i>Cistothorus palustris marianae</i>	ST
Piping Plover	<i>Charadrius melodus</i>	FT
Red–cockaded Woodpecker	<i>Picoides borealis</i>	FE
Reddish Egret	<i>Egretta rufescens</i>	ST
Roseate Spoonbill	<i>Platalea ajaja</i>	ST
Roseate Tern	<i>Sterna dougallii dougallii</i>	FT
Rufa Red Knot	<i>Calidris canutus rufa</i>	FT
Scott’s Seaside Sparrow	<i>Ammodramus maritimus peninsulae</i>	ST
Snowy Plover	<i>Charadrius nivosus</i>	ST
Southeastern American Kestrel	<i>Falco sparverius paulus</i>	ST
Tricolored Heron	<i>Egretta tricolor</i>	ST
Wakulla Seaside Sparrow	<i>Ammodramus maritimus juncicola</i>	ST
White–crowned Pigeon	<i>Patagioenas leucocephala</i>	ST
Whooping Crane	<i>Grus americana</i>	FXN
Worthington’s Marsh Wren	<i>Cistothorus palustris griseus</i>	ST
Wood Stork	<i>Mycteria americana</i>	FT



EXHIBIT A-3: Listed Amphibians in Florida as of June 30, 2023.

Common Name	Scientific Name	Status
Florida Bog Frog	<i>Lithobates okaloosae</i>	ST
Frosted Flatwoods Salamander	<i>Ambystoma cingulatum</i>	FT
Georgia Blind Salamander	<i>Eurycea wallacei</i>	ST
Reticulated Flatwoods Salamander	<i>Ambystoma bishopi</i>	FE
Striped Newt	<i>Notophthalmus perstriatus</i>	ST

EXHIBIT A-4: Listed Reptiles in Florida as of June 30, 2023.

Common Name	Scientific Name	Status
American Alligator	<i>Alligator mississippiensis</i>	FT (S/A)
American Crocodile	<i>Crocodylus acutus</i>	FT
Atlantic Salt Marsh Snake	<i>Nerodia clarkii taeniata</i>	FT
Barbour's Map Turtle	<i>Graptemys barbouri</i>	ST
Bluetail Mole Skink	<i>Plestiodon egregius lividus</i>	FT
Eastern Indigo Snake	<i>Drymarchon couperi</i>	FT
Florida Brown Snake	<i>Storeria victa</i>	ST ³
Florida Keys Mole Skink	<i>Plestiodon egregius egregious</i>	ST
Florida Pine Snake	<i>Pituophis melanoleucus mugitus</i>	ST
Gopher Tortoise	<i>Gopherus polyphemus</i>	ST
Green Sea Turtle	<i>Chelonia mydas</i>	FT ¹
Hawksbill Sea Turtle	<i>Eretmochelys imbricata</i>	FE ¹
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	FE ¹
Key Ringneck Snake	<i>Diadophis punctatus acricus</i>	ST
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	FE ¹
Loggerhead Sea Turtle	<i>Caretta caretta</i>	FT ¹
Rim Rock Crowned Snake	<i>Tantilla oolitica</i>	ST
Sand Skink	<i>Plestiodon reynoldsi</i>	FT
Short-tailed Snake	<i>Lampropeltis extenuatua</i>	ST
Suwannee Alligator Snapping Turtle	<i>Macrochelys suwanniensis</i>	ST



EXHIBIT A-5: Listed Fish in Florida as of June 30, 2023.

Common Name	Scientific Name	Status
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	FE
Blackmouth Shiner	<i>Notropis melanostomus</i>	ST
Bluenose Shiner	<i>Pteronotropis welaka</i>	ST
Crystal Darter	<i>Crystallaria asprella</i>	ST
Giant Manta Ray	<i>Manta birostris</i>	FT
Gulf Sturgeon	<i>Acipenser oxyrinchus desotoi</i>	FT ¹
Key Silverside	<i>Menidia conchorum</i>	ST
Nassau Grouper	<i>Epinephelus striatus</i>	FT
Okaloosa Darter	<i>Etheostoma okalossae</i>	FT
Saltmarsh Topminnow	<i>Fundulus jenkinsi</i>	ST
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	FE ¹
Smalltooth Sawfish	<i>Pristis pectinata</i>	FE
Southern Tessellated Darter	<i>Etheostoma olmstedii maculaticeps</i>	ST

EXHIBIT A-6: Listed Corals in Florida as of June 30, 2023.

Common Name	Scientific Name	Status
Boulder Star Coral	<i>Orbicella franksi</i>	FT
Elkhorn Coral	<i>Acropora palmata</i>	FT
Lobed Star Coral	<i>Orbicella annularis</i>	FT
Mountainous Star Coral	<i>Orbicella faveolata</i>	FT
Pillar Coral	<i>Dendrogyra cylindrus</i>	FT
Rough Cactus Coral	<i>Mycetophyllia ferox</i>	FT
Staghorn Coral	<i>Acropora cervicornis</i>	FT

EXHIBIT A-7: Listed Crustaceans in Florida as of June 30, 2023.

Common Name	Scientific Name	Status
Black Creek Crayfish	<i>Procambarus pictus</i>	ST
Panama City Crayfish	<i>Procambarus econfinae</i>	FT
Santa Fe [Cave] Crayfish	<i>Procambarus erythrops</i>	ST
Squirrel Chimney Cave Shrimp	<i>Palaemonetes cummingi</i>	FT



EXHIBIT A-8: Listed Insects in Florida as of June 30, 2023.

Common Name	Scientific Name	Status
American Burying Beetle	<i>Nicrophorus americanus</i>	FE
Bartram's Scrub-haristreak	<i>Strymon acis bartrami</i>	FE
Cassius Blue Butterfly	<i>Leptotes cassius theonus</i>	FT (S/A)
Ceraunus Blue Butterfly	<i>Hemiargus ceraunus antibubastus</i>	FT (S/A)
Florida Leafwing Butterfly	<i>Anaea troglodyta floralis</i>	FE
Miami Blue Butterfly	<i>Cyclargus thomasi bethunebakeri</i>	FE
Miami Tiger Beetle	<i>Cicindelidia floridana</i>	FE
Nickerbean Blue Butterfly	<i>Cyclargus ammon</i>	FT (S/A)
Schaus Swallowtail Butterfly	<i>Heraclides aristodemus ponceanus</i>	FE

EXHIBIT A-9: Listed Mollusks in Florida as of June 30, 2023.

Common Name	Scientific Name	Status
Chipola Slabshell (mussel)	<i>Elliptio chipolaensis</i>	FT
Choctaw Bean (mussel)	<i>Villosa choctawensis</i>	FE
Fat Threeridge (mussel)	<i>Amblema neiserii</i>	FE
Fuzzy Pigtoe (mussel)	<i>Pleurobema strodeanum</i>	FT
Gulf Moccasinshell (mussel)	<i>Medionidus penicillatus</i>	FE
Narrow Pigtoe (mussel)	<i>Fusconaia escambia</i>	FT
Ochlockonee Moccasinshell (mussel)	<i>Medionidus simpsonianus</i>	FE
Oval Pigtoe (mussel)	<i>Pleurobema pyriforme</i>	FE
Purple Bankclimber (mussel)	<i>Elliptioideus sloatianus</i>	FT
Round Ebonyshell (mussel)	<i>Fusconaia rotulata</i>	FE
Shinyrayed Pocketbook (mussel)	<i>Lampsilis subangulata</i>	FE
Southern Kidneyshell (mussel)	<i>Ptychobranthus jonesi</i>	FE
Southern Sandshell (mussel)	<i>Hamiota australis</i>	FT
Stock Island Tree Snail	<i>Orthalicus reses [not incl. nesodryas]</i>	FT
Suwannee Moccasinshell (mussel)	<i>Medionidus walkeri</i>	FT
Tapered Pigtoe (mussel)	<i>Fusconaia burki</i>	FT

¹ A species for which the FWC does not have constitutional authority.

² Not documented in Florida.

³ Lower keys population only.



APPENDIX B. LIST OF ACRONYMS USED IN THIS REPORT

Acronym	Term
AFB	Air Force Base
ANF	Apalachicola National Forest
BCC	Black Creek Crayfish
BCNP	Big Cypress National Preserve
CFR	Code of Federal Regulations
CREMP	Coral Reef Evaluation and Monitoring Project
CWA	Critical Wildlife Area
CWCI	Coastal Wildlife Conservation Initiative
DOD	Department of Defense
DRM	Disturbance Response Monitoring
ETDM	Efficient Transportation Decision Making
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FE	Federally-designated endangered
FFS	Florida Forest Service
FLM	Feline Leukomyelopathy
FNAI	Florida Natural Areas Inventory
FSA	Florida Shorebird Alliance
FSD	Florida Shorebird Database
FT	Federally-designated threatened
FT(S/A)	Federally-designated threatened due to similarity of appearance
FY	Fiscal Year
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
FXN	Federally-designated nonessential experimental population
GINs	Gulf Islands National Seashore
GIS	Geographic Information System
GPS	Global Positioning Satellite
HMAF	Habitat Management Assistance Funding
INBS	Index Nesting Beach Survey
IPM	Integrated Population Model
IRL	Indian River Lagoon
ITP	Incidental Take Permit
JHWEA	John C. and Mariana Jones/Hungryland Wildlife and Environmental Area
JWCWMA	J.W. Corbett Wildlife Management Area
LAP	Landowner Assistance Program
LTBMP	Long Term Bat Monitoring Program



APPENDIX B (continued)

MPP	Manatee Protection Plan
MOA	Memorandum of Agreement
NOAA – Fisheries	National Oceanic and Atmospheric Administration Marine Fisheries Service
NPA	Nest Productivity Assessment
NPS	National Park Service
OCIC	Orianna Center for Indigo Conservation
PBG	Potential breeding group
PCC	Panama City Crayfish
PIT	Passive Integrated Transponder
PVC	Polyvinyl chloride
RCW	Red-cockaded Woodpecker
ROW	Right-of-Way
SCC	Species of Special Concern
SCTLD	Stony Coral Tissue Loss Disease
SECREMP	Southeast Coral Reef Evaluation and Monitoring Project
SGCN	Species of Greatest Conservation Need
SNBS	Statewide Nesting Beach Survey
SNP	Single Nucleotide Polymorphism
SRTC	Southern Range Translocation Cooperative
SSA	Species Status Assessment
ST	State-designated threatened
SWG	State Wildlife Grant
TED	Turtle Excluder Devices
TLA	The Longleaf Alliance
TLWMA	Three Lakes Wildlife Management Area
UF	University of Florida
UME	Unusual Mortality Event
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WEA	Wildlife and Environmental Area
WMA	Wildlife Management Area
WNS	White nose syndrome
WTC	White-Tubercled Crayfish



APPENDIX C. FWC'S FISH AND WILDLIFE RESEARCH INSTITUTE'S PUBLICATIONS DURING FY 2023-24

FWC strives to produce high-quality publications and has been doing so since the Florida State Board of Conservation's first publication in 1948. Since then, over 1,000 publications have documented FWRI findings. These contributions have appeared in various scientific journals or as publications of FWRI. While supplies last, FWRI sends printed single copies, at no cost, to individuals who request them.

Many publications are available at: <http://myfwc.com/research/publications/scientific/new/>

Beck MW, Flaherty-Walia K, Sclaro S, Burke MC, Furman B, et al. 2024. Hot and fresh: evidence of climate-related suboptimal water conditions for seagrass in a large Gulf Coast estuary. *Estuaries Coast.* 14(6):1475-1497.

Butler CB, Butler J, Sharp WC, Matthews TR. 2024. Refining spiny lobster (*Panulirus argus*) escape and mortality estimates in Florida's lobster trap fishery using long-term video. *Fish Res.* 279:107139.

Chandler HC, Stegenga BS, Cava ZA, Colton A, Mays JD, et al. 2024. Ghosts of the swamp: challenges associated with surveying for spotted turtles (*Clemmys guttata*) in the Southeastern United States. *Northeast Nat.* 31(sp12): C1-C16.

Crossman CA, Hamilton PK, Brown MW, Conger LA, Jackson KA, et al. 2024. Effects of inbreeding on reproductive success in endangered North Atlantic right whales. *R Soc Open Sci.* 11(7):240490.

Duran A, Speare KE, Fuchs C, Adam TC, Palma L, et al. 2024. Long sediment-laden algal turf likely impairs coral recovery on Florida's coral reefs. *Coral Reefs.* 43(4):1109-1120.

Galloway A, Lyons K, Portnoy D, Barker A, Adams D, et al. 2024. Trophic ecology of Carolina Sphyrna gilberti and scalloped S. lewini hammerheads in the southeastern USA. *Mar Ecol Prog Ser.* 743:25-46.



Hoffman M, Steen D. 2024. *Drymarchon couperi* (Eastern indigo snake) digging behavior. *Herpetol Rev.* 2024;54(4):586-7.

Hutchinson E, Matthews TR, Renchen GF. 2024. Relationships between postlarval settlement and commercial landings of Caribbean spiny lobster (*Panulirus argus*) in Florida (USA). *Fish Res.* 279:107137.

Kawahara M, Cody TT, Yanong RPE, Henderson E, Yazdi Z, et al. 2024. *Francisella sciaenopsi* sp. nov. isolated from diseased red drum *Sciaenops ocellatus* in Florida, USA. *Dis Aquat Organ.* 159:79-89.

Meck JR, Jones MT, Willey LL, Mays JD. 2024. Evaluation of road-crossing *Terrapene carolina major* (Gulf Coast box turtle) in the Florida Panhandle. *Northeast Nat.* 31(sp12):T4-T11.

Miller K, Hewett Ragheb E, Layman C. 2024. Optimizing avian translocation success: a systematic review of the effect of release age on survival, dispersal, and productivity. *Conserv Sci Pract.*

Onorato DP, Cunningham MW, Criffield M, Clemons BCF, Shea CP, et al. 2024. Multi-generational benefits of genetic rescue. *Sci Rep.* 14(1):17519.

Smith L, Hassler K. 2024. Mink latrines are hotspots for wildlife activity. *Southeast Nat.* 23(3):N37-43.



APPENDIX D. COMMON AND SCIENTIFIC NAMES OF NON-LISTED SPECIES MENTIONED IN THIS REPORT

Common Name	Scientific Name
MAMMALS	
Bobcat	<i>Lynx rufus</i>
Coyote	<i>Canis latrans</i>
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>
Florida Black Bear	<i>Ursus americanus floridanus</i>
Gray Fox	<i>Urocyon cinereoargenteus</i>
Old-field Mouse	<i>Peromyscus polionotus</i>
Raccoon	<i>Procyon lotor</i>
Red fox	<i>Vulpes vulpes</i>
Rhesus Monkey	<i>Rhesus macaque</i>
River Otter	<i>Lontra canadensis</i>
Santa Rosa Beach Mouse	<i>Peromyscus polionotus leucocephalus</i>
Southern Flying Squirrel	<i>Glaucomys volans</i>
Southern Fox Squirrel	<i>Sciurus niger niger</i>
Southeastern Myotis	<i>Myotis austroriparius</i>
Tri-colored Bat	<i>Peromyotis subflavus</i>
BIRDS	
Anhinga	<i>Anhinga Anhinga</i>
Black-bellied Whistling Duck	<i>Dendrocygna autumnalis</i>
Black – crowned Night Heron	<i>Nycticorax nycticorax</i>
Brown Pelican	<i>Pelecanus occidentalis</i>
Caspian Tern	<i>Hydroprogne caspia</i>
Cattle Egret	<i>Bubulcus ibis</i>
Double–crested Cormorant	<i>Phalacrocorax auritus</i>
Eastern Bluebird	<i>Sialia sialis</i>
Eastern Screech Owl	<i>Megascops asio</i>
European Starling	<i>Sturnus vulgaris</i>
Glossy Ibis	<i>Plegadis falcinellus</i>
Great Blue Heron	<i>Ardea herodias</i>
Great Crested Flycatcher	<i>Myiarchus crinitus</i>
Great Egret	<i>Ardea alba</i>
Gull–billed tern	<i>Gelochelidon nilotica</i>
Killdeer	<i>Charadrius vociferus</i>
King Rail	<i>Rallus elegans</i>
Laughing Gull	<i>Larus atricilla</i>
Louisiana Seaside Sparrow	<i>Ammospiza maritima fisheri</i>



Appendix D (continued)

Common Name	Scientific Name
BIRDS	
Osprey	<i>Pandion haliaetus</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Royal Tern	<i>Thalasseus maxima</i>
Sandwich Tern	<i>Thalasseus sandvicensis</i>
Snowy Egret	<i>Egretta thula</i>
Sooty Tern	<i>Onychoprion fuscatus</i>
Swallow-tailed Kite	<i>Elanoides forficatus</i>
Tufted Titmouse	<i>Baeolophus bicolor</i>
White Ibis	<i>Eudocimus albus</i>
Willet	<i>Tringa semipalmata</i>
Wilson's Plover	<i>Charadrius wilsonia</i>
Wood Duck	<i>Aix sponsa</i>
AMPHIBIANS	
Gopher Frog	<i>Lithobates capito</i>
Striped Newt	<i>Notophthalmus perstriatus</i>
REPTILES	
Cedar Key Mole Skink	<i>Plestiodon egregious insularis</i>
Diamondback Terrapin	<i>Malaclemys terrapin</i>
Eastern Diamondback Rattlesnake	<i>Crotalus adamanteus</i>
Florida Scrub Lizard	<i>Sceloporus woodi</i>
Spotted Turtle	<i>Clemmys guttata</i>
Western Ratsnake	<i>Pantherophis obsoletus</i>
FISH	
Blacktail Shiner	<i>Cyprinella venusta</i>
Blackbanded Darter	<i>Percina nigrofasciata</i>
Bluegill Sunfish	<i>Lepomis macrochirus</i>
Eastern Mosquitofish	<i>Gambusia holbrooki</i>
Redbreast Sunfish	<i>Lepomis auratus</i>
Sailfin Shiner	<i>Pteronotropis hypselopterus</i>
Spotted Bass	<i>Micropterus punctulatus</i>
INVERTEBRATES	
Flatwoods Creekshell	<i>Strophitus williamsi</i>
Giant Barrel Sponge	<i>Xestospongia muta</i>
Great Star Coral	<i>Montastraea cavernosa</i>
Massive Starlet Coral	<i>Siderastrea siderea</i>
Miami Cave Crayfish	<i>Procambarus milleri</i>
Rayed Creekshell	<i>Strophitus radiatus</i>



Appendix D (continued)

Common Name	Scientific Name
INVERTEBRATES	
Southern Elktoe	<i>Alasmidonta triangulata</i>
Symmetrical Brain Coral	<i>Pseudodiploria strigosa</i>
White-tubercled Crayfish	<i>Procambarus spiculifer</i>



APPENDIX E. GLOSSARY OF TERMS

Candidate - Plants and animal species for which the USFWS has sufficient information on the biological status and threats to propose the species as endangered or threatened under the Endangered Species Act, but development of proposed listing is precluded by higher priority listing activities.
Cavity - A hollow or hole occupied by an organism.
Cluster - The aggregation of cavity trees previously and currently used and defended by a group of woodpeckers.
Coastal Construction Control Line - A Florida Department of Environmental Protection program that regulates structures and activities which can cause beach erosion, destabilize dunes, damage upland properties, and interfere with public access.
Cold-stun - When a Sea Turtle becomes hypothermic due to water temperatures becoming too cold.
Colony - A distinguishable localized population within a species.
Commensal - A species that has a symbiotic relationship with another species where benefits are experienced by one (i.e. nutrients, shelter, etc.), but the other is unharmed.
Critical Habitat - A legally designated space that is directly or indirectly necessary for the conservation of a Federally listed species.
Depredation - When wildlife preys upon livestock or pets.
Encounter/Multiple Encounters: An unexpected direct meeting or a series of meetings over a short period between a human and a Panther. Panther exhibits nonthreatening behavior. Multiple encounters involve the same Panther, which over a short period has shown no aggression nor has deliberately approached people in an area.
Endemic - Restricted or peculiar to a certain area or region.
Extirpation - Cease to exist in a given area.
Federally-designated Endangered Species - Species, subspecies, or isolated populations of species or subspecies that are native to Florida and classified as Endangered under FWC Commission rule by virtue of designation by the U.S. Department of Interior or Commerce as Endangered under the Federal Endangered Species Act.
Federally-designated Threatened Species - Species, subspecies, or isolated populations of species or subspecies that are native to Florida and classified as Threatened under FWC Commission rule by virtue of designation by the U.S. Department of Interior or Commerce as Threatened under the Federal Endangered Species Act.
Fledge - To raise a young bird until it is capable of flight.
Fledged - To leave a nest.
Fledgling - A young bird that has recently developed flight feathers and is capable of flight.
FWC Commissioners - The seven-member board of FWC that meet five times each year to hear staff reports, consider rule proposals, and conduct other FWC Commission business.



APPENDIX E (continued)

Genetic Diversity - The total number of genetic characteristics in a genetic makeup of a species.
Geographic Information Systems (GIS) - Captures, stores, analyzes, manages, and presents data that is linked to a location.
Habitat - A natural environment where a species lives and grows.
Helper Bird - Usually a previous male offspring of either the breeding male or both breeders. Helpers participate in territory defense, constructing and maintaining nests and cavities, incubating eggs, feeding and brooding nestlings, removing fecal sacs from the cavity, and feeding fledglings.
Keystone Species - A species that plays a unique and critical role in the structure of an ecosystem and the way it functions. Without this species, the ecosystem would be dramatically different or cease to exist.
Life History - All changes experienced by a species from birth to death.
Listed Species - Species included on the Florida Endangered and Threatened Species list or the Species of Special Concern list. Prior to November 10, 2010, listed species were species designated as Endangered, Threatened, or Species of Special Concern.
Metamorphosis - Transition from a larval to a terrestrial juvenile stage.
Metapopulation - A group of spatially separated populations of the same species that interact at some level.
Necropsy - The examination of a body after death.
Nestling - A young bird that has not abandoned the nest.
Nonessential Experimental Population - A population of a species that is designated under the Endangered Species Act to restore a species outside the species' current range, but within its historical range is not essential to the survival of the species. A population designated as experimental is treated as Federally-designated Threatened regardless of the species' designation elsewhere in its range.
Passive Integrated Transponder (PIT) Tags - a chip placed below the skin to identify individuals.
Productivity - The ability to produce; fertility.
Recruitment - The addition of individuals into a breeding population through reproduction and/or immigration and attainment of breeding position.
Rookery - A colony of breeding animals.
Roosts - A place where species can sleep or reside.

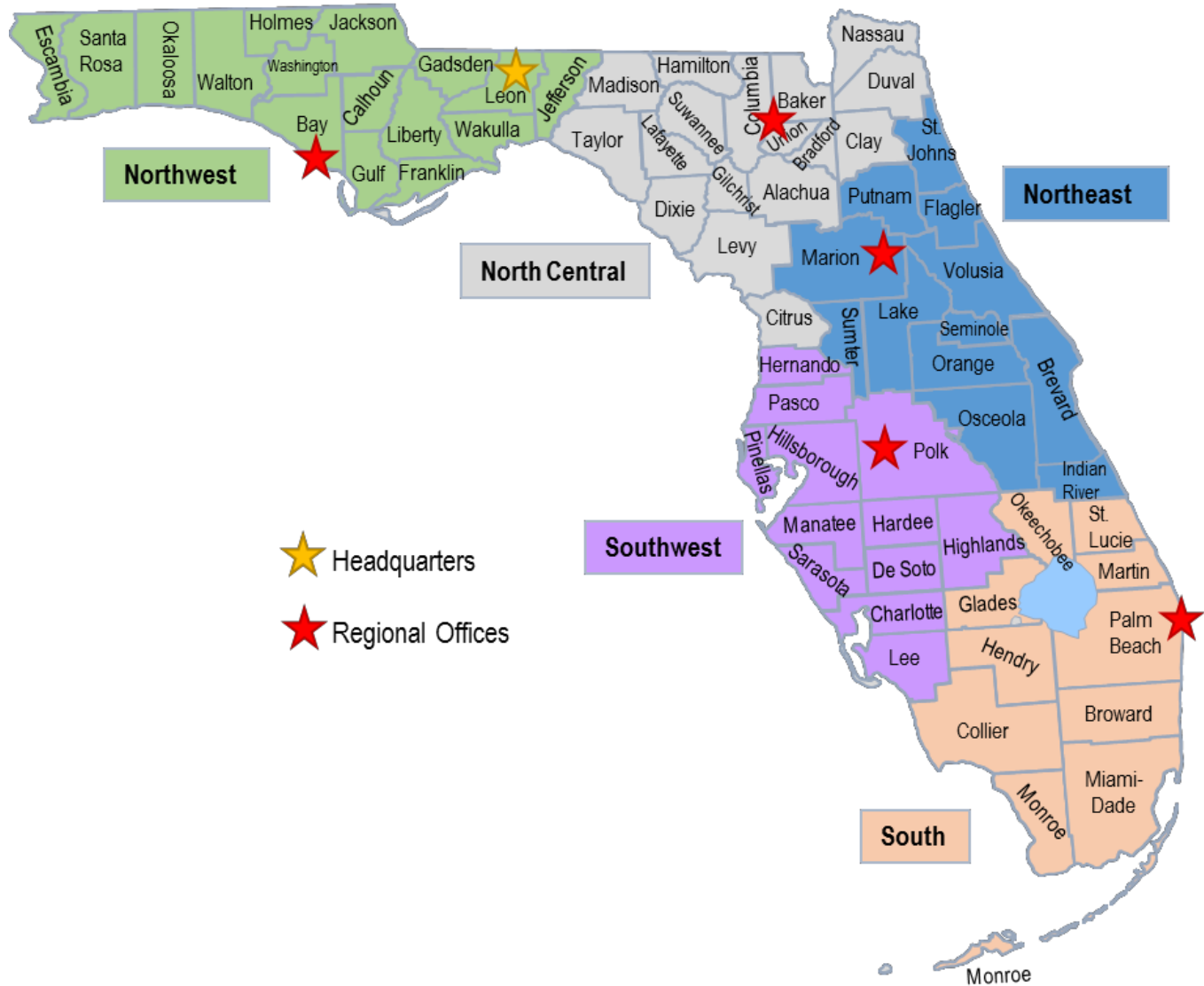


APPENDIX E (continued)

Single Nucleotide Polymorphism (SNP) - A variation in a single base pair in a DNA sequence.
Species Status Assessment (SSA) - An analytical approach developed by the US Fish and Wildlife Service to deliver foundational science for informing all Endangered Species Act decisions. A focused, repeatable, and rigorous scientific assessment.
State-designated Species of Special Concern - As designated by FWC Commissioners, a species, subspecies, or isolated population of a species or subspecies which is facing a moderate risk of extinction or extirpation from Florida in the future.
State-designated Threatened Species - As designated by FWC Commissioners, a species, subspecies, or isolated population of a species or subspecies that are native to Florida and are classified as Threatened due to a reduction in population size, a severely fragmented and/or declined geographic range, a population fewer than 10, 000 mature individuals, a small and/or restricted population, and/or a quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.
Taxonomy - Scientific classification of a species.
Translocation - Movement of an individual from one location to another.
Telemetry - Transmission of data through technology, such as radio collars, from a species to an observer.



APPENDIX F. MAP OF FWC REGIONS



APPENDIX G. MAP OF FWC LEAD MANAGED AREAS

