Florida Fish and Wildlife Conservation Commission

Endangered and Threatened Species Management and Conservation Plan

Progress Report

Fiscal Year 2022–23

October 2023

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EXECUTIVE SUMMARY

This report covers Fiscal Year (FY) 2022-23 and constitutes the 45th 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), FE (50), FT (39), FT(S/A) (4) and FXN (1). The list is unchanged since December 1, 2022. 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 December 1, 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	2	9	6	2	**39**
State Species of Special Concern (SSC)	0	0	0	0	0	0	**0**
TOTAL	**28(6)**	**32**	**4**	**20(5)**	**13(2)**	**36**	**133(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 11*1). 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 that are at–risk or could become at–risk 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 2021, FWC Commissioners approved the staff recommendation to add the Striped Newt as a Candidate Species in Rule 68A-27.0021, F.A.C. Staff developed a Species Action Plan and Species Conservation Measures and Permitting Guidelines for this species. These documents were presented at the November/ December 2022 Commission meeting, and the FWC gave final approval to list the Striped Newt as State-Threatened in Rule 68A-27.003, F.A.C and remove it as a Candidate Species from Rule 68A-27.0021, F.A.C.

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 2022-23, the Panama City Crayfish was added to the Florida's Endangered and Threatened Species list.

Imperiled Species Management Program Species Guidelines

From July 2022 to June 2023, the Species Conservation Measures and Permitting Guidelines (Guidelines) for the Striped Newt and four state-listed beach-nesting bird species (American oystercatcher, snowy plover, least tern, and black skimmer) were approved by the FWC Commissioners. 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 Guidelines serve to provide regulatory certainty for activities specifically authorized without a permit and inform potential applicants regarding permit options. The Gopher Tortoise Permitting Guidelines were also revised to better protect Gopher Tortoises during permitted activities. These guidelines are incorporated by reference in Rule 68A-27.003, Florida Administrative Code.

The Florida Endangered and Threatened Species List and State Listing Actions

In FY 2022-23, FWC received two species evaluation requests to list the Wilson's plover and Florida black bear on the state-designated Threatened species list. In FY 2021-22, FWC received three species evaluation requests to list the Alligator Gar, Black-banded Sunfish, and Southern Dusky Salamander on the state-designated Threatened species list. The Kirtland's Warbler completed a federal delisting change during this time. In FY 2020-21, FWC received one species evaluation request to list the Florida Reef Gecko on the state-designated Threatened species list. Staff developed workplans for these species in accordance with Rule 68A-27.0012, F.A.C. to determine if the species warrants listing. Biological Review Groups were appointed for Florida Reef Gecko and Kirtland's Warbler for evaluation for state listing action in November of 2022. Biological Review Groups will be appointed shortly for Alligator Gar, Black-banded Sunfish, and Southern Dusky Salamander for evaluation for state listing action.

Funding Request

The recommended level of funding for FWC endangered species programs in FY 2024-25 is $37,072,095 (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 2024-25.

FUNDING SOURCE	AMOUNT ($)
Federal Grants Trust Fund (FGTF)	$9,408,140
Florida Panther Research and Management Trust Fund (FPRMTF)	$817,812
General Revenue Fund (GR)	$1,308,485
Grants and Donations Trust Fund (GDTF)	$5,409,384
Land Acquisition (LATF)	$2,315,161
Marine Resources Conservation Trust Fund (MRCTF)	$6,326,640
Nongame Wildlife Trust Fund (NWTF)	$5,334,856
Save the Manatees Trust Fund (STMTF)	$3,512,405
State Game Trust Fund (SGTF)	$2,639,212
TOTAL	**37,072,095**

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).

Gulf Coast Beach Mice – 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 of coastal community habitat quality. To monitor the Beach Mice, FWC established track tube stations along the coastal dunes from Escambia to Gulf Counties. Each station consists of a polyvinyl chloride (PVC) tube baited with sunflower seeds and lined with paper and an inkpad that records footprints as mice enter the tube. At most sites, stations are set 328-1,640 feet apart in lines parallel to the dunes. These track tube stations do not provide population estimates. Instead, they indicate areas occupied by Beach Mice, data which FWC uses to monitor fluctuations in distribution over time. FWC biologists and partners from the Florida Park Service, Gulf Islands National Seashore (GINS), the St. Joe Company, and Tyndall Air Force Base (AFB) regularly check the stations for tracks. FWC staff also participated in a US Fish and Wildlife Service-led effort to trap and translocate several mice between two Choctawatchee Beach Mouse populations.

In FY 2022- 23, monitoring continued at 13 sites on public lands and at 2 privately-owned sites. For each location, staff calculate the percentage of stations that detected tracks each sampling period (detection rate). In FY 2022-23, the average detection rate varied from 0% at Deer Lake State Park and WaterSound to 93% at Perdido Key National Seashore. Multiple sites had mean detection rates above 80%, indicating Beach Mice were present on most of the available dune habitat at these sites. In FY 2022-23, FWC received a fourth year of funds from the USFWS for a multi-year project designed to assess Beach Mouse and habitat recovery since Hurricane Michael. A third year of funds was awarded to continue monitoring efforts and prioritizing potential restoration efforts where dune habitat or Beach Mouse populations are not recovering well from hurricane impacts. In FY 2019-20, FWC and USFWS began a multi-year project funded by the Florida Gulf Environmental Benefit Fund through the National Fish and Wildlife Foundation to restore and enhance the diversity and resilience of coastal dune ecosystems throughout northwest Florida. As part of this project, additional sites were established at Eglin AFB, GINS, Okaloosa County, Johnson beach in Perdido Key, and at the private community of WaterSound. Monitoring efforts are expected to continue at all sites and additional monitoring may be added based on restoration efforts and timelines.

ATLANTIC COAST BEACH MOUSE– The Southeastern Beach Mouse historically occurred from Volusia County south to Broward County, and possibly as far south as Miami Beach. The current distribution of this subspecies is likely restricted to Volusia and Brevard counties and possibly scattered locations in Indian River County. In FY 2022-23, FWC entered year 4 of a 5-year project funded through the USFWS Coastal Program titled “Assessing habitat restoration and management activities and benefits for Atlantic Coast Beach Mouse recovery through long-term monitoring.” This

project improves the conservation of both the Southeastern Beach Mouse and the Anastasia Island Beach Mouse subspecies along Florida's Atlantic Coast. The information collected from this project is used to develop strategic management recommendations, prioritize restoration actions, and support proposed translocations of Beach Mice. Southeastern Beach Mice were monitored using 114 track tubes across six properties. Monitoring continued at Smyrna Dunes Park, and a coastal vegetation planting to improve Beach Mouse habitat occurred here in a 0.33 acre area. Monitoring at Canaveral National Seashore was focused on areas that were impacted by Hurricanes Ian and Nicole, which caused significant sand movement and dune erosion. FWC monitoring efforts at Cape Canaveral Space Force Center focused on areas that had similar vegetation structure and composition to Sebastian Inlet State Park. This information will help guide future possible translocations to Sebastian Inlet State Park. The Southeastern Beach Mice has not been detected south of Cape Canaveral Space Force Station since 2012.

Exhibit 3. Percentage of Southeastern Beach Mice detections at track tubes across six sites in the species' range for FY 2022-23.

Study site	Track tubes/Cameras	Detections	Total surveys	Percent detections
Smyrna Dunes Park	14	103	148	69.6
Canaveral National Seashore	24	39	95	41.1
Cape Canaveral Space Force Stations	42	32	84	38.1
Sebastian Inlet State Park	9	0	27	0
Pelican Island NWR	15	0	60	0
Treasure Shores Beach Park	10	0	30	0

The Anastasia Island Beach Mouse historically ranged as far north as the Duval—St. Johns County line but is now found only on Anastasia Island (St. Johns County). The USFWS Coastal Program project also intends to improve conservation of the Anastasia Island Beach Mouse through more effective management. FWC monitored the Anastasia Island Beach Mice during FY 2022-23 with 27 tubes at Fort Matanzas National Monument at the southern end of the species range, which saw a drastic decrease of Beach Mouse habitat post Hurricane Nicole. There were 195 detections within 281 surveys (detection percentage of 69.4). In the fall of 2022, an effort to enhance Beach Mouse habitat by planting native species occurred at the southern end of Anastasia State Park at Pope Road (0.51 acres).

Florida Bats

GRAY BAT - 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 February 8, 2023, FWC biologists again found no Gray Bats in Old Indian Cave, the former primary wintering cave in Florida Caverns State Park. This winter, biologists did not survey Dugong Cave, a smaller cave adjacent to the park where Gray Bats previously roosted in some winters. In addition, FWC biologists did not observe Gray Bats in any of the other 25 caves in northwest Florida visited during FY 2022-23 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 162 stationary acoustic data collection points across the state including 23 points in the Gray Bat

historical range. In FY 2022-23, FWC biologists and partners collected 570,398 acoustic files with 193,395 identified to bat species. Unfortunately, none of these have been confirmed as Gray Bats.

FLORIDA BONNETED BAT - The federally endangered Florida Bonneted Bat is endemic to Florida. In FY 2022-23, all 11 artificial bat roosts (1 roost is 2 houses) and 2 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 six 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.

FWC maintained 11 bat roosts and one bat condo on Babcock-Webb WMA during FY 2022-23. Three roosts were swapped to sturdier utility poles and one bat house was rebuilt and replaced. FWC also maintained eight automatic PIT tag readers on Florida Bonneted Bat roosts in Babcock Webb WMA. At the end of the fiscal year, only six readers were functional, but repairs are in progress. Each reader collects data on when PIT tagged bats enter and exit a roost.

In FY 2022-23, 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 2022, six acoustic detectors were deployed across the management area. In June 2023, the number of detectors was increased to eight in order to better survey the management area. On May 25th, 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. Eight bats of only one species (evening bats, Nycticeius humeralis) were captured; no Florida Bonneted Bats were captured.

Since FY2015-16, FWC and University of Florida have been working 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 2020-2023. In FY2022-23, acoustic surveys were conducted at 16 sites for four nights Picayune Strand State Forest along intact canals and plugged canals. FWC conducted mist net surveys at 15 net sites over 4 nights in Avon Park Air Force Range and Fakahatchee Strand Preserve State Park based on Florida Bonneted Bat activity levels documented with acoustic surveys. During these surveys, FWC captured 20 bats, 3 of which were Florida Bonneted Bats, attached radio transmitters to 2 individuals. Radio-telemetry was then used to track one bat back to two new roost trees

located in Fakahatchee Strand Preserve State Park and in Big Cypress National Preserve; the second bats was never found. Emergence counts were conducted on these newly identified roost trees and on 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 were prepared during FY22-23 and will be submitted for publication in FY23-24. Another manuscript assessing the effects of Everglades hydrological restoration on Florida Bonneted Bats was completed and reviewed internally by FWC in FY22-23 and will be submitted shortly to the Journal Restoration Ecology.

TRI-COLORED BAT – The Tri-colored 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. Tri-colored 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 Tri-colored 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 Tri-colored Bat hibernacula caves, but bats at these caves usually occurred in small numbers (<10 individuals). Only 8 caves contained more than 40 Tri-colored Bats, and only two caves had over 100 bats.

In FY 2022-23, as part of long-term monitoring, FWC biologists resurveyed 44 important bat caves, 25 in northwest Florida and 19 in north central Florida and observed 293 Tri-colored Bats in 35 (80%) 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 Tri-colored 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 Tri-colored 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 2022-23, FWC biologists surveyed 30 roadway culverts in north Florida. Biologists detected two species including the Tri-colored Bat and the

more common southeastern myotis and counted 94 Tri-colored Bats in 19 (63%) of the culverts surveyed. FWC biologists identified 2 new culvert roosts with >20 Tri-colored Bats each, making these the largest culvert hibernacula in the state. Although Tri-colored Bats occupied only a small percentage of culverts, Florida has thousands of roadway culverts which may cumulatively provide roosting habitat for many Tri-colored Bats. FWC biologists also surveyed one known Tri-colored Bat bridge hibernaculum which contained 49 Tri-colored Bats, the highest count in the state. In addition, biologists located a new bridge hibernaculum with 20 Tri-colored Bats. Further research is needed to investigate bat use of bridges to determine their importance to Tri-colored 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 Tri-colored 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 Tri-colored Bats roosting in transportation structures. In FY2022-23, biologists continued this work and tracked 12 Tri-colored Bats and tracked them for an average of 13.1 days. During both winters of tracking, FWC biologists identified 30 tree roosts, predominantly in sweetgum, oak, and cypress trees. Tri-colored Bats also roosted in culvert and cave roosts. Biologists found that Tri-colored 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 Tri-colored Bats from WNS.

ACOUSTIC MONITORING OF BATS IN FLORIDA THROUGH THE LONG-TERM BAT MONITORING PROGRAM – Bats in Florida, including Tri-colored 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 162

stationary points across the state to record the ultrasonic echolocation calls of bats. In FY 2022-23, FWC biologists and partners collected 570,398 acoustic files with 193,395 identified to bat species. Of these calls, 35,292 (18.2%) have been automatically identified as Tri-colored Bats. Tri-colored 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 cave bat research to better address WNS management issues. Acoustic monitoring data shows that Florida's Tri-colored Bats are active in areas without any caves in winter. This raises the possibility that Florida's Tri-colored Bats may be overwintering in other roost types like trees, culverts, and buildings that are less susceptible to the fungus that causes WNS, indicating that the state may be a potential refuge for the species. Additionally, acoustic monitoring can confirm trends of population decline seen in Florida's caves, evaluate changes over a wider geographic scale, and identify habitat most important for Tri-colored Bat conservation.

TRI-COLORED BAT CAPTURES AND ACOUSTICS IN SOUTH FLORIDA - As part of roost location efforts for 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. Only 14 Tri-colored Bats were captured out of 515 total bats (2.7%) on 9 nights of 123 (10%) between 2015-2023. In FY2022-23, FWC conducted mist net surveys at 18 net sites over 5 nights in Avon Park Air Force Range, Babcock-Webb WMA and Fakahatchee Strand Preserve State Park; however, no Tri-colored Bats were captured.

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. During FY2020-21 and FY2021-22, acoustic surveys were conducted at 194 sites for four nights twice in the wet season (June – Sept) and twice in the dry season (Jan-May) 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. Tri-colored Bats were detected at 100% of the survey sites and on 53% of survey nights 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, Tri-colored Bats were more active within the fully hydrologically restored and reference areas compared to the unrestored and partially restored areas; they were also most active in freshwater forested wetlands and positively associated with the percent of freshwater forested wetland (within 150 m of the detector). These findings suggest the species may benefit from hydrological restoration. In FY2022-23, acoustic surveys were conducted at 16 additional sites for four nights in Picayune Strand State Forest along intact canals and plugged canals to investigate canal usage. These sites were also surveyed in

FY2020-21 and FY2021-22. Over the three-year period, Tri-colored Bats were detected at all 16 canal sites on 78% of the nights and represented nearly 4% of the total calls, suggesting that the species frequently forages along both intact and plugged canals.

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 as 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 – In FY 2022-23, FWC biologists began a study to develop best monitoring protocols to survey for Everglades Mink using camera traps and comparing four lures and baits at 23 transects across FSPSP (n=14), Picayune Strand State Forest (PSSF; n=8), and Great Heart of the Everglades (GHE; n=1). 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 audio lure (Kill Squeak Trap Call; plays mouse squeaks). Cameras were set for 14 days, rebaited if necessary, and set for an additional 14 days. Everglades Mink were detected at 12 (52%) of 23 sites, all within FSPSP. Everglades Mink were most frequently detected by bait and audio lures (Table 1). Formal analyses to determine best monitoring protocols and potential habitat associations will be performed in FY 2023-24.

Additionally, a detection dog and handler team surveyed each transect on at least 2 occasions during the study period. The detection dog successfully located 57 mink scats from 7 sites in FSPSP. The scats were sent to the National Genomics Center for Wildlife and Fish Conservation for species confirmation and are awaiting diet analysis. A better understanding of Everglades Mink diet will potentially identify reasons for decline or opportunities for management.

By improving existing knowledge gaps in monitoring protocols and aspects of the Everglades Mink's life history, 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 4. Summary of survey results for camera trap surveys and detection dog surveys for the Everglades Mink in FY 2022-23.

Property	Number of transects	Number Mink-occupied sites	Number of Mink-occupied sites by lure type*				Scats collected
			Audio	*Bait*	*Scent*	*Visual*	
FSPSP	14	12	10	9	5	7	57
PSSF	8	0	0	0	0	0	0
GHE	1	0	0	0	0	0	0

* Mink detections by lure type do not equal the number of mink-occupied sites because mink could be detected by multiple cameras/lure types at a single site.

GENETIC VERIFICATION OF SUBSPECIES DESIGNATION – The Everglades Mink was originally described as a subspecies in the late 1940s based primarily on physical characteristics of 3 specimens. However, a later analysis of skull and dental measurements in the late 1980s questioned their subspecies status—potentially having implications for the conservation status of the subspecies. Since FY 2013-14, FWC biologists collected 45 samples from mink subspecies in the state. Biologists collaborated with Central Connecticut State University for the first genetic analysis to verify the subspecies designation of the Everglades Mink. Multiple genetic tests supported the designation of the Everglades Mink as a unique subspecies that, when coupled with geographic isolation, distinct physical characteristics, and differing ecological traits, adds further support to the conservation status of this species. Biologists are currently preparing a manuscript on this work.

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 (https://myfwc.com/media/2038/manatee-mgmt-plan.pdf) and the USFWS Florida Manatee Recovery Plan (http://ecos.fws.gov/docs/recovery_plan/011030.pdf).

MORTALITY AND RESCUE – FWC researchers and law enforcement officers respond to statewide reports of manatee carcasses and injured manatees. In FY 2022-23, 531 carcasses were documented in Florida. 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/.

During 2022-23 statewide FWC staff and cooperators rescued 121 sick or injured manatees under the Federally permitted statewide rescue program. Five oceanaria (Homosassa Springs Wildlife State Park, Jacksonville Zoo and Gardens, Miami Seaquarium, 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 2022-23, 59 of these rescued manatees were released, 32 died, and 30 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 (2015-2016) estimate of statewide abundance was 8,810 with 95% probability that the real abundance was 7,520 - 10,280 manatees. More information can be found at FWC's Second Update to the Statewide Florida Manatee Abundance Estimate | FWC (myfwc.com). In FY 2022-23, the Atlantic coast of Florida was surveyed as part of the next statewide abundance survey. The Gulf coast of Florida was flown the prior year, and with both coasts now completed, an analysis is underway to update and publish a statewide abundance estimate. FWC staff also conducted smaller-scale distributional surveys in IRL in response to the above-mentioned UME.

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 region was recently updated and included in an application of an Integrated Population Model (IPM) in southwest Florida (Reconstructing population dynamics of a threatened marine mammal using multiple data sets | Scientific Reports (nature.com). The FWC is currently expanding upon the IPM analytical framework to enable assessment of the Atlantic management unit. 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 over 2,900 unique individuals identified by skin samples collected from live manatees in the southwest Florida pilot study area. A manuscript was published in 2021 (A hidden Markov model for estimating age-specific survival when age and size are uncertain - Gowan - 2021 - Ecology - Wiley Online Library) that describes application of a modeling approach to estimate survival using genetics capture-recapture information.

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 2022-23, 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 interagency project that started in fall 2021 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. A summary report from this warm-water work is expected by the end of 2023.

MANATEE FORUM - In FY 2022-23, the Manatee Forum, a diverse stakeholder group hosted by the FWC, met in October 2022 and remotely through teleconference in May 2023. Presentation topics in both of these meetings were related to the ongoing manatee Unusual Mortality Event (UME) along the Atlantic coast and habitat restoration activities. Specifically, updates were provided on agency response efforts, manatee tracking studies, and Indian River Lagoon habitat monitoring. Additionally, an update was provided on manatee habitat restoration projects supported by legislative funding as well as a presentation summarizing the Warm-water Habitat Action Plan workshop. Other presentations included a review of sublethal watercraft interactions, Brevard County's Save our Indian River Lagoon program, and the Indian River Lagoon National Estuarine Program. 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 (https://myfwc.com/research/manatee/trust-fund/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 2022-23, 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 write a Letter of Concurrence regarding an Addendum to the Volusia County MPP which will 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. In FY 2022-23, FWC staff coordinated with Sarasota County to complete data collection efforts for future MPP revisions.

In response to the ongoing manatee UME, an emergency, temporary No Entry Zone in Brevard County was prepared and filed in FY 2022-23 and FWC staff finalized a new No Entry Manatee Protection Zone at the Florida Power & Light Cape Canaveral Energy Center in Brevard County. The rule (68C-22.029, F.A.C.) was filed for adoption with the Department of State in January 2023. In FY 2022-23, 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. In FY 2022-23, staff worked with Lee County Board of County Commissioners to review and approve Manatee Protection Zones through the local ordinance process.

PERMIT REVIEWS – FWC staff produced 420 final comments or assistance letters for proposed projects reviewed in FY 2022-23 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 2022-23, 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 2022-23, FWC staff successfully encumbered these funds to begin construction on high-priority projects such as enhances manatee access to Warm Mineral Springs in Sarasota County and shoreline stabilization in Blue Spring, Volusia County. FWC staff also continued the collaborative implementation of the Indian River Lagoon seagrass nursery network to aid in growth of forage donor material.

In FY 2022-23, FWC and USFWS implemented a stakeholder workshop in partnership with Florida Power & Light to begin process development and implementation of the recently finalized Florida Manatee Warm-Water Habitat Action

Plan. One outcome of the workshop was continued collaborative meetings to develop regional planning teams for long-term warm-water habitat concerns associated with planned upgrades to existing power generating units. Additionally, FWC staff hosted a workshop in September 2022 with industrial partners, the Department of Environmental Protection, and the USFWS to discuss updates and revisions to power plant Manatee Protection Plans.

OUTREACH – In FY 2022-23, FWC staff participated in several in-person and virtual outreach events, with audience members ranging from elementary school students to adult continued learning participants. Staff represented the FWC at the annual Manatee Festival in Crystal River, the Right Whale Festival in St. Augustine, and Capitol Day in Tallahassee. Additional outreach efforts focused on distributing educational materials through boating education classes, mail services, and via partner working groups. In addition to this outreach, staff worked to develop new outreach material including a "Go Slow-Look Out Below" sticker and "Appropriate Manatee Viewing" educational signage. Several existing publications were updated or printed for distribution.

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, 264 panthers have been radiocollared. Location data was collected on five panthers in FY 2022-23. 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 2022-23. During FY 2022-23, 16 wild panthers are known to have died, including one (female) radiocollared panther and 15 (5 males, 10 females) uncollared panthers. All 16 panthers died after being hit by vehicles.

FWC maintained 33 unique trail camera locations south of the Caloosahatchee River. A camera-trapping effort of 8,666 trap-days produced 479 independent panther detections. FWC and USFWS maintained 44 unique trail camera locations on public lands north of the Caloosahatchee River between 1 July 2022 and 30 June 2023. A camera-trapping effort of 9,074 trap-days produced 151 independent panther detections. This included 22 adult female detections, likely representing at least 2 unique individuals. Panthers were detected in Charlotte County (Babcock Ranch Preserve), Glades County (Fisheating Creek Wildlife Management Area (WMA), and Lee County (Bob Janes

Preserve). Female panthers were photographed at Babcock Ranch Preserve and Fisheating Creek WMA. A kitten was photographed at Fisheating Creek WMA. Additional photos submitted to the FWC Panther Sightings website or otherwise communicated directly to FWC included 16 additional independent panther detections north of the Caloosahatchee River.

COLLABORATIVE RESEARCH ACTIVITIES - FWC is involved in multiple research projects focusing on population analyses and models; genetic differences between panthers and other puma populations; mortality factors; the efficacy of rehabilitation; benefits of genetic restoration; assessing the application of artificial intelligence to classify trail camera videos and photos by species; panther densities on private lands; and impacts of varied diseases on the population. In FY 2022-23, FWC staff assisted with the completion of research projects including: an evaluation of male panther reproductive parameters following genetic rescue and the effect of admixture on mutation load in panthers. Agency staff served as lead or as co-authors on four 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. This debilitating disease impairs the ability of affected felids to survive in the wild. Since first documented in 2017, FLM has been diagnosed in 78 panthers and bobcats. As of 30 June 2023, FWC has confirmed 17 cases (by histology; 6 panthers, 11 bobcats) and 61 probable cases (based on remote video; 26 panthers, 35 bobcats) of FLM. Cases were in peninsular Florida 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. In Southwest Florida, cases extend eastward into Big Cypress National Preserve and Fakahatchee Strand Preserve State Park.

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.

HUMAN-PANTHER INTERACTIONS - FWC verified panthers were responsible for preying upon domestic animals (depredations) in 8 separate events in FY 2022-2023. Panthers preyed on 3 calves, 7 goats, 1 sheep, and a dog (injured). These events occurred in Collier, Lee and Hendry 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 is developing a payment for ecosystem services program and a compensation program for cattle producers who experience depredations by panthers. 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.

FWC provided information and reviews of numerous road and development projects throughout southern Florida in FY 2022-23. These reviews can assist with: minimizing the disruption and loss of panther habitat and corridors; and providing recommendations to reduce the risk of panther-vehicle collisions and the likelihood of human-panther interactions.

PANTHER SIGHTINGS - FWC launched a website in August 2012 where the public can report panther sightings and upload pictures or videos of those sightings (http://www.myfwc.com/panthersightings). By the end of FY 2022-23, over 11,000 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 32% as panthers and 32% as bobcats. Other purported sightings were determined to be house cats, dogs, coyotes, bears, foxes, otters, raccoon and a monkey (Rhesus macaque).

FAIRS, FESTIVALS AND EVENTS – The Florida Panther Festival, hosted by the Naples Zoo was held on November 5, 2022, 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 3,095 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 booth and a presentation at the Save The Panther Day festival at Florida Panther National Wildlife Refuge, and on Earth Day at Highlands Hammock State Park.

OTHER EDUCATIONAL AND OUTREACH PROGRAMS AND PRESENTATIONS – Panther staff provided presentations to NGOs, Girl Scouts, Summer camp, school classes, HOAs, and other interested organizations, reaching an estimated

300 people.

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 (http://rwcatalog.neaq.org/Terms.aspx). 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 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.

During the 2022-2023 calving season, FWC conducted 56 aerial surveys and 17 vessel cruises (under permit #20556-01 issued to GDNR). Through collaborative efforts in the southeast U.S., the FWC, NOAA-Fisheries, the Georgia Department of Natural Resources (GDNR), the Clearwater Marine Aquarium Research Institute, and volunteer sighting networks documented 59 unique North Atlantic Right Whales (including 11 mother-calf pairs). Four Right Whale genetic samples were obtained by FWC which contributed to the overall 15 samples (including 11 calves) collected in the southeast U.S. FWRI also worked with volunteer sighting networks in Florida to assess and respond to whale sightings reported by the public, as well as mitigate human interaction with whales.

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.

Three entangled Right Whales were sighted by aerial survey teams in the southeast U.S. during the 2022-2023 season:
Catalog #4904 (a juvenile female) was sighted approx. 20NM off Rodanthe, NC on 08 January. The configuration of the entanglement was complex, including line embedded across the rostrum and wrapped around the peduncle and flukes. The entanglement was considered life-threatening, and the whale was in poor body condition. Due to the whale's location, a rapid vessel response was not possible. There have been no subsequent sightings of this whale.

On 20 January, the FWC aerial survey team sighted Catalog #3812 'Nimbus' (an adult male), off Jekyll Island, GA. The entanglement consisted of a loop of rope exiting the right mouth trailing back to the peduncle and a single rope exiting the left mouth trailing several hundred feet behind the fluke. With support from the aerial survey teams, disentanglement responders from GDNR, FWC and NOAA were able shorten the rope on the whale's left side using a cutting grapple, ultimately removing approximately 375 ft of rope which terminated in an apparent trap bridle. The whale was able to shed the remaining rope on his own and was seen gear-free in March, south of Martha's Vineyard, MA. The gear that was removed was thoroughly examined by NOAA and Fisheries and Ocean Canada (DFO) who determined that it was from the Gulf of St. Lawrence snow crab fishery.

Another entangled Right Whale (Catalog #1218 'Argo') was sighted on 27 January off Surf City, NC. The entanglement consisted of multiple embedded wraps around the peduncle at the fluke insertion, a large blue object just aft of the fluke, and trailing line that disappeared at depth. With favorable weather forecasted for the following days, disentanglement responders from GDNR and FWC moved boats and gear to North Carolina in preparation for a response. With support from the aerial survey planes, the team spent two days on the water collecting additional documentation, developing an action plan, deploying a telemetry buoy, and tracking the whale. Ultimately, a small combat inflatable boat was employed to pull up directly behind the whale's fluke in order to make multiple cuts to the rope that was embedded around the peduncle. Over 150ft of rope and two lobster traps were recovered. NOAA and DFO examined the gear and determined that the gear originated from Lobster Fishing Area 33 off Nova Scotia.

In January, a Right Whale mother-calf pair attracted the attention of the public as they traveled close to shore along the coast between Cape Canaveral and Jupiter Inlet. Curious boaters, surfers, and paddleboarders approached the

whales, getting dangerously close, putting themselves at risk as well as disrupting the whales' behavior. This activity generated public sighting reports through dedicated reporting hotlines, the Whale Alert App, and social media. Monitoring efforts and conservation messaging required a significant amount of coordination within and between FWC, NOAA, USCG, and local responders. Priority tasks included real-time responses; USCG Broadcast Notices to Mariners; assessing the whales' proximity to inlets and ports; and communicating needs to law enforcement assets, including FWC LE, NOAA OLE, County Sheriffs' Offices, local police departments, and lifeguards. The high levels of vessel traffic and general lack of awareness about Right Whales makes these areas in south Florida a particular concern for both vessel collisions and whale harassment.

On the morning of 20 February, a vague report was received about a Right Whale in the vicinity of Mayport Naval Station. A survey plane responded and located a Right Whale mother-calf pair near the west end of the northern jetty, inside the St. Johns River Entrance. NOAA and FWC staff worked to implement established river incursion event procedures. Coordination involved NOAA, FWC, USCG Sector Jacksonville, JAXPORT, the St. Johns harbor pilots, Naval Station Mayport, dredge companies, FWC LE, aerial survey teams and vessel traffic in the area. While the plane was on scene the whales made slow progress east, towards the ocean. The aircraft established communication with an outbound container ship and the ship adjusted course as much as possible in the narrow channel, passing within about 100 yards of the whales. Another cargo ship delayed entry and remained offshore until the whales were clear of the channel to the north. A USCG small boat was deployed to escort the whales and FWC relieved the USCG vessel to continue monitoring and collect additional documentation. In total, the event lasted approximately three hours.

BIRDS

Audubon's Crested Caracara

The Audubon's Crested Caracara is a federally Threatened species. The Florida Fish and Wildlife Conservation Commission (FWC) continued annual caracara breeding territory surveys during Fiscal Year (FY) 2022-23 on Dinner Island Ranch, Fisheating Creek, Holey Land, Okaloacoochee Slough, and Rotenberger Wildlife Management Areas (WMAs) using FWC's standard monitoring protocol. Surveys at Spirit of the Wild WMA began this FY after the first documented active caracara nest was found last year on the WMA. In addition, new active nests were found on Dinner Island Ranch (2), Rotenberger (1), and Spirit of the Wild (2) WMAs. Historical nests were only active on Fisheating Creek WMA (3). Nesting was not observed at Holey Land WMA; however, staff suspect that the area shares the same breeding pair that nested in Rotenberger WMA this year. Nesting was also not observed this year at Okaloacoochee Slough WMA.

Eastern Black Rail

The Black Rail is a federally Threatened species. Everglades and Francis S. Taylor WMA (EWMA) staff have conducted Eastern Black Rail surveys since 2021. Staff used the FWC standardized Black Rail callback monitoring protocol until a Federal protocol was introduced in early 2023. Black rails were detected at one survey station in EWMA in 2023 but were also detected multiple times elsewhere within the EWMA via opportunistic observations outside of the survey period. Black Rails were also documented opportunistically in Rotenberger WMA. Both J.W. Corbett WMA and John C. and Mariana Jones/Hungryland WEA conducted surveys from 2020-2022; however, surveys were discontinued in 2023 due to lack of detections in previous years.

Everglade Snail Kite

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 UF in FY 2015-16, FY 2016-17, FY 2018-19, FY 2019-20, and FY 2021-2022 for all areas of Snail Kite habitat except Lake Okeechobee and the Everglades. There were 444 active Snail Kite nests recorded throughout Florida in 2023, a decrease in nests compared to 2022 (585 nests) but roughly equal to 10-year average for total nests. Nearly half of the nests in 2023 were found in Payne's Prairie Preserve State Park (Alachua County).

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. Data from Year 1 and 2 will be used to generate a minimum population index for the rural population of Florida Burrowing Owls. Preliminary statistical results have large confidence intervals, due in part to the large number of locations on private properties that could not be surveyed, so an estimated population size may not be achievable. However, the data does show where owls are in rural areas, which has not been previously described. The data is also a starting point for assessing population trends through time.

Florida Grasshopper Sparrow

HABITAT MANAGEMENT - To restore and maintain the Florida Dry Prairie habitat for sparrows, Three Lakes Wildlife Management Area (WMA) 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 3,464 acres of sparrow habitat with prescribed fire. Staff also roller-chopped 128 acres of sparrow habitat to reduce the shrub component. These mechanical treatments help improve habitat and control saw palmetto density.

DEMOGRAPHIC MONITORING AND NEST PROTECTION - The eleventh season of Florida Grasshopper Sparrow demographic research by FWC was conducted during FY 2022-23 and the beginning of FY 2023-24 (March-August 2023). 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 Three Lakes WMA (TLWMA) to be able to identify all individuals, 13 adult males, 5 females, and 113 nestlings were newly captured and color-banded in the 2023 season. In addition to these new captures, 60 males and 30 females banded prior to 2023 were resighted in 2023. Together, the number of color-banded individuals observed at least once at TLWMA in 2023 was 73 adult males, 35 adult females, and at least 74 fledged nestlings of unknown sex. All known adult males and females in the Three Lakes WMA population have been color-banded in 2023.

In the 2023 season, FWC biologists have located and monitored 57 Florida Grasshopper Sparrow nests. Of these nests, at least 28 survived to fledge young (4 of which were partially depredated but fledged at least one young), 17 were depredated by snakes, one was depredated by red imported fire ants, one due to flooding, one due to spotted skunk, five due to undeveloped eggs or abandonment, and one for unknown reasons. Biologist confirmed the mortality of one female by a snake at the nest. Four of the nests that failed were nests that did not have a predator deflection fence (see below). Miniature nest cameras were placed at the entrance of 55 Grasshopper Sparrow nests, helping us identify the predator in many cases. The combined data provided by the nest camera project (2014-2023) has been invaluable to understanding the predator community at Three Lakes WMA and will be critical when planning future predation management strategies. In 2023, Florida Grasshopper Sparrow nests (n=50) 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 22, 2023, staff have released 537 Florida Grasshopper Sparrows at TLWMA, Osceola County, including 116 adults and 421 juveniles. birds released per-year: 105 in 2019, 148 in 2020, 146 in 2021, 65 in 2022, and so far 73 in 2023. Releases in 2023 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 2023 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 2022 was composed of about 45% captive-bred and released sparrows. In 2023, 31% of the adult population were released birds and another 31% are birds of wild origin but descend from released birds; thus, 62% of adults at TLWMA are genetically related to birds from the conservation breeding and release program. Around 60% 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 2022 breeding season. Staff identified 460 adults and 68 juveniles during the 2022 surveys. Adult numbers were the highest observed among all survey years, and the number of juveniles was slightly more than average. 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 2022-23 as part of a project to understand habitat use, movements, and survival of cranes in suburban areas and conservation lands. To date, 149 cranes have been radio-tagged and/or color-banded throughout central Florida. Staff used locations of resighted marked birds to examine adult survival along an urbanization gradient from wildlands to urban/suburban areas. Annual survival was greatest in the least urbanized locations (85%) and lowest in the most urbanized locations (65%). Twenty cranes died during the study, with vehicle strikes (n = 8) being the most prevalent identified source of mortality. Overall, the adult survival rate observed was lower than has been reported for other populations of Sandhill Cranes in North America that are considered stable or growing. Staff suggests conservation efforts should target protecting wildlands and natural habitats used by cranes because survival was greater in these areas, and that road segments with regular vehicle strikes should be identified 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 dedicated for 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 2022-2023, FWC staff assisted in organizing and planning the 14th 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. Oscar Scherer State Park hosted the Florida Scrub-jay Festival on April 22nd, 2023, in conjunction with Oscar Scherer State Park's 34th Annual Earth Day. Hundreds of visitors of all ages attended. The festival offered guided hikes and educational tram tours, a Question & Answer panel featuring park staff and agency representatives, 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 will be held at Merritt Island National Wildlife Refuge in Spring of 2024.

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 FY22-23, all three of the FWC-maintained regional Florida scrub working groups met in-person. On March 13th, the Southeast Regional Florida Scrub Working Group met at Jonathan Dickinson State Park with a field tour through the park. On March 28th, the Southwest Regional Florida Scrub Working Group met at the Punta Gorda Library with a field tour through Prairie Creek Preserve. On April 14th, the Northeast Regional Florida Scrub Working group met at the Ocala Youth Camp and Conservation Center with a field tour through the Ocala National Forest. Staff continue to update the Florida Scrub-jay website (https://fsjconservation.org/) with notes, events, conservation news and updates, and presentations from the working group meetings. Additionally, the Florida Scrub-jay website provides technical assistance to stakeholders regarding scrub and Florida Scrub-jay habitat management, development planning, and general inquiries. FWC Staff 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.

OCALA NATIONAL FOREST MONITORING AND POPULATION ESTIMATION – FWC staff and volunteers continued mid-summer productivity surveys and long-term demographic monitoring at Ocala National Forest. Research study plots in "Scrub Jay Management Area" zones created by the U.S. Forest Service supported very high densities of Florida Scrub-jays, ranging from 8 to 12 family groups per 100 acres. FWC research staff also conducted the first rigorous assessment of population size at this important site, using field data collected during 2011-2022 and Poisson regression models describing how densities respond to different land management actions. The average of all model estimates was 2,026 family groups at Ocala National Forest, which is many times larger than any other remaining population.

ARBUCKLE AND WALK-IN-THE-WATER WILDLIFE MANAGEMENT AREAS – The Arbuckle Wildlife Management Area (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 2022-23, 26 scrub-jay groups were located on Arbuckle WMA. The number of groups (26), the total number of birds (86) and the number of juveniles per group (1.0) all increased over the composition of 22 groups, 73 birds and .91 juveniles per group size from the previous year. The mean group size (3.3) stayed the same as it was the previous year.

During FY 2022-23, one scrub-jay group with two adults and one unknown was located on Walk-In-The-Water WMA. The total number of groups (1) and the total number of birds (3) both decreased from the composition of two groups and four birds from the previous year. The number of juveniles per group (0.0) stayed the same.

To help stabilize and hopefully increase the population at Walk-In-The-Water, FWC funded an ongoing sandhill habitat enhancement project. This included mowing approximately 47 acres of dense, smaller (<6" DBH) scrub oaks with a skid steer bobcat. The FDACS followed-up this treatment with prescribed fire.

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, Silver Lake, Holmes Ave., and Highland Park Estates tracts. Group numbers remained the same at the Sunray and Jack Creek tracts. Group numbers decreased at the Gould Rd., McJunkin, Carter Creek, Henscratch, Sun N Lakes, and Highlands Ridge tracts. Prescribed fires occurred on 829 acres, 258 acres were mechanically treated, and wildfires occurred on 92 acres (Exhibit 9).

HICKEY CREEK WEA - Scrub-jay monitoring in Lee County revealed 3 groups of scrub-jays and a total of 7 birds on the site. This is the highest group numbers in several years although to total number has not increased. Only one juvenile was confirmed after the nesting season, although having an additional breeding pair should be beneficial to recruitment in subsequent years. Five additional scrub jays from 2 groups were located off site within 1 mile in a residential area. Management actions include 46 acres of burning, 40 acres of strategic mechanical mowing within oak scrub along with chemical treatment exotics also occurs on 15 acres within their habitat.

PLATT BRANCH WEA - The Platt Branch WEA in Highlands County was monitored by FWC and has a scrub-jay population that consists of 9 groups with 30 individuals. Group numbers remained the same and individuals increased slightly over last year, and all remain within the long-term average. Ten of the scrub-jays were juveniles, which was up 3 from the previous year. Management efforts included burning 496 acres at the site including some scrub habitats. Mechanical treatments included mowing 93 acres and felling sand pines on 20 acres to improve habitat.

MOODY BRANCH WEA - Moody Branch Wildlife and Environmental Area had 10 family groups present on the area during the 2022 – 2023 fiscal year. This is two groups more than the previous fiscal year. The mean group size was 4.7 and the average number of juveniles per group was 1.4. There were 45 individual Florida Scrub Jays observed during the 2022 – 2023 fiscal year. Mechanical treatments occurred on 327 acres of Moody Brach Wildlife and Environmental Area, which included mowing and hardwood removal. Chemical treatments of non-native plants occurred on 186 acres. There were no prescribed fires implemented at Moody Branch Wildlife and Environmental Area during the 2022 – 2023 fiscal year.

Red-Cockaded Woodpecker

SURVEYS – Big Cypress National Preserve (BCNP) spans 729,000 acres of public land in Collier, Monroe, and Dade counties in South Florida and supports the southernmost population of Red-cockaded Woodpeckers (RCWs) range-wide. This population continues to be monitored cooperatively by the National Park Service (NPS) and Florida Fish and Wildlife Conservation Commission (FWC).

The total number of known RCW clusters in BCNP is now 128, with 125 actively being managed and 3 having been previously deleted. FY 2022-23 cluster inspections revealed 81 active clusters and 27 inactive clusters. A further 17 clusters were not assessed due to time and access constraints. Two clusters (#127 and #128) were newly discovered during surveys. No subadult RCWs were translocated to the smaller sub population of Lostman's Pines in FY 22-23. Twenty-four active clusters were chosen as a subsample for intensive breeding season monitoring (nest checks, nestling banding, fledge checks, and roost checks), all of which had confirmed PBGs (potential breeding groups). Twenty-one PBGs attempted nesting with 20 of those successfully hatching chicks. For the second year, only nestlings hatched in the Lostman's Pines subpopulation were banded, totaling four nestlings. Across all monitored groups, five juveniles were confirmed as fledged (4 females and 1 unknown) with a further 14 nestlings presumed to have fledged (6 males, 5 females, 3 unknown). Four groups failed with their first clutch, all of which attempted to re-nest and 3 ultimately succeeding in fledging young. Helpers were observed in 4 of the monitored clusters.

This year, FWC funded understory vegetation clearing and tree painting of 200 RCW cavity trees as a fire protection measure, benefiting 31 clusters in total. BCNP experienced wildfires totaling approximately 20,374ac of RCW foraging and nesting habitat, impacting 17 clusters. Early assessments indicate the burns were largely beneficial and not catastrophic. Additionally, 19,676 acres of prescribed fire benefited 16 clusters. Five new artificial cavities were installed, two old artificial cavities were replaced, and 38 new natural cavity trees in various stages of

excavation were discovered.

During FY 2022-23, FWC staff at J.W. Corbett WMA (JWCWMA), John C. and Mariana Jones/Hungryland WEA (JHWEA), and John G. and Susan H. Dupuis, Jr. WEA (Dupuis WEA) determined the number of active clusters, monitored active clusters for nests, color-banded nestlings and adults, and determined fledging success for RCWs. An artificial cavity was replaced in an existing cluster in Dupuis WEA, and 5 new clusters (30 artificial inserts) were installed in JHWEA with 2 new starts observed. Having met federal recovery standards of 40 PBGs combined with the Dupuis WEA/JWCWMA metapopulation, JWCWMA did not translocate birds; however, JHWEA will continue to request RCWs in coordination with the Southern Range Translocation Cooperative (SRTC). Staff plan to annually translocate as many pairs as possible (up to 5 or 6) until JHWEA has at least 10 PBG. This year, JHWEA has requested 5 pairs for translocation through the SRTC. After JHWEA has reached its goal of 10 PBGs, future requests will depend on the breeding status of the resident RCWs, SRTC recommendations and RCW availability, as well as if the habitat is ready for more birds. Once a population goal of 20 PBGs has been attained via translocation and potential population growth; on-going management will include monitoring and banding of nestlings on JHWEA, intra-population moves and infrequent translocations to maintain the desired number of breeding groups, construction of additional artificial cavities as needed, frequent prescribed burning and understory control (particularly in RCW clusters), and implementation of management programs that reduce the potential impacts of cavity competitors. Dupuis WEA will continue to evaluate whether they need translocated birds on an annual basis in coordination with SRTC. Interestingly, Dupuis WEA had an adult female RCW from Babcock Webb WMA join an active cluster, and JHWEA had a non-banded adult female join a single male. Management activities occurring across these three areas included over 2,800 acres prescribed burned and 313 acres of mechanical treatments benefiting 8 clusters. An additional 24 cavity trees were cleared around in JHWEA.

FWC staff at Picayune Strand State Forest (PSSF) began monitoring the Red-cockaded Woodpecker (RCW) population in March 2019, which entails annual cluster inspections, cavity maintenance, artificial cavity augmentation, nest monitoring, nestling banding, fledge checks, and roost checks. As of FY 2022-23, PSSF has 16 total clusters, 15 active and 1 inactive. Pre-breeding population surveys revealed 14 PBGs (potential breeding groups). During nesting season, all 14 PBGs attempted nesting, 7 of which were successful with 11 nest failures. Staff banded 15 nestlings, 8 of which successfully fledged.

FFS completed 1,562 acres of prescribed burns near some of the RCW clusters and in the RCW future improvement areas. FWC continued their contracted groundcover reduction project that cleared all vegetation around 79 RCW trees in 14 clusters. FWC also installed an artificial cavity in one cluster, replaced 9 inserts in 5 more clusters, and

drilled a cavity in a final cluster. Other accomplished management activities near or in RCW clusters included 886 acres of exotic vegetation treatments completed by FFS. Finally, 150 acres of cabbage palm mulching occurred in the WMA. Additionally, restoration and habitat management plans are being developed for future RCW recruitment in other areas of Picayune to expand the population to meet the recovery goal of 25 PBGs.

Exhibit 5. Red-cockaded Woodpecker surveys and habitat management activities conducted during FY 22-23

Location	County	Active Clusters	Potential Breeding Groups	Solitary Birds	Nest Attempts	Bandings	Fledglings	Cavity Maintenance	Habitat Management (acres)
Apalachicola River WEA	Franklin	11	11	0	11	0	unknown		Prescribed fire (2,700), Mowing (2)
Tate's Hell WMA	Franklin, Liberty	83	80		75	61	45	Installed 20 20 cavities cleaned of debris	Mechanical treatment (80)
Apalachicola WMA	Leon, Wakulla							Installed 45 inserts in 15 clusters	
Babcock Ranch Preserve	Charlotte	22	21	1	21 (3 failures)	26	29	13 inserts added, none inserts replaced	Prescribed fire (4,252)
Babcock/Webb and Yucca Pens Unit WMA	Charlotte, Lee	45	41	4	41 (12 failures)	41	33	15 new artificial cavities installed	Prescribed fire (25,004), roller chopped (1,575), chemically treated (27,007)
Croom WMA	Hernando , Sumter	48	45	3	40 (5 failures)	75 (3 unbanded)	67	Trees prepped before burns	Prescribed fire (3,649), chemically treated (490)
Platt Branch WEA	Highland s	6	5	1	4 (1 failure)	8	5	2 inserts replaced	Prescribed fire (496), mechanical (93)
Big Cypress National Preserve	Collier, Monroe, Dade	81	24*	0	25	4	19	5 artificial cavities installed and 2 replaced	Funded vegetation clearing around 200 cavity trees, Rx 19676 acres benefiting 16 clusters, Rx 20374ac impacting 17 clusters

Exhibit 5.(continued)

Location	County	Active Clusters	Potential Breeding Groups	Solitary Birds	Nest Attempts	Bandings	Fledglings	Cavity Maintenance	Habitat Management (acres)
John G. and Susan H. Dupuis, Jr. WMA	Martin, Palm Beach	19	18	1	19	23	16	Installed & Replaced 1 cavities;	2500 acres burned
J.W. Corbett WMA	Palm Beach	37	33	3	31	34	35	None conducted	Prescribed fire on 302 acres benefitting 0 clusters Mechanical treatment on 105 acres benefitting 3 clusters Invasive plant treatment on 27,327 acres benefitting 43 clusters
John C. and Mariana Jones/Hungryland WEA	Martin, Palm Beach	7	7	0	6	8	7	: 5 new clusters installed (30 artificial insert cavities) 2 new starts discovered	Prescribed fire on 0 acres Mechanical treatment on 208 acres benefitting 5 clusters Invasive plant treatment on 4,255 acres north of clusters 24 cavity trees cleared around
Picayune Strand State Forest WMA**	Collier	15	14	1	18 (7 successful nests & 11 failed nests)	15	8	1 insert installed in 1 cluster, 9 inserts replaced in 5 clusters and 1 drilled cavity installed in 1 cluster.	Prescribed Fire - 1,562 acres; Exotics Treatment -868 acres; Cabbage Palm Mulching - 150 acres; Active RCW Tree Clearing Project - 79 Trees/14 Clusters

Salt Marsh Songbirds

EFFECTS OF PRESCRIBED FIRE ON SALTMARSH SPECIES – Fire has long shaped upland ecosystems in Florida, and the purposeful use of prescribed fires as a management tool is frequently employed in many of Florida's upland ecosystems. Fire also historically occurred in many of Florida's wetlands, including its coastal saltmarshes, but the effects of fire on Florida's imperiled saltmarsh wildlife, and thus the benefits of prescribed fires in these marshes, are not well understood.

In 2019, FWC initiated a study to understand the effects of fire on the abundance and reproductive performance of the Mariana's Marsh Wren (*Cistothorus palustris marianae*) and the Wakulla Seaside Sparrow (*Ammospiza maritima juncicola*), two of Florida's imperiled saltmarsh songbird species. Data collection for this project was hampered by circumstances; the 2020 field season was cancelled because of COVID and the 2023 field season was cancelled because of staff turnover. Grant rules prohibited another extension, so this project was cancelled and a final report was drafted during this fiscal year. Results should be considered preliminary because of the incompleteness of the dataset but indicated some benefit of recent fire to Seaside Sparrows and clapper rails, with more birds detected in more recently burned units. Seaside Sparrow abundance was also influenced by elevation, with fewer birds in low marsh. Marsh Wren abundance was greater, but nest survival rates were lower, farther from the mainland. Camera traps for raccoons (*Procyon lotor*) and rice rats (*Oryzomys palustris*), two known predators of songbird nests in saltmarshes, indicated fire was not a good predictor of their occupancy or abundance. However, rice rat abundances were positively correlated with clapper rail and Seaside Sparrow abundances, which suggests that birds are not selecting nesting habitat that helps them avoid nest predators.

The preliminary results from this study suggest that fire may provide some benefits to birds but should be interpreted with appropriate caution given the limited data collection that occurred. A similar ongoing project funded by the National Oceanic and Atmospheric Administration that focuses on different avian species in saltmarshes throughout the U.S. Gulf Coast may shed further light on the effects of prescribed fire on imperiled saltmarsh species. Not all saltmarsh is amenable to prescribed fire (e.g., one of this study's initial study sites had to be abandoned because it would not carry a prescribed fire), and location-specific management recommendations may be needed that incorporate the potential benefits to birds as well as the practicality of regular prescribed burns.

Shorebirds and Seabirds

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 https://myfwc.com/media/2128/imperiled-beach-nesting-birds-species-action-plan-final-draft.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. https://flshorebirdalliance.org/media/1lfdeh0p/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 the FWC Policy team in finalizing the Species Conservation and Permitting Guidelines for Imperiled Beach-nesting Birds. The approved Guidelines will take effect September 2023. 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 2022 nesting season, FSA partners collectively monitored 987 miles of coastline and protected 7,124 State-Threatened seabird nests and 468 State-Threatened shorebird nests with posting.

The FSA publishes a monthly e-newsletter (the Wrack Line) that reaches over 32,500 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 (https://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 2022 nesting season, partners entered 17,838 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. The Shorebird Program published an 2022 monitoring report, "Florida Shorebird Alliance Monitoring Data at Work" that summarizes monitoring data entered into the Database. https://flshorebirdalliance.org/media/socjn5zs/2022fsamonitoringreport.pdf

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. Some prep work, such as kestrel box repairs and replacements, was conducted during February. Kestrel box monitoring occurred from April through June with some early checks in March. FWC staff manage and monitor boxes on WMAs and WEAs (Exhibit 6). In FY 2022-23, kestrel nest box monitoring was intensified in targeted areas in collaboration with an FWRI study.

Additionally, the partnership includes 79 boxes on utility Right-Of-Ways, private property, or city parks in Marion County (44), Hernando County (4), and Levy County (38) that are monitored by the FWC's volunteer program (Exhibit below). Of the 37 boxes on Right-Of-Ways in Marion County, 19 boxes were used by kestrels and at least 9 were successful. As of June 2023, four of the Marion County kestrel boxes were still actively housing nests. FWC staff and volunteers monitored the 38 existing boxes in Levy County, of which 26 were used by kestrels, at least 13 were successful, and 11 were still active as of June 2023. 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, one of which was successful and two were still active as of June 2023.

JENNINGS STATE FOREST - On Jennings State Forest WMA in Clay and Duval counties, 6 existing boxes were cleaned and maintained in early February of 2023. FWC staff conducted three visits during nesting season (April – June). No kestrel activity was noted. Other species utilizing boxes on Jennings were Great-crested flycatchers, screech owls, corn snake, and Flying Squirrels.

CAMP BLANDING WMA - On Camp Blanding WMA in Clay County, 49 existing boxes were cleaned and maintained in February of 2022. Three box locations were retired from 2022 season. FWC staff conducted four visits during nesting season (March – June). Kestrel activity was noted, 28 boxes were successful, with a success rate of 54%. 115 eggs were counted, 55 chicks were observed, 19 eggs did not hatch. Other species utilizing 15 boxes on Camp Blanding were flying squirrels, great-crested flycatchers, blue birds, bats, fox squirrel young, red wasps, and Southeastern screech owls. Eight boxes were not used and remained vacant.

BELL RIDGE LONGLEAF WEA, Gilchrist County – FWC staff cleaned and maintained 4 nest boxes and conducted four visits during nesting season. Staff observed 14 eggs and 11 chicks. Other species observed utilizing boxes on Bell Ridge Longleaf WEA were Eastern Screech Owls.

FORT WHITE WEA, Gilchrist County – FWC staff cleaned and maintained 8 nest boxes and conducted three visits during nesting season. No Kestrels nested in the boxes. Other species observed utilizing boxes on Fort White WEA were Southern flying squirrels, Great-Crested flycatchers, Eastern Screech Owls and Tufted titmice.

TWIN RIVERS STATE FOREST WMA, Madison county – FWC staff monitored 8 nest boxes for usage in March-June 2023. Kestrel eggs were identified in 3 boxes, and 2 boxes hatched chicks. In the 2 nest boxes that hatched chicks, one hatched 3 chicks (2 male, 1 female) and the other hatched 4 chicks (sex unknown). Fledges were not determined. Boxes not used by kestrels this season were used by other wildlife including eastern screech owls and (*Megascops asio*) and southern flying squirrel (Glaucomys volans).

Exhibit 6. Southeastern American Kestrel monitoring box summary for FY 22-23

WMA/WEA	County	Boxes Managed	Boxes Utilized	Nest Success	Other Species Found in Boxes
N/A	Marion*	44	22	**10**	Southern flying squirrel, eastern screech owl, gray crested flycatcher, eastern bluebird, eastern gray squirrel
N/A	Levy	38	26	13	Eastern gray squirrel, eastern screech owl, gray crested flycatcher
N/A	Hernando	N/A	N/A	N/A	N/A
Blackwater and Yellow River	Okaloosa, Santa Rosa	27	6	Yes, at least 8 chicks	Eastern screech owl, eastern bluebird, great-crested flycatcher
Watermelon Pond WEA	Alachua	5	2	Yes	Eastern Screech Owl, Great-crested Flycatcher
Twin Rivers State Forest	Madison	8	3	Yes	Eastern Screech Owl, Southern flying squirrel
Bell Ridge Longleaf WEA	Gilchrist	4	3	Yes	Eastern Screech Owl
Fort White WEA	Gilchrist	8	0	No	Southern Flying Squirrel, Eastern Screech Owl, and Tufted titmouse
Hilochee	Polk	7	0	No	Eastern Screech-Owl, Great Crested Flycatcher
Janet Butterfield Brooks	Hernando	1	0	No	Eastern Bluebird
Lake Wales Ridge	Highlands, Polk	13	3	Yes, 3 chicks	Eastern Screech-Owl, Great Crested Flycatcher, Wood Duck
Perry Oldenburg	Hernando	3	1	Yes, 2 chicks	Eastern Bluebird
Platt Branch	Highlands	4	0	No	Eastern Screech-Owl, Great Crested Flycatcher
Moody Branch	Manatee	2	0	No	Eastern Screech-Owl
Tenoroc Public Use Area	Polk	1	0	No	N/A
Three Lakes	Osceola	8	0	No	Eastern Screech Owl, Wood Duck, Black-Bellied Whistling Duck

*Includes boxes on Right-Of-Ways and boxes on City of Ocala parks

TELEMETRY PROJECT: MOVEMENTS, HOME RANGE, AND HABITAT USE – FWC staff initiated a project to assess the kestrel movements and space use to inform Florida's Species Conservation Measures and Permitting Guidelines for the species and assist with habitat management efforts on public and private lands. Research staff captured 21 adult female kestrels at nest boxes in Levy and Marion counties and fitted 14 of them with GPS telemetry tags. More than 13,000 kestrel locations were downloaded during the fiscal year. The project will continue for two more breeding seasons.

White-crowned Pigeon

The White–crowned Pigeon is a state-Threatened species. To help address monitoring goals listed in the Species Action Plan, Florida Keys WEA (FKWEA) staff conduct nesting occurrence surveys throughout the Florida Keys. Currently, most known nesting islands are protected within the FKWEA, Everglades National Park, and Biscayne National Park. In FY 2018-19, range–wide foraging surveys for the species were completed, and FKWEA staff followed up by spending FY 2019-20 scouting multiple sites across the Keys for potential nesting locations. At the end of FY 2020-21, FKWEA staff began conducting official flight-line count surveys to find new nesting locations throughout the WEA. Staff documented 16 islands with nesting occurrence using the sampling design, and then used direct counts to confirm nesting on 10 of those islands. Flight line surveys began again in early FY 22-23 with the goal of expanding the number of known nesting islands. Two new islands were documented, along with other indications of nesting occurring in the upper, middle, and lower keys at some of the same locations that were surveyed in the previous year. Staff will continue trying to expand the number of known nesting sites across the Florida Keys in the future.

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.

With hopes of aiding the species' conservation, from January 2019 – October 2022, staff subsequently transferred 5 of the remaining Florida birds to Louisiana where a similar project had recently begun. The 3 female and 2 male birds ranged in age from 2.5 to 21 years old, and all but one was wild-hatched and reared. After being quarantined and undergoing a medical exam at the White Oak Conservation facility in Yulee, Florida, Louisiana 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 on the same day or the day following their transfer. Post-transfer release survival was 100% and none of the birds made return movements to Florida. Four were confirmed or suspected of

having successfully molted at least once. Four associated with Louisiana whooping cranes within several weeks, though not all of the initial associations persisted. All 3 females nested within 1.5 years of their release in Louisiana, though none succeeded in hatching their own chicks. One wild-hatched crane remains in Florida and its capture will end 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.

In FY 2022-23, US Fish and Wildlife Service (USFWS) biologists photographed 15 of the annually surveyed stork colonies with a 7-array camera system mounted in the belly of a small aircraft. Staff is working with USFWS in the post-processing of the photographs to create mosaics of the colonies where active nests can be tallied.

AMPHIBIANS

Flatwood 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 will potentially inform various aspects of the species population dynamics and the impacts of headstarting on local gene pools.

FWRI biologists continued to participate in the flatwoods salamander federal recovery team, a multi-institutional group of stakeholders focused on conservation of the species.

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 2022-23, TLA staff, with assistance from FWC, collected over 400 eggs from 5 wetlands. Of these eggs, 350 successfully hatched for rearing and 338 of the hatched individuals survived to be released as late-stage larvae and metamorphs (330 larvae, 8 metamorphs, 97% success rate). In addition to headstarting, TLA and FWC monitored wetlands using a standardized dip netting protocol and determined larval occupancy in 16 of 50 targeted wetlands, capturing a total of 230 larvae. TLA also monitored 2 drift fences for 7 trap nights at 2 separate wetlands and captured 2 adults at fences and 6 incidental adults between both wetlands. In total, staff documented Reticulated Flatwoods Salamanders in 16 wetlands this fiscal year, all having previously documented occupancy. A total of 571 tissue samples were collected from captured individuals for genetic analysis. Habitat restoration this fiscal year included 11.77 acres of mechanical and chemical treatments.

Florida Bog Frog

In FY 2022-23, FWC conducted surveys for the Florida Bog Frog along 2 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: 10 on Garnier Creek and 8 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 5 survey points downstream from the ROW that had received previous habitat restoration. Florida Bog Frogs were not detected during surveys on Julian Mill Creek. In May 2023, autonomous recording units (ARUs) were placed at 2 locations on Julian Mill Creek and 1 location at Burnt Grocery Creek, which is also on Yellow River WMA. The ARUs will be left in place until August 2023 when staff will analyze the data for Florida Bog Frog presence. Habitat restoration in FY 2022-23 was conducted in 2.5 acres at Julian Mill Creek using a floating excavator to cut and mulch trees adjacent to areas restored previously and near the location of the Florida Bog Frog detected in FY 2021-22.

On Eglin Air Force Base WMA, habitat restoration using hand cutting and herbicide was conducted in 9.52 acres along Horse Branch Creek, and 4 acres along Live Oak Creek. Aerial herbicide application via helicopter was used to treat 90 acres along Malone Creek.

Gopher Frog

FWC staff participated in a Gopher Frog Team meeting of the Southeast Partners in Amphibian and Reptile Conservation and published four papers on Gopher Frog genetics, status and distribution, metapopulation breeding dynamics, and terrestrial distribution.

SURVEYS – Gopher Frog tadpoles were detected during dipnet surveys in a basin marsh on Princess Place Preserve, which represents the first known breeding pond in Flagler County.

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.

RECOVERY – In November 2023, FWC listed the Striped Newt as state Threatened and had a Species Action Plan and Species Conservation Measures and Permitting Guidelines approved by agency Commissioners. The species was also incorporated into Florida's Imperiled Species Management Plan.

SURVEYS– In FY 2022-23, staff detected Striped Newts in five ponds on Princess Place Preserve and six ponds on Pellicer Creek Conservation Area during site visits in November and December 2022. This represents the first record of the species in Flagler County, and a geographic distribution note was published on the discovery. A few of the ponds were too ephemeral for successful reproduction, but a large basin marsh on Princess Place Preserve and a large dome swamp on both conservation lands support large breeding populations.

FWC staff continued working with researchers at Tall Timbers Research Station on Striped Newt populations living on Livingston Place in Jefferson County. The ongoing research project involves estimating population sizes through mark-recapture and a detailed evaluation of microhabitats both within and between ponds. As part of this effort, Striped Newts were detected in two of five known breeding ponds on the property. This work is funded by a Conserve Wildlife Tag Grant from the Fish and Wildlife Foundation.

RESTORATION – Staff from Flagler County, St. Johns River Water Management District, and various divisions of FWC conducted a site visit to Princess Place Preserve and Pellicer Creek Conservation Area in March 2023 to assess whether some of the breeding ponds were good candidates for wetland restoration.

REPTILES

Alligator Snapping Turtle

In Florida, this species occurs from the Ochlockonee River westward. The USFWS is planning on listing it as Threatened due to similarity in appearance to the Suwannee Alligator Snapping Turtle. FWC staff collaborated on four papers that were published in a special issue of Southeastern Naturalist devoted to Alligator Snapping Turtles. One of these papers summarized surveys conducted in the Panhandle.

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)). American Crocodile sightings have been documented among the Florida Keys, and 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 non-hatchlings) paired with a commensurate 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 (CRC) supervises a network of Crocodile Response Agents (CRAs). FWC staff evaluate and respond to crocodile calls using the best management solutions for the public and the 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 2022–23, FWC received 216 calls regarding the American Crocodile which consisted of complaints and reported sightings. Most of the complaints were resolved by educating the public as well as through telephone calls and site visits.

Of the 216 calls that were received this year, 20 crocodiles were captured. Captured animals ranged from 2.2ft to 11.2ft in length with the average individual measuring 7.2ft. Two animals were captured and translocated further from

the sites of capture and released into suitable habitat. Eighteen animals were captured and relocated nearby. Six of those relocated animals were outfitted with GPS transmitters so that they could be included in an urban crocodile study being conducted by FWRI (Fish and Wildlife Research Institute; see details below). One of the study animals was caught and relocated on two separate occasions during this fiscal year, a reminder that relocation may be a short-term solution. All crocodile captures and handling events follow the guidance found in the *American Crocodile–Human Interaction Response Plan* (2020).

During FY 2022–23 FWC was involved in the recovery of 5 American Crocodile carcasses (two males, one female, and two of unknown sex). Their sizes ranged from 3.3ft to 11.1ft in total length. Two of the five mortalities were caused by vehicle strikes. The causes of death of the remaining three remain undetermined.

The digital dashboard for illustrating crocodile complaints that was created during FY 2021-22 served to be a helpful tool that allowed information to be shared with internal and external partners. This dashboard, though not available to the public, helps facilitate the coordination of management goals between agencies as it pertains to both outreach and the recovery of the American Crocodile.

FISH AND WILDLIFE RESEARCH INSTITUTE – During FY 2022-23, FWRI published a study on crocodile translocations in the Journal of Wildlife Management titled *Effects of translocation on American Crocodile movements and habitat use in South Florida*. Findings showed 6 out of 7 translocated crocodiles either returned (n = 4) or attempted to return (n = 2) to their original capture site. Three crocodiles translocated 28 miles or less returned in under 2 weeks. One female crocodile was translocated 95 miles and was recaptured just 1/4 mile from its original capture site over 2.5 years after its release. Because of concerns regarding crocodiles returning as well as the stress associated with capture and translocation of this federally-threatened species, the study concluded that crocodile translocations have limited conservation value in Florida. Translocations may only be worth considering after all other reasonable options are exhausted, which aligns with FWC current management practices. The full article is available through open access at https://doi.org/10.1002/jwmg.22427. Additionally, an interactive website giving a thorough overview of the study was created and can be found at https://storymaps.arcgis.com/stories/b27d8165222d4e2aa9918be42f4f173e.

FWRI also 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 very small minority held negative views of FWC. A manuscript on the study is currently being written to be submitted to a peer-reviewed journal in FY 2023-24.

A new tracking study on American Crocodiles living in urbanized environments was started by FWRI in October 2022. To date, 9 GPS tags have been deployed on crocodiles (7 in the greater Miami region, 1 in Brevard County, and 1 in Key Largo); six tags remain to be deployed for a total sample size of 15 crocodiles. 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 surroundings 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.

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 2022 Barbour's Map Turtle survey was conducted on Double Bayou and Cypress Creek. Staff surveyed the same 2 miles of each waterway multiple times, counting all observed Barbour's Map Turtles. FWC completed the fall 2022 surveys between October 10th and November 4th and observed 5 total Barbour's Map Turtles within the surveyed area. This is a much lower rate of occurrence compared to other portions of the Apalachicola River watershed, likely due to Lake Wimico creating a barrier for dispersal into Double Bayou and Cypress Creek.

Eastern Indigo Snake

MONITORING & CONSERVATION – The Florida Rare Snake Sightings webpage received 19 verified Indigo Snake reports that were provided to the USFWS, along with sightings from other sources. FWC staff published a paper summarizing all Indigo Snake records in the Florida Keys. 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 (available December 2023) a scientific article detailing Indigo Snake growth rates

(with an emphasis on reintroduced snakes) and are drafting a manuscript based on an analysis quantifying the movements, habitat use, and survival of reintroduced snakes. Staff are also collaborating on a paper examining disease prevalence in Indigo Snakes in South Florida and anticipate publication in late 2023.

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 continued implementation of 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. In FY22-23, 19 snakes were released at the reintroduction site in Liberty County. The total number of snakes released at the site is 126. A film crew from Crawford Entertainment filmed a segment about the release for 'Protect Our Paradise', which will air 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. An FWC volunteer reviewed over 400,000 photos collected at the release site. Staff continued to partner with Auburn University on a federal grant to study the genetics of captive broodstock and wild Indigo Snakes. Year 2 of this project has been completed, and funding for the final year has been secured.

Florida Pine Snake

Monitoring for at-risk snake species continued in FY 2022-23 at 6 locations on Blackwater and Yellow River WMAs in Santa Rosa and Okaloosa counties to determine the distribution of Florida Pine Snakes, Southern Hog-nosed Snakes, and other at-risk snake species, and to prioritize areas for habitat management activities. From September to November 2022, staff monitored 2 trap arrays within the Blackwater WMA Rock Creek Management Unit and 1 array within the Blackwater WMA Floridale Management Unit. From February to June 2023, staff monitored 3 arrays within Yellow River WMA. Traps were placed in Yellow River WMA with Southern Hog-nosed Snakes as a primary target. FWC staff had 226 individual captures comprising 12 snake species, including 20 Florida Pine Snake captures. No Southern Hog-nosed Snakes were captured. Trapping will continue in Yellow River WMA in the fall of 2023. Staff will relocate traps to 3 new locations in the winter of FY 2023-24 where they will remain for 1 spring and 1 fall trapping season.

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 published a paper on a successful translocation effort in March 2019 of 102 lizards to Hypoluxo Scrub Natural Area in Palm Beach County. This population is being surveyed quarterly and appears to be declining

3–4 years after the release. FWC staff provided the USFWS with survey data for the upcoming Species Status Assessment.

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. In order 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 (https://myfwc.com/media/1819/gt-management-plan.pdf) 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 is intended to guide the continued conservation of the Gopher Tortoise in Florida through 2034. The FWC also revised the Gopher Tortoise Permitting Guidelines in FY 2022-23 (Approved December 2022, Implemented April 2023). The goal of the April 2023 Guidelines revision is to better protect Gopher Tortoises by incentivizing relocations to protected recipient sites, clearly defining roles and responsibilities in the relocation process, and by clarifying other provisions in the guidelines. FWC continues to coordinate with the stakeholder Gopher Tortoise Technical Assistance Group (GTTAG) on Gopher Tortoise conservation issues. The continued participation of stakeholders is vital to the long-term conservation of the species.

Efforts have been consistently made to engage Florida residents in Gopher Tortoise conservation. FWC currently offers a number of opportunities for Florida residents to get involved and help conserve the Gopher Tortoise. These opportunities include submission of tortoise sightings in Florida, mortality data collection, waif tortoise (tortoises of unknown origin) transportation, silt fence installation, and conducting burrow surveys on recipient sites for the humane relocation of tortoises associated with incidental take permits.

FWC maintains a web-based Gopher Tortoise Sighting platform (https://app.myfwc.com/HSC/GopherTortoise/) that acts as a one-stop reporting system for community scientists to document tortoise sightings and burrow locations, as well as sick, injured, or dead tortoises. It is intended to provide biologists with more detailed and reliable data while also promoting community involvement in conservation efforts. The FWC has collected Gopher Tortoise sighting data since 2014 and has received over 15,780 citizen submissions, of which 2,717 were submitted during FY 2022-23. The collected data allows FWC to determine Gopher Tortoise mortality “hotspots” throughout the state. In FY 2022-23, 206 mortalities were reported to the web form, and vehicles were the leading cause of death. Citizens that reported an injured or ill tortoise were provided with contact information for a nearby licensed wildlife rehabilitator to provide the tortoise with prompt medical attention.

INTERNSHIP – The Gopher Tortoise program has also utilized student interns from Florida State University since 2011, who have contributed approximately 800 hours during FY 2022-23 to help implement Gopher Tortoise conservation actions. The internship was recently renamed the Wildlife Conservation and Management Internship and expanded to include conservation actions that benefit Species of Greatest Conservation Need (SGCN). Many of the actions completed by Summer 2022, Fall 2022, and Spring 2023 interns may not have otherwise been accomplished with existing staff resources and benefited interns by providing professional experience in wildlife conservation and work in a government agency. Projects assigned (Exhibit 7) for FY 2022-23 continued to primarily address the objectives of the Gopher Tortoise Management Plan (2012).

Exhibit 7. Summary of projects completed by student interns during FY 2022-23.

Project Title	Semester
Water Management District Easement Outreach	Summer 2022
Florida Species Profile Updates	Summer 2022, Fall 2022, Spring 2023
Gopher Tortoise Permitted Wildlife Rehabilitator Update	Fall 2022
Education & Outreach Coordination	Summer 2022, Fall 2022, Spring 2023
Volunteer Program Coordination	Summer 2022, Fall 2022, Spring 2023
Florida Gopher Tortoise Smartphone App Submission Review	Summer 2022, Fall 2022, Spring 2023
Gopher Tortoise Education Kit Assembly	Fall 2022, Spring 2023
Hurricane Assessment	Spring 2023
ITP Mapping	Spring 2023

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 35,420 acres of Gopher Tortoise habitat have been protected through permanent conservation easements, of which 2,771 acres were permitted in FY 2022-23. Additionally, a total of 1,281 acres of Gopher Tortoise habitat were put under short-term (30-50 year) conservation easements with FWC in FY 2022-23. 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 in perpetuity. As of the end of FY 2022-23, 67 recipient sites with an available capacity of 20,128 tortoises are permitted. During FY 2022-23, 10,371 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 ITP recipient sites on several properties in northern Florida. FWC has partnered with Nokuse Plantation, Avalon Plantation, and Eglin AFB to approve ITP recipient sites on each of these three sites. Each recipient site contains at least 250 acres of suitable tortoise habitat and can accept at least 250 adult Gopher Tortoises, criteria required to establish a viable population. There are currently 3,494 acres of suitable tortoise habitat. During FY 2022-23, 783 ITP Gopher Tortoises were relocated to Eglin AFB.

During FY 2022-23, 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." No new waif recipient sites were established in FY 2022-23, however, one previously permitted site that has not yet been available to receive tortoises, Nixon Smiley Pinelands Preserve in Miami-Dade County, is now capable of receiving up to 199 Gopher Tortoises in a particularly high-volume waif origin portion of Florida. Exhibit 8 illustrates the number of waif Gopher Tortoises received at existing waif recipient sites during FY 2022-23.

Exhibit 8: Summary of waif Gopher Tortoise placements for FY 2022-23.

Waif Site	County	Tortoises Received	Male.Female	Juvenile.Unknown	Placements Available
Bay Pines STEM Center	Pinellas	0	0	0	0
Circle B Bar Reserve	Polk	20	0	0.2	121
Lemon Bay Park	Sarasota	0	0	0	0
Marie Acres	Hernando	0	0	0	90
Nixon Smiley Pineland Preserve	Miami-Dade	16	0	0.16	183
Winding Waters	Palm Beach	0	0	0	0
Totals		**36**	**0**	**0.36**	**394**

FWC is in the process of developing additional waif sites by working with public and private landowners. FWC is also working with wildlife rehabilitators to have waifs placed at designated recipient sites or to have them released back to their origin if location information is known. Under a Memorandum of Agreement (MOA) with the South Carolina Department of Natural Resources (SCDNR), there is also an ongoing effort to restock depleted Gopher

Tortoise populations on public lands in South Carolina through the FWC waif program. The MOA executed on April 10, 2019, and continues the partnership established in the original agreement (2012) until April of 2024. 35 tortoises were relocated to Aiken Gopher Tortoise Heritage Preserve during FY 2022-23; since 2012, 196 tortoises have been relocated to South Carolina under this partnership. The goal of the MOA is to relocate up to 100 sexually mature adult Gopher Tortoises to the Aiken Gopher Tortoise Heritage Preserve in Aiken, South Carolina. A new effort was initiated in Econfina Creek Water Management Area utilizing waif Gopher Tortoises to aid in a reintroduction of gopher frogs. During FY 2022-23, 2 waif Gopher Tortoises were released to the Water Management Area.

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 on private lands. 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 Air Force Base added an additional 3,781 acres of Gopher Tortoise habitat for a total of 7,236 acres to their previously permitted recipient site within the Eglin Air Force Base 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 2022-23, the FWC funded scientific research through Gopher Tortoise mitigation contributions. 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 2022-23, three research projects were selected with a total financial support of over $50,000. These projects aim to fill knowledge gaps and inform Gopher Tortoise policies and practices.

SURVEYS - In FY 2022-23, FWC contracted Florida Natural Areas Inventory (FNAI) to conduct a series of surveys at selected state conservation lands following protocol for Line Transect Distance Sampling (https://myfwc.com/research/wildlife/amphibians-reptiles/turtles/gopher-tortoise/publications/). FNAI surveyed four conservation lands, 2 of which 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 tortoise habitat). Future monitoring will focus on surveying additional public conservation lands to locate viable populations and locate populations that may become viable with increased management.

Exhibit 9*:* Summary of Gopher Tortoise population survey results for FY 2022-23.

Survey Location	County	Population Estimate	Density (tortoises/acre)	Suitable Habitat (acres)
Apalachee WMA	Jackson	648	0.76	853
Apalachicola National Forest - Munson East	Leon	1315	0.37	3,560
Apalachicola National Forest - Munson West	Leon	2350	0.14	16,266
Chassahowitzka WMA	Hernando	2651	0.55	4,790
Edward Chance Reserve	Manatee	966	0.58	1,669
Guana River WMA	St. Johns	159	0.34	464
Platt Branch WEA	Highlands	1033	1.23	843
Troy Spring Conservation Area	Lafayette	829	1.30	636

HABITAT MANAGEMENT - During FY 2022-23, the Habitat Management Assistance Funding (HMAF) program provided nearly $76,000 in funding to assist local governments with Gopher Tortoise habitat management activities on more than 395 acres of their conservation lands (Exhibit 10). The HMAF program continues to offer a reimbursement for the installation of silt fencing on prospective waif Gopher Tortoise recipient sites, and sites intended for the soft release of Gopher Tortoises on public lands that have agreed to receive tortoises from previously permitted ITP development sites. However, no new recipient sites were funded through HMAF in FY 2022-23.

Exhibit 10. Summary of Habitat Management Assistance Funding program results for FY 2022-23.

Property Name	Local Government	Amount Received	Acres Managed	Management Activities
Boyd Hill Nature Preserve	City of St. Petersburg	4,211	48	Mechanical removal of saw palmetto
Cypress Creek Wellfield Unit 1	Tampa Bay Water	9,026	23	Prescribed burn over 23 acres
Oakland Nature Preserve	Town of Oakland	15,000	55	Chemical, mechanical, and fire treatment with native groundcover planting
Nixon Smiley Pineland Addition Preserve	Miami-Dade County	15,000	10	Scraping of 10 acres of farmed soil
Betz Tiger Point Preserve	City of Jacksonville	15,000	10	Clearing approximately 23,000 linear feet of trails and fire lines to reduce wildfire risk and improve Gopher Tortoise habitat
GTH Unit 1A-1D	Pinellas County	4,897	209	Prescribed fire over 209 acres
GTH Unit 2B	Pinellas County	12,555	41	Exotic groundcover herbicide treatment, selective hardwood tree reduction to be girdled and treated with herbicide

EDUCATION AND OUTREACH – FWC distributes fact sheets, brochures, and other educational materials to increase knowledge of Gopher Tortoises in Florida. Over 12,500 Gopher Tortoise brochures, fact sheets, and other educational publications were distributed in FY 2022-23 (Exhibit 11). All publications are also available at each of FWC's regional offices, and electronic versions are available for download at www.MyFWC.com/GopherTortoise.

Exhibit 11. Summary of Gopher Tortoise publications distributed during FY 2022-23.

Publication Name	Number Distributed	Primary Audience
Living with Gopher Tortoises	1,754	Local governments, schools, nature centers, Florida residents
Before You Build	1,405	Local governments, non-governmental organizations, Florida landowners
Before you Build (Spanish)	233	Local governments, non-governmental organizations, Florida landowners
Gopher Tortoise Laws, Policies, and Guidelines	631	Local governments, non-governmental organizations, Florida landowners
Get the Facts about Gopher Tortoises (various topics)	1,014	Local governments, schools, nature centers, Florida residents
Safe Roads for People and Gopher Tortoises	543	Florida Visitor Centers, state/local parks, highway rest stops
Gopher Tortoise Decals	3,383	Schools, nature centers, Florida residents
Gopher Tortoise Day Temporary Tattoos	2,161	Florida residents, children's camps
Children's Publications	1,415	Florida residents, children's camps

The FWC Gopher Tortoise Conservation Program hosted or participated in 25 outreach events in FY 2022-23 (Exhibit 10). Outreach for the fiscal year included eight training events for FWC law enforcement, one training event for the Florida Department of Environmental Protection, and several presentations to stakeholders and children.

Exhibit 12. Summary of Gopher Tortoise Conservation Program outreach events & presentations for FY 2022-23.

Outreach Event	County
FAMU STEM Day	Leon
Florida DEP Gopher Tortoise Management & Relocation Training	Virtual/Leon
Fort Walton Beach Local Government Workshop	Okaloosa
Florida State University Environmental Service Program Presentation	Leon
Gopher Tortoise Candidate Conservation Agreement Meeting Presentation	Garnett, SC
Gopher Tortoise Council Presentation	Virtual/Range wide

Exhibit 12. (continued)

Outreach Event	County
Gopher Tortoise Subject Matter Expert Panel	Virtual/Statewide
HSC Law Enforcement Academy Training Day	Virtual/Gadsden
Jacksonville Duty Officer Presentation	Virtual
Lee County Local Government Workshop	Lee
Madison County 4-H Ecology Day	Madison
North Central Region Law Enforcement Specialist Training	Alachua
Northeast Region Duty Officer Presentation	Virtual/Marion
Northeast Region Law Enforcement Specialist Training	Orange
Port St. Lucie Local Government Workshop	St. Lucie
Project Learning Tree-Crawfordville Elementary	Wakulla
Sanford Duty Officer Presentation	Virtual
Starkey Wilderness Park Gopher Tortoise Day Event	Pasco
Starkey Wilderness Summer Camp Presentation	Pasco
Southwest Region Law Enforcement Specialist Training	Hillsborough
Tallahassee Duty Officer Presentation	Leon
Tallahassee Science Festival	Leon
Taylor County 4-H Ag Day	Taylor
Wallwood Longleaf Challenge Presentation	Virtual/Leon & Gadsden
Landscape Conservation Summit Presentation	Lee

Marine Turtles

The Florida Fish and Wildlife Conservation Commission (FWC) maintains management and research programs fostering the recovery of the five marine turtle species that occur along Florida's coasts: Leatherback, Hawksbill, and Kemp's Ridley (all Federally Endangered) and Green and Loggerhead Turtles (both Federally Threatened). The FWC works with various partners in State and Federal agencies, local governments, stakeholders, conservation organizations, citizens, and academic programs to conserve marine turtles and their habitat. The FWC served on multiple committees, boards and working groups in FY 2022-2023 in Florida, the USA, and internationally.

STRANDING NETWORK – The FWC coordinated the Florida portion of the Sea Turtle Stranding and Salvage Network (Network), an 18-state program administered by the National Oceanographic and Atmospheric Administration (NOAA) Fisheries. The Network is responsible for gathering data on dead, sick, or injured marine turtles. In FY

2022-23, 2,076 dead or debilitated turtles were documented (640 loggerheads, 1,320 green turtles, 151 Kemp's Ridleys, 12 Hawksbills, 6 Leatherbacks, and 7 not identified to species). The FWC responded to 2,517 reports from the public about Sea Turtles (primarily reports of dead, sick, or injured turtles), transported 31 sick or injured turtles to rehabilitation facilities, and conducted necropsies on 141 carcasses. Five workshops, involving 542 participants, provided training on how to document strandings. Real-time Florida stranding data is readily available at http://ocean.floridamarine.org/SeaTurtle/flstssn/ for use by various entities, such as NOAA-Fisheries, FWC law enforcement, and protected species management personnel.

NESTING AND HATCHLING PROGRAMS – In FY 2022-23, an in-person workshop and two webinars were presented to 1,253 participants on conducting nest surveys using two monitoring programs, the Statewide Nesting Beach Survey (SNBS) and the Index Nesting Beach Survey (INBS). The workshop and webinars also included training on monitoring nest fate during incubation and conducting nest fate evaluations. These data are collected as part of the Nest Productivity Assessment (NPA) program. The SNBS Program began in 1979 and acquires data on nest numbers, distribution, and seasonality for nearly all nesting beaches. In 2022, 229 areas (838 miles) were surveyed, recording 116,765 loggerhead nests, 37,028 green turtle nests, 1,848 Leatherback nests, and 7 Kemp's Ridley nests. A Statewide Atlas of Sea Turtle Nesting Occurrence and Density (http://myfwc.com/research/wildlife/sea-turtles/nesting/nesting-atlas/) provides summary information on nest distribution and density, and species occurrence. The INBS Program began in 1989 and collects more detailed data from a subset of beaches. Since 1989, loggerhead nest counts have varied greatly due to a complex interannual nesting pattern. Green turtle nest counts have increased exponentially by eightyfold. Leatherback nest counts increased exponentially until 2014 but have been oscillating widely in more recent years. The NPA program began in 2002 on 16 beaches and has now expanded to cover most beaches where loggerheads nest in Florida. Spatial coverage of green turtle and Leatherback nests is limited due to the voluntary nature of the NPA program. The NPA program is used to estimate egg-to-hatchling survivorship, measure annual estimated productivity, and quantify sources of mortality impacting eggs. Due to the amount of data submitted, the timing of submission, and the voluntary nature of the NPA program, there is a one-year lag in processing the data and the estimate of hatchling production for the current fiscal year (FY 2022-23) will be completed next fiscal year. In 2021, a total of 123,150 clutches were laid on 150 Florida beaches participating in NPA. A subset of those clutches (24,151) was excavated to determine hatchling production. FWC researchers estimated that Florida hatchling production in 2021 was 6,315,336 loggerhead hatchlings, 2,461,460 green turtle hatchlings and 66,129 Leatherback hatchlings.

IN-WATER RESEARCH – In June 2023, 45 loggerheads were captured during an annual eight-day sampling session in Florida Bay to assess relative and absolute abundances, conduct health assessments, monitor

fibropapillomatosis (a disease specific to turtles), measure growth, determine sex ratios and genetic identities, and assess residency and movements. This project has been conducted continuously since 1990. Some individual turtles have now been captured numerous times; 26.7% of the loggerheads captured this year had been captured previously. FWC researchers also study where adult female loggerheads reside and forage when they are not nesting on Florida beaches. Results indicate that nearly 50% of the loggerheads nesting on Florida beaches are concentrated in the Florida Keys and on the Great Bahama Bank during the non-nesting period. The remaining half of the females reside on the Southwest Florida continental shelf, the continental shelf between Delaware and North Carolina and to a lesser extent on the continental shelf off east-central Florida. The Great Bahama Bank is the main foraging area outside of U.S. jurisdiction. The FWC maintains an electronic inventory of in-water research and monitoring projects in collaboration with the marine turtle research community. For more information on the Sea Turtle Research Program, see http://myfwc.com/research/wildlife/sea-turtles/.

ENVIRONMENTAL COMMENTING (INCLUDING LIGHTING) - Imperiled Species Management staff were realigned during fall 2022 to enable a more effective use of personnel. An Environmental Commenting Lead position was created to oversee staff review of state and federal regulatory permits including those involving marine turtles and their habitats. This realignment included designation of a three-member Sea Turtle Lighting Team focused on review and approval of lighting plans for state-authorized beachfront construction, post-construction lighting inspections, and stakeholder coordination. In FY 2022-23, FWC staff reviewed 383 applications and provided final comments for 259 projects ensuring marine turtles and their habitat remain protected. This included review and approval of 21 lighting plans for beachfront construction and site visits or post-construction inspections for 20 projects. Staff also responded to requests from local governments for assistance by conducting lighting surveys with local government staff, reviewing protection ordinances, or general technical assistance.

MARINE TURTLE PERMITS (INCLUDING REHABILITATION) – In FY 2022-2023, the FWC issued 136 authorizations including amendments for nesting beach surveys and 36 authorizations to hold marine turtles for rehabilitation, educational display, or research. FWC staff reviewed and processed 100 requests for existing, new, or modified research. Approximately 100 one-time consent permits were issued for filming, transfer of specimens into or out of Florida for research, and transport of turtles into Florida for release following out-of-state rehabilitation. Six (6) new or amended Loan Agreements were issued to hold or use specimens for research, teaching, or education. There were 27 permits or amendments processed authorizing educational marine turtle walks. FWC staff assisted in the placement, transport, and release of stranded marine turtles, including facility inspection and approval. Approximately 115 cold-stunned turtles that stranded in New England were transferred to Florida for rehabilitation and release. Staff inspected two (2) Florida facilities to ensure turtles were held in appropriate

conditions. The FWC placed ten (10) non-releasable turtles in educational facilities within and outside of Florida.

ANNUAL PERMIT HOLDER MEETING – In February 2023, the FWC hosted the 26th Annual Marine Turtle Permit Holder Meeting at the Safety Harbor Resort and Spa with co-hosts the Wildlife Alert Reward Association and the Florida Fish and Wildlife Foundation. Over 400 permit holders, volunteers, and staff from local government, state, and federal agencies registered to attend the meeting. Topics included updates on state and federal marine turtle programs as well as research, conservation and education projects funded by the Sea Turtle License Plate Grants Program.

WILDLIFE LIGHTING – During FY 2022-23, FWC staff continued to coordinate with local government, federal and state agency stakeholders on methods to minimize the impacts of beachfront lighting on marine turtle nesting beaches. Through the FWC's Wildlife Lighting Certification Program, staff work with lighting engineers and corporations on the development of lamps and fixtures appropriate for use along marine turtle nesting beaches. FWC staff also co-hosted the 4th Annual Light Pollution Management Workshop with the Archie Carr Center for Sea Turtle Research. Staff from the FWC, the Florida Department of Transportation, the Florida Department of Health, local governments, industry representatives, Sea Turtle conservation groups, and Florida power companies presented on their organizations' efforts to minimize lighting impacts to marine turtles. More than 40 participants from state and federal agencies, local governments, industry and interested citizens attended the online workshop. For more information on the Sea Turtle Management Program, see http://myfwc.com/wildlifehabitats/managed/sea-turtles/.

Rim Rock Crowned Snake

Staff collaborated on publishing a manuscript documenting a Rim Rock Crowned Snake that apparently asphyxiated while swallowing a juvenile Caribbean Giant Centipede. This represents the first dietary record for the species. The USFWS published a proposal to list the species as federally Threatened, and FWC provided comments concurring with this proposed designation.

Short-tailed Kingsnake

Six verified observations were reported on the Florida Rare Snake Sightings webpage. FWC staff contacted HerpMapper and entered seven of its records into the rare upland snakes database. FWC staff updated a Maxent habitat model using records through 2022 and more recent GIS layers, and they worked on revising a manuscript on the status and distribution of this species.

Southern Hog-nosed Snake

In 2019, the USFWS determined that this species did not warrant listing but has agreed to reconsider its decision after being sued by the Center for Biological Diversity. Nine verified observations were reported on the Florida Rare Snake Sightings webpage. FWC staff contacted HerpMapper and entered 22 of its records into the rare upland snakes database.

Suwannee Alligator Snapping Turtle

The Suwannee Alligator Snapping Turtle was described as a distinct species in 2014, and Florida designated it as Threatened in November 2018. As part of a SWG grant, FWC staff and Travis Thomas 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. On 4 April 2023, the Suwannee River at Branford was trapped trying to recapture two females on which satellite transmitters were attached in April 2022. The females were not captured, but the batteries were still functioning and indicated they nested in April 2023. FWC staff collaborated on five papers that were published in a special issue of Southeastern Naturalist devoted to Alligator Snapping Turtles. A paper on home range and habitat selection of turtles at two sites on the Suwannee River is in press. Staff assisted a PBS film crew producing a segment for America Outdoors by letting them film while checking traps on the Suwannee River in April 2023.

SURVEYS – As part of a long-term population monitoring program on the Suwannee River, three sites (White Springs, Rock Bluff, and Fowler's Bluff) were trapped using 12 traps in July 2022, October 2022, and March 2023. On 4 April 2023, 12 turtles totaling 753 pounds were trapped in 12 traps set at the Rock Bluff site while trying to catch gravid females to outfit with GPS tags to find their nest sites. Radiographs indicated the two young females captured did not have shelled eggs, but eight turtles were recaptures. One large male had the same length as 10 years ago but gained almost 18 pounds, whereas another male grew 3.5 inches and gained almost 29 pounds in 12 years. During some trapping sessions, turtles were radiographed for ingested fishhooks, and baseline health assessments were conducted by drawing blood and swabbing cloacae. A juvenile male trapped near the boat ramp at the White Springs site had ingested 5 fishhooks, likely from anglers.

After receiving an observation of an Alligator Snapping Turtle in Pepper Creek, a drainage canal in the Ellie Schiller Homosassa Springs Wildlife State Park in Citrus County, FWC staff requested a research permit from the FDEP and set 14 traps from a pontoon boat on 12 April 2023 with assistance from FDEP staff and volunteers. Five adult males and two adult females were trapped, and two more adult males were captured by hand in Pepper Creek. The turtles weighed 26 to 90 pounds, and a larger turtle was observed. Four traps set in the Southeast Fork of the Homosassa River failed to capture Alligator Snapping Turtles, but there is video evidence that one lives there. On 29 June 2023, 16 traps set in Pepper Creek trapped two new males, and a new 53-pound male was captured by hand at the boat launch. A 90-pound male trapped in April was recaptured by diving on it from a boat on successive days at sites 1280 feet apart. Twelve traps set in upstream sections of Pepper Creek failed to capture turtles, but a 50-pound male was captured by hand from a kayak. A YouTube video of the April survey posted on FWRI social media received 90,000 views, and Bay News 9 in St. Petersburg produced a segment on the June survey. Snorkeling the Chassahowitzka River and the Southeast Fork on 27 June 2023 failed to detect Alligator Snapping Turtles. Interviews of local residents and present and former FDEP staff have failed to determine the source of this population, which may be a natural population that has gone undiscovered by scientists. Morphological evidence indicates these are Suwannee Alligator Snapping Turtles, and 14 genetic samples have been collected for future analysis.

FISH

Freshwater Fish

BLUENOSE SHINER- The Bluenose Shiner is State designated as Threatened. A Florida State Wildlife Grant (SWG) was recently initiated (FY 2022-23) to determine suitability for the fish across its range in Florida. Information collected may be used to inform minimum flow and levels for spring habitats. In FY 2022-23, 124 individuals were collected from various spring and spring run habitats in the Choctawhatchee, Yellow, and Escambia watersheds. Genetic analyses are ongoing to determine the evolutionary distinction between the St. Johns drainage population and those in western Florida, Alabama, Mississippi, and Louisiana

BLACKMOUTH SHINER- The Blackmouth Shiner is a small fish that inhabits backwater pools in the Blackwater River in Florida. Blackmouth Shiners are State designated as Threatened due to their restricted range, severe population fragmentation and general decline in extent and quality in habitat. A genetic monitoring protocol for Blackmouth Shiners was conducted between 2016 and 2020 and was completed in FY 2020-21. No species directed sampling

was conducted during FY 2022-2023. Additional sampling is planned for the species in the future.

CRYSTAL DARTER- The Crystal Darter is a small bodied fish that is considered a gravel obligate species, residing in the upper reaches of the Escambia River in Florida. Crystal Darter are State designated as Threatened due to their restricted range and affinity to highly restricted gravel habitat. While there was previous species directed project to assess the status and trend of the species, there is currently no species directed sampling toward the species. Subsequently no Crystal Darters were collected in FY2022-23.

SALTMARSH TOPMINNOW- The Saltmarsh Topminnow is a small-bodied fish that is found within low salinity salt marshes along the Gulf Coast. Saltmarsh Topminnows are designated as State Threatened and are candidates for federal listing pending a final decision from the USFWS. A population trend assessment of Saltmarsh Topminnows was conducted between 2016 and 2020 and was completed in FY 2020-21. In FY 2022-23, 57 Saltmarsh Topminnows were collected from Perdido Bay, Blackwater Bay and Garcon Point for additional genetics analysis. Collections will be genotyped in order to better characterize population genetic structure of Saltmarsh Topminnows within the Pensacola Bay Complex.

Smalltooth Sawfish

The Smalltooth Sawfish are Federally Endangered, and they are now primarily found from Charlotte Harbor (Charlotte and Lee County) to the Keys (Monroe County). In FY 2022–23, the Charlotte Harbor estuarine system was sampled using a multi-gear approach. There were 95 individuals captured, including 17 recaptures. For more information on FWC's Sawfish Research Program, see https://MyFWC.com/research/saltwater/fish/sawfish.

Sturgeon

ATLANTIC STURGEON ACTIVITIES - The Atlantic Sturgeon is listed as Federally Endangered. The USFWS, NOAA Fisheries, and the USGS conduct most of the monitoring and management of this species. FWC did not incidentally collect any Atlantic Sturgeon in FY 2021-22. Additionally, no Atlantic Sturgeon carcasses were reported to FWC. FWC will provide any future collections and any associated information to the Atlantic Sturgeon Salvage Network, managed by NOAA-Fisheries, as well as to the Atlantic States Marine Fisheries Commission, in order to assist with population monitoring and management of this species.

GULF STURGEON ACTIVITIES - The Gulf Sturgeon is listed as Federally Threatened by the USFWS and NOAA. Monitoring and management is primarily conducted by NOAA-Fisheries, USGS, and USFWS. FWC is currently conducting research on population dynamics of juvenile Gulf Sturgeon from the Pensacola Bay watershed. This project is funded by a multi-state Cooperative agreement to assess juvenile population dynamics simultaneously throughout its range. In FY 2022-23, FWC collected 93 Gulf Sturgeon from freshwater portions of the Yellow River, and 33 Gulf Sturgeon from the Escambia River. This is now in the final year of a 4-year project.

INVERTEBRATES

Blue Calamintha Bee

The Blue Calamintha 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 Calamintha 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 Calamintha 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 original project ended in 2022, but a follow-up SWG project began that year. Besides expanding on Blue Calamintha Bee research, the current project also covers 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 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."

Coral

Florida Coral Rescue – 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 is accomplished by collecting both healthy corals from ahead of the disease boundary and surviving corals that remain in the endemic zone and holding (or gene-banking) them in land-based facilities to prevent them from becoming infected. These corals are being used in captive 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 13). FWC led two rescue collections (47 colonies) from the

endemic zone during FY 2022-23. FWC staff are now heavily involved in developing a Coral Propagation Strategy for Florida's Coral Reef.

In FY 2022-23, the Florida Coral Rescue Center (an Association of Zoos and Aquariums facility) had rough Cactus Coral (*Mycetophyllia ferox*) release more than 600 larvae combined. In FY 2022-23, 5 genets of Pillar Coral (*Dendrogyra cylindrus*) from the 2020 spawn at the Florida Aquarium were transferred into an in-situ coral nursery.

Exhibit 13. Florida Coral Rescue FY 2022-23 Federally listed coral species rescued and currently in holding. FT = Federally Threatened.

Common Name	Scientific Name	Status	Total Number of Coral Colonies Rescued	Number of Colonies in Holding
Boulder Star Coral	*Orbicella franksi*	FT	37	39
Lobed Star Coral	*Orbicella annularis*	FT	27	19
Mountainous Star Coral	*Orbicella faveolata*	FT	129	120
Pillar Coral	*Dendrogyra cylindrus*	FT	572	422
Rough Cactus Coral	*Mycetophyllia ferox*	FT	15	10

As part of this rescue effort, FWC is addressing coral genetic data gaps using single nucleotide polymorphism (SNP) genetic discovery panels to develop markers for five of the Federally-designated Threatened corals (Exhibit 14). Most of these coral species had microsatellite markers developed but no SNP genetic information which greatly improves the resolution at which coral colonies can be identified as genetically distinct individuals. SNP markers were completed for Staghorn Coral (*Acropora cervicornis)* and Elkhorn Coral (*A. palmata)* and FWC was involved in genotyping the remaining wild population of Elkhorn Coral in Florida using the SNP markers. The goal is to genotype all colonies of these seven species that are collected as part of the Coral Rescue Project and other NOAA-led species recovery programs and catalogue them in FWC's genet registry database.

Exhibit 14: Status of the development of genetic tools used to identify genetically distinct individuals. FT = Federally Threatened

Common Name	Scientific Name	Status	Microsatellite Markers?	SNP Markers Completed
Boulder Star Coral	*Orbicella franksi*	FT	Yes	No
Elkhorn Coral	*Acropora palmata*	FT	Yes	Yes
Lobed Star Coral	*Orbicella annularis*	FT	Yes	Pending
Mountainous Star Coral	*Orbicella faveolata*	FT	Yes	No
Pillar Coral	*Dendrogyra cylindrus*	FT	Yes	Pending
Rough Cactus Coral	*Mycetophyllia ferox*	FT	No	No
Staghorn Coral	*Acropora cervicornis*	FT	Yes	Yes

CHARACTERIZATION OF THE MICROBIOME OF CORALS WITH SCTLD THROUGH SPACE AND TIME – FWC and partners at Mote Marine Laboratory and NOAA are investigating how SCTLD alters the microbiome (associated bacteria and archaea) of corals. The goals of this project include identifying the potential causes of the disease and investigating the efficacy of probiotics which may be used to treat corals affected by the disease. In FY 2022-23, FWC and partners compared the microbiomes of healthy and diseased coral tissue samples from six species of corals, including 47 samples from Mountainous Star Coral (*Orbicella faveolata*), sampled from reefs throughout the Florida Keys before, during, and after the arrival of SCTLD. Results show that the microbiomes of SCTLD lesions vary by area of the Florida Keys but still have some consistent microbes or related microbial groups across regions. Additionally, the disease changed the microbiomes of healthy corals a year or more after the disease was epidemic (active) on their reef. These results indicate that the disease has had long-term effects on coral health even though the most active phase of the disease has waned.

CORAL REEF EVALUATION AND MONITORING PROJECT (CREMP) – The Coral Reef Evaluation and Monitoring Project (CREMP) has monitored coral reef and hardbottom habitat conditions at fixed locations annually in the Florida Keys since 1996 and the Dry Tortugas since 1999. In FY 2022-23, FWC surveyed 51 sites in the Florida Keys National Marine Sanctuary and the Dry Tortugas National Park (Monroe County). CREMP follows a repeated measures survey design, surveying the same location annually to study temporal changes in resource conditions through time. This sampling effort included 199 photographic camera transects to estimate benthic cover, 199 stony coral density and condition surveys, 119 octocoral density and condition surveys, and 22 Giant Barrel Sponge (Xestospongia muta) demographic surveys combined for the two regions. As part of this survey effort CREMP

collects information on the seven Federally-designated Threatened coral species located at each site and the critical habitat required for these endangered species (Exhibit 15). FWC also revamped the CREMP website this fiscal year (https://myfwc.com/research/habitat/coral/cremp/), which includes a dashboard to visualize the data from all three monitoring regions.

Exhibit 15: Abundance (number of colonies) of Federally-designated Threatened coral species recorded by the Coral Reef Evaluation and Monitoring Project between 2014 and 2022.

Common Name	Scientific Name	Total Number of Colonies								
		2014	2015	2016	2017	2018	2019	2020	2021	2022
Boulder Star Coral	*Orbicella franksi*	131	94	98	164	176	143	114	120	53
Elkhorn Coral	*Acropora palmata*	36	27	44	37	24	23	29	16	33
Lobed Star Coral	*Orbicella annularis*	121	78	79	66	51	48	35	41	40
Mountainous Star Coral	*Orbicella faveolata*	245	319	309	213	218	225	235	219	242
Pillar Coral	*Dendrogyra cylindrus*	1	0	1	0	0	0	0	0	0
Rough Cactus Coral	*Myceto-phyllia ferox*	10	10	5	5	4	3	3	3	3
Staghorn Coral	*Acropora cervicornis*	48	49	47	38	43	30	50	112	95

Southeast Coral Reef Evaluation and Monitoring Project (SECREMP) – The Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP) has monitored coral reef and hardbottom habitat conditions at fixed locations annually off Southeast Florida since 2003. FWRI provides planning and surveying assistance and manages the SECREMP datasets while in situ surveys are conducted by Nova Southeastern University. In FY 2022-23 SECREMP surveyed 22 sites in Martin, Palm Beach, Broward, and Miami-Dade counties. This sampling effort included 88 photographic camera transects to estimate benthic cover, 88 stony coral density and condition surveys, 88 octocoral density and condition surveys, and 88 giant barrel sponge demographic surveys. As part of this survey effort SECREMP collects information on the seven Federally-designated Threatened coral species located at each site and the critical habitat required for these endangered species (Exhibit 16). Similar to CREMP, SECREMP follows a repeated measures survey design, surveying the same locations annually to study temporal changes in resource

conditions through time. Elkhorn Coral (*Acropora palmata*), Pillar Coral (*Dendrogyra cylindrus*), and rough Cactus Coral (*Mycetophyllia ferox*) are not found at SECREMP sites.

Exhibit 16: Abundance (number of colonies) of Federally-designated Threatened coral species recorded by the Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP) between 2014 and 2022.

Common Name	*Scientific Name*	Total Number of Colonies								
		2014	2015	2016	2017	2018	2019	2020	2021	2022
Boulder Star Coral	*Orbicella franksi*	1	0	0	0	0	3	5	1	2
Lobed Star Coral	*Orbicella annularis*	3	1	0	0	0	0	1	0	0
Mountainous Star Coral	*Orbicella faveolata*	17	23	24	21	12	13	7	13	11
Staghorn Coral	*Acropora cervicornis*	22	17	19	19	8	9	9	13	13

Disturbance Response Monitoring (DRM) – FWC has coordinated the Florida Reef Resilience Program's Disturbance Response Monitoring (DRM) program since 2018. DRM is a multi-partner effort to monitor shallow reef systems from Martin County to the Dry Tortugas to better understand how rising sea temperatures and disease affect Florida's coral reefs. In FY 2022-23, 450 sites were surveyed across four counties in Southeast Florida and six subregions in the Florida Keys, including the Marquesas and Dry Tortugas. FWC staff conducted 48 of those surveys. The belt transects collect information for all coral species including all seven Federally-designated Threatened coral species (Exhibit 17). The number of sites with boulder Star Coral (*Orbicella franksi*) is likely underrepresented because this species is more common on deeper reefs and DRM surveys are limited to 60' of depth. Elkhorn Coral (*Acropora palmata*), although known to be present in specific habitats, was not observed.

The 2022 DRM surveys indicated a moderate bleaching year with the highest prevalence of bleached colonies in the northern half of the reef tract and the outer reefs of the Florida Keys. Overall coral disease prevalence was low including the Dry Tortugas, where SCLTD was previously epidemic in 2020 and 2021. Among the Federally-designated Threatened coral species, mountainous Star Coral (*Orbicella faveolata*) had the highest number of colonies recorded with SCTLD (20 total colonies) with the majority observed in the Dry Tortugas (11 colonies). Rapid Tissue Loss Disease and White Band Disease were recorded on Staghorn Coral but totaled less than 5% of the surveyed population (Exhibit 18). More detailed results from the 2022 DRM survey are available in the 2022 DRM Quick Look Report that can be accessed through the DRM website https://ocean.floridamarine.org/FRRP/Home/About.

Exhibit 17: Abundance (number of coral colonies) of Federally-designated Threatened coral species recorded along the DRM belt transects surveyed

Common Name	Scientific Name	County/Subregion	Total Abundance	Total Number of Sites
Boulder Star Coral	*Orbicella franksi*	Upper Keys	12	21
		Middle Keys	2	
		Lower Keys	5	
		Marquesas	6	
		Dry Tortugas	21	
		TOTAL	46	
Lobed Star Coral	*Orbicella annularis*	Palm Beach	2	35
		Biscayne	1	
		Upper Keys	49	
		Middle Keys	2	
		Lower Keys	193	
		TOTAL	247	
Mountainous Star Coral	*Orbicella faveolata*	Palm Beach	1	147
		Broward-Miami	28	
		Biscayne	14	
		Upper Keys	126	
		Middle Keys	30	
		Lower Keys	141	
		Marquesas	19	
		Dry Tortugas	67	
		TOTAL	426	
Rough Cactus Coral	*Mycetophyllia ferox*	Middle Keys	1	2
		Lower Keys	1	
		TOTAL	2	
Staghorn Coral	*Acropora cervicornis*	Broward-Miami	146	39
		Biscayne	8	
		Upper Keys	14	
		Lower Keys	12	
		Marquesas	5	
		Dry Tortugas	48	
		TOTAL	233	
Grand Total			**954**	

Exhibit 18: The number of Federally-designated Threatened coral species recorded with disease resulting in tissue loss during the 2022 DRM season.

Common Name	Scientific Name	County/ Subregion	Stony coral tissue loss disease	Rapid Tissue Loss	White Band Disease	White Plague Disease	Unknown Tissue Loss Disease
Staghorn Coral	*Acropora cervicornis*	Broward-Miami	0	1	7	0	0
		Dry Tortugas	0	2	0	0	0
Lobed Star Coral	*Orbicella annularis*	Upper Keys	2	0	0	0	1
		Lower Keys	0	0	0	0	5
Mountainous Star Coral	*Orbicella faveolata*	Broward-Miami	3	0	0	0	0
		Upper Keys	0	0	0	0	1
		Lower Keys	5	0	0	0	0
		Marquesas	1	0	0	0	1
		Dry Tortugas	11	0	0	0	1
Boulder Star Coral	*Orbicella franksi*	Marquesas	1	0	0	0	0
		Dry Tortugas	8	0	0	1	0
Grand Total			**31**	**3**	**7**	**1**	**9**

Special Activity Licenses – In FY 2022-23, the FWC issued 22 Marine Special Activity Licenses to conduct scientific research and restoration activities for coral species. The Federally-designated Threatened species boulder Star Coral (*Orbicella franksi*), lobed Star Coral (*Orbicella annularis*), mountainous Star Coral (*Orbicella faveolata*), Pillar Coral (*Dendrogyra cylindrus*), rough Cactus Coral (*Mycetophyllia ferox*), Elkhorn Coral (*Acropora palmata*), and Staghorn Coral (*A. cervicornis*) were included in these issued licenses.

CORAL NURSERY AND OUTPLANTING OPERATIONS – FWC operates one in situ coral nursery located in the middle Florida Keys. FWC's mid-channel nursery maintains three Federally-designated Threatened coral species: mountainous Star Coral (*Orbicella faveolata*), Elkhorn Coral (*Acropora palmata*), and Staghorn Coral (*Acropora cervicornis*). Exhibit 19 summarizes the number of colonies of each species that were present within FWC's nursery at the end of FY 2022-23.

Exhibit 19: Number of coral colonies present in FWC's in situ Marathon Mid-Channel Coral Nursery, June 2023.

Common Name	Scientific Name	Status	Number of Coral Colonies
Mountainous Star Coral	Orbicella faveolata	FT	295
Elkhorn Coral	Acropora palmata	FT	61
Staghorn Coral	Acropora cervicornis	FT	1,330
Grand Total			**1,686**

During FY 2022-23 FWC outplanted 2,187 federally-listed coral colonies to 16 sites in the Middle Keys. Exhibit 20 includes the total number of coral colonies by species and reef site.

Exhibit 20: Number of coral colonies by species and reef site outplanted in FY 2022-23 by the FWC.

Common Name	Scientific Name	Reef Site	Number of Outplanted Colonies
Staghorn Coral	Acropora cervicornis	NOAA8	180
		Delta East 4	140
		Delta East 6	140
		Delta West 3	140
		Delta West 4	140
		Yellow Rocks 1	140
		Yellow Rocks 6	140
		Site O	126
		Site O2	125
		Site P	132
		East Turtle.5	128
		East Turtle.6	131
		East Turtle.7	129
		Site Y	129
		Site Z	139
		Rawa.2	128
Grand Total			**2,187**

NOAA Elkhorn Coral Monitoring on Florida's Coral reef – The Elkhorn Coral (*Acropora palmata*) is Federally-designated as Threatened. Although it is not susceptible to SCTLD, it is highly susceptible to other coral diseases that have been described in the literature such as "white plague" and "white pox" named for the appearance of the lesions on the colony. FWC has had a long-term agreement in place with NOAA to monitor Elkhorn Coral at seven locations along Florida's Coral Reef (two in Biscayne National Park, one in the Middle Keys and four in the Lower Keys). Throughout the project, wild colonies have endured an onslaught of disturbances including short-term, acute stressors such as hurricanes and elevated seawater temperatures, as well as recurring, chronic stressors such as corallivorous snail predation and disease. Due to the frequency and combined effects of these stressors, Elkhorn Coral populations have been in a perpetual state of decline. As of March 2023, elkhorn was no longer present at two of the Lower Keys sites. Across all sites, population abundance (the total number of colonies) and the amount of living tissue (Live Area Index) had collectively been reduced by ~78% and ~71%, respectively since 2011.

Pillar Coral Monitoring in the Dry Tortugas – The Pillar Coral (*Dendrogyra cylindrus*) is Federally-designated as Threatened and is highly susceptible to SCTLD. A long-term agreement between FWC and the Dry Tortugas National Park requires FWC to monitor 10 relatively large (>1 meter in height) colonies on a tri-annual basis every year. SCTLD reached Dry Tortugas National Park in FY (20-21), placing the survival of these 10 colonies at risk. The latest assessment occurred on March 7th, 2023. At that time, SCTLD was present on two of the colonies; however, the impact of the disease was small, causing <1% tissue loss on the affected colonies. Those two colonies were the only colonies with >10% of their live tissue remaining. Dry Tortugas Park staff continue to treat SCTLD lesions with antibiotics to save the remaining tissue; however, continued tissue loss could result in complete mortalities among these fate-tracked colonies. The next scheduled assessment from FWC will take place in August 2023.

Crayfish

BLACK CREEK CRAYFISH –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 determined that federal listing was not warranted in September 2021. However, results from more recent surveys and observed disease prevalence have led the USFWS to reevaluate this species for potential listing. Surveys from 2019 to present found that White-tubercled Crayfish (WTC) are replacing BCC in historically occupied sites. WTC are native to other parts of Florida but were not found within the Lower St. Johns watershed until 2008, when they were first observed at two nearby sites in

the Lower South Fork Black Creek – unlikely to be the result of natural range expansion. Of the 102 sites surveyed in the Black Creek Basin between 2018-2023, WTC was consistently present without BCC at 37 sites. 5 sites had both species during earlier sampling events but had only WTC on later sampling events. Thus, a total of 42 sites (41.2%) are presently occupied by WTC without BCC. Both WTC and BCC were found at 19 sites (18.6%). BCC occurred without WTC at only 17 sites (16.7%), all of which were located upstream of a natural or artificial barrier (e.g., culverts and waterfalls). 24 sites (23.5%) had neither species present. When these results were compared to historical sampling efforts, BCC site occupancy significantly decreased while WTC site occupancy significantly increased, supporting the hypothesis that WTC are replacing BCC. Sites where BCC occur without WTC within the Black Creek Basin are all located upstream of a natural or artificial barrier (e.g., culverts and waterfalls).

Beginning in FY 2020-21 and continuing through FY 22-23, FWC has used federal Section 6 funding to partner with UF to further investigate ongoing threats and potential management responses. Intensive trapping of WTC from 1 km of stream began in FY 21-22 and continued in FY 22-23. To date, 2,675 WTC have been removed from trapping. Fortifying or installing barriers in combination with trapping and removing WTC may be an effective management strategy for BCC conservation. Additionally, BCC face threats from microsporidian parasites that infect muscle and connective tissues and ultimately are fatal. Genetic sequencing from infected BCC and WTC tissue showed that both species were infected with novel microsporidia in the genus Nosema, either a single species or two closely related species. Non-lethal tissue sampling methods for microsporidian detection were tested using WTC by either removing an abdominal tissue plug or collecting a walking leg. Experiments showed that this method was successful at detecting infection and did not impact crayfish survival and function. Removing walking legs to detect microsporidian infection is especially promising because it can be quickly done in the field and does not appear to cause lasting damage to crayfish. Future work will examine whether WTC alter the prevalence of microsporidian pathogens in BCC and investigate the impacts of these pathogens on BCC health and survival.

PANAMA CITY CRAYFISH – FWC staff and partners completed work funded through a multi-year, USFWS Section 6 grant intended to fill critical gaps in the life history knowledge and management needs of Panama City Crayfish (PCC). Specifically, progress was made in developing a practical and efficient method of marking individual crayfish, understanding crayfish population densities, status, and distribution, and in laying the framework for scientifically-sound, implementable, population monitoring and translocation plans. In addition, habitat management specifically for PCC was completed on two important conservation properties.

Freshwater Mussels

CHIPOLA SLABSHELL – The Federally Threatened Chipola Slabshell is found in the Apalachicola River basin. In FY

2022-23, FWC performed nine surveys for this species and 13 live individuals were found from eight of these localities (Exhibit 21). Three of the 12 individuals checked were brooding larvae. The Chipola Slabshell is a short-term brooder and is gravid from May—August. FWC received federal Section 6 funds (Federal Identifier: F19AP00875-01; F20AP11726-00) to identify host fishes for eight Federally Petitioned freshwater mussels, including the Chipola Slabshell. Although a small trial was performed, no transformed juveniles were recovered from inoculated potential host fish species. A detailed understanding of the mechanisms behind the complex life history of native freshwater mussels will aid in their conservation.

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 2022-23, FWC performed 48 surveys for this species and found 30 live individuals among 11 localities (Exhibit 21); 16 were checked for larvae, and one of them was brooding. Utilizing funds received through the federal Section 6 Grant, primary host fish species of the Choctaw Bean were identified to be topminnow, darter, and lamprey species.

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 2022-23, FWC conducted nine surveys within this range, but no individuals were found (Exhibit 21). 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, 42 surveys were conducted during FY 2022-23, but only one live specimen of Flatwoods Creekshell was located in Bruce Creek of the Choctawhatchee basin, and the individual was also not brooding larvae.

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 2022-23, FWC performed 48 surveys for this species and found 81 live individuals among 10 localities (Exhibit 21). Twenty-nine individuals were checked for larvae, and 12 of them 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 2022-23, no individuals were found despite FWC's nine surveys in this species' range (Exhibit 21). 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 2022-23, FWC performed 17 surveys for this species and found 93 live individuals among five localities (Exhibit 21). Twenty-six individuals were checked for larvae, and two were 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, which were not surveyed during FY 2022-23. 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 larvae from June—October. Host fish species are unknown for this species but are thought to be darters due to the host use of related species.

OVAL PIGTOE – The Federally Endangered Oval Pigtoe is found in the Econfina Creek, Apalachicola, Ochlockonee, and Suwannee River basins. In FY 2022-23, FWC performed 38 surveys for Oval Pigtoe and found 17 live individuals; of which, 16 were checked for gravidity, and one was brooding larvae (Exhibit 21). Two individuals of this species were located in the mainstem Suwannee River in November 2022 and May 2023. These collections represent the 9th and 10th representatives of this species to be observed in this drainage since 2012. 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 2022-23, FWC performed nine surveys but did not locate any individuals of the Purple Bankclimber (Exhibit 21). 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 2022-23, FWC conducted nine surveys in the Apalachicola basin but only located two live individuals of Rayed Creekshell from one locality in the Chipola River, and neither individual was brooding larvae. On 17 July 2023, the Center for Biological Diversity withdrew their petition from 2010 requesting protection of the Rayed Creekshell under the Endangered Species Act. 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 2022-23, FWC performed 11 surveys but did not locate any live individuals (Exhibit 21). 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 2022-23, FWC performed nine surveys for the Shinyrayed Pocketbook and found 24 live individuals among eight localities, of which 15 individuals were checked for larvae and eight were brooding (Exhibit 21). 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 nine surveys FWC conducted in the basin in the last fiscal year, no individuals were collected. 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 listing as an Endangered species and for critical habitat designation (88 FR 40160). Hosts of the Southern Elktoe are currently being identified by the Alabama Aquatic Biodiversity Center.

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 2022-23, FWC performed 31 surveys but did not find any individuals (Exhibit 21). 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 2022-23, FWC performed 37 surveys for the Southern Sandshell and found 33 live individuals among six localities (Exhibit 21). Only one of three individuals were observed to be brooding larvae. 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 29 surveys for the Suwannee Moccasinshell during FY 2022-23 and found 27 live individuals (Exhibit 21) among 10 localities. Twenty-six individuals were checked for larvae, and seven 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 2022-23, FWC performed 31 surveys for the Tapered Pigtoe and located 46 live individuals among 10 localities (Exhibit 21). Thirty-three individuals were checked for larvae, and nine were observed brooding larvae. This bivalve broods from March—June and is a host specialist only parasitizing the Blacktail Shiner.

Exhibit 21. Freshwater mussel surveys conducted in FY 2022-23.

Species	Apalachicola (9)	Choctawhatchee (31)	Escambia (11)	Econfina Creek (0)	Ochlockonee (0)	Suwannee (29)	Yellow (6)	Total (86)
Chipola Slabshell	13	-	-	-	-	-	-	13
Choctaw Bean	-	16	14	-	-	-	0	30
Fat Threeridge	0	-	-	-	-	-	-	0
Flatwoods Creekshell	-	1	0	-	-	-	-	1
Fuzzy Pigtoe	-	71	10	-	-	-	0	81
Gulf Moccasinshell	0	-	-	NS	-	-	-	0
Narrow Pigtoe	-	-	87	-	-	-	6	93
Ochlockonee Moccasinshell	-	-	-	-	NS	-	-	0
Oval Pigtoe	15	-	-	NS	NS	2	-	17
Purple Bankclimber	0	-	-	-	NS	-	-	0
Rayed Creekshell	2	-	-	-	-	-	-	2
Round Ebonyshell	-	-	0	-	-	-	-	0
Shinyrayed Pocketbook	24	-	-	NS	NS	-	-	24
Southern Elktoe	0	-	-	-	-	-	-	0
Southern Kidneyshell	-	0	-	-	-	-	-	0
Southern Sandshell	-	30	-	-	-	-	3	33
Suwannee Moccasinshell	-	-	-	-	-	27	-	27
Tapered Pigtoe	-	46	-	-	-	-	-	46
Totals	54	164	111	0	0	29	9	367

Frosted Elfin Butterfly

The Frosted Elfin Butterfly ranges in the eastern U.S. from New Hampshire to Texas, but it has become rare throughout most of its range, and it is under consideration for federal listing under the Endangered Species Act. Threats to the Frosted Elfin include effects of small population size, habitat loss or degradation, invasive plant species, succession, and incompatible management. In Florida, its host plant – upon which the caterpillars feed – is the sundial lupine, a distinctive and attractive legume that carpets the longleaf pine forest floor with its bright green palmately compound leaves and spikes of blue, pea-like flowers. In 2023 FWC received USFWS approval for a Section 6 grant to initiate efforts to repatriate the Frosted Elfin onto conservation lands across North Florida. A Frosted Elfin "summit" in February 2023 kicked off the year's survey efforts and the drafting of a statewide conservation plan for the species, involving multiple federal, state, and private conservation partners. Using wild-caught caterpillars, a Frosted Elfin captive population is being established at the McGuire Center for Lepidoptera and Biodiversity (Florida Museum of Natural History, University of Florida) in Gainesville, which has a proven track record for the captive propagation of other imperiled butterflies, including the Schaus swallowtail and Miami blue. Building on previous success translocating Frosted Elfins from an Apalachicola National Forest population to the Jones Center at Ichauway biological station near Newton, Georgia, where the species had been extirpated, the captive population should provide stock for repatriations to Florida sites with sufficient sundial lupine populations.

Miami Tiger Beetle

The Miami Tiger Beetle was undetected for nearly 85 years, losing greater than 98% of their fire dependent pine-rockland habitat, and was presumed extinct. The species was rediscovered within the Richmond Tract of South Miami in 2007, where a population had persisted among a handful of scattered, open patches still being maintained by fire among an urban landscape.

Miami Tiger Beetles are iridescent copper-green insects less than 10mm long. Despite their small size, these beetles are voracious predators, consuming ants and other ground-dwelling invertebrates.

Endemic to Florida and known only from critically rare pine rockland habitats in southern Miami-Dade County, the Miami Tiger Beetle was designated 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 2023, 25 pine rockland sites have been surveyed, but Miami Tiger Beetles have only been detected at 5 properties, all within the greater Richmond Pine Rockland area. Four of the 5 sites are contiguous and likely

represent a single population. The total combined area of occupied habitat is less than 30 acres.

Ongoing research seeks to determine habitat requirements of the Miami Tiger Beetle, quantify detection rates, and monitor population trends. Prescribed fire is the primary mechanism utilized in healthy habitat management within the pine rockland ecosystem. However, fire is a challenging endeavor within an urban landscape (e.g., smoke management, containment), therefore other mechanical and manual options are being explored to help abate succession and maintain open patches of sand and rock which is 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. Continued multi-agency cooperation and sound management decisions are required for both this beetle and its imperiled pine-rockland habitat to persist.

Stock Island Tree Snail

The Stock Island Tree Snail is a federally Threatened subspecies originally known only from Stock Island near Key West, where it was threatened by development and overcollection. The subspecies has now disappeared from Stock Island, but over the last several decades snail enthusiasts and conservationists established populations elsewhere in the Keys and the South Florida mainland. The location of those sites is not well documented, and monitoring the snails has been spotty at best, so the taxon's current status is poorly known. An ongoing State Wildlife Grant to study the status and distribution of Tree Snails and the predatory nonnative invasive New Guinea flatworm has included the Stock Island Tree Snail in its surveys and will be providing data to USFWS to assist in its conservation.

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 22). Regional media receive regional-only news and information as well as statewide releases. In FY 2022-23, the FWC issued many press releases on listed species. FWC press releases are posted online at MyFWC.com/News.

Exhibit 22. Number of reporters sent FWC press releases in FY 2022-23

FWC Region	Number of Reporters
Northwest	46
North Central	47
Northeast	72
Southwest	43
South	78
Statewide Total	286

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 23). 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 23. Total interactions with each FWC social media account obtained in 2022-23.

Social Media Platform	**Quantity**
@MyFWC Facebook	352,732 Followers
@MyFWC Twitter	42,606 Followers
@MyFWC Instagram	104,310 Followers
MyFWCMedia Flickr	33,606,393 Views
@MyFWC YouTube	1,200,782 Views
@FloridaBirdingTrail Facebook	22,400 Followers
@FWCResearch Facebook	109,101 Followers
@FWCvolunteers	2,157 Followers

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 24 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 24. Number of subscribers in FY 2022-23 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 2022-2023, FWC staff assisted in organizing and planning the 14th 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. Oscar Scherer State Park hosted the Florida Scrub-jay Festival on April 22nd, 2023, in conjunction with Oscar Scherer State Park's 34th Annual Earth Day. Hundreds of visitors of all ages attended. The festival offered guided hikes and educational tram tours, a Question & Answer panel featuring park staff and agency representatives, 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 will be held at Merritt Island National Wildlife Refuge in Spring of 2024.

Florida Panther Festival - The Florida Panther Festival, hosted by the Naples Zoo was held on November 5, 2022, 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 3,095 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 booth and a presentation at the Save The Panther Day festival at Florida Panther National Wildlife Refuge, and on Earth Day at Highlands Hammock State Park.

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.

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 2022-23, FWC Wildlife Assistance Biologists conducted five site visits

to assist individuals with concerns regarding Threatened or Endangered species including Florida Panthers, Florida Sandhill Cranes, and Burrowing Owls.

Additionally, the Red-cockaded Woodpecker Working Group meeting was held in a hybrid virtual/in-person meeting in 2023; in August 2022, this meeting was also held as a hybrid virtual/in-person meeting.
Florida Panther staff provided presentations to NGOs, Girl Scouts, Summer camp, school classes, HOAs, and other interested organizations, reaching an estimated 300 people.

OTHER EDUCATIONAL AND OUTREACH PROGRAMS AND PRESENTATIONS – The FWC works to engage members of the public in learning about listed species in a variety of ways, including partnering with educators to reach young people and creating fun and interactive incentives programs for wildlife viewing. Project WILD connects with teachers and other educators to provide educational materials in a wide variety of subject matter relating to Florida wildlife, including threatened and endangered species.

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.

Coastal Wildlife Conservation Initiative

The Coastal Wildlife Conservation Initiative (CWCI) is an FWC-led, multi-partner (e.g., FDEP, USFWS, and UF's Institute of Food and Agriculture Sciences) strategy that aims to facilitate a statewide, cooperative effort to provide greater consistency and coordination in protecting coastal wildlife populations, conserving and managing coastal ecosystems, and achieving balance between these efforts and human use of coastal areas. In FY 2022-23, the CWCI and partners continued progress on projects to conserve coastal wildlife, including listed species. One of these efforts was to expand offerings of a living shorelines training course for marine contractors developed by FWC and partners. Living shorelines (using plants, oysters, and other natural structural materials) are softer, greener alternatives to traditional seawalls used to stabilize shorelines from erosion, sea level rise, and other damage.

The CWCI has led efforts to develop technical assistance for FWC staff and partners on how to benefit wildlife when conducting dune restoration activities. In addition to providing important habitat for wildlife, including both

State and Federally listed species, dune restoration also protects people and property by improving coastal resiliency. The FWC acknowledges the necessity of balancing the needs of different state and federally listed species – such as Beach Mice, shorebirds and seabirds, and marine turtles - during restoration efforts. This technical assistance document will provide information on species' life histories, best practices to minimize impacts to vulnerable species, regulatory considerations, and a process partners can employ to make decisions in situations when species needs conflict.

Coordination and Assistance

REVIEWS AND ASSISTANCE FOR TRANSPORTATION PROJECTS - FWC performed 126 reviews of highway projects during FY 2022-23, 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 38 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 1,810 projects and provided written assistance on 1,529 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 2022-23. 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, regional visioning projects, 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 2022-23, FWC's LAP assisted more than 814 private landowners, including providing written evaluations of effects from proposed agricultural practices to listed species on 369 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 2022-23, 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 1,326 assists to more than 814 landowners on 137,901 acres.

CENTER FOR BIOSTATISTICS AND MODELING – Staff from FWRI's Center for Biostatistics and Modeling provided statistical and data management support for numerous projects focused on threatened and endangered species. Staff 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
American Crocodiles
American Oystercatcher
Black Skimmer
Boulder Star Coral
Chipola Slabshell
Choctaw Bean
Diamondback Terrapin
Eastern Indigo Snake
Elkhorn Coral
Everglade Snail Kite
Fat Threeridge
Florida Black Bear
Florida Bonneted Bat
Florida Burrowing Owl
Florida Grasshopper Sparrow
Florida Keys Mole Skink
Florida Panther
Florida Manatee
Florida Pine Snake
Florida Sandhill Crane
Florida Scrub Jay
Fuzzy Pigtoe
Georgia Blind Salamander

Gopher Tortoise
Green Sea Turtle
Gulf Moccasinshell
Gulf Sturgeon
Hawksbill Sea Turtle
Kemp's Ridley Sea Turtle
Key Ringneck Snake
Least Tern
Leatherback Sea Turtle
Little Blue Heron
Lobed Star Coral
Loggerhead Turtle
Marian's Marsh Wren
Mountainous Star Coral
Narrow Pigtoe
Nassau Grouper
Ochlockonee Moccasinshell
Osprey
Oval Pigtoe
Panama City Crayfish
Pillar Coral
Piping Plover
Purple Bankclimber
Red-cockaded Woodpecker
Reddish Egret
Reticulated Flatwoods Salamander
Roseate Spoonbill
Roseate Tern
Rough Cactus Coral
Round Ebonyshell
Short-tailed Snake
Smalltooth Sawfish
Snowy Plover
Southeastern American Kestrel
Southern Kidneyshell
Southern Sandshell
Shinyrayed Pocketbook
Staghorn Coral
Suwannee Moccasinshell
Tapered Pigtoe
Tricolored Heron
Whooping Crane
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 2022-23 (Exhibit 25). The total peak nest count for breeding birds on CWAs statewide was 19,624 in FY 2022-23, as compared to 11,124 in FY 2021-22, and 15,009 in FY 2020-21.

In addition to monitoring CWAs for use in FY 2022-23, staff and partners also collected disturbance and predator data, and stewarded regularly. Regional conservation 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 2022-23 were largely focused on restoring CWAs to pre-storm conditions following Hurricanes Ian and Nicole. Hurricane impacts included damage to regulatory buoys and signage, defoliation of vegetation, erosion, and a buildup of large debris at CWAs. Staff and partners have worked to repair signage, secure funding and contractors for the replacement of regulatory buoys, organize and conduct debris removals, and identify nearby dredging and nourishment projects that could aide in the restoration of habitat. Efforts to return CWAs to pre-storm conditions and increase resiliency of coastal CWAs are ongoing and will continue into FY 2023-24.

Exhibit 25. Critical Wildlife Areas in Florida during FY 2022-23.

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species in Bold)*	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	2, 28, 18, 1, 5, 22, 2 nests	200 ac
Flag Island[b]	Franklin	Year-round	Black Skimmer, Least Tern, American Oystercatcher, Caspian Tern, Gull-Billed Tern, Royal Tern, Sandwich Tern	99, 12, 7, 51, 13, 92, 95 nests	27 ac
St. George Causeway	Franklin	1 Mar to 30 Sept	American Oystercatcher, Brown Pelican, Caspian Tern, Royal Tern, Sandwich Tern, Sooty Tern, Laughing Gull	6, 883, 71, 1700, 350, 1, 964 nests	32 ac
Lanark Reef[b]	Franklin	Year-round	Black Skimmer, American Oystercatcher, Tricolored Heron, Brown Pelican, Gull-Billed Tern, Laughing Gull, Snowy Egret, Great Egret	30, 11, 20, 561, 9, 350, 1, 7 nests	34 ac
Alligator Point	Franklin	15 Feb to 31 Aug	Black Skimmer, Least Tern, American Oystercatcher, Wilson's Plover	1, 4, 2, 6 nests	66 ac
NORTH CENTRAL REGION (4 CWAs)					
Amelia Island	Nassau	1 Mar to 1 Sept	Least Tern, American Oystercatcher, Willet, Wilson's Plover	175, 1, 1, 14 nests	45 ac
Nassau Sound Islands[b]	Duval	Year-round	Black Skimmer, Least Tern, American Oystercatcher, Gull-Billed Tern, Willet, Wilson's Plover	111, 7, 2, 50, 1, 14 nests	37 ac
Fort George Inlet	Duval	1 May - 31 Aug	Black Skimmer, Least Tern, American Oystercatcher, Brown Pelican, Royal Tern, Laughing Gull, Sandwich Tern, Wilson's Plover	2, 114, 5, 62, 1834, 2063, 82, 20 nests	88 ac
Withlacoochee Caves	Citrus	15 Apr - 15 Aug and 15 Dec - 15 Mar	Southeastern Myotis, Tri-colored Bat		3 ac

Exhibit 25. *(continued)*

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES (Imperiled Species in Bold)	STATUS[a]	MANAGED AREA
NORTHEAST REGION (4 CWAs)					
Port Orange	Volusia	1 Jan - 31 Aug	American Oystercatcher	1 nest	4 ac
Matanzas Inlet	St. Johns	1 Apr - 15 Aug	Least Tern, Wilson's Plover	14, 1 nests	28 ac
BC49	Brevard	1 Jan - 31 Aug	Wood Stork, Roseate Spoonbill, Little Blue Heron, Tricolored Heron, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Cattle Egret, White Ibis, Glossy Ibis, Black-Crowned Night Heron, Anhinga, Double-Crested Cormorant	72, 5, 2, 21, 69, 3, 15, 4, 64, 22, 1, 7, 4, 23 nests	6 ac
Stick Marsh	Brevard	1 Jan - 31 Jul	Roseate Spoonbill, Tricolored Heron, Great Egret, Snowy Egret, Cattle Egret, Anhinga	64, 1, 162, 2, 38, 25 nests	2 ac
SOUTHWEST REGION (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, Cattle Egret, White Ibis, Glossy Ibis, Black-Crowned Night Heron, Double-Crested Cormorant (Green Heron nesting=present)	150, 3, 5, 30, 3, 390, 25, 110, 20, 15, 500, 20, 20, 47 nests	93 ac
Dot Dash Dit	Manatee	1 Jan - 31 Aug	Wood Stork, Roseate Spoonbill, Tricolored Heron, Great Blue Heron, Great Egret, Snowy Egret, Cattle Egret, Black-Crowned Night Heron, Anhinga, Double-Crested Cormorant	138, 13, 4, 31, 52, 3, 1, 3, 5, 31 nests	5 ac
Roberts Bay	Sarasota	Year-round	Roseate Spoonbill, Reddish Egret, Little Blue Heron, Tricolored Heron, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Anhinga, Double-Crested Cormorant	14, 1, 1, 2, 94, 23, 96, 6, 4, 6, 54 nests	5 ac
Myakka River	Sarasota	1 Jan - 31 Aug	Wood stork, Great Blue Heron, Great Egret, Snowy Egret, Anhinga	54, 3, 14, 1, 8 nests	1 ac

Exhibit 25. *(continued)*

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES (Imperiled Species in Bold)	STATUS[a]	MANAGED AREA
SOUTHWEST REGION (10 CWAs)					
Broken Islands	Lee	1 Mar - 31 Aug	Roseate Spoonbill, Reddish Egret, Tricolored Heron, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Cattle Egret, White Ibis, Black-Crowned Night Heron, Double-Crested Cormorant	2, 1, 9, 138, 3, 1, 1, 8, 37, 1, 126 nests	31 ac
Hemp Key	Lee	Year-round	Reddish Egret, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Double-Crested Cormorant	5, 99, 16, 21, 1, 148 nests	10 ac
Matanzas Pass Island	Lee	Year-round	Reddish Egret, Tricolored Heron, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Double-Crested Cormorant	5, 6, 25, 14, 1, 3, 1, 30 nests	4 ac
Coconut Point	Lee	Year-round	Roseate Spoonbill, Tricolored Heron, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron, Double-Crested Cormorant	2, 3, 2, 15, 7, 5, 8 nests	4 ac
Big Carlos Pass	Lee	Year-round	Tricolored Heron, Brown Pelican, Great Blue Heron, Great Egret, Snowy Egret, Black-Crowned Night Heron	1, 27, 4, 20, 2, 6 nests	2 ac
Little Estero Island	Lee	1 Apr - 31 Aug	Least Tern, Snowy Plover, Wilson's Plover, Killdeer	26, 1, 6, 4 nests	6 ac
SOUTH REGION (9 CWAs)					
Bird Island	Martin	Year-round	Wood Stork, Roseate Spoonbill, Brown Pelican, Great Egret, Snowy Egret, Double-Crested Cormorant	57, 14, 36, 30, 3, 8 nests	8 ac
Deerfield Island	Broward	Year-round	Gopher Tortoise	not surveyed	56 ac
Bill Sadowski[b]	Dade	Year-round	Supports foraging and roosting shorebirds and wading birds		700 ac
Rookery Islands	Collier	Year-round	Tricolored Heron, Great Egret, Double-Crested Cormorant	1, 4, 4 nests	1 ac
Caxambas Pass	Collier	1 Apr - 31 Aug	*No nesting occurred within the CWA boundary this year.*		1 ac
Big Marco Pass[b]	Collier	Year-round	Black Skimmer, Least Tern, Wilson's Plover	188, 41, 1 nests	30 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	2, 4, 56, 8, 29, 3, 3, 3, 17 nests	75 ac

Exhibit 25. *(continued)*

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES (Imperiled Species in Bold)	STATUS[a]	MANAGED AREA
SOUTH REGION (9 CWAs)					
Second Chance	Collier	1 Mar - 31 Aug	Least Tern, Black Skimmer, Wilson's Plover	61, 97, 5 nests	3 ac
Pelican Shoal	Monroe	1 Apr - 31 Aug	*No nesting occurred within the CWA boundary this year.*		1 ac

[a]Count or estimate of peak number of nests per breeding species at each site during the closure period in FY 2022-23. Numbers correspond in order of species listed in previous column.

[b]Site 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 2022-23. These activities included:

• Regular patrols of the Florida Panther reduced-speed zones. Officers statewide documented 3,234 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; 66,697 officer water patrol hours were dedicated to manatee zone enforcement, resulting in 2,974 citations and 4,077 warnings

• In addition, 82 citations and 102 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.

Protected Species Permitting and Technical Assistance

The FWC provides science-based and regulatory guidance to issue permits that ensure requested wildlife-related activities will either result in a net conservation benefit or prove not to be detrimental for the involved non-listed and listed species. In FY 2022-2023, the FWC provided federal agencies, other state agencies, environmental consultants, and regional and local regulatory authorities with guidance regarding projects that impact listed wildlife on managed federal, state, and private lands, and lands slated for development. Many of these entities, as well as researchers, landowners, and educational facilities, utilized this guidance to apply for scientific collecting (capture, sample, release, and/or collection of wildlife), captive possession, nuisance wildlife, human safety, and incidental take permits.

Assistance for developers, environmental consultants, and regulatory agencies usually consisted of any combination of the following: 1) comments on species management plans submitted for review; 2) development of species management plans or guidelines; and 3) on-site visits to determine management needs. The public was provided information on listed species such as: 1) life history and other biological information; 2) locality and occurrence data; 3) listing status and rule protections; and 4) solutions to nuisance situations (i.e., education on species behavior and habitat requirements with suggestions for coexistence with native wildlife).

Some permit holders are required to carry out an approved site or species-specific management plan, while others require permit holders to follow FWC approved species rules, guidelines, policies, or management plans. Scientific permits are generally conditioned on an approved research proposal or educational use plan. The permit review process usually involves coordination between FWC, researchers, wildlife educational outreach facilities, and may include external subject matter experts as well. More information on species guidelines, policies, and permit applications is available at https://myfwc.com/license/wildlife/protected-wildlife-permits/.

Wildlife Conservation Prioritization and Recovery

FWC is taking a pro-active, science-based approach to evaluating management needs of at-risk species on FWC-managed lands. FWC is implementing this approach through the Wildlife Conservation Prioritization and Recovery Program. Using input from our Imperiled Species Management Plan, Species Action Plans, Subject Matter Experts input, and previous Strategy's findings, FWC determines where focal species conservation can be affected on each Wildlife Management Area (WMA) or Wildlife and Environmental Area (WEA). FWC integrates the outcome of the landscape level assessment with area-specific and expert knowledge to produce species management strategies.

Strategies are particular to each WMA/WEA and outline the role of the area(s) in wildlife conservation. Each strategy contains measurable objectives for managing priority species and their habitat, a list of actions necessary to achieve

these objectives, and provisions for monitoring to verify progress towards meeting the objectives. Implementing this program ensures FWC is efficiently meeting the needs of Florida's at-risk species on lands managed by the agency.

During FY 2022-23, FWC completed five workshops covering four WMAs and three WEAs. The areas covered by a workshop included: Apalachee WMA-Judges Caves WEA (Jackson County), Branan Field WEA (Duval County), Florida Keys WEA (Monroe County), Herky-Huffman Bull Creek WMA (Seminole County), Orange Hammock WMA (Sarasota County) Triple-N-Ranch WMA (Seminole County). FWC initiated the drafting of strategies that are the output from these workshops, and all of them will be complete before the end of FY 2023-2024.

During FY 2022-2023, FWC finalized six strategies covering five WMAs and three WEAs. Properties covered by these completed strategies include: Apalachee WMA (Jackson County), the Everglades complex of WMAs – Everglades & Francis Taylor WMA, Holeyland WMA, Rotenberger WMA (Broward/Dade County), Judges Caves WEA (Jackson County), L Kirk Edwards WEA (Leon County), Lake Wales Ridge WEA (Polk/Highlands County).

The Program will continue to assess the changing needs of wildlife at the statewide level. FWC plans to update Strategies on a regular basis in conjunction with required updates to each area's management plan.

APPENDIX A. FLORIDA'S LISTED WILDLIFE SPECIES AS OF JUNE 30, 2023

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, 2023.

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

EXHIBIT A–2: Listed Birds in Florida as of June 30, 2023.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Common Name	Scientific Name	Status
Chipola Slabshell (mussel)	*Elliptio chiplolaensis*	FT
Choctaw Bean (mussel)	*Villosa choctawensis*	FE
Fat Threeridge (mussel)	*Amblema neislerii*	FE
Fuzzy Pigtoe (mussel)	*Pleurobema strodeanum*	FT
Gulf Moccasinshell (mussel)	*Medionidus penicillatus*	FE
Narrow Pigtoe (mussel)	*Fusconaia escambia*	FT
Ochlockonee Moccasinshell (mussel)	*Medionidus simpsonianus*	FE
Oval Pigtoe (mussel)	*Pleurobema pyriforme*	FE
Purple Bankclimber (mussel)	*Elliptoideus sloatianus*	FT
Round Ebonyshell (mussel)	*Fusconaia rotulata*	FE
Shinyrayed Pocketbook (mussel)	*Lampsilis subangulata*	FE
Southern Kidneyshell (mussel)	*Ptychobranchus jonesi*	FE
Southern Sandshell (mussel)	*Hamiota australis*	FT
Stock Island Tree Snail	*Orthalicus reses [not incl. nesodryas]*	FT
Suwannee Moccasinshell (mussel)	*Medionidus walkeri*	FT
Tapered Pigtoe (mussel)	*Fusconaia burki*	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	Orianne 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 2022-23

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/.

Crawford, B.A., A.L. Farmer, K.M. Enge, A. Heupel Greene, L. Diaz, J.C. Maerz, and C.T. Moore. 2022. Breeding dynamics of Gopher Frog metapopulations over 10 years. Journal of Fish and Wildlife Management 13:422–436.

Devitt, T.J., K.M. Enge, A.L. Farmer, P. Beerli, S.C. Richter, J.G. Hall, and S. Lance. 2023. Population subdivision in the Gopher Frog (*Rana capito*) across the fragmented longleaf pine-wiregrass savanna of the southeastern USA. Diversity 5(1):93.

Enge, K.M., A.L. Farmer, B. Bankovich, A. Heupel Greene, and M.T. Fedler. 2023. Status and distribution of the Gopher Frog (*Rana capito*) in Florida. Herpetological Conservation and Biology 18:57–70.

Enge, K.M., J.A. Gray, C.M. Sheehy III, T. Ferraro, D.M. Martin, and J.D. Mays. 2022. What killed the rarest snake in North America? Ecology:e3857.

Gilbertson, M. L. J., N. M. Fountain-Jones, J. L. Malmberg, R. B. Gagne, J. S. Lee, S. Kraberger, S. Kechejian, R. Petch, E. S. Chiu, D. Onorato, M. W. Cunningham, K. R. Crooks, W. C. Funk, S. Carver, S. VandeWoude, K. VanderWaal, and M. E. Craft. 2022. Apathogenic proxies for transmission dynamics of a fatal virus. *Frontiers in Veterinary Science* 9.

Jones, N.P., Ruzicka, R.R., Colella, M.A. *et al.* Frequent disturbances and chronic pressures constrain stony coral recovery on Florida's Coral Reef. *Coral Reefs* **41**, 1665–1679 (2022). https://doi.org/10.1007/s00338-022-02313-z

Marshall, C.D., B.A. Crawford, L.L. Smith, K.M. Enge, M. Elliott, S. McGuire, and J.C. Maerz. 2023. Using ancillary data to model the terrestrial distribution of Gopher Frogs. Journal of Wildlife Management 2023:e22397.

Ochoa, A., D. P. Onorato, M. E. Roelke-Parker, M. Culver, and R. R. Fitak. 2022. Give and take: effects of genetic admixture on mutation load in endangered Florida Panthers. *Journal of Heredity* 113:491-499.

Penfold, L. M., M. Criffield, M. W. Cunningham, D. Jansen, M. Lotz, C. Shea, and D. Onorato. 2022. Long-term evaluation of male Florida Panther (*Puma concolor coryi*) reproductive parameters following genetic introgression. *Journal of Mammalogy* 103:835-844.

Petch, R. J., R. B. Gagne, E. Chiu, C. Mankowski, J. Rudd, M. Roelke-Parker, T. W. Vickers, K. A. Logan, M. Alldredge, D. Clifford, M. W. Cunningham, D. Onorato, and S. VandeWoude. 2022. Feline leukemia virus frequently spills over from domestic cats to North American pumas. *Journal of Virology* 96:e01201-01222

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

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

Appendix D (*continued*)

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

Appendix D (*continued*)

Common Name	Scientific Name
INVERTEBRATES	
Southern Elktoe	*Alasmidonta triangulata*
Symmetrical Brain Coral	*Pseudodiploria strigosa*
White-tubercled Crayfish	*Procambarus spiculifer*

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.

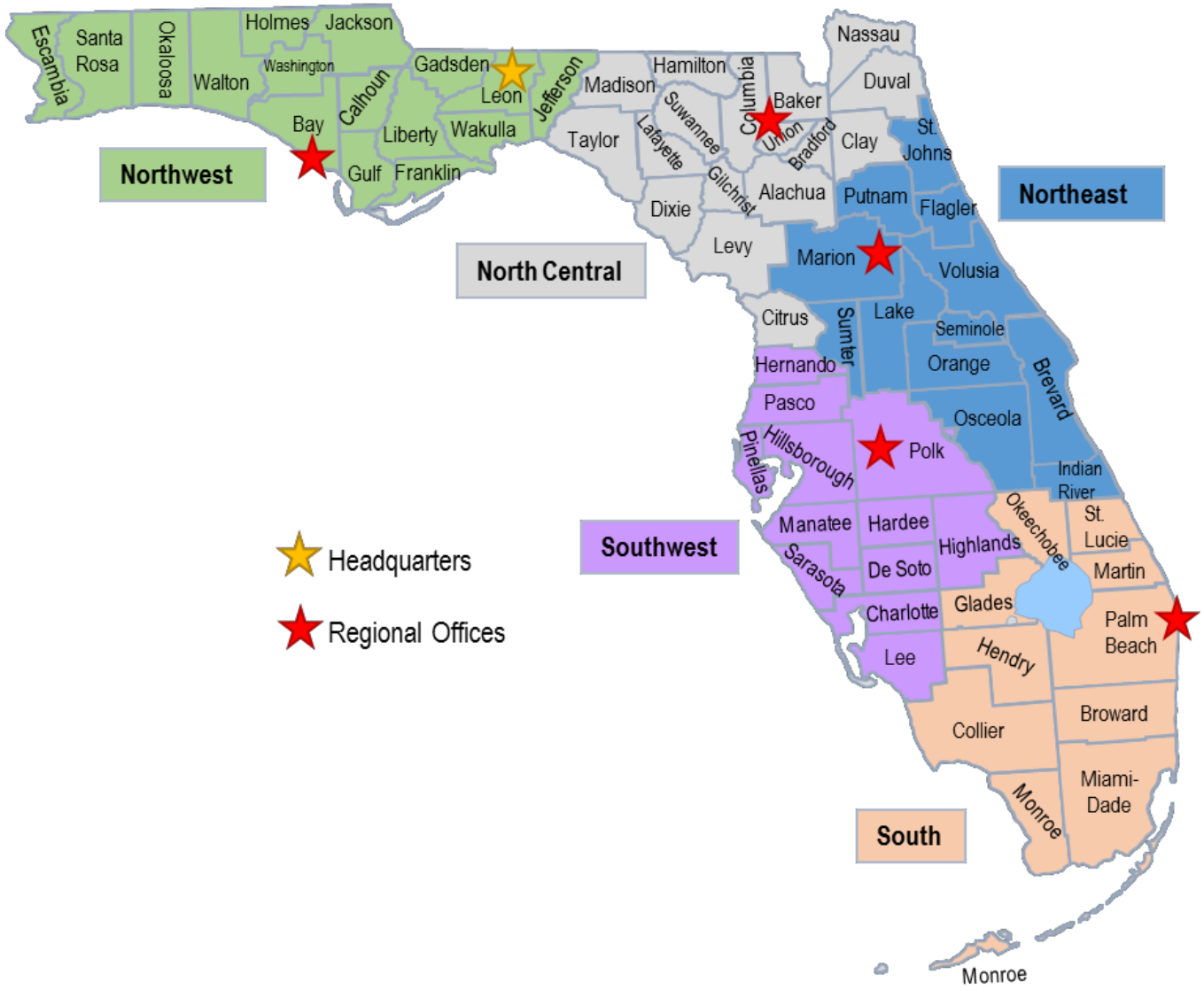
APPENDIX E (*continued*)

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 MANAGED AREAS