Florida Fish and Wildlife Conservation Commission

Endangered and Threatened Species Management and Conservation Plan

Progress Report

Fiscal Year 2021–22

February 2022

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EXECUTIVE SUMMARY

This report covers Fiscal Year (FY) 2021-22 and constitutes the 44th 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 funding request for FY 2023-24, a progress report providing a description of agency actions for listed species, and a description of FWC's citizen awareness program as it relates to listed species. In addition, it includes progress reports of staff activities relating to listed mammals, birds, amphibians, reptiles, fish and invertebrates; as well as updates on agency actions to provide coordination and assistance, Critical Wildlife Areas (CWA), incentive–based conservation programs, law enforcement activities and permitting for listed species.

SUMMARY OF PROTECTED WILDLIFE LISTS

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

Rules 68A-27.003 and 68A-27.0031, Florida Administrative Code (F.A.C.), contain the official Florida Endangered and Threatened Species List. Rule 68A-27.005, F.A.C., contains the SSC List. Currently, FWC lists 133 fish and wildlife species (Exhibit 1) as ST (39), SSC (1), FE (50), FT (38), FT(S/A) (4) and FXN (1). The list is unchanged since June 30, 2021. There is no duplication between lists. Collectively, these 133 species are referred to as Florida's listed species. FWC did not conduct management or research activities on all listed species this year; therefore, this report does not contain discussion of all listed species. Appendix A contains all of Florida's listed species as of June 30, 2022. Changes to the list may occur throughout the year. A compiled list of Florida's currently listed species is available at: https://myfwc.com/media/1945/threatened-endangered-species.pdf. Rules noted above are available at: https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27

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

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

Exhibit 1. Summary of Florida's Listed Species List as of June 30, 2022.

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)	17	38(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	1	1
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 here is their current Federal status as of June 2022.

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'sspecies 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 – No new listing actions were completed in FY 2021-2022. 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, and these documents were presented at the November/ December 2022 Commission meeting. After approval by the FWC Commissioners, and the FWC's Imperiled Species Management Plan has been updated, the striped newt will be listed as State-Threatened in Rule 68A-27.003, F.A.C, and removed as a Candidate Species from Rule 68A-27.0021, F.A.C.

In July 2022, the Imperiled Beach-Nesting Birds Species Conservation Measures and Permitting Guidelines were approved and incorporated by reference in 68A-27.003, F.A.C. These Guidelines include the American Oystercatcher, Snowy Plover, Black Skimmer, and Least Tern and will be effective September 2023.

Gopher Tortoise Guidelines revisions were presented and approved at the December 2022 Commission meeting and were incorporated by reference into rule 68A-27.003, 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 2021-22, no species changed federal status in Florida's Endangered and Threatened Species list.

Imperiled Species Management Program Species Guidelines

From July 2021 to June 2022, no new or revised Species Conservation Measures and Permitting Guidelines (Guidelines) were completed. These Guidelines outline the species' biological background and define activities likely to impair essential behavior patterns. They also provide voluntary conservation measures that may benefit the species and outline options for avoidance, minimization, and mitigation for State-Threatened species. The Guidelines serve to provide regulatory certainty for activities specifically authorized without a permit and inform potential applicants regarding permit options.

The Florida Endangered and Threatened Species List and State Listing Actions

In FY 2020-21, FWC received one species evaluation request to list the Florida Reef Gecko 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. 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 will be appointed shortly for Florida Reef Gecko and Kirtland's Warbler for evaluation for state listing action.

Funding Request

The recommended level of funding for FWC endangered species programs in FY 2023-24 is $38,574,684 (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 2023-24.

FUNDING SOURCE	AMOUNT ($)
Federal Grants Trust Fund	8,380,309
Florida Panther Research and Management Trust Fund	831,504
Grants and Donations Trust Fund	4,651,379
Land Acquisition	1,878,543
Marine Resources Conservation Trust Fund	9,761,310
Nongame Wildlife Trust Fund	4,558,546
Save the Manatees Trust Fund	2,196,615
State Game Trust Fund	732,570
General Revenue	5,583,908
TOTAL	38,574,684

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 – To monitor Beach Mice, FWC established track tube stations along the coastal dunes from Gulf to Escambia County. 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. Track tube stations do not provide population estimates, instead they indicate areas occupied by Beach Mice, and FWC uses the data 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. In FY 2021-22, 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 2021-22, the average detection rate varied from 0% at Deer Lake State Park to 96% at Gulf State Park (AL). 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 2021-22, FWC received a third year of funds from the USFWS for a multi-year project designed to assess Beach Mouse and habitat recovery since Hurricane Michael. A second 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 (except WaterSound where no mice were detected) 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 2021-22, FWC entered year 3 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. In the third year of this project, FWC monitored southeastern beach mice using a total

of 204 track tubes and supplemental camera traps (Exhibit 3). FWC continued monitoring at several sites within the Cape Canaveral Space Force Station to study how prescribed fire and other land management actions influence beach mouse distributions. To determine the effects of management, monitoring was established in areas of lower quality beach mouse habitat. Therefore, detection rates were lower in some areas compared to what would be expected in areas of high-quality Beach Mouse habitat. As a result of this monitoring, FWC developed plans to improve Beach Mouse habitat at Smyrna Dunes Park. Implementation of those plans is scheduled for early FY 2022-23. In FY 2021-22, FWC was awarded funding to continue the fourth year of this project.

Exhibit 3. Percentage of Beach Mouse detections at track tube stations deployed at 4 study sites within Southeastern Beach Mouse range for FY 2021-22.

Study site	Track tubes/Cameras	Detections	Total surveys	Percent detections
Canaveral National Seashore	25	75	177	42.4
Smyrna Dunes Park	30	300	613	48.9
Kennedy Space Center	10	35	67	52.2
Cape Canaveral Space Force Station	139	1,026	1,926	53.3

In FY 2021-22, work continued on a USFWS funded project investigating the genetic diversity of the Southeastern Beach Mouse and other Beach Mouse subspecies. This project will determine how genetically different mice are across the range of both Atlantic Coast Beach Mouse subspecies. This will help inform and prioritize management and recovery efforts, such as supporting translocations, for these species. Analyses are ongoing and are expected to be completed in early FY 2022-23.

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 though more effective management. During FY 2021-22, the third year of this project, FWC monitored Anastasia Island beach mice using a total of 81 track tubes throughout its range and completed surveys every 2 weeks (Exhibit 4). These data will be used to guide land management actions to improve beach mouse habitat and provide effective conservation benefits. As a result of this Beach Mouse monitoring, FWC worked with partners to improve habitat connectivity and developed a Beach Mouse habitat improvement project for the south end of Anastasia State Park which is scheduled to be completed in early FY 2022-23.

Exhibit 4. Percentage of Beach Mouse detections at track tube stations deployed at 2 study sites within Anastasia Island Beach Mouse range for FY 2021-22.

Study site	Track tubes	Detections	Total surveys	Percent detections
Anastasia State Park	32	362	648	55.9
Fort Matanzas National Monument	30	106	257	58.8

Florida Bats

GRAY BAT - The Gray Bat is a Federally Endangered species that roosts almost exclusively in caves throughout much of the south-central U.S. Gray bats occupy different caves in summer and winter based upon temperature, and historically some bats migrated out of Florida during winter. 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 (WNS), a disease decimating many hibernating bats in North America. WNS is not believed to be adversely affecting Florida's Gray Bats at this time and is having lower impacts on gray bats range wide than on other hibernating bat species in North America. 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. During the most recent winter count on February 10, 2022, FWC biologists again found no Gray Bats in or adjacent to Florida Caverns State Park. FWC biologists did not observe Gray Bats in any of the other 19 caves in northwest Florida visited during FY 2021-22 as part of a broader study of the use of caves by wintering bats. 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, it may be that the number of Gray Bats in Florida remains critically low, or the species may be absent from the state. 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. That may be a result, in part, of physical or behavioral traits that provide the gray bat some degree of resistance or tolerance to impacts from white-nose syndrome. Because some Gray Bats in Florida were 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.

FLORIDA BONNETED BAT - The federally Endangered Florida Bonneted Bat is endemic to Florida. In FY 2021–22, all 13 bat roosts (1 roost is 1-2 houses) were occupied for at least one night on Babcock-Webb Wildlife Management Area (WMA; Charlotte County). FWC observed pups in seven roosts throughout the FY across various survey types—pup counts, occupancy surveys, and after emergence surveys. FWC resumed capture

events in FY2021-22. During the December 2021 capture event, a total of 121 Florida Bonneted Bat individuals were captured and recorded, with 68 new tags placed. During the April 2022 capture event, 147 bats were processed, with 37 bats given passive integrated transponder (PIT) tags. FWC maintained 13 bat roosts on Babcock-Webb WMA during FY2021-22, including constructing new bat houses and replacing 8 houses that were in poor condition. FWC maintained seven automatic PIT tag readers on Florida Bonneted Bat houses in Babcock-Webb WMA. Each reader collects data on when PIT tagged bats enter and exit bat houses.

Since FY 2015-16, FWC and University of Florida (UF) have been working together to locate, monitor and characterize natural roosts and the surrounding habitat using acoustic surveys, mist net surveys and radio-telemetry. In FY 2021-22, both acoustic and mist net surveys were conducted in 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. FWC captured 18 Florida Bonneted Bats and attached radio transmitters to 13 individuals, using radio-telemetry to track these bats back to eight new roost trees located in Fakahatchee Strand Preserve State Park and four new roost trees in Big Cypress National Preserve. Emergence counts were conducted on these newly identified roost trees and on previously identified roost trees to document occupancy and roost use.

Acoustic surveys were conducted at Spirit of the Wild WMA (Hendry County), Dinner Island Ranch WMA (Hendry County), Fisheating Creek WMA (Hendry County), Everglades and Francis S. Taylor WMA (Miami-Dade, Broward, and Palm Beach Counties), J.W Corbett WMA (JWCWMA; Palm Beach County), John C. and Mariana Jones/Hungryland Wildlife and Environmental Area (JHWEA; Palm Beach County), Southern Glades Wildlife and Environmental Area (WEA; Miami-Dade County), and Rocky Glades Public Small Game Hunting Area (Miami-Dade County), Honey Moon Island State Park (Pinellas County), Terra Ceia State Park (Manatee County), Gamble Plantation (Manatee County), Myakka River State Park (Sarasota County), Oscar Sherer State Park (Sarasota), Orange Hammock WMA (Sarasota), Highlands Hammock State Park (Highlands County), Kissimmee Prairie Preserve State Park (Okeechobee County), Lake Kissimmee State Park (Polk County), Paynes Creek Historic State Park (Hardee County), and Peace River Park (Hardee County, Exhibit 5). FWC provided the USFWS with input on critical habitat designation, natural roost characteristics, acoustic survey protocols and protocols to address problems that may arise if Bonneted Bats roost in houses or other man-made structures.

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 WNS. 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 this threat, a large-scale study was initiated in 2014 to better understand the distribution and abundance of cave bats, quantify ideal cave roosting habitat, determine the susceptibility of caves to WNS infection, and identify WNS transmission routes. In FY 2021-2022, FWC biologists resurveyed 32 important bat caves, 19 in northwest Florida and 13 in north central Florida and observed 264 Tri-Colored Bats in 13 (84%) 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 (USGS) 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 free of WNS.

Following anecdotal reports of Tri-Colored Bats in culverts under roads, FWC biologists began surveying roadway culverts in winter 2017-2018 to determine their importance to cave-roosting bat species. In FY 2021-2022, FWC biologists surveyed 49 roadway culverts in north Florida. Biologists detected two species including the Tri-Colored Bat and the more common Southeastern Myotis and counted 26 Tri-Colored Bats in 9 (18%) of the culverts surveyed. 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. Despite the potential roosting habitat culverts provide, the use of culverts 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.

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, habitat, and activity patterns of our state's bat populations. Protocols were adapted from the North American Bat Monitoring Program so that FWC can address Florida-specific goals while contributing to bat conservation at the national level. Since the start of the LTBMP, over 140 stationary acoustic data collection points across the state.

Exhibit 5. Acoustic and mist netting surveys of Florida Bats conducted during FY 21-22.

Location	County	Acoustic Survey Nights	Bats Detected?	Mist net survey sites	Bats Captured?	New Roost Discovered?	Roost Occupancy
Babcock- Webb WMA	Charlotte	0	No	2	Yes	No	Yes - one roost occupied, 5 roosts not occupied or destroyed
Big Cypress National Preserve	Collier/Monroe	320	Yes	9	Yes	Yes	Yes - 4 roosts occupied, 1 roost not occupied
Collier-Seminole State Park	Collier	24	Yes	0	No	No	N/A
Fakahatchee Strand Preserve State Park	Collier	208	Yes	25	Yes	Yes	Yes - 8 roosts occupied, 9 roosts not occupied or destroyed
Florida Panther National Wildlife Refuge	Collier	48	Yes	14	Yes	Yes	Yes - 2 roosts not occupied or destroyed
Picayune Strand State Forest	Collier	608	Yes	29	Yes	No	N/A
Picayune Strand State Forest - Belle Meade Tract	Collier	128	Yes	0	No	No	N/A
Ten Thousand Islands National Wildlife Refuge	Collier	16	Yes	0	No	No	N/A
Fisheating Creek WMA	Glades	218	No	0	n/a	No	N/A
Dinner Island Ranch WMA	Hendry	182	Yes	0	n/a	No	N/A
Spirit of the Wild WMA	Hendry	146	Yes	0	n/a	No	N/A
Avon Park Air Force Range	Highlands	0	n/a	12	Yes	No	Yes - one roost occupied, 4 roosts not occupied or destroyed
Highlands Hammock State Park	Highlands	43	No, needs confirmation	0	No	No	N/A
Terra Ceia State Park	Manatee	120	Processing not complete	0	No	No	N/A
Gamble Plantation	Manatee	36	Processing not complete	0	No	No	N/A
Rocky Glades PSGHA	Miami-Dade	271	Yes	0	No	No	N/A
Southern Glades WEA	Miami-Dade	76	Yes	0	n/a	No	N/A
Everglades and Francis S. Taylor WMA	Miami-Dade, Broward, and Palm Beach	585	Yes	0	n/a	No	N/A
J.W. Corbett WMA	Palm Beach	485	Yes	0	n/a	No	N/A

Exhibit 5. *(continued)*

Location	County	Acoustic Survey Nights	Bats Detected?	Mist net survey sites	Bats Captured?	New Roost Discovered?	Roost Occupancy
John C. and Mariana Jones/Hungryland WEA	Palm Beach	2*	No	0	n/a	No	N/A
John C. and Mariana Jones/Hungryland WEA	Palm Beach	2*	No	0	n/a	No	N/A
Honey Moon Island State Park	Pinellas	28	No	0	n/a	No	N/A
Myakka River State Park	Sarasota	27	Processing not complete	0	No	No	N/A
Orange Hammock WMA	Sarasota	96	No	0	No	No	N/A
Oscar Sherer State Park	Sarasota	27	Processing not complete	0	No	No	N/A

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 2021-22, 883 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 a high level of manatee deaths and respond to manatee rescues along the Atlantic coast of Florida. Findings to date indicate starvation due to lack of forage within the Indian River Lagoon (IRL), however, consequences for manatees extend beyond the IRL. There is potential for long term health effects on reproduction and metabolism. More information can be found at https://myfwc.com/research/manatee/rescue-mortality-response/statistics/mortality/ume-carcass/. An interactive searchable web-based database with manatee mortality information is available at https://myfwc.com/research/manatee/rescue-mortality-response/statistics/.

In FY 2021-22, FWC staff and cooperators rescued 134 sick or injured manatees statewide 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 2021-22, 69 of these rescued manatees were released, 34 died, and 31 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. In FY 2021-22, the Gulf Coast of Florida was surveyed as part of the next statewide abundance survey. The Atlantic coast of Florida is scheduled to be flown in December 2022. After surveys from both coasts are completed, an analysis will be performed to update the statewide abundance estimate. FWC staff also conducted smaller-scale distributional surveys in IRL in response to the above-mentioned UME.

The FWC, with the USGS Sirenia Project and Mote Marine Laboratory in Sarasota, 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 was recently updated and included in an application of an Integrated Population Model (IPM) in southwest Florida. 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 (https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ecy.3426).

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 2021-22, FWC staff continued to monitor wintering sites on the Florida west coast undergoing restoration or mitigation. FWC continued to monitor water temperature of manatee warm-water habitats statewide via deployment of temperature probes at key sites as well as the management and interpretation of these data. In 2021, the Fish and Wildlife Research Institute (FWRI) received a NOAA-funded grant 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.

MANATEE FORUM - In FY 2021-22, the Manatee Forum, a diverse stakeholder group hosted by the FWC, met in November 2021 and in May 2022. Presentation topics in both of these meetings were related to the ongoing manatee UME along the Atlantic coast. 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 as well as a presentation summarizing the NOAA-funded actionable science grant. 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/h), 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 2021-22, FWC staff corresponded with Brevard County and provided informal input regarding potential future updates or data collection efforts while they assess potential revisions to their MPP. In FY 2021-22, FWC staff met regularly with Miami-Dade County and the USFWS to review the Miami-Dade County MPP and discuss revisions and FWC staff coordinated with Sarasota County to continue data collection efforts for future MPP revisions.

In FY 2021-22, HSC staff worked with the FWC Division of Law Enforcement staff on sign-posting plans for routine maintenance and repair of waterway signs for Collier and Miami-Dade counties. Staff continued to review and monitor available data in several of the county Manatee Protection Zone rules. In response to the Manatee UME, an emergency, temporary No Entry Zone in Brevard County was prepared and filed. In FY 2021-22, staff worked with local municipalities in Lee County and Citrus County to review and approve Manatee Protection Zones through the local ordinance process.

PERMIT REVIEWS – FWC staff produced 498 final comments or assistance letters for proposed projects reviewed in FY 2021-22 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 2021-22, 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 2021, the Florida Legislature provided $8 million for FY 2021-22 to the FWC to help restore manatee access to springs and restore habitat in other areas important to manatees. FWC staff collaborated with partners to develop and implement high-priority projects such as enhanced manatee access to Warm Mineral Springs in Sarasota County and shoreline stabilization in Blue Spring, Volusia County. FWC staff continued project planning and implementation of the Indian River Lagoon seagrass nursery network to aid in growth of forage donor material.

In FY 2021-22, FWC and USFWS staff began planning an interagency and stakeholder workshop with Florida Power & Light to begin process development and implementation of the recently finalized Florida Manatee Warm-Water Habitat Action Plan. One of the challenges identified in this long-term planning tool is the protection of manatees during work to upgrade existing power generating units.

OUTREACH – As in-person outreach events were minimal in FY 2021-22, staff focused on distributing educational materials through boating education classes, mail services, and via virtual presentation. 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 Endangered Florida Panther is a subspecies of the 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 radio transmitters. These radiocollared panthers are monitored two times a week and their locations are recorded. Since 1981, 264 panthers have been radiocollared. Radio telemetry data was collected on ten panthers in FY 2021-22. In addition to monitoring adults by radiotelemetry, biologists visit dens of radiocollared female panthers to collect data on and mark newborn kittens with PIT tags. Since 1992, 521 kittens have been handled at dens. In FY 2021-22, biologists visited one den and documented three kittens (one male, two females). During FY 2021-22, 26 wild panthers are known to have died, including three (female) radiocollared panthers and 23 (13 males, nine females, 1 unknown sex) uncollared panthers. Of the 26 documented, 23 panthers died after being hit by vehicles and three died of unknown causes.

FWC and USFWS maintained 44 unique trail camera locations on public lands north of the Caloosahatchee River between 1 July 2021 and 30 June 2022. A trapping effort of 9,818 trap-days produced 82 independent panther detections. This included 2 adult female detections, likely representing at least 2 unique individuals. panthers were detected in Charlotte County (Babcock Ranch Preserve), Glades County (Fisheating Creek WMA), and Lee County (Bob Janes Preserve). Female panthers were photographed at Babcock Ranch Preserve and Fisheating Creek WMA. A female was documented paired with an adult male on one occasion. Additional photos submitted to the FWC Panther Sightings website or otherwise communicated directly to FWC included 14 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 2021-22, FWC staff assisted with the completion of research projects including: an assessment of pseudorabies as an underdiagnosed cause of death in Panthers; optimizing virus management strategies for panthers. Agency staff served as lead or as co-authors on two 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 62 Panthers and Bobcats. As of 30 June 2022, FWC staff have confirmed 15 cases (by histology; 4 Panthers, 11 Bobcats) and 47 probable cases (based on remote video; 16 Panthers, 31 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 appear 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. Staff also compiled citizen reports with video that added to our database of probable cases. FWC staff 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, the FWC was in contact with regional wildlife rehabilitators, veterinarians, animal shelters, and more to monitor other species.

HUMAN-PANTHER INTERACTIONS – FWC staff verified Panthers were responsible for preying upon domestic animals (depredations) in 20 separate events in FY 2021-22. Panthers preyed on 13 calves (10 fatal, 3 injured), three miniature horses, two sheep, a goose, and a cat. These events occurred in Collier County. Additionally, one encounter occurred when a Panther was unexpectedly observed at close range by a person feeding feral cats. The Panther retreated after the person threw a stick at it. During depredation and interaction investigations, FWC staff provide advice and assistance to affected residents on how to reduce the human safety risk and prevent domestic animal attacks by panthers.

FWC staff provided information and reviews of numerous road and development projects throughout southern Florida in FY 2021-22. FWC staff review road projects and development plans to minimize the disruption and loss of Panther habitat and corridors, and to provide recommendations to reduce the risk of vehicle-Panther 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 2021-22, over 10,000 Panther sightings were submitted. Most records (74%) did not include evidence that would permit verification by FWC staff the animal observed was a panther. Of the records containing photographs, 33% were verified as panthers and 28% as bobcats. Other purported sightings were determined to be house cats, dogs, coyotes, bears, foxes, otters, raccoon and a monkey (Rhesus macaque).

North Atlantic Right Whale

The North Atlantic Right Whale is a Federally 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 staff collaborate with Federal, State, and non-governmental partners to carry out field research, including aerial surveys, biopsy sampling, tagging, disentanglement, and response to stranding events. Most of this work is supported by funds from the 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. During the 2021-22 calving season, FWC staff conducted 64 aerial surveys and 9 vessel cruises. Through collaborative efforts in the southeast U.S., the FWC, NOAA-Fisheries, the Georgia Department of Natural Resources, the Clearwater Marine Aquarium Research Institute, and volunteer sighting networks, 64 unique North Atlantic Right Whales were documented (including 15 newborn calves). Two Right Whale genetic samples were obtained.

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. The FWC analyzes ship traffic data to help monitor compliance with vessel speed regulations and conduct risk assessments. FWC 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.

Right Whales are part of an ongoing UME declared in 2017 by NOAA-Fisheries. The UME declaration results from elevated mortality for this species and, while the investigation is ongoing, vessel strikes and entanglement are the leading causes of death for the Right Whales examined. During the 2021-22 season, one entangled right whale was observed off Florida, a female with a dependent calf; a chronic entanglement case (#3560). She was first seen entangled in March 2021 in Cape Cod Bay and was the subject of multiple interventions. In January 2022, vessel-based monitoring revealed a small segment of rope exiting a rostrum wound and entering the mouth. Much of the discussion in this case had centered on the presence/absence of rope in the rostrum wound, so this information was critical to inform future response efforts. Another whale (#1301) and her 2–4-week-old calf were sighted off Sea Island, GA on January 18, 2022. The calf was noticeably thin and emaciated and likely died on the calving grounds as #1301 was subsequently seen alone in Cape Cod Bay in April. The reasons for this failure to thrive are unknown.

BIRDS

Audubon's Crested Caracara

The Audubon's Crested Caracara is a Federally Threatened species. FWC continued annual Caracara breeding territory surveys during FY 2021-22 on Dinner Island Ranch, Fisheating Creek, Holey Land, Okaloacoochee Slough, and Rotenberger WMAs using FWC's standard monitoring protocol. New active nests were found in Fisheating Creek (3), Dinner Island Ranch (1), and Okaloacoochee Slough (1) WMAs. Spirit of the Wild WMA will begin breeding territory surveys next FY but did opportunistically find a nest this FY. This is the first active Caracara nest found in Spirit of the Wild WMA. Historical nests were active in Holey Land (1), Fisheating Creek WMA (3), and Okaloacoochee Slough (1) WMAs. Nesting was not observed at Rotenberger WMA; however, area staff suspect it may be the same pair nesting in Holey Land WMA. Next FY, Okaloacoochee Slough WMA staff will conduct breeding territory surveys on another property FWC acquired in 2021 and will revisit historically active nests in the area.

Eastern Black Rail

The Black Rail is a sparrow-sized, secretive marshbird that occupies extremely shallow fresh and saltwater marshes in North and South America. The Eastern Black Rail subspecies, which occurs in the U.S. in Florida and north along the Atlantic Coast, is Federally Threatened because of rapid, severe population declines and an apparent range contraction in the northern extent of its U.S. distribution. In an effort to understand the habitat selection and the impact of management on Black Rails, FWC researchers continue to survey for the species. JWCWMA and JHWEA staff conducted Eastern Black Rail surveys in 2020, 2021, and 2022. Everglades and Francis S. Taylor WMA conducted Black Rail surveys in 2021 and 2022. Staff used the FWC standardized Black Rail callback monitoring protocol in all areas. No Black Rails were detected during the callback surveys on JWCWMA and JHWEA. Black Rails were detected

at one survey station in Everglades and Francis S. Taylor WMA; however, King Rails were detected in all three areas. Even though Black Rails were detected once on Everglades WMA during callback surveys, Black Rails were detected multiple times elsewhere on the property via opportunistic observations within the Everglades and Francis S. Taylor WMA outside the survey period. Annual surveys were implemented on Salt Lake WMA in 2017. A survey was conducted in FY 2021-22 by FWRI. No Black Rails were detected during this survey. Habitat management on the area during FY 2021-22 included treatment of 100 acres of potential black rail habitat with prescribed fire. A second consecutive year of exploratory surveys for Black Rails were conducted on Tosohatchee WMA during FY 2021-22 by FWRI staff. Seven survey stations were each visited six times. Black Rails were not detected.

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. However, the 2020 population estimate showed the first significant decrease in the last 10 years to roughly 2,550 birds. The population 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 585 active Snail Kite nests recorded throughout Florida in 2021, a major increase in nests compared to 2020 (184 nests) and was the third largest recorded number of active nests since at least 2006. Lake Okeechobee, Lake Hicpochee Impoundments (Glades County), and the C-44 Stormwater Treatment Area (Martin County) produced the most nests.

In anticipation of the planned 2019/20 East Lake Tohopekaliga (Osceola County) drawdown, FWC funded a UF study of juvenile Snail Kite movement, survival, and response to hydrologic fluctuation. The study focuses on the Kissimmee Chain of Lakes, but some juvenile kites were tracked from other wetland systems. Global positioning satellite (GPS) trackers were used to track 56 juvenile Snail Kites that fledged from nests on East Lake Tohopekaliga, West Lake Tohopekaliga, Lake Kissimmee (all three Osceola County), Lake Parker (Polk County), Payne's Prairie (Alachua County), Loxahatchee Slough (Palm Beach County), Lake Marian (Osceola County) and Lake Jackson (Osceola County). The juveniles spent an average of 42 days near their nest site after fledging before traveling a significant distance from their nest area. They typically returned to their nest area multiple times before leaving their nest site for good an average of 53 days after fledging. Over the course of their first year, the juveniles traveled as much as 2,865 miles, reaching as much as 505 miles from their nest site. There was no noticeable impact of the 2020 drawdown of East Lake Tohopekaliga on either movement or survival of juvenile Snail Kites.

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. Staff 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. 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. Additionally, data from both years will be used to improve our detection probability model. The estimated population size of rural Burrowing Owls resulting from two years of surveys will be important when evaluating the relative proportion of rural vs. urban owls as well as serve as the starting point for assessing population trends through time.

Florida Grasshopper Sparrow

The Florida Grasshopper Sparrow is listed as Federally Endangered. In 2018, the FWC and partners estimated that fewer than 30 breeding pairs remained in the wild. FWC helps these birds through a combination of conservation actions, including habitat management, population monitoring and nest protection from predators, and a captive breeding and release program.

HABITAT MANAGEMENT - To restore and maintain the Florida Dry Prairie habitat for sparrows, Three Lakes WMA (TLWMA) staff in Osceola County have performed several management actions. Management includes treatment of small oak trees and cabbage palms mechanically to prevent encroachment into dry prairie. Florida Grasshopper Sparrows rely on prescribed fire to maintain vertical structure at a minimal height and allow for maintenance of bare ground. A total of 6,365 acres of dry prairie were burned in FY 2021-22, or about a third of the total dry prairie that the Florida Grasshopper Sparrow most frequently use. Additionally, staff mechanically treated 150 acres (roller chopped: 117, mulched: 33). These mechanical treatments help improve habitat and control saw palmetto density. Invasive plant management of cogon grass and Brazilian peppertree within the dry prairie was performed as needed.

DEMOGRAPHIC MONITORING AND NEST PROTECTION - The tenth season of Florida Grasshopper Sparrow demographic research by FWC was conducted during FY 2021-22 and the beginning of FY 2022-23 (March-August 2022). This project has been a cooperative effort involving staff and support from FWC, the USFWS, and members of the Florida Grasshopper Sparrow Working Group. As part of FWC's continued effort to color-band the entire population at TLWMA to be able to identify all individuals, 8 adult males, 6 females, 1 dependent fledgling, and 209 nestlings were newly captured and color-banded in the 2022 season. In addition to these new captures, 62 males and 43 females banded prior to 2022 were resighted in 2022. Together, the number of color-banded individuals observed at least once at TLWMA in 2022 was 70 adult males, 50 adult females, 1 dependent fledgling, and at least

133 fledged nestlings of unknown sex. All known adult males and females in the TLWMA population have been color-banded in 2022.

During FY 2021-22, TLWMA staff conducted Florida Grasshopper Sparrow point count surveys. Staff surveyed 250 stations visiting each point 3 times from April 4, 2022 to May 18, 2022. Sparrows were detected at 38 survey stations. Fourteen adult male sparrows were detected during the first repetition. Seventeen adult male sparrows were detected during the second repetition. Twenty adult male sparrows were detected during the third repetition.

In the 2022 season, FWC biologists located and monitored 80 Florida Grasshopper Sparrow nests. Of these nests, at least 45 survived to fledge young (5 of which were partially depredated but fledged at least one young), 21 were depredated by snakes, 2 were depredated by red imported fire ants, and 2 failed for unknown reasons but evidence indicate the female may have been depredated outside the nest for one of them. Five of the nests that failed were nests that did not have a predator deflection fence. Miniature nest cameras were placed at the entrance of 77 grasshopper sparrow nests, helping us identify the predator in many cases. The combined data provided by the nest camera project (2014-2022) have been invaluable to understanding the predator community at TLWMA and will be critical when planning future predation management strategies. In 2022, Florida Grasshopper Sparrow nests (n=80) 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. While fence installation is labor-intensive and fences only protect the subset of nests located prior to predation, it helps boost local productivity and protect incubating females providing biologists more time to investigate long-term habitat management solutions.

CONSERVATION BREEDING AND RELEASE PROGRAM - In 2019, staff started releasing Florida Grasshopper Sparrows that were bred at White Oak Conservation, a conservation breeding facility. Since then, birds have also been bred at Avian Preservation and Education Conservancy and Brevard Zoo. The purpose of these releases is to augment the wild sparrow population and to assure the population is genetically diverse. As of August 18, 2022, staff have released 455 Florida Grasshopper Sparrows at TLWMA, Osceola County, including 110 adults and 345 juveniles. Over 100 birds have been released per-year: 105 in 2019, 148 in 2020, 146 in 2021, and so far, 56 in 2022. Staff released 109 sparrows in FY 2021-22 (107 juveniles and 2 adults). Releases in 2022 are ongoing.

To monitor efficacy of the release program, staff uniquely banded all birds. FWC obtained data on the survival of

released birds via re-sights of their color leg-bands during the 2022 breeding seasons. These data indicate over 30% of the released birds survive and stay in the population. Many of the released birds have bred successfully in the wild; around 25% of released sparrows were detected breeding either with a wild partner or another captive-bred bird. The adult Florida Grasshopper Sparrow population at TLWMA between 2020 and 2022 was composed of about 45% captive-bred and released sparrows. In 2022, 47% of the adult population were released birds and another 22% are birds of wild origin but descend from released birds; thus, 69% of adults at TLWMA are genetically related to birds from the conservation breeding and release program. Over 60% of the nests in the wild had at least one released parent and these pairs produced over 65% 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. Between 2019 and 2022, the sparrow population at TLWMA grew by 140%.

Florida Sandhill Crane

The Florida Sandhill Crane is State 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 2021 breeding season. Staff identified 433 adults and 63 juveniles during the 2021 surveys. Adult numbers were the second highest observed among all survey years, however, the number of juveniles was slightly less than average. Road survey routes in Osceola and Okeechobee County remain regional crane strongholds.

To understand habitat use, movements, and survival of cranes in suburban areas and conservation lands, staff began radio-tagging individuals in June 2017. In FY 2021-22, FWC continued radio-tagging and/or color-banding cranes. To date, 41 birds have been radio-tagged and 77 color-banded throughout central Florida. Staff also determined that suburban cranes had home ranges similar in size to those reported in past studies on prairie/pastureland. Some conservation land birds had very large home ranges which contributed to conservation land cranes having a mean home range size 6 times greater than those of suburban cranes. FWC staff speculates that supplemental feeding may have influenced both suburban and conservation land home range size. Although the average size of home ranges differed, survival was similar between suburban and conservation land cranes. The probability of a crane pair successfully hatching, fledging, and raising a chick to independence was not different between conservation land and suburban cranes. Project results indicate that preserving and maintaining natural areas within and surrounding developed areas is necessary for Florida Sandhill Crane habitat management, and mortalities from vehicles and prevention of intentional feeding by landowners has to be addressed.

Florida Scrub-Jay

The Florida Scrub-Jay is a Federally Threatened species that is endemic to 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 numbers 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.

SURVEYS – Volunteers from the Jay Watch program conduct surveys each summer. This year, surveys were conducted over 3 days with three adult jays observed. On multiple occasions, surveys were done partially or unable to be done at all due to presence of predators (Swallow-Tailed Kites and Red Shouldered Hawks). The Arbuckle WMA and the Walk-In-The-Water WMA are part of the Lake Wales Ridge Sate Forest and are managed using prescribed fire. In FY 2021-22, 22 Scrub-Jay groups were located on Arbuckle WMA. The number of groups (22), the total number of birds (73), the number of juveniles per group (.91) and the mean group size (3.3) were all similar to the previous year. In FY 2021-22, two Scrub-Jay groups were located on Walk-In-The-Water WMA. The total number of groups (2), the total number of birds (4) and the mean group size (2.0) all decreased from the previous year. The number of juveniles per group (0.0) stayed the same (Exhibit 6). To help stabilize and hopefully increase the population at Walk-In-The-Water, FWC funded an ongoing sandhill restoration project.

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 Henscratch, McJunkin, Lake Apthorpe, Sun ‘N Lakes, and Carter Creek tracts. Group numbers remained the same at the Sunray tract. Group numbers decreased at the Gould Rd., Highland Park Estates, Highlands Ridge, Holmes Ave., Jack Creek, Lake Placid Scrub, Royce and Silver Lake tracts. Prescribed fires occurred on 240 acres and 273 acres were mechanically treated (Exhibit 6).

Annual monitoring of Florida Scrub-Jays during FY 2021-22 occurred at three Wildlife and Environmental Areas in the southwest region. Scrub-Jay monitoring at Hickey Creek WEA in Lee County revealed 2 groups of scrub-jays and a total 7 birds on the site. The group numbers remained the same as FY 20-21. Two juveniles were confirmed after the nesting season. Additional birds were occasionally observed just off the site in a residential area. Management actions include 151 acres of burning, 25 acres of strategic mechanical mowing within oak scrub along with chemical treatment exotics also occurs on 287 acres within their habitat. The Platt Branch WEA in Highlands County was monitored by FWC and has a Scrub-Jay population that consists of 9 groups with 27 individuals. In FY 2021-22, group

numbers decreased, but individuals remained consistent with FY 2020-21 and each remain above the long-term average. Management efforts included burning 377 acres at the site including some scrub habitats. Mechanical treatments included mowing 26 acres to improve habitat. At Moody Branch WEA in Manatee County, the group number increased 2 from the previous year. Two jays from the nearby Rutland Ranch Preserve immigrated to the site as evidenced by leg band combinations. In FY 2021-22, mechanical treatments were conducted on 230 acres and 289 acres were treated chemically to remove exotic plant species and 153 acres of habitat was burned (Exhibit 6).

Exhibit 6. Florida Scrub-Jay surveys and management activities conducted during FY 21-22

WMA/WEA	County	Number of Groups	Number of Birds	Mean Group Size	Juveniles per Group	Habitat Management (acres)
Arbuckle	Polk	22	73	3.3	0.9	0
Carter Creek tract	Highlands	29	101	3.5	1.1	Prescribed Fire (49); Mechanical (105)
Gould Road tract	Highlands	10	42	4.2	1	Mechanical (110)
Henscratch 27 tract	Highlands	0	0	0	0	Mechanical (7)
Henscratch tract	Highlands	8	20	2.5	0.4	Prescribed Fire (130); Mechanical (9)
Hickey Creek	Lee	2	7	3.6	1	Prescribed Fire (151); Mechanical (26)
Highlands Park Estates tract	Highlands	2	7	3.5	0.5	0
Highlands Ridge	Highlands	8	20	2.5	0.5	0
Holmes Ave tract	Highlands	10	31	3.1	0.9	Mechanical (1)
Jack Creek tract	Highlands	0	0	0	0	0
Lake Apthorpe tract	Highlands	6	15	2.5	0.7	Prescribed Fire (4); Mechanical (10)
Lake Placid Scrub tract	Highlands	35	124	3.5	1.4	Mechanical (7)
McJunkin tract	Highlands	18	68	3.8	1.7	Prescribed Fire (23); Mechanical (2)
Moody Branch	Manatee	8	29	3.6	0.9	Prescribed Fire (153); Mechanical (230)
Platt Branch	Highlands	9	27	3	0.8	Prescribed Burning (377) Mechanical (26)
Royce Ranch tract	Highlands	6	28	4.7	2.2	Prescribed Fire (6); Mechanical (1)

Exhibit 6. *(continued)*

WMA/WEA	County	Number of Groups	Number of Birds	Mean Group Size	Juveniles per Group	Habitat Management (acres)
Silver Lake tract	Highlands	8	22	2.8	0.4	Prescribed Fire (28); Mechanical (3)
Sun 'N Lakes tract	Highlands	13	44	3.4	0.8	Mechanical (18)
Sunray	Polk	1	3	3	1	Mechanical (130)
Walk–in–the–Water	Polk	2	4	2	0	Mechanical (47)

Red–Cockaded Woodpecker

The Red-Cockaded Woodpecker (RCW) is Federally Endangered. Staff continues to enroll landowners in the statewide RCW Safe Harbor program, which allow landowners to restore or enhance RCW habitat without incurring additional regulatory restrictions on the use of their land. No new agreements were signed in FY 2020-21, but there are 17 properties currently enrolled in the program totally roughly 76,000 acres of land protected for RCWs. Exact acreage will be confirmed this year.

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 RCWs range-wide. This population continues to be monitored cooperatively by the National Park Service (NPS) and FWC. The total number of known RCW clusters in BCNP is 126, with 123 actively being managed and 3 having been previously deleted. In FY 2020-21, cluster inspections revealed 92 active clusters and 23 inactive clusters. A further 8 clusters were not assessed due to time and access constraints. One cluster was newly discovered during annual inspections. Thirty-four active clusters were chosen as a subsample for intensive breeding season monitoring, 32 of which had confirmed potential breeding groups (PBG). Thirty-one confirmed PBGs attempted nesting with 30 of those successfully hatching chicks. Across all monitored groups, 23 juveniles were confirmed as fledged. Eleven groups failed with their first clutch and 7 of those attempted to re-nest, with 4 ultimately succeeding in fledging young. This year, FWC and NPS staff cleared around 2924 RCW cavity trees as a prescribed and wildfire protection measure, benefiting 52 clusters. BCNP burned approximately 55,300 acres of RCW foraging and nesting habitat, benefiting 24 clusters. Invasive plant treatments totaling over 120,000 acres benefited 51 clusters. No artificial cavities were installed, however 61 new natural cavity trees in various stages of excavation were discovered (Exhibit 7).

In FY 2021-22, FWC staff at JWCWMA, JHWEA, and John G. and Susan H. Dupuis, Jr. WEA determined the number of active clusters, monitored active clusters for nests, color-banded nestlings and adults, and determined fledging success. Artificial cavities were installed, replaced, and maintained in existing clusters. Having met federal recovery standards of 40 PBGs combined with the Susan H. Dupuis, Jr. 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. 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. Susan H. Dupuis, Jr. WEA will continue to evaluate whether they need translocated birds on an annual basis in coordination with SRTC (Exhibit 7).

Picayune Strand State Forest is a 74,138-acre WMA located in Collier County in Southwest Florida and is cooperatively managed by Florida Forest Service (FFS) and the FWC. RCW population monitoring began on the property in March 2019. As of FY 2021-22, Picayune Strand State Forest has 16 total RCW clusters, 13 active and 3 inactive. Pre-breeding population surveys revealed 13 PBGs. During nesting season, all the 13 PBGs attempted nesting, 7 of which were successful. Of the twelve nest failures, two groups did not attempt to re-nest. Of the six groups that attempted re-nesting, 4 failed again, with two groups failing twice. We had a total of 22 nestlings, 14 of which were banded and 11 successfully fledged, producing 5 males and 6 females. FFS completed 3,285 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 90 RCW trees in March 2022. FWC also installed 2 artificial cavities and 1 drilled cavity in one inactive cluster (Exhibit 7).

The Fred C. Babcock/Cecil M. Webb Wildlife Management Area is located in Charlotte County and covers approximately 65,758 ac. RCW monitoring began in 1998, and intensive monitoring of clusters, including group size and fledge counts, began in 2001. All clusters are checked prior to March for activity. Cavity maintenance is also completed during this time. Surveys conducted in FY 2021-22 revealed 46 active RCW clusters. Annual roost checks confirmed 45 potential breeding pairs, with one solitary bird cluster. Forty-two potential breeding pairs attempted nesting; 30 nests failed with four successful re-nests. Thirty-four nestlings were banded with 35 confirmed fledglings. One artificial cavity was replaced, along with 2 new artificial inserts across the property. FWC completed controlled burns on 24,113 acres, roller chopped 2,379 acres, and chemically treated 21,356 acres (Exhibit 7).

The Babcock Ranch Preserve is located in Charlotte County and covers 67,619 acres. The ranch was purchased by the state in 2006 and was placed under management of the FFS in 2016. RCW monitoring began in 2008, but intensive monitoring of clusters, including fledge counts and potential breeding group counts, began in 2012. Twenty-two clusters were active during the 2022 breeding season, of which 21 were potential breeding groups and one contained a solitary male. Fifteen of these groups attempted nesting for a total of 17 attempts; 10 were successful, 7 failed. A total of 18 nestlings were banded, 14 of which fledged successfully. FWC personnel installed 10 new inserts and replaced 3 inserts. FWC assisted partners with 10,279 acres of prescribed fire (Exhibit 7).

Platt Branch WEA is in Highlands County and cover 1,971 acres. The population consisted of five active clusters in FY2021-22, which is down one from the previous two years as one of the clusters became captured by large adjacent group. All five of these clusters represent potential breeding groups with no single bird clusters this year. An additional three clusters occur on adjacent lands. Nesting success was monitored during the spring of 2022, with 4 successful nests, 2 failed nest and eight nestlings banded. Five birds were confirmed to have fledged which is the same as the previous year. Controlled burns were conducted on 377 acres and mechanical habitat enhancement strategically targeted 26 acres. Fuel reduction was completed around all active clusters and 2 new insert cavity boxes were installed (Exhibit 7).

In FY 2021-22, staff conducted annual RCW monitoring, cavity maintenance, and habitat management on the Apalachicola WMA, Apalachicola River WEA, Blackwater WMA, Croom WMA, John C. and Mariana Jones/Hungryland WEA, and Tate’s Hell WMA as well (Exhibit 7).

Exhibit 7. Red-Cockaded Woodpecker surveys and habitat management activities conducted during FY 21-22

Location	County	Active Clusters	Potential Breeding Groups	Solitary Birds	Nest Attempts	Bandings	Fledglings	Cavity Maintenance	Habitat Management (acres)
Apalachicola WMA	Leon, Wakulla							Installed 45 inserts in 15 clusters	
Apalachicola River WEA	Franklin	11	11	1	11	23	17	Augmented 3 existing clusters	Prescribed fire (828), Mowing (2)
Babcock Ranch Preserve	Charlotte	22	21	1	17 (7 failures)	18	14	10 inserts added, 3 inserts replaced	Prescribed fire (10,279)
Babcock/Webb and Yucca Pens Unit WMA	Charlotte, Lee	46	45	1	54 (30 failures)	34	35	2 inserts added, 1 insert replaced	Prescribed fire (24,113), roller chopped (2,379), chemically treated (21,356)
Big Cypress National Preserve (sub-sample of monitored group)	Collier, Monroe, Dade	92	32	2	31 (20 successful nests, 11 initially failed with 4 out of 7 re-attempted nests succeeding)	8	23	none conducted	Prescribed fire (55,300); Vegetation clearing around 292 trees; Invasive plant treatments (120,000)
Blackwater WMA	Okaloosa, Santa Rosa								Mechanical treatment (8 acres in 3 clusters); hand clearing in preparation for prescribed burns (10 clusters)
Croom WMA	Hernando, Sumter	45	42	3	40 (7 failures)	62 (8 unbanded)	57	8 inserts added	Prescribed fire (4,692)
John C. and Mariana Jones/Hungryland WEA	Martin, Palm Beach	4	4	0	4	4	2	4 artificial insert cavities installed	33 cavity trees cleared around

Exhibit 7. *(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	17	1	21	33	20	Installed and replaced 11 cavities	Prescribed fire (1,100)
J.W. Corbett WMA	Palm Beach	35	30	5	30	32	30	3 new artificial insert cavities installed	90 cavity trees cleared around
Picayune Strand State Forest WMA	Collier	13	13	0	19 (12 failures)	14	11	2 inserts installed	Prescribe fire (3,285); invasive vegetation treatment (2,391); 90 trees cleared around
Platt Branch WEA	Highlands	5	5	0	6 (2 failures)	8	5	2 inserts added	Prescribed fire (377), mechanical (26)
Tate's Hell WMA	Franklin, Liberty	76	69		69	50	35	Installed 20 cavities (12 cavities in 3 new recruitment clusters, 8 cavities to augment 5 existing clusters); 20 cavities cleaned of debris	Mechanical treatment (96)

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 began a study to understand the effects of fire on the abundance and reproductive performance of the Mariana's Marsh Wren and the Wakulla Seaside Sparrow, two

of Florida's imperiled saltmarsh songbird species. A limited field season was implemented in FY21-22 because of staff turnover, with staff surveying marshes in Wakulla and Franklin counties. Results to date indicate that both species are commonly found the area's saltmarshes, but that reproductive performance for both species is low. Data collection is ongoing, and an analysis of the effects of fire on the abundance and reproduction of these birds has yet to occur.

SEASIDE SPARROW GENETICS STUDY - Scott's Seaside Sparrow and Wakulla Seaside Sparrow are non-migratory salt marsh specialists and two of five recognized subspecies of seaside sparrow that breed in Florida. Questions have been raised about whether current subspecies designations are valid. FWC and collaborators at UF examined population structure in seaside sparrows along Florida's coastline using multiple approaches and modern genetic methods to determine the relatedness of sparrows in these populations. Three genetic clusters (in addition to the interior population of Cape Sable seaside sparrow which was not included in this study) were identified corresponding to three geographic regions in Florida: Atlantic coast, Gulf coast peninsula, and the western panhandle. Genetic analysis did not support the distinctiveness of state listed Wakulla Seaside Sparrow but did support Scott's and Louisiana Seaside Sparrow as distinct genetic units. Analysis of morphological data did not suggest that Wakulla Seaside Sparrow is distinguishable from other Florida subspecies using body measurements. Characteristics of primary song were analyzed for differences between subspecies and genetic groups. Differences in primary song did not match up with putative genetic clusters based on sample location. Although characteristics of primary song differed geographically, these differences do not suggest the Wakulla subspecies is distinguishable from the other subspecies by primary song. These combined results will be used to refine taxonomic designations of seaside sparrow which may affect listing status and, therefore, future conservation and management priorities.

Shorebirds and Seabirds

Twenty species of shorebirds and seabirds breed in Florida, four are State Threatened (American Oystercatcher, Black Skimmer, Least Tern, and Snowy Plover), and one is Federally Threatened (Roseate Tern). Over 40 species of shorebirds and seabirds winter in Florida, two are Federally listed, the Red Knot (Threatened) and Piping Plover (Endangered).

SHOREBIRD PROGRAM - To build upon the existing species action plan completed in November 2013 (https://myfwc.com/wildlifehabitats/wildlife/species-action-plans/), in 2016 FWC and partners completed the Florida Beach-nesting Bird Plan that includes specific population goals, metrics, timelines, funding needs, and a conceptual framework consistent with national shorebird recovery plans (http://flshorebirdalliance.org/media/1007/floridabeachnestingbirdplan.pdf). To implement the Beach-nesting Bird Plan, FWC inaugurated a dedicated Shorebird Program that 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. The 4-year Phase I project is now complete and Phase II is ongoing. Shorebird Program staff also assisted the FWC Policy team in developing draft Species Conservation and Permitting Guidelines for Imperiled Beach-nesting Birds for presentation to the Commission in July 2022. Data provided from the Florida Shorebird Database (FSD) 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 2021 nesting season, FSA partners collectively monitored 1,029 miles of coastline and protected 5,185 State-Threatened seabird nests and 535 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, FWC manages the FSA website (https://flshorebirdalliance.org/), which functions as a tool to improve coordination and information sharing between regional partnerships.

FLORIDA SHOREBIRD DATABASE - The Florida Shorebird Database (FSD; www.flshorebirddatabase.org) was launched in spring 2011 to serve as the central repository for data collected on shorebirds and seabirds in Florida. Over 1,700 monitoring partners throughout the state have registered accounts in the FSD and many of these partners collect and report breeding data. During the 2021 nesting season, partners entered 18,181 data records in the FSD. Monitoring data are available online to anyone with an account, thereby allowing researchers, managers, conservationists, and permit reviewers to use information to help manage and conserve shorebirds and seabirds. The Shorebird Program published an annual monitoring report, “Florida Shorebird Alliance Monitoring Data at Work” that summarizes monitoring data entered into the FSD (https://flshorebirdalliance.org/media/1267/2021fsamonitoringdataatwork.pdf).

Southeastern American Kestrel

The Southeastern American Kestrel (Kestrel) is a State Threatened 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 Kestrel includes sandhills, scrub, pasture, and prairies across the Southeastern U.S.

In FY 2021-22, staff and FWC volunteers performed annual maintenance on and replacements of Kestrel boxes in December – February. Kestrel box monitoring occurred from April through June with some early checks in March. Late nesting attempts were monitored through July. Additionally, the Southeastern America Kestrel Conservation Partnership group includes 87 boxes on utility Right-Of-Ways, private property, or city parks in Marion County (48), Hernando County (4), and Levy County (35) that are monitored by FWC's volunteer program (Exhibit 8). Of the 41 boxes on Right-Of-Ways in Marion County, 28 boxes were used by kestrels and 20 were successful. As of July 2022, two of the Marion County kestrel boxes were still actively housing nests. In Hernando County, kestrels used two of the boxes with one success. Due to staffing constraints, two of the four kestrel boxes of Hernando County were not monitored during June. The partnership expanded this year to include new monitoring for boxes in Levy and Marion County. FWC staff added 35 existing boxes in Levy County into the volunteer monitoring program, of which 23 were used by Kestrels, and 13 were successful, and 9 were still active as of July 2022. 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 4 of these boxes, one of which was successful and two were still active in mid-July.

Exhibit 8. Southeastern American Kestrel monitoring box summary for FY 21-22

WMA/WEA	County	Boxes Managed	Boxes Utilized	Nest Success	Other Species Found in Boxes
N/A	Marion*	48	32	21	Eastern Gray Squirrel, Eastern Bluebird, Great Crested Flycatcher, Southern Flying Squirrel, European Starling, Tufted Titmouse
N/A	Levy	35	23	13	Southern Fox Squirrel, Rat Snake
N/A	Hernando	4	2	1	Tufted Titmouse
Blackwater and Yellow River	Okaloosa, Santa Rosa	26	6	Yes, 10 chicks	Eastern Screech-Owl, Eastern Bluebird, Great Crested Flycatcher
Caravelle Ranch	Putnam	3	0	No	Eastern Bluebird
Chassahowitzka	Hernando	9	6	Yes, 16 chicks	Eastern Screech-Owl, unknown songbird
Chinsegut	Hernando	2	0	No	Eastern Bluebird, Eastern Screech-Owl, Great Crested Flycatcher
Crooked Lake	Polk	3	0	No	Eastern Bluebird, Eastern Screech-Owl, Great Crested Flycatcher
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

Wading Birds

FORAGING HABITAT MAPPING – High quality foraging habitat is key to support breeding populations of wading birds. As such, understanding where coastal foraging habitat is located throughout Florida is essential to conservation planning and the implementation of conservation measures. Mapping coastal foraging habitat is challenging, however, because wading birds prefer narrow windows of foraging depths, and depths can be dependent on tides, wind, and other factors. In 2021, FWC partnered with experts at Texas A&M University - Corpus Christi to develop foraging habitat models along the Gulf of Mexico coast in southern Florida for the Reddish Egret, Little Blue Heron, Tricolored Heron, and Roseate Spoonbill. This study will use ground-truthed bathymetric data

coupled with real-time water depth data and observations of foraging birds, to develop a dynamic map of foraging habitat for all four species. Fieldwork will commence in 2023 and the project is scheduled to run through 2024.

STATEWIDE WADING BIRD COLONY DATABASE – FWC regularly conducted statewide surveys of wading bird breeding colonies in the 1980's and 1990's to prioritize protection and management efforts. Those surveys were costly and tended to undercount some of Florida's most imperiled wading bird species that nest out of view of an aerial observer, so the surveys were discontinued, and the regular prioritization of wading bird colonies ceased in the early 2000s. Nevertheless, FWC and many of its partners continued to conduct a variety of wading bird colony surveys and FWC recognized that the aggregation of data from those efforts would allow for a renewal of the prioritization process. In 2020, FWC began a project to build a database to house wading bird colony survey from Florida. Staff also developed an updated set of prioritization criteria based on the relative importance of a colony, the severity and urgency of threats, and the opportunity to manage those threats. This project was successfully completed and FWC now hosts a web-based public-facing version of the database and a more extensive version for staff. Staff also solicited information from colony managers to prioritize colonies and created prioritized lists for each of Florida's imperiled wading bird species (Reddish Egret, Little Blue Heron, Tricolored Heron, Roseate Spoonbill, Wood Stork, and the Great White Heron). Two additional lists prioritized Florida's largest mixed-species colonies. The development of the database concluded in FY 2021-22, but FWC will add new data and reprioritize colonies annually to ensure that the highest priority colonies continue to be identified for management.

WOOD STORK MONITORING - The Federally Threatened Wood Stork nest in colonies that are often remote or surrounded by water which makes monitoring difficult. In 2008, FWC began annually surveying breeding colonies in south and central Florida via a small plane. In FY 2021-22, staff surveyed 21 stork colonies in nine counties and counted 1,030 nests. The overall nest count is similar to survey results from recent years; however, this is the first survey since 2010 that no colonies had at least 100 nests.

Little Gator Creek WEA in Pasco County has a ten-acre wood stork and wading bird nesting colony. FWC uses water control structures and pumps to manage water levels in the basin swamp that contains the colony. This maintains suitable conditions for wood storks and wading bird nesting, and allows the colony to persist, even during drought years. Wood storks have nested intermittently in the colony, including three of the last five years. In 2012, a monitoring protocol was developed and implemented to assess wood stork nesting success. Using this protocol, FWC conducted periodic site visits during the breeding season (January to April) in FY2021-22. Wood storks were not observed nesting in the colony during FY2021-22.

White-crowned Pigeon

The State Threatened White–Crowned Pigeon is endemic to Monroe and Miami–Dade Counties. Most known nesting islands are protected in the Florida Keys, Everglades National Park and Biscayne National Park. In FY 2018-19, range–wide foraging survey were completed, and Florida Keys WEA staff spent FY 2019-20 scouting multiple sites in the Florida Keys for potential nesting locations. At the end of FY 2020-21, Florida Keys WEA staff began conducting flight-line count surveys in order to confirm and find new nesting locations throughout the Florida Keys. Surveys were conducted from July-August 2021. Of the 17 flight-line count stations located near a potential nesting island, 16 islands had nesting occurring on them based of the sampling design and formula used to calculate nests. Staff followed up flight-line count surveys by conducting surveys around the perimeter or inside the island. The direct island count surveys resulted in 10 out of the 17 islands having nests. This technique will not be continued moving forward as some islands are extremely difficult to survey and staff do not want to disturb the species. Surveys that began at the end of FY 2021-22 are still ongoing and those results will be presented in next FY's report. Preliminary results from current flight-line count surveys are still reporting nesting in the upper, middle, and lower keys at the same locations that were surveyed in the previous year as well as some new nesting locations.

AMPHIBIANS

Flatwood Salamanders

FROSTED FLATWOODS SALAMANDER - FWC staff headstarted Frosted Flatwoods Salamanders in the Apalachicola National Forest (ANF) for the for the 6th consecutive breeding season. Ongoing drift fence monitoring of two breeding ponds resulted in the capture of only 6 adult salamanders at a single pond (4 males, 1 female, 1 unknown), representing a 62% population decline in 5 years. All adults were inferred to be recaptured headstarts released in the previous two years. Overall annual return rates of headstarts are <1%, which is insufficient to augment populations. Frosted flatwoods salamander egg-searching efforts took place Nov-Dec in 20 ponds. Due to unusually flooded conditions, egg encounter rates were exceptionally low, and staff found only 311 salamander eggs among six ponds. Of the wild collected eggs, 240 reached hatching stage. Of these, 110 died shortly after hatching due to chemical contamination of mesocosm equipment. Of the remaining 130, 100 survived to metamorphosis (77%). These were all transferred to multiple zoo partners to augment the captive assurance colony.

In 2022, staff dip-netted 106 distinct pond basins (142 total surveys). Due to extreme winter drought conditions, there was little to no water in the ponds before March, and nearly all ponds remained too dry for flatwoods salamander eggs to hatch naturally. Eight total ponds were determined to be occupied during the breeding season.

Only two of these ponds had larval occupancy that was confirmed by dip-netting and the other six ponds were confirmed as occupied by egg detections in the early winter. This is the fifth year of little-to-no natural recruitment in the ANF in the last six years, placing the species at immediate risk of global extinction.

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 enabled implementation of a headstarting program to further aid in species recovery. In FY 2021-22, TLA staff, with assistance from FWC, collected 200 eggs from 4 wetlands and 5 larvae. Of these eggs, 180 hatched and 178 of the hatched individuals survived to be released as late-stage larvae (96% success rate). In addition to headstarting, TLA and FWC monitored wetlands using a standardized dip netting protocol and determined larval occupancy in 6 of 56 targeted wetlands, capturing a total of 7 larvae and 1 adult. TLA also monitored two drift fences for 22 trap nights at two separate wetlands and captured 8 adults between both wetlands. In total, staff documented Reticulated Flatwoods Salamanders in 6 wetlands this fiscal year, all having previously documented occupancy. A total of 197 tissue samples were collected from captured individuals for genetic analysis.

Florida Bog Frog

In FY 2021-22, FWC conducted surveys for the Florida Bog Frog along two creeks on Yellow River WMA (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 eight on Julian Mill Creek. On Garnier Creek, staff detected a maximum of 2 Florida bog frogs at the powerline right-of-way (ROW) and a maximum of 10 Florida Bog Frogs at five survey points downstream from the ROW that had received previous restoration treatments. This is the most frogs documented downstream of the ROW since monitoring of the restoration sites began. Outside of the ROW, Florida Bog Frogs were only detected at points where habitat restoration has occurred. On Julian Mill, staff detected one frog at the ROW.

In FY 2021-22, habitat management was conducted in approximately 10.8 acres at Garnier Creek. This work occurred within the 18.9-acre restoration area treated previously and included selective thinning of remaining overstory trees and foliar treatment of resprouting or seedling hardwood trees. Subsequently, FFS conducted a prescribed burn in March 2022, which was effective in further controlling hardwood growth, consuming organic material, and reducing debris from restoration activities. GulfCorps hand crews conducted additional habitat management at approximately 0.6 acres within the restoration area that included cutting and applying herbicide to woody regrowth. Future habitat management efforts on Garnier Creek will focus on treatment of woody regrowth as needed within the restoration

area. The Longleaf Alliance Wetland Ecosystem Support Team, in cooperation with FWC, conducted initial restoration of approximately 0.14 acres at one location on Julian Mill Creek adjacent to the powerline ROW. The site was selected for potential Bog Frog habitat and its proximity to the frog detected during call surveys. In person surveys and automated recording units will be used to monitor Bog Frog response to restoration on Julian Mill Creek. Future habitat management on Julian Mill will focus on expanding the restoration areas and treating woody regrowth as needed.

Georgia Blind Salamander

FWC staff served on the Georgia Blind Salamander expert team for the federal Species Status Assessment (SSA) by participating in discussions, providing data, and reviewing drafts.

Gopher Frog

In May of 2020, FWC staff detected Gopher Frog tadpoles in two wetlands on Blackwater WMA while conducting dipnet surveys. Prior to these records, Gopher Frogs had not been detected on the area since 2001. Gopher frog monitoring in FY 2021-22 included dipnet surveys for larvae in March, April, May, and June 2022. Larvae were only detected at one wetland in May. Future habitat management will focus on prescribed fire with emphasis on growing season burns as well as reducing overstory trees around the wetland perimeters.

Striped Newt

The Striped Newt is endemic to north Florida and South Georgia, where it has been extirpated from many parts of its range. It was a candidate for Federal listing as Threatened but was found to not warrant listing under the Endangered Species Act. Consequently, FWC was requested to evaluate the Striped Newt, initiating the biological review process. FWC staff completed the Biological Status Review report which recommended that the species be listed as State threatened. FWC staff presented the recommendation to the agency Commissioners in May 2021. The recommendation was accepted and the species was placed on the Candidate Species list. Staff then developed a Species Action Plan and Species Conservation Measures and Permitting Guidelines. Staff will seek approval of these documents and complete the listing process in FY 2022-23. FWC staff gave presentations at the Striped Newt Working Group meeting organized by FWC and Tall Timbers Land Conservancy and held public webinars on the species.

REPATRIATION – In FY 2021-22, FWC continued assisting with ongoing reintroduction program in the Munson Sandhills of the ANF. The program is led by the Coastal Plains Institute with U.S. Forest Service and involves releasing zoo–raised Striped Newts into former breeding ponds where they no longer occur. FWC marked newts before their release and assisted in surveys to estimate their survival. The marking effort was discontinued in 2021-22 due to a combination of COVID-19 concerns, lack of recaptures, and the marking process possibly affecting post-release newt

survival. In November 2021, FWC assisted in the collection of 12 adult Striped Newts to found a captive propagation colony in the Atlanta Botanical Garden's Amphibian Conservation program. These newts produced offspring that were released back to the ANF in June 2022.

SURVEYS – During the past 3 years, FWC staff tried to dipnet all known Striped Newt breeding ponds as part of a long-term monitoring effort, but ponds at some sites remained dry. Additional dipnet surveys were conducted for Ornate Chorus Frogs. In FY 2021-22, 94 ponds on eight conservation lands and four ponds on private lands were surveyed (Exhibit 9). Striped Newts were detected in two known breeding ponds on the Big Bend WMA. Striped Newts were found in one known and one new breeding pond on Jennings State Forest. Three new breeding ponds were found in a subdivision in Putnam County adjacent to Ordway-Swisher Biological Station. Striped Newts were not found in any of the nine known ponds at Triple N Ranch WMA, many of which have been invaded by nonnative African Jewelfish. FWC staff continued working with researchers at Tall Timbers Research Station and University of Florida to monitor Striped Newt breeding ponds and study amphibian disease ecology on Livingston Place. As part of this effort, Striped Newts were detected in two of five known breeding ponds on the property.

During FY 2021-22, staff continued to manage upland and wetland habitat for Striped Newts in Guana River WMA (St. Johns County) by treating 263 acres of upland habitat with prescribed fire. Staff also continued habitat management on Triple N Ranch WMA (Osceola County) by treating 652 acres of potential upland and wetland striped newt habitat with prescribed fire.

Exhibit 9. Striped Newt and Gopher Frog surveys conducted in FY 2021-22.

Location	County	No. Ponds	Striped Newt	Gopher Frog
Apalachicola National Forest	Leon	0	0	0
Big Bend WMA – Spring Creek Unit	Taylor	10	2	0
Etoniah Creek State Forest	Putnam	14	0	1
Goethe State Forest	Alachua/Levy	24	0	5
Herky Huffman/Bull Creek WMA	Osceola	13	0	7
Jennings State Forest	Clay	15	2	0
Livingston Place	Jefferson	3	2	0
Potts Preserve	Citrus	5	0	1
Private land	Marion	1	0	1
Private land	Putnam	3	3	1
Triple N Ranch WMA	Osceola	9	0	5
Withlacoochee State Forest – Citrus Tract	Citrus	4	0	2

REPTILES

Alligator Snapping Turtle

In 2017, a biological status review determined that the Alligator Snapping Turtle did not warrant listing as State Threatened however, the USFWS is planning on listing the species as Threatened due to similarity of appearance to the Suwannee Alligator Snapping Turtle. FWC staff coauthored a paper on coastal observations of Alligator Snapping Turtles in the panhandle and notes documenting the first records from the New River and a juvenile that moved from Apalachicola Bay into the mouth of a stream on St. Vincent Island.

American Crocodile

The American Crocodile is currently a Federally Threatened species in Florida and has been documented as far north as Brevard County on the east coast and Pinellas County on the west coast. With the increasing crocodile population (estimated between 1,160 and 2,800 non-hatchlings), a commensurate increase in crocodile-human conflicts has been documented. FWC manages these conflicts on a case-by-case basis with human safety being the highest priority, while also recognizing the needs of a recovering species. In FY 2021–22, FWC received 211 complaints regarding the American crocodile. Most of these complaints were resolved by educating the public through telephone calls and site visits.

FWC has crocodile response agents who respond to crocodile calls, some of which require capture of the crocodile. A total of 11 individual crocodiles were captured by FWC in FY 2021–22. Captured animals ranged from 3.1 to 8.9 feet in length, for an average of 6.3 feet. Eight were captured and removed from human-interaction situations and released near their capture sites. Three crocodiles were captured and relocated to a site further away from the complainant area in suitable habitat. Of the 11 captured individuals, two crocodiles were captured on two separate occasions during this fiscal year. In FY 2021-22, FWC was involved in the recovery of 6 American crocodile carcasses (one male, three females, and two of unknown sex). The male was 10.2 feet and females ranged from 4.3 to 10.0 feet in length. The two of indeterminate sex were 1.0 and 7.0 feet. Four of the six mortalities were caused by vehicle strikes, and the remaining two were of an unknown cause. Staff also focused on creating a digital dashboard of crocodile complaints to share with our internal and external partners in FY 2021-22. This dashboard, though not available to the public, will help facilitate the coordination of management goals between agencies as it pertains to both outreach and the recovery of the American crocodile.

Cedar Key Mole Skink

In 2018, the USFWS completed a Species Status Review and determined that the Cedar Key Mole Skink did not warrant listing. FWC staff participated in discussions with USFWS and UF staff on how to monitor populations and on possible survey methods. In April 2022, FWC, USFWS, and UF staff surveyed for the taxon on Airstrip Island, Cedar Point, North Key, Scale Key, and Seahorse Key. All these islands are known sites, but specimens were found only on North and Seahorse keys. In June 2022, FWC staff unsuccessfully surveyed Dog Island, Live Oak Island, and Scale Key. FWC staff collaborated on manuscripts on reproduction and hatchling coloration, which has been submitted, and distribution of the Cedar Key Mole Skink. The latter manuscript will be submitted after surveys of additional islands are conducted in July 2022.

Eastern Indigo Snake

Eastern Indigo Snakes are Federally Threatened snakes that have historically occurred throughout Florida. It is thought that the snake is extirpated in the Florida Panhandle and FWC is working closely with collaborators to reintroduce the species to a portion of its historic range.

MONITORING & CONSERVATION – The Florida Rare Snake Sightings webpage received 14 verified Indigo Snake reports that were provided to the USFWS, along with sightings from other sources. After receiving a photo of an Indigo Snake from Middle Torch Key, which represented only the second island in the Florida Keys with a record since 1998, FWC staff prepared a manuscript summarizing all Indigo Snake records in the Keys. Staff also worked on establishing a long-term monitoring program for wild populations in northern Florida.

RESEARCH – FWC staff are currently collaborating on research efforts that include an analysis of Indigo Snake growth rates and quantifying the movements, habitat use, and survival of reintroduced snakes. A manuscript examining disease prevalence at the reintroduction site was submitted for publication. Staff also worked on a manuscript comparing the Indigo Snake and Eastern Diamondback Rattlesnake in terms of modeled potential habitat and future distribution based on projected development trends.

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 with The Nature Conservancy and OCIC. FWC staff participated in a meeting of the Eastern Indigo Snake Reintroduction Committee. In FY21-22, 26 snakes were released at the reintroduction site in Liberty County. The total number of snakes released at the site is 107. 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. Staff continued to partner with Auburn University on a Traditional Section 6 Grant to study the genetics of captive broodstock and wild Indigo Snakes. Year 1 of this project has been completed and funding for an additional year has been secured.

Escambia Map Turtle

The Escambia Map Turtle occupies a narrow geographic range in the Escambia, Choctawhatchee, and the Yellow Rivers in Alabama in Florida. In 2021, the USFWS listed the species as Proposed Similarity of Appearance (Threatened) due to similarity of appearance to the Proposed Threatened Pearl River Map Turtle. However, no comprehensive distribution or population status surveys have been undertaken for the species in Florida. To accomplish this, FWC biologists initiated a multi-year effort to assess the species status in Florida. In summer 2022, biologists kayaked 95.9 river kilometers, observing a total of 945 turtles of 6 species. A total of 522 Escambia Map Turtles were observed (Exhibit 10). Distributional surveys will resume in spring/summer 2023.

Exhibit 10. Summary of survey effort and Escambia Map Turtle observations.

River	River km Surveyed	No. Map Turtles	Turtles/km
Escambia	44.3	435	9.8
Shoal	21.3	11	0.5
Yellow	25	76	3.0
Blackwater	5.3	0	0.0
Total	95.9	522	5.4

Florida Keys Mole Skink

FWC staff reviewed the Florida Keys Mole Skink USFWS SSA Version 1.2. The original SSA was published in 2017 and the USFWS found that the species did not warrant federal listing at that time. An updated federal listing determination decision is expected in the near future.

Florida Pine Snake

In FY 2021-22, trapping for State Threatened Florida Pine Snake continued at 6 locations on Blackwater WMA (Santa Rosa and Okaloosa counties). FWC captured 193 individuals comprising 14 snake species, including 12 Florida Pine Snakes. Trapping will continue in the Rock Creek and Floridale Management Units in fall 2022. The traps will be relocated to three new locations in the winter of FY 2022-23 where they will remain for one spring and one fall trapping season. Snake trapping will continue on Blackwater WMA at new locations each year to determine the distribution of Florida Pine Snakes and other at-risk snake species and prioritize areas for management activities.

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 the status and distribution of the Florida Scrub Lizard and submitted a manuscript describing a successful translocation effort to Hypoluxo Scrub Natural Area in Palm Beach County. In addition, FWC staff gave a presentation on the translocation at the Florida Chapter of The Wildlife Society meeting.

Gopher Tortoise

MANAGEMENT - The Gopher Tortoise is listed as a Threatened species in Florida and are keystone species as their burrows provide refuge for over 350 other species. The Gopher Tortoise Management Plan (https://myfwc.com/media/1819/gt-management-plan.pdf) is intended to guide the continued conservation of the gopher tortoise in Florida through 2022. The plan places an emphasis on landowner incentives, habitat management, and maintaining the gopher tortoise as a keystone species through commensal species conservation. Revisions to the Gopher Tortoise Management Plan are underway. FWC continues to coordinate with the stakeholder Gopher Tortoise Technical Assistance Group on gopher tortoise conservation issues. The continued participation of stakeholders is vital to the long-term conservation of the species. FWC offers several opportunities for Florida residents to get involved and help conserve the gopher tortoise including, the Florida Gopher Tortoise Day initiative, submission of tortoise and burrow sightings in Florida, mortality and disease incidence data collection, a Gopher Tortoise Friendly Yard Recognition Program, an internship program, and multiple gopher tortoise

volunteer opportunities.

INTERNSHIP – In FY 2021-22, student interns from Florida State University contributed approximately 286 hours 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 SGCN. Many of the actions completed by Summer 2021, Fall 2021, and Spring 2022 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 in FY 2021-22 continued to primarily address the objectives of the Gopher Tortoise Management Plan (2012; Exhibit 11).

Exhibit 11. Summary of projects completed by student interns during FY 2021-22.

Project Title	Semester
Gopher Tortoise Day Outreach	Spring 2022
Large Landowner Outreach	Spring 2022
Species Profile Development	Summer 2021; Fall 2021; Spring 2022
Education & Outreach Coordination	Summer 2021; Fall 2021; Spring 2022
Volunteer Program Coordination	Summer 2021; Fall 2021; Spring 2022
Florida Gopher Tortoise Smartphone App Submission Review	Summer 2021; Fall 2021; Spring 2022

INCIDENTAL TAKE PERMITS - The Incidental Take Permit (ITP) gopher tortoise volunteer relocation program mobilizes volunteers to conduct burrow surveys at development sites permitted for incidental take and to transport gopher tortoises from the development site to the approved recipient site. During FY 2021-22, FWC staff did not train any new volunteers to conduct gopher tortoise surveys or to transport tortoises from ITP project sites. The use of volunteers helps reduce the cost of gopher tortoise relocation, recognizing that the developer has previously paid mitigation and is not required to relocate the tortoises under these formerly-issued permits. Volunteer usage on ITP development sites significantly decreased because of COVID-19 and other restrictions.

To humanely relocate tortoises from ITP 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 most recently 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. During FY 2021-22, 777 gopher tortoises were relocated to the approved ITP recipient sites at Eglin AFB.

TRANSLOCATION - Since 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 32,649 acres of gopher tortoise habitat have been protected through permanent conservation easements. 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. Currently, 59 recipient sites with an available capacity of 21,642 tortoises are permitted. In FY 2021-22, 12,996 tortoises were relocated under FWC-issued on-site and off-site relocation permits.

WAIF TORTOISES - In FY 2021-22, FWC continued efforts to identify solutions for waif tortoises (tortoises that have been removed from the wild either by unauthorized means or due to injury whose origin cannot be determined). One solution includes identifying willing landowners to care for waifs on their property, designating the land as a "waif tortoise recipient site." One new waif recipient site was established in FY 2021-22: the Oberlander property. This site did not receive any waif gopher tortoises in FY 2021-22. In FY 2021-22, 32 waif Gopher Tortoises were received at existing waif recipient sites (Exhibit 12).

Exhibit 12. Summary of waif Gopher Tortoise placements for FY 2021-22.

Waif Site	County	Tortoises Received	Male.Female	Juvenile.Unknown	Placements Available
Bay Pines STEM Center	Pinellas	1	1.0	0.0	0
Marie Acres	Hernando	2	0.0	0.6	0
Circle B Bar Reserve	Polk	16	1.6	0.9	125
Nixon Smiley Pineland Preserve	Miami-Dade	8	0.0	0.8	191
Totals		32	5.9	0.16	454

Under a Memorandum of Agreement (MOA) with the South Carolina Department of Natural Resources, there is also an ongoing effort to restock depleted gopher tortoise populations on public lands in South Carolina through the FWC waif program. In FY 2021-22, 36 tortoises were relocated to Aiken Gopher Tortoise Heritage Preserve. 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 furthers the objectives of the gopher tortoise management plan, the FWC has entered into two

MOA's. The DOD and Eglin AFB added an additional 5,490.5 acres of gopher tortoise habitat for a total of 6,698.5 acres of gopher tortoise habitat to their previously permitted recipient site within the Eglin AFB. The public conservation lands recipient site was established to receive gopher tortoises from renewable energy projects that occur in Florida and to restock lands on Eglin AFB.

HABITAT MANAGEMENT - In FY 2021-22, the Habitat Management Assistance Funding (HMAF) program provided nearly $128,000 in funding to assist local governments with gopher tortoise habitat management activities on more than 520 acres of their conservation lands (Exhibit 13). 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 2021-22.

Exhibit 13. Summary of Habitat Management Assistance Funding program results for FY 2021-22.

Property Name	Local Government	Amount Received	Acres Managed	Management Activities
Gulfside City Park	City of Sanibel	2,970	4	Maintenance of woody vegetation, mowing, invasive plant management and forage
Lake Townsen Preseve	Hernando County	7,632	18	Mechanical and chemical treatment of woody under/mid story vegetation
GTH Unit 1C	Pinellas County	14,840	53	Selective hardwood tree reduction to be girdled and treated with herbicide
GTH Unit 1D	Pinellas County	14,840	53	Selective hardwood tree reduction to be girdled and treated with herbicide
Boyd Hill Nature Preserve	City of St. Petersburg	10,000	35	Selective hand removal and mechanical removal/treatment of exotics/sabals

OUTREACH – FWC 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 launched a new web-based Gopher Tortoise Sighting platform (https://public.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 new system replaced the Gopher Tortoise Mortality webpage and the Florida Gopher Tortoise smartphone app, decommissioned in September 2020. The FWC has

collected gopher tortoise sighting data since 2014 and has received over 13,063 citizen submissions, of which 3,179 were submitted during FY 2021-22. The collected data allows FWC to determine gopher tortoise mortality "hotspots" throughout the state. In FY 2021-22, 209 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.

FWC distributes fact sheets, brochures, and other educational materials to increase knowledge of gopher tortoises in Florida. Over 19,000 gopher tortoise brochures, fact sheets, and other educational publications were distributed in FY 2021-22 (Exhibit 14). 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 14. Summary of Gopher Tortoise publications distributed during FY 2021-22.

Publication Name	Number Distributed	Primary Audience
Living with Gopher Tortoises	4,571	Local governments, schools, nature centers, Florida residents
Before You Build	1,493	Local governments, non-government organizations, Florida landowners
Before you Build (Spanish)	151	Local governments, non-government organizations, Florida landowners
Gopher Tortoise Laws, Policies, and Guidelines	765	Local governments, non-government organizations, Florida landowners
Get the Facts about Gopher Tortoises (various topics)	1,626	Local governments, schools, nature centers, Florida residents
Safe Roads for People and Gopher Tortoises	1,427	Florida Visitor Centers, state/local parks, highway rest stops
Gopher Tortoise Decals	4,569	Schools, nature centers, Florida residents
Gopher Tortoise Day Temporary Tattoos	3,125	Florida residents, children's camps
Children's Publications	1,460	Florida residents, children's camps

Gopher tortoise outreach was limited in FY 2021-22 due to COVID-19 however, virtual events were incorporated in lieu of in-person events, where appropriate (Exhibit 15). The FWC Gopher Tortoise Conservation Program hosted or participated in 40 outreach events in FY 2021-22. Outreach for the fiscal year included five training events for FWC law enforcement, 3 Gopher Tortoise Day events, and several presentations to stakeholders and children.

Exhibit 15. Summary of Gopher Tortoise Conservation Program outreach events & presentations for FY 2021-22.

Outreach Event	County
Pepine Realty Presentation	Virtual/Alachua
FSU Environmental Service Program	Virtual/Leon
FDLE Outreach Event	Leon
FSU Coastal & Marine Lab Open House	Franklin
Wild Amelia Presentation	Nassau
City of Clermont Local Government Workshop	Lake
Gulf Specimen Marine Lab Camp Presentation	Wakulla
Joe Budd WMA Camp Presentation	Gadsden
Madison County 4-H Presentation	Madison
Jefferson County Wildlife Recreation Camp	Jefferson
Florida Land Steward Presentation	Virtual
Gopher Tortoise Technical Assistance Group Meeting (2)	Virtual
Florida Association of Mitigation Bankers Presentation	Virtual
Reptile and Amphibian Noteworthy Accomplishments (RANA) Presentation	Virtual
Gopher Tortoise Council Presentation	Virtual
Florida Forestry Association Presentation	Virtual
Gopher Tortoise Research Symposium	Virtual
Scottsdale Academy Presentations (2)	Leon
Leon County 4-H Field Day	Leon
Gopher Tortoise Friendly Yards UF Horticulture Presentation	Virtual/Alachua
North Central Region Call Center Training	Virtual/Columbia
Southwest Region Call Center Training	Virtual/Polk
GT South Region Dispatch Training	Virtual/Palm Beach
HSC Law Enforcement Academy Day (2)	Gadsden
South Region Law Enforcement Presentation	Palm Beach
Sanford Law Enforcement Dispatch Training	Virtual/Seminole
Marco Island Presentation	Collier
Gopher Tortoise Day at Ponce Inlet	Volusia
Gopher Tortoise Day at Circle B Bar Reserve	Polk
Gopher Tortoise Day at Koreshan State Park	Lee
Circle B Bar Reserve Master Naturalist Course	Polk
City of North Port Commission Meeting Presentation	Sarasota

Exhibit 15. (*continued*)

Outreach Event	County
Charlotte County Harbour Heights Presentation	Charlotte
Clearwater Aquarium Go Wild Event	Pinellas
SEPARC Presentation	Virtual
Longboat Key Presentation	Manatee
Viera High School Presentation	Brevard

RESEARCH - In FY 2021-2022, 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 2021-22, three new research projects were contracted with a total financial support of $147,960.00. These projects aim to develop a new recipient-site specific Line Transect Distance Sampling method and examine burrow detection likelihood across survey methods. These projects will help fill knowledge gaps and inform gopher tortoise policies and practices.

SURVEYS AND MANAGEMENT – In FY 2021-22, FWC contracted with Florida Natural Areas Inventory (FNAI) to conduct a series of surveys on public conservation lands (Exhibit 16). Of the 7 sites, 5 met the criteria for a viable population (at least 250 adult tortoises, at least 0.16 tortoises/acre, and at least 250 acres of continuous gopher tortoise habitat). Future monitoring will focus on surveying additional public conservation lands to locate viable populations, as well as locate populations that may become viable with increased management.

Additional surveys were conducted at Hickey Creek WEA, Platt Branch WEA, Bull Frog Creek WEA, Moody Branch WEA, Crooked Lake WEA, Perry Oldenburg WEA, and Janet Butterfield Brooks WEA (Exhibit 17).

Exhibit 16. Summary of Gopher Tortoise management activities conducted during FY 21-22

Location	County	Management Activities (acres)
Perry Oldenburg WEA	Hernando	Prescribed fire (116); Chemical herbicide (367); Mechanical (8)
Platt Branch WEA	Highlands	Prescribed fire (377); Chemical herbicide (110); Mechanical (26)
Bullfrog Creek WEA	Hillsborough	Chemical herbicide (140); Mechanical (251)
Hickey Creek WEA	Lee	Prescribed fire (150); Chemical herbicide (287); Mechanical (26)
Moody Branch WEA	Manatee	Prescribed fire (153); Chemical herbicide (289); Mechanical (230)
Crooked Lake WEA	Polk	Prescribed fire (172); Chemical herbicide (289); Mechanical (296)

Exhibit 17. Summary of Gopher Tortoise population survey results for FY 2021-22.

Survey Location	County	Population Estimate	Density (tortoises/acre)	Suitable Habitat (acres)
Apalachicola Bluffs & Ravines Preserve	Liberty	269	0.10	2746
Crooked Lake WEA	Polk	162	0.64	252
Hickey Creek WEA	Lee	232	0.69	345
Lafayette Forest WEA	Lafayette	602	1.40	429
Lake Monroe Conservation Area	Volusia	832	1.82	457
Little Big Econ State Forest	Seminole	688	1.47	467
Suwannee Ridge WMA	Hamilton	805	0.69	1168

Marine Turtles

The 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 turtle and loggerhead (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. FWC served on multiple committees, boards and working groups in FY 2021-22 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 NOAA-Fisheries. The Network is responsible for gathering data on dead, sick, or injured marine turtles. In FY 2021-22, 2,076 dead or debilitated turtles were documented (544 loggerheads, 1,162 green turtles, 348 Kemp's ridleys, 10 hawksbills, 6 leatherbacks, and 6 not identified to species). The FWC responded to 2,101 reports from the public about sea turtles (primarily reports of dead, sick, or injured turtles), transported 34 sick or injured turtles to rehabilitation facilities, and conducted necropsies on 142 carcasses. Seven workshops, involving 757 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 2021-22, three webinars were presented to 1,279 participants on how to conduct nest surveys using two monitoring programs, the Statewide Nesting Beach Survey (SNBS) and the Index Nesting Beach Survey (INBS). The webinars also included training on how to monitor nest fate during incubation and how to conduct 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 2021, 228 areas (839 miles) were surveyed, recording 96,666 loggerhead nests, 32,680 green turtle nests, 1,390 leatherback nests, and 12 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 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 that is submitted, the timing of submission and the voluntary nature of the NPA program, FWC is unable to estimate hatchling production for the current FY (2021-22), as there is one year lag. In 2020, a total of 107,635 clutches were laid on 147 Florida beaches participating in NPA. A subset of those clutches (18,006) was excavated to determine hatchling production. FWC estimated that Florida hatchling production in 2020 was 5,025,170 loggerhead hatchlings, 1,470,117 green turtle hatchlings and 60,548 leatherback hatchlings. Approximately 20% of the loggerhead and green turtle nests monitored as part of the NPA program were completely lost mostly due to weather-related events.

IN-WATER RESEARCH – In June 2021, 61 loggerheads were captured during an annual eight-day sampling session in Florida Bay to assess relative and absolute abundances, health assessments and monitoring of fibropapillomatosis (a disease specific to turtles), studies of growth, determinations of sex ratios and genetic identities, and studies of residency and movements. This project has been conducted continuously since 1990. Some individual turtles have now been captured numerous times, with 45.9% being captured previously this year. FWC studies 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 resides 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 - In FY 2021-22, FWC staff reviewed 307 applications and provided final comments for 176 projects ensuring marine turtles and their habitat remain protected. The FWC continued to work with Florida Department of Environmental Protection (FDEP) and the USFWS to develop the Florida Statewide Beaches Habitat Conservation Plan. This Plan will provide flexibility to local governments and beachfront property owners to conduct FDEP coastal construction control line permitted activities while ensuring impacts to coastal species and their habitat are minimized and mitigated.

In FY 2021-22, FWC staff reviewed and approved 19 lighting plans for beachfront construction and conducted site visits or post-construction site inspections for 18 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 (http://myfwc.com/wildlifehabitats/managed/sea-turtles/).

MARINE TURTLE PERMITS – In FY 2021-22, the FWC issued 144 authorizations including amendments for nesting beach surveys and 31 authorizations to hold marine turtles for rehabilitation, educational display, or research. FWC staff reviewed and processed 117 permit requests for existing, new or modified research. Approximately 60 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. Five (5) 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 116 cold-stunned turtles that stranded in New England were transferred to Florida for rehabilitation and release. Staff inspected four (4) Florida facilities to ensure turtles were held in appropriate conditions. The FWC placed four (4) non-releasable turtles in educational facilities within and outside of Florida.

ANNUAL PERMIT HOLDER MEETING – In January 2022, the FWC hosted the 25th Annual Marine Turtle Permit Holder Meeting virtually with co-hosts the Wildlife Alert Reward Association and the Florida Fish and Wildlife Foundation. Over 425 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 – In FY 2021-22, 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. In FY 2021-22, FWC staff re-initiated the certification process by first reviewing existing requests and contacting applicants for any additional information needed. FWC staff also co-hosted the 3rd Annual Light Pollution 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, sea turtle conservation groups, and Florida power companies presented on their organizations efforts to minimize lighting impacts to marine turtles. More than 90 participants from state and federal agencies, local governments, and interested citizens attended the online workshop.

Sand Skink

In FY 2021-22, FWC staff served on the Sand Skink expert team for the federal SSA by reviewing the draft final report.

Short-tailed Kingsnake

In FY 2021-22, FWC staff served on the Short-tailed Kingsnake expert team for the federal SSA by participating on a call discussing resiliency metrics. Four verified observations were reported on the Florida Rare Snake Sightings webpage. A manuscript on the status and distribution of the Short-tailed Kingsnake and two other imperiled upland snake species was submitted to a journal.

Spotted Turtle

The Spotted Turtle is being evaluated for Federal listing and has been documented from 18 counties in Florida with most records being single individuals crossing roads in spring. Little information exists on the life history or demographics of southern populations. In 2014, FWC began using radio-telemetry and mark-recapture techniques to gather information on home range, movement, seasonal phenology, and population dynamics at two sites in North Florida. As of June 2022, 82 individual Spotted Turtles have been captured at the two sites, with 30 of those turtles fitted with radio-transmitters and relocated 1-2 times per week: 20 turtles marked and 16 tracked at Site 1 and 62 turtles marked and 14 tracked at Site 2.

This research suggests Spotted Turtles in Florida are uncommon and cryptic, rarely basking or spending time upland. Shallow water and abundance of woody debris within complex, forested wetlands appear to be the most reliable habitat characteristics for predicting Spotted Turtle presence in Florida, with roads/high traffic volume negatively impacting populations and restricting movement and dispersal. Adult home range size varied between sites and individuals, from 0.25 to 106 acres, with an average of 16 acres. Spotted Turtles remain active year-round in Florida, with males moving greater distances and utilizing larger areas than females.

FWC continues to build on this work and in 2018 partnered with a multi-state "Maine-to-Florida" initiative to address Spotted Turtle status and conservation across the species' entire range. Through this partnership we developed a range-wide status summary, conducted demographic and rapid population assessments at multiple sites, and ranked priority populations range wide and at multiple scales including state, ecoregion, and watershed basin. Results from this work have led to various habitat models and a comprehensive plan to guide future efforts necessary for the long-term conservation and proper management of the species. In Florida, protection of large-scale wetland complexes and preserving connectivity is vital for the long-term conservation of this rare and secretive turtle.

Suwannee Alligator Snapping Turtle

The Suwannee Alligator Snapping Turtle was described as a distinct species in 2014, and Florida listed it as a Threatened species in November 2018. The USFWS issued a 12-month finding in April 2021 that the species warranted federal listing as Threatened. FWC provided comments to the USFWS on the proposed listing recommendation. FWC and UF staff obtained funding 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. Two females were trapped in early April 2022 in the Suwannee River at Branford, and satellite transmitters were attached. A radiograph determined that one of the females contained 32 eggs, and she nested on 23 April on the narrow berm separating the river from the floodplain. A trapping effort in May to try to retrieve the transmitters for reuse was unsuccessful, although nine other turtles were captured. FWC staff unsuccessfully trapped Hunter Creek, Rocky Creek, and Olustee Creek trying to obtain a blood sample for inclusion in a larger study on reptile genomes, but a sample was later collected from the Suwannee River.

SURVEYS – As part of a long-term population monitoring program on the Suwannee River, three sites were trapped using 12 traps in October 2021. These sites were initially trapped during a mark-recapture study in 2011-13, and survivorship and growth data from recaptured turtles will help refine population model parameters. At White Springs, the upstream site, a record seven turtles (five recaptures) were caught. At Rock Bluff, the middle site, 12 turtles (six recaptures) were caught; one trap had five turtles weighing 344 lb. At Fowler's Bluff, the downstream site, one juvenile turtle was trapped. The spring 2022 survey had to be canceled due to high water levels. FWC staff collaborated on papers published on the distribution and relative abundance of the species throughout its range and on its population status in the Suwannee River in Florida.

FISH

Freshwater Fish

BLUENOSE SHINER- The Bluenose Shiner is State designated as Threatened. In FY 2021-22, nine individuals were collected from the Choctawhatchee River and 40 individuals were collected on Holmes Creek during Long-Term Monitoring. Genetic analyses are ongoing to determine the evolutionary distinction between the St. Johns drainage population and those in western Florida, Alabama, Mississippi, and Louisiana. 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.

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 2021-2022. Additional sampling is planned for the species in the future.

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 2021-22, 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 2021–22, 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 2021-22, FWC collected 118 Gulf Sturgeon from freshwater portions of the Yellow River, 27 Gulf Sturgeon from the Blackwater River, and 54 Gulf Sturgeon from the Escambia River. This project is now in the 3rd 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 UF began conducting a 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. This project is ending in 2022, but a follow-up SWG – which also includes matching support from FWC – will allow the research to be expanded.

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 is to preserve the genetic diversity of Florida's Coral Reef by collecting both healthy corals from ahead of the disease boundary and surviving corals that remain in the endemic zone, hold (gene-bank) the corals 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. In FY 2021-22, FWC led one rescue collection from the endemic zone. Out of the 20 species targeted for rescue, five are Federally-designated as Threatened (Exhibit 18). In FY 21-22, the Florida Coral Rescue Center (an AZA holder) had two Rough

Cactus Coral release more than 1,000 larvae combined. Twenty-one larvae have settled and metamorphosed but post-release settlement mortality remains an area for improvement. FWC moved from the Coral Rescue Data Portal to Tracks, where holders enter data, photos and observations. In FY 21-22, FWC incorporated 366 Pillar Coral into the new Coral Rescue database, Tracks.

Exhibit 18. Florida Coral Rescue FY 21-22 Federally listed coral species rescued and currently in holding.

Common Name	Scientific Name	Status	Total Number of Coral Colonies Rescued	Number of Colonies in Holding
Boulder Star Coral	*Orbicella franksi*	FT	37	36
Lobed Star Coral	*Orbicella annularis*	FT	27	19
Mountainous Star Coral	*Orbicella faveolata*	FT	124	105
Rough Cactus Coral	*Mycetophyllia ferox*	FT	15	10
Pillar Coral	*Dendrogyra cylindrus*	FT	572 (2 rescued in FY 21-22)	346

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 Threatened corals. 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 and Elkhorn Coral and FWC is 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 new genet registry database.

INVESTIGATING THE CAUSE OF SCTLD – In FY 2021-22, FWC and partners continued the investigation of SCTLD. FWC partnered with Mote Marine Laboratory and George Mason University in a SCTLD induction and lesion progression study under controlled laboratory conditions. This study showed that apparently healthy tissue directly adjacent to lesions on both Great Star Coral and Mountainous Star Coral species can exhibit tissue loss and induce the disease in other apparently healthy coral fragments. Histologically, tissue-loss lesions in both species exhibited characteristic lytic necrosis. Pathological changes were also noticed by USGS in the zooxanthellae using samples collected by FWC during fiscal year 2018. Through collaboration work on transmission electron microscopy studies, zooxanthellae infected with RNA viruses of plants were found in five coral species (Great Star Coral, Mountainous Star Coral, Boulder Brain Coral, Symmetrical Brain Coral, and Massive Starlet Coral).

CHARACTERIZATION OF THE MICROBIOME OF CORALS WITH SCTLD THROUGH SPACE AND TIME – FWC and partners 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. Corals are sampled by scraping surface tissue, sequencing and identifying the microbial deoxyribonucleic acid (DNA) of these samples, and comparing the differences in these microbes between healthy and diseased corals. In FY 21-22, FWC and partners began analyzing the microbiomes of six species of corals, including the Federally Threatened Mountainous Star Coral, sampled from reefs throughout the Florida Keys before, during, and after the arrival of SCTLD; 47 colonies of Mountainous Star Coral are included in this analysis.

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 2021-22, 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 demographic surveys combined for the two regions. CREMP collects information on the seven Federally Threatened coral species located at each site and the critical habitat required for these endangered species.

SOUTHEAST CORAL REEF EVALUATION AND MONITORING PROJECT – The Southeast CREMP (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 2021-22, SECREMP surveyed 22 sites in Martin, Palm Beach, Broward, and Miami-Dade counties. SECREMP collects information on the seven Federally Threatened coral species located at each site and the critical habitat required for these endangered species.

DISTURBANCE RESPONSE MONITORING – FWC has coordinated the Florida Reef Resilience Program's Disturbance Response Monitoring (DRM) program. 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 2021-22, 378 surveys were completed and 130 of those surveys were conducted by FWC. Belt transects collect information for all coral species and record the abundance of 6 of the 7 Federally Threatened coral species (Exhibit 19). Elkhorn coral was not observed during any of the 2021 DRM surveys. Only two pillar coral were

recorded in Dry Tortugas National Park where both were infected with SCTLD. The results indicated 2021 was a mild bleaching year. Overall coral disease prevalence was low except in the Dry Tortugas. Of the 6 Threatened coral species observed across the reef tract, Mountainous Star Coral had the greatest number of disease observations (Exhibit 20). The 2021 DRM Quick Look Report is available on the DRM website http://ocean.floridamarine.org/FRRP/Home/About.

Exhibit 19. Abundance values of Federally listed coral species recorded along belt transects in FY 2021-22.

Common Name	Scientific Name	County/Subregion	Total Abundance
Staghorn Coral	*Acropora cervicornis*	Broward-Miami	22
		Biscayne	46
		Upper Keys	1
		Middle Keys	4
		Lower Keys	41
		Marquesas	7
		Dry Tortugas	56
Pillar Coral	*Dendrogyra cylindrus*	Dry Tortugas	2
Rough Cactus Coral	*Mycetophyllia ferox*	Upper Keys	1
		Dry Tortugas	1
Lobed Star Coral	*Orbicella annularis*	Palm Beach	1
		Broward-Miami	1
		Biscayne	5
		Upper Keys	56
		Middle Keys	6
		Lower Keys	9
		Marquesas	2
		Dry Tortugas	4
Mountainous Star Coral	*Orbicella faveolata*	Palm Beach	1
		Broward-Miami	14
		Biscayne	16
		Upper Keys	45
		Middle Keys	19
		Lower Keys	72
		Marquesas	31
		Dry Tortugas	112
Boulder Star Coral	*Orbicella franksi*	Biscayne	1
		Upper Keys	15
		Lower Keys	6
		Marquesas	3
		Dry Tortugas	57
Overall Totals for 2021			657

Exhibit 20. Number of Federally Threatened coral species recorded with disease resulting in tissue loss in FY 2021-22.

Common Name	Scientific Name	County / Subregion	Stony Coral Tissue Loss Disease	White Plague Disease	Yellow Band Disease	Rapid Tissue Loss	Unknown Tissue Loss Disease
Staghorn Coral	*Acropora cervicornis*	Broward-Miami					2
		Lower Keys				1	
		Dry Tortugas				3	
Pillar Coral	*Dendrogyra cylindrus*	Dry Tortugas	2				
Lobed Star Coral	*Orbicella annularis*	Upper Keys	2				
		Lower Keys			1		
Mountainous Star Coral	*Orbicella faveolata*	Broward-Miami	1				
		Upper Keys			1		
		Lower Keys	5				
		Marquesas	5	1			
		Dry Tortugas	7	4			1
Boulder Star Coral	*Orbicella franksi*	Dry Tortugas	2	3			

SPECIAL ACTIVITY LICENSES – In FY 2021-22, the FWC issued 23 Marine Special Activity Licenses to conduct scientific research and restoration activities for coral species. The Federally Threatened species Boulder Star Coral, Lobed Star Coral, Mountainous Star Coral, Pillar Coral, Rough Cactus Coral, Elkhorn Coral, and Staghorn Coral were included in these issued licenses.

CORAL NURSERY AND OUTPLANTING OPERATIONS – FWC operates two *in situ* coral nurseries located in the middle Florida Keys in which three Federally Threatened coral species are maintained: Mountainous Star Coral, Elkhorn Coral, and Staghorn Coral. Reef Renewal, LLC maintains two additional coral nurseries, one off Tavernier Key in the upper Florida Keys and one near Looe Key in the lower Florida Keys, and stocks them with all seven Federally Threatened species: Boulder Star Coral, Lobed Star Coral, Mountainous Star Coral, Rough Cactus Coral, Elkhorn Coral, Staghorn Coral, and Pillar Coral. Exhibit 21 summarizes the number of colonies of each species that were present within each of the four nurseries at the end of FY 2021-22. In FY 2021-22, Reef Renewal outplanted 22,119 federally-listed coral colonies in the Florida Keys. Exhibit 22 includes the total number of coral colonies by species and reef site.

Exhibit 21. Number of coral colonies present in FWC's *in situ* coral nurseries [1] and two nurseries maintained by Reef Renewal, LLC under contract to the FWC, June 2022.

Common Name	Scientific Name	Status	Number of Coral Colonies				
			FWC Marathon Mid-Channel Nursery	FWC/RR Marathon Offshore Nursery	RR Tavernier Nursery	RR Looe Key Nursery	Total
Boulder Star Coral	*Orbicella franksi*	FT	0	0	0	1,932	1,932
Lobed Star Coral	*Orbicella annularis*	FT	0	50	3,720	1,740	5,510
Mountainous Star Coral	*Orbicella faveolata*	FT	231	570	4,508	1,788	7,097
Rough Cactus Coral	*Mycetophyllia ferox*	FT	0	0	0	12	12
Elkhorn Coral	*Acropora palmata*	FT	57	943	6,538	1,710	9,248
Staghorn Coral	*Acropora cervicornis*	FT	1,900	0	1,155	2,052	5,107
Pillar Coral	*Dendrogyra cylindrus*	FT	0	0	0	128	128
Total							29,034

Exhibit 22. Number of coral colonies outplanted in FY 2021-22 by the FWC and by Reef Renewal, LLC under contract from the FWC.

Common Name	Scientific Name	Reef Site	Number of Outplanted Colonies
Staghorn Coral	*Acropora cervicornis*	South Carysfort	557
		Reef North of Elbow	140
		Elbow Reef North	0
		Elbow Reef North	0
		Molasses Reef	190
		Pickles Patch Reef Site 1	325
		Pickles Patch Reef Site 2	174
		Tavernier Patch Reef Site 1	1,001
		Tavernier Patch Reef Site 2	404
		Tavernier Patch Reef Site 3	482
		Conch Reef Site 2	1,657
		Conch Reef Site 3	1,535
		Little Conch Reef	600
		Sombrero Reef	215
		Looe Key Site 23	1,120
		Looe Key Site 22	888
		Looe Key Site 24	2,066
		Eastern Dry Rocks	520
		Critter Ridge	479
		Heelo Hill	250
		Kissing Grunts	487
Elkhorn Coral	*Acropora palmata*	Elbow Reef North	50
		Elbow Reef North	31
		Molasses Reef	342
		Conch Reef Site 2	1,121
		Conch Reef Site 3	385
		Little Conch Reef	120
		Looe Key Site 23	64
		Looe Key Site 24	32
Mountainous Star Coral	*Orbicella faveolata*	Molasses Reef	1,616
		Conch Reef Site 2	1,710
		Conch Reef Site 3	1,081
		Sombrero Reef	835
		Looe Key Site 23	308
		Looe Key Site 24	437
Lobed Star Coral	*Orbicella annularis*	Molasses Reef	448
		Conch Reef Site 2	704
		Conch Reef Site 3	208
		Sombrero Reef	26
		Looe Key Site 23	329

Exhibit 22. (*continued*)

Common Name	Scientific Name	Reef Site	Number of Outplanted Colonies
Boulder Star Coral	*Orbicella franksi*	Molasses Reef	94
		Conch Reef Site 2	304

ELKHORN CORAL – The Elkhorn Coral is Federally Threatened and is not susceptible to SCTLD. FWC has an agreement with NOAA to monitor Elkhorn Coral at seven locations along Florida's Coral Reef. As of 2021, Elkhorn Coral was no longer present at two of the survey sites, and population abundance and the amount of living tissue had collectively been reduced by ~80% since 2011.

PILLAR CORAL – The Pillar Coral is Federally Threatened and is highly susceptible to SCTLD. The latest monitoring assessment occurred on April 14th, 2022. At the time, all colonies still had more than 50% of their live tissue remaining except two, but SCTLD was causing areas of numerous areas of tissue loss on all colonies due to the formation of new lesions in healthy portions of the colonies. Dry Tortugas National Park staff continues to treat the lesions with antibiotics to save the remaining tissue and the next scheduled assessment from FWC will take place in August.

Crayfish

BLACK CREEK CRAYFISH – The Black Creek Crayfish (BCC) is State Threatened and is endemic to northeast Florida, where much of its known range is in the Black Creek drainage. It inhabits streams with cool, unpolluted water with constant flow and high oxygen content. All documented occurrences have been within the lower St. Johns River watershed basin (St. Johns, Duval, Clay, and Putnam counties). The USFWS was petitioned to evaluate the BCC for listing but determined in September 2021, that listing was not warranted. Surveys conducted in 2019 suggested White-Tubercled Crayfish (WTC) are replacing BCC in historically occupied sites. In FY 2020-21, FWC used federal Section 6 funding to partner with UF to further investigate this ongoing threat. Of the 94 sites surveyed between 2020-2022, BCC were detected at 34 sites and WTC at 49 sites. The two species occurred together at 18 sites; BCC occurred without WTC at only 16 sites. At 60 sites sampled in both a 2008-2012 survey period and the 2018-2022 survey period, BCC occupancy significantly decreased while WTC occupancy significantly increased. In FY 2021-22, UF partners conducted experiments examining shelter competition and aggressive interactions between WTC and BCC. They found that when BCC and WTC are similarly sized, BCC are strong competitors. However, when WTC are larger (as is often the case in the wild), they win more aggressive interactions and outcompete BCC for shelter. Intensive trapping of 1 km of stream in summer 2021 and winter/spring 2022 resulted in 1,657 WTC removed and 908 BCC collected and released. The effectiveness of trapping as a conservation technique is still being tested, but results to date indicate that trapping can be effective at reducing abundance of WTC. In addition to the presence of

competing WTC, BCC are facing a threat from one or more microsporidian parasites. Microsporidia are not well-studied, but can be fatal, and infections may be becoming more prevalent in BCC.

PANAMA CITY CRAYFISH – The USFWS proposal to list the Panama City Crayfish (PCC) as a Federally Endangered went into effect on February 4, 2022. Efforts to meet the identified recovery goal of 2,200 protected and managed acres of PCC habitat have been ongoing during FY 2021-2022. Specifically, FWC and partners have actively pursued acquisition funds while simultaneously identifying parcels for potential acquisition and contacting relevant landowners. Additionally, FWC began working to develop a population and habitat monitoring method that will be useful to track changes in the species' status. These efforts will be ongoing into 2023.

MIAMI CAVE CRAYFISH – The Miami Cave Crayfish inhabits subterranean waters in Miami–Dade County and has been collected from wells that draw on the subsurface aquifer. USFWS has been petitioned to evaluate the Miami Cave Crayfish for possible listing. In previous years, FWC assisted with coordinating a survey project and providing information on known occurrences. In December 2021, FWC staff provided review comments on a draft SSA for the Miami cave crayfish which had been prepared for the USFWS.

Freshwater Mussels

CHIPOLA SLABSHELL – The Federally Threatened Chipola Slabshell is found in the Apalachicola River basin. It is a short-term brooder and is gravid from June–July and potential host fish are Bluegill and Redbreast Sunfish. FWC has obtained funding to identify host fishes for eight Federally Petitioned freshwater mussels, as well as the Chipola Slabshell and the Federally Endangered Choctaw Bean. A detailed understanding of the mechanisms behind the complex life history of native freshwater mussels will aid in their conservation (Exhibit 23).

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. Fish hosts are unknown, but it is believed to be a host specialist due to known hosts for closely related species. Utilizing funds received through the federal Section 6 Grant, primary host fish species of the Choctaw Bean will be targeted for identification. In FY 2021-22, FWC performed 12 surveys for this species and found 56 individuals; 47 were checked for larvae, and four of them were brooding (Exhibit 23).

FAT THREERIDGE – The Federally Endangered Fat Threeridge is found only in the Apalachicola and Chipola Riversa and broods from May—June. It is a generalist, parasitizing five fish species. 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 2021-22, FWC conducted

14 surveys and found 736 individuals. Although recent studies suggest population recruitment to be strong, of the 20 checked, only one brooding individual was found (Exhibit 23).

FUZZY PIGTOE – The Federally Threatened Fuzzy Pigtoe is found in the Escambia, Yellow, and Choctawhatchee River basins and broods from March—August, although it has been observed brooding in October. This mussel is a specialist and can only parasitize the Blacktail Shiner. Threats to this species include water quality changes due to nitrogen pollution and habitat alteration through sedimentation. In FY 2021-22, FWC performed 20 surveys for this species and found 20 individuals (Exhibit 29). Two individuals were checked for larvae, but neither were brooding (Exhibit 23).

GULF MOCCASINSHELL – The Federally Endangered Gulf Moccasinshell is found in upper tributaries of the Chipola River and Econfina Creek and 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. 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 2021-22, no individuals were found despite FWC's 10 surveys in this species' range. Since 2013, only eight individuals have been sampled at one site on Baker Creek (Exhibit 23).

NARROW PIGTOE – The Federally Threatened Narrow Pigtoe is found in the Escambia and Yellow Rivers and 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). Water quality changes due to increased nitrogen pollution is a common threat for this species. In FY 2021-22, FWC performed 15 surveys for this species and found 35 individuals. Only one of 16 individuals checked for larvae was brooding (Exhibit 23).

OCHLOCKONEE MOCCASINSHELL – The Federally Endangered Ochlockonee Moccasinshell is found only in the lower reaches of the Ochlockonee River, which were not surveyed during FY 2021-22. Localities of the Ochlockonee Moccasinshell are dependent on the availability of necessary host fish, which may be lacking because of migratory restrictions placed 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 (Exhibit 23).

OVAL PIGTOE – The Federally Endangered Oval Pigtoe is found in the Econfina Creek, Apalachicola, Ochlockonee, and Suwannee River basins and broods from March—August. The Oval Pigtoe only parasitizes Sailfin Shiners and

Eastern Mosquitofish. Populations of the Oval Pigtoe may be negatively impacted by changes in water quality (e.g., Deer Point Reservoir in Econfina Creek). Furthermore, the Talquin Reservoir on the Ochlockonee River can impede mussel movement by restricting the migration of necessary host fish. In FY 2021-22, FWC performed 14 surveys for Oval Pigtoe and found 20 individuals; of which, 10 were brooding larvae (Exhibit 23).

PURPLE BANKCLIMBER – The Federally Threatened Purple Bankclimber is found in the Apalachicola, Lower Chipola, and Ochlockonee River basins and 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. In FY 2021-22, FWC performed 14 surveys but did not locate any individuals of the Purple Bankclimber (Exhibit 23).

RAYED CREEKSHELL/FLATWOODS CREEKSHELL– Recently, the Rayed Creekshell underwent several taxonomic changes, and was split into Rayed Creekshell and Flatwoods Creekshell. The Rayed Creekshell occurs in the Apalachicola and Mobile basins, while the Flatwoods Creekshell is restricted to the Choctawhatchee and Escambia River watersheds. Both species are gravid from autumn to the following summer. In FY 2021-22, FWC conducted 14 surveys in the Apalachicola basin but only located four individuals of Rayed Creekshell, none of which were brooding larvae. In the Choctawhatchee basin, five surveys were conducted but only three specimens of Flatwoods Creekshell were located, all of which were brooding larvae. This species has been targeted for host fish identification by FWC utilizing Section 6 grant funds (Exhibit 23).

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 2021-22, FWC performed 12 surveys but did not locate any individuals. 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 (Exhibit 23).

SHINYRAYED POCKETBOOK – The Federally Endangered Shinyrayed Pocketbook is found in the Econfina Creek, Apalachicola, and Ochlockonee River basins in Florida, broods from November—August, and parasitizes Spotted Bass. In FY 2021-22, FWC performed 14 surveys for the Shinyrayed Pocketbook and found 38 individuals, of which 27 were checked for larvae and 16 were brooding (Exhibit 23).

SOUTHERN ELKTOE– The Southern Elktoe occurs only in the Apalachicola basin in Florida and Georgia. In the 14 surveys FWC conducted in the basin in the last fiscal year, only one individual was collected and was not

brooding larvae. The Southern Elktoe is a rare species; since 2000, only 66 live individuals and 10 shells have been observed. Hosts of the Southern Elktoe are currently being identified by the Alabama Aquatic Biodiversity Center (Exhibit 23).

SOUTHERN KIDNEYSHELL – The Federally Endangered Southern Kidneyshell is restricted to the Choctawhatchee basin in Florida. This bivalve broods from September—May and host fish utilized by the Southern Kidneyshell include the Blackbanded Darter, Brown Darter, and the Swamp Darter. In FY 2021-22, FWC performed five surveys but did not find any individuals (Exhibit 23).

SOUTHERN SANDSHELL – The Federally Endangered Southern Sandshell is restricted to the Yellow and Choctawhatchee River basins. 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. In FY 2021-22, FWC performed eight surveys for the Southern Sandshell and found six individuals (Exhibit 29). Only one of five individuals were observed to be brooding larvae (Exhibit 23).

SUWANNEE MOCCASINSHELL – The Federally Threatened Suwannee Moccasinshell is a rare mussel endemic to the Suwannee River basin. 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. The species was not surveyed during FY 2021-22 due to high water levels (Exhibit 23).

TAPERED PIGTOE – The Federally Threatened Tapered Pigtoe is restricted to the Choctawhatchee River basin. This bivalve broods from March—June and is a host specialist only parasitizing the Blacktail Shiner. In FY 2021-22, FWC performed five surveys for the Tapered Pigtoe and located 14 individuals. Four individuals were checked for larvae, but none were brooding (Exhibit 23).

Exhibit 23. Freshwater mussel surveys conducted in FY 2021-22. Number of surveys is in parentheses after the basin name. Dashes indicate the species is not known to occur in that basin. "NS" denotes a basin where the species occurs but where the basin was not surveyed in FY 2021-22.

Species	Apalachicola (14)	Choctawhatchee (5)	Escambia (12)	Econfina Creek (0)	Ochlockonee (0)	Suwannee (0)	Yellow (3)	Total (34)
Chipola Slabshell	50	-	-	-	-	-	-	50
Choctaw Bean	-	0	56	-	-	-	0	56
Fat Threeridge	736	-	-	-	-	-	-	736
Flatwoods Creekshell	-	3	0	-	-	-	-	3
Fuzzy Pigtoe	-	1	19	-	-	-	0	20
Gulf Moccasinshell	0	-	-	NS	-	-	-	0
Narrow Pigtoe	-	-	35	-	-	-		35
Ochlockonee Moccasinshell	-	-	-	-	NS	-	-	0
Oval Pigtoe	20	-	-	-	NS	NS	-	20
Purple Bankclimber	0	-	-	-	NS	-	-	0
Rayed Creekshell	4	-	-	-	-	-	-	4
Round Ebonyshell	-	-	0	-	-	-	-	0
Shinyrayed Pocketbook	38	-	-	NS	NS	-	-	38
Southern Elktoe	1	-	-	-	-	-	-	1
Southern Kidneyshell	-	0	-	-	-	-	-	0
Southern Sandshell	-	3	-	-	-	-	3	6
Suwannee Moccasinshell	-	-	-	-	-	NS	-	0
Tapered Pigtoe	-	14	-	-	-	-	-	14
Totals	849	21	110	NS	NS	NS	3	983

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. 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 April 2022, Frosted Elfin caterpillars were collected from ANF and transported to the Jones Center at Ichauway biological station near Newton, Georgia. There they were released into screened "dorms" within which they will pupate and overwinter. Next spring, Frosted Elfin adults will emerge to start a new population, the only one known in Georgia, where the butterfly once occurred but is now considered extirpated. This translocation event was coordinated by Tall Timbers Research Station, in partnership with the Jones Center at Ichauway, the U.S. Forest Service, the FWC, and Georgia Department of Natural Resources.

Miami Tiger Beetle

The Federally Endangered Miami Tiger Beetle is known only from critically rare pine rockland habitats in southern Miami-Dade County. In 2015, FWC with staff from Miami-Dade County Parks, Recreation, and Open Spaces began surveys at known and potential sites to determine the distribution of the beetle, monitor fluctuations in abundance, and study the beetle's biology including flight time, activity patterns, reproduction, and habitat. As of June 2022, 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 20 acres. Ongoing research seeks to determine habitat requirements of the Miami Tiger Beetle, quantify detection rates, and monitor population trends.

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 2021-22.

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 24). Regional media receive regional-only news and information as well as statewide releases. In FY 2021-22, the FWC issued many press releases on listed species. FWC press releases are posted online at MyFWC.com/News.

Exhibit 24. Number of reporters sent FWC press releases in FY 2021-22

FWC Region	Number of Reporters
Northwest	46
North Central	47
Northeast	29
Southwest	44
South	72
Statewide Total	262

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 25). 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 25. Total interactions with each FWC social media account obtained in FY 2021-22.

Social Media Platform	Quantity
@MyFWC Facebook	335,000 Likes
@MyFWC Twitter	37,000 Followers
@MyFWC Instagram	97,000 Followers
MyFWCMedia Flickr	2,258,180 Views
@MyFWC Youtube	841,568 Views
@FloridaBirdingTrail Facebook	21,779 Likes
@FWCResearch Facebook	100,000 Likes
@FWCvolunteers	2,061 Likes

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 26 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 26. Number of subscribers in FY 2021-22 for select GovDelivery topics.

Topic	Subscribers
Imperiled Species Management Plan	44,479
Florida Panther	46,959
Manatee	47,183
Sea Turtles	47,472
Landowner Assistance Program	30,495
Coral Reefs	32,713
Gopher Tortoises	44,907
Volunteer Programs	40,096

FAIRS, FESTIVALS AND EVENTS – Due to the COVID-19 pandemic, some events were either rescheduled or done virtually in FY 2021-2022. In 2022, FWC was able to have the annual Florida Scrub-Jay Festival in-person, with approximately 700 people in attendance. The Florida Panther Festival also returned in-person in 2021 and was held in conjunction with the zoo's free admission day for Collier County residents which occurs on the first Saturday of each month. The FWC participated in the Florida Bat Festival at the Lubee Bat Conservancy to increase public support for bats in Florida. In 2021, the Florida Bat Festival hosted over 4,000 attendees.

VOLUNTEER OPPORTUNITIES – FWC volunteers contribute greatly to the success of the state's conservation of listed species. The agency's Regional Volunteer Program Biologists and the Ridge Rangers Coordinator work with staff and partners to develop and sustain projects that meet strategic objectives and involve all aspects of volunteer management. Listed species conservation is one of the focal issues for the regional program. In FY 2021-22, volunteers assisted with monitoring imperiled shorebirds, imperiled wading birds, near-threatened scrub lizards, Florida scrub-jays, and Southeastern American Kestrels. From January to early April, volunteers provided support at the Temporary Field Response Station for the Manatee Unusual Mortality Event. Additionally, volunteers 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. Volunteer involvement also included managing invasive exotic vegetation from scrub habitats, spreading wiregrass seeds and removing hardwoods to allow for more listed plant species growth, as well as restoration plantings of endangered species such as clasping warea, Carter's mustard, *warea carteri*, and long leaf pines. Furthermore, volunteers reviewed footage from game cameras distributed throughout certain WMAs 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 2021-22, they conducted three site visits to assist individuals with concerns regarding Threatened or Endangered species including Florida panther, Florida bonneted bat and the Florida sandhill crane. Additionally, the Red-Cockaded Woodpecker Working Group meeting was held virtually in August 2021. Florida panther biologists gave several individual presentations to the public about panthers in FY 2021-22. Attendance typically ranged upwards of 20 people for each presentation, which were given both in-person and virtually.

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. These lessons reached an estimated. 379,000 youth in FY 2021-22.

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 335 certificates for FY 2021-22 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 2021-22, 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.

Another effort by the CWCI during FY 2021-22 to conserve coastal wildlife was participation in the establishment of the Hooked Pelican Working Group, which coordinates multiple stakeholder groups for streamlined conservation

effort of brown pelicans, an at-risk species. One of the goals of this working group is to integrate the distinct issues of feeding (direct or indirect), entanglement, wildlife protections, landscape-level effect, and pelican behavior/habituation. The working group's steering committee hosted a series of virtual meetings in November and December of 2021 enabling identification of actions to focus on. Following these coordinated efforts, staff observed a notable reduction in conflict at known hot spots such as Sunshine Skyway Fishing Pier State Park compared to previous seasons.

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 156 reviews of highway projects in FY 2021-22, 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 50 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 1,683 projects and provided written assistance on 893 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 in FY 2021-22. 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.

In FY 2021-22, FWC's LAP assisted more than 856 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 UF's Institute of Food and Agriculture Sciences, FNAI, and various other conservation organizations to assist Florida's private landowners. While private landowners represent the majority assisted by LAP in FY 2021-22, public conservation land managers including the U.S. DOD, water management districts, and county governments received assistance with development or review of management plans for their conservation lands. In total, LAP biologists delivered 1,489 assists to more than 860 landowners on 178,937 acres. For more information, please visit the LAP Website at: https://myfwc.com/conservation/special-initiatives/lap/

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, such as breeding, roosting and migratory stopover. For each CWA, the closure boundary and duration that may be posted as closed to public access 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 necessary management and monitoring activities for these areas each year. Management and monitoring activities are conducted with the participation of FWC staff and multiple partners including other state agencies, local

governments, and nongovernmental organizations. Thirty-two CWAs are established around the state: 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-six of the CWAs provided breeding habitat for federally- or state-listed imperiled species in FY 2021-22 (Exhibit 27).

All CWAs were monitored for use in FY 2021-22 by FWC staff or management partners. Regional conservation staff also coordinated with DLE to incorporate targeted patrols for CWAs during the breeding season. The total peak nest count for breeding birds on statewide CWAs was 11,124 in FY 2021-22, as compared to 15,009 in FY 2020-21, 16,896 in FY 2019-20, 24,614 in FY 2018-19 and 14,102 in FY 2017-18. Factors besides human disturbance that can impede nesting include habitat impacts due to storms and erosion, reduced prey availability, or predation pressures. Staff use a variety of techniques to identify site-specific factors impeding nesting success. For example, game cameras or traps are deployed to identify predators at CWAs and implement predation management protocols. Habitat management is conducted at CWAs outside the breeding season, including vegetation management, trash removal and storm debris cleanup.

Exhibit 27. Critical Wildlife Areas in Florida during FY 2021-22.

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	41, 442, 15, 1, 59, 17, 3 nests	200 ac
Flag Island[b]	Franklin	Year-round	**Black Skimmer**, **Least Tern**, **American Oystercatcher**, Caspian Tern, Gull-Billed Tern, Royal Tern, Sandwich Tern	145, 21, 5, 39, 5, 67, 78 nests	80 ac
St. George Causeway	Franklin	1 Mar to 30 Sept	**Black Skimmer**, **American Oystercatcher**, Brown Pelican, Caspian Tern, Gull-Billed Tern, Royal Tern, Sandwich Tern, Sooty Tern, Laughing Gull	63, 5, 841, 85, 4, 1244, 369, 1, 940 nests	32 ac
Lanark Reef[b]	Franklin	Year-round	**Black Skimmer**, **American Oystercatcher**, Willet, Brown Pelican, Caspian Tern, Gull-Billed Tern, Royal Tern, Sandwich Tern, Laughing Gull, **Tricolored Heron**, Great Egret	34, 6, 2, 392, 2, 7, 75, 18, 350, 20, 6 nests	65 ac
Alligator Point	Franklin	15 Feb to 31 Aug	**Black Skimmer**, **Least Tern**, **American Oystercatcher**, **Snowy Plover**, Wilson's Plover	3, 3, 2, 0, 6 nests	66 ac
NORTH CENTRAL REGION (4 CWAs)					
Amelia Island	Nassau	1 Mar to 1 Sept	**Least Tern**, Wilson's Plover, Willet	186, 16, 3 nests	250 ac
Nassau Sound Islands[b]	Duval	Year-round	**Black Skimmer**, **Least Tern**, **American Oystercatcher**, Gull-Billed Tern, Wilson's Plover, Willet	52, 45, 4, 33, 22, 0 nests	18 ac
Fort George Inlet	Duval	1 May - 31 Aug	**Black Skimmer**, **Least Tern**, **American Oystercatcher**, Brown Pelican, Royal Tern, Laughing Gull, Wilson's Plover	20, 52, 7, 0, 209, 839, 25 nests	82 ac
Withlacoochee Caves	Citrus	15 Apr - 15 Aug and 15 Dec - 15 Mar	Southern Myotis, Tricolored Bat	401, 42 individuals (wintering); 13 individuals (breeding)	3 ac
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	*No nesting occurred within the CWA boundary this year.*		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	69, 7, 4, 24, 63, 5, 16, 4, 84, 32, 1, 3, 7, 27 nests	6 ac

Exhibit 27. (*continued*)

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species In Bold)*	STATUS[a]	MANAGED AREA
Stick Marsh	Brevard	1 Jan - 31 Jul	**Wood Stork**, **Roseate Spoonbill**, **Tricolored Heron**, Great Egret, Snowy Egret, Cattle Egret, Anhinga	4, 62, 3, 110, 17, 106, 30 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
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

Exhibit 27. (*continued*)

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species In Bold)*	STATUS[a]	MANAGED AREA
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
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 2020-21. 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 2021-22. These activities included:

• Regular patrols of the Florida Panther reduced-speed zones. Officers statewide documented 3,768 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 320 vessel patrol hours were focused on TED enforcement during the year resulting in 65 TED inspections and 35 documented state and federal TED violations

• Patrol efforts targeting coastal nesting areas of protected shorebirds 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; 75,836 water patrol hours were dedicated to manatee zone enforcement, resulting in 1,784 citations and 3,482 warnings

• In addition, 43 citations and 157 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 FWC 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 214 proactive deployments resulting in 9 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 2021-2022, 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.

The above assistance and guidance led to the FWC issuing 89 scientific collecting (intentional take), 331 incidental take, 8 special purpose, 5 non-Florida resident falconry and 6 Peregrine falconry permits that resulted in a net conservation benefit or proved not to be detrimental for the species. More information on species guidelines, policies, and permit applications is available at http://myfwc.com/license/wildlife/protected-wildlife/.

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 (Program). Using input from our Imperiled Species Management Plan, Species Action Plans, subject matter expert input, and previous Strategy's findings, FWC determines where focal species conservation can be affected on

each WMA or 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 actions 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 these actions. Implementing this program ensures FWC is efficiently meeting the needs of Florida's at-risk species on lands managed by the agency.

In FY 2021-22, FWC completed four workshops covering three WMAs and three WEAs. The areas covered by a workshop included: Watermelon Pond WEA (Alachua County), L Kirk Edwards WEA (Leon County), Everglades Complex of WMAs (Broward, Miami-Dade County), and Lake Wales Ridge WEA (Highlands, Polk 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 2022-23. In FY 2021-22, FWC finalized six strategies covering 3 WMAs and 5 WEAs: Box R WMA (Gulf County), JWCWMA (Palm Beach County), Caravelle Ranch WMA (Putnam County), Little Gator Creek WEA (Polk County), Perry-Oldenberg WEA (Hernando County), Janet Butterfield Brooks WEA (Hernando County), Chinsegut WEA (Polk County), Watermelon Pond WEA (Alachua 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, 2022

Exhibits A–1 through A–9 contain all of Florida's listed species as of June 30, 2022, 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, 2022.

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, 2022.

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, 2022.

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

EXHIBIT A–4: Listed Reptiles in Florida as of June 30, 2022.

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, 2022.

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, 2022.

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, 2022.

Common Name	Scientific Name	Status
Black Creek Crayfish	*Procambarus pictus*	ST
Panama City Crayfish	*Procambarus econfinae*	SSC
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, 2022.

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, 2022.

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 2021-22

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/.

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Gilbertson, M. L. J., D. Onorato, M. Cunningham, S. VandeWoude, and M. E. Craft. 2022. Paradoxes and synergies: Optimizing management of a deadly virus in an endangered carnivore. Journal of Applied Ecology 59:1548-1558.

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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	
Blue Calamintha Bee	*Osmia calaminthae*
Flatwoods Creekshell	*Strophitus williamsi*
Frosted Elfin Butterfly	*Callophrys irus irus*
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.

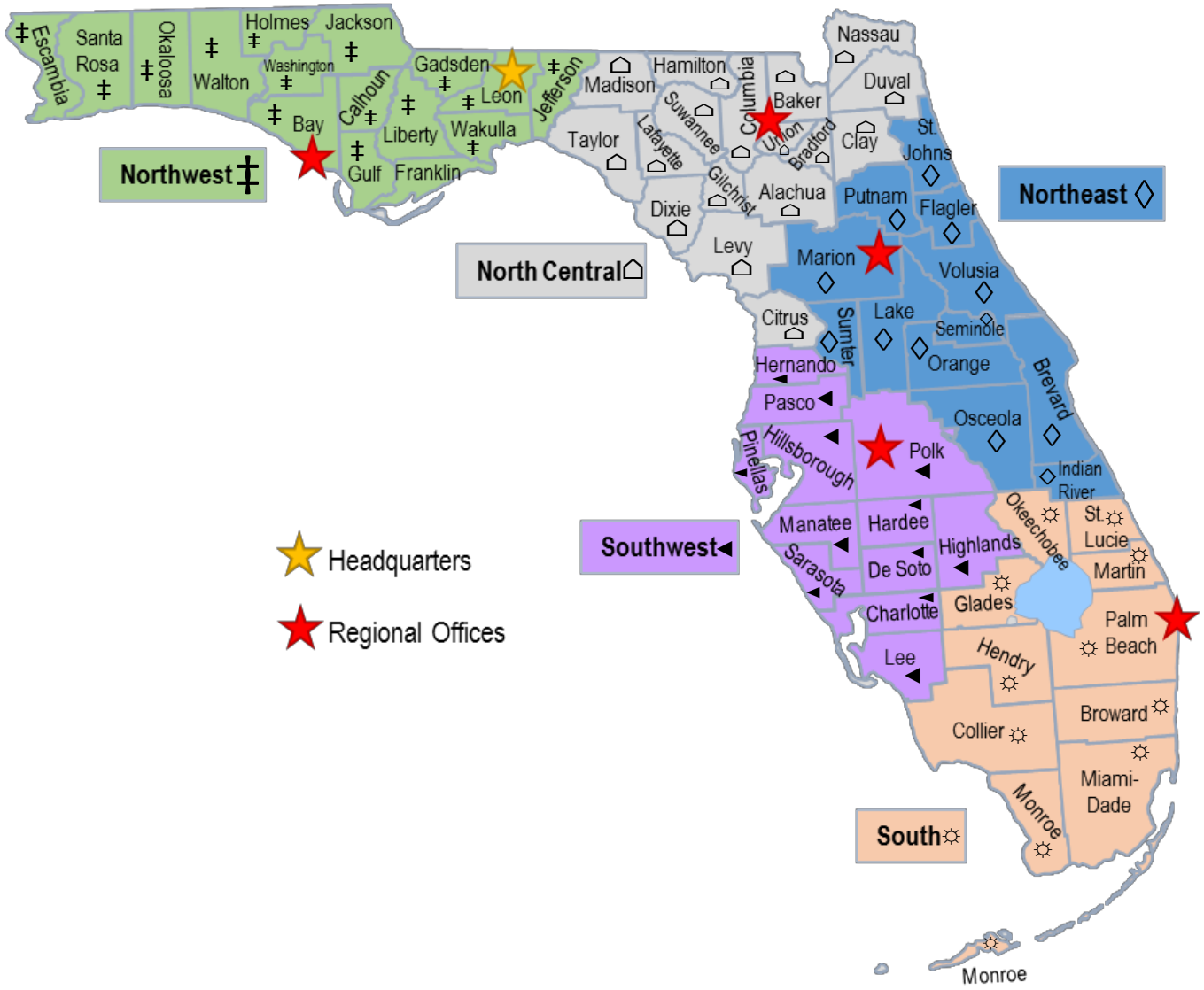
APPENDIX E (*continued*)

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