Florida Fish and Wildlife Conservation Commission

Endangered and Threatened Species Management and Conservation Plan

Progress Report

Fiscal Year 2016-17

December 1, 2017

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EXECUTIVE SUMMARY

This report covers Fiscal Year (FY) 2016-17 and constitutes the 39th 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 Endangered and Threatened species in Florida. Federal- and State-designated Endangered and Threatened species, as well as State-designated Species of Special Concern, are collectively referred to as listed species in this report.

The initial plan submitted in March 1978 remains the basic reference document for the annual updates. Subsequent annual reports may be consulted regarding a chronological history of listed species activities and may be obtained at http://www.myfwc.com/about/inside-fwc/legislative-affairs/archive-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 2018-19, 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. 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 all contained in a single-category called State-designated Threatened (ST). This single-category is designed to eliminate controversy about what a species is called and instead focus attention on the conservation actions needed to improve the species' status. Florida's Species of Special Concern (SSC) List has been temporarily retained to allow time to assess these species under Florida's listing process to determine whether they should be listed as State-designated Threatened species or removed from the list. In addition, all Florida species listed under the United States Endangered Species Act by the United States Department of the Interior's Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Agency's Marine Fisheries Service (NOAA-Fisheries) are now included on 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 species (FXN).

Rule 68A-27.003, *Florida Administrative Code*, contains the official Florida Endangered and Threatened Species List. Rule 68A-27.005, F.A.C., contains the State-designated Species of Special Concern List. Currently, FWC lists 133 fish and wildlife species (Exhibit 1) as ST (38), or SSC (6), FE (50), FT (34), FT(S/A) (4), FXN (1). There is no duplication in species listing 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 a complete listing of Florida's listed fish and wildlife species as of June 30, 2017. Changes to the list may occur throughout the year. A compilation of Florida's current listed species is available at http://myfwc.com/media/1515251/threatened-endangered-species.pdf. The rules noted above are available at the F.A.C. website (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: animals in 50 Code of Federal Regulations - 17, and plants in 50 Code of Federal Regulations - 23. Additional information regarding federal listings may be located at the following sources:

NOAA Fisheries Federal Listings	http://www.nmfs.noaa.gov/pr/species/index.htm
USFWS Federal Listings	http://www.fws.gov/endangered/species/us-species.html
Florida Department of Agriculture and Consumer Services: Florida Statewide Endangered and Threatened Plant Conservation Program - includes federally-listed plant species	http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Our-Forests/Forest-Health/Florida-Statewide-Endangered-and-Threatened-Plant-Conservation-Program

Exhibit 1
Summary of Florida's Protected Wildlife List as of June 30, 2017

STATUS DESIGNATION	FISH	AMPHIBIANS	REPTILES	BIRDS	MAMMALS	INVERTEBRATES	TOTAL
Federally-designated Endangered (FE)	3(1)[1]	1	3(3)	8	21(5)[2]	14	**50(9)**
Federally-designated Threatened (FT)	2(1)	1	7(2)	6	2(1)	16	**34(4)**
Federally-designated Threatened Due to Similarity of Appearance [(FT(S/A)]	0	0	1	0	0	3	**4**
Federally-designated Nonessential Experimental Population (FXN)	0	0	0	1	0	0	**1**
State-designated Threatened (ST)	6	2	8	16	4	2	**38**
State-designated Species of Special Concern (SSC)	1	0	1	1	2	1	**6**
TOTAL	**12(2)**	**4**	**20(5)**	**32**	**29(6)**	**36**	**133(13)**

[1] Numbers in the parentheses are the number of species for which the FWC does not have constitutional authority. For example, there are three fish species in the Federally-designated Endangered (FE) category, one of which the FWC does not have constitutional authority.
[2] There is one additional species included in Rule 68A-27.0031, FAC as a species for which the 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 in 1990 (*Millsap, B. M., J. A. Gore, D. E. Runde, and S. I. Cerulean. 1990. Setting priorities for the conservation of fish and wildlife species in Florida. Wildlife Monographs 111*). This ranking process provides a biological score, which ranks species based on their biological vulnerability; an action score that ranks species based on the amount of available information and ongoing management actions for a species; and a supplemental score that looks at variables not included in biological or action scores. These scores help identify species most in need of conservation measures and the amount of effort previously expended on them, which then is used to help in prioritizing agency resources. FWC also maintains a list of Species of Greatest Conservation Need, which uses a set of scientific core criteria and identifies the broad range of Florida's species that are at-risk or could become at-risk in the future. In addition to these tools, FWC must also consider available funding sources, legislation, court rulings, grant agreements, and approved management plans when setting priorities for allocating resources for the management and conservation of Florida's State-listed species.

Statewide Policies Pertaining To Listed Species

LISTING ACTIONS – On January 11, 2017, the state listing status changes that were proposed in 2011 as part of the newly implemented Threatened Species Management System became official after the approval of Florida's Imperiled Species Management Plan by FWC Commissioners.

- 15 species were removed from Florida's Endangered and Threatened Species List: Eastern chipmunk, Florida mouse, brown pelican, limpkin, snowy egret, white ibis, Peninsula ribbon snake (Lower Keys population), red rat snake (Lower Keys population), striped mud turtle (Lower Keys

population), Suwannee cooter, gopher frog, Pine Barrens tree frog, Lake Eustis pupfish, mangrove rivulus, and Florida tree snail.

- 23 species changed from State-designated Species of Special Concern to State-designated Threatened species: Sherman's short-tailed shrew, Sanibel rice rat, little blue heron, tricolored heron, reddish egret, roseate spoonbill, American oystercatcher, black skimmer, Florida burrowing owl, Marian's marsh wren, Worthington's Marsh wren, Scott's seaside sparrow, Wakulla seaside sparrow, Barbour's map turtle, Florida Keys mole skink, Florida pine snake, Georgia blind salamander, Florida bog frog, bluenose shiner, saltmarsh top minnow, Southern tessellated darter, Santa Fe Cave crayfish, and Black Creek crayfish.
- 14 species maintain their State-designated Threatened status: Everglades mink, Big Cypress fox squirrel, Florida sandhill crane, snowy plover, least tern, white-crowned pigeon, Southeastern American kestrel, Florida brown snake (Lower Keys population), Key ringneck snake, short-tailed snake, rim rock crowned snake, Key silverside, blackmouth shiner, and crystal darter.
- 5 species remain listed as State-designated Species of Special Concern: Homosassa shrew, Sherman's fox squirrel, osprey (Monroe County population), alligator snapping turtle, and harlequin darter.

During FY 2016-17, species evaluation requests were submitted for the Sherman's fox squirrel, the Homosassa shrew, the osprey (Monroe County population), and the harlequin darter. In addition, the biological status review for three species of alligator snapping turtle was completed and staff are moving forward on the revision of the Species Action Plan.

Completed biological status reports, species action plans, and completed management plans are available at http://myfwc.com/wildlifehabitats/imperiled/biological-status/, http://myfwc.com/wildlifehabitats/imperiled/species-action-plans/, and http://myfwc.com/wildlifehabitats/imperiled/management-plans/, respectively.

Threatened Species Management System, the Listing Process, and Management plans - Rules implementing the Threatened Species Management System, including a revised listing process, became effective on November 8, 2010. These rules are available at https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27. In fall 2010, FWC conducted biological status reviews for all State-designated Threatened or State-designated Species of Special

Concern that had not recently been evaluated. FWC Commissioners approved updated species listing recommendations in June 2011, based on these biological status reviews. FWC developed species action plans for the species that did not have existing management plans. Species action plans describe individual species threats and conservation needs. Management planning for State-designated Threatened species and State-designated Species of Special Concern has been completed, with final approval of the Imperiled Species Management Plan (http://myfwc.com/media/4133167/Floridas-Imperiled-Species-Management-Plan-2016-2026.pdf) in November 2016 and final rule changes effective February 2017.

As of June 30, 2017, there were 38 State-designated Threatened species and six State-designated Species of Special Concern. Gopher tortoise management and permitting is proceeding under the revised ten-year management plan, approved in September 2012, and the revised permitting guidelines, approved in February 2015. The Panama City crayfish has a draft management plan (http://myfwc.com/media/3395300/Panama-City-Crayfish-Draft-Management-Plan-February-2016.pdf) and is currently under review for federal listing. The remaining 42 State-listed species are included in the new management planning approach for at-risk species. The focus for on-going at-risk species management planning is to utilize an integrated management approach to improve resource utilization and cooperation with partners and provide a long-term strategy for conservation and management of at-risk species. This integrated model includes a multi-species plan (the Imperiled Species Management Plan) that allows FWC to identify potential or real conflicts, recognize opportunities, and achieve efficiencies in a way that single-species management at this volume would not allow.

Since the final approval of the Imperiled Species Management Plan, staff have been working on the implementation of the six main objectives and the development of Species Conservation Measures and Permitting Guidelines (http://myfwc.com/wildlifehabitats/imperiled/management-plans/) for all 57 species included in the Plan, starting with the 42 that are State-listed. The final public comment period for the Plan and 8 of the associated guidelines occurred in Fall 2016 and received over 300 comments and suggestions. Partners and stakeholders have been integral in the development of the species action plans and Imperiled Species Management Plan and FWC will continue to engage and update stakeholders in implementation of the Plan and continued development of permitting guidelines. Independent Economic Assessments have been conducted relating to the rule changes associated with Rule 68A-27 F.A.C. and the Species Conservation

Measures and Permitting Guidelines. Additional information on these resources may be accessed at http://myfwc.com/wildlifehabitats/imperiled/species-guidelines/.

Since FY 2013-14, the Legislature has authorized recurring Threatened and Nongame Species Management funding. FWC uses these funds to conduct activities to improve the status of Florida's State-designated Threatened and nongame species, focusing on the development and implementation of management plans, research and monitoring programs, and undertaking conservation actions. This funding has allowed FWC to conduct conservation actions and/or monitoring for State-listed species such as the Homosassa shrew, Florida mouse, Sherman's fox squirrel, Eastern chipmunk, blackmouth shiner, saltmarsh topminnow, harlequin darter, Panama City crayfish, Worthington's marsh wren, reddish egret, and American oystercatcher. FWC also utilizes these funds for conservation actions for the Federally-designated Endangered Florida grasshopper sparrow, and habitat management to benefit sandhill species at several wildlife management areas (WMAs). Funding also provides volunteer coordinators to assist with citizen science projects for the Southeastern American kestrel and the Florida bonneted bat, and technicians have conducted stewardship activities for listed shorebirds, such as the snowy plover, American oystercatcher, black skimmer, and least tern, at designated Critical Wildlife Areas (CWA) across the state.

Required Legislation

Currently, FWC has no requests for legislative changes affecting listed species. FWC will work with the Legislature should any legislation involving listed wildlife species be proposed.

Funding Request

RECOMMENDED FUNDING LEVEL – The recommended level of funding for the FWC endangered species programs in FY 2018-19 is $33,621,933 (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 and Threatened Species Funding Request for FY 2018-19

FUNDING SOURCE	AMOUNT
Nongame Wildlife Trust Fund (NWTF)	$5,393,606
General Revenue Fund (GR)	$415,283
Florida Panther Research & Management Trust Fund (FPRMTF)	$1,412,507
Save the Manatee Trust Fund (STMTF)	$3,485,132
Marine Resources Conservation Trust Fund (MRCTF)	$9,338,610
Land Acquisition Trust Fund (LATF)	$1,769,356
State Game Trust Fund (SGTF)	$843,595
Federal Grants (FGTF)	$8,486,634
Grants and Donations Trust Fund	$2,477,210
Total	**$33,621,933**

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 of listed species. Research is also leading 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.

MAMMALS

Beach Mice

Several subspecies of the old-field mouse, collectively known as beach mice, inhabit coastal dune habitat along the Atlantic Coast and northwest Gulf Coast of Florida. Beach mice also occur along the coast of Alabama. Due to extensive development of their coastal habitat, as well as impacts from hurricanes and non-native predators, all but one of the beach mouse subspecies are listed as Federally Endangered or Threatened by the USFWS. In Florida, these include the Choctawhatchee beach mouse, Anastasia Island beach mouse, St. Andrew beach mouse, Perdido Key beach mouse (all Federally-designated Endangered), and the Southeastern beach mouse (Federally-designated Threatened).

GULF COAST CONSERVATION AND POPULATION MONITORING – FWC, Florida Department of Environmental Protection's (FDEP), Gulf Islands National Seashore, the St. Joe Company, and Tyndall Air Force Base continued a long-term monitoring program for beach mice during FY 2016-17 at 11 public sites and one private site along the northwest Gulf Coast of Florida (Exhibit 3).

The mean detection rate (percentage of stations with tracks per sampling period) varied from 46% at Grayton Beach State Park to 95% at Shell Island East (Exhibit 3). Most sites had mean detection rates above 80%, which indicates most of the available dune habitat at these sites is occupied by beach mice. On the other hand, the same four sites (Deer Lake State Park, Grayton Beach State Park, Topsail Hill State Park, and Rish State Park) that had the lowest detection rates in FY 2014-15 and FY 2015-16 had the lowest rates again in FY 2016-17, suggesting that populations at these sites merit continued close monitoring.

The high detection rate for Perdido Key beach mice is encouraging. Less than ten years ago, populations of the Perdido Key beach mouse were at perilously low levels and were restricted to the eastern end of the island. Since 2010, however, beach mice have been detected throughout the three large public lands on Perdido Key and in some areas in between. The continued presence of Choctawhatchee beach mice at Grayton Beach State Park is also encouraging. Despite several prior translocations, beach mice were absent here in 2011 when mice were reintroduced from nearby Topsail Hill Preserve State Park. Although beach mice are still present at Grayton Beach State Park six years after being reintroduced, less than half of the stations detected beach mice in FY 2016-17, and that was the lowest proportion of detections at any site.

St. Andrews State Park in Bay County consists of the primary park property on the mainland plus an adjacent large undeveloped area of dunes on Shell Island. The mainland part of the park has been devoid of beach mice for several decades, while the island portion has maintained a stable population of Choctawhatchee beach mice. In FY 2016-17, FWC helped USFWS, FDEP, and Tyndall Air Force Base capture mice on Shell Island and transfer them to the uninhabited state park property on the mainland. A few weeks later, a second cohort of mice was moved to the mainland and subsequent trapping showed some reintroduced mice had survived and some had even reproduced. Although some non-native house mice are present in the mainland recipient site, biologists are optimistic that the reintroduced beach mice will continue to survive and reproduce, thereby providing another population in case storms, disease, or predators cause the Shell Island population to decline.

Exhibit 3. Mean Percentage of Track Stations where Beach Mouse Tracks were Detected in FY 2016-17 During Repeated Monitoring at 12 Coastal Locations in Northwest Florida.

SAMPLING LOCATION	COUNTY	BEACH MOUSE SUBSPECIES	NUMBER OF STATIONS	PERCENT OF STATIONS WITH TRACKS
Billy Joe Rish Park	Gulf	St. Andrew	21	65
East Crooked Island	Gulf	St. Andrew	42	84
St. Joseph Peninsula State Park	Gulf	St. Andrew	40	94
Deer Lake State Park	Walton	Choctawhatchee	16	58
Grayton Beach	Walton	Choctawhatchee	45	46
Shell Island East	Bay	Choctawhatchee	30	95
Shell Island West	Bay	Choctawhatchee	20	86
Topsail Hill Preserve	Walton	Choctawhatchee	32	58
Water Sound	Walton	Choctawhatchee	4	80
West Crooked Island	Bay	Choctawhatchee	30	89
Gulf Islands National Seashore	Escambia	Perdido Key	80	83
Perdido Key State Park	Escambia	Perdido Key	81	91

ATLANTIC COAST BEACH MOUSE CONSERVATION – 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 mouse is likely restricted to Volusia and Brevard counties, and perhaps scattered locations in Indian River, St. Lucie, and Martin counties. In FY 2015-16, FWC used track tubes to determine the presence of Southeastern beach mice in St. Lucie and Martin counties. Although rodent tracks were detected, no beach mice were captured during subsequent trapping. No additional surveys were conducted during FY 2016-17 and the current southern extent of the range of the Southeastern beach mouse remains undetermined.

In October 2016, Hurricane Matthew passed along the east coast of Florida and winds and storm surge severely impacted beach mouse habitat in the coastal dunes along Anastasia Island. Due to the storm's destruction to much of the dune vegetation, biologists were concerned that beach mice might not have enough natural food plants to survive. FWC and partners in USFWS, FDEP, and the National Park Service devised a plan to scatter sunflower seeds in the dunes as a supplemental food for beach mice that survived the storm. Track tubes and remote cameras were placed along feeding transects to monitor the presence of beach mice at Anastasia State Park and Fort Matanzas National Monument. Supplemental feeding and monitoring began in May and continued into the summer.

During FY 2016-17, the USFWS approved FWC to allocate federal funds for a one-year project to evaluate impacts from Hurricane Matthew on the Anastasia Island beach mouse population and the habitats where it occurs within Fort Matanzas National Monument and Anastasia State Park. FWC will assess the relative abundance of Anastasia Island beach mice and the condition of the available habitats on those sites post-hurricane. A site-specific habitat restoration strategy will also be produced.

Florida Mouse

In 2010, FWC and external experts conducted a Biological Status Review of the Florida mouse, during which it was determined the species did not meet the criteria for State listing. However, the Florida mouse retained its status as a State-designated Species of Special Concern until the Imperiled Species Management Plan was finalized and rule changes became effective in January 2017. This species will no longer be included in future reports.

Assessing the Genetic Structure of the Statewide Florida Mouse Population for More Effective Conservation and Management – Genetic samples have been collected from Florida mice across the state and analysis is underway. Data collected will allow for the development of fine scale species distribution models that can be used to improve management for this and other sandhill and scrub dependent species. This project, conducted by researchers from the University of Florida, was initiated in FY 2013-14. In FY 2015-16, FWC obtained a grant to support the remaining work for this project which will be completed in FY 2017-18. Genetic analyses conducted for this study will produce information on the extent of gene flow, or connectivity, among local populations across the range of the Florida mouse, which is needed for better management of this species across its range. Genetic analyses also will help to identify and prioritize areas of high conservation value for Florida mice throughout the state.

To date, University of Florida researchers have genotyped 1001 Podomys, representing 61 unique locations where the mice were trapped; researched fine scale phylogenetic relationships among recently diverged populations; and are currently sequencing 160 samples from 16 sites along the Lake Wales Ridge. The University of Florida researchers also have successfully sequenced a large portion (~850 bp) of the mitochondrial cytochrome b gene. Currently they have sequenced 254 Podomys for the cytochrome b gene. The set of markers from the nuclear DNA is being used to genotype the samples as one method of analysis. Cytochrome b, a mitochondrial DNA gene, is being

sequenced from a subset of samples as a separate genetic marker for a second type of analysis. Because these two types of markers come from different sources in an individual (nucleus and mitochondrion) they provide complementary information with which to better evaluate the potential causes for any patterns (differences) that are found. This is a cutting edge approach that will produce robust data that can then be applied to develop the most appropriate conservation and management recommendations for these wildlife populations. Results to date have revealed a large amount of variation in the cytochrome b gene range-wide. Basic diversity statistics indicate sequence diversity is relatively low in most northern locations, and higher at more southerly locations (with the exception of the Atlantic Ridge sites). Within the Lake Wales Ridge area, genetic differentiation was high among sampled locations, even at scales of only a few kilometers. However, samples from locations separated by shorter distances tended to be linked together more closely. Two sites at the southern end of the Lake Wales Ridge appear to contain highly divergent set of DNA variations, suggesting that may be an important area of genetic diversity. Also, locations south of St. Lucie Inlet are highly divergent from other locations including Savannas State Preserve, which is only a few miles north of the inlet.

Currently, researchers are using genotype data for the 160 Podomys from the Lake Wales Ridge in combination with other data (e.g., soils) to develop a fine-scale species distribution model. The model can be used to assess genetic variation among sites relative to the historical distribution of suitable habitat and changes in land use that have occurred. Those results can be used to improve how management actions are applied going forward.

SURVEYS ON WEAS AND WMAS – Surveys were conducted at three sites: Branan Field Wildlife and Environmental Area (WEA) in Duval County, Lafayette Forest WEA in Lafayette County, and Half Moon WMA in Sumter County. As a gopher tortoise commensal, the Florida mouse benefits from land management for gopher tortoises, however understanding use of these sites by Florida mice can assist in meeting the goals of the Species Action Plan and preventing the need to re-list in the future. Branan Field contains limited habitat suitable for the Florida mouse. During FY 2016-17, FWC conducted a Florida mouse survey on 75 acres of sandhill habitat on the northern end of Branan Field WEA. Surveys were conducted between December 5th and 10th, 2016, and no Florida mice were captured. This was the third unsuccessful attempt to capture Florida mice and no future survey is planned for Branan Field. FWC also conducted a Florida mouse survey on 1,258 acres of restoration sandhill and flatwoods habitat on the southern end of Lafayette Forest WEA in Lafayette

County. FWC conducted the surveys between February and April 2017, and 37 Florida mice were captured. In December 2016 and January 2017, FWC completed a small mammal presence/absence survey in four areas of scrubby flatwoods on Half Moon Wildlife Management Area (WMA) in Sumter County. During 320 trap nights, three Florida mice were captured at one of the sites.

Everglades Mink

The Everglades mink is a State-designated Threatened subspecies; Species Conservation Measures and Permitting Guidelines were approved for the Everglades mink in November 2016. The Everglades mink is known to occur in the fresh water marshes and wet forests of the Everglades. Information on its distribution and habitat needs are lacking, in part due to the absence of an effective survey method. In order to learn more about Everglades mink distribution, an effective survey method needs to be developed. To meet this need, FWC evaluated the efficacy of camera traps and spotlighting as methods for detecting mink in Florida. In addition, a website (http://myfwc.com/research/wildlife/terrestrial-mammals/mink-sightings/) was created for the public to report mink sightings, which can be used to guide survey efforts and supplement field data. The website included a Google Maps© tool for reporting the exact location of each mink sighting and a comments section for providing sighting details, as well the opportunity to attach pictures. Comments, pictures, and contact information submitted with the sighting location were used to evaluate the validity of the sighting. The website address and its purpose were advertised to the public using local media resources.

Between July 2014 and June 2016, FWC conducted field surveys on three mink subspecies in Florida: Gulf salt marsh mink, Atlantic salt marsh mink, and Everglades mink. FWC conducted earlier camera trap surveys of both Atlantic and Gulf salt marsh mink (October 2013 through May 2016). Camera traps consisted of a trail camera placed within a bucket on a floating platform, a method developed by researchers at the University of Florida. Camera trap surveys were conducted in salt marsh habitat in Duval, Nassau, and St. John's counties in northeast Florida, and in Dixie, Levy, and Citrus counties along the Gulf coast. FWC detected Atlantic salt marsh mink on 50 of 274 (18%) camera traps. Gulf salt marsh mink were detected on 37 of 537 (7%) camera traps. Mink were detected with camera traps in Nassau, Duval, Dixie, Levy, and Citrus counties.

Under a grant FWC biologists received in July 2014, FWC evaluated camera traps and visual surveys as methods for detecting Everglades mink. FWC biologists conducted camera trap surveys for

Everglades mink between July 2014 and June 2017 using two types of camera traps. First, floating camera traps were used to survey in salt marsh and fresh water swamp. Second, trail cameras were attached to trees and focused on small water holes within forested wetlands. Everglades mink camera trap surveys occurred in Fakahatchee Strand Preserve State Park, Picayune Strand State Forest, Ten Thousand Islands National Wildlife Refuge, and Big Cypress National Preserve.

In addition to camera trap surveys, FWC conducted visual surveys of Everglades mink in Fakahatchee Strand Preserve State Park, Big Cypress National Preserve, and Picayune Strand State Forest along roads and trails between April 2015 and June 2017. In total, FWC surveyed 24 transects, two to four nights each. A single night's survey involved traveling along a predetermined route and scanning for mink along the edges of roads and trails. Half of the surveys were conducted for two hours starting at sunrise and half during the two hours either immediately before or after sunset. Mink were detected by their distinctive, yellow eye-shine at night or visually during the day and their location recorded.

Between June 2012 and June 2017, 550 sightings were reported on the mink website. Sightings occurred throughout the state with 32 sightings reported in the Everglades region. Overall, less than 30% of the sightings were deemed valid based on comments and pictures submitted. Most of the sighting reports were river otter, which are more common than mink but similar in appearance.

Everglades mink were detected on one transect during spotlight surveys along Janes Scenic Drive in Fakahatchee Strand Preserve State Park. Everglades mink were also detected on two of 537 (less than 1%) camera traps, both of which were trail cameras attached to trees. No Everglades mink were detected on floating camera traps.

Camera traps effectively detected Atlantic and Gulf salt marsh mink. Neither camera traps nor visual surveys were particularly effective in detecting Everglades mink. Future Everglades mink surveys will focus on surveying additional public lands.

Homosassa Shrew

The Homosassa shrew is currently listed in Florida as a State-designated Species of Special Concern. In 2014, FWC completed a project studying the status and distribution of the Homosassa shrew in Florida. The goal of this project was to obtain data needed to reassess the listing status. Multiple sources of data obtained during that project indicated the current accepted range is a reasonable estimate of the extent of occurrence. The number of habitats where Homosassa shrews were

recorded showed the Homosassa shrew has a large area of occupancy within that extent of occurrence. The project results also indicated an apparent low rate of occurrence for the Homosassa shrew, which seemed consistent with results from other recently published studies. The project results were detailed in a final report. In April 2017, staff initiated the reevaluation of the biological status of the Homosassa shrew with final findings anticipated in FY 2017-18. The Biological Review Group will consist of three experts, including two from outside FWC.

Sherman's Short-tailed Shrew

The Sherman's short-tailed shrew is one of two species of short-tailed shrew that occurs in Florida. The Sherman's short-tailed shrew is currently listed as a State-designated Threatened species in Florida. The Sherman's short-tailed shrew is believed to be restricted to a small area in southwest Florida from the vicinity of Royal Palm to just north of Fort Myers. The specimens used to differentiate Sherman's short-tailed shrew from other species of short-tailed shrew and delineate its range in Florida were collected in 1955. Sampling is being conducted to evaluate its population status and determine if it is still present within its presumed range.

Between December 2014 and February 2017, FWC surveyed for Sherman's short-tailed shrew on publicly managed lands in Charlotte and Lee counties. FWC established 63 drift-fence arrays, each of which was constructed using three 30-foot segments of silt fence in a "Y" formation with seven two-gallon buckets placed flush with the ground at the ends and center of each fence segment. Raised covers were placed over each bucket to protect captured animals from sun and rain. Each array was open for a minimum of 30 days, with most arrays open for 60 days. Each array was checked two to three times a week and all captured shrews were identified by species and either tissue samples (e.g. tail tip) or whole carcasses were collected for future genetic analysis.

In total, 259 least shrews and three short-tailed shrews were captured. The three short-tailed shrew specimens were captured on the Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area (WEA) in Lee County. This location is within the presumed range of the Sherman's short-tailed shrew, but genetic analysis is required to confirm that the specimens are Sherman's short-tailed shrew, and not the more common related species.

Sanibel Island Rice Rat

The Sanibel Island rice rat occurs only on Sanibel Island. In 2010, FWC and external experts conducted a biological status review that determined the Sanibel Island rice rat met the criteria to be listed in Florida as a State-designated Threatened species. The status of the Sanibel Island rice rat was changed to State-designated Threatened from Species of Special Concern in January 2017 and it is now listed under 68A-27.003, F.A.C. The Species Action Plan developed in 2013 stated that development of a reliable monitoring program for detecting rice rats needs to be an initial focus for plan implementation. On Sanibel Island, the Sanibel Island rice rat exists mostly in freshwater, open marsh habitat that forms in swales across the island. The freshwater marshes in the swales are extremely important to the existence of the Sanibel Island rice rat, but much of that habitat has been lost or degraded through construction of ditches in the past and by invasion of woody brush.

Filling Data Gaps to Address the Status and Management of the Sanibel Island Rice Rat – During FY 2015-16 the University of Florida began a project to fill data gaps on the Sanibel Island rice rat with funding from a State Wildlife Grant This project addresses four objectives: 1) Determine the current distribution of the Sanibel Island rice rat; 2) Identify habitat features that influence the occurrence, colonization, and extirpation of Sanibel Island rice rat; 3) Evaluate the effects of habitat management activities on the occurrence and activity of Sanibel Island rice rats; 4) Determine the most appropriate methods for a reliable monitoring program for the Sanibel Island rice rat population.

The second year of field work for this project was completed during FY 2016-17. Sanibel Island rice rats have been captured at multiple study sites both by photographs from game cameras as well as by standard live-trapping of individuals. The third year of field work surveying for the Sanibel Island rice rat is underway. Results to date indicate the amount of cordgrass present in freshwater marsh habitat is significantly positively correlated with the probability that Sanibel Island rice rats will occur there. These results support the efforts to restore the open freshwater marsh habitat on Sanibel Island.

Restoring Freshwater Spartina Marsh Habitat on Sanibel Island to Benefit the Sanibel Island Rice Rat – This three-year project also began in FY 2015-16. FWC funded this project to restore significant areas of freshwater marsh habitat to benefit the Sanibel Island rice rat. FWC funds and manages contracts for the USFWS "Ding" Darling National Wildlife Refuge and the Sanibel-Captiva Conservation Foundation, the organizations that manage a large proportion of the habitat

potentially occupied by the Sanibel Island rice rat on Sanibel Island. The goal of the project is to restore the hydrology and the open, freshwater sand cordgrass marsh habitat in swales, which occur on the island. So far, this project has successfully removed 69.5 acres of hardwood brush species such as Brazilian pepper, wax myrtle, and green buttonwood, and has increased the acreage of open freshwater marsh habitat available for the Sanibel Island rice rat. FWC is also funding vegetation monitoring to measure changes in the vegetation community within the project areas. These habitat restoration and monitoring efforts complement the Sanibel Island rice rat surveys conducted by the University of Florida (*see above*).

During FY 2016-17, the hydrologic restoration component of this project began. The objectives for hydrology restoration are to increase groundwater levels and surface-water holding capacity, restore additional sand cordgrass marsh, and increase and extend the hydroperiod in those marshes on the Bailey Tract within the "Ding" Darling Refuge. During the first year, land surveys were done, and hydrologic modeling and engineering plans were started. In FY 2017-18, the plans will be finalized and construction will be done to restore hydrology by removing levees, installing culverts, and filling a man-made pond.

Florida Bonneted Bat

The Florida bonneted bat was Federally-listed by the USFWS as an Endangered species in October 2013. The Florida bonneted bat is the largest and rarest bat species in Florida. Florida bonneted bats have been known to occur in the Miami area since the 1930's; however, only one roost was known outside Miami (in a bat house at a private residence in Ft. Myers) until 2006. That year, bonneted bats were detected through acoustic surveys by the Florida Bat Conservancy on Babcock-Webb Wildlife Management Area (WMA) in Charlotte County.

During FY 2016-17, emergence counts were conducted in December 2016 (96 bats in nine bat houses and three natural roosts) and April 2017 (106 bats in ten bat houses and four natural roosts) on Babcock-Webb WMA. Also in FY 2016-17, FWC conducted pup counts at nine bat houses to determine in which houses Florida bonneted bats gave birth and how many young were produced. Approximately 117 pups were observed in nine bat houses in FY 2016-17 compared to 36 pups in seven houses counted in FY 2015-16. FWC will continue conducting periodic emergence counts and monitoring for young in FY 2017-18.

Exhibit 4
FY 2016-17 Florida Bonneted Bat Acoustic Surveys

LOCATION	TIME PERIOD	NUMBER OF SURVEY NIGHTS	BATS DETECTED?
Bond Farm, Charlotte County	November - December 2016	39	Yes
Platt Breach WEA, Highlands County	May - June 2017	245	Analysis will be completed during FY 2017-18
Holey Land and Everglades and Francis S. Taylor WMA, Palm Beach and Broward Counties	February - June 2017	48	Everglades - Yes Holey Land - No

FWC and partners have funded four collaborative research projects involving the University of Florida for bonneted bats on Babcock-Webb WMA. A project to develop a survey protocol for the Florida bonneted bat and to identify habitats important for roosting and foraging was concluded in FY 2015-16. A portion of the grant also involved monitoring the bonneted bats occupying bat houses on Babcock-Webb WMA to determine survival rates. Data collection for this study ended in December 2015 after a total of 175 bonneted bats (60 males and 115 females) were captured. University of Florida researchers completed analysis of survival rates in FY 2015-16 and published results in FY 2016-17.

The second collaborative project, initiated by FWC in FY 2014-15, was designed to study the social structure of bonneted bat colonies and to identify factors that influence the roosting activity of the bats at Babcock-Webb WMA. During three capture sessions in FY 2016-17, FWC and University of Florida captured a total of 269 Florida bonneted bats, including 74 bats (34 male, 40 female) that were captured for the first time and marked with Passive Integrated Transponder (PIT) tags. Bats were captured at ten of the 13 bat houses on Babcock-Webb WMA and at two roosts in tree cavities. The number of bats in individual occupied houses ranged from a single bat to 38 bats. Also during FY 2016-17, FWC maintained six automatic PIT tag readers on bat houses at Babcock-Webb WMA to collect data on when bats entered and exited the bat houses. This information will help determine when bats are active relative to local weather and other environmental variables. FWC also purchased one automatic PIT tag reader that will be installed on a seventh bat house during FY 2017-18.

A third research project exploring the effects of prescribed fire on Florida bonneted bats was initiated in FY 2014-15. This project includes acoustic monitoring and telemetry to evaluate how bonneted bats utilize habitat relative to prescribed fire. Babcock-Webb WMA is one of four study areas included in this project. During FY 2015-16, the University of Florida deployed acoustic

detectors on Babcock-Webb WMA to monitor bat use in burned and unburned habitat. In addition, FWC helped capture bats on Babcock-Webb WMA and the University of Florida placed radio tags and Global Positioning Satellite (GPS) tags on captured Florida bonneted bats. During FY 2016-17, researchers continued to deploy radio and GPS tags on bats captured by FWC. This project is ongoing and results will become available during FY 2017-18.

In the fourth collaborative project, a University of Florida graduate student is collecting fecal samples from below bat houses at Babcock-Webb WMA to determine what insects the bats have been eating and how their diet changes seasonally. The student is also capturing bats at multiple sites to evaluate their diet. Data collection is ongoing, and preliminary results are expected to be available in FY 2017-18.

FWC continues to provide assistance to conservation partners regarding the Florida bonneted bat. FWC has worked to provide USFWS input on protocols to address problems that may arise if Florida bonneted bats roost in houses or other structures. FWC has provided recommendations for steps that can be taken to reduce the types of problems that may occur and to reduce the time it may take to resolve potential problems, among other issues. FWC and partners hosted the third meeting of the Florida Bonneted Bat Working Group in May 2016. Forty-two people representing 15 organizations met to discuss ongoing research, monitoring, and conservation across the species' range. The Working Group will meet again in September 2017 to coordinate conservation activities among partners.

Gray Bat

The gray bat is a Federally-designated Endangered species that roosts in colonies in caves throughout much of the south-central U.S. Gray bat populations previously suffered severe declines due to disturbance of their cave roosts, but the species' range-wide population now appears to be increasing. In Florida, however, the gray bat roosts only in a few caves in Jackson County, and the population is declining in spite of the fact that the roost caves are protected. This decline began prior to the emergence of white-nose syndrome, a disease decimating hibernating bats in eastern North America, and it is not believed to be adversely affecting Florida's gray bats at this time. Gray bats occupy different caves in summer and winter based upon temperature, and historically some bats migrated out of Florida during winter. No gray bats have been observed or captured at summer roosts in Florida during survey attempts since 1990.

Gray bats formerly roosted in winter in two Florida caves, and hibernating bats could be readily counted at both sites. During the most recent winter count on February 13, 2017, FWC found no gray bats in the former primary wintering cave (Old Indian Cave) in Florida Caverns State Park in Jackson County. Two days later, on February 15, 2017, biologists also found no gray bats in the secondary cave adjacent to the park where gray bats previously roosted in some winters. In addition, FWC observed no gray bats in any of the 84 caves in northwest Florida that they visited during FY 2016-17 as part of a broader study of the use of caves by wintering bats. Although thousands of gray bats previously wintered in Florida's caves, no more than nine gray bats have been found hibernating in the state in any year since 2002.

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

Big Cypress Fox Squirrel

The Big Cypress fox squirrel is State-designated Threatened species that only occurs in southwest Florida, south of the Caloosahatchee River. The subspecies is genetically isolated from other fox squirrel populations and little is known about it. Data gaps likely exist because Big Cypress fox squirrels are secretive and difficult to live-trap. In addition, South Florida habitat is remote and challenging to access.

Threats to the Big Cypress fox squirrel population include habitat loss and fragmentation, the emergence of invasive and predatory species, disease, and fire suppression. The Big Cypress Fox Squirrel Species Action Plan created by FWC in 2013 recommends that more research be conducted on the extent of occurrence, area of occupancy, and habitat use of the Big Cypress fox squirrel to inform habitat management and conservation efforts.

During FY 2016-17, FWC solicited research proposals and selected the University of Arizona's Dr. John Koprowski to research Big Cypress fox squirrels from 2017-2020. Dr. Koprowski's doctoral student at the University of Arizona, Kira Hefty, is leading the project. This range-wide study will be conducted in 16 public lands throughout southwest Florida and survey a variety of typical southwest Florida habitats. The study objective is to identify the extent of occurrence, habitat use, and the effects of habitat fragmentation on the Big Cypress fox squirrel over the next four years.

Survey protocol includes using game cameras to identify presence, PVC tubes to collect hair, and opportunistic observations to identify Big Cypress fox squirrel sign near traps. Using Geographic Information Systems (GIS), researchers have mapped potential survey plots for nine of the 16 public lands to be surveyed. Researchers have established a total of 211 survey plots in Big Cypress National Preserve, Florida Panther National Wildlife Refuge, Fakahatchee Strand Preserve State Park, and Picayune Strand State Forest. Data collection will continue through early 2019, and results will be available in August 2020.

Sherman's Fox Squirrel

The Sherman's fox squirrel is a State-designated Species of Special Concern in Florida. Species Conservation Measures and Permitting Guidelines for the Sherman's fox squirrel were approved in November 2016. Monitoring of Sherman's fox squirrels in Florida is difficult because of their large home ranges, low population densities, and the difficulty in live-trapping individuals. One of the major threats to the Sherman's fox squirrel is the loss, fragmentation, and degradation of remaining habitat. The Species Action Plan for the Sherman's fox squirrel specifies the need for identifying and evaluating the extent of the remaining habitat, which includes a need to identify priority habitats and to develop management and monitoring guidelines.

During FY 2016-17, data analysis and manuscript publication related to the multi-year University of Florida and FWC study investigating the ecology and conservation of fox squirrels in Florida continued. This included evaluation of the factors that influence fox squirrel distribution using a multi-scale occupancy study throughout the range of Sherman's fox squirrel. The research evaluated distribution of fox squirrels at fine, local, and landscape scales, improving our understanding on factors related to their distribution, such as how canopy cover and woody ground cover can influence where fox squirrels occur. In addition, a comprehensive assessment of fox squirrel density estimates was conducted and results published. Using modern methodological and

analytical approaches, staff compared fox squirrel density estimates spanning nearly 70 years of research, including those obtained through our collaborative study. This research showed that densities of fox squirrels in Florida have always been naturally low, and often were inflated due to statistical limitations and oversights. Once these limitations and oversights were considered using modern approaches, there was little temporal or geographical variation over time. Additionally, an evaluation of data collected through the fox squirrel sighting website was completed and published. This research highlighted the benefits of citizen science in fox squirrel conservation. In April 2017, based on results of the recent studies, staff initiated the reevaluation of the status of the Sherman's fox squirrel with final findings anticipated in FY 2017-18.

Florida Panther

The Florida panther is a Federally-designated Endangered subspecies of the puma (also known as cougar or mountain lion) that once roamed across eight southeastern states. Unregulated harvest of panthers through the mid-1900s along with subsequent habitat loss and fragmentation due to human population growth, reduced the size of the population and isolated it from other puma populations. When FWC began investigations into the status and distribution of panthers in the early 1970s, there were likely fewer than 30 panthers still living in South Florida. Small population size and geographic isolation from other puma populations made the Florida panther vulnerable to extinction due to inbreeding. Therefore, in 1995, FWC, with the approval of the USFWS, began a genetic restoration plan by temporarily releasing eight female pumas from Texas into the wild in South Florida to increase the genetic diversity of the remnant population. These releases mimicked natural genetic exchange among panthers and other puma subspecies that likely last occurred in the 19th century. The benefits accrued to the Florida panther population via genetic restoration have played a pivotal role in the subsequent increase in the population size since 1995. FWC estimates that the Florida panther population is currently between 120-230 adults and subadults in South Florida.

FWC and its partner, Big Cypress National Preserve (BCNP), continue to monitor the genetics and population parameters of the Florida panther. Biologists annually capture a sample of panthers between November and February and fit them with collars containing radio transmitters. Some collars also have GPS satellite transmitters. The radio-collared panthers are monitored two to three times a week and their locations are recorded. GPS collars are programed to provide more frequent locations. Since 1981, 249 panthers have been radio-collared, providing essential data for the management and conservation of the population. Biologists collected telemetry data on 19 Florida

panthers during FY 2016-17. In addition to monitoring adult panthers by radio telemetry, FWC and BCNP biologists visit dens of radio-collared female panthers to mark and collect biological samples from newborn kittens. These work-ups included weighing, determining gender, administering de-wormers, marking them with passive integrated transponders (PIT) tags (a chip placed below the skin to identify individual panthers), and collecting tissue and fecal samples to assess their physical and genetic health. During FY 2016-17, FWC and BCNP biologists visited six panther dens and documented 18 kittens (10 males, 8 females). Since 1992, 480 kittens have been handled at dens.

During FY 2016-17, 30 wild Florida panthers are known to have died, including four (two males, two females) radio-collared panthers and 26 (11 males, 13 females, two unknown sex) uncollared panthers. Twenty-four of the 30 panthers died after being hit by vehicles, three were killed by other panthers, two died from undetermined causes, and one died of pseudorabies. In addition to these mortalities, biologists removed one young panther (female K480) from the wild permanently after it was abandoned by its mother. K480 is now in permanent captivity at the Naples Zoo at Caribbean Gardens in Collier County.

FWC is currently involved in several collaborative research projects focusing on issues related to Florida panther conservation and management. Among these are: 1) A population viability analysis that includes individual-based models; 2) Assessing genetic restoration using whole genome sequencing; 3) Determining mortality factors; 4) Assessing the efficacy of panther rehabilitation; 5) Analyzing the long-term benefits accrued to panthers via genetic restoration; and 6) Evaluating the diet of panthers from scat and stomach contents. Research projects involving FWC are also playing an integral role on several sub-teams of the USFWS Panther Recovery Implementation Team in hopes of improving the science involved with monitoring progress towards recovery. FWC assisted with the completion of several collaborative research projects during FY 2016-17 including peer reviewed publications that focused on: 1) Cross-species transmission of the feline immunodeficiency virus; 2) Mitogenomics associated with the genetic restoration of panthers; and 3) Trichinella parasite occurrence in puma.

FWC continues to assess innovative techniques that could potentially provide statistically robust estimates of the panther population size, a task that is notoriously difficult for wide-ranging, Endangered large carnivores like the Florida panther. Collaborative efforts have identified two promising protocols. A methodology that relies on a combination of trail camera surveys and marked panthers was initiated in the spring of 2014. Analyses completed during FY 2016-17 indicate

that this method has utility for estimating site specific density estimates for panthers with reasonable levels of precision. At this point in time though, this technique is not able to provide a range-wide estimate of the population size due to limitations of the data that is collected from panthers (sample size associated with difficulty of capturing panthers). Results from this work will be submitted for publication in a peer-reviewed journal. The second technique, that incorporates panther road mortality data and telemetry locations, has been applied to data collected by FWC from 2000-2012. The appeal of this method is that it permits both a retrospective and current assessment of the range-wide panther population size. While this methodology provided the first true estimate of the population size of Florida panthers across the entire breeding range, the confidence intervals associated with the estimate were wide due to sample sizes. FWC anticipates initiating new research using this method in FY 2017-18 to determine ways to improve the precision of these estimates.

FWC investigates human-panther interactions in accordance with the Interagency Florida Panther Response Plan, which may be accessed at: http://myfwc.com/wildlifehabitats/managed/panther/reports/. FWC verified that panthers were responsible for preying upon domestic animals (called depredations) in 47 separate events during FY 2016-17. In some cases, multiple animals were killed or injured during a single event. These 47 verified panther depredation events all occurred in Collier, Hendry, Lee, and Polk counties, and the majority of depredations occurred in Golden Gate Estates, east of Naples in Collier County. During depredation investigations, FWC provides assistance and advice to affected residents on how they can reduce the risk of panther attacks on pets and livestock. FWC, as a member of the Interagency Florida Panther Response Team, also documented two panther encounters and one incident. An encounter is defined as an unexpected direct meeting or a series of meetings over a short period between a human and a panther; an incident is similar except that the panther displays potentially threatening behavior. The two encounters occurred when: 1) a juvenile panther was treed in a yard by the residents' dogs and; 2) a juvenile panther was discovered amongst debris underneath a stilt home. The incident occurred in association with a depredation when a person approached the panther and its cached prey item.

FWC provided information and reviews of numerous road and development projects throughout southern Florida during FY 2016-17. FWC reviews road projects to minimize the disruption of panther habitat and corridors, and provides recommendations to reduce the risk of panther-vehicle

collisions. Similarly, FWC reviews plans for urban development to minimize the loss of panther habitat and to reduce the likelihood of human-panther interactions.

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). As of the end of FY 2016-17, people submitted over 4,300 records of panther sightings. Most records (75%) did not include evidence that would permit verification by FWC that the animal seen was a panther. Of the records that included photographs, FWC verified 47% as panthers and 24% as bobcats. Other past purported sightings of panthers were determined to be other animals such as coyotes, dogs, foxes, house cats, otters, and a monkey (Rhesus macaque).

Florida Panther Net has been the source for panther information from FWC for over 20 years. FWC updated the site's content with a special emphasis on the 'living with panthers' message. Panther information is now housed on FWC's main website at: http://myfwc.com/panther. An extensive collection of additional panther reports and publications on current panther management and research may be found at: http://myfwc.com/wildlifehabitats/managed/panther/reports/ and https://www.fws.gov/verobeach/ListedSpeciesMammals.html.

Florida Manatee

The Florida manatee (listed by the USFWS as the West Indian manatee) is native to Florida's coastal estuaries and riverine waters and is a Federally-designated Threatened species. Manatees have been protected in Florida since 1892. The manatee is also federally protected under the Marine Mammal Protection Act. 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 of 1978 [s. 379.2431(2), *F.S.*], the Florida Manatee Management Plan approved by FWC Commissioners in December 2007 (http://myfwc.com/media/415297/manateemgmtplan.pdf), and the USFWS Florida Manatee Recovery Plan of 2001 (https://www.fws.gov/northflorida/Manatee/Documents/Recovery%20Plan/MRP-start.pdf).

In 2004, FWC and USFWS established the Manatee Forum, a diverse stakeholder group, with the goal of reducing litigation by establishing areas of common ground, identifying problems or conflicts, developing potential solutions, and accepting differences through increased communication. During FY 2016-17, the Manatee Forum met twice, once in October 2016 and once in May 2017. During the

October meeting, the presentation topics focused on manatee carrying capacity, manatee health assessments, and the status and trends in Florida seagrasses. The May meeting included information about the USFWS' reclassification of the West Indian manatee and the revisions to the Core Biological Model. FWC believes in the importance of having a stakeholder group focused on manatee issues. The opportunity for information exchange and the discussion of ideas is very valuable to all parties.

MANAGEMENT ACTIVITIES – FWC and USFWS continue to work closely on manatee issues, particularly human-related threats and habitat enhancement. For more information regarding manatee conservation efforts, please see the *Save the Manatee Trust Fund Report* provided to the President of the Florida Senate and the Speaker of the Florida House of Representatives each year, available at: http://www.myfwc.com/research/manatee/trust-fund/annual-reports, which describes progress and activities of the Manatee Management Plan. This manatee report covers programs such as Manatee Protection Plans, Manatee Protection Zones, permit reviews, habitat, population assessment, and behavioral ecology. FWC's Florida Manatee Management Plan directs management activities, and it focuses on five program areas: Manatee Protection Plan, Manatee Protection Zones, permit reviews, manatee habitat, and outreach (provided in the outreach portion of this report).

MANATEE PROTECTION PLANS (MPPS) – Development of these plans involves FWC working closely with county governments and the USFWS to develop and implement comprehensive county-based MPPs. FWC's Executive Director approves MPPs with concurrence by the USFWS. During FY 2016-17, FWC, in collaboration with Charlotte County and the USFWS, completed the Charlotte County MPP. FWC also continues to assist Miami-Dade County with informal input, when requested, while they assess revisions to their MPP.

PROTECTION ZONES – FWC develops boating speed and safe haven zones statewide to protect manatees. Extensive work, involving county governments, stakeholder groups, and the public is required in order to develop and authorize these zones. FWC Commissioners approve the final protection zone rules. During FY 2016-17, FWC continued work to review the existing rule for Collier County. FWC met with local governments, interested stakeholder groups, and residents to discuss available data and potential protection needs. A rule development workshop was held in Naples in July, and in August FWC provided written response to the Collier County Local Rule Review Committee Report. In November 2016, FWC presented the proposed rule revisions to the FWC

Commissioners and it was approved for publication and open for public review and comments. After additional meetings with local residents, a public hearing in Naples, and review of public comments, FWC brought the proposed rule back to the Commission for final action at the April 2017 Commission Meeting. The Commissioners provided approval to file the final rule for adoption. In May 2017, the final rule for Collier County was challenged and FWC is currently working to prepare for the administrative hearing. Also during FY 2016-17, installation of the western Pinellas County manatee protection zones markers began in June 2017 and installation will be completed by the end of the summer.

Permit Reviews – FWC produced 325 final comment or assistance letters for proposed permitting projects reviewed during FY 2016-17. These biological opinions provide recommendations to regulatory agencies on methods to reduce impacts to manatees. Implementation of the boat facility siting portion of FWC-approved MPPs is accomplished during permit reviews and helps expedite the process. Distribution of public information about manatees is also completed through these comments, as facilities are required to post manatee informational signs and distribute written materials to vessel operators.

Manatee Habitat – During FY 2016-17, FWC participated in various intergovernmental groups and task forces regarding minimum flows and levels at springs, invasive aquatic plant control, seagrass monitoring and protection, water control structure-related mortalities, and other habitat-related concerns. Revisions to the Warm Water Action Plan document, now entitled, "Recommendations for Future Manatee Warm-Water Habitat," were made through a joint effort between the FWC and the USFWS, and an updated version is expected to be available in the fall 2017.

FWC worked collaboratively with the Southwest Florida Water Management District and the USFWS to stabilize approximately 1,100 feet of shoreline at Three Sisters Springs, a high use recreational area and critical manatee warm-water refuge in Crystal River, FL. This project was completed in November 2016. Additionally, FWC is working with the U.S. Army Corps of Engineers, Sarasota County, and many other federal and local partners to complete engineering and modeling required to plan for the restoration and enhancement of Warm Mineral Springs' downstream run, considered the most important manatee natural warm-water refuge along Florida's southwest coast. This project will improve access and habitat quality for manatees. The data collection and survey work began in April 2017 and all modeling and engineering is expected to be completed by fall 2018.

RESEARCH ACTIVITIES – The manatee research program included work in the following areas:

MORTALITY AND RESCUE – FWC researchers and law enforcement officers respond to statewide reports of manatee carcasses and injured manatees. FWC has manatee staff strategically located in five coastal field stations in order to maintain response capabilities on a statewide basis. During FY 2016-17, 514 manatee carcasses were documented in Florida. All but six of these carcasses were recovered and examined in order to determine causes of death. During FY 2016-17, a red tide persisted along the southwest coast of Florida coast since early fall 2016 resulting in elevated manatee mortality. The National Working Group on Marine Mammal Unusual Mortality Events determined that a 'Repeat Mortality Event' involving manatees was occurring concurrent with the red tide bloom. Collision with watercraft accounted for 90 of the 514 cases. Other causes of manatee death are those associated with near-term or newborn (perinatal) issues, cold stress, natural causes, and human influence. An interactive searchable web-based database with manatee mortality information is available at http://myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/.

FWC and cooperators rescued 115 sick or injured manatees under the federally-permitted statewide rescue program. Three oceanaria (Lowry Park Zoo in Tampa, Miami Seaquarium, and Sea World in Orlando) participate in the state-funded rehabilitation program for critical care treatment and are partially reimbursed by FWC for their costs. As of June 2017, 64 of these rescued manatees were released back into the wild, 24 died, and 27 are still being treated. FWC participated as a contributing organization to multi-agency efforts to release and track rehabilitated manatees that were rescued due to injury, cold stress, or other problems. As part of that partnership, FWC participated in almost every rescue, transport to rehabilitation facilities, pre-release health assessment, and release of rehabilitated manatees in various parts of the state. The information obtained from manatee rescue, rehabilitation, treatment, and necropsy contributes to manatee conservation efforts by identifying important continuing and emerging threats to the species.

POPULATION ASSESSMENT – FWC uses a variety of methods to assess and monitor the current and future status of the manatee population in Florida. Population assessments currently include conducting manatee counts at winter aggregation sites, aerial surveys used to determine regional distribution and abundance of manatees and to assess habitat use, and estimating survival, population growth, and reproductive rates through photo-identification and the recent application of genetic markers.

The annual statewide manatee synoptic survey [required annually, weather permitting, by s. 379.2431(4)(a), *F.S.*] was conducted in winter 2017, and 6,620 manatees were counted by a team of 15 observers from ten organizations. Results from the traditional synoptic survey provide a minimum number of manatees known to be alive using warm water and winter habitats on a particular survey day. The inability to account for manatees not seen during the fly over (related to weather and water conditions, and manatee behavior) results in counts that vary widely across surveys and are consequentially of limited utility. Concerted effort has therefore been put forth over the past several years to improve our ability to estimate manatee abundance. For more information about previous synoptic counts, please refer to http://myfwc.com/research/manatee/research/population-monitoring/.

In 2015, FWC accomplished a key goal of its Manatee Management Plan with the publication of results from its first statewide abundance estimate of the Florida manatee in the journal, Biological Conservation. A primary conservation goal of the plan was to "implement peer-reviewed and statistically sound methods to estimate the manatee population and monitor trends." The findings represent a significant improvement over the traditional synoptic survey approach discussed above. The new abundance survey is a benchmark achievement in monitoring Florida manatees. The new survey design accounts for key sources of bias and variation and provides an estimate of the Florida manatee population. Reliable estimates can be used to track population changes over time and as part of population projection models to provide valuable feedback to conservation managers.

Designing a new method for estimating manatees has been challenging because manatees occur over large landscapes and are often in near shore habitats that makes it difficult to apply traditional statistically sound survey methods. To meet this challenge, an innovative approach was designed, tested, and vetted with experts. This approach is based on a random sampling design and combines multiple sources of information. A combination of a double-observer protocol (i.e., multiple observers in each plane), repeated passes, and detailed diving behavior data were used to account for imperfect detection of animals. The newly published estimate uses data collected from February 28 to March 22, 2011 along Florida's west coast and from March 5 to 13, 2012 along Florida's east coast. The estimate of abundance for the period 2011 and 2012 with 95% confidence was 6,350. In December of 2015, an aerial survey to estimate manatee abundance was flown on the west coast of Florida from the Alabama-Florida state line to Monroe County. The east coast was flown in December 2016. An updated estimate of abundance is currently underway.

FWC, in cooperation with the U.S. Geological Survey's Sirenia Project, and Mote Marine Laboratory in Sarasota, maintains an image-based, computerized database called the Manatee Individual Photo-Identification System, used for photo-identification of individual manatees. These data assist scientists in estimating important population vital rates as well as life history information. Survival rate information from photo-identification efforts was recently updated and included in the latest status and threats assessment found at: https://pubs.usgs.gov/sir/2017/5030/sir20175030.pdf.

Genetic testing offers an additional means of identifying individual manatees; its application could greatly enhance existing monitoring and assessment studies. FWC continues to analyze data and make modifications to the sampling strategy in order to assess the potential of this technique. The manatee genetic-ID database currently includes 1,845 unique individuals identified by skin samples collected from live manatees in our southwest Florida pilot study area.

BEHAVIORAL ECOLOGY – Warm-water habitat is of particular interest to FWC and agency partners because the predicted future loss of this habitat is a key, long-term threat to the manatee population. During FY 2016-17, FWC monitored two wintering sites on the Florida west coast that are in the process of restoration (Warm Mineral Springs) or mitigation (Port of the Islands). Mote Marine Laboratory with FWC investigated hydrographic characterization of a secondary warm-water site at Ten Mile Canal in Lee County, FL, to learn more about the adequacy of this site regarding temperature and winter manatee use. FWC continued to monitor temperature of manatee warm-water habitat statewide via deployment of temperature probes at key sites. In addition, staff contributed to estimates of carrying capacity and manatee behavioral rules for warm-water habitat distribution which were incorporated in an updated status and threats assessment (see above).

Florida Sea Grant awarded FWC funds to advance a quantitative framework to evaluate vessel collision risk for marine mammals, including manatees, in Florida. The work integrates various aspects of collision risk such as probability of intersection between boats and animals. The modeling effort is expected to help aid in the future assessment and design of speed zones that help to protect Florida's marine mammals from traumatic injury and death. In 2015, a paper that presents a quantitative framework for estimating the probability of encounters between marine wildlife (manatees and right whales) and vessels was published in the peer-reviewed scientific journal Methods in Ecology and Evolution. Work regarding components identified in the framework continue to be advanced.

North Atlantic Right Whale

The North Atlantic right whale is a Federally-designated Endangered species in Florida. The primary calving grounds for this species are off the Atlantic coast of Florida and Georgia. The southeastern U.S. calving season for the North Atlantic right whale is approximately November 15 - April 15. During the calving season, FWC collaborates with federal, state, and non-governmental partners to carryout field research including: aerial surveys, biopsy sampling, tagging, disentanglement, and stranding events. Most of this work is supported by funds from the National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries) and is aimed at documenting the seasonal presence of right whales, mitigating vessel-whale collisions, and assessing population dynamics. FWC is one of a handful of major contributors to the North Atlantic Right Whale Photographic Database (http://rwcatalog.neaq.org/Terms.aspx) – the central repository for archiving and maintaining photographs and sighting data on right whales. Photographs are used to identify individual right whales based on the callosity (a natural growth of cornified skin) pattern on their head as well as scars caused by vessel strikes and entanglement in fishing gear. Over time, population demographics, reproductive success, mortality, and trends in health and scarring are monitored, in part, through this photo-identification research. FWC has also worked closely with partners to compile years of southeastern U.S. aerial survey data into a geographic information system (GIS). Analyses of these spatial data help scientists and managers to evaluate right whale residency patterns and distribution in the calving area in relation to environmental factors, such as sea surface temperatures and water depth, and human activities, such as vessel traffic and fishing activity. FWC also analyzes ship traffic data to help monitor compliance with vessel speed regulations and conduct risk assessments.

During the 2016-17 calving season, FWC conducted 54 aerial surveys and 10 vessel cruises. Through collaborative efforts with NOAA-Fisheries, the Georgia Department of Natural Resources, the Sea to Shore Alliance, and volunteer sighting networks, seven unique right whales were documented (including three newborn calves). All three right whale calves were biopsy sampled. Additionally, FWC worked with volunteer sightings networks in Florida to confirm sightings of whales reported by the public, as well as mitigate human interaction with whales.

No right whale carcasses or entanglements were detected in the Southeast U.S. during this calving season, but FWC and other partners disentangled a 13-year-old right whale off Cumberland Island, GA in January 2017. Over 400 feet of rope attached to an approximately 135-pound cone-shaped trap was

removed from the whale. The gear appears similar to snow crab pots used in Atlantic Canada, however, there was no gear marking present, so origin of the gear is currently unknown.

BIRDS

Audubon's Crested Caracara

The Audubon's crested caracara is a Federally-designated Threatened species. FWC continued annual Audubon's crested caracara nest surveys during FY 2016-17. The surveys were conducted from January to March using FWC's standard monitoring protocol. Nest checks were performed at six nests previously found at Dinner Island Ranch Wildlife Management Area (WMA) in Hendry County during past surveys but only one of those nests was determined to be active. During the surveys, two additional crested caracara nests were located. During a survey on Fisheating Creek WMA in Glades County, four crested caracara nests were located with three nest believed to fledge young. No nests were located on Rotenberger WMA in Palm Beach County. A pair of caracaras was observed during the second survey, but no additional breeding behavior was documented. FWC plans to continue yearly surveys.

Black Rail

The black rail is an at-risk species, petitioned for Federal listing with the 12-month listing decision anticipated in FY 2018-19. The black rail is a secretive marsh bird that inhabits high salt marsh and shallow freshwater marshes throughout Florida. The Eastern subspecies is currently undergoing review for Federal listing due to rapidly declining numbers and range contraction in portions of its U.S. range. The species' current status and distribution in Florida, as well as trends at historically occupied sites, is unknown. At the request of the USFWS, FWC conducted two years of surveys to document black rail occurrence throughout conservation lands in the state.

In 2017, FWC researchers coordinated surveys on 14 conservation lands with potentially suitable habitat across half the state, from Central to South Florida, for black rails. The overall number of birds found was low, but black rails were confirmed as being present on eight of the 14 conservation lands surveyed. This combined with the results from surveys conducted in 2016 in the northern half of the state means that black rails were found on 14 of 27 total conservation lands surveyed. Final analysis of the data is on-going.

Everglade Snail Kite

The Everglades snail kite is a Federally-designated 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. In recent years, Lake Istokpoga in Highlands County and storm water treatment areas in Palm Beach and Hendry counties have also seen significant levels of snail kite nesting. The Everglades snail kite population crashed in the 2000s, going from over 3,000 birds at the end of the 1990s to approximately 600 by 2008. Since then, the population has been steadily increasing, and the most recent population estimate is roughly 2,100 birds, but the population is still about half what it was less than 20 years ago. The snail kite population decline was primarily caused by low levels of reproduction and too few young surviving to breeding age.

The primary focus of management efforts 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 from management activities and to improve nesting and foraging habitats through proactive plant management. Snail kite nesting locations are marked with warning signs if they occur in places with high levels of recreational use or near residential areas, and tourism, angling, and hunting activities are coordinated to reduce disturbances. Foraging perches are also distributed around nesting sites, providing more stable platforms for young snail kites learning to feed themselves and to eat large exotic snails.

Large-scale habitat management activities involve multiple agencies. FWC works closely with partners to improve Everglades habitats, lake 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 also clear that at least some of the recent population increase has been due to the presence of the exotic apple snail, which reproduces in large numbers and can tolerate a wide range of habitat conditions. There are risks involved, however, with relying on an exotic species to assist in achieving recovery goals. Therefore, FWC must continue to conserve and restore native apple snail habitat, and more information is needed about the long-term impact that exotic apple snails may have on snail kite ecology and habitat. FWC is conducting multiple studies to assess the impact of habitat management and water level control on the snail kite prey population and nesting effort. FWC's work

with partners on hydrologic and vegetation management will continue to play a critical role in snail kite recovery efforts.

Florida Grasshopper Sparrow

The Florida grasshopper sparrow is a Federally-designated Endangered species endemic to the dry prairie plant communities of Florida. Florida's dry prairie is a distinct region of the state characterized by flat, open expanses dominated by fire-dependent grasses, saw palmetto, and low shrubs. Following a status survey conducted by the FWC, the Florida grasshopper sparrow was Federally-listed as Endangered in 1986 because of its low numbers, restricted distribution, and habitat loss. The federal recovery objective is to down-list the grasshopper sparrow to Federally-Threatened when ten protected locations contain stable, self-sustaining populations of more than 50 breeding pairs each.

The Florida grasshopper sparrow is not known to exist at more than four locations, including: Three Lakes Wildlife Management Area (WMA) in Osceola County, Kissimmee Prairie Preserve State Park in Okeechobee County, Avon Park Air Force Range (federal land) in Highlands and Polk counties, and a parcel of privately owned land in Osceola County. Florida grasshopper sparrows existing on protected public lands are monitored by annual point count surveys, a standard method used to assess the relative abundance of bird populations. Kissimmee Prairie Preserve State Park and Avon Park Air Force Range populations are currently near extirpation. The population on the Three Lakes WMA has also witnessed a large decline over the last several years, but active reproduction still continues. Population levels on additional private lands are currently unknown but are being assessed by FWC and USFWS.

Surveys on Three Lakes Wildlife Management Area in Osceola County – Surveys for Florida grasshopper sparrow have been conducted on the Three Lakes WMA since FY 1990-91. The surveys are conducted each spring (April-June) and consist of a grid of 190 stations spaced 0.25 miles apart. Of the 190 stations, 24 are located in unsuitable habitat and are not surveyed annually. Each station is surveyed for five minutes, three times each spring, and all Florida grasshopper sparrows heard or observed are recorded. During FY 2016-17, surveys estimated there were at least 22 different male Florida grasshopper sparrows at the main site which is a substantial decrease from the from 34 detected in FY 2015-16. The overall declining trend of detected males across the last several years is of great concern to FWC. Monitoring will continue on the Three Lakes WMA in FY 2017-18.

In an effort to restore and maintain the dry prairie, oak trees and cabbage palms were mulched on 160 acres of the prairie, oaks re-sprouting within previous tree removal areas were cut and sprayed with

herbicide to prevent re-encroachment into these areas, and oaks outside of historic mesic hammocks were cut down by WMA staff. In addition, an interagency working group, USFWS, and FWC are conducting intensive research in an attempt to determine the primary causes for the Florida grasshopper sparrow's decline and taking measures to increase survival and productivity.

Demographic Monitoring at Three Lakes Wildlife Management Area in Osceola County – The fifth season of Florida grasshopper sparrow demographic research by FWC was conducted during FY 2016-17 and the beginning of FY 2017-18 (March-August 2017). This project has been a cooperative effort involving staff and support from FWC, USFWS, and members of the Florida Grasshopper Sparrow Working Group.

As part of our continued effort to color-band the entire male population, one adult male, three adult females, and 42 nestlings were newly captured and color-banded in the 2017 season to date. In addition to these new captures, 28 males and seven females banded prior to 2017 were resighted in 2017. Together, the number of color-banded individuals observed at least once at Three Lakes WMA in 2017 is 29 adult males and ten adult females, as well as 30-39 fledged nestlings of unknown sex. All known adult males have been color-banded so far in the 2017 breeding season, but several females remain unbanded.

So far in the 2017 season, FWC has located and monitored 23 Florida grasshopper sparrow nests (19 of these were protected with fences; see below). Of these nests, 13 survived to fledge young, four flooded, and six were depredated. More information on the predator community was obtained through a concurrent nest camera study of several grassland bird species (see below).

Corkscrew Regional Ecosystem Watershed, (CREW) Management Area in Collier County – In May and June of 2017, FWC biologists and volunteers surveyed approximately 250-acres of abandoned pasture for the presence of Florida grasshopper sparrows. This property was recently acquired by the South Florida Water Management District as part of the CREW Management Area in Collier County. The objective of the survey was to determine if the Florida grasshopper sparrow was using the area to help guide future management decisions. The surveys also would supplement a capture and banding effort that was conducted in the same area from January to March 2017 in search of listed sparrow species.

Using the standardized FWC Florida grasshopper sparrow survey protocol, the property was broken into two units (North and South) consisting of 17 survey points (five in the North and 12 in the South). Each unit was surveyed three times on foot by one or two observers. Each survey was separated by at least two weeks. At each survey point, FWC watched and listened for Florida grasshopper sparrows for a total

of five minutes. Florida grasshopper sparrow playback calls were used at the three-minute mark to increase detections.

No Florida grasshopper sparrows were detected during the surveys, and we do not expect to conduct these surveys again next year.

Surveillance of Grassland Bird Nests Using Video Systems – In 2017, we placed miniature nest cameras at the entrances of 38 ground-nesting birds (25 Florida grasshopper sparrows, five Bachman's sparrows, five Eastern meadowlarks, and three Common ground-doves) at Three Lakes WMA. Twenty-two of these nests successfully fledged young, including four Florida grasshopper sparrow nests that were collected by USFWS for captive breeding. Eight were depredated, four were flooded, one failed for unknown reasons, and two had fates that were not recorded because of camera removal or malfunction. One nest was abandoned but it is not believed to be due to the presence of the camera. Four of the eight depredated nests were consumed by Eastern spotted skunks (two) and coyotes (two). One depredated nest contained nestlings that were likely killed by ants based on the picking behavior of the parents on video at the nest and the condition of the nestlings after death. The final three nests were confirmed depredated but the predator was not captured on camera. These data provided by the nest camera project (2014-2017) have been invaluable to FWC's understanding of the predator community and will be critical when planning future management strategies.

The Effectiveness of Predator Deflection Fencing at Increasing Nest Survival of Ground-Nesting Birds – In 2017, a subset of Florida grasshopper sparrow nests were protected using predator deflection fencing developed and tested in 2015. The fence design consisted of two-foot tall, open-topped fence circling the nest with a nine-foot. radius. The fence material was constructed of metal hardware cloth with a ¼ inch mesh. The fence was held upright with steel reinforced garden stakes and zip-ties. Foam strips were secured to the bottom of the fence with landscaping staples to fill gaps created by uneven ground. Fence installation was practiced by a team of four people until installation time was consistently 20 minutes or less. Bachman's sparrow nests were left unfenced and monitored to serve as a control group.

To date, 19 Florida grasshopper and one Bachman's sparrow nests have been fenced, and four Florida grasshopper sparrow and 11 Bachman's sparrows were unfenced. Fencing results from previous years (2015 and 2016) revealed that nest survival is substantially increased (up to 5.94 times) by fence installation. While fencing techniques are labor-intensive and only protect the subset of nests located prior to predation, it may help boost local productivity and protect incubating females providing more time to investigate long-term habitat management solutions.

Florida Sandhill Crane

The Florida sandhill crane is non-migratory and confined to Florida and adjacent parts of southern Georgia, primarily the Okefenokee Swamp. This subspecies is State-designated Threatened due to population decline throughout its range in recent decades. Furthermore, the Florida sandhill crane subspecies is petitioned for Federal listing and a 12-month finding is expected in 2018.

MONITORING AND MANAGEMENT PROTOCOL DEVELOPMENT – In FY 2013-14, FWC began range-wide road surveys to measure the regional productivity of Florida sandhill cranes. Based on their range and available habitat, staff established 12 routes totaling roughly 640 miles through 16 counties and surveyed twice during the fall. An average of 360 adult cranes and 74 juveniles have been observed annually during the last four survey years. The lowest productivity year was 2013, a drought year, when FWC counted only 37 young or 9% of observed cranes that year. The following three years had high winter and spring rainfall which likely helped productivity. In 2014, 2015, and 2016, young-of-the-year accounted for 18%, 20% and 21%, respectively, of cranes observed. In all survey years, Osceola and Okeechobee county routes were regional crane strongholds. Another round of surveys will continue in 2017.

HABITAT MANAGEMENT TO IMPROVE PRODUCTIVITY – In 2013, FWC began a study to examine whether habitat manipulation of dry prairie can enhance crane productivity. The study area is in Osceola County and consists of marshes surrounded by dry prairie on Three Lakes Wildlife Management Area (WMA) and marshes surrounded by improved pasture on an adjacent private ranch. The Three Lakes study site has suitable marshes for cranes to breed; these marshes, however, are surrounded by unsuitable habitat consisting of a dense ring of palmetto. The dry prairie also consists of sparse to dense palmetto. FWC roller-chopped one-half of the Three Lakes study site to determine if this management tool could be used to increase sandhill crane productivity by reducing palmetto density.

FWC collected nesting and productivity data in 2014, 2015, 2016, and 2017 via aerial surveys. In 2014, there were 18 nests: ten on the private ranch, and eight on Three Lakes dry prairie. No chicks survived to fledging age (approximately 60 days). Prior to the start of the 2015 breeding season, a total of 413.5 acres of palmetto were roller-chopped on the Three Lakes study site, roughly one-quarter of the study site. During the 2015 breeding season, staff monitored 11 nests on the private ranch and four on Three Lakes dry prairie. Two of the private ranch nests fledged chicks, but none fledged on Three Lakes, nor were any marshes adjacent to roller-chopped areas used for nesting. Another quarter of the Three Lakes study site was roller-chopped in the winter of 2015 for a total of 785 roller-chopped acres. During the 2016 breeding season, FWC monitored 16 nests on the private ranch, three on Three Lakes dry prairie,

and one in the Three Lakes roller-chopped area. No chicks survived to fledging at any of the sites. During 2017, the final year of the study, low winter water levels and no spring rains resulted in the fewest nesting attempts during the four-year project. Three nests were observed on the private ranch and all failed during incubation. Two nests were monitored on Three Lakes dry prairie, both failed, one possible due to wild hog predation due to low water levels. The Three Lakes roller-chopped area contained two nests. One nest failed and the other had a chick that survived at least 50 days and possibly fledged. FWC is currently analyzing project data and will submit the results of this study to a peer-reviewed journal in FY 2017-18.

Florida Scrub-Jay

The Florida scrub-jay is a Federally-designated Threatened species that is endemic to Florida. Habitat loss and degradation have caused widespread declines throughout the scrub-jay's range. Scrub-jay populations are thought to have declined by as much as 90% since the late 1800s due to habitat loss and degradation. Florida scrub-jays rely on fire to maintain low and open habitat. Typical habitat management efforts include controlled burning and mechanical treatments such as roller chopping and cutting of trees that have encroached on scrub-jay habitat. Conserving this species requires the efforts of multiple local, state, and federal agencies, as well as non-governmental organizations and private landowners. The Florida Scrub-Jay Conservation Coordination Project assists these efforts by facilitating communication among partners; collecting and distributing information regarding monitoring and management; working with partners to establish priority management actions; and developing standards and guidelines for conservation efforts. Since the vast majority of species found in scrub have habitat requirements similar to those of Florida scrub-jays, conservation actions aimed at scrub-jays are likely to benefit many other species.

FLORIDA SCRUB-JAY CONSERVATION COORDINATION – During FY 2016-17, the Florida Scrub-jay Conservation Coordination Project continued to work with partners to enhance range-wide conservation efforts. Project personnel provided assistance to internal and external stakeholders, promoted and facilitated communication and information exchange among partners (e.g., through regional working groups), developed guidelines and management plans for effective conservation, and provided information and outreach to stakeholders.

Providing assistance to stakeholders for conservation planning, habitat management, restoration, translocations, and monitoring was a key role played by the project Coordinator. Project staff provided

eight site visits to properties managed by county, state, and federal agencies, as well as private properties to discuss land management opportunities for scrub-jays. Staff also provided feedback to land managers on a field trip associated with regional working group meetings and provided assistance on potential translocation sites in coordination with the USFWS. The Coordinator provided training in survey methods for state-wide population surveys through the Jay Watch program. Staff provided assistance with surveys looking at the dispersal of scrub-jays in Ocala National Forest in the summers of 2016 and 2017.

Project staff continued to facilitate communication and information exchange among partners via regional working groups focused on conservation of scrub-jays and their habitat. The working group attendees included representatives from all major public land management entities as well as non-governmental organizations, university staff, and private landowners. These working groups provided an excellent opportunity for participants to network, share ideas and experiences, and learn about new developments. During FY 2016-17, project staff organized, attended, and facilitated two working group meetings and two working group field trips. These working groups provide an excellent opportunity for participants to network, share ideas and experiences, and learn about new developments. Project staff developed, commented on, and reviewed management plans and guidelines to assist partners with scrub-jay conservation efforts. Agency-wide comments were collected and submitted regarding Ocala National Forest Amendment 12 to re-designate over 50,000 acres of Ocala National Forest from sand-pine to scrub-jay management. With Ocala National Forest being home to the largest contiguous population of Florida scrub-jays, this action has great recovery potential for the species.

The Coordinator participated in updating the Federal Recovery Plan for the species. The Federal Recovery Plan, which has not been updated since 1990, will provide an important "road map" for scrub-jay conservation. Project staff worked closely with USFWS staff in generating materials such as mapping and diagrams to be included in a draft Species Status Assessment as well.

The Coordinator also participated in outreach activities to raise awareness for scrub-jays and encourage support for management of scrub-jay habitat. Staff helped organize the annual Florida Scrub-Jay Festival to celebrate and raise awareness about the Florida scrub-jay and its habitat. The annual festival moves around the state from year to year to reach out to different audiences. Staff presented on Florida scrub-jay status and state-wide conservation efforts at three public events held on state and private lands. The Coordinator also provided a scrub-jay translocation presentation for the annual Jay Watch volunteer appreciation event. Jay Watch (http://fl.audubon.org/jay-watch) organizes teams of citizen scientists

annually throughout the state to survey scrub-jay populations, and actively involves communities in Florida scrub-jay conservation efforts.

Translocation from Ocala National Forest to Seminole State Forest in Central Florida – Many populations of Florida scrub-jays throughout the state are vulnerable to genetic isolation due to habitat fragmentation. Genetic isolation increases the likelihood that a population will disappear. Further, Florida scrub-jays generally do not move long distances through non-scrub habitat. Thus, FWC conducted the initial experimental translocation of Florida scrub-jays to determine if a state-wide translocation program would improve the health of Florida scrub-jay populations throughout the state. This initial translocation was a collaborative effort between staff from FWC, Florida Department of Environmental Protection (FDEP), and the U.S. Forest Service.

During January and February, nine Florida scrub-jays were translocated from Ocala National Forest (Marion County) to Seminole State Forest (Lake County). FWC monitored Florida scrub-jays at donor sites and recipient sites to determine the effects that moving birds from one location to another caused. The nine translocated birds constituted four different family groups, including one group of three. A new release method was compared to a more time-consuming method that had been used before. Two groups were housed in on-site acclimation cages before release, and two groups were released without first being housed in acclimation cages (the new approach). The translocated groups were tracked using radio telemetry to determine the extent to which they moved throughout the landscape. Interactions with neighboring groups were also noted. All four groups that were translocated established territories within 700 feet of where they were released. In Ocala National Forest, the territories that were vacated due to translocation were regularly visited to determine if other Florida scrub-jays replaced those that were translocated. By the beginning of the breeding season (mid-March), all four territories had been utilized by other Florida scrub-jays. Three neighboring groups added the vacated areas to their existing territory, and one vacated territory was claimed by an immigrant group which abandoned their old, sub-optimal territory. From March to June, all nesting attempts by the translocated birds were documented. Each of the four groups attempted to nest multiple times, and the group of three successfully fledged young.

Overall, the translocated birds appeared to acclimate well to the recipient sites, and populations at the donor sites did not appear to be negatively affected by translocation. These results suggest that future translocations will be a worthwhile tool for stabilizing and increasing populations of Florida scrub-jays on managed lands. There did not appear to be any difference between behavior of the translocated groups with respect to release method, which may indicate that foregoing the use of acclimation cages in the

future could be feasible. At Ocala National Forest, biologists and volunteers conducted post-reproductive surveys to determine how many fledglings were produced in areas where Florida scrub-jays will likely be trapped and translocated in the future. This information will help determine ideal candidates for future translocation. At least four more family groups of Florida scrub-jays will be translocated to Seminole State Forest from Ocala National Forest in late 2017 and/or early 2018. Second-year birds will also be translocated without an accompanying family group. This continued effort will allow for an increased understanding of what methodology may help to better conserve Florida scrub-jay populations throughout the state.

Exhibit 5
Florida Scrub-jay Population Surveys on Wildlife Management Areas (WMA) during FY 2016-17

LOCATION	GROUP NUMBERS	TOTAL NUMBER OF BIRDS	MEAN GROUP SIZE	HABITAT MANAGEMENT
Arbuckle WMA, Polk County	15	47	3.1	N/A
Walk-in-the-Water WMA, Polk County	8	22	2.8	N/A
Camp Blanding WMA, Clay County	No scrub-jays were located during the survey. This site is the northern most population of the Florida scrub-jay.			
Half Moon WMA, Sumter County	3	7	2.3	N/A
Salt Lake WMA, Brevard County	3	6	2.0	242 acres prescribed burned

MITIGATION PARKS – The goal of mitigation parks is to provide an off-site alternative for resolving certain wildlife resource conflicts. Most mitigation park facilities are developed in cooperation with other local, state, and federal agencies, usually following the signing and execution of a Memorandum of Understanding. The Memorandum's function is to establish an orderly process for administering monetary transactions and to provide a process for land acquisition and management. The responsibility for the management of lands acquired through the mitigation park program rests with FWC. These parks are managed primarily to enhance listed species populations, particularly those animals for which state and federal approvals are required prior to their being impacted by new land development. All mitigation parks are designated by FWC as Wildlife and Environmental Areas (WEAs). Annual monitoring of Florida scrub-jays during FY 2016-17 occurred at three mitigation parks in the southwest region.

Exhibit 6
Florida Jay Watch Survey on Wildlife and Environmental Areas (WEA) during FY 2016-17

LOCATION	GROUP NUMBERS	TOTAL NUMBER OF BIRDS	MEAN GROUP SIZE	NUMBER OF JUVENILES PER GROUP	HABITAT MANAGEMENT
Moody Branch WEA Manatee County	3	11	3.7	Not included due to survey timing.	140 acres prescribed burn, 265 acres chemically treated, and 295 acres mechanically treated.
Hickey Creek WEA Lee County	2	4	2.0	0	74 acres prescribed burn, 20 acres mechanically treated, and 28 acres chemically treated.
Platt Branch WEA Highlands County	9	31	3.4	8	694 acres prescribed burn, 75 acres mechanically treated, and 4 half-acre plots were planted with scrub oaks.

Tract Surveys on Lake Wales Ridge Wildlife and Environmental Area in Highlands and Polk Counties – The Lake Wales Ridge WEA in Highlands and Polk counties consists of 19 tracts, 12 of which retain groups of Florida scrub-jays. FWC monitors scrub-jay populations on select tracts of the Lake Wales Ridge WEA in cooperation with Archbold Biological Station and Jay Watch. During FY 2016-17, Lake Placid Scrub, Holmes Avenue, Highland Park Estates, Gould Road, Royce Unit, Clements, Silver Lake, Sun n' Lakes, and Highlands Ridge tracts of the WEA were surveyed.

Four of the surveyed tracts saw an increase in number of scrub-jay groups from FY 2015-16 to FY 2016-17. Lake Placid Scrub increased from 32 groups to 38 groups. The Holmes Avenue tract saw an increase from ten groups to 13. Total number of groups increased at Highland Park Estates from five groups in to eight. At Gould Road, the number of groups increased from seven to ten. Group numbers remained the same at Royce Unit with seven groups recorded in both fiscal years.

Five of the surveyed tracts recorded decreases in the number of groups from FY 2015-16 to FY 2016-17. The McJunkin tract decreased from 21 groups to 18. Clements tract decreased from three groups to two groups. Total number of groups at Silver Lake decreased from seven groups to five. Sun n' Lakes also decreased from seven groups to four. The Highlands Ridge tract saw the most significant decrease in the number of groups having gone from 17 groups to nine.

Controlled burns during FY 2016-17 included approximately 2,038 acres of occupied or potential scrub-jay habitat at Gould Rd, McJunkin, Lake Placid Scrub, Highlands Ridge, Holmes Ave, Royce Unit, Silver Lake, and Carter Creek tracts. At the Royce Unit, four acres of potential habitat were planted with oak seedlings and eight acres were dibbled with acorns.

Limpkin

In 2010, FWC and external experts had conducted a Biological Status Review of the limpkin, during which it was determined the species did not meet the criteria for State listing. However, the limpkin retained its status as a State-designated Species of Special Concern until the Imperiled Species Management Plan was finalized. In January 2017, the limpkin was removed from Florida's Endangered and Threatened Species List.

In FY 2013-14, FWC initiated testing of a draft protocol to detect trends in abundance and changes in occupancy of limpkins utilizing the Wacissa River spring run in Jefferson County. FWC conducted three surveys on March 22, April 14, and May 11, 2017. On March 22, six limpkins were observed (five males and one unknown sex); on April 14, nine limpkins were observed (eight males and one female); and on May 11, 13 limpkins were observed (nine males and four females).

Because the limpkin is no longer on the State's Endangered and Threatened Species List, research, management, and conservation efforts on this species will not be included in future annual reports.

Marsh Birds

Marian's Marsh Wren in Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – FWC identified a need to collect information on the distribution, abundance, and population trends of Florida's listed saltmarsh songbirds to better assess their status. Since the spring of 2015, FWC has conducted surveys for Marian's marsh wren, which is State-designated Threatened, at Apalachicola River WEA. Staff visit 20 survey points at a maximum of three times each during April and May. During the 2017 survey period, staff detected at least one wren at 16 out of 20 (80%) locations (exhibit 7), a similar number to that of previous efforts.

Exhibit 7
Number of Survey Points with at Least One Detection of Marian's Marsh Wren.

YEAR	NUMBER OF POINTS WITH DETECTION	PERCENT
2015	14 out of 20	70%
2016	12 out of 13*	92%
2017	16 out of 20	80%

*Seven points were inaccessible due to flooding and were not surveyed.

Worthington's Marsh Wren and MacGillivray's Seaside Sparrow in Northeast Florida – Worthington's marsh wren and MacGillivray's seaside sparrow are two subspecies of salt marsh songbirds that occur in northeast Florida. Worthington's marsh wren is a State-designated Threatened subspecies, while the MacGillivray's seaside sparrow is currently undergoing review for Federal listing, with a listing decision anticipated in late 2018. Historically, both subspecies occurred from Nassau County south to Volusia County. Both subspecies have undergone considerable range contraction in the last 50 years and now only occur in northern Duval and Nassau counties. Their narrow coastal distribution makes them especially vulnerable to habitat loss and fragmentation. The two subspecies overlap in their habitat requirements and can therefore be surveyed together. Studies to examine the habitat needs of both subspecies began in 2014.

During FY 2016-17, FWC continued nest surveys and monitoring to examine nest success and habitat selection in both subspecies. Surveys conducted in summer 2016 found and monitored 348 marsh wren nests and 71 seaside sparrow nests, while surveys in 2017 found and monitored 279 wren nests and 26 sparrow nests. In addition to nest success, FWC researchers also radio-tagged 16 and 34 marsh wren fledglings (young birds that are capable of flight and ready to leave the nest) in 2016 and 2017 respectively to examine survival during the first 21 days after fledging. Analysis of the reproductive and survival data is on-going.

Osprey

Two distinct subpopulations of osprey appear to exist in Florida: one is a declining, winter-nesting, non-migratory subpopulation along the southernmost coast of Florida (primarily in Monroe County), while the other is stable or increasing, late-winter-or-spring-nesting, migratory subpopulation. Although genetically they do not appear to be distinct, the demographic relationship between the southern coastal

Florida population and other osprey in northern Florida remains unknown. The number of breeding pairs of osprey in Monroe County has been declining for decades, even though more northerly subpopulations are stable or increasing. In April 2017, based on results of the recent genetic studies, staff initiated the re-evaluation of the status of the osprey (Monroe County population) with final findings anticipated in FY 2017-18. Regardless of whether the population remains listed, the conservation and management actions identified in the species' action plan are likely to benefit osprey in southern Florida.

Assessing Florida Osprey Diets – In FY 2013–14, FWC and Virginia Commonwealth University began a study to determine if the southern coastal osprey population is a distinct subspecies using population genetic methods. Osprey feathers were collected from 182 locations through and genetic analyses was completed in November 2015. In conjunction with the genetic project, Virginia Commonwealth University researchers used part of feather samples in a stable isotope analysis to assess the diet of ospreys. The feathers' chemical structures will provide information as to what prey species are being consumed at the various sample locales. This study may provide insight into potential causes of declines of South Florida osprey populations. FWC expects results from Virginia Commonwealth University during 2018.

Mercury Concentrations in Feathers of Adult and Nestling Osprey from Coastal and Freshwater Environments of Florida – Feathers collected during the genetics and stable isotopes projects were also used by Florida Gulf Coast University researchers to determine mercury contamination of nestling and adult ospreys. Feathers from nestlings contained significantly lower mercury concentrations than did feathers from adults. Overall, mercury levels were above normal when compared to similar studies; however, they did not exceed levels from previous studies in heavily contaminated areas. Nestlings from the coastal habitats of Collier and Monroe counties had the highest levels. These results were published in a peer-reviewed journal.

Red-cockaded Woodpecker

Conservation Planning – The red-cockaded woodpecker is a Federally-designated Endangered species. At the close of FY 2006-07, implementation of most of the conservation actions identified in Florida's Red-cockaded Woodpecker Management Plan was complete; however, progress on the remaining conservation actions in the plan are ongoing and are outlined below:

- Establish and convene a meeting of the Florida red-cockaded woodpecker working groups. One red-cockaded woodpecker working group currently meets. Agenda items relevant to the Florida

Red-cockaded Woodpecker Management Plan have been incorporated into working group meetings and will continue as needed in the future.

- Coordinate with USFWS to develop a statewide Safe Harbor program for red-cockaded woodpeckers in Florida. The statewide Red-cockaded Woodpecker Safe Harbor program (http://myfwc.com/conservation/terrestrial/safe-harbor) was initiated in November 2006 through an agreement between USFWS and FWC under the Federal Endangered Species Act. Since red-cockaded woodpeckers are protected under the Endangered Species Act, landowners have a legal obligation to protect the birds and their habitat. Safe Harbor agreements make sense whenever landowners are interested in restoring or enhancing habitats that may benefit this species but are concerned about incurring additional regulatory restrictions on the use of their land. An agreement effectively freezes a landowner's Endangered Species Act responsibilities as long as the owner agrees to restore, enhance, or create habitat that benefits red-cockaded woodpeckers. The program, maintained by FWC, continues to enroll landowners. By the end of FY 2016-17, there were 16 signed agreements that comprised 19 different properties in the program with a total of 98,850 acres committed for habitat management by the landowners.

At the close of the 2017 red-cockaded woodpecker breeding season, populations continued on a track to achieve and in many cases, exceed the year 2020 population and metapopulation goals outlined in Florida's Red-cockaded Woodpecker Management Plan. Large red-cockaded woodpecker populations in Florida continue to be well-managed. Fire suppression, reliance on dormant season prescribed fire, and low availability of old growth pines remain the greatest threats to red-cockaded woodpecker recovery in Florida. Meetings of the red-cockaded woodpecker working group and implementation of the statewide Red-cockaded Woodpecker Safe Harbor program will continue until the species meets its conservation goals.

Exhibit 8
Red-cockaded Woodpecker Surveys During FY 2016-17

LOCATION	ACTIVE CLUSTER NUMBERS	PBG NUMBERS	SOLITARY NUMBERS	NEST ATTEMPTS	BANDING NUMBERS	FLEDGLING NUMBERS	CAVITY MAINTENANCE	HABITAT MANAGEMENT
Backcock/Webb and Yucca Pens Unit WMA Charlotte and Lee counties	47	41	6	36 attempts, 14 fails, and 6 reattempts	33	19	6 cavities replaced in four active clusters, five drilled starts added to three active clusters	19,652 acres prescribed burn, and 1,809 acres mechanically treated
Camp Blanding WMA Clay County	35	35	0	41 nest attempts, 10 failures, 6 re-nesting attempts	61	62	10 inserts replaced	Prescribed burn around 15 clusters and surrounding foraging area
Citrus WMA Citrus County	81	78	2	75	114	107	6 inserts replaced, 12 inserts cleaned/repaired, and 1 new insert installed	Prescribed burn 8,828 acres
Croom WMA Hernando and Sumter counties	38	37	1	34, eight failed, seven re-nesting attempts in six clusters, of which four were successful	57	47	No maintenance performed	2,792 acres prescribed burn
J. W. Corbett WMA Palm Beach County	30	25	4	21	20 nestlings	16	5 new recruitment clusters installed for new translocated birds and 5 new clusters added to existing groups. 33 artificial cavities installed. 22 new cavities found	3,440 acres prescribed burn, 29,413 acres chemically treated
Three Lakes WMA Osceola County	49	45	3	28 of 43 nesting attempts were successful	53	36	1 new cavity insert was installed, 12 cavity inserts were, 15 insert boxes were cleaned and maintained	11,006 acres prescribed burn
Triple N Ranch and Herky Huffman/Bull Creek WMAs	24	21	2	11 of 18 attempts were successful	16 nestlings	12	20 cavity inserts were installed, 1 cavity insert was replaced, and 61 cavity inserts were cleaned and maintained	9,586 acres prescribed burn (1,099 additional acres burned by wildfires), 791 acres mechanically treated, and 4,131 acres chemically treated
Babcock Ranch Preserve Charlotte County	12	11	1	6 of 11 were successful	9 chicks and 13 adults	6	No cavity maintenance required	3,529 acres prescribed burn, 30 acres burned by wildfire
Big Cypress National Preserve South Florida	40 out of 91 are monitored regularly	37	3	27 of 34 were successful, with 4 reattempts	39 chicks and 4 adults	16	24 artificial cavities were newly installed and two were replaced	14 acres mechanically treated, 12,225 acres prescribed burn, and managed 3,779 acres of wildfire
Goethe State Forest Levy County	62	52	11	58	70	51	4 inserts added	183 acres mechanically treated, 1,500 acres prescribed burn
Tates Hell WMA Franklin and Liberty counties	56	49	None recorded.	49 had eggs. 37 nests contained nestlings (12 nest attempts failed)	74	56	30 artificial cavities were installed. Nine cavity-limited clusters were augmented, and three new recruitment clusters were installed	93 acres mechanically treated, 4,334 acres prescribed burn
Apalachicola River WEA Franklin County	9	9	None recorded.	9	16	11	No maintenance was performed	2,800 acres prescribed burn
John G. and Susan H. DuPuis, Jr. WEA Martin and Palm Beach counties	15	12	2	11	12	11	1 cavity insert added, 20 inserts cleaned/repaired	Vegetative survey was completed
Platt Branch Mitigation Park WEA Highlands County	6	5	1	5	7	5	None recorded	64 acres prescribed burn and 136 acres mechanically treated

TRANSLOCATIONS – Red-cockaded woodpeckers are often translocated from one population in Florida into another to supplement genetics and/or a dwindling population. In October 2016, 12 young-of-the-year red-cockaded woodpeckers were translocated from Citrus WMA to Avon Park (three pairs) and Disney Wildlife Preserve (three pairs). Up to six pairs will again be available from Citrus this fall to augment smaller populations to the south. At Croom WMA in Hernando and Sumter counties, the population of red-cockaded woodpeckers is stable, which allowed for six young birds to be caught and translocated to a different conservation property in summer 2016. Corbett WMA in Palm Beach County received five pair of birds from Osceola National Forest in the fall of 2016. In October 2016, eight individuals were translocated to Triple N Ranch and Herky Huffman/Bull Creek WMAs. Three of the translocated individuals remain in the area and all three attempted to nest (two as a pair). A bird banded from Webb WMA was captured on Babcock Ranch Preserve. This is the second bird captured that was banded on an adjoining property, the other one being a bird that was banded on Lykes Brothers. In BCNP, no red-cockaded woodpeckers were translocated into the population during FY 2016-17 due to the success of red-cockaded woodpeckers present on property. FWC has fall 2017 translocation plans in place for the smaller southern aggregation in Lostman's Pines, and will be working with cooperating agencies to continue translocations from BCNP. Apalachicola River WEA (ARWEA) staff documented a four-year old female, originally banded nearly three miles north in Apalachicola WMA, again having a successful nest in the same ARWEA cluster she has inhabited during the two years prior. Additionally, staff found a six-year old male born in ARWEA 12 miles away at a cluster in Tate's Hell WMA. Of the six birds translocated from Croom WMA in the fall of 2016, one was found during the 2017 breeding season. Six woodpeckers will be translocated in fall 2017 to Platt Branch Mitigation Park WEA. Four red-cockaded woodpeckers were translocated in FY 2016-17 from the Camp Blanding WMA to Platt Branch WEA, with 50% staying locally and one new breeding pair forming.

Reddish Egret

The reddish egret was listed as State-designated Threatened in Florida in January 2017 because of its small population size, potential recent population declines, and restricted distribution. FWC implemented a statewide survey of nesting reddish egrets during 2016 to provide a baseline population size for population monitoring and to identify the largest breeding colonies to help prioritize management activities in Florida. FWC first prioritized potential breeding sites based on historical data and then used a combination of survey types to estimate the number of breeding pairs at 305 sites throughout Florida. Fifty-eight of 305 waterbird sites surveyed (19%) had at least one nesting pair of reddish egrets. Birds

were fairly evenly distributed across the core nesting areas, with 78–86 pairs in southwest Florida, 54–88 pairs in Florida Bay, 95 pairs in the lower Florida Keys, and 34–43 pairs in or near Merritt Island National Wildlife Refuge. No nesting birds were observed north of Merritt Island on the East Coast or north of Cedar Key on the Gulf Coast. The estimated population size of surveyed sites was 480 nesting pairs (95% confidence interval of 375-606). This study differs from past efforts in survey methodology, intensity, and analytical approach so we caution against attempts to make quantitative inferences about population trends by comparing this to past estimates. Qualitatively, however, the raw count total (262-311 pairs) is substantially less than that reported in past survey efforts, and no colonies were observed as large as the three largest colonies (28, 38, and 54 pairs) documented in Florida Bay during 1977–1978.

FWC also used the location and abundance of nesting reddish egrets surveyed during 2015-2016 in Florida, to identify factors that influence the probability of occurrence and the abundance of nesting reddish egrets. Sites with a greater amount of foraging habitat within a 3.1-mile radius, with greater numbers of nesting species, and to a lesser extent, with shorter vegetation, tended to have a greater number of nesting reddish egrets. By contrast, the distance from an island from the mainland, island size, and proximity to deep water did not influence the probability of occurrence or abundance of nesting reddish egrets. These results suggest that effective management of large, species rich coastal rookeries are likely to benefit reddish egrets. The results also suggest that coastal restoration efforts that tightly link nest site management with high quality foraging habitat will be most likely to prove beneficial to reddish egrets.

Roseate Tern

The roseate tern is a Federally-designated Threatened seabird. In Florida, this species is only found in extreme South Florida and in a limited number of colonies. After the hurricane season of 2005, the roseate tern's main nesting island, Pelican Shoal Critical Wildlife Area, their main stronghold and ground colony in the Florida Keys, was submerged under one to two feet of water and no longer available as a nesting site for roseate terns.

In the spring of 2006, FWC attempted to provide the birds displaced from Pelican Shoal to an alternative nesting area. In cooperation with the National Park Service, biologists placed plastic tern decoys along with a sound system and speakers broadcasting tern calls on Long Key at Dry Tortugas National Park. These techniques, known as "social attraction," have been used worldwide to attract colonially nesting birds to nesting areas and to restore seabird colonies. FWC did not place decoys and call broadcasting

equipment at the Dry Tortugas after 2010 to determine if the terns would nest there on their own. Only twelve nests were recorded in 2011, no nest counts were conducted in 2012, 63 nests were recorded in 2013, and seven nests in 2014. FWC did not record any roseate tern nests at the Dry Tortugas National Park in 2015. In 2016, 95 nests were recorded on gravel roofs, structures and Dry Tortugas National Park. FWC also surveyed eight gravel roofs and structures in 2017 that contained roseate terns nesting colonies. One of the structures was on an abandoned bridge that is cut off on both ends. FWC estimates the total roseate tern population for Florida is 42 pairs based on peak nest numbers during the first wave of nests. Productivity was very low and difficult to assess at most sites. The highest number of fledged chicks was estimated at 17. Twenty chicks were banded during 2017.

Shorebirds

Twenty species of shorebirds and seabirds breed in Florida, four of which are currently listed as State-designated Threatened (American oystercatcher, black skimmer, least tern, and snowy plover), based on biological status reviews conducted in 2011In addition to the previously State-Threatened least tern and snowy plover, the status of American oystercatchers and black skimmers changed to State-designated Threatened in January 2017. In addition, more than 40 species of shorebirds and seabirds winter in Florida. Two species of non-breeding shorebirds are Federally-listed: the red knot is Federally-Threatened and the piping plover is Federally-Endangered.

A draft species action plan for listed shorebirds was completed in November 2013 (http://myfwc.com/media/2720106/Imperiled-Beach-Nesting-Birds-Species-Action-Plan-Final-Draft.pdf). The goal of the multi-species action plan is to improve the conservation status of the four State-designated Threatened species to a point that they can be removed from the Florida Endangered and Threatened Species List and not again need to be listed. To build upon the species action plan, in 2016 the 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://www.flshorebirdalliance.org/media/55868/Florida_beach_nesting_bird_plan_FINAL.pdf)

To begin implementing the Beach-nesting Bird Plan the FWC received a grant through the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund. The project expands upon foundational shorebird conservation work by creating a dedicated shorebird and seabird program for the State of Florida. FWC will work with a key partner, Audubon of Florida, to continue to recover shorebird

populations using five strategies: 1) Reduce human disturbance, 2) Manage habitat, 3) Manage predation, 4) Inform management and track outcomes, and 5) Improve regulatory coordination. The project area encompasses a variety of habitats used by breeding, wintering, and migrating shorebirds. These habitats include rooftops, sand beaches, emergent flats, dredge spoil islands, marine and freshwater sand bars, oyster reefs, freshwater wetlands, and upland construction and industrial sites. The four-year project represents Phase 1 of a larger vision and will conclude with a focused review of all program activities to assess programmatic efficacy. This approach will provide the information needed to continue a robust statewide shorebird and seabird program.

FLORIDA SHOREBIRD ALLIANCE – To achieve the goals of the Beach-nesting Bird Plan and the newly instated shorebird program, FWC leads a unique statewide partnership effort through the Florida Shorebird Alliance. The Florida Shorebird Alliance is organized into 12 regional partnerships that work locally to ensure important shorebird and seabird sites are surveyed, monitored, posted, and stewarded. During the 2016 nesting season, Alliance partners collectively monitored 859 miles of coastline, and posted 172 seabird colonies and 771 shorebird nests.

The Shorebird Alliance Coordinator publishes a monthly e-newsletter (the Wrack Line), maintains an email list-serve of over 23,000 contacts, coordinates training and data quality control for the statewide shorebird-monitoring program, and manages the Alliance website (www.FLShorebirdAlliance.org). This website functions as an online resource for information and materials on Florida's shorebirds and seabirds, and as a tool to improve coordination and information sharing between regional partnerships.

FLORIDA SHOREBIRD DATABASE – The Florida Shorebird Database, which may be accessed at www.flshorebirddatabase.org, was launched in spring 2011 to serve as the central repository for data collected on shorebirds and seabirds in Florida. Over 950 monitoring partners from throughout the state have registered accounts in the Database and many of these partners collect and report breeding data. During the 2016 nesting season, partners entered 14,939 data records in the Database. Monitoring data are available online to anyone with an account, thereby allowing researchers, managers, conservationists, and permit reviewers to use information to help conserve shorebirds and seabirds.

A group of select partners are also participating in non-breeding shorebird and seabird surveys. In early 2014, FWC drafted an official non-breeding protocol to be used by partners statewide. Members of the Florida Shorebird Alliance, especially those from the Panhandle partnership, started using the protocol in 2014. The USFWS has adopted the monitoring protocol and data entry as part of the permit requirements

for beach restoration projects. This program continues to grow with the need for standardized data and the convenience of a centralized data repository.

Seaside Sparrows

Biological status reviews conducted by FWC recommended that Scott's seaside sparrow and the Wakulla seaside sparrow, be listed as State-listed subspecies and they were included in FWC's draft Saltmarsh Songbird Species Action Plan. The non-migratory salt marsh specialists are two of five recognized subspecies of seaside sparrow that breed in Florida (the other three include the MacGillivray's seaside sparrow, the Federally Endangered Cape Sable seaside sparrow, and the Louisiana seaside sparrow.

In FY 2015-16, FWC initiated a study to reexamine the subspecies relationships of seaside sparrows in Florida as outlined in the Species Action Plan (http://myfwc.com/media/2738837/Saltmarsh-Songbird-Species-Action-Plan-Final-Draft.pdf) for salt marsh songbirds. To date, FWC has collected 320 genetic samples across 14 sites. Phenotypic data including morphometrics, audio recordings of vocalizations, and detailed photographs were also collected to supplement data obtained from genetic material. Other local, state, and federal partners [National Oceanic and Atmospheric Agency (NOAA), USFWS, Florida Department of Environmental Protection (FDEP), National Park Service (NPS), Northwest Florida Water Management District, Southwest Florida Water Management District) also contributed to the project by providing access to their lands, housing and assistance with sample collection. FWC and collaborators at University of Florida are using DNA analyses to determine the relatedness of sparrows in these populations. During FY 2016-17, FWC began laboratory processing of the 147 genetic samples collected in FY 2015-16. Analysis is ongoing. Results from this project will be used to refine taxonomic designations of seaside sparrow, which may affect listing status, and therefore future conservation and management priorities.

Southeastern American Kestrel

The Southeastern American kestrel is a State-designated Threatened non-migratory falcon closely tied to sandhills, scrub, pasture, and prairies in the southeastern U.S. This subspecies has undergone a range reduction and population decline throughout its range in recent decades. The kestrel's current population size is estimated to be approximately 1,350-1,500 breeding pairs. In July 2008, FWC initiated a long-term effort to develop a regional Southeastern American kestrel conservation partnership within and across agencies by: 1) Identifying suitable but unoccupied kestrel habitat; 2) Establishing population targets for kestrels on FWC's Wildlife Management Areas (WMAs) and other public lands; 3) Building and

installing new nest boxes and repairing old nest boxes; 4) Providing standardized data collection protocols to monitor kestrels and establishing a database to manage annual monitoring data on public lands; 5) Monitoring nest boxes during the breeding season; 6) Educating biologists, land managers, bird watchers, and others through talks, web sites, and printed media; and 7) Conducting additional research on kestrel breeding habitat requirements.

Two of the major threats identified in the Species Action Plan (http://myfwc.com/media/2738858/Southeastern-American-Kestrel-Species-Action-Plan-Final-Draft.pdf) for kestrels are a lack of cavities for nesting and lack of suitable foraging habitat. Addressing these threats requires coordinated efforts of internal staff and external partners for both population management and habitat management. This project provides the necessary coordination to enhance conservation efforts for this threatened species.

Nest box installation is an effective form of population management for kestrels (and is a high priority, urgent action identified in the species action plan. During FY 2016-17, FWC worked with subject matter experts to continue refining the goal, scope, and measurable objectives for a Southeastern American kestrel monitoring partnership. FWC compiled a list of existing nest boxes and worked on guidance for staff and partners on nest box placement at the local and landscape scale.

Exhibit 9
Kestrel Nest Box Maintenance During FY 2016-17

LOCATION	NUMBER OF NEST BOXES MANAGED	NUMBER OF NEST BOXES UTILIZED BY KESTRELS	NEST SUCCESS?	OTHER SPECIES FOUND IN NEST BOXES
Bell Ridge Longleaf WEA Gilchrist County	4	3	Undeterminable	Great-crested flycatcher and Eastern screech owl
Blackwater WMA Okaloosa and Santa Rosa counties	22	6	Yes. 26 eggs and one live chick noted	None noted
Camp Blanding WMA Clay County	56	22	Yes. 80 eggs and 27 chicks fledged	Squirrels
Fort White WEA Gilchrist County	9	0	No	Southern flying squirrel, great-crested flycatcher, and Eastern screech owl
Jennings State Forest WMA Clay and Duval counties	26	0	No	Southern flying squirrels, Eastern gray squirrels, Sherman's fox, squirrels, great-crested flycatchers, Eastern screech owls, Eastern bluebirds
Twin Rivers State Forest WMA Madison County	11	4	Yes, eggs and 6 fledglings	Tufted titmice and Southern flying squirrels
Watermelon Pond WEA Alachua County	7	2	Yes, 3 eggs in each box, and 3 chicks fledged	None noted
Southwest Region				
• Chassahowitzka WMA Hernando County		4	Yes	
• Perry Oldenburg WEA Hernando County		2	Yes	
• Lake Wales Ridge WEA Highlands and Polk counties		2	Yes	Eastern screech owls, Eastern bluebirds, red-bellied woodpeckers, great-crested flycatchers, and gray squirrels
• Crooked Lake WEA Polk County	50 total	1	Yes	

Wading Birds

Aucilla Wildlife Management Area in Jefferson and Taylor Counties – Aucilla WMA consists of numerous wetlands that provide habitat for several listed species of colonial wading birds, including the little blue heron, tricolored heron, and wood stork. In order to monitor the number and distribution of nests over time and identify areas that should be protected during land management activities, FWC conducts an aerial survey of nesting colonies in the spring of each year. Of six previously identified wading bird colonies, two were active in 2017, which is one less than the number of active colonies in 2013-2016. Of the six known colonies, no more than five have ever been active at the same time. The wading bird colonies are typically mixed with listed species and non-listed species including great egret, little blue heron, snowy egret, and yellow-crowned night-heron.

Big Bend Wildlife Management Area in Dixie and Taylor Counties – Numerous wetlands that provide habitat for colonial wading birds, including the little blue heron, snowy egret, tricolored heron, and white ibis, occur on or near Big Bend WMA. FWC conducts an aerial survey of nesting colonies in the spring of each year to monitor the number and distribution of nests over time and identify areas that should be protected during land management activities. No new colonies were documented, but the survey did confirm nesting in known colonies on Cherry Island Grade (great egret, little blue heron), Rock Island (tricolored heron, snowy egret, great egret), and Pepperfish Key (great blue heron, great egret, cattle egret, snowy egret, little blue heron, tricolored heron).

Fisheating Creek Wildlife Management Area in Glades County – Aerial surveys were conducted over the WMA during FY 2016-17. No known rookeries were on the area prior to the survey. Surveys occurred once per month March through May 2017. A total of 11 foraging aggregations and two roosting aggregations were documented on the surveys. No rookeries were located. Many species were documented including great egret, wood stork, great blue heron, roseate spoonbill, snowy egret, little blue heron, and tricolored heron.

Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area in Washington County – Numerous water bodies and associated wetlands on the Fitzhugh Carter Tract of Econfina Creek WMA provide excellent nesting and foraging habitat for the many species of wading birds found in the Florida Panhandle, several of which are listed species. In particular, Little Deep Edge Pond supports nesting of various species of colonial-breeding wading birds including the little blue heron and tricolored heron, which are State-designated Threatened. FWC monitors the colony annually from April to July to document species use, number of adult birds, and number of chicks produced (exhibit 10). FWC will

continue to annually monitor wading bird colonies on the Carter Tract, as well as document incidental observations of at-risk wading bird species.

Exhibit 10
Annual Little Blue Heron and Tricolored Heron use of the Little Deep Edge Pond Wading Bird Colony, Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida

	LITTLE BLUE HERONS			TRICOLORED HERONS		
YEAR	ADULTS	NESTS	CHICKS	ADULTS	NESTS	CHICKS
2008	8	3	0	2	unknown	0
2009	1	0	0	0	0	0
2010	0	0	0	0	0	0
2011	20	14	34	1	1	1
2012	7	4	6	0	0	0
2013	5	3	4	0	0	0
2014	14	6	6	0	0	0
2015	7	4	3	0	0	0
2016	13	13	15	0	0	0
2017	10	5	3	1	1	0

J.W. Corbett Wildlife Management Area in Palm Beach County – Wading bird rookeries were surveyed for activity in April and June of 2017. All historic rookeries were dry during the survey period, and no wading bird breeding activity was observed.

Apalachicola River Wildlife and Environmental Area and Box-R Wildlife Management Area and Tate's Hell Wildlife Management Area in Gulf, Franklin, and Liberty Counties – FWC has conducted an aerial survey of nesting colonies within the lower Apalachicola River basin during April and May of each year since 1993. During April 2017, FWC detected one colony, in the same location since 2011, of the Federally-designated Threatened wood stork with 25-30 nests (exhibit 11). FWC has found no other active wood stork colonies during annual surveying.

Exhibit 11
Annual Estimate of Wood Stork Nests and Adults at the Only Known Colony in the Lower Apalachicola River Basin

YEAR	NUMBER OF NESTS	NUMBER OF ADULTS
2011	25-30	20
2012	30	40
2013	100	100
2014	40	40
2015	50	50
2016	10	50
2017	25-30	25-30

Concurrent to the wood stork colony survey, FWC also document colonies of the State-designated Threatened little blue heron. Since 2010, there have either been one or two active nesting colonies. In 2017, a colony first discovered last breeding season was the only active little blue heron colony observed with approximately 75 nests. The other colony, active almost every year since 2010, was likely affected by drought. During the mid-May survey, the colony site was almost completely dry, a condition observed across the survey area at sites known in previous years to contain colonies of non-listed species.

Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area in Lee and Collier Counties – FWC has conducted nesting, foraging, and roosting surveys in and around the CREW WEA and National Audubon's Corkscrew Swamp Sanctuary in Lee and Collier counties for five consecutive years. The objective is to identify priority nesting, foraging, and roosting habitat, as well as monitor trends in wading bird nesting over time in and around the management area.

Eleven transects, spaced 0.8 nautical miles apart were flown at an altitude between 500 and 800 feet above ground in a fixed-wing aircraft one time per month from November through July. Photos were taken of each colony or aggregation to allow for counting and identifying bird to species after the flight.

During FY 2016-17, FWC identified and monitored nine nesting wading bird colonies that included between one and five nesting species per colony. Nesting effort was observed from: wood storks (467), great egrets (166), cattle egrets (152), little blue herons (37), snowy egrets (24), anhingas (14), black-crowned night herons (nine), and roseate spoonbills (six).

FWC also identified 99 foraging aggregations consisting of 8,382 individuals. Foraging groups primarily included wood storks, little blue herons, roseate spoonbills, tricolored herons, white ibis, great egrets, snowy egrets, cattle egrets, glossy ibis, great-blue herons, black-crowned night herons, anhingas, and black-necked stilts.

Additionally, a total of 53 roosting colonies with 2,863 individuals were observed in and around the area. Roosting species primarily consisted of white ibis, great egrets, wood storks, anhingas, great-blue herons, cattle egrets, snowy egrets, black-crowned night herons, and roseate spoonbills.

Although peak nest counts increased by 46% over last year due to wood storks nesting in the survey area, FWC biologists observed an overall decline in most nesting colonies compared with previous years. FWC will continue to monitoring these colonies annually and begin analyzing the presence of wading birds in foraging areas and nest initiation timing as they relate to regional surface water levels and rainfall.

John C. and Mariana Jones/Hungryland Wildlife and Environmental Area in Martin and Palm Beach Counties – The Species Management Strategy for the Hungryland WEA calls for the monitoring of wading birds to identify trends in nesting or habitat use and to document rookery locations. FWC conducted aerial wading bird surveys over Hungryland WEA during the breeding season detecting two colonies supporting great blue heron and great egret nests. Opportunistic observations of listed wading bird species on the area are also documented throughout the year.

White-crowned Pigeon

The white-crowned pigeon, a State-designated Threatened species, nests on mangrove islands and forages in deciduous forests in Monroe and Miami-Dade counties. Tropical hardwood hammock and pine rockland forests have been severely reduced and fragmented and remain under threat. The majority of the known nesting islands are protected within the Keys Refuge Complex in the Lower Florida Keys and Biscayne National Park. In June/July 2016, FWC surveyed 35 mangrove islands in upper Florida Bay to determine the presence and absence of nesting white-crown pigeons. Islands which had the most number of potential nesting pigeons will be more intensively monitored in subsequent years.

Although most nesting islands are protected, the white-crowned pigeon relies on fruiting trees in habitat which may not be protected. Identifying important foraging areas is a crucial component in conservation of this species. In FY 2015-16, FWC tested a method to survey foraging pigeons in isolated patches of hardwood hammock in Miami-Dade County. No pigeons were detected likely due to the spatial and temporal variation in fruit availability. In FY 2016-17, the survey was refined and initiated in Monroe

County. Transects were placed within six state parks, two private parcels, and throughout the Florida Keys Wildlife and Environmental Area. Surveys will continue through the nesting season into FY 2017-18.

Whooping Crane

Non-Migratory Population – The whooping crane in Florida is a Federally-designated Nonessential Experimental Population that is not essential for the continued existence of the species. Non-migratory whooping cranes are no longer being released in Florida. Low productivity and high mortality limit the likelihood of achieving a self-sustaining population. FWC's intensive monitoring of the remaining birds ended in June 2012, and at that time, the population was estimated at 18 birds. FWC continues to monitor the remaining birds opportunistically.

Eastern Migratory Population – A separate reintroduction of migratory whooping cranes is taking place in the Eastern U.S., these birds breed in Wisconsin and migrate to Florida (and other southeastern states) in the winter. There are currently 100 birds in this population. Like the non-migratory flock, the migratory flock is encountering reproductive challenges and research is underway to identify the limiting factors. FWC's involvement with this project consists only of occasional field monitoring.

Wood Stork

Monitoring in Central and South Florida – In 2008, FWC began aerial monitoring of two Central and South Florida stork colonies in the process of radio-tracking whooping cranes; FWC now surveys 34 colonies annually. The colonies are located in cypress swamps and on islands in lakes, borrow pits, rivers, lagoons, and bays in eight counties, coast to coast, from Orange to Charlotte. Surveys occur in late April to early May from a fixed-wing aircraft, typically 600–1,000 feet above ground level. In recent years, FWC counted approximately 2,900 nests on these surveys, an estimated 20% of the U.S. nesting population. In April 2017, staff counted 1,601 total nests in 16 active colonies.

Little Gator Creek Wildlife and Environmental Area in Pasco County – 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 marsh that contains the colony. This maintains suitable conditions for wood stork and wading bird nesting, and allows the colony to persist, even during drought years. Wood storks have nested intermittently in the colony for several years, including four of the last seven. FWC conducted periodic site visits during the breeding season (January to April) in FY 2016-17. Wood storks were not observed nesting in the colony during FY 2016-17.

L. KIRK EDWARDS WILDLIFE AND ENVIRONMENTAL AREA IN LEON COUNTY – Lower Lake Lafayette located within the L. Kirk Edwards WEA is home to the Chaires wood stork colony. Area staff conducted the annual aerial survey of the colony on April 26, 2017. The colony contained no wood stork nests during FY 2016-17, although approximately 15 great egret nests and five great blue heron nests were observed. Since 2012, wood stork activity at the colony has fluctuated, with staff documenting nests in 2013, 2014, and 2016, but not in 2012 or 2015.

In April 2017, FWC also monitored two additional wood stork colonies (Ochlockonee North and Ochlockonee South) that occur on private property in western Leon County. There were no nests observed at the location of the Ochlockonee North colony and approximately 275 nests at the Ochlockonee South colony. This is roughly the same number of nests observed in 2016.

AMPHIBIANS

Flatwoods Salamanders

The flatwoods salamanders are two closely related species endemic to pine forests of the lower southeastern coastal plain. In Florida, the reticulated flatwoods salamander occurs west of the Apalachicola River and is a Federally-designated Endangered species. The frosted flatwoods salamander occurs east of the Apalachicola River and is a Federally-designated Threatened species. Both species are in steep decline, with Florida populations representing the largest and healthiest remaining.

During FY 2016-17, FWC implemented a headstarting program in the Apalachicola National Forest, which contains one of two remaining population strongholds for the frosted flatwoods salamander. Due to drought conditions during the winter breeding season, nearly 600 eggs were located and salvaged from eight of 34 breeding ponds that were searched. Of these, 500 eggs were hatched and raised in large plastic “cattle tank” mesocosms and nearly 100 were admitted to a captive assurance colony at The Amphibian Foundation in Atlanta, Georgia. Of the approximately 500 larvae raised in meosocosms, nearly 400 (approximately 80%) survived to metamorphosis and were released back to their breeding ponds.

FWC was largely unable to conduct dipnet surveys for the frosted flatwoods salamander in the Apalachicola National Forest because of abnormally hot and dry winter conditions. Most breeding ponds remained dry during the winter breeding season and larvae were only detected at a single site where the water levels were high enough to inundate nesting habitat.

FWC also conducted larval dipnet surveys for the reticulated flatwoods salamander on public lands within its potential range that have recent or historical records. Larvae were detected in an inundated plowline peripheral to a single known site in Garcon Point WMA in Santa Rosa County. Surveys were unsuccessful at two known sites on Yellow River Marsh Preserve State Park and Yellow River WMA in Santa Rosa County. FWC documented six new breeding populations on Escribano Point WMA (Santa Rosa County), bringing the total number of breeding ponds on this property to 11. This represents the second largest remaining population of reticulated flatwoods salamanders within their range and the largest population of flatwoods salamanders on state land.

In FY 2017-18, FWC and their interagency collaborators received a multistate competitive grant from USFWS to restore wetlands for the benefit of frosted and reticulated flatwoods salamanders and other amphibians in Florida and Georgia, and to study the impact of different wetland restoration techniques on wetland amphibian and plant communities. This project will begin in September 2017 and continue for three years.

FWC participated in the Flatwoods Salamander Recovery Team to discuss the recovery plan with the USFWS lead, and also participated on numerous other phone calls and email communications about conservation coordination for the species. FWC commented on land development projects that could impact this species. At the conclusion of the field season, FWC met with others (U.S. Geological Survey, Virginia Tech, St. Marks National Wildlife Refuge, and Florida Department of Environmental Protection) to compare and contrast headstarting efforts for better future collaboration and management practices. Under the new Salamander Habitat Improvement Team, FWC is examining the vegetation of flatwoods salamander breeding ponds in Florida to assist with guiding habitat management. FWC completed the pilot survey in FY 2016-17, and plan to continue monitoring in FY 2017-18. FWC is in the planning phases of organizing a Flatwoods salamander habitat working group so that management obstacles can be identified and tackled for greater likelihood of conservation.

Florida is predicted to be a likely entry point for the salamander chytrid fungus (Batrachochytrium salamandrivorans; Bsal). Models suggest that native salamanders, would likely be negatively impacted if Bsal was introduced into the environment. This exotic fungal pathogen has had devastating impacts on salamanders in Europe and has been found in the pet trade, but has not yet been detected in the U.S. Therefore, prevention and early detection are important drivers to prevent the spread of Bsal. For early detection, FWC is sampling striped newts and non-native salamander species for Bsal. Sampling is based on which species are most likely to introduce Bsal into Florida. If non-natives are not sampled, the

window of early detection may be missed if/when Bsal is introduced. FWC is leading an outreach campaign to raise awareness and assist stakeholders.

Hurlburt Field Habitat Restoration in Okaloosa County – Ephemeral wetlands serve as breeding and larval habitat for reticulated flatwoods salamanders as well as a variety of other rare plant and wildlife species. These systems have degraded over time due to a shift away from natural fire regimes. To restore degraded wet flatwoods and ephemeral wetland habitat on Hurlburt Field, FWC removes invasive woody vegetation from the site and treats the cut stumps with herbicide to minimize re-sprouting. Ideally, the Department of Defense then uses prescribed fire to prevent regeneration of woody vegetation, maintain an open canopy, and foster native herbaceous groundcover.

Wetland habitats on Eglin Air Force Base and Hurlburt Field are ecologically connected. Proposed restoration sites are part of a large wetland complex that includes 14 known reticulated flatwoods salamander breeding wetlands on Eglin, and 13 known breeding wetlands on Hurlburt Field, for 27 total breeding wetlands that constitute a single population. Successful restoration of this wetland complex will ensure connectivity of extensive habitat for this species. In 2010, FWC coordinated with the Department of Defense and Virginia Tech to restore approximately 28 acres of wetland habitat on Eglin through woody vegetation removal and herbicide treatment. In FY 2016-17, approximately six acres were treated on Hurlburt Field, bringing the total acres restored since 2010 to 34. The most recent restoration treatments began in May 2017 on an additional 18.92 acres of wetland habitat on Hurlburt Field, and work is expected to be completed early into FY 2017-18. Funds should be available through 2020 to continue annual restoration work on Hurlburt Field and Eglin, ultimately working towards the goal of restoring 76 total acres of breeding habitat.

Apalachicola Wildlife Management Area in Franklin, Liberty, Leon, and Wakulla Counties – Apalachicola WMA contains more breeding sites for the frosted flatwoods salamander than any other area and is therefore a priority for habitat restoration efforts. Since 2011, FWC has worked cooperatively with the U.S. Forest Service and The Nature Conservancy to restore breeding sites for the flatwoods salamander on the WMA. This is accomplished through the removal of dense midstory vegetation, followed by herbicide application to prevent regrowth of hardwoods, in order to facilitate the re-entry of fire into the breeding ponds. The number of breeding sites and approximate acreage that have received restoration treatments are as follows: 19 sites (21 acres) in 2011, seven sites (12 acres) in 2013, one site (one acre) in 2014, 13 sites (22 acres) in 2015, and 17 sites (15 acres) in 2016. In FY 2016-17, FWC funded restoration

treatments in 34 breeding sites totaling 30.8 acres. FWC will continue working with partner agencies to restore additional sites next fiscal year.

Aucilla Wildlife Management Area in Jefferson County – Aucilla WMA has roughly 11,000 acres of potential habitat for the frosted flatwoods salamander. Although this species has not been documented on the area since state acquisition, the frosted flatwoods salamander is known to have historically occurred on the WMA. The Management Plan for Aucilla WMA prioritizes restoration of both upland and breeding habitat for this species. Efforts to restore habitat are ongoing and include thinning of offsite slash pine plantation, application of prescribed fire, and mechanical restoration of potential breeding ponds. During FY 2016-17, staff implemented a contract for herbicide treatment in the upland habitats. The goals of the treatment are to reduce shrub cover and competition for herbaceous ground cover. Forty-six acres of the total 166 acres contracted were treated in May 2017 before heavy rains forced a work stoppage. The remaining area will be treated by September 2017.

Escribano Point and Eglin Air Force Base in Santa Rosa County – Reticulated flatwoods salamanders were first documented on Escribano Point WMA in October 2015 when one adult was captured in a drift fence during a baseline amphibian and reptile survey. Since then staff have conducted annual dip netting surveys of ephemeral wetlands for larval flatwoods salamanders.

From January to March 2017, FWC conducted larval dip netting surveys according to a standardized protocol. Forty wetlands were sampled, with larval flatwoods salamanders documented in eight. Reproduction had not previously been reported in five of these eight wetlands, although adults were captured in two of the wetlands in FY 2015-16. During the 2017 surveys, FWC did not capture larvae in two wetlands that had captures in 2016.

In May 2017, FWC funded mechanical restoration of four ephemeral wetlands totaling 4.97 acres on Escribano Point WMA (0.32 acres) and Eglin Air Force Base (4.65 acres), which is adjacent to the WMA. Work utilized an innovative mechanical technique in which a large, tracked excavator equipped with a hydraulic “thumb” pulled unwanted vegetation out of wetland basins and scraped away muck and duff to expose bare, organic soil. This work will improve habitat for flatwoods salamanders by promoting the growth of herbaceous vegetation, which the species needs for successful reproduction.

Flint Rock Wildlife Management Area in Wakulla and Jefferson Counties – Flint Rock WMA has five confirmed breeding ponds for the frosted flatwoods salamander. One of the breeding ponds represents an isolated population that is particularly vulnerable to extirpation. During FY 2016-17, FWC cooperated

with The Nature Conservancy to restore this breeding pond and four nearby ponds. Restoration efforts were also conducted in six additional ponds with potential to support flatwoods salamanders, and included: hand cutting and removal of invasive shrubs and trees to reduce competition for herbaceous species; improve the effectiveness of prescribed fire; and reduce the potential for organic accumulation in the pond basin. The cut stumps were treated with herbicide to prevent re-sprouting. Larger broadleaf trees were girdled and treated with herbicide. Pine trees were girdled and left standing. In addition to the restoration and enhancement of potential breeding ponds, 398 acres of potential upland habitat were treated with a drum chopper to reduce the shrub layer and increase the amount of herbaceous ground cover.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – Since 2010, FWC has worked towards restoring habitat for the frosted flatwoods salamander on Apalachicola River Wildlife and Environmental Area (ARWEA), with the goal of improving habitat so that individuals can eventually migrate to ARWEA from known populations within Apalachicola WMA to the north. In FY 2010-11, FWC prioritized 49 ponds for restoration to encourage the growth of grassy species, which are favored by flatwoods salamanders. In winter 2017, restoration contractors conducted follow-up treatments in 21 of the original 49 ponds, totaling approximately 40 acres. The work consisted of mechanical and herbicide treatments to reduce encroachment of hardwood trees and shrubs within pond basins and ecotones. ARWEA staff also applied prescribed fire to 2,800 acres of uplands surrounding 6 of these ponds. This restoration work will improve habitat for the frosted flatwoods salamander and increase the likelihood of ARWEA supporting the species in the future.

Tate's Hell Wildlife Management Area in Franklin and Liberty Counties – Frosted flatwoods salamanders have not been observed on Tate's Hell WMA since FY 1998-99. Since 2014, FWC has cooperated with Florida Department of Agriculture and Consumer Services (FDACS) to improve potential breeding habitat for flatwoods salamanders on the WMA. In November 2016, staff targeted seven potential breeding ponds with significant hardwood encroachment, totaling approximately 3.8 acres, for restoration. Ponds were located in the Sumatra Tract and within a grassy wet savannah already in growing season rotation for prescribed burning. Hardwoods less than five inches in diameter were cut and removed from the pond and their stumps treated with herbicide shortly after cutting to prohibit regrowth. Ideally, a prescribed fire will follow this treatment to further promote the growth of herbaceous vegetation favored by flatwoods salamanders.

Striped Newt

The striped newt is a candidate for federal protection under the Endangered Species Act, but it is not currently protected in Florida. It is endemic to northern Florida and southern Georgia, where it is patchily distributed and has been extirpated from many parts of its former range. This species spends most of its time in xeric uplands but migrates to temporary, fishless wetlands to lay their eggs in grassy wetland vegetation. This species can breed at any time of the year but generally breeds during the fall or winter months. FWC generally monitors this species during April-June when both adults and larvae can be detected in the breeding wetlands, increasing the chance of detection. The striped newt has been identified as a species that will likely be negatively impacted by the arrival of the Salamander chytrid fungus (Bsal).

During FY 2016-17, FWC did not survey specifically for this species due to the dry conditions during April-June. However, FWC surveyed 64 wetlands suitable for striped newts on 11 public or conservation lands and one private lands during surveys for other amphibians, finding larvae or adults in nine of these ponds (exhibit 12).

FWC also assisted with the ongoing reintroduction program for striped newts in the Munson Sandhills of the Apalachicola National forest. The program, which was led by the Coastal Plains Institute in cooperation with the U.S. Forest Service, involves releasing zoo-raised newts into former breeding ponds where they are presumed to have been extirpated. Since January 2016, FWC has augmented the effort by adding a mark-recapture component to the project. Zoo-raised newts are individually marked before their release in order to estimate their detectability and survival. Notable survey results were finding 13 more adult and one larval newt in a pond where the species was rediscovered in FY 2015-16 after a ten-year hiatus. In early 2017, 108 adult and larval newts were released into two ponds. Monthly recapture rates continued to be low, suggesting low detectability and/or survival. However, five aquatic adults were captured that were offspring of adult newts released in 2016, and a single larval offspring from this generation was detected in July. This is the first demonstration of natural reproduction beyond the first generation in a reintroduction pond. Four adult males and five adult females were sent to the Jacksonville Zoo as part of a captive-breeding colony. Only two males and four females of the newts survived, and most of the larvae from eggs produced by these animals in captivity perished from disease. A manuscript on the status and distribution of the striped newt in Florida and Georgia based on recent surveys and historical species records has been accepted by Herpetological Conservation and Biology.

FWC organized and led the inaugural meeting of the Striped Newt Working Group in Jacksonville, Florida, where nearly 40 attendees participated in a two-day meeting aimed at coordinating conservation of the species. Representatives from 20 agencies and non-governmental organizations participated in the meeting. Participants sorted into six subcommittees that will work on focused efforts on Policy, Research, Captive Populations and Husbandry, Habitat Management, Outreach, and Applied Species Management. The Steering Committee for this group is charged with maintaining momentum and meeting team goals.

FWC also worked with collaborators at the University of Central Florida and the University of Georgia on a project to assess gene flow between striped newt populations and their genetic health. During FY 2016-17, the genotyping of 546 genetic samples from Florida and Georgia populations was completed at the University of Georgia's Savannah River Ecology Lab. This study will help FWC understand the management needs of this species and the degree of isolation and health of the remaining populations. The completion of this study is anticipated for December 2017.

Exhibit 12
Number of Ponds Visited, Dipnetted, and Containing Striped Newts on Various Properties in FY 2016-17

PROPERTY	NUMBER OF PONDS VISITED	NUMBER OF PONDS SURVEYED	NUMBER OF PONDS WITH STRIPED NEWTS
NORTHWEST REGION			
Apalachicola National Forest	12	12	1
Private Land – Jefferson County	2	2	2
NORTH CENTRAL REGION			
Big Bend WMA, Spring Creek Unit	2	2	1
Camp Blanding Military Reservation	7	1	0
Cary State Forest	3	3	0
Goethe State Forest – Watermelon Pond Tract	3	3	0
Jennings State Forest	5	3	1
Watermelon Pond - Metzger Tract	1	1	0
NORTHEAST REGION			
Etoniah Creek State Forest	1	1	0
Ocala National Forest	16	11	2
Ordway-Swisher Biological Station	5	3	2
Seminole State Forest	7	7	0
TOTAL	64	49	9

Apalachicola WMA in Leon County – Striped newts were historically documented from 19 wetlands within the Munson Sandhills region of Apalachicola WMA. Suffering apparent declines, striped newts were assumed extirpated from the area until being detected again in one wetland in 2016. This re-discovery of wild striped newts on Apalachicola WMA prompted FWC and the U.S. Forest Service to request funding for a more extensive survey than had been conducted in recent years. Florida Natural Areas Inventory staff visited 176 potential breeding sites from March 21-May 31, 2017. Due to dry conditions this spring, only 80 ponds held enough water for sampling. No striped newts were detected during these surveys. Florida Natural Areas Inventory staff did detect other amphibian larvae, including gopher frogs, which are State-designated Threatened.

In response to the threat of off-highway vehicle use, FWC funded the construction of a fence around the only known, wild striped newt breeding pond on Apalachicola WMA. This fence will serve to cut off several access points and allow vegetation to recover from previous vehicle use in the pond basin. The pond is approximately six acres and the length of the fence is approximately 2,700 feet. In order to improve the effectiveness of prescribed burns in the uplands adjacent to potential striped newt breeding ponds, FWC worked cooperatively with the U.S. Forest Service and The Nature Conservancy to contract the mechanical removal and herbicide treatment of hardwood-encroached ecotones totaling 47.6 acres.

Florida Bog Frog

The Florida bog frog is a State-designated Threatened species in Florida.

Yellow River Wildlife Management Area in Okaloosa and Santa Rosa Counties – In 2009, FWC staff established 10 survey points for the Florida bog frog along three creeks (Garnier, Julian Mill, and Burnt Grocery) on Yellow River WMA. In 2013, staff removed three points and added one point at the Julian Mill Creek right of way. FWC has documented bog frogs at the Julian Mill creek right of way in 2014 and 2016, and at the Garnier Creek right of way every year since surveys began in 2009.

During the winter of FY 2012-13, FWC, in cooperation with FDACS, initiated restoration on one acre of habitat along Garnier Creek. Using an experimental approach, five 0.2-acre treatment plots were established by hand-cutting woody vegetation and immediately treating stumps with herbicide. Treatment plots were paired with five reference plots of equal size that did not receive treatment. Staff conducted the last bog frog surveys in the experimental and reference plots in July 2015, with the species detected in the three northernmost treatment plots. The successful detection of bog frogs within multiple treatment plots encouraged FWC to expand habitat restoration along Garnier Creek. In FY 2016-

17, FWC funded 6.4 acres of habitat restoration along Garnier Creek between the right of way and the northernmost treatment plot. This work was completed in March 2017.

In April 2016, staff installed fifteen automated bioacoustic recorders along Garnier Creek. These devices aid staff in their monitoring efforts by recording calling bog frogs, thus documenting if the species is present in the location of the recorder. One recorder was installed in each of the five treatment plots, and remained in each plot through August 2016. The remaining ten recorders were distributed along the untreated length of Garnier Creek between the right of way and experimental plot five, and were incrementally moved south along the creek at the end of each month (May, June, and July) in order to maximize coverage of the untreated area. In April 2017, staff again installed recorders in each of the five treatment plots. Nine recorders were also installed evenly along the creek between the right of way and the three northernmost treatment plots. FWC utilized this arrangement to focus monitoring within the recently restored 6.4 acres and an additional 11.08 untreated acres proposed for restoration in FY 2017-18. The recorders will remain fixed through August 2017. FWC is using bioacoustics software to develop a recognizer program specific for the call of the Florida bog frog. Once this program is developed, all recordings will be analyzed to evaluate past restoration and guide future habitat restoration efforts along Garnier Creek.

Gopher Frog

The gopher frog was delisted as a State-designated Species of Special Concern in January 2017 following approval of the Imperiled Species Management Plan by the FWC Commissioners. During FY 2016-17, FWC surveyed 121 ponds on 27 public or conservation lands and one private land for gopher frogs, finding tadpoles in 50 ponds on 14 public lands (exhibit 13). Surveys during FY 2016-17 primarily focused on a new gopher frog monitoring project that tracks the status of gopher frogs in 100 wetlands over time and answers natural history questions about wetland use by this species. Additional suitable and known breeding wetlands were surveyed during monitoring activities for this and other amphibian monitoring projects. These surveys discovered five previously unknown gopher frog breeding ponds.

Thomas Devitt with the University of Texas at Austin was contracted to conduct genetic analyses using microsatellite DNA of 1,191 gopher frog samples (primarily tadpole tail tips) collected during previous years by FWC as part of a grant to assess the genetics of Florida populations. The project was completed in FY 2016-17. Genetic diversity is high; an analysis of molecular variance indicated that the within-population component of genetic variation contributes 82% of total genetic diversity. Population

clustering analyses identified Panhandle and Peninsular populations as two genetic clusters separated by the low-lying region near the Aucilla River. These genetic clusters correspond with the Coastal Plain and Peninsular lineages identified previously using mitochondrial DNA, however we failed to detect a second genetic break in the peninsula. Analyses using the program Geneland identified 26-31 genetic clusters, indicating further substructure on a regional scale. Migration over the last several generations was examined in Ocala National Forest and Jennings State Forest/Camp Blanding Military Reservation. This and an earlier genetic study suggest that the Panhandle and Peninsular subpopulations should be considered different management units.

Until recently, FWC policy allowed the translocation of the gopher frog and other commensal species with gopher tortoises that were being moved to recipient sites as part of gopher tortoise permitting for lands slated for development. Concerns about the potential for disease transmission and other possible negative impacts led to an interim policy in 2012 that limited translocation to on-site movements until the effects of translocation could be studied. FWC is conducting a pilot study to assess the effects of translocation on gopher frog survivorship and behavior using radio-telemetry to track movements and survival of translocated and non-translocated animals. This initial study will provide valuable information on whether translocation of gopher frogs from development sites is feasible and allow FWC to evaluate research methods and determine if a large-scale study is feasible. To date, 20 translocated frogs have been successfully monitored. At the end of the project, the movement and survival of translocated animals will be compared with that of non-translocated frogs using data from 13 frogs monitored during this study and 11 frogs monitored previously in Ocala National Forest by collaborators from the University of Florida.

Exhibit 13
Number of Ponds Visited, Surveyed by Dipnetting, and Containing Gopher Frog Tadpoles on Various Properties in FY 2016-17

PROPERTY	NUMBER OF PONDS VISITED	NUMBER OF PONDS SURVEYED	NUMBER OF PONDS WITH GOPHER FROGS
NORTHWEST REGION			
Apalachicola National Forest	12	12	6
Blackwater River State Forest	2	2	0
Eglin Air Force Base	14	14	9
Private Land – Jefferson County	2	2	0
NORTH CENTRAL REGION			
Big Bend WMA, Spring Creek Unit	2	2	2
Camp Blanding Military Reservation	7	1	0
Cary State Forest	3	3	1
Goethe State Forest	6	6	2
Jennings State Forest	5	3	0
Lafayette Forest WEA	4	4	0
Longleaf Flatwoods Reserve	2	1	0
Watermelon Pond - Metzger Tract	1	1	0
NORTHEAST REGION			
Etoniah Creek State Forest	3	3	3
Lake Panasoffkee	1	1	0
Ocala National Forest	16	11	7
Ordway-Swisher Biological Station	5	3	1
St. Sebastian River Preserve State Park	3	3	0
Seminole State Forest	7	7	7
Welaka State Forest	1	0	0
SOUTHWEST REGION			
Allen David Broussard Catfish Creek Preserve State Park	3	3	2
Archbold Biological Station	3	3	0
Avon Park Air Force Range	2	2	0
Conner Preserve	1	1	0
Green Swamp West	1	1	0
Lake Wales Ridge State Forest	6	6	3
Lake Wales Ridge WEA - Sun N Lakes Tract	1	1	1
Starkey Wilderness Preserve	1	1	1
Withlacoochee State Forest – Croom Tract	7	7	5
TOTAL	121	104	50

Because the gopher frog is no longer on the State's Endangered and Threatened Species List, research, management, and conservation efforts on this species will not be included in future annual reports.

Pine Barrens Treefrog

The pine Barrens tree frog was delisted as a State-designated Species of Special Concern in January 2017 following approval of the Imperiled Species Management Plan by the FWC Commissioners. During surveys in FY 2016-17, the species was detected calling at 44% of 111 historical sites visited. FWC identified 33 new localities on public lands and four new sites on private lands. As part of an occupancy modeling study to better understand detection variability at occupied sites, four FWC biologists conducted repeated surveys and detected calling frogs at 23 of 31 historical sites and 22 of 40 potential sites identified on Blackwater Wildlife Management Area (WMA) in Okaloosa and Santa Rosa counties. In FY 2016-17, the data were analyzed for this study. Because the pine barrens tree frog is no longer on the State's Endangered and Threatened Species List, research, management, and conservation efforts on this species will not be included in future annual reports.

REPTILES

American Crocodile

The American crocodile is currently a Federally-designated Threatened species in Florida. The population has experienced tremendous growth since 1975, when the species was listed as Endangered under the Federal Endangered Species Act. Crocodile sightings have been documented as far north as Cocoa Beach in Brevard County on the east coast and Lake Tarpon in Pinellas County on the west coast. With the increasing crocodile population (estimated between 1,500 and 2,000 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. During FY 2016-17, FWC received 138 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 five individual crocodiles were captured by FWC in FY 2016-17. Four of these crocodiles (two males and two females) were captured and translocated to a site deemed suitable by FWC. One crocodile (a female measuring 5.4 feet in length) was captured and removed from a human-interaction situation and released near her capture site.

In addition to the crocodiles handled by FWC in FY 2016-17, one male crocodile was captured and translocated from Dry Tortugas National Park to Everglades National Park by members of the National Park Service. This crocodile was approximately 9.0 feet in total length. Including the Dry Tortugas crocodile, translocated animals ranged from 5.4 to 9.0 feet in length.

FWC was involved in the recovery of nine American crocodile carcasses (four males, two females, and three unknown) during FY 2016-17. The animals ranged from 0.7 to 11.0 feet in length. The cause of death for three of the animals was attributed to wounds inflicted by automobile traffic. One male measuring 11.0 feet was the victim of an act of unlawful take. That animal was a recapture previously tagged as a hatchling at Turkey Point in 1994. One carcass was that of a hatchling that died as the result of a birth deformity. Another carcass was that of a female measuring 10.0 feet that died most likely as the result of cold stress in combination with her advanced age. The remaining three carcasses were too decomposed to determine a cause of death.

Alligator Snapping Turtle

The alligator snapping turtle is the largest freshwater turtle in North America and is currently listed in Florida as a state-designated Species of Special Concern. FWC turtle regulations prohibit its harvest in Florida, and possession of an alligator snapping turtle requires an FWC permit. The alligator snapping turtle was petitioned for federal protection by the Endangered Species Act in 2012, and this petition is still under review. In 2014, a paper described two new species, the Suwannee (Macrochelys suwanniensis) and Apalachicola (M. apalachicolae) alligator snapping turtles, based upon differences in genetics and the morphology of skulls and shells. Florida is the only state with all three species. Based upon biological status reviews of all three species conducted in FY 2016-17, FWC recommended that only the Suwannee species be listed as Threatened, but this recommendation has yet to be adopted by the FWC Commissioners. However, all three species are currently protected from harvest.

In FY 2016-17, 20 alligator snapping turtles were confiscated from an individual, and an additional 15 long-term captives were voluntarily turned over by an individual. Genetic analyses were conducted to determine the origin of these turtles. Fourteen turtles that originated from the Mississippi River drainage were transported to southern Illinois for a reintroduction program by the Illinois Department of Natural Resources. Six turtles were adopted out to individuals who obtained permits for educational purposes. Ten turtles of the Apalachicola species were marked and will be released in the Choctawhatchee River, which has low alligator snapper densities. Turtles released in the Choctawhatchee River will be monitored

with radiotelemetry to determine their fate and movement patterns. This monitoring will be similar to that taking place in Illinois where the cohort released there will also be monitored. A recent trapping study caught less than one turtle per 100 trap nights in the Choctawhatchee River compared to 36 turtles/100 trap nights in the Apalachicola River and 53 turtles/100 trap nights in the Ochlockonee River. After a health assessment, a confiscated 75-pound Suwannee alligator snapping turtle was released in the New River, a tributary of the Santa Fe River.

FWC developed a "ticketbook" freshwater turtle guide to assist law enforcement officers and stakeholders with quick identification of native freshwater turtle species and their protections. The guide is designed to be short and simple for ease of transport. All native freshwater turtles are covered in the guide, including the State-listed species (Alligator snapping turtle and Barbour's map turtle). It is currently being finalized by FWC, with final release scheduled in FY 2017-18.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – This monitoring project uses a mark-recapture method to provide data that will serve as an indicator for measuring management success and identify threats and population changes. Monitoring took place in two tributaries of the Apalachicola River from July 2016 to July 2017. Apalachicola River Wildlife and Environmental Area (ARWEA) staff captured six unmarked turtles from six different locations and recaptured two previously marked individuals. One of the recaptured individuals was captured two years and one month after the original capture date and approximately 0.16 miles from the original capture site. The other recaptured individual was captured two years and eight months after the original capture date and approximately 0.16 miles from the original capture site. Since 2008, 40 turtles have been captured, 17 male (42.5%), 21 female (52.5%), one juvenile (2.5%) and one unknown (2.5%). Since 2014, staff have recaptured four marked individuals.

Barbour's Map Turtle

The State-designated Threatened species in Florida. The USFWS was petitioned in 2010 to list the Barbour's map turtle Federally as Threatened, and FWC received a USFWS grant to determine its status. Upon approval of the Imperiled Species Management Plan (ISMP) in 2017, the Barbour's map turtle Species Conservation Measures and Permitting Guidelines were completed and approved by Commissioners.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – Staff of the Apalachicola River Wildlife and Environmental Area (ARWEA) conduct surveys for basking Barbour's map turtles in the fall of each year in order to determine population trends over time. The survey routes cover approximately 36 miles along sections of the Apalachicola, Brothers, and Chipola rivers in the Panhandle. FWC completed the fall 2016 surveys between October 10th and October 19th. Staff counted 1,067 turtles during this survey period, fewer than in the 2015 survey but greater than the overall average since the survey began in 2009. The Chipola River section continues to have the most turtles with 765 observed in 2016, followed by the Apalachicola River with 159 turtles, and the Brothers River with 143 turtles observed. Environmental factors including the river's water height and the difference between air and water temperature likely influence the number of turtles out basking and thus FWC's ability to detect them.

Gopher Tortoise

Management – The gopher tortoise is listed as a State-designated Threatened species in Florida. Gopher tortoises are keystone species as their burrows are home to over 350 other species. In order to conserve the species and its habitat, FWC published its first Gopher Tortoise Management Plan in 2007 and revised it in 2012. The Gopher Tortoise Management Plan (http://myfwc.com/media/2286685/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. 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.

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

FWC is recruiting citizen scientists to assist in conservation efforts by submitting photos of their gopher tortoise sighting to FWC using the "Florida Gopher Tortoise" smartphone app (http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/app/). The goal of this app is to increase

public awareness of gopher tortoises and citizen participation in conservation at the local level. Citizens can use the app to learn more about the life history of the species, report potential wildlife violations, and test their gopher tortoise knowledge with a quiz. Citizens can view an interactive map online and on their mobile device that displays where tortoises have been documented by citizen scientists in Florida. To date, FWC has received photos for over 1,768 gopher tortoise locations, 867 of which were submitted during FY 2016-17.

The mortality data collection program engages Florida residents in conservation efforts by asking citizens to notify FWC if they encounter a deceased or injured gopher tortoise. Mortality data is submitted to FWC via an online web form that may be accessed at https://public.myfwc.com/HSC/GopherTortoise/GTMortality.aspx, or via the Florida Gopher Tortoise smartphone app. These data allow FWC to determine gopher tortoise mortality "hotspots" throughout the state. During FY 2016-17, 164 gopher tortoises were reported as sick or dead, and vehicles were the leading cause of the mortality. Citizens that reported an injured or ill tortoise were provided with contact information for a nearby licensed wildlife rehabilitator in an effort to provide the tortoise with prompt medical attention.

The Incidental Take Permit gopher tortoise volunteer relocation program mobilizes volunteers to conduct burrow surveys at development sites permitted for incidental take. During FY 2016-17, FWC trained five new volunteers and utilized twelve existing volunteers for the incidental take permit relocation program. FWC volunteers conducted gopher tortoise surveys on properties with active incidental take permits in Coral Gables (Lee County), Lecanto (Citrus County), and Grand Island (Lake County). A total of 96.5 acres were surveyed and 626 burrows were recorded across the three properties. Volunteers also assisted with the transport of 160 gopher tortoises from an ITP donor site in Land O'Lakes (Pasco County), FL to Eglin Air Force Base (AFB; Okaloosa County). 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. The Gopher Tortoise program has also utilized student interns from Florida State University since 2011, who have contributed approximately 967 hours during FY 2016-17 to help implement gopher tortoise conservation actions. Many of these actions may not have otherwise been accomplished with existing staff resources, and also benefit interns by providing professional experience in wildlife conservation and work in a government agency. Examples of projects completed by interns during FY 2016-17 include: creation and dissemination of an information packet for Florida realtors describing gopher tortoise laws and regulations on private properties; development of an

eastern indigo snake eLearning course designed for those applying for a Scientific Collecting permit for research, education, and reintroduction of the species; creation of a webpage that provides tips on content and placement of gopher tortoise signage; and continued outreach for "Gopher Tortoise Day" and the associated website (http://gophertortoisedayfl.com). Gopher Tortoise Day outreach in FY 2016-17 resulted in the adoption of 16 resolutions proclaiming April 10th as Gopher Tortoise Day in counties and municipalities throughout Florida.

FWC frequently distributes fact sheets and brochures to increase knowledge of gopher tortoises in Florida. Approximately 10,339 gopher tortoise brochures and fact sheets have been distributed, including 4,545 of *A Guide to Living with Gopher Tortoises* that were distributed to local governments, schools, nature centers, and Florida residents. The poster Got Gophers, Get Permits is continuously distributed to planning councils, county and city building departments, and local permitting offices. More than 1,191 Safe Roads for People and Tortoises placards have been distributed and are available at Florida visitor centers, state and local parks, and highway rest stops. Over 2,200 children's publications have been distributed. All publications are also available at each of FWC's regional offices, and electronic versions are available for download at www.MyFWC.com/GopherTortoise.

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 17,709 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, 38 recipient sites with an available capacity of 13,903 tortoises are permitted. An additional ten recipient site permit applications are currently under review with potential available capacity for 5,670 tortoises on 3,034 acres of gopher tortoise habitat. During FY 2016-17, 6,779 tortoises were relocated under FWC-issued permits.

To humanely relocate tortoises from incidental take permitted development sites, and restock tortoises on conservation lands where tortoise populations have been depleted, FWC established incidental take permit recipient sites. In FY 2016-17, FWC partnered with Eglin Air Force Base and the Department of Defense to approve three incidental take permit recipient sites on Eglin Air Force Base. 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. Release of incidental take permit site

tortoises on Eglin Air Force Base's recipient area began in October 2016. More than 330 gopher tortoises were relocated to an incidental take permit recipient site on Eglin Air Force Base during FY 2016-17. An additional 150 tortoises have been relocated from incidental take development sites to other FWC-approved incidental take permit recipient sites at Nokuse Plantation and Avalon Plantation. The gopher tortoise program also did a directed outreach effort to encourage the top 20% of incidental take permit holders (those whose projects will impact the greatest number of tortoises) to humanely relocate the tortoises from the development site. Several environmental consultants associated with incidental take permits were also informed of FWC's humane gopher tortoise relocation efforts.

During FY 2016-17, FWC continued efforts to identify solutions for waif tortoises. Waifs are gopher tortoises that have been removed from the wild (either unauthorized 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 site was established on a Palm Beach County-owned preserve, has capacity for 100 tortoises, and an existing waif recipient site, the Circle B Bar Reserve in Polk County, expanded its waif capacity by 220 tortoises. Previously-permitted waif recipient sites received the following: Perico Preserve (Manatee County) received 15 tortoises, Circle B Bar Reserve (Polk County) received seven tortoises, Panama City Beach (Bay County) received four tortoises, and the Sabal Bluff (Lake County) waif recipient site received one tortoise. FWC is currently in the process of developing additional waif sites by working with landowners to establish sites in Hendry, Sarasota, and Flagler counties. FWC is also working with wildlife rehabilitators to place waifs at designated recipient sites, or releasing them back to their origin if this location is known. Under a Memorandum of Agreement 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. During FY 2016-17, 30 adult tortoises were relocated to Aiken Gopher Tortoise Heritage Preserve under South Carolina Natural Resource's supervision; to date, 118 tortoises have been relocated to South Carolina under this Agreement. The goal of this Agreement is to restock 200 gopher tortoises at Aiken Gopher Tortoise Heritage Preserve, leaving a remaining capacity of 82 tortoises.

To address special situations that provide more flexibility and further the objectives of the Gopher Tortoise Management Plan, FWC has amended an existing Memorandum of Agreement between FWC, Nokuse Plantation, the St. Joe Company, the St. Joe Community Foundation, Inc., and the Humane Society of the United States. The purpose of this Agreement is to set forth a structure for humane gopher

tortoise relocations associated with FWC-issued incidental take permits. The amendment extended this Agreement for an additional three years.

Research provides information needed to help achieve the conservation goals of the Gopher Tortoise Management Plan, and FWC coordinated with researchers on several projects during FY 2016-17. FWC assisted with the development and funding (through the Fish & Wildlife Foundation of Florida) and issued a scientific collecting permit for a University of Central Florida study to assess the impacts of temporary exclusion on gopher tortoises from the Sabal Trail Natural Gas Pipeline project area in Central Florida. This research is still in progress, but preliminary analyses suggest relocated male tortoises are more likely to return to their original locations than females. A recently completed project conducted at the Kennedy Space Center was funded through Florida's State Wildlife Grants Program. This project examined the use of movement corridors by gopher tortoises in response to sea level rise and identified barriers to these movements. As stated in the final report, roadsides may be used as corridors for retreat during sea level rise, and railroad tracks may be significant barriers to tortoise movement. FWC staff also conducted a study to assess gopher tortoise health following a mortality event at Lake Louisa State Park in Lake County. To identify potential causes of this mortality event, blood samples were collected from living tortoises found within the area of documented mortality. Approximately 31% of sampled tortoises tested positive for disease, indicating a previous or current infection. Further study is needed to examine the potential spread of disease in this population.

To better understand gopher tortoise population distribution and health, as well as monitor trends in Florida, five public conservation lands were surveyed in FY 2016-17 under a three-year contract with the Florida Natural Areas Inventory. Two additional conservation lands, Platt Branch Wildlife and Environmental Area (WEA) and Branan Field WEA, were surveyed by Gopher Tortoise program staff between January and April 2017. Branan Field WEA in Duval County contained the highest population density (1.4 tortoises/acre), and Kissimmee Prairie Preserve State Park in Okeechobee County had the largest population estimate (4,778 tortoises). Gopher tortoise staff input survey data into a GIS database to identify, monitor, and track potential viable and supporting populations throughout Florida. Of the seven conservation lands monitored during FY 2016-17, five sites 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 statewide, as well as locate populations that may become viable with increased management.

During FY 2016-17, the Habitat Management Assistance Funding Program provided $78,830.74 in funding to assist local governments with gopher tortoise habitat management activities on more than 330 acres of their conservation lands. The Program now also offers a reimbursement for the installation of silt fencing, intended for the soft release of gopher tortoises on public lands that have agreed to receive tortoises from previously-permitted incidental take permit development sites. Some habitat management and improvement activities conducted through the Program included fire line management, prescribed burns, selective tree removal, mowing, the control of exotic and invasive plants via the utilization of herbicide applications, and the installation of more than 6,500 linear feet of silt fencing for the establishment of an incidental take permit recipient site.

WILDLIFE MANAGEMENT AREA AND WILDLIFE AND ENVIRONMENTAL AREA HABITAT RESTORATION ACTIVITIES – In FY 2016-17, habitat restoration projects were completed in spring 2017 on various properties. The expectation is that these management actions will allow these acres to be maintained with prescribed fire and provide long term ecological benefits to the gopher tortoise population.

At Platt Branch WEA, the initial monitoring of the site was conducted in 2017 yielding an estimate of 697 total tortoises with a density of 3.134 tortoises per hectare. At Hickey Creek WEA, the initial monitoring of the site was conducted in 2017 yielding an estimate of 165 total tortoises and a density of 0.997 tortoises per hectare.

FWC also continued to monitor gopher tortoise site restoration efforts from past enhancement activities on seven different areas within Jennings State Forest WMA in Clay and Duval counties. Photo points were established prior to initial work commencing, and monitoring on each site is conducted at least once a year, preferably during the summer months.

During FY 2016-17, FWC continued habitat management and restoration activities to fulfill its role in increasing the number of gopher tortoises on conservation lands. FWC and volunteers continued habitat restoration activities on two project areas covering 60 acres of degraded scrub and 35 acres of former agricultural lands. Volunteers collected over 5,000 acorns, planted more than 1,000 acorns into pots, and propagated many other native plants for habitat enhancement and restoration purposes. This effort culminated in over 1,900 native potted plants being transplanted into the project areas and approximately 4,000 acorns directly sown on site.

Exhibit 14
Gopher Tortoise Habitat Restoration Projects in Spring 2017

WEA/WMA	COUNTY	ACRES RESTORED	MANAGEMENT ACTIVITIES
Bell Ridge Longleaf WEA	Gilchrist	136	Small oak trees were felled with chainsaws and an herbicide application used to control re-sprouting of hardwoods (to prevent over-shading of native groundcover while promoting the growth of desirable species through reduced competition)
Fort White WEA	Gilchrist	40	Brush cutting equipment was used to shred hardwood dominated brush
Lafayette Forest WEA	Lafayette	8/1,373	Brush cutting equipment was used to shred hardwood dominated brush on 8 acres. Dormant season prescribed fire was used to maintain and enhance 1,373 acres of gopher tortoise habitat
Suwannee Ridge WEA	Hamilton	450	Dormant season prescribed fire
Watermelon Pond WEA	Alachua	33/374/366	33 acres planted with longleaf seedlings, 374 acres chemically treated to eradicate pasture grasses, and 366 acres prescribed burn
Lake Wales Ridge WEA	Highlands and Polk	2,038/187/75	2,038 acres were prescribed burn, 187 acres of gopher tortoise habitat were mechanically thinned, and invasive plants were controlled with herbicide applications on 75 acres
Crooked Lake WEA	Polk	310/275/245	310 acres were treated for exotic plants and 275 acres were mowed and mechanically treated for habitat improvement, and 245 acres were burned
Perry Oldenburg WEA	Hernando	69/8.4/3.7 220/53	69 acres burned, 8.4 acres of invasive plant control, and 3.7 acres of chemically treated hardwoods. Timber harvest was conducted on 220 acres, with an additional 53 acres shredded
Janet Butterfield Brooks WEA	Hernando	56/1.2/1.8	56 acres were prescribed burn, 1.2 acres mechanically treated, and 1.8 acres chemically treated
Bullfrog Creek WEA	Hillsborough	195/175	195 acres mechanically treated to control hardwoods and weedy species, and 175 acres chemically treated for exotics
Moody Branch WEA	Manatee	140/295/265	140 acres prescribed burn, 295 acres mowed to control weedy species, and 265 acres of exotics chemically treated
Platt Branch WEA	Highlands	64/210/136	64 acres were prescribed burn, 210 acres of exotic vegetation were chemically treated, and 136 acres were mechanically treated
Hickey Creek WEA	Lee	74/20/28	74 acres were prescribed burn, 20 acres of mature oak were mechanically treated, and 28 acres of exotic plants were chemically treated
Apalachicola WMA	Franklin, Liberty, Leon, and Wakulla	247/185/62	247 acres were chemically treated, 185 acres were treated via spot grid application, and 62 acres were treated by hack-n-squirt and cut stump methods
Aucilla WMA	Jefferson	30	30 acres were chemically treated. Site was prescribed burn and mowed before chemical application
L. Kirk Edwards WEA	Leon	7	7 acres planted as part of site prep activities

Continued management activities are planned for FY 2017-18 to promote habitat suitability for gopher tortoises and to increase and maintain tortoise densities. Plans include prescription burning of 1,500 acres, applying chemical and mechanical treatments to 50 acres, and continuing habitat restoration activities on 11 acres of existing and potential gopher tortoise habitats.

MONITORING – During FY 2016-17, FWC continued a multi-year comprehensive burrow survey, designed to evaluate the entire 200,000 acres of Blackwater WMA in Okaloosa and Santa Rosa counties. The purpose of the survey is to provide FDACS, the lead land manager on the area, with habitat improvement recommendations. FWC surveyed approximately 1,776 acres of potential gopher tortoise habitat and located 198 burrows. To date, almost 89,000 acres of habitat have been surveyed with 3,980 burrows located. Only approximately 14.2% of gopher tortoise burrows have been classified as abandoned. Once all suitable habitat has been surveyed, FWC will monitor subsamples of gopher tortoise populations and habitats within each management unit on Blackwater WMA to assess whether forest management efforts have influenced gopher tortoise population sizes, distributions, and recruitment.

During FY 2016-17, FWC continued to monitor and assess the status of gopher tortoises on Pine Log and Point Washington WMAs located in Bay, Washington, and Walton counties. Previously, FWC delineated clusters of tortoises and tortoise habitat on the WMAs to facilitate management. Pine Log WMA contains 15 clusters (2,749 acres) and Point Washington WMA contains 33 clusters (15,427 acres). Prior to FY 2016-17, staff surveyed clusters annually on Pine Log and every three years on Point Washington during spring through early fall. Staff sampled three clusters on Pine Log WMA following a 319-acre habitat enhancement project completed in November 2016. After the completion of the habitat enhancement, the area was burned in spring 2017. Staff documented a total of 60 burrows: 26 burrows were classified as active, 19 were possibly active and 15 were classified as inactive or abandoned. Hatchling burrows accounted for 45.0% of detected burrows, juvenile burrows accounted for 11.7%, sub-adults accounted for 36.6% and adult burrows accounted for 6.7% of the total burrows detected.

FLORIDA NATURAL AREAS INVENTORY GOPHER TORTOISE MONITORING – During FY 2016-17, FWC contracted Florida Natural Areas Inventory to conduct a series of gopher tortoise surveys at selected WMAs/WEAs following the protocol for Line Transect Distance Sampling. The intent of these surveys was generate area-specific population estimates on lead areas. Florida Natural Areas Inventory surveyed four total WMAs/WEAs, including Crooked Lake WEA (Polk County), Hickey Creek WEA (Lee County), Lafayette Forest WEA (Lafayette County), and Suwannee Ridge WEA (Hamilton County). With the support of area biologists, Florida National Areas Inventory stratified sampling frames by natural community type to

ensure all suitable tortoise habitats within the sample frame were surveyed. Florida Natural Areas Inventory then conducted full surveys; using the pilot encounter rates to calculate the distance of transects needed within the select sampling frame. Florida Natural Areas Inventory conducted these surveys from August-November 2016 to avoid any periods when burrows may be flooded, or area staff may be conducting prescribed fire.

Florida Natural Areas Inventory surveyors scoped all usable burrows observed a burrow scoping camera to determine occupancy, and recorded the location of each scoped burrow, the burrow's size, and the occupancy status of the burrow. Contractors then processed the data using ArcGIS to determine length of transect for each site, encounter rate for each site, and encounter rate for each community at each site. From August-November 2016, Florida Natural Areas Inventory contractors surveyed a total of approximately 150 miles of transects at four sites, and scoped a total of 1,062 burrows, in which 415 tortoises were encountered. One Florida pine snake was also encountered in a burrow at Lafayette Forest WEA. Tortoise density ranged from 1.81 tortoises/2.5 miles at Suwannee Ridge WEA, 1.58 tortoises/2.5 miles at Crooked Lake WEA, 1.26 tortoises/2.5 miles at Lafayette Forest WEA, and 0.99 tortoises/2.5 miles at Hickey Creek WEA. Based upon these results, all four areas can support a viable population of gopher tortoises.

In FY 2016-17, FWC also contracted Florida Natural Areas Inventory to conduct a series of gopher tortoise surveys at selected non-FWC lead areas following the protocol for Line Transect Distance Sampling to generate area-specific population estimates. Florida Natural Areas Inventory surveyed two State Forests, Tate's Hell State Forest (Franklin County), and Wakulla State Forest (Wakulla County), in addition to a Northwest Florida Water Management District property, the Carter Tract of Ecofina Creek WMA (Gulf and Bay counties). With the support of area biologists, Florida Natural Areas Inventory randomly generated and stratified pilot transects by natural community type to ensure all suitable tortoise habitats within the sample frame were surveyed. On Ecofina Creek WMA, Florida Natural Areas Inventory followed-up pilot surveys with full surveys; using the pilot encounter rates to calculate the distance of transects needed within the select sampling frame. Tortoise density was approximately 0.25 tortoises/2.5 miles and a total population size of 96 tortoises. Using the same results, Florida Natural Areas Inventory analyzed the data with a Belt Transect method, documenting an average density of 0.225 tortoises/ha and a total population size of 86 tortoises. For Wakulla State Forest and Tate's Hell State Forest, however, encounter rates were too low to conduct full LTDS surveys, and were therefore monitored using Belt Transect methods. Florida Natural Areas Inventory found 25 tortoises in total over three tracts of land on

Wakulla State Forest (Woodville Tract, Eight Mile Tract, and Wakulla Tract), and only three tortoises over three tracts of land on Tate's Hell State Forest. Based upon these results, neither area could support an independent and viable population of tortoises.

Sea Turtles

FWC continues to maintain management and research programs to foster the recovery of the five species of sea turtles that occur along Florida's coast: leatherback, hawksbill, and Kemp's ridley (all Federally-designated Endangered), and the green and loggerhead (Federally designated Threatened). FWC interacts frequently with a diversity of stakeholders in state and federal agencies, local governments, conservation organizations, citizens, and academic programs, including working with the Florida Department of Environmental Protection (FDEP), the Water Management Districts, the USFWS, and the U.S. Army Corps of Engineers during environmental commenting. FWC served on several scientific advisory committees, governing boards, working groups, and committees during FY 2016-17, including: FDEP Beach Management Agreement for Palm Beach Island; Florida Sea Turtle License Plate Grants Committee; steering committee and working group for FDEP's Beaches Habitat Conservation Plan; Green Turtle Fibropapillomatosis Working Group; expert working group for the Ocean Conservancy's Integrated Gulf of Mexico Restoration Sea Turtle Case Study; steering committee for the National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries) effort to determining abundance and trends of northwest Atlantic loggerhead turtles on foraging grounds; editorial board of the Umigame Newsletter; working group to develop oil spill restoration strategic frameworks for sea turtles; and the International Union for the Conservation of Nature's Marine Turtle Specialist Group. FWC reviewed all proposals submitted to the small grants program of the Florida Sea Turtle License Plate.

MANAGEMENT ACTIVITIES – During FY 2016-17, FWC continued to work closely with the federal government, state regulatory agencies, volunteer conservation groups, and local governments to implement the state's responsibilities in accordance with the Marine Turtle Protection Act [s. 379.2431(1), F.S.] and the USFWS' Recovery Plans for five species of sea turtle (also known as marine turtles) in Florida.

In February 2017, FWC hosted the 20th Annual Marine Turtle Permit Holder Workshop in Gainesville, Florida. Approximately 360 permit holders and volunteers along with local government, state, and federal agency staff attended this meeting, which was co-hosted by the Sea Turtle Conservancy. Topics presented at the Gainesville meeting included FWC updates on sea turtle nest and stranding numbers, the Wildlife Lighting program, and management activities. Sea turtle biologists with the USFWS and National

Oceanographic and Atmospheric Administration (NOA) provided updates on federal sea turtle programs. There was also a session highlighting marine turtle research, conservation, and education projects funded from the Sea Turtle License Plate Grants Program.

During FY 2016-17, FWC worked with 27 businesses (from Arizona, California, Colorado, Florida, Hawaii, Louisiana, Michigan, Missouri, New Jersey, New York, Tennessee, Texas and Australia) to identify lighting options appropriate for use adjacent to Florida's sea turtle nesting beach. FWC assessed 87 fixtures and bulbs and listed them on FWC's website so that beachfront property owners, local governments, and beach businesses have access to beach lighting options that limit impacts to nesting and hatchling sea turtles.

During FY 2016-17, FWC and FDEP worked together to implement an early restoration project, "Restoring the Night Sky," to offset impacts to sea turtle nesting habitat due to response injury that occurred during the Deep Water Horizon Event. This project includes reducing light sources on and around northwest Florida's conservation lands and assisting local governments in their efforts to reduce the impact of beachfront lighting on sea turtles, their nests, and nesting beaches. FWC worked in partnership with local governments and Gulf Power on lighting appropriate to minimize impacts to sea turtles on adjacent nesting beaches while safely lighting beachfront county and private properties.

Franklin County, Santa Rosa and Escambia County utilized grant funds to enhance compliance with their local lighting ordinances by hiring additional staff to focus on education and compliance or by providing information and appropriate bulbs and fixtures to beachfront properties. FWC staff worked with Santa Rosa County and Gulf Power to retrofit pole lights at Navarre Beach County Park. FWC is also coordinating with Okaloosa County on a project to retrofit county-owned parking lot lights in Fort Walton Beach. Using grant funds, FWC and FDEP contracted with the University of Florida's Institute of Food and Agricultural Sciences program to work with local businesses, condominium associations, and private property owners in Franklin, Gulf, and Bay counties to retrofit lights on properties surrounding conservation lands.

FWC staff are working on a Gulf Environmental Benefit Fund project on improved reporting of sea turtles impacted by lights on northwest Florida beaches. This project includes development of methods to improve reporting of the number of sea turtles impacted by lights. This information will then be made available on the FWC website for local governments as they work to protect sea turtles and their nesting habitat in their communities.

During FY 2016-17, FWC reviewed 313 applications as requested by FDEP, water management districts, and the State Clearing House to ensure consistency of approved activities with Florida statutes requiring protection of sea turtles, their nests, and nesting habitat. Projects reviewed included coastal construction control line applications, environmental resource permit applications, joint coastal permit applications, and federal documents submitted to the State Clearing House. FWC participated in the development of the Florida Statewide Beaches Habitat Conservation Plan (in cooperation with FDEP). This Plan will provide flexibility to local governments and beachfront property owners for conduct of FDEP coastal construction control line permitted activities in marine turtle nesting habitat while ensuring impacts to marine turtles and their habitat are appropriately minimized and mitigated.

During FY 2016-17, FWC reviewed and approved approximately 300 renewals, new applications, and amendment requests for conservation activities with sea turtles. FWC issued 29 authorizations to hold sea turtles for rehabilitation, educational display, or research. FWC coordinated the review and approval of requests for monitoring associated with FDEP-authorized activities and oversaw review and approval of 46 permit requests for new or modified research involving Threatened and Endangered sea turtles for 42 distinct research projects. Twenty-two permits or amendments were processed to authorize educational turtle walks, allowing the public to observe nesting loggerhead sea turtles during June and July on the southeast and the southwest Florida coasts.

FWC coordinated transfer and release of sea turtles undergoing rehabilitation and assisted with coordinating sea turtle releases. This included over 3,160 post-hatchling turtles that were washed back to shore by strong winds, waves and storms such as Hurricane Matthew. This also included 88 sea turtles that stranded in New England during a cold-stunning event and were then transferred to Florida for rehabilitation. For more information on FWC's Sea Turtle Management Program, please visit http://myfwc.com/wildlifehabitats/managed/sea-turtles/.

RESEARCH ACTIVITIES – FWC coordinated the Florida portion of the Sea Turtle Stranding and Salvage Network (Network), an 18-state program administered by the National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries). The Network is responsible for gathering data on dead, sick, or injured (i.e., stranded) sea turtles.

During FY 2016-17, 1,838 dead or debilitated sea turtles were documented (825 loggerheads, 814 green turtles, 166 Kemp's ridleys, ten hawksbills, four leatherbacks, and 19 sea turtles not identified by species). FWC responded to 2,309 reports regarding sea turtle concerns (primarily reports of dead, sick, or injured sea turtles), transported 84 sick or injured sea turtles to rehabilitation facilities, and

conducted necropsies on 188 carcasses. Twenty-three training workshops, involving 722 participants, were held around the state to teach volunteers how to document stranded sea turtles. Real-time Florida sea turtle stranding data were readily available on a dedicated website (http://ocean.floridamarine.org/SeaTurtle/flstssn/) for use by various entities such as NOAA-Fisheries, FWC law enforcement, and protected species management personnel.

Approximately 90% of the world's largest loggerhead nesting population occurs in Florida, and the green turtle and leatherback nesting populations are of regional significance. Assessments of nesting abundance and reproductive output are coordinated through a network of state, federal, and volunteer permit holders who monitor sea turtle reproduction on Florida's beaches. FWC establishes scientifically sound monitoring designs, provides training, resolves data collection problems, assess data collection error rates, analyzes data trends, and serves as a clearinghouse for information on sea turtle populations and habitats. During FY 2016-17, six workshops were presented around the state to 1,231 participants providing training on how to conduct nest surveys.

Two monitoring programs, the Statewide Nesting Beach Survey Program (initiated in 1979) and the Index Nesting Beach Survey Program (initiated in 1989), have different objectives. The Statewide Nesting Beach Survey Program provides nearly complete survey coverage of the state's nesting beaches to acquire data on total nest numbers, nest geographic distribution, and nesting seasonality for each species. Managers use results to minimize human impacts to sea turtles and nesting beach habitats, and to identify important areas for land acquisition or enhanced protection. In 2016, 224 survey areas were monitored, comprising 840 miles of beaches. Statewide, in 2016, the program documented 122,707 loggerhead nests, 5,393 green turtle nests, 1,054 leatherback nests, five hawksbill nests, and 17 Kemp's ridley nests. A Statewide Atlas of Sea Turtle Nesting Occurrence and Density is now available at http://myfwc.com/research/wildlife/sea-turtles/nesting/nesting-atlas/. This resource provides a summary of the geographic distribution of sea turtle nest occurrence and nest density throughout the state during the last five years, and occurrence data for all species of sea turtles since 1979.

The Index Nesting Beach Survey Program collects more detailed data from a smaller set of index beaches. Surveyors identify each sea turtle track to species, identify the tracks as a nest or abandoned attempt, and locate nests within an approximate half-mile beach zone. Nests and nesting attempts have been monitored for 28 years at 517 index beach zones, surveyed daily during each 109-day nesting season (May-August). These efforts currently provide more than six million records in the Index Nesting Beach Survey Program database. The program provides a reliable way to detect changes in the abundance of Florida

sea turtles. In 2016, the program documented increasing trends in nesting for loggerheads, green turtle, and leatherbacks.

The Hatchling Orientation Index Program provides data on how accurately hatchling sea turtles crawl toward the ocean after emerging from the nest. These hatchlings typically move towards the brightest and most open horizon. On a natural beach at night, this leads them to the water. Unfortunately, artificial lighting overrides other orientation cues, and strongly attracts crawling hatchlings. This causes the hatchlings to move away from the water, either increasing the time it takes them to reach the water (wasting energy and exposing them for a longer period to predators on the beach), or leading them to their deaths (going into parking lots or roadways or dying from dehydration). The Program objectively assesses conditions on sea turtle nesting beaches related to the effects of artificial lighting on hatchlings, identifies problem areas and allows for evaluations of efforts to reduce the problem of artificial lighting. During FY 2016-17, data were collected from hatchling emergences at 587 nest sites on 13 beaches around Florida. Participants in this project (about 350) included university students/professors, federal/state government employees, non-government organization employees, and sea turtle nesting/stranding volunteers.

In June 2017, 104 loggerheads and one hawksbill were captured during an annual eight-day sampling session in Florida Bay. This work was conducted as part of a study of sea turtles in Florida Bay. The primary elements of this study include assessments of 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. All captured turtles were measured and tagged. Almost half (50) of the loggerheads had been previously tagged, providing data on growth and residency in Florida Bay. All turtles were released shortly after capture. This project has been conducted continuously since 1990. Some individual turtles have now been captured numerous times over periods spanning as long as 20 years.

FWC studies the abundance, distribution, behavior, and diet of recent hatchlings and small juvenile sea turtles in open-ocean habitat off Florida's coasts. These sea turtles live in surface waters and represent a pelagic stage (deep ocean water) in sea turtle development. This stage precedes the stage when they will live primarily along the bottom of more shallow, coastal areas. Among other things, study objectives include determining threats to sea turtles in this stage such as ingestion of plastics and tar. During FY 2016-17, FWC researchers sampled Gulf of Mexico waters offshore of Pensacola, Florida; Venice, Louisiana; and St. Petersburg, Florida. Researchers observed 18 sea turtles of three species including two

green turtles, 15 loggerheads, and one Kemp's ridley. Miniature, solar-powered satellite transmitters were deployed on two green turtles (one captured offshore of Pensacola and one captured offshore of St. Petersburg).

In addition to capturing live animals at sea and monitoring trends in nest numbers and hatchling production on the nesting beach, FWC is studying where adult female loggerheads reside and forage when they are not nesting on Florida beaches. Understanding the link between nesting and foraging areas is critical to the development of appropriate management and conservation strategies for sea turtles. FWC uses a combination of satellite telemetry and tissues collected on nesting beaches to identify foraging areas used by Florida loggerheads. The isotopic method has been validated and is much cheaper than satellite telemetry, allowing increased sample size and better representation of the nesting population. The project aims to identify foraging hotspots and determine the relative importance of foraging areas to the Florida nesting aggregation and how it changes among years. The project relies on the established Florida permit-holder system and involves the collection of non-viable unhatched eggs from a subsample of loggerhead nests inventoried for the FWC hatchling production program. More than 200 nests have been sampled annually across Florida since 2013. The results of the first three years of the study indicate that most females forage within the U.S. Economic Exclusive Zone (http://oceanservice.noaa.gov/facts/eez.html) and are concentrated in the Florida Keys, on the Southwest Florida continental shelf, the waters off east-central Florida, and on the continental shelf between Delaware and North Carolina. The Great Bahama Bank (in particular, the continental shelf South of Andros) is the main foraging area used by loggerheads nesting in Florida outside of U.S. jurisdiction. Results indicate a considerable variability in relative importance of foraging areas to the Florida nesting aggregation.

FWC also maintains an electronic inventory of in-water sea turtle research and monitoring projects. FWC maintains this database in close collaboration with the sea turtle research community. The database currently serves state and federal conservation managers by providing information on in-water sea turtle research and a connection to the researchers responsible for conducting the work. For more information on the Sea Turtle Research Program, please visit http://myfwc.com/research/wildlife/sea-turtles/.

Eastern Indigo Snake

The Eastern indigo snake is a Federally-designated Threatened species that once occurred throughout Florida but has experienced significant population declines in some areas, particularly the panhandle and

heavily populated areas. During FY 2016-17, FWC continued adding new observations to the existing indigo snake database, and it shared a potential habitat model with the USFWS. FWC is collaborating with The Orianne Society, Central Florida Zoo in Sanford, Atlanta Zoo, Auburn University, The Nature Conservancy, Georgia Department of Natural Resources, and the USFWS to reintroduce indigo snakes into Apalachicola Bluffs and Ravines Preserve in Liberty County. The last verified record of the species from the Florida panhandle was in 1999 on Eglin Air Force Base in Okaloosa County. A Conserve Wildlife specialty license grant will help fund tracking the fate of 12 captive-produced snakes that will be released in July 2017 after being raised for at least two years in captivity. FWC participated in an indigo repatriation meeting in June 2017 at Apalachicola Bluffs and Ravines Preserve and will assist with the reintroduction and tracking of snakes. In April 2016, FWC approved an application allowing the collection of 24 pregnant female snakes from the Gulf region of Florida over a three-year period. These females were to be held at the Orianne Center for Indigo Conservation in Lake County until eggs are laid, and then returned to their point of capture and released. The hatchlings will be used to establish a colony with new genetics from the Gulf region of Florida, which is crucial to future releases at ABRP. A two-day effort by FWC staff, Orianne Center staff, and Auburn University to collect eight pregnant females in February 2017 from public lands in Citrus and Hernando counties was unsuccessful. The strategy for obtaining additional Florida breeding stock is being reassessed.

FWC and law enforcement officers have been working with USFWS special agents to ensure that the illegal capture and/or sale of indigo snakes is minimized. FWC was planning to start issuing permits for indigo snake work and possession, as had been done historically, under the guise of the drafted Eastern Indigo Snake Permitting Guidelines. However, that collaborative process has stopped while the USFWS deals with litigation related to Section 6.

Camp Blanding Wildlife Management Area in Clay County – FWC and Camp Blanding environmental staff are monitoring the areas for Eastern indigo snakes. While no formal search was conducted, any incidental sighting were to be recorded and reported to the environmental staff. There was no individual sighting by FWC staff noted in FY 2016-17, however Camp Blanding environmental staff observed three indigo snakes in June 2017.

Florida Pine Snake and Short-tailed Snake

The Florida pine snake and short-tailed snake were listed as State-designated Threatened species in January 2017 following approval of the Imperiled Species Management Plan (ISMP) by the FWC

Commissioners. Upon approval of the ISMP in 2017, the Florida Pine Snake Species Conservation Measures and Permitting Guidelines were completed and approved by Commissioners. The Florida pine snake is large (up to 7.5 feet), whereas the short-tailed snake is small (less than two feet) and extremely slender. The short-tailed snake is restricted to sandhill and scrub habitats, and the Florida pine snake is found in these two habitats as well as other well-drained habitats with an open or no canopy of trees. Both species are seldom seen because they spend much of their time underground. FWC continued adding new records of these species to an existing database.

In 2013, FWC received a USFWS grant to determine the status of the Florida pine snake. By FY 2016-17, FWC had compiled 451 recent records (2000–2016) of the pinesnake from 45 counties and 97 conservation lands (68% of records). Ninety-one recent records of the short-tailed kingsnake were obtained from 11 counties and 18 conservation lands (70% of records), but only one record came from the Lake Wales Ridge, the southern extent of its range. Records with accurate locational information were used to create potential habitat models, which provided the acreage of potential habitat by county and conservation land. The proportion of high-quality potential habitat that occurs on conservation lands was 44% for the pine snake and 43% for the short-tailed kingsnake. The pine snake still occurs over much of its historical range but has always been uncommon or absent from the southern peninsula because of unsuitable habitat.

Blackwater and Yellow River Wildlife Management Areas in Okaloosa and Santa Rosa Counties – FWC began snake trapping for at-risk upland snake species at one site on Blackwater WMA in the spring of 2015. Trapping was expanded to three new sites within upland pine and sandhill habitat in March 2016, including one location on Yellow River WMA.

Snake trapping continued in FY 2016-17 at the same locations from September to November 2016 and March to June 2017. FWC captured 191 individuals comprising 16 snake species, including seven Florida pine snakes. Other species of note include two eastern diamondback rattlesnakes and three copperheads. Snake trapping will continue on Blackwater WMA in FY 2017-18 at new locations, with trap sites changing on a regular basis to determine distribution of target species on the WMAs.

Florida Keys Reptiles

The Florida brown snake, peninsula ribbon snake, and red rat snake were delisted in January 2017 following approval of FWC's Imperiled Species Management Plan (ISMP). Upon approval of the ISMP in 2017, four of the Florida Keys Reptiles' (Florida Keys mole skink, Key ringneck snake, rim rock crowned

snake, and Lower Keys populations of Florida brown snake) Species Conservation Measures and Permitting Guidelines were completed and approved by Commissioners, as well as their State-designated Threatened status.

A pilot status survey was conducted from July 2015 to July 2016 for seven state-listed reptile species in the Florida Keys: Florida Keys mole skink, Key ringneck snake, rim rock crowned snake, and Lower Keys populations of the striped mud turtle, Florida brown snake, Peninsula ribbon snake, and red rat snake. This survey attempted to collect updated occurrence records and assess the status of historical localities, determine effective survey methods, and collect genetic samples for future taxonomic studies. Public outreach efforts, including an FWC website developed to solicit sightings, produced 75 reports of target taxa (ten mud turtles, eight mole skinks, ten ringneck snakes, 35 red rat snakes, one brown snake, and 11 ribbon snake records). Monthly visits for one year produced 164 records of target taxa. Seventy-three records of three target taxa came from road surveys (12 striped mud turtles, 23 red rat snakes, and seven ribbon snakes) or pedestrian surveys (eight striped mud turtles, 11 red rat snakes, and 12 ribbon snakes), whereas 192 coverboards produced only eight mole skinks on Bahia Honda Key and two ringneck snakes on Big Pine and Cudjoe Keys. Trapping yielded 62 striped mud turtles and raking litter yielded 19 Florida Keys mole skinks. We collected genetic samples from 57 striped mud turtles, 18 mole skinks, two ringneck snakes, three red rat snakes, and 17 ribbon snakes. The striped mud turtle samples were sent to a researcher at the University of Southern Mississippi as part of a genetic assessment of all mud turtle species. Mole skink genetic samples were provided to the University of Central Florida for a taxonomic assessment of the species funded by the USFWS.

Additional surveys could collect sufficient data on the striped mud turtle and red rat snake to determine their population status, but observations during this pilot study suggest that both are doing well, despite experiencing road mortality. Future work targeting the Florida Keys mole skink or ribbon snake has potential, but detection of both species is highly weather dependent. We were unsuccessful at detecting the rim rock crowned snake and at developing effective methodologies to use in future surveys of the Keys ringneck snake, brown snake, and rim rock crowned snake. The Florida Keys mole skink, which was State-listed as Threatened in January 2017 following approval of the Imperiled Species Management Plan by the FWC Commissioners, has been petitioned for Federal listing as Threatened. This year, FWC served on the USFWS's Species Status Assessment Technical Team and reviewed the draft Species Status Assessment document.

Because these Keys reptiles are no longer on the State's Endangered and Threatened Species List, research, management, and conservation efforts on these species will not be included in future annual reports.

Florida Scrub Lizard

In 2012, the Florida scrub lizard was federally-petitioned for listing as a Threatened species, and the USFWS provided funds to FWC in 2015 to conduct a two-year status survey. The species occurs in three disjunct areas: the Mount Dora Ridge from Putnam to Osceola County; the Lake Wales, Winter Haven, and Bombing Range ridges in southeastern Lake, Polk, and Highlands counties; and the Atlantic Coast Ridge from Brevard to Broward County. Populations once occurred as far south as northern Miami-Dade County and on the southwestern Gulf Coast in Lee and Collier counties. The Gulf Coast population has been extirpated from Marco and Estero islands and may no longer occur near Naples in Collier County.

Six hundred fifty sites were visually assessed, and 588 sites were surveyed a total of 1,017 times by visual encounter surveys. Sixty-two sites were posted and could not be surveyed. Three hundred twenty-eight sites were surveyed once, 110 sites were surveyed twice, 131 sites were surveyed three times, and 19 sites were surveyed four times. During FY 2016-17, scrub lizards were not detected in 18 sites in Lake County or in seven sites in Broward County, but they were detected in three of 52 sites in Brevard County, two of 21 sites in Indian River County, ten of 30 sites in St. Lucie County, nine of 37 sites in Martin County, and two of 39 sites in Palm Beach County.

Scrub lizards were detected at 27.3% of 33 historical sites surveyed along the Atlantic Coast and at 79.7% of 64 historical sites surveyed along inland ridges. Scrub lizards were detected in 15.8% of 165 new sites surveyed along the Atlantic Coast and in 42.4% of 278 new sites surveyed along inland ridges. Populations along the southwestern Gulf Coast are apparently extirpated, although suitable habitat still exists in Lee and Collier counties (not at historical locations, however). Conservation lands with scrub lizards in the Northeast Region are Helen and Alan Cruikshank Sanctuary, North Sebastian Conservation Area, Ocala National Forest, Reunion Conservation Area, Valkaria Scrub Sanctuary, and Wabasso Scrub Conservation Area. Conservation lands with scrub lizards in the Southwest Region are Allen David Broussard Catfish Creek Preserve State Park, Archbold Biological Station, Avon Park Air Force Range, Bok Tower Gardens Pine Ridge Preserve, Crooked Lake Prairie, Crooked Lake Sandhill, Crooked Lake West, Crooked Lake WEA, Fisheating Creek/Smoak Groves Conservation Easement, Grassland Reserve Program #106, Hickory Lake Scrub County Park, Highland Hammock State Park, Jack Creek, Lake June-in-Winter Scrub State

Park, Lake Wales Ridge National Wildlife Refuge (two units), Lake Wales Ridge State Forest (three tracts), Lake Wales Ridge WEA (11 units), Saddle Blanket Scrub Preserve, Southern Lakes Land and Trust Conservation Area, Tiger Creek Preserve, Upper Lake Marion Creek Watershed, Upper Lakes Basin Watershed, and Watersong Preserve. Conservation lands with scrub lizards in the South Region are Atlantic Ridge State Park, Eaglewood Preserve, Florida Atlantic University Harbor Branch, Hobe Sound National Wildlife Refuge, Indrio North Savannahs, Jonathan Dickinson State Park, Jupiter Ridge Natural Area, Radnor, Savannas Preserve State Park, Seabranch Preserve State Park, and Walton Scrub.

Future surveys will concentrate on resurveying inland sites, particularly "unoccupied" sites, in order to calculate detection probability and to estimate the number of unoccupied sites that have scrub lizards. At sites where scrub lizards were observed, it took a mean of 2.5 minutes to detect a lizard at inland sites and 3.3 minutes at Atlantic Coast sites.

FISH

Freshwater Fish

LONG TERM MONITORING OF FLORIDA RIVERS – FWC collects standardized fisheries independent data from selected rivers to characterize fish populations and communities to assist in informing management decisions. While sampling is not directed toward collecting threatened and endangered species, these species are occasionally encountered. Sampling was conducted from the Perdido, Escambia, Yellow, Chipola, Ocklawaha, Santa Fe, Upper and Lower St. John's, and Withlacoochee (south) during the previous fiscal year.

RESEARCH ACTIVITIES – FWC has several ongoing species directed projects on both state and federally listed fishes during the previous fiscal year. These projects include status assessments on the harlequin darter, the saltmarsh topminnow, and the crystal darter. FWC also initiated a new project during the previous fiscal year to determine habitat use, movement, and survival of juvenile Gulf of Mexico Sturgeon from the Pensacola Bay watershed in Florida.

BLUENOSE SHINER – The bluenose shiner is currently listed in Florida as a State-designated Threatened. A species action plan has been completed for this species. The bluenose shiner occurs in several watersheds throughout Florida. During FY 2016-17, 23 bluenose shiners were collected from the Yellow River in the western Panhandle. Genetic analysis to determine evolutionary distinction between the

bluenose shiner population in the St. Johns drainage (eastern Florida) and populations in western Florida, Alabama, Mississippi, and Louisiana is ongoing.

CRYSTAL DARTER – The crystal darter is currently listed in Florida as State-designated Threatened. A species action plan has been completed for this species. The crystal darter is only known to occur in the upper section of the Escambia River near Century, Florida, in the western Panhandle. During FY 2016-17, 296 trawl surveys were conducted across the upper Escambia River, and a total of 23 crystal darters were collected. Prior to this fiscal year, only 11 had ever been collected in Florida using traditional sampling methods (boat electrofishing and seining). Now that effective sampling techniques have been identified, current research goals are to assess the population status of the species.

BLACKMOUTH SHINER – The blackmouth shiner is currently listed in Florida as State-designated Threatened. A species action plan has been completed for this species. Sampling was not conducted for blackmouth shiners during FY 2016-17. In FY 2015-16, 369 blackmouth shiners were collected from the Blackwater River watershed in Santa Rosa County, but none were collected from the Shoal River in Okaloosa County despite extensive surveys. Future research will involve monitoring populations in the Blackwater River, continued surveys in the Shoal River, and assessing genetic diversity and population structure across the range of the species.

HARLEQUIN DARTER – The harlequin darter is currently listed in Florida as a State-designated Species of Special Concern. A species action plan has been completed for this species. While restricted in range (only the Escambia River watershed in the western Panhandle), the species is regularly collected from both tributaries and the mainstream Escambia River when suitable habitats (submerged woody debris) are present. During FY 2016-17, 14 harlequin darters were collected from the mainstream Escambia River using boat electrofishing gear and 121 were collected while trawling. Additionally, work to estimate the population size of harlequin darters in the Escambia River watershed was continued. FWC is finalizing analysis to determine stream-wide abundance estimates from Pine Barren and Big Escambia Creeks (Escambia River watershed). A final status assessment for harlequin darters in the Escambia River watershed is expected in 2017.

SALTMARSH TOPMINNOW – The saltmarsh topminnow is currently listed in Florida as a State-designated Threatened. A species action plan has been completed for this species. saltmarsh topminnows occur in the estuarine reaches of western Panhandle Rivers from the Perdido Bay to the Yellow River. During FY 2016-17, 32 sites were surveyed across the Perdido, Escambia, Blackwater, and East bays using minnow

traps and Breder traps. A total of 379 saltmarsh topminnows were collected. Future sampling will continue in Choctawhatchee Bay and will be expanded to Apalachicola Bay.

Southern Tessellated Darter – The Southern tessellated darter is currently listed as a State-designated Threatened. A species action plan has been completed for this species. Southern tessellated darters are only known to occur in the Ocklawaha River watershed (a tributary to the St. Johns River) in north-central Florida. No sampling for Southern tessellated darters was conducted during FY 2016-17. Prior genetic analyses suggest the Southern tessellated darters in the Ocklawaha River watershed have low genetic diversity and a small population size due to a long (hundreds of generations) isolation from other populations. Future work will involve determining appropriate listing status and conservation actions needed for this species.

Smalltooth Sawfish

The smalltooth sawfish is a Federally-designated Endangered species that was once common in the coastal and estuarine waters of the southeastern U.S., but during the 20th Century it became rare throughout its North American range. FWC attributes this decline to two main factors: 1) bycatch in commercial and recreational fisheries; and 2) life history parameters that include late maturity and production of small numbers of young. Smalltooth sawfish in Florida are currently primarily found only from Charlotte Harbor in Charlotte County to the Florida Keys in Monroe County.

During FY 2016-17, FWC performed sampling for smalltooth sawfish in the Charlotte Harbor estuarine system, which is located on the southwest Gulf Coast. Monthly sampling for smalltooth sawfish was conducted in the Caloosahatchee River in Lee County and in upper Charlotte Harbor using a multi-gear approach. FWC captured and released 47 smalltooth sawfish, including eight recaptures. Total lengths ranged from approximately two and a half to seven feet.

For more information on FWC's Smalltooth Sawfish Research and Monitoring, including access to publications on specific topics, please visit http://myfwc.com/research/saltwater/fish/sawfish/.

Sturgeon

Atlantic Sturgeon Activities – The Atlantic Sturgeon was Federally-listed as an Endangered species in 2012. The USFWS, National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries), and the U.S. Geological Survey (USGS) conduct most of the monitoring and management of this species. FWC did not incidentally collect any Atlantic Sturgeon during FY 2016-17. Additionally, no

Atlantic Sturgeon carcasses were reported to FWC. FWC will provide any future collections of the species 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 a Federally-designated Threatened species in Florida. Monitoring and management of this species has been primarily conducted by NOAA-Fisheries, USGS, and USFWS. During FY 2016-17, FWC initiated a study with goals to 1) determine juvenile survival, 2) develop techniques to collect young of the year individuals, and 3) characterize movement and habitats of juveniles in the Yellow and Blackwater rivers (western Panhandle). Only three days of sampling occurred during late spring and early summer due to high water levels in the rivers. One adult Sturgeon was captured in the Yellow River, but no juveniles were captured. Additionally during ongoing Alligator Gar research, two adult Gulf Sturgeon were incidentally captured in the Yellow River and assessed for tags, and data from these fish was shared with Gulf Sturgeon collaborative researchers with USFWS.

INVERTEBRATES

Miami Tiger Beetle

The Miami tiger beetle is an iridescent copper-green ground beetle less than ten millimeters long. It is a Florida endemic and habitat specialist of sandy pockets in pine rocklands within Miami-Dade County, specifically in sandy to loamy-sand soil areas with patches of bare ground. In November of 2016, the Miami tiger beetle was listed as Endangered by the USFWS.

During FY 2016-17, FWC, in cooperation with Miami-Dade County Parks, Recreation, and Open Spaces, conducted presence/absence surveys for the Miami tiger beetle at both known and potential sites with pine rockland habitat in South Florida. The primary objectives of this work were to 1) determine the distribution and area of occupancy of the Miami tiger beetle, 2) monitor fluctuations in observed abundance among different dates/survey events, and 3) observe and document associated phenology and natural history events such as flight times, activity patterns, mating, and oviposition. Results from these surveys will inform both future monitoring and detection efforts along with providing recommendations for management in pine rockland habitat (e.g., prescribed burn frequency, alternative treatment such as mowing).

FWC conducted 61 surveys among 18 pine rockland properties during the course of this work and observed a total of 271 adult Miami tiger beetles at four of these including three properties owned by Miami-Dade County and another by the U.S. Coast Guard. No new sites were found in FY 2016-17, though areas of occupancy were expanded slightly at all four occupied properties (a fifth known occupied property owned by University of Miami was not surveyed as we were denied access). In addition to the distribution and abundance surveys for Miami tiger beetle, we also assessed habitat selection by conducting surveys to compare characteristics of 25 locations known to be occupied to 25 randomly selected locations at three pine rockland sites. FWC found Miami tiger beetles are selecting areas within pine rockland habitat that are sandy or bare soil with few shrubs and trees. Importantly, these conditions occur only in recently disturbed (e.g., burned) areas within pine rockland habitat. These results emphasize the critical importance of active fire management for maintaining habitat for this highly endangered species.

Black Creek Crayfish

During FY 2016-17, the Imperiled Species Management Plan and associated rules were approved, so the listing status of the Black Creek crayfish changed from Species of Special Concern to State-designated Threatened. The Black Creek crayfish inhabits streams with cool, unpolluted water with a constant flow and high oxygen content. This species is endemic to northeast Florida, where the majority of its known range is in the Black Creek drainage. All documented occurrences have been within the lower St. Johns River watershed basin.

During FY 2016-17, FWC began drafting a Species Conservation Measures and Permitting Guidelines document for the Black Creek crayfish, expected to be finalized during FY 2017-18. FWC has worked with Florida's Department of Military Affairs and Department of Environmental Protection to stabilize stream crossings in Black Creek tributaries to maintain water quality essential to Black Creek crayfish persistence. FWC staff also reviewed several proposed projects within the region to determine potential impacts to Black Creek crayfish.

Panama City Crayfish

The Panama City crayfish is a small freshwater crustacean found exclusively within an estimated 51-square-mile portion of central Bay County in the Florida Panhandle. Historically, the Panama City crayfish thrived in wet pine flatwoods with an open, vegetative understory. Development and incompatible silviculture practices have resulted in habitat loss and degradation. The Panama City crayfish is currently a State-designated Species of Special Concern. FWC worked during FY 2016-17 to

update the State's Draft Management Plan for the Panama City Crayfish (http://myfwc.com/wildlifehabitats/imperiled/listing-actions/panama-city-crayfish/), which includes the recommendation to reclassify the species to that of State-designated Threatened. The draft Plan has as its conservation goal to ensure the long-term conservation of the Panama City crayfish throughout its range so that it no longer warrants listing by the State of Florida. The Plan's conservation objectives are: 1) To secure at least 2,000 acres of occupied habitat throughout the species range in conservation easements that are managed in perpetuity; and 2) Close data gaps on what constitutes a viable population and other population parameters. With stakeholder input, FWC is also developing a draft Species Conservation Measures and Permitting Guidelines document (that includes recommended conservation practices and presents options for addressing activities that may impact the Panama City crayfish or its habitat.

During FY 2016-17, FWC provided assistance to USFWS while it considered potential federal listing of the Panama City crayfish. Specifically, FWC gave feedback on characterizing barriers to Panama City crayfish dispersal, and helped review and interpret a report on the genetic analysis of the species funded by USFWS.

During FY 2016-17, FWC provided subject matter expertise for development, construction, and other land-use conversion and maintenance activities with the potential to impact the Panama City crayfish. FWC consulted with the Florida Department of Transportation, USFWS, Bay County, City of Lynn Haven, environmental consultants, and public and private landowners to provide guidance on proposed projects and to prevent the unauthorized take of Panama City crayfish.

FWC annually surveys for Panama City crayfish, with the majority of surveys taking place on Panama City crayfish management areas and other existing or potential conservation easements to assess Panama City crayfish response to habitat restoration efforts and fluctuating groundwater levels. During surveys in FY 2015-16 and FY 2016-17, genetic samples were also collected as part of a cooperative effort for a USFWS/University of Florida project to analyze Panama City crayfish population size and connectivity. From April-June 2017, FWC funded a temporary technician to perform additional surveys, filling in data gaps regarding the basic biology, ecology, and detection of the Panama City crayfish.

Restoring Panama City crayfish habitat on properties held under conservation easement reduces the need for protection under the Endangered Species Act, and moves the species towards recovery goals proposed in the draft management plan. Sites targeted for management expand the Panama City crayfish's area of occupancy, thereby improving the resiliency of this species within its small historic range. To date, four

Panama City crayfish management areas have been established: Talkington Preserve, Marjorie's Magical Marsh/Symone's Sanctimonious Swamp, City of Lynn Haven, and D&H/Deerpoint Elementary; each have undergone varying levels of restoration to date. Due to the urban matrix surrounding these four management areas, it is often difficult to implement prescribed fire to maintain ideal vegetation composition. During FY 2016-17, FWC partnered with USFWS to bush-hog Talkington Preserve to replicate the effects of prescribed fire. D&H/Deerpoint Elementary was likewise bush-hogged by the easement landowner. Also during FY 2016-17, a scope of work was finalized and contractor bids were requested for five acres of additional habitat restoration on Magical Mars/Sanctimonious Swamp. However, all bids exceeded budget constraints for FY 2016-17. A contract has been established to continue habitat restoration work on Panama City crayfish management areas through 2020, as funding allows, and two easements have been identified as being eligible for receiving mitigation burns through a partnership with the Florida Forest Service.

Santa Fe Cave Crayfish

During FY 2016-17, the listing status of the Santa Fe cave crayfish changed from Species of Special Concern to State-designated Threatened. The Santa Fe cave crayfish inhabits subterranean water sources in southern Suwannee and Columbia counties. Thus far, it is only known from several caves and sinkholes in the Santa Fe/Suwannee River basin.

During FY 2016-17, the presence of the Santa Fe cave crayfish was confirmed at its type locality, Sims Sink, and in two new locations – a sinkhole less than one-half mile N of Sims Sink, and a cave on private property about two miles NNE of Sims Sink. Pending funding approval of a proposal submitted to the USFWS, FWC staff and associates intend to: (1) conduct a status assessment for Santa Fe cave crayfish at historic sites, and at additional new sites, if such are discovered; (2) collect 8-10 tissue samples (non-lethal collection of a leg or chela) from each site to be used for genetic analysis; (3) if available, collect one voucher Form I male Santa Fe cave crayfish from each newly documented site to be preserved and used for morphological analysis; (4) conduct genetic analysis of Santa Fe cave crayfish from occupied sites to determine effective population sizes and degree of isolation and connectivity of the sites; and (5) provide an interpretation of Santa Fe cave crayfish intraspecific diversity based on evidence from genetics, morphology, and distribution.

Miami Blue Butterfly

The Miami blue butterfly was State-designated Threatened until April 2012 when it was listed as Federally-Endangered by the USFWS. The butterfly historically ranged from Hillsborough County to the Dry Tortugas in Monroe County on the Gulf Coast, and from Merritt Island in Brevard County to the Florida Keys. Currently, it is found only in two populations in the Key West National Wildlife Refuge in extreme South Florida.

In previous years, progress on implementing the 2010 Miami Blue Butterfly Management Plan (http://myfwc.com/wildlifehabitats/imperiled/listing-actions/miami-blue/) has been severely limited. This was due to the 2010 loss of both the wild population at the Florida Department of Environmental Protection's Bahia Honda State Park (due to inclement weather and predation by non-native green iguanas) and the captive population (due to inclement weather that affected their food supply) at the University of Florida. Planned research to use captive-raised Miami blue butterflies to develop techniques to successfully reintroduce the species was postponed until a new captive population could be established, and until it could be determined that the remaining wild populations in Key West National Wildlife Refuge were robust enough to support collection from the wild.

However, in June 2016, the USFWS provided a permit to the University of Florida allowing the collection of Miami blue butterflies from Key West National Wildlife Refuge for the purposes of lab and field research, pending appropriate population numbers. This has led to progress being made in Miami blue conservation in FY 2016-17. As of summer 2017, the Miami blue captive population in the University of Florida lab is in the F7 generation from stock collected from Key West National Wildlife Refuge in November 2016. A small amount of additional stock from Boca Grande was collected in May; those were crossed with captive stock to increase the genetic diversity. University of Florida biologists have completed several host plant trials (nickerbean Caesalpinia vs blackbead Pithecellobium), and are working on finalizing plans to start field experiments at Bahia Honda and Long Key State Parks as part of a Cooperative Recovery Initiative award from USFWS. Plans are to have livestock on site at Bahia Honda SP in August 2017.

Schaus Swallowtail Butterfly

The Schaus swallowtail butterfly (Schaus) is a Federally-designated Endangered species. The species has historically been most commonly seen at Biscayne National Park in Miami-Dade County and North Key Largo in Monroe County, but its numbers in recent years have shown a dramatic decline. Surveys

conducted by FWC, the North American Butterfly Association, and the National Park Service in 2011 yielded only 35 Schaus seen at Biscayne National Park and six seen on North Key Largo. In 2012, the USFWS contracted the University of Florida's Maguire Center for Lepidoptera Research to conduct surveys, and that year there were only four verified Schaus adult sightings, all on Elliott Key in Biscayne National Park. This precipitous decline, down from the 41 sighted in 2011, prompted concern that the species may be in imminent danger of extinction. Since then, a headstarting program involving Schaus raised in University of Florida facilities from eggs and larvae collected in the wild, then reintroduced to their native range, has had good success augmenting the wild population.

During spring and summer 2017 surveys conducted by the University of Florida, Florida Department of Environmental Protection, FWC, National Park Service, and National American Butterfly Association volunteers, 28 adult Schaus were observed in Biscayne National Park; eight of those were marked. About 60 Schaus eggs and larvae were collected, yielding approximately 48 viable pupae in the University of Florida lab for headstarting. It is planned to breed those individuals in September 2017 to build up numbers; their resulting offspring will be used for reintroduction in 2018.

Florida Tree Snail

FLORIDA TREE SNAILS PRESENCE/ABSENCE SURVEYS – Florida tree snail surveys were conducted on the Florida Keys Wildlife and Environmental Area (WEA) in Monroe County. Determining the presence or absence of the Florida tree snail (no longer listed as a Species of Special Concern as of January 11, 2017) aids staff in making management decisions. Surveys were conducted throughout the year using a standardized monitoring protocol. Staff designated 1,043 acres as suitable habitat. Since suitable habitat on the WEA is non-contiguous, the 1,043 acres were separated into 129 individual units, ranging in size from 1-64 acres. During FY 2016-17, 33 units were surveyed. Florida tree snail presence was documented on four of the 33 units. Surveys will continue through FY 2017-18 until all units have been surveyed.

The Florida tree snail is no longer on the State's Endangered and Threatened Species List, therefore, research, management, and conservation efforts on this species will not be included in future annual reports.

SNAIL AND FLATWORM STUDIES – There are two other ongoing projects that target Florida tree snail status. Late in FY 2016-17, FWC hired a biologist to survey Florida tree snails and other arboreal and ground-dwelling snails on conservation lands in the Florida Keys. The goal of this project is to collect data on live and dead snails, and to document evidence of the presence of the predatory non-native invasive New

Guinea flatworm, Platydemus manokwari, which has been implicated in tree snail declines. Preliminary results from the project suggest that only remote portions of North Key Largo still have abundant snail populations, arboreal species are becoming harder to find near developed areas, and populations of ground-dwelling or near-ground-dwelling snails – both native and non-native species – seem to have been hit the hardest, with mortality at most sites approaching 100%.

Also late in FY 2016-17, FWC awarded a contract to Florida International University and Miami-Dade County staff to conduct a related project on tree snails and the New Guinea flatworm in mainland Florida. The objectives of this study include: determining the extent and genetic identify of Platydemus flatworms in Florida – especially near imperiled tree snail populations; determining the mechanisms of flatworm spread and potential ways to limit its spread; determine the presence and prevalence of infective Angiostrongylus nematodes (which present a human health risk) in flatworm populations; and determining the predation effects of the New Guinea flatworm on imperiled tree snail populations in the Castellow Hammock Complex Preserve as a test case of overall flatworm effects on native tree snail populations. Flatworm genetic work and testing for nematodes is proceeding, but an unusually dry season postponed the study of flatworm spread. Initial surveys on the Preserve have documented the preponderance of dead Florida tree snails and (non-native) Cuban garden snails.

OTHER WORK

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. The program integrates conservation planning, Population Viability Analysis results, and geospatial analytical techniques to model potential habitat on FWC-lead areas. Using this information, FWC determines where focal species conservation can be affected on each Wildlife Management Area (WMA) or Wildlife and Environmental Area (WEA). FWC integrates the outcome of the landscape level assessment with area-specific and expert knowledge to produce species management strategies.

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

actions necessary to achieve these objectives, and provisions for monitoring to verify progress towards meeting the objectives. Implementing this program ensures FWC is efficiently meeting the needs of Florida's at-risk species on lands managed by the agency. As every FWC-lead WMA has received a WCPR Strategy, the Program has assessed its outreach efforts and concluded that it should update assessments and prioritizations on WMAs at approximately ten-year intervals. Hence, WCPR will restart the workshop and strategy cycle within the next two years. 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

Coordination and Assistance

COORDINATION – Listed species coordination during FY 2016-17 included overseeing, monitoring, facilitating, and otherwise organizing activities associated with listed species. It also included ensuring adherence to federal and state reporting and documentation requirements and guidelines; implementing or facilitating protection through coordination of assistance, regulatory measures and permit review; providing or facilitating consultation and assistance to private interests; and interacting with state and federal agencies, conservation organizations, and others regarding a wide range of listed species matters. The USFWS and National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries) jointly provided funding for coordination through Section 6 of the Federal Endangered Species Act of 1973, Florida's Nongame Wildlife Trust Fund, and the Florida Panther Research and Management Trust Fund.

Assistance on listed species was provided to state and federal agencies, environmental-related consulting firms, private individuals, and local authorities through telephone calls, emails, written correspondence, and agency commenting. Section 6 Cooperative Agreements with USFWS and NOAA-Fisheries were administered, including preparing emergency handling reports, preparing and executing Section 6 grants, and developing the renewal packets for the Cooperative Agreements. Section 6 provides funding to States and Territories with cooperative agreements, for species and habitat conservation actions on non-federal lands.

FWC's Listed Species Website, http://myfwc.com/wildlifehabitats/imperiled/, includes, among other things, copies of previous legislative reports, the current list of listed species, information on listed species permits, and listed species management plans.

CENTER FOR BIOSTATISTICS AND MODELING – Staff provided statistical and data management support for numerous projects focused on Threatened and Endangered species and Species of Special Concern. Activities performed by staff contributed to the following: population trend analysis, monitoring, or assessment of shorebirds, marshbirds, wading birds, American alligators and crocodiles, Florida black bears, Florida panthers, sea turtles, short-tailed snakes, Florida pine snakes, winter breeding reptiles and amphibians, as well as Elkhorn and Staghorn coral.

REVIEWS AND ASSISTANCE FOR TRANSPORTATION PROJECTS – FWC performed 127 reviews of highway projects during FY 2015-16, which included projects reviewed through the Florida Department of Transportation's Efficient Transportation Decision Making Process and assistance letters outside of the Process, including 80 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 1,163 projects and provided written assistance on 468 of those projects for public and private land and water use planning activities that had the potential to impact listed fish and wildlife species and their habitats during FY 2015-16. The types of projects reviewed and commented on included: developments of regional impact, county comprehensive plan evaluation and appraisal reports, proposed amendments and sector plans, regional visioning projects, various state and federal permit applications, 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.

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 listed and at-risk wildlife from human disturbance during critical periods of their life cycle, such as breeding and migration. For each CWA, the boundaries and periods of time when the area may be posted as closed to entry are approved by 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 the wildlife populations using those areas each year. Management and monitoring activities are conducted with the participation of FWC staff and multiple partners including other state and federal agencies, local governments, and nongovernmental organizations.

During FY 2016-17, staff completed a statewide effort to obtain public input on proposals to establish new or improve existing CWAs. More than 425 people attended 14 workshops held throughout the state in July and August. The workshops were designed to explain how CWAs work and why they are needed, address questions from attendees and gather public feedback about proposals for each site. A summary of public input along with staff recommendations was presented at the FWC's September meeting. Final proposals for 13 new CWAs and 5 revisions were approved by Commissioners at the November meeting. One existing CWA, Gerome's Cave, was disestablished in February at the request of a new private landowner. This brings the total to 31 CWAs that the FWC is responsible for posting, monitoring, and enforcing.

Sixteen of the new or re-established CWAs require in-water signs or buoys. Staff from the Species Conservation Planning Section of the Division of Habitat and Species Conservation and the Boating and Waterways Section of the Division of Law Enforcement completed site visits to all 16 sites in April to determine marker locations. A Conserve Wildlife Tag grant was applied for in March and awarded by the Fish and Wildlife Foundation of Florida in April for funding of CWA in-water signs, buoys, and installation contracts. Permitting and bid solicitations are in progress, with marker installation expected to take place in fall 2017.

In addition to activities associated with the new and re-established CWAs, all established and active CWAs were posted with appropriate signage. Active CWAs were monitored in FY 2016-17 by FWC and management partners. Twenty-nine of the 31 CWAs supported populations of listed and other important wildlife species during FY 2016-17 (exhibit 15). Two CWAs, both located in FWC's South Region, were inactive due to submersion and erosion.

FWC biologists in the Species Conservation Planning Section have provided CWA training to more than 50 new Law Enforcement officers at Academy Training in FY 2016-17, and continue to coordinate with regional FWC Law Enforcement on site-specific patrol needs and protocols for CWAs. Monitoring protocols are being evaluated in an effort to standardize among sites, but generally involve perimeter surveys and direct counts of adults, nests, and young. Protection and monitoring efforts for listed species of shorebirds and seabirds at many CWAs have been improved through the work of partnership networks. FWC provides species expertise, assistance, and available management and educational materials when partnering with other groups in these efforts. CWAs are proven to be an important and effective conservation tool for many Florida wildlife species and the habitats they depend on for breeding and roosting. For that reason, this project is expected to be an ongoing priority for FWC.

Exhibit 15
Critical Wildlife Areas (CWAs) In Florida During FY 2016-17

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species In Bold)*	STATUS[a]	MANAGED AREA
NORTHWEST REGION (5 CWAs)					
Tyndall[c]	Bay	Year-round	**American oystercatcher, least tern, snowy plover**, Wilson's plover, willet, osprey	1, **24, 2**1, 22, **6**, 1 nests	200 ac
Flag Island[b, c]	Franklin	Year-round	**Black skimmer, American oystercatcher, least tern**, brown pelican, Caspian tern, gull-billed tern, royal tern, sandwich tern, laughing gull	**137, 5, 19**, 15, 25, 28, 110, 50, 25 nests	27 ac
St. George Causeway[b]	Franklin	1 Apr to 31 Aug	**American oystercatcher, least tern**, brown pelican, Caspian tern, royal tern, sandwich tern, sooty tern, laughing gull	**7, 3**, 392, 124, 1060, 732, **1**, 851 nests	32 ac
Lanark Reef[b, c]	Franklin	Year-round	**Black skimmer, American oystercatcher**, brown pelican, laughing gull	**35, 11**, 150, 90 nests	34 ac
Alligator Point	Franklin	15 Feb to 31 Aug	**American oystercatcher, least tern, snowy plover**, Wilson's plover	**2, 1, 3, 4** nests	66 ac
NORTH CENTRAL (4 CWAs)					
Amelia Island	Nassau	1 Apr to 1 Sept	**Least tern**, Wilson's plover	**16**, 9 nests	10 ac
Nassau Sound Bird Islands[b, c]	Duval	1 Apr to 1 Sept	**Black skimmer, American oystercatcher, least tern**, Wilson's plover, gull-billed tern.	**15, 2, 32**, 29, 3 nests	7 ac
Withlacoochee Caves[b]	Citrus	15 Apr to 15 Aug & 15 Dec to 15 Mar	Southeastern myotis, tricolored bat	Undetermined	3 ac
Fort George Inlet	Duval	1 Apr to 1 Sept	**Black skimmer, American oystercatcher**, Wilson's plover, laughing gull, royal tern	**2, 6**, 16, 2134, 2371, nests	10 ac

[a] Counts or estimates of peak number of nests per breeding species at each site during the closure period in FY 2016-17. Numbers correspond in order of species listed in previous column.
[b] Site is new or re-established in FY 2016-17.
[c] Site also supports migrating and wintering species such as the federally listed piping plover and red knot.

Exhibit 15 *continued*
Critical Wildlife Areas (CWAs) In Florida During FY 2016-17

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species In Bold)*	STATUS[a]	MANAGED AREA
NORTHEAST REGION (3 CWAs)					
Matanzas Inlet	St. Johns	1 Apr to 1 Sept	**Least tern**, Wilson's plover	28, 11 nests	28 ac
BC49[b]	Brevard	1 Jan to 31 Aug	**Wood stork, roseate spoonbill, tricolored heron, little blue heron**, white ibis, cattle egret, brown pelicans, cormorant, great egret, great blue heron, black vulture, snowy egret, anhinga, black-crowned night heron	**72, 7, 13, 3**, 39, 46, 20, 22, 4, 1, 1, 2, 5, 1 nests	4 ac
STICK MARSH[B]	Brevard	1 Jan to 31 Jul	**Roseate spoonbill, tricolored heron,** great egret, snowy egret, cattle egret, anhinga	Undetermined	1 ac

[a] Counts or estimates of peak number of nests per breeding species at each site during the closure period in FY 2016-17. Numbers correspond in order of species listed in previous column.
[b] Site is new or re-established in FY 2016-17.
[c] Site also supports migrating and wintering species such as the federally listed piping plover and red knot.

Exhibit 15 *continued*
Critical Wildlife Areas (CWAs) In Florida During FY 2016-17

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species In Bold)*	STATUS[a]	MANAGED AREA
SOUTHWEST REGION (10 CWAs)					
Alafia Banks[b]	Hillsborough	Year-round	**Roseate spoonbill, tricolored heron, little blue heron, reddish egre**t, brown pelican, great blue heron, snowy egret, great egret, cattle egret, black-crowned night heron, yellow-crowned night heron, white ibis, glossy ibis, willet, **American oystercatcher**, cormorant	**195, 60, 30, 5, 5**, 400, 30, 45, 45, 30, 20, 30, 2500, 40, 2, 100 nests	60 ac
Dot Dash Dit[b]	Manatee	1 Jan to 31 Aug	**Wood stork, roseate spoonbill, tricolored heron**, great blue heron, great egret, snowy egret, cattle egret, green heron, black-crowned night heron, anhinga, cormorant	**137, 28, 3**, 25, 45, 45, 15, 3, 5, 14, 16 nests	4 ac
Roberts Bay[b]	Sarasota	Year-round	**Roseate spoonbill, tricolored heron**, little blue heron, reddish egret, brown pelican, great blue heron, great egret, snowy egret, cattle egret, black-crowned night heron, anhinga, cormorant	**13, 15, 6, 2**, 151, 37, 60, 45, 7, 3, 3, 102 nests	3 ac
Myakka River[b]	Sarasota	1 Mar to 1 Nov	**Wood stork**, great egret, great blue heron, anhinga	**80**, 21, 2, 9 nests	1 ac
Little Estero Island	Lee	1 Apr to 1 Sept	**Least tern**, Wilson's plover	**16**, 5 nests	6 ac

[a] Counts or estimates of peak number of nests per breeding species at each site during the closure period in FY 2016-17. Numbers correspond in order of species listed in previous column.
[b] Site is new or re-established in FY 2016-17.
[c] Site also supports migrating and wintering species such as the federally listed piping plover and red knot.

Exhibit 15 *continued*
Critical Wildlife Areas (CWAs) In Florida During FY 2016-17

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species In Bold)*	STATUS[a]	MANAGED AREA
SOUTHWEST REGION *continued* (10 CWAs)					
Broken Island[b]	Lee	1 Mar to 31 Aug	**Reddish egret, tricolored heron**, snowy egret, great egret, great blue heron, cattle egret, yellow-crowned night heron, white ibis, brown pelican, cormorant, anhinga	**4, 11**, 4, 1, 5, 3, 1, 28, 85, 69, 1 nests	15 ac
Hemp Key[b]	Lee	Year-round	Great blue heron, great egret, green heron, brown pelican, cormorant	9, 14, 1, 66, 164 nests	6 ac
Big Carlos M52[b]	Lee	Year-round	**Reddish egret, tricolored heron**, brown pelican, cormorant, great blue heron, great egret, snowy egret, black-crowned night heron, yellow-crowned night heron	**2, 12**, 18, 8, 6, 25, 6, 2, 1 nests	1 ac
Coconut Point East[b]	Lee	Year-round	**Roseate spoonbill, reddish egret, tricolored heron, little blue heron**, brown pelican, cormorant, great blue heron, great egret, snowy egret, black-crowned night heron	**1, 1, 1, 1**, 47, 20, 8, 12, 10, 3 nests	1 ac
Matanzas Pass[b]	Lee	Year-round	**Reddish egret, tricolored heron, little blue heron**, brown pelican, cormorant, great blue heron, great egret, snowy egret, black-crowned night heron, cattle egret	**1, 38, 8**, 53, 14, 11, 4, 15, 3, 2 nests	1 ac

[a] Counts or estimates of peak number of nests per breeding species at each site during the closure period in FY 2016-17. Numbers correspond in order of species listed in previous column.
[b] Site is new or re-established in FY 2016-17.
[c] Site also supports migrating and wintering species such as the federally listed piping plover and red knot.

Exhibit 15 *continued*
Critical Wildlife Areas (CWAs) In Florida During FY 2016-17

CWA BY REGION	COUNTY	CLOSURE PERIOD	BREEDING SPECIES *(Imperiled Species In Bold)*	STATUS[a]	MANAGED AREA
SOUTH REGION (9 CWAs)					
Bird Island MC2	Martin	Year-round	**Wood stork, roseate spoonbill**, brown pelican, cormorant, great egret, snowy egret.	**44, 3**, 38, 20, 21, 3 nests	7.5 ac
Deerfield Island Park	Broward	Year-round	**Gopher tortoise**	**12** individuals	56 ac
Rookery Islands[b]	Collier	Year-round	**Reddish egret, little blue heron, tricolored heron**, great egret, snowy egret, cattle egret, white ibis, glossy ibis, brown pelican, cormorant	Undetermined	1 ac
ABC Islands	Collier	Year-round	**Reddish egret, little blue heron, tricolored heron**, great blue heron, great egret, snowy egret, cattle egret, black-crowned night heron, brown pelican, anhinga	Undetermined	75 ac
Big Marco Pass[c]	Collier	Year-round	**Black skimmer, least tern**, Wilson's plover	**615, 491**, 11 nests	30 ac
Caxambas Pass	Collier	1 Apr to 31 Aug	*Submerged*	Inactive	1 ac
Second Chance	Collier	1 Mar to 1 Sept	**Black skimmer, least tern**, Wilson's plover	**50, 101**, 4 nests	3 ac
Bill Sadowski[c]	Dade	Year-round	Supports foraging and roosting shorebirds and wading birds	~1000 individuals	700 ac
Pelican Shoal	Monroe	1 Apr to 1 Sept	Submerged	Inactive	1 ac

[a] Counts or estimates of peak number of nests per breeding species at each site during the closure period in FY 2016-17. Numbers correspond in order of species listed in previous column.
[b] Site is new or re-established in FY 2016-17.
[c] Site also supports migrating and wintering species such as the federally listed piping plover and red knot.

Florida's Landowner Assistance Program

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

During FY 2016-17, FWC's LAP assisted more than 467 landowners, including providing written evaluations of effects from proposed agricultural practices to listed species on 67 projects. Many of the landowners also received financial assistance through state or federal cost-share or easement programs such as the U.S. Farm Bill and USFWS Partners for Fish and Wildlife Programs. LAP worked in cooperation with the U.S. Department of Agriculture's Natural Resources Conservation Service, USFWS, Florida Department of Agriculture and Consumer Services, the University of Florida's Institute of Food and Agriculture Sciences, Florida Natural Areas Inventory, and various other conservation organizations, to assist Florida's private landowners. While private landowners represent the majority assisted by LAP during FY 2016-17, public conservation land managers including the U.S. Department of Defense and county governments received assistance with development or review of management plans for their conservation lands.

For more information, please visit the LAP Website at http://myfwc.com/conservation/special-initiatives/lap/.

Law Enforcement

FWC's Division of Law Enforcement continued statewide enforcement activities to protect specific Endangered and Threatened species during FY 2016-17. These activities included:

- Regular patrols of the Florida panther reduced-speed zones in Lee and Collier counties to protect panther and prey species, and to provide public safety;
- 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 750 vessel patrol hours were focused on TED enforcement during the year;
- Patrol efforts directed toward the enforcement of the 500-yard approach restriction to protect North Atlantic right whales; 72 vessel patrol hours were dedicated to right whale protection in accordance with the joint enforcement agreement with NOAA;
- Patrol efforts targeting coastal nesting areas of protected shore birds to reduce nest disturbance, nest destruction, and incidental take;
- Investigations by the Internet Crimes Unit targeting the unlawful sale and possession of protected species on the internet;
- Enhanced statewide enforcement efforts directed towards utilizing radar and the manatee cam surveillance technology to ensure compliance with boat speed zones to prevent manatee vessel strikes and manatee harassment; more than 71,600 water patrol hours were dedicated to manatee enforcement, resulting in 2,403 citations and 1,552 warnings;
- In addition, 27 citations and 48 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; and
- The three new Port Inspection K-9 Teams have been conducting inspections within Florida's ports. Two additional Port K-9 Teams are in training and will soon expand FWC's efforts in this important mission. These teams are trained to detect certain turtle, snake, and other potential Endangered/Threatened species as they arrive or depart in Florida's ports.

Permitting and Assistance

During FY 2016-17, FWC provided federal agencies, other state agencies, environmental consultants, and regional and local regulatory authorities with assistance and guidance regarding projects that impact State-listed fish, bird, and land dwelling species 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 assistance and guidance when applying for scientific collecting, captive possession, nest removal, wildlife relocation, and incidental take permits for State-listed species.

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 individual species management plans or guidelines; and 3) On-site visits to determine species management needs. Generally, the public was provided information regarding listed species such as: 1) life history and other biological information; 2) locality and occurrence data; 3) listing status; and 4) solutions to nuisance situations (i.e., education on the species behavior and habitat requirements and suggestions for coexisting with the species).

Some permits require permit holders to carry out an approved site or species-specific management plan, while others require permit holders to follow FWC species guidelines, policies, or management plans. Scientific permits are generally conditioned on an approved research proposal. The permit review process usually involves coordination between FWC, environmental consultants, other state agencies, federal agencies, and regional and local regulatory entities.

Overall, FWC provided science-based and regulatory guidance to ensure that permitted activities would either result in a net conservation benefit or prove not to be detrimental for the involved species. Additional information regarding species guidelines, policies, and permit applications may be accessed at http://myfwc.com/license/wildlife/protected-wildlife/. Applications for scientific collecting, migratory bird nest relocation (now issued as listed species incidental take due to recent rule changes), and non-resident falconry permits, may be accessed via the online permitting system at http://myfwc.com/license/wildlife/protected-wildlife/#falconry.

Coastal Wildlife Conservation Initiative

The Coastal Wildlife Conservation Initiative (CWCI) is an FWC-led, multi-partner [e.g., Florida Department of Environmental Protection, USFWS, and the University of Florida's Institute of Food and Agriculture Sciences] strategy that began in May 2007. The goal of the CWCI is to facilitate a statewide, cooperative process 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.

During FY 2016-17, the CWCI and partners built upon previous years' efforts for conservation of coastal wildlife, including endangered and threatened species, and began new projects as well. The CWCI expanded its "Grow a Better Beach" outreach campaign, which encourages reduced mechanical beach cleaning to allow beneficial vegetation and wrack (marine vegetation that washes ashore) to provide habitat and food for wildlife. The CWCI also continued its "Don't Cut the Line" campaign, which focuses

on preventing seabird entanglement, by partnering on signage at local hotspots (e.g., fishing piers with recurring entanglement issues), providing information in fishing clinics and publications, and developing an app to find a seabird rehabilitator. A new project begun in FY 2016-17 was the development of a course for marine contractors on the installation of "living shorelines." Living shorelines use vegetation alone or with some type of harder shoreline structure (e.g. oyster reefs or rock sills) to maintain continuity of the natural land-water interface and reduce erosion while providing habitat value for wildlife and enhancing coastal resilience. This course is being designed with input from multiple partner organizations and is expected to be completed during the next fiscal year. Other projects begun in FY 2016-17 included educational outreach regarding new Critical Wildlife Areas (areas where important congregations of wildlife can be protected from human impacts during critical parts of their life cycle), outreach efforts to dog owners to reduce dog disturbance of wildlife on beaches, publication of a quarterly newsletter to keep partners and others abreast of coastal wildlife issues, and work to address other conservation actions identified in species action plans for State-listed species.

Citizen Awareness Program

Section 379.2291(5), *Florida Statutes*, requires 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 regularly provide information to and interact with the public about listed species by conducting citizen awareness programs throughout the agency to fulfill the statutory requirement. The following summarizes these efforts for listed species from July 1, 2016, to June 30, 2017.

FWC engaged in major efforts promoting citizen awareness of listed or at-risk species and their habitats in FY 2016-17. Examples include:

FWC is celebrating the 75th anniversary of Florida's Wildlife Management Areas (WMA) system in 2017 with the goal of broadening awareness of the WMAs and their benefits to wildlife, habitats, and people. Events and activities for the public started in January 2017 and continue throughout the year: http://myfwc.com/viewing/recreation/celebrate75/. The kickoff was held January 21, 2017, at Babcock-Webb WMA, the first area acquired in what is now one of the Nation's largest, most successful WMA systems. Nearly 500 people attended, most of them families and first-time visitors to a WMA. Like other WMAs, Babcock-Webb is home to many of Florida's Endangered and Threatened species. Among the many family-friendly activities at the event were booths on the Florida bonneted bat and the red-cockaded woodpecker, both Federally-Endangered species. Biologists working with these species at

Babcock-Webb WMA, the only place where bonneted bats have been documented on public lands. talked to the public about the bat and the woodpecker, including what is being done to conserve them and how people can help. Also part of the kickoff was a "Wings Over Florida" birding field trip, organized by FWC staff with the Great Florida Birding and Wildlife Trail. A female red-cockaded woodpecker posed at the opening of her nest box for several minutes while field trip participants heard about efforts to support the species.

Other 75th anniversary activities also are aimed at getting the public interested and excited about visiting WMAs, which not only conserve Endangered and Threatened species and their habitats but offer opportunities for wildlife viewing, boating, hunting, hiking, paddling trails, camping, and biking. The activities include:

- Bioblitzes involving citizen scientists were held for the first time on WMAs around the state. The first one on April 1 at Chassahowitzka WMA had 40 participants going out with biologists and looking for reptiles, amphibians, birds, and insects. The citizen scientists uploaded photos of what they saw on the outing, plant or animal, to the iNaturalist app: http://www.inaturalist.org/. Experts with iNaturalist then identify the species. The new Florida Nature Trackers project on iNaturalist is collecting observations from these bioblitzes, as well as on other Florida WMAs and species, with the goal of expanding the knowledge and documentation of Endangered and Threatened species on WMAs. A "Join a bioblitz to survey species on WMAs" message was sent out on April 25, 2017: http://myfwc.com/news/news-releases/2017/april/25/bioblitz/.

- About 59,000 FWC email subscribers received six articles on topics tied to the wildlife, habitats, and the importance to people of Florida's WMAs. The six articles mentioned species such as the red-cockaded woodpecker (Birding on WMAs); reticulated and frosted flatwoods salamanders (Happiness from a Salamander's Perspective); coastal lowland cave crayfish and short-tailed snake (Hidden Secrets of Florida WMAs); ornate chorus frog (Righting Wrongs and Bob Dylan Songs); frosted flatwoods salamander (The Power of Partnerships Part 2); Florida scrub-jay, Florida burrowing owl, Florida sand skink, and Eastern indigo snake (What Can You Do article).

- A weekend-long wildlife viewing and paddling event was hosted by Escribano Point WMA, in which most of the 18 participants were new to visiting a WMA and became interested in volunteering to assist wildlife management efforts in the future. The group also picked up a large pile of litter on the shore.

- Other Wings Over Florida events tied to the anniversary: a February outing in the Florida Keys Wildlife Environmental Area (WEA), which gave attendees a good look at Threatened white-crowned pigeons in dense tropical hardwood forest, and an April outing at Three Lakes WMA, where Endangered red-cockaded woodpeckers and Threatened crested caracaras were viewed.

- The 75 Years Wild photo contest on Facebook and Instagram was announced in a February 15, 2017 press release: http://myfwc.com/news/news-releases/2017/february/15/photo-contest/, and the geocaching contest on WMAs was announced in a March 13 press release: http://myfwc.com/news/news-releases/2017/march/13/wma-geocaching.

- A calendar of events informs the public about 75th anniversary events: http://outreach.myfwc.com/events/event_list.asp?show=&group=&start=2%2F10%2F2017&end=&view=&cid=16711.

Milestones achieved in the recovery of Endangered Florida panthers during FY 2016-17 were shared with the public, such as when an adult female panther and panther kittens were documented for the first time north of the Caloosahatchee River in southwest Florida. The presence of a female Florida panther was positively verified by FWC on the Babcock Ranch Preserve in Charlotte County in November 2016. This first verified documentation since 1973 of a female north of the Caloosahatchee River, historically a great hindrance to dispersal of female panthers, was shared with the public in a November 14, 2016 press release: http://myfwc.com/news/news-releases/2016/november/14/female-panther/. Shortly afterwards in March 2017, two young kittens were documented, indicating breeding also is occurring north of the Caloosahatchee River, and a press release was issued on March 27, 2017: http://myfwc.com/news/news-releases/2017/march/27/kittens/. The presence of breeding females north of the Caloosahatchee River represents a milestone for Florida panther recovery and demonstrates panthers can naturally expand their breeding territory across the river.

FWC's "Restore the Night Sky" National Resource Damage Assessment Early Restoration grant provided funds for a sea turtle educational campaign focused on educating visitors in northwest Florida about sea turtles and lights during the 2016 sea turtle nesting season. FWC partnered with Sachs Media Group to develop four key messages: "Do Not Disturb: Turtle Nesting in Progress," "Use the Right Light to Help Sea Turtles at Night." "Turn Out the Lights to Save a Life," and "Clear the Way at the End of the Day." The campaign reported a reach of 265,916 people on Facebook and 251,268 on Instagram. A total of 48 pieces of social media content were created and promoted, including a social media video, broadcast radio spots and a Pandora radio spot. There also were several press releases, including this one on September 13, 2016: Learn about sea turtles, practice turtle 'Safety 101': http://myfwc.com/news/news-releases/2016/september/13/sea-turtles/.

FWC's online community engagement during Manatee Awareness Month in November 2016 was more comprehensive and creative than ever. The manatee, recently reclassified as a Threatened species, is the official state marine mammal and one of the state's iconic species. FWC's goal was to get people informed and excited about helping conserve manatees during this month celebrating their presence in

springs, rivers, and coastal waters. This included making manatees fun and relevant to audiences often unacquainted with them, including kids, tourists, and new Florida residents. It is also the month when manatees start migrating to warmer waters and manatee protection zones become active on waterways, so it was important to remind boaters, jet skiers, and paddlers to look out and slow down for manatees, and also not to get too close and disturb them. Online engagement kicked off with a November 1 press release with a link to a Flickr album of 109 manatee photos: http://myfwc.com/news/news-releases/2016/november/01/migrating-manatees/. The press release was sent by email to media statewide and more than 30,000 subscribers to FWC manatee news on GovDelivery. Additionally in November, 11 manatee-related posts appeared on MyFWC's Facebook, including posts about a photo contest, a quiz, two short videos, a live video broadcast from a spring where manatees shelter in winter, and two rescues, including one on November 30 reaching over 100,000 people. On the last day of the month, people got to "Like" their favorite of five finalists in the photo contest, with the winner announced later that day. With online community engagement, all the basic messaging about how people can help manatees was highlighted, including: slow down for manatees when boating; wear polarized sunglasses to spot circular "footprints" they leave on the water's surface; watch for them in shallow waters; discard fishing line properly to avoid their entanglement; and report injured, sick, entangled, or dead manatees to the FWC's Wildlife Alert Hotline, 1-888-404-FWCC (3922). People also were reminded about buying a "Save the Manatee" license plate or manatee decal to support research, rescue and management of the species. During November, manatee messaging appeared on a cross section of other social media platforms, including at least 25 Tweets, four MyFWC Instagram posts and others on Snapchat. Social media posts included links to www.MyFWC.com/Manatee, the online site for all things manatee, and the popular webpage, "Where Can I See Manatees in Florida?" The results? On November 1, the "Epic journey of a pregnant manatee" Facebook post reached over 53,000 people. Other Facebook posts went as high as over 65,000 people looking at the five finalists in the manatee photo contest and picking their favorite, over 81,000 people exposed to the "It takes a team" video, and over 100,000 people following the rescue of a manatee stuck in a storm drain.

A SIGNIFICANT PORTION OF FLORIDA'S UNDEVELOPED LAND IS PRIVATELY OWNED, THEREFORE, EFFECTIVE PARTNERSHIPS WITH PRIVATE LANDOWNERS ARE A PRIORITY FOR FWC AS AN INNOVATIVE STRATEGY TO MAINTAIN AND RESTORE DIVERSITY OF WILDLIFE IN THE STATE, INCLUDING ENDANGERED AND THREATENED SPECIES. The "Using fire on a Florida cattle ranch conserving wildlife" video shows the importance of the partnership between a private landowner and the FWC's Landowner Assistance Program (LAP) in achieving a successful prescribed fire benefiting both wildlife and cattle on a Central Florida ranch. The audience is meant to

be private landowners, and also Floridians unaware that landowners using prescribed fire play a critical role in helping conserve the state's wildlife and habitats. The video is posted on the Private Lands Partnership homepage, www.MyFWC.com/LAP, as well as on YouTube: https://www.youtube.com/watch?v=zYGmW-CJmAE. The video was shown at an October 2016 conference in Florida of Partners for Conservation, a national grassroots group of private landowners collaborating with agencies and organizations to support conservation. The video also is used by LAP biologists when they are presenting at meetings and workshops. Prior to 2016, the LAP did not have any videos promoting the program.

MEDIA RELATIONS – FWC press releases reach substantial regional and statewide media 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.

MEDIA	NUMBER REACHED
Northwest Region	105
North Central Region	64
Northeast Region	93
Southwest Region	49
South Region	143
STATEWIDE TOTAL	11,949

During FY 2016-17, the FWC issued many press releases on Endangered and Threatened species. FWC press releases are posted online at www.MyFWC.com/News. Examples include:

- FWC seeking additional public input on Collier County manatee zones, July 5, 2016: http://myfwc.com/news/news-releases/2016/july/05/manatee-collier/.
- FWC workshop July 12 in Walton County gives local governments ways to conserve gopher tortoises, July 6, 2016: http://myfwc.com/news/news-releases/2016/july/06/gopher-workshop/.
- FWC requests public input at Critical Wildlife Area workshops, July 7, 2016: http://www.myfwc.com/news/news-releases/2016/july/01/franklin-cwa/.
- City of St. Augustine partners with FWC to protect nesting shorebirds, July 13, 2016: http://myfwc.com/news/news-releases/2016/july/13/staug-shorebirds/.
- 'Hands off!' is best policy for sea turtle hatchlings, August 25, 2016: http://myfwc.com/news/news-releases/2016/august/25/hatchlings/.
- Learn about sea turtles, practice turtle 'Safety 101', September 13, 2016: http://myfwc.com/news/news-releases/2016/september/13/sea-turtles/.
- Naples Zoo welcomes Florida Panther Festival, October 25, 2016: http://myfwc.com/news/news-releases/2016/october/25/pad-panther-fest/.

- Watch out for migrating manatees! November 1, 2016: http://myfwc.com/news/news-releases/2016/november/01/migrating-manatees/.
- FWC to assist with sea turtle-friendly lighting retrofits on beachfront properties, November 3, 2016: http://myfwc.com/news/news-releases/2016/november/03/turtle-friendly/.
- FWC collects evidence of a female panther north of Caloosahatchee River, November 14, 2016: http://myfwc.com/news/news-releases/2016/november/14/female-panther/.
- FWC approves unprecedented effort to protect vulnerable Florida wildlife, November 16, 2016: http://myfwc.com/news/news-releases/2016/november/16/cwas-created/.
- FWC approves historic plan to conserve imperiled species, November 17, 2016: http://myfwc.com/news/news-releases/2016/november/17/ismp/.

SOCIAL MEDIA – FWC's Facebook site reached a new peak of more than 136,000 followers as of June 30, 2017. The newer FWC Fish and Wildlife Research Institute (FWRI) Facebook site reaches nearly 32,000 followers. FWC's Great Florida Birding Trail Facebook site now has more than 15,000 "Likes". The Agency's social media team has also begun doing live social media on Facebook, including two occasions where the topic was manatees.

FWC's use of social media goes beyond Facebook, and all the Agency's social media audiences grew significantly during FY 2016-17:

- Flickr photo views reached more than 14 million.
- YouTube video views reached 2.4 million.
- Twitter followers grew to more than 35,000.
- Instagram followers reached more than 36,000.

(FWC uses two Twitter, two YouTube and two Flickr accounts to highlight listed species, numbers were combined.)

FWC's social media is meant to be exciting as well as educational to keep audiences interested in stories about Florida wildlife. Several examples include:

- *BIG LEAP FOR FLORIDA PANTHER CONSERVATION ON MYFWC FACEBOOK, MARCH 27, 2017*. At least two panther kittens have been documented north of the Caloosahatchee River. This is a big leap for Florida panther conservation because it indicates panthers are expanding their breeding territory across the river naturally. This is a major milestone on the road to recovery for the Florida panther. These kittens are presumed to be the offspring of the first wild female panther documented north of the river since 1973! In the two images below—taken just seconds apart by one of our trail cameras—one of the kittens can be seen following closely behind its mother. We

work closely with the the first wild female panther documented north of the river since 1973. The post reached 2,200 people.

- *Cold stressed manatee rescue "music video" on FWRI Facebook, December 30, 2016*. When manatees experience prolonged exposure to water temperatures below 68 degrees, they can develop a condition called cold-stress syndrome, which can be fatal. Two manatees, a mother and the first wild female panther documented north of the river since 1973! In the two images below—taken just seconds apart by one of our trail cameras—one of the kittens can be seen following closely behind its mother. We work closely with the USFWS to ensure panther conservation on both private and public lands.the first wild female panther documented north of the river since 1973! In the two images below—taken just seconds apart by one of our trail cameras—one of the kittens can be seen following closely behind its mother. We work closely with the USFWS to ensure panther conservation on both private and public lands. the first wild female panther documented north of the river since 1973! In the two images below—taken just seconds apart by one of our trail cameras—one of the kittens can be seen following closely behind its mother. We work closely with the USFWS to ensure panther conservation on both private and public lands.her dependent calf, were rescued in Crane Creek in Melbourne the previous day after exhibiting signs of cold stress. The mom had severe cold stress but the calf's injuries were minor. The rescue team captured both transported them to Sea World Orlando for rehabilitation. The post reached 121,849 people.

- *Tiny turtles take back to the ocean "music video" on MyFWC's Facebook, November 5, 2016*. Approximately 1,700 sea turtles were released back into the ocean. The young sea turtles were found stranded along Florida's east coast beaches following rough winds and waves caused by hurricanes. The "washbacks," as they are referred to by sea turtle biologists, were rescued and taken to specialized sea turtle rehab facilities to recuperate until weather conditions were safe enough for them to be returned to the ocean. The post reached 307,111 people.

GovDelivery and Websites - The public in today's world turns to email and the Internet for instant information on Florida's listed species and their habitats.

Approximately 1.6 million people regularly receive emails from FWC, including news and updates on Endangered and Threatened species. GovDelivery, which FWC began using in 2013, lets the public sign up for emails or text updates on topics they choose. MyFWC.com visitors just click on the "Sign Up" tab on all FWC webpages to get started. GovDelivery helps increase citizen awareness of Endangered and Threatened species.

Last year, 1,935 messages and 80,240,557 emails were sent to more than 1.5 million GovDelivery subscribers. These messages averaged an engagement rate of 42%. This is the percentage of recipients who opened the bulletin or clicked on a link. The median engagement rate for government/nonprofits is 17.5 percent. There were 1,618,989 FWC GovDelivery subscribers as of June 30, 2017.

Florida panther website was redesigned in early 2017 to make topics easier to find: http://myfwc.com/wildlifehabitats/managed/panther/. Many topics that people are most interested in – such as Panther Pulse updates on births, deaths, and depredations; "A guide to living with Florida panthers;" Report Panther Sightings; and the "Protect the Panther" license tag – are posted on the panther home page. The menu of panther issues is extensive, including description and range, capturing panthers, biology, genetics, health, wildlife crossings, reports, and how to help. People can access the panther webpages at MyFWC.com/panther.

The Great Florida Birding and Wildlife Trail website was recognized with a 2016 first place award by the Association of Conservation Information, a peer-based organization of state wildlife agency professionals across the U.S. The visually compelling, interactive website, http://floridabirdingtrail.com/, uses a video for its home page, and includes a Trip Planner for the many state residents and visitors who want to know where to go to see Florida's diversity of birds and their habitats in different areas of the state. Birds are featured on the website using photos, information on species' behavior and habitats, and where to find them "on the trail." Also featured on the site are Florida butterflies and a calendar of events.

A new webpage addressing manatee entanglement was created and added to MyFWC.com/Manatee. FWC produced a comprehensive explanation of entanglement issues affecting Florida manatees: http://www.myfwc.com/wildlifehabitats/managed/manatee/entanglement/. According to researchers, in over 6,500 manatee necropsy reports from a 20-year dataset (1993 to 2012), over 11 percent of the animals that died either ingested or showed evidence of entanglement in marine debris. The webpage includes information on how people can help.

Fairs, Festivals and Events – FWC shows up at places where kids, families, retirees, and tourists are having fun to share the excitement and importance of conserving Florida wildlife, including Endangered and Threatened species.

22nd annual MarineQuest attracts over 17,600 visitors – The FWC's Fish and Wildlife Research Institute's 22nd annual open house was held October 20-22, 2016. More than 1,600 students in grades fourth through eighth and their teachers attended, as well over 16,000 additional visitors. Students toured lab stations managed by FWC scientists. Hands-on displays and activities drew students into the world of marine science and the fascinating things that scientists discover. Displays spotlighted listed species such as the manatee, panther, North Atlantic right whale, sea turtles, and corals. Visitors participated in the

simulated rescue of a manatee. A "MarineQuest features educational fun for all ages" press release went out on October 19, 2016: http://myfwc.com/news/news-releases/2016/october/19/marinequest/.

Coastal Wildlife Conservation Initiative (CWCI) hosts booth at MarineQuest for the first time. The CWCI booth focused on several important coastal issues, including marine debris, mechanical beach cleaning, and entrapment of diamond-backed terrapins in blue crab traps. Children drew coastal pictures on a canvas, while CWCI team members discussed how attendees could help address coastal problems. CWCI also distributed outreach materials such as the highly popular "Beach Wrack ID Guide." Many visitors left the booth with a new understanding of the importance of beach wrack to wildlife and the harm that items such as balloons can do to wildlife on the beach.

Florida Panther Festival 2016 breaks records at Naples Zoo. The Naples Zoo at Caribbean Gardens hosted a record-breaking Florida Panther Festival in 2016 with over 5,500 guests attending. The festival was held on November 5, 2016 in conjunction with the zoo's free admission day for Collier County residents, which occurs on the first Saturday of each month. Attendees enjoyed several outdoor exhibits by area conservation partners and gained valuable information from talks about living with wildlife presented by subject matter experts. They learned about Florida panther research and management activities from FWC panther biologists at their booth set up near "Uno," the zoo's resident Florida panther. A "Naples Zoo welcomes Florida Panther Festival" press release went out October 25, 2016: http://myfwc.com/news/news-releases/2016/october/25/pad-panther-fest/.

Florida celebrates its second Gopher Tortoise Day. Florida continued to celebrate April 10 as Gopher Tortoise Day in 2017. Florida first joined other southeastern states in celebrating April 10 as Gopher Tortoise Day in 2016 to raise awareness about this State-designated Threatened keystone species. Over 350 wildlife species use the extensive burrows of gopher tortoises for shelter, including Endangered and Threatened species like the Eastern indigo snake, gopher frog, and Florida mouse. During FY 2016-17, a Gopher Tortoise program intern advertised Gopher Tortoise Day to local governments and the general public to raise awareness for the gopher tortoise through the adoption of a resolution. Local governments were encouraged to view the Gopher Tortoise Day website, GopherTortoiseDayFL.com, which is packed with "how to" tools, including how to host a gopher tortoise event, a sample Gopher Tortoise Day resolution, educational materials, and fun facts. The project resulted in eight counties and eight municipalities adopting resolutions proclaiming April 10 as Gopher Tortoise Day in their jurisdictions. Through these efforts, numerous Gopher Tortoise Day events were hosted throughout the state. FWC also sent out a press release, http://gophertortoisedayfl.com/news-release/, and a Gopher Tortoise Day Facebook post. The goal is for Gopher Tortoise Day to become a tradition in Florida.

PUBLICATIONS, EXHIBITS AND SIGNS – Sharing compelling stories and critical information about Florida wildlife in writing and pictures is an inviting challenge.

For over 20 years, FWC researchers have been detectives, tracking the travels of manatees along Florida's coasts and rivers. During FY 2016-17, the "Tracking Manatees" decal, https://www.flickr.com/photos/myfwcmedia/27766136016/in/photolist-ox5C7y-eVh6wf-JiAGSw-cpG18d-WCtXpg-eVh6ym-ox1FgV-cpG1f1-JiAGT3-ofMRwA-WQcK3r, highlighted these efforts and took second place in the graphic category in the Association of Conservation Information's annual competition. To track manatees, researchers attach a buoyant radio tag to a padded belt around their tail. The tag contains a satellite-linked Global Positioning System (GPS) transmitter. The GPS-transmitted locations then provide a detailed record of manatees' movements and migratory behavior. Wildlife managers use the tracking data to improve the management strategies used for continued recovery of this large aquatic mammal. This manatee decal, available for a $5 donation from local tax collectors' offices around the state and through the FWC, highlights a manatee with a tracking device. It was designed to look awesome on a kayak, paddleboard, surfboard, canoe, motor boat, personal watercraft, or vehicle. Manatee decal funds are used for conservation of this Endangered species.

VISITORS TO SEVERAL WMAS HAVE NEW MATERIALS HIGHLIGHTING SPECIES THERE AND HOW THEY ARE BEING CONSERVED. Interpretive plans for WMAs are prepared to guide development of interpretive panels, guides, webpages, and other materials, and every year, work is done to implement portions of these long-term plans. These plans include information about the importance of each WMA to native species, including Endangered and Threatened species. During FY 2016-17, interpretive products were produced for Andrews, Chassahowitzka, and Jones/Hungryland WMAs, highlighting the alligator snapping turtle, gopher tortoise, snail kite, limpkin, round-tailed muskrat, and Florida panther. In addition, a recreation guide for Caravelle Ranch WMA is near completion and will highlight the Southeastern American kestrel, Florida sandhill crane, short-tailed hawk, swallow-tailed kite, gopher tortoise, hooded pitcher plant, and Florida black bear.

LIVING ON THE EDGE NEWSLETTER. The CWCI launched a new quarterly newsletter called "Living on the Edge," focusing on coastal issues. It has covered topics relevant to Endangered and Threatened species such as coastal habitat restoration, sea turtle egg poaching, shorebird disturbance and predation, marine debris, mechanical beach cleaning, Critical Wildlife Areas, the Imperiled Species Management Plan, and right whale migration. The newsletter's readership grew to over 10,000 during FY 2016-17.

Florida panther removed from wild and placed in captive management. FWC, in cooperation with federal partners, captured a Florida panther at Farm Worker Village near Immokalee in Collier County on April 12, 2016 because of several unexpected direct encounters with residents as the panther preyed on feral cats. After a brief stint in captivity to make sure it was not harboring the fatal feline leukemia virus, the panther was radiocollared and released in the southern portion of Big Cypress National Preserve in late May. This relocation was done as a form of aversive conditioning with the intent of altering the panther's behavior to avoid residential areas. The panther, now identified as FP243, trekked northward 42 miles from his release site to the Big Cypress Seminole Indian Reservation community and displayed similar behavioral patterns. Although FP243 never displayed any aggressive behavior towards humans, the pattern of behavior was concerning enough that the Interagency Florida Panther Response Team decided to remove him from the wild as a proactive response. After consulting with the Tribe, FP243 was captured on July 21, 2016 and permanently placed at Tampa's Lowry Park Zoo. FP243, now known as "Micanopy" shares a space with LPZ's female Florida panther, "Lucy." The story of rhe panther and its new home was shared in a press release from USFWS: https://www.fws.gov/verobeach/20170213PantherGetsNewHomeatTLPZ.htmlU.

Don't Cut the Line. Several new efforts were made as part of the "Don't Cut the Line!" campaign during FY 2016-17. This campaign focuses on how to safely unhook a pelican or other seabird, while also providing information on how to prevent seabird entanglement. New citizen awareness efforts included: a video demonstrating how to safely unhook a pelican; articles in fishing publications; public presentations at partner group meetings; messaging at FWC's Kids' Fishing Clinics and FWC's Law Enforcement Officer Training; additional signage placed at various piers and boat ramps throughout the state; updating the rehabilitator list; a new method of reporting death due to entanglement on the FWC's Bird Mortality Database; the creation of a bilingual sign in partnership with Volusia County; surveying anglers to find out if they know how to handle a hooked bird; and distribution of several thousand more decals and "What to Do if You Hook a Pelican" brochures.

Manatee outreach resource boxes were created for six FWC law enforcement locations around the state that provide staff with materials to use in presentations or at events. The boxes include manatee bones, fossils, hands on items, activities, pictures, research information, and a variety of support items. This in-reach project meets the need for front-line staff to learn about and encourage public conservation for one of the Agency's listed species.

The Manatee Cultural Art Treasure Quest, a somewhat different manatee awareness community project, was completed this year for several counties in North Florida. The Manatee Cultural Art Treasure Quest

promotes the discovery of significant but lesser known manatee-related cultural or art items to participants willing to search for them in North Florida locations. The quest debuted in June 2017 and is part of the WFSU Summer Passport program. Start the quest at: http://www.myfwc.com/education/wildlife/manatee/where-to-see/.

THE CWCI CREATED SEVERAL NEW BROCHURES AND GUIDES TO RAISE AWARENESS OF WHAT'S GOING ON AT THE BEACH AND HOW BEACHGOERS CAN HELP CONSERVE SPECIES AND HABITAT:

- *Grow a Better Beach* – A brochure emphasizing the importance of beach vegetation to many types of wildlife, including Endangered and Threatened species. It recommends the reduction of mechanical beach cleaning, and includes a commitment card that may be mailed in to receive a vehicle magnet to spread the message.

- *Beach Wrack ID Guide* – A pocket-sized, waterproof flipbook demonstrating the value of beach wrack by highlighting the many organisms that are a part of the wrack. It recommends keeping wrack on the beach rather than removing it via mechanical beach cleaning. The guide has been popular, with partners around the state requesting copies.

- *Dogs on the Beach*: Being a wildlife-friendly pet owner – A brochure addressing the major issue of dogs on the beach that can harm many Endangered and Threatened species. It outlines the importance of the beach habitat to several different types of wildlife, the ways that dogs can impact beach wildlife and guidelines for dogs on beaches. It includes a list of some pet-friendly beaches throughout the state where people can take their dogs instead of taking them to wildlife-sensitive areas.

- *Conserve Nature Coast Waterbirds* – A brochure highlighting the importance of the Nature Coast to Endangered and Threatened waterbirds and recommends actions that can minimize disturbance of waterbirds. FWC partnered with the Nature Coast Biological Station and USFWS to develop and distribute this brochure.

VOLUNTEER OPPORTUNITIES – FWC volunteers contribute greatly to the success of the state's conservation of Endangered and Threatened species. The agency's regional volunteer coordinators work with staff and partners to develop and sustain projects that meet strategic objectives and involve all aspects of volunteer management. Endangered and Threatened Species conservation is one of the focal issues for volunteer coordinators. Examples of volunteer efforts during FY 2016-17 include:

- *Project Acorn, a multi-year project led by Ridge Rangers volunteers, engaged about 500 volunteers in restoration of oak scrub habitat on the Lake Wales Ridge WMA in Central Florida.* Scrub habitat is home to Threatened species such as the gopher tortoise and Florida scrub-jay. In July and August 2016, Ridge Rangers and civic organizations planted 1,400 scrub oak sprouts in the Royce Unit scrub restoration area, completing the third year of this work. An additional 400 scrub oaks and 100 wiregrass plants were planted in May and June 2017. In fall 2016, Ridge Rangers

gathered scrub oak acorns from FWC conservation areas and staffed outreach booths at community festivals, where attendees potted the acorns in trays. Sprouts from these acorns were later planted in May and June of 2017.

- *Volunteers help survey Florida scrub-jays*. Surveys of populations of the Threatened Florida scrub-jay were conducted with partners on public and private lands for Jay Watch, an Audubon of Florida program. Volunteers surveyed six properties in Citrus, Marion, Sumter, and Lake counties to determine the number of family groups, family group sizes and habitat use, while also identifying banded scrub-jays. Twenty-six volunteers helped with scrub-jay surveys in the FWC's northeast region at sites including Halpata Tastanaki Preserve, Cross Florida Greenways "Triangle" Property, the Ross Prairie State Forest, Ocala State Forest, and Half Moon WMA. Volunteers also participated in scrub-jay surveys at Moody Branch Mitigation Park in Manatee County.

- *The Southeastern American kestrel benefits from nest box program which augments habitat by providing more nesting opportunities*. The Threatened Southeastern American kestrel is a cavity nester. Due to a reduction in available habitat, FWC has a nest monitoring project which involves placing nest boxes in areas of suitable habitat. In FWC's northeast and north-central regions, five volunteers monitored 14 nest boxes, recording the number of eggs and nestlings on four properties in Marion, Sumter, and Citrus counties. Kestrels actively used two of the 20 boxes. In FWC's southwest region, three volunteers monitored 19 kestrel boxes in Hernando County, and 23 kestrel boxes in Polk County. Six of the 19 boxes in Hernando County were occupied by kestrels while four of the 23 boxes in Polk County were occupied by kestrels.

- *FWC volunteers participate in survey seeking evidence of Endangered Florida bonneted bat in Central Florida*. Eleven citizen scientists assisted natural resource professionals in conducting surveys using acoustic song meters to detect the presence of the Florida bonneted bat on 22 properties in central Florida. The study area included De Soto, Hardee, Highlands, Okeechobee, Polk, Sarasota, and Charlotte counties, including 11 public conservation lands and 11 private residential properties. While the Florida bonneted bat was not found on any of the 22 properties, a total of 46,417 bat calls were recorded and analyzed. The six bat species detected during the surveys were Brazilian free-tailed bat, tricolored bat, evening bat, northern yellow bat, big brown bat, and the Seminole bat.

- *Gopher tortoise surveys conducted to identify burrows on soon to be developed properties*. Gopher tortoise burrow surveys were conducted in Lee, Citrus, and Lake counties to facilitate relocation of gopher tortoises from development sites permitted for incidental take. During FY 2016-17, FWC trained five new volunteers and utilized 12 existing volunteers for the Incidental Take Permit (ITP) relocation program. FWC volunteers conducted gopher tortoise surveys on properties with active ITPs in Coral Gables (Lee County), Lecanto (Citrus County), and Grand Island (Lake County). A total of 96.5 acres were surveyed and volunteers documented 626 gopher tortoise burrows.

- *Partners, volunteers, and landowners succeed in moving gopher tortoises 400 miles to new home*. During eight days in late April 2017, 160 gopher tortoises were moved from a property in Land

O'Lakes, Pasco County and relocated to Eglin Air Force Base in Okaloosa County, over 400 miles away. The property in Land O'Lakes was soon to be developed and had an active ITP. The property owners worked with the FWC to remove all gopher tortoises prior to construction. This endeavor was coordinated by FWC, Eglin Air Force Base, and the USFWS. Central to the success of this project was a dedicated group of volunteers who drove the gopher tortoises to their new home.

- *Volunteers aid shorebird/seabird monitoring and stewarding efforts during a successful breeding season*. Prior to nesting season, FWC hosted shorebird stewarding and monitoring trainings for the Brevard County Shorebird Partnership, Volusia County Shorebird Partnership and St. Johns/Flagler Shorebird Partnership. FWC volunteers then monitored beaches and rooftops for shorebird and seabird activity in Nassau, Duval, St. Johns, Brevard, and Volusia counties, and reported data to the FWC's Florida Shorebird Database. Before the end of the season, 282 least tern chicks were counted at two colonies in Anastasia State Park. Volunteers also acted as beach stewards to protect from disturbing least tern colonies and black skimmer nests in St. Johns County and nesting American oystercatchers and Wilson's plovers in Volusia County. Volunteers spoke with more than 400 beachgoers and dealt with dozens of situations of dogs on the beach to explain how disturbance harms nesting shorebirds and seabirds. Volunteers also monitored building rooftops on the beach where chicks had no protection from falling – and did this work three times a day, seven days a week, between May and July. If chicks were discovered on the ground, volunteers safely returned them to the rooftops.

- *Volunteers assist with habitat management activities for Florida burrowing owls*. Installation of artificial burrows for Florida burrowing owls, a Threatened species, were conducted in collaboration with partners. Thirteen volunteers assisted with the installation of 14 artificial burrows in Broward and Palm Beach counties. Within one month of installation, eight burrows were occupied by four pairs of owls. Three of the owl pairs fledged a total of ten chicks.

- *Volunteers assisted in restoration and management of Critical Wildlife Areas*. Martin County Number 2, a two-acre spoil island located in the Indian River Lagoon in Martin County, is a designated Critical Wildlife Area (CWA) due to the high number of at-risk birds using the island for nesting or roosting. Three volunteers planted 50 green buttonwood trees and five red mangroves, removed balsam apple vine, conducted bird surveys outside of the breeding season, and baited, set up, and collected rat traps around the island. On other CWAs in Collier County, Big Marco Pass (456 acres) and ABC Islands (75 acres), a volunteer helped with maintenance of posted signs in these critical areas for nesting and roosting of shorebirds and wading birds.

- *International Coastal Cleanup partnership* – The CWCI partnered with the Ocean Conservancy and many local organizers for the first time on the International Coastal Cleanup Day on September 17, 2016 to promote and educate participating volunteers. In addition to the important goal of cleaning up trash that threatens marine and coastal wildlife, the CWCI raised awareness about other threats, such as mechanical beach cleaning and wildlife disturbance, by distributing outreach materials. A video was created to highlight the contributions of volunteers around the state.

COMMUNITY MEETINGS, WORKSHOPS, AND PRESENTATIONS – FWC interacts with communities, including homeowners, private landowners, businesses, and stakeholders on an array of issues involving living with Florida's listed species.

NEW FLORIDA PANTHER OUTREACH SPECIALIST REACHES OVER 4,000 CITIZENS. A panther public information specialist, a newly created position in the FWC panther management program, began the important role of promoting panther education and awareness in November 2016. The primary part of this job is presenting panther education programs to varied audiences of all ages. One of the major goals of this panther outreach specialist is to reduce conflicts between humans and panthers through education and community-wide efforts to secure attractants. These efforts are primarily focused in southwest Florida where a continuous influx of new residents share the environment with the majority of the Florida panther population. In just the first six months of this job, the panther outreach specialist gave 21 presentations, participated in 13 festivals and other events, and reached more than 4,000 people.

THE 20TH ANNUAL MARINE TURTLE PERMIT HOLDER WAS HELD FEBRUARY 24-26, 2017 IN GAINESVILLE. Topics presented at the Gainesville meeting included FWC updates on sea turtle nest and stranding numbers, the Wildlife Lighting program, and management activities. Sea turtle biologists with the USFWS and National Oceanic and Atmosphere Agency's Marine Fisheries Service (NOAA-NMFS) provided updates on federal sea turtle programs. There was also a session highlighting marine turtle research, conservation, and education projects funded from the Sea Turtle License Plate Grants Program.

SEVEN GOPHER TORTOISE WORKSHOPS WITH LOCAL GOVERNMENTS HELD ACROSS THE STATE. FWC held seven workshops in July and August 2016 with the goal of identifying ways cities and counties could participate in protecting one of Florida's Threatened species. Partnerships involving cities, counties, and FWC have led to important projects to help conserve gopher tortoises and their extensive burrows, which shelter many other native wildlife species. This was the eighth year of the workshops, which have been held in 39 counties to date. Over 55 people attended this year's Palm Beach County workshop, including representatives of the Palm Beach County Code Enforcement Officers Association, the Town of Jupiter, Florida Department of Transportation, the Village of Palm Springs, St. Lucie Botanical Gardens, and Palm Beach County.

PREVENTING SEABIRD ENTANGLEMENT PRESENTATIONS. The CWCI gave public presentations about seabird entanglement at several locations throughout the state, including Panama City, Yankeetown, Rockledge, and Fort Lauderdale. The main messages were to avoid feeding birds because it encourages them to congregate in areas where they are likely to be harmed; use seabird-friendly fishing practices to avoid

entanglement such as discarding of fish carcasses in lidded trash cans; and do not cut the line when a seabird gets hooked – instead reel, remove, and release.

SCHOOL-BASED PROGRAMS AND PRESENTATIONS – FWC regularly reaches out to teachers who can get school-aged children energized and excited about the wildlife in Florida and what they can do to help conserve native species.

RECRUITMENT, RETENTION, AND REACTIVATION OF PROJECT WILD FACILITATORS HAS LED TO A 61 PERCENT INCREASE IN PROJECT WILD WORKSHOP PARTICIPATION. Project WILD workshops were brought to 28 counties in FY 2016-17. Each educator equipped with Project WILD curricula can impact 25 or more students per year, increasing and expanding youth participation in wildlife discovery. Project WILD facilitators are supported and celebrated at Call of the WILD, a weekend held at FWC's Ocala Youth Conservation Camp. Dr. Rebecca Baldwin from the University of Florida Entomology Department was the guest lecturer. The Call event is also a place where team building is possible through outdoor experiences such as kayaking and canoeing on Lake Eaton. Awards are distributed to active facilitators. Three new groups of volunteer facilitators were recruited and trained during FY 2016-17. WILD hosted a north area, south area, and panhandle area training. New recruits are paired with experienced WILD Ones, who are available to help plan and conduct workshops. Observing such success and enthusiasm, many inactive WILD Ones have reconnected to the fold and are conducting workshops, participating as mentors, and assisting at "train the trainer" workshops. More on Project WILD: http://myfwc.com/education/educators/project-wild/.

APPENDIX A
LISTED WILDLIFE SPECIES IN FLORIDA AS OF JUNE 30, 2017

Exhibits A-1 through A-9 contain all listed species in Florida as of June 30, 2017, including each species scientific name and status: Federally-designated Endangered (FE), Federally-designated Threatened (FT), Federally-designated Threatened Due to Similarity of Appearance [FT(S/A)], or Federally-designated Nonessential Experimental species (FXN).

VERTEBRATES

Fish

Exhibit A-1
Listed Fish in Florida as of June 30, 2017

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
Gulf sturgeon	Acipenser oxyrinchus [=oxyrhynchus] desotoi	FT[1]
Harlequin darter	Etheostoma histrio	SSC
Key silverside	Menidia conchorum	ST
Okaloosa darter	Etheostoma okalossae	FT
Saltmarsh topminnow	Fundulus jenkinsi	ST
Shortnose sturgeon	Acipenser brevirostrum	FE[1]
Smalltooth sawfish	Pristis pectinate	FE
Southern tessellated darter	Etheostoma olmstedi maculaticeps	ST

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

Amphibians

Exhibit A-2
Listed Amphibians in Florida as of June 30, 2017

COMMON NAME	SCIENTIFIC NAME	STATUS
Florida bog frog	Lithobates okaloosae	ST
Frosted flatwoods salamander	Ambystoma cingulatum	FT
Georgia blind salamander	Haideotriton wallacei	ST
Reticulated flatwoods salamander	Ambystoma bishopi	FE

Reptiles

Exhibit A-3
Listed Reptiles in Florida as of June 30, 2017

COMMON NAME	SCIENTIFIC NAME	STATUS
Alligator snapping turtle	Macrochelys temminckii	SSC
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	Eumeces egregius lividus	FT
Eastern indigo snake	Drymarchon corais couperi	FT
Florida brown snake[1]	Storeria victa	ST
Florida Keys mole skink	Eumeces egregius egregius	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	Neoseps reynoldsi	FT
Short-tailed snake	Stilosoma extenuatum	ST

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

Birds

Exhibit A-4
Listed Birds in Florida as of June 30, 2017

COMMON NAME	SCIENTIFIC NAME	STATUS
American oystercatcher	Haematopus palliatus	ST
Audubon'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
Eskimo curlew	Numenius borealis	FE
Everglade snail kite	Rostrhamus sociabilis plumbeus	FE
Florida burrowing owl	Athene cunicularia floridana	ST
Florida grasshopper sparrow	Ammodramus savannarum floridanus	FE
Florida sandhill crane	Antigone canadensis pratensis	ST
Florida scrub-jay	Aphelocoma coerulescens	FT
Ivory-billed woodpecker	Campephilus principalis	FE
Kirtland's warbler (Kirtland'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
Osprey[2]	Pandion haliaetus	SSC
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

Mammals

Exhibit A-5
Listed Mammals in Florida as of June 30, 2017

COMMON NAME	SCIENTIFIC NAME	STATUS
Anastasia Island beach mouse	Peromyscus polionotus phasma	FE
Big Cypress fox squirrel	Sciurus niger avicennia	ST
Choctawhatchee beach mouse	Peromyscus polionotus allophrys	FE
Everglades mink	Neovison vison evergladensis	ST
Finback whale	Balaenoptera physalus	FE[1]
Florida bonneted bat	Eumops floridanus	FE
Florida panther	Puma [=Felis] concolor coryi	FE
Florida salt marsh vole	Microtus pennsylvanicus dukecampbelli	FE
Gray bat	Myotis grisescens	FE
Gray wolf	Canis lupus	FE[3]
Homosassa shrew	Sorex longirostris eonis	SSC
Humpback whale	Megaptera novaeangliae	FE[1]
Indiana bat	Myotis sodalis	FE
Key deer	Odocoileus virginianus clavium	FE
Key Largo cotton mouse	Peromyscus gossypinus allapaticola	FE
Key Largo woodrat	Neotoma floridana smalli	FE
Lower Keys 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[4]
Sanibel [Island] rice rat	Oryzomys palustris sanibeli	ST
Sei whale	Balaenoptera borealis	FE[1]
Sherman's fox squirrel	Sciurus niger shermani	SSC
Sherman's short-tailed shrew	Blarina shermani	ST
Southeastern beach mouse	Peromyscus polionotus niveiventris	FT
Sperm whale	Physeter catodon [=macrocephalus]	FE[1]
St. Andrew beach mouse	Peromyscus polionotus peninsularis	FE
West Indian manatee (Florida manatee)	Trichechus manatus (Trichechus manatus latirostris)	FT[1]

[1] A species for which the FWC does not have constitutional authority.
[2] Monroe County population only.
[3] Not documented in Florida.
[4] Lower keys population only.

INVERTEBRATES

Corals

Exhibit A-6
Listed Corals in Florida as of June 30, 2017

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 cylindricus	FT
Rough cactus coral	Mycetophyllia ferox	FT
Staghorn coral	Acropora cervicornis	FT

Crustaceans

Exhibit A-7
Listed Crustaceans in Florida as of June 30, 2017

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

Insects

Exhibit A-8
Listed Insects in Florida as of June 30, 2017

COMMON NAME	SCIENTIFIC NAME	STATUS
American burying beetle	Nicrophorus americanus	FE
Bartram's scrub-hairstreak	Strymon acisbartrami	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

Mollusks

Exhibit A-9
Listed Mollusks in Florida as of June 30, 2017

COMMON NAME	SCIENTIFIC NAME	STATUS
Chipola slabshell (mussel)	Elliptio chiplolaensis	FT
Choctaw bean	Villosa choctawensis	FE
Fat threeridge (mussel)	Amblema neislerii	FE
Fuzzy pigtoe	Pleurobema strodeanum	FT
Gulf moccasinshell (mussel)	Medionidus penicillatus	FE
Narrow pigtoe	Fusconai escambia	FT
Ochlockonee moccasinshell (mussel)	Medionidus simpsonianus	FE
Oval pigtoe (mussel)	Pleurobema pyriforme	FE
Purple bankclimber (mussel)	Elliptoideus sloatianus	FT
Round ebonyshell	Fusconaia rotulata	FE
Shinyrayed pocketbook (mussel)	Lampsilis subangulata	FE
Southern kidneyshell	Ptychobranchus jonesi	FE
Southern sandshell	Hamiota australis	FT
Stock Island tree snail	Orthalicus reses [not incl. nesodryas]	FT
Suwannee moccasinshell	Medionidus walker	FT
Tapered pigtoe	Fusconaia burki	FT

APPENDIX B
LIST OF ACRONYMS USED IN THIS REPORT

TERM	ACRONYM
Apalachicola River Wildlife and Environmental Area	ARWEA
Big Cypress National Preserve	BCNP
Critical Wildlife Area	CWA
Coastal Wildlife Conservation Initiative	CWCI
Deoxyribonucleic acid	DNA
Florida Department of Environmental Protection	FDEP
Florida Department of Agriculture and Consumer Services	FDACS
Florida Fish and Wildlife Conservation Commission	FWC
Fiscal Year	FY
Geographic Information System	GIS
Global Positioning System	GPS
Landowner Assistance Program	LAP
Manatee Protection Plans	MPP
National Oceanic and Atmospheric Agency's Marine Fisheries Service	NOAA-Fisheries
National Wildlife Refuge	NWR
Passive Integrated Transponder	PIT
U.S. Geological Survey	USGS
U.S. Fish and Wildlife Service	USFWS
Wildlife and Environmental Area	WEA
Wildlife Management Area	WMA

APPENDIX C
FWC'S FISH AND WILDLIFE RESEARCH INSTITUTE'S PUBLICATIONS DURING FY 2016-17

FWC strives to produce high-quality publications and has been doing so since the Florida State Board of Conservation's first publication in 1948. That first paper in an Education Series dealt with red tide, which is still a topic of research at FWC's Fish and Wildlife Research Institute (Institute). Since then, more than 1,000 published works have documented the findings of Institute scientists. These contributions have appeared in various scientific journals or as publications of the Institute. The publications and reprint issues are exchanged with libraries throughout the world. While supplies last, the Institute sends single copies of the publications in print, at no cost, to individuals who request them. Many publications are also made available for download at http://myfwc.com/research/publications/scientific/new/.

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Enge, K. M., J. D. Mays, E. P. Hill, and B. B. Harris. 2016. Status assessments of the southern hog-nosed snake, Florida pinesnake, short-tailed kingsnake, and eastern diamond-backed rattlesnake in Florida. Final Report, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Wildlife Research Section, Gainesville, Florida, USA. 92pp.

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

Invertebrates, Fish, Amphibians, and Reptiles

COMMON NAME	SCIENTIFIC NAME
INVERTEBRATES	
New Guinea flatworm	Platydemus manokwari
FISH	
None	
AMPHIBIANS	
Striped newt	Notophthalmus peristriatus
REPTILES	
Apalachicola alligator snapping turtle	Macrochelys apalachicolae
Copperhead	Agkistrodon contortrix
Eastern diamond-backed rattlesnake	Crotalus adamanteus
Suwannee alligator snapping turtle	Macrochelys suwanniensis

Appendix D *continued* - Birds

COMMON NAME	SCIENTIFIC NAME
BIRDS	
American coot	Fulica americana
Anhinga	Anhinga anhinga
Barn swallow	Hirundo rustica
Black rail	Laterallus jamaicensis
Black-necked stilts	Plegadis falcinellus
Black-whiskered vireo	Vireo altiloquus
Blue-gray gnatcatchers	Polioptila caerulea
Cattle egret	Bubulcus ibis
Clapper rail	Rallus longirostris
Common moorhen	Gallinula chloropus
Eastern bluebird	Sialia sialis
Eastern screech-owl	Otus asio
Glossy ibis	Plegadis falcinellus
Gray kingbird	Tyrannus dominicensis
Great blue heron	Ardea herodias
Great-crested flycatchers	Myiarchus crinitus
Great egret	Ardea alba
Great White Heron	Ardea herodias occidentalis
King rail	Rallus elegans
Least bittern	Ixobrychus exilis
Louisiana seaside sparrow	Ammodramus maritimus fisheri
MacGillivray's seaside sparrow	Ammodramus maritimus macgillivraii
Northern bobwhite quail	Colinus virginianus
Northern cardinal	Cardinalis cardinalis
Pied-billed grebe	Podilymbus podiceps
Prairie warbler	Setophaga discolor
Purple gallinule	Porphyrio martinicus
Red-bellied woodpecker	Melanerpes carolinus
Sora	Porzana carolina
Tufted titmouse	Baeolophus bicolor
White-eyed vireos	Vireo griseus
Yellow-crowned night heron	Nyctanassa violacea
Yellow warbler	Setophaga petechia

Appendix D *continued* - Mammals and Plants

COMMON NAME	SCIENTIFIC NAME
MAMMALS	
Atlantic salt marsh mink	Neovison vison lutensis
Florida black bear	Ursus americanus floridanus
Gray squirrel	Sciurus carolinensis
Gulf salt marsh mink	Neovison vison halilimnetes
Least shrew	Cryptotis parva
Short-tailed shrew	Blarina sp.
Southern flying squirrel	Glaucomys volans
PLANTS	
Bahiagrass	Paspalum notatum
Balsam apple vine	Momordica balsamina
Blackbead	Pithecellobium
Brazilian pepper	Schinus teribinthifolius
Green buttonwood	Conocarpus erectus
Nickerbean	Caesalpinia
Oak trees	Quercus spp.)
Red mangrove	Rhizophora mangle
Saw palmetto	Serenoa repens
Sand cordgrass	Spartina bakerii
Wax myrtle	Myrica cerifera

APPENDIX E
GLOSSARY OF TERMS

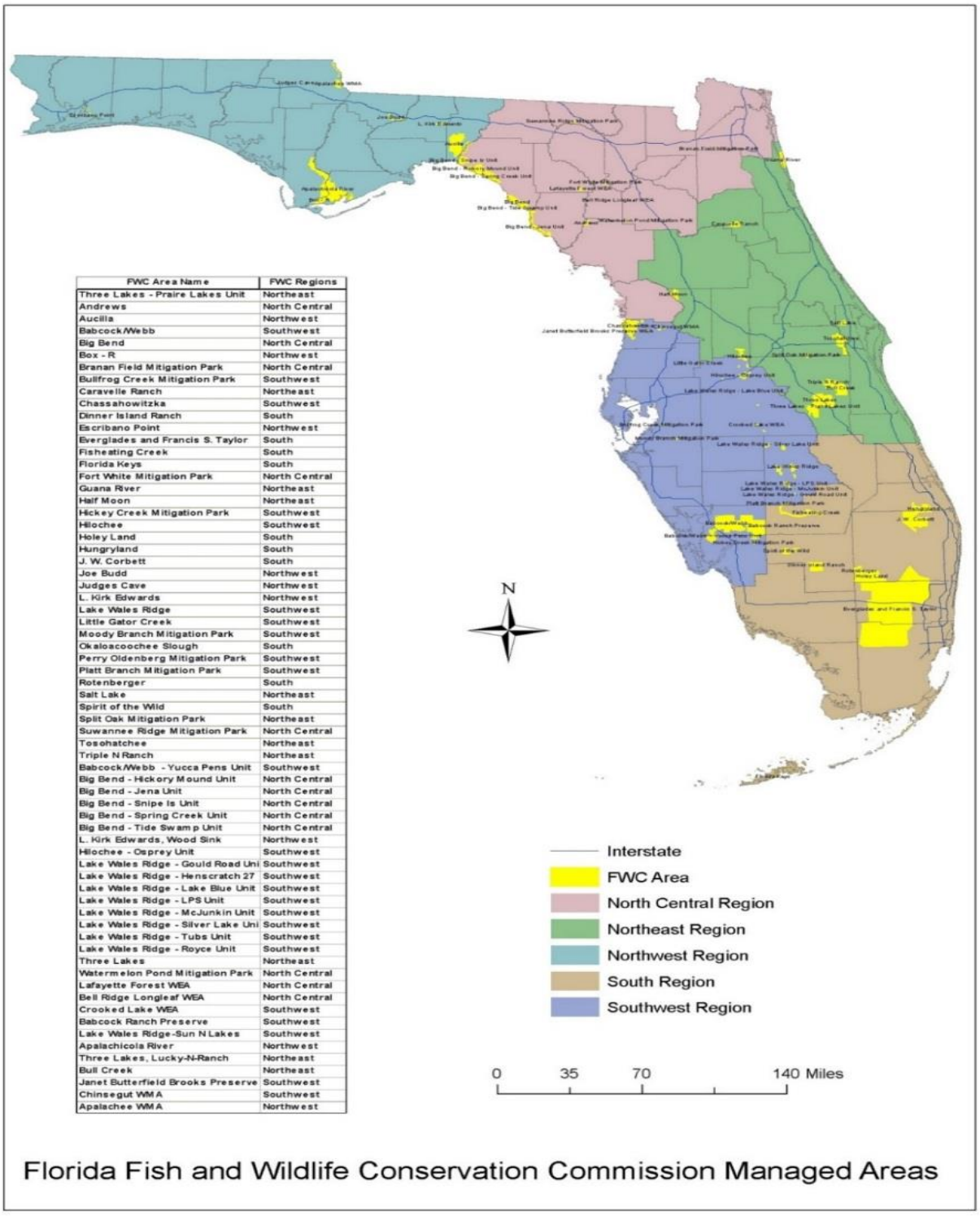
Abiotic – The non-living chemical and physical factors in the environment.
Anthropogenic – Resulting from human influence on nature.
Area of Occupancy – The area within its `extent of occurrence` which is occupied by a taxon, excluding cases of vagrancy. In some cases, the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon.
Benthic – The lowest level of the ocean that includes the sediment surface and some sub-surface layers.
Cavity – A hollow or hole occupied by an organism.
Cavity Insert – A premade box with a cavity built into it that is used to mimic natural cavities.
Cluster – The aggregation of cavity trees previously and currently used and defended by a group of woodpeckers.
Colony – A distinguishable localized population within a species.
Commensal – A species that has a symbiotic relationship with another species where the commensal benefits (nutrients, shelter, etc.) and the other is unharmed.
Depredation – When domestic livestock or pets are preyed upon by a panther or other wildlife.
Endemic – Restricted or peculiar to a certain area or region.
Ephemeral – Lasting a very short time.
Extent of Occurrence – The area contained within the shortest continuous imaginary boundary, which can be drawn to encompass all the known, inferred, or projected sites of present occurrence of a taxon, excluding cases of vagrancy.
Extirpation – Cease to exist in a given area.
Federally-designated Endangered Species – Species of fish or wild animal life, subspecies or isolated populations of species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Endangered under FWC Commission rule by virtue of designation by the U.S. Departments of Interior or Commerce as Endangered under the Federal Endangered Species Act.
Federally-designated Threatened Species – Species of fish or wild animal life, subspecies or isolated populations of species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Threatened under FWC Commission rule by virtue of designation by the U.S. Departments of Interior or Commerce as Threatened under the Federal Endangered Species Act.

Appendix E *continued*
Fledge – To raise a young bird until it is capable of flight.
Fledged – To leave the 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.
Genetic Introgression – Adding new genes to a population.
Geographic Information System (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 nest and roost cavities, incubating eggs, feeding and brooding nestlings, removing fecal sacs from the nest cavity, and feeding fledglings.
Hydroperiod – The cyclical changes in the amount or stage of water in a wet habitat.
Keystone species – A species that plays a unique and crucial role in the structure of an ecosystem and the way it functions. Without their existence, the ecosystem would be dramatically different or cease to exist altogether.
Life History – All of the changes experienced by a species, from its birth to its 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 those species designated as Endangered, Threatened, or Species of Special Concern.
Metapopulation – A group of spatially separated populations of the same species that interact at some level.
Morbidity – A disease or the incidence of disease within a population.
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, but 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.
Pelagic – Deep ocean water.

Appendix E *continued*
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.
Recruitment Cluster – A cluster of artificial cavities in suitable nesting habitat, located close to existing clusters.
Rookery – A colony of breeding animals.
Roosts – A place where species such as bats, and often multiple individuals sleep or reside.
Safe Haven – An area of water [established by §379.2431(2)(o) Florida Statute] that manatees may rest, feed, reproduce, give birth, or nurse in while remaining undisturbed by human activity.
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 Commission, species of fish or wild animal life, subspecies, or isolated population of a species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Threatened due to a reduction in population size, a severely fragmented and/or declind geographic range, a population size that numbers 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.
Stock – A group of marine mammals of the same species or smaller taxa in a common spatial arrangement that interbreed when mature.
Telemetry – Transmission of data through technology (such as radio collars attached to panthers) from a species to an observer.

APPENDIX F
MAP OF FWC REGIONS

APPENDIX G
MAP OF FWC MANAGED AREAS



FWC Area Name	FWC Regions
Three Lakes - Praire Lakes Unit	Northeast
Andrews	North Central
Aucilla	Northwest
Babcock/Webb	Southwest
Big Bend	North Central
Box - R	Northwest
Branan Field Mitigation Park	North Central
Bullfrog Creek Mitigation Park	Southwest
Caravelle Ranch	Northeast
Chassahowitzka	Southwest
Dinner Island Ranch	South
Escribano Point	Northwest
Everglades and Francis S. Taylor	South
Fisheating Creek	South
Florida Keys	South
Fort White Mitigation Park	North Central
Guana River	Northeast
Half Moon	Northeast
Hickey Creek Mitigation Park	Southwest
Hilochee	Southwest
Holey Land	South
Hungryland	South
J. W. Corbett	South
Joe Budd	Northwest
Judges Cave	Northwest
L. Kirk Edwards	Northwest
Lake Wales Ridge	Southwest
Little Gator Creek	Southwest
Moody Branch Mitigation Park	Southwest
Okaloacoochee Slough	South
Perry Oldenberg Mitigation Park	Southwest
Platt Branch Mitigation Park	Southwest
Rotenberger	South
Salt Lake	Northeast
Spirit of the Wild	South
Split Oak Mitigation Park	Northeast
Suwannee Ridge Mitigation Park	North Central
Tosohatchee	Northeast
Triple N Ranch	Northeast
Babcock/Webb - Yucca Pens Unit	Southwest
Big Bend - Hickory Mound Unit	North Central
Big Bend - Jena Unit	North Central
Big Bend - Snipe Is Unit	North Central
Big Bend - Spring Creek Unit	North Central
Big Bend - Tide Swamp Unit	North Central
L. Kirk Edwards, Wood Sink	Northwest
Hilochee - Osprey Unit	Southwest
Lake Wales Ridge - Gould Road Uni	Southwest
Lake Wales Ridge - Henscratch 27	Southwest
Lake Wales Ridge - Lake Blue Unit	Southwest
Lake Wales Ridge - LPS Unit	Southwest
Lake Wales Ridge - McJunkin Unit	Southwest
Lake Wales Ridge - Silver Lake Uni	Southwest
Lake Wales Ridge - Tubs Unit	Southwest
Lake Wales Ridge - Royce Unit	Southwest
Three Lakes	Northeast
Watermelon Pond Mitigation Park	North Central
Lafayette Forest WEA	North Central
Bell Ridge Longleaf WEA	North Central
Crooked Lake WEA	Southwest
Babcock Ranch Preserve	Southwest
Lake Wales Ridge-Sun N Lakes	Southwest
Apalachicola River	Northwest
Three Lakes, Lucky-N-Ranch	Northeast
Bull Creek	Northeast
Janet Butterfield Brooks Preserve	Southwest
Chinsegut WMA	Southwest
Apalachee WMA	Northwest