Responsible Conservation

of Florida's Wildlife Heritage

SAVE THE MANATEE TRUST FUND

ANNUAL REPORT

FISCAL YEAR 2016-17

MyFWC.com

SUBMITTED BY
FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
Fish and Wildlife Research Institute
and
Division of Habitat and Species Conservation

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

1-888-404-FWCC (3922)

to report fish and wildlife violations, as well as manatee injuries and mortalities

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Cover photo Florida manatees and FWC biologists rescue an injured manatee
Photographs Courtesy of FWC, unless otherwise noted

Research activities involving live manatees were conducted under Federal permit #MA773494

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EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) is pleased to submit the annual report on the expenditures from the Save the Manatee Trust Fund (Trust Fund), per section 379.2431(4)(b), *Florida Statutes*. The Trust Fund is the primary source of funding for the State's manatee-related research and conservation activities. As required by Florida law, the report is provided to the President of the Florida Senate and the Speaker of the Florida House of Representatives by December 1, annually. This report covers the period from July 1, 2016 through June 30, 2017.

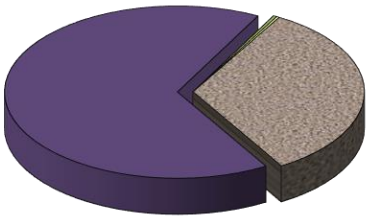
Earlier this year, the U.S. Fish and Wildlife Service (USFWS) reclassified the Florida manatee from an endangered species to a threatened species. The reclassification is a significant conservation milestone reflecting the combined multi-decadal efforts of the FWC, USFWS, U.S. Geological Survey (USGS), and our many partners. While this step is notable, there is still work to be done to ensure continued progress toward recovery of this species.

This past year scientists with the USGS and FWC used data from ongoing monitoring efforts to complete an updated status and threats analysis for the Florida manatee. They reported that, assuming threats manatees face continue to be managed effectively, manatees are projected to persist on both coasts of Florida. They did caution that the future loss of warm water from industrial effluents (power plants) could negatively affect a significant portion of the state’s manatee population. The FWC, federal agencies, and other partners are working together to address the long-term future of warm water habitat and the conservation of seagrass and freshwater vegetation that manatees need to thrive. These and other efforts are consistent with FWC’s guiding conservation goal for the Florida manatee, which is to effectively manage the wildlife resource in perpetuity throughout Florida. Towards this overarching goal, FWC and partner agencies have identified essential information needs and actions that will maintain a viable population that has suitable and sustained habitat. With the long-term support of the Trust Fund, FWC continues to invest in innovative scientific methods to provide management the information needed to guide actions that conserve the species and their habitat. The rigor and investment in these approaches is appropriate and necessary given the need to adapt to environmental and human-related impacts faced by Florida.

These activities are possible because of the funding of the Trust Fund. The Trust Fund receives money from sales of manatee license plates and decals, boat registration fees, and voluntary donations. Revenues for FY 2016-17 totaled $3,853,832. Appropriations from the Trust Fund for the same period were $3,900,263, with $325,000 provided for manatee research activities at Mote Marine Laboratory (Mote), and a service charge to General Revenue of $231,251 that most trust funds are required by law to pay. In FY 2016-17, FWC's Division of Habitat and Species Conservation expended $1,149,649 for conservation activities and the Fish and Wildlife Research Institute expended $1,897,430 on research and monitoring. Details of revenues, appropriations, and expenditures are shown on page 6 of this report.

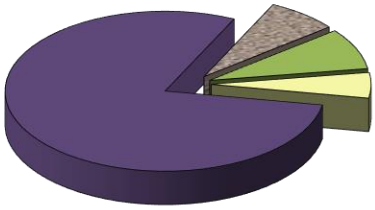
TRUST FUND FY 2016-17
REVENUES AND EXPENDITURES

REVENUES
$3,853,832



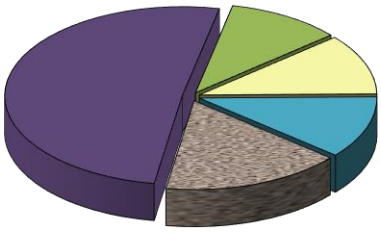
- Save the Manatee License Plate ($1,238,810)
- Vessel Registrations ($2,591,212)
- Interest ($13,499)
- Decals and Donations ($10,311)

APPROPRIATIONS
$4,506,514



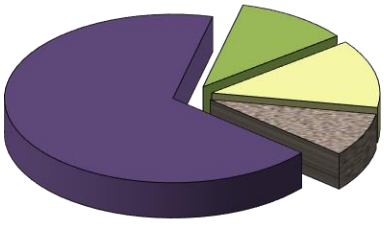
- FWC Manatee Program ($3,575,263)
- Mote Marine Laboratory ($325,000)
- Administrative Overhead ($375,000)
- Service Charge to General Revenue ($231,251)

FWC MANATEE PROGRAM CONSERVATION MANAGEMENT EXPENDITURES
$1,149,649



- Manatee Protection Zones ($188,790)
- Plan and Permit Reviews ($584,299)
- Habitat Protection ($120,100)
- Data Distribution ($126,406)
- Public Outreach ($130,055)

FWC MANATEE PROGRAM RESEARCH EXPENDITURES
$1,897,430



- Behavioral Ecology ($158,735)
- Mortality and Rescue ($1,283,966)
- Photo Identification (Life History) ($205,830)
- Population Assessment and Monitoring ($248,897)

MANATEE BASICS

COMMON NAME	Florida manatee
SCIENTIFIC NAME	*Trichechus manatus latirostris* (Order: Sirenia)
STATUS	Threatened (Federal)
RANGE	Throughout Florida (summer months into southeastern states but reported as far north as Cape Cod and as far west as Texas)
MAXIMUM SYNOPTIC SURVEY COUNT	6,620 in 2017
HISTORY	A native species found in Florida's fossil record and recorded by earliest explorers
DIET	Freshwater and marine species of plants
REPRODUCTION	Breed year-round; most calves born in spring; mature female can produce one calf approximately every three years, rarely twins
LIFE SPAN	Can live over 60 years; of manatees that reach adulthood, about half are expected to survive at least into their early 20's

A CLOSER LOOK

Adult manatees average 8-10 feet (2.5-3 meters) in length and weigh around 1,000 pounds (454 kilograms). The largest manatees may reach 14 feet (4.2 meters) in length and weigh over 3,500 pounds (1,588 kilograms). Adults are gray in color, with sparse hairs distributed over much of the body. Algae growing on the skin may make them appear green or brown. Manatees that live in saltwater may also have barnacles growing on their skin. Stiff whiskers (called "vibrissae") grow around the face and lips. Despite their large size, manatees can be difficult to see in the wild because of their color and behavior.

Manatees eat a variety of marine and freshwater aquatic plants and are often seen near natural or artificial freshwater sources. Manatees mate year-round; however, most calves are born in the spring. Gestation lasts approximately 13 months and results in the birth of a calf (rarely twins) measuring 3-4 feet (1-1.2 meters) in length. The calves remain with their mothers for up to two years.

There are a variety of threats to manatees, both natural and human-related. Manatees may die from exposure to harmful algal blooms (red tide), the effects of cold weather, and disease. Human-related causes of death include collisions with watercraft, crushing in water control gates and boat locks, and entanglement in fishing gear. During periods of cold weather, manatees gather in waters warmer than 68°F (20°C). This warm water may be in south Florida or may be from an artesian spring or industrial discharge. Manatee habitat loss is also of concern, including future changes in artificial warm-water refuges and reductions in natural spring flows.

FLORIDA MANATEE MANAGEMENT PLAN

"To remove the manatee from the State imperiled species list and effectively manage the population in perpetuity throughout Florida by securing habitat and minimizing threats."

The Florida Manatee Management Plan (Plan), approved at the December 2007 FWC Commission meeting, guides key conservation work supported through the Trust Fund. The Plan provides an overview of the myriad programs, initiatives, and strategies implemented to protect and conserve manatees and their habitat along with a detailed listing of tasks with timelines for both research and management activities.

The primary objectives of the Plan upon which the individual tasks are based are:

- Implement improved methods to estimate manatee population and trends
- Reduce the human-caused mortality rate by reducing human-caused threats
- Develop and implement plans to address future changes in power plant operation
- Assist in the development of minimum flow rules at Florida springs
- Enhance management practices to secure seagrass and freshwater vegetation
- Use measurable biological goals to measure progress toward recovery

The Plan relies on the ongoing collection of manatee-related data to support science-informed decisions and to guide management actions. The major areas of focus are:

- Speed zone review
- Improve enforcement efforts
- Improve permit review process
- Review and development of county-level Manatee Protection Plans
- Secure warm-water resources
- Monitor and protect seagrass
- Retrofit water control structures
- Launch new outreach initiatives

MORTALITY AND RESCUE

research activities

A network of researchers and law enforcement agencies was established in 1974 to recover manatee carcasses and assist injured manatees. The responsibility of manatee carcass salvage and necropsy and field coordination of the rescue program were transferred to the State of Florida by USFWS in 1985 and now rest largely with FWC's Fish and Wildlife Research Institute (FWRI).

FWC staff members from five coastal field stations retrieve all reported carcasses, a key monitoring activity described in the Plan. These stations are located around the State: Jacksonville, Melbourne Beach, Tequesta, Port Charlotte, and St. Petersburg. Most recovered carcasses are transported by field personnel from recovery locations to FWC's Marine Mammal Pathobiology Laboratory (MMPL) in St. Petersburg. MMPL performs consistent, high quality, post-mortem examinations to determine cause of death. Information gained from the carcass salvage and manatee rescue program is crucial to providing wildlife managers with information about manatee health, mortality factors, life history, and general and reproductive biology, as well as potential causes for Unusual Mortality Events[1] (UMEs). Through this work, FWC contributes significantly to the evaluation of threats facing Florida manatees and provides key information to resource managers and partner agencies. MMPL makes timely mortality information available on the FWC website (http://myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/).

In addition to manatee carcass salvage, FWC receives calls from the public reporting manatees in distress. Field staff members respond to these calls, coordinate rescues, and when necessary, transport manatees to rehabilitation facilities.

FWC is a contributing organization to multiagency efforts to release and track rehabilitated manatees that were rescued due to injury, cold stress, or other problems. The Manatee Rehabilitation Partnership consists of representatives from Federal and State agencies (USFWS, U.S. Geological Survey - USGS, DEP, FWC), academic institutions (University of Florida - UF), non-governmental organizations (Save the Manatee Club, Sea to Shore Alliance), and private oceanaria (Cincinnati Zoo, Columbus Zoo, Lowry Park Zoo, Jacksonville Zoo, Miami Seaquarium, Mote, The Seas at Epcot, Sea World Orlando, South Florida Museum).

[1] Unusual Mortality Events are defined by the Marine Mammal Protection Act as "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response." See http://www.nmfs.noaa.gov/pr/health/mmume/ for more information.

FY 2016-17 HIGHLIGHTS

- Statewide, there were 514 manatee carcasses documented in Florida during FY 2016-17. All but 6 were recovered and examined. Additionally, five carcasses were documented in Georgia, one in Maryland, one in Louisiana, two in North Carolina, two in South Carolina, one in Texas, and one in Alabama.

- One hundred-fifteen rescues were performed statewide during FY 2016-17. As of July 28, 2017, 64 of the manatees rescued statewide were released back into the wild, 24 died, and the remaining 27 animals were still being rehabilitated in facilities around the State.

- Fourteen rescues were manatees entrapped after storm surge from Hurricane Hermine.

- During FY 2016-17, a red tide-related Repeat Mortality Event was declared in Southwest Florida. The event lasted from fall into spring and included 102 mortalities (preliminary number) and 10 rescues. A Manatee Unusual Mortality Event declared for Indian River Lagoon in 2012 continued during FY 2016-17. During this time, 11 manatee deaths were documented in this event. The cause of the UME is still under investigation.

- Researchers collected tissue samples for genetic analysis from most carcasses. Other samples were collected for advanced diagnostic analyses, aging, and requests from external researchers.

Manatee Rescues FY 2016-17

Type of Rescue	*Number of Rescues*
Calf—Alone	21
Calf—With Rescued Mother	4
Mother—With Rescued Calf	0
Human—Entanglement	12
Human— Entrapment*	29
Human—Watercraft- Related	24
Human—Other	2
Natural–Includes Red Tide	22
Undetermined; Other	1
Total	**115**

*includes power plant intake canals, irrigation canals, weirs, culverts, man-made canals, manmade lakes, etc.

Manatee Mortality FY 2016-17

Cause of Death	*Number of Deaths*
Human—Flood Gate or Canal Lock	1
Human—Other (entanglements, etc.)	9
Human—Watercraft Related	90
Natural—Cold Stress	21
Natural—Other (includes red tide)	107
Perinatal (total body length less than 150 centimeters or about 5 feet)	116
Undetermined (decomposed or other)	164
Verified, Not Recovered	6
Total	**514**

POPULATION MONITORING AND ASSESSMENT

research activities

FWC scientists use a variety of methods to assess and monitor the current and future status of the Florida manatee population. Population assessments currently include: a) conducting manatee counts at winter aggregation sites; b) aerial surveys to determine regional abundance and distribution of manatees; and c) estimating survival and reproductive rates through photo-identification and genetic identification. Assessments also include estimates of risk to the population, including projected population growth and probability of persistence into the future (i.e., risk of extinction).

Traditional synoptic surveys, flown after winter cold fronts, provide a minimum number of manatees known to be alive using warm water and winter habitats on a particular survey day. Synoptic surveys are conducted annually, weather permitting, pursuant to s. 379.2431(4)(a), F.S. A traditional synoptic survey was conducted in January 31 to February 2, 2017 and resulted in a count of 6,620 manatees. Although the count is not a statistical estimate of total population size nor is it comparable to previous synoptic counts, it does provide information to managers about manatee distribution among warm water sites throughout the state. Sustaining adequate winter habitat for manatees remains a statewide conservation goal and a key factor in long-term recovery of manatees.

In December 2016, an abundance aerial survey was flown on the east coast of Florida, from the Georgia-Florida State line to Monroe County, to estimate the manatee population. These surveys will be combined with the west coast survey conducted in 2015 and analyzed using newly designed methods resulting in an updated statewide abundance estimate. The findings from the new abundance surveys represent a significant improvement over the traditional synoptic survey by providing a sound estimate of the Florida manatee population. Reliable estimates from the new abundance surveys can be used to track population changes over time and as part of population projection models. The recently published (Martin et al 2015) statewide abundance estimate was included in the latest update of the Core Biological Model (CBM). This model (see Publications and Reports section, Runge et al 2017) is designed to forecast Florida manatee population dynamics in what is referred to as a population viability analysis. The findings in the report represent a comprehensive update to the structure and components (parameters) of the CBM. The model provides a framework to assess the status

of manatees, understand the relative influence of the threats manatees face, and evaluate concerns around potentially emerging threats.

Long-term research and monitoring of the Florida manatee population by FWC and our key partners (USGS, Mote Marine Lab) has provided a solid foundation of high-quality data from which we can make strong inferences about manatee population status and trends throughout Florida. Reliable population models such as the CBM include information on manatee life history, essential for assessing manatee population dynamics and recovery. Specifically, long-term data on survival of individuals and reproductive performance of mature females are included within these population models. Manatee photo-identification is a research technique that uses the unique pattern of scars and mutilations on a manatee's body and tail to identify individual animals over time. The scars are usually the result of encounters with boats, but they can also be caused by entanglement in fishing gear, cold-stress lesions, and injury caused by infections. This research is conducted through a partnership between FWC, USGS, and Mote. Partners work collaboratively to photograph Florida manatees throughout their range, process images, identify manatees, and manage an integrated sightings database, known as the Manatee Individual Photo-Identification System (MIPS). The records in MIPS provide insights into manatee movements, site fidelity (i.e., the tendency to return to the same location year after year), adult survival and reproductive rates, and reproductive parameters such as calving intervals (time between births), and length of calf dependency.

Demographic parameters in need of refinement to better model manatee status and recovery include annual sex-specific movement between federal management units, sex-specific adult survival rates in the southwest region, and survival rates for calves and young adults. These parameters can sometimes be difficult to estimate through photo-identification because of unfavorable photographic conditions and limited animal accessibility. Identification of individuals through the analysis of genetic markers, also known as DNA fingerprinting or genotyping, offers a complementary means to analyze life history that could greatly enhance existing manatee monitoring and population assessment studies, particularly in the southwest region. Genetic analysis can help in the identification of calves and other individuals with no markings, as well as carcasses in an advanced state of decomposition. Genetic markers can also be used to determine the gender of identified individuals. FWC implemented a genetic identification (ID) sampling program in 2008 to collect skin biopsy samples from wild manatees and have continued with this effort.

FY 2016-17 HIGHLIGHTS

- A count of 6,620 manatees resulted from the 2017 traditional synoptic survey effort and represents a minimum number of manatees known to be alive using warm water and winter habitats over the particular survey days.
- FWRI St. Petersburg based staff members and interns spent over 80 days conducting land and boat-based photo-ID research during 210+ visits to sites used by manatees. Statewide, other FWC field staff, research partners, and volunteers photo-documented manatees. More than 15,000 images documenting the unique features of individual manatees were taken and archived by FWC. Manatee photo-ID data were processed and analyzed to support updated adult survival and reproductive rates—key input parameters in ongoing population modeling efforts. Data for the southwest region through April 30, 2016, were made available for analyses.
- 140 manatees meeting specific photo-ID criteria were added to the southwest portion of the MIPS catalog of uniquely identifiable animals. The statewide MIPS catalog currently includes 4,199 animals and more than 100,000 sighting records.
- Genetic sampling surveys were conducted in southwest Florida. A total of 410 samples were collected from free swimming manatees: 51 samples at Port of the Islands (Collier County), 165 samples in the Orange River (Lee County), and 194 samples in the Tampa Bay area.
- The manatee genetic-ID database currently includes 1,845 unique individuals identified by skin samples collected from live manatees in our southwest Florida study area.

Photo-ID cataloged manatee known as TB496 with first-year calf at Tampa Electric Company's Big Bend Power Station discharge canal.

BEHAVIORAL ECOLOGY

research activities

Research on manatee use of Florida's coastal and riverine habitats is essential to understanding the resources required to recover and sustain a healthy population. By tracking the movements of individual manatees through their aquatic environment, FWC biologists obtain valuable information about manatee seasonal and daily movements, migratory behavior, site fidelity, diving behavior, and habitat requirements. To track manatees, researchers place a padded belt around a manatee's tail and attach a buoyant radio-tag containing a satellite-linked transmitter to the belt. The Global Positioning System (GPS) locations provide a detailed record of manatee movements over long periods of time. In the field, biologists locate these study animals by homing in on the tag's unique radio signals to obtain data on behavior, group size, and habitat attributes. Processed data are mapped in a Geographic Information System (GIS) and are used in devising strategies for manatee conservation and recovery.

Warm-water habitat is of particular concern because the predicted future loss or decline of industrial and natural spring sources is deemed a key long-term threat to the manatee population. Therefore, managers are taking proactive steps to restore spring systems and to mitigate for the expected loss of other warm-water habitats. One crucial site being considered for restoration is Warm Mineral Springs, which flows via Salt Creek into the lower Myakka River. Manatees are precluded from accessing the warm-water refuge at low tides because of sedimentation from past human activities. FWC biologists are monitoring water temperatures, water levels, and manatee use along the spring run during winter to establish a pre-restoration baseline. A passive thermal basin that has provided warm-water habitat for a large aggregation of manatees at Port of the Islands is expected to disappear once hydrologic restoration of sheet flow in the Picayune Strand is completed in a few years. To mitigate this loss, the South Florida Water Management District and Army Corps of Engineers—in consultation with FWC, USFWS, and USGS—created deep pools that are designed to provide and hold warm, saline ground water. Researchers are monitoring manatee winter use of the newly-created habitat and evaluating water temperature conditions there and at other aggregation sites in the region. The Plan provides further information on this subject (see Chapter 10, "Ongoing and Future Research" pp. 103).

Salt Creek, Warm Mineral Springs, during low tide manatee cannot access the warm waters of the spring

Watercraft collision is the single greatest human threat to manatees in Florida and ongoing research efforts address various aspects of this issue. With support from Florida Sea Grant, FWC researchers collaborated with colleagues and students at the University of Florida and the University of South Florida to develop a comprehensive risk assessment framework that quantitatively evaluates the probabilities of manatee-boat encounters. This project integrates information on the density and distribution of manatees and watercraft with data on manatee behavior, including swim speed, diving behavior, and response to approaching boats. This work will contribute to evaluation of high-risk areas, estimation of speed zone effectiveness, and optimization of speed zone configurations. These projects address key issues identified in the Plan (see Chapter 10, "Ongoing and Future Research" p. 111).

FY 2016-17 HIGHLIGHTS

- Manatee distribution and abundance at Salt Creek, Warm Mineral Springs, was investigated in relation to ambient temperature from winter ground surveys. Fluctuations in continuously-monitored water temperatures and water levels within the creek provided a baseline for future comparison to the system after restoration.
- FWC monitored water temperatures during the winter with temperature data recorders placed at many warm-water habitats and associated ambient sites throughout much of the manatees' winter range. Several passive thermal sites (i.e., non-discharge sites such as canals) were investigated for their potential to provide sufficient warmth to sustain manatees through cold winter periods.
- Statistical analyses were completed on a study that documented manatee response to approaching boats using a combination of manatee-borne electronic tags [digital acoustic recording tags (DTAG) and GPS tags] and boat-based observations. The DTAG provided a continuous record of boat noise and other sounds and recorded a suite of behavioral parameters, allowing a three-dimensional reconstruction of manatee movements, depth, and orientation underwater. A manuscript of this work was prepared for publication in a peer-reviewed scientific journal.
- The *Manatee Radio-telemetry and Tracking* section of our FWRI web site was completely overhauled with the addition of informative articles of what we do and what we've learned, photo albums showing tracking methods and manatee behavior, maps illustrating tagged manatee movements and habitat use, and even an animation of a movement track. See http://myfwc.com/research/manatee/research/radiotelemetry-tracking/.

RIGHT WHALES

research activities

In addition to manatee recovery efforts, FWC is involved in the recovery of other endangered marine mammals, including the North Atlantic right whale, Eubalaena glacialis. Most of this work is supported by grant funding provided by the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA Fisheries Service); however, portions of some staff salaries are provided by the Trust Fund [s. 379.2431(4), F.S]. FWC collaborates with federal, state, and non-governmental organization partners to carry out field research, mainly aerial surveys, biopsy sampling, disentanglement and stranding response. Efforts to protect this species are outlined in the North Atlantic Right Whale Recovery Plan (http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_right_northatlantic.pdf). The North Atlantic right whale is one of the most endangered large whales in the world with a population estimated at approximately 500 individuals. Vessel collisions and entanglement in fishing gear are the leading known causes of death in this species. Even one unnatural death per year could have a significant effect on the population. Efforts to prevent human-caused mortality are a priority.

The southeastern United States (U.S.) is the primary calving area for the North Atlantic right whale. In 1994 and 2016, NOAA Fisheries Service designated portions of Florida and Georgia coastal waters as critical habitat. Federal and state efforts to protect right whales in their calving area resulted in the formation of the Southeast U.S. Right Whale Recovery Plan Implementation Team (SEIT), a multi-agency and citizen advisory group. FWC has been a member of the SEIT since its 1993 inception.

FWC has conducted aerial surveys to monitor seasonal presence of right whales, mitigate vessel-whale collisions, and assess population dynamics since 1987. An Early Warning System communication network, coordinated by NOAA Fisheries Service with assistance from FWC, is utilized to protect right whales from vessel collisions by notifying key agencies, ports, and mariners via email or text message when and where right whales have been sighted. FWC is also one of a handful of major contributors to the North Atlantic Right Whale Identification Database—the central repository for archiving and maintaining photographs and sighting data on right whales. Photographs taken by staff are used to identify individual right whales based on the callosity pattern (a natural growth of rough, cornified skin) on their heads as

well as human-related scars. Over time, population demographics, reproductive success, mortality, and trends in health are monitored in part through this photo-identification research, as well as through genetic sampling. FWC has worked closely with partners to compile years of aerial survey data into a GIS program. Analysis of these spatial data help scientists and managers to evaluate right whale distribution patterns in the calving grounds in relation to environmental factors, such as sea surface temperatures and water depth, and human activities, such as vessel traffic.

FWC has developed the infrastructure and analytical tools for monitoring commercial vessel traffic in the right whale calving area using the Automatic Identification System (AIS). Commercial vessels are required by federal regulations to be equipped with an AIS transponder and to broadcast their location and speed as determined by GPS. Ongoing analyses characterize vessel traffic patterns and estimate compliance with Federal speed regulations. Data on whale distribution, habitat preferences, environmental conditions, and vessel traffic provides a framework for quantifying the risk of vessel strikes and informs and evaluates the effectiveness of proposed management plans.

FY 2016-17 HIGHLIGHTS

- In total, 7 individual right whales, including 3 mother-calf pairs, were documented in the southeastern U.S. during the calving season (November 15 – April 15). Two additional mother-calf pairs were sighted by survey teams off Massachusetts in late April, bringing the total number of calves to 5. This is one of the lowest calf counts since surveys began in the late 1980's.

- From December 1 – March 31, FWC collaborated with the Georgia Department of Natural Resources and Sea to Shore Alliance to survey between Canaveral National Seashore, Florida, and Sapelo Island, Georgia, out to approximately 30 nautical miles offshore. FWC conducted 54 aerial surveys and identified 12 right whales during preliminary photo analysis, of which 5 (including calves) were unique individuals. Select photos from the calving season can be viewed here: http://myfwc.com/research/wildlife/right-whales/images/

- Although right whale sightings were lower than average, aerial survey teams observed an increase in humpback whale sightings during the winter of 2016-2017. FWC recorded 19 humpback whale sightings and, based on preliminary photo analysis, there were at least 13 individuals sighted in the southeastern U.S.

- One entangled whale was sighted in the southeastern U.S. during the calving season. FWC, Sea2Shore Alliance, Georgia Department of Natural Resources, and NOAA Fisheries Service participated in the documentation and disentanglement response. On January 5-6, Catalog #3530, a thirteen year-old male, was assessed, tagged, and completely disentangled. Over 400ft of fishing rope attached to a ~135lb cone-shaped pot were 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. A video summarizing the disentanglement response can be viewed here: https://youtu.be/-0hwT8lx82M.

- No right whale stranding events occurred in the southeastern U.S. during the calving season. However, at least 13 right whales have been found dead in Atlantic Canada and the northeastern U.S during the summer of 2017. This unprecedented number of deaths represents over 2% of the population.

Right whale #3530, a thirteen year-old male, was the target of a successful two-day disentanglement operation off the coast of Florida and Georgia in January. (Photo taken under NOAA research permit #15488.)

RESEARCH PUBLICATIONS AND REPORTS

research activities

2016-17 PUBLICATIONS: (*FWC authors in bold type*)

Hill A.N., C. Karniski J. Robbins, **T. Pitchford**, S. Todd, R. Asmutis-Silvia. 2017. Vessel collision injuries on live humpback whales, *Megaptera novaeangliae*, in the southern Gulf of Maine. Mar. Mamm. Sci. 33(2):558-573.

Martin, J., M. C. Runge, **L. J. Flewelling, C. J. Deutsch,** and **J. H. Landsberg.** *In press*. An expert elicitation process to project the frequency and magnitude of Florida manatee mortality events caused by red tide (*Karenia brevis*). U.S. Geological Survey Scientific Investigation Report 2017-XXXX.

Reinert, T. R., **A. C. Spellman**, **B.L. Bassett**. 2017. Entanglement in and ingestion of fishing gear and other marine debris by Florida Manatees, 1993 to 2012. Endang Species Res 32: 415-427. DIO: https://doi.org/10.3354/esr00816.

Runge, M. C., C. A. Sanders-Reed, C. A. Langtimm, **J. A. Hostetler,** J. Martin, **C. J. Deutsch, L. I. Ward-Geiger,** and G. L. Mahon. 2017. Status and threats analysis for the Florida manatee (*Trichechus manatus latirostris*), 2016. U.S. Geological Survey Scientific Investigation Report 2017–5030. 40 p. DIO: https://doi.org/10.3133/sir20175030

Smith, L. N., T. B. Waltzek, D. S. Rotstein, R. Francis-Floyd, M. T. Walsh, J. F.X. Wellehan, R. Gerhold, A. E. Chapman, **M. de Wit**. 2016. Diseases of Aquatic Organisms 122: 77-83. DOI: 10.3354/dao03055.

MOTE MARINE LABORATORY MANATEE RESEARCH PROJECTS

research activities

The Legislature annually appropriates $325,000 from the Trust Fund for the Manatee Research Program at Mote, in Sarasota, Florida. The following projects were funded in FY 2016-17:

- *PHOTO-IDENTIFICATION AND GENETIC SAMPLING STUDIES OF MANATEES IN SOUTHWEST FLORIDA* — The objectives of this project were to: 1) ensure that Mote's photographic catalog and data are thoroughly checked for quality and completeness and are shared with FWC, USGS, and other partner organizations; 2) continue field work to perpetuate the long-term photo-identification and other data collection efforts in southwest Florida; and 3) contribute to genetic sampling of wild manatees.

- *MANATEE RESCUE AND VERIFICATION* — Mote is a federally-registered partner in the manatee carcass salvage and rescue program. Mote researchers are permitted to verify carcasses and assist in rescues of injured or trapped manatees, primarily in Manatee and Sarasota counties.

- *ASSESSMENT OF WATER TEMPERATURE DATA COLLECTION IN SOUTHWEST FLORIDA* — Mote conducted water temperature monitoring in association with photo-identification efforts to better understand winter-habitat of manatees. Mote studied a passive thermal basin in southwest Florida to better understand the ability of the basin to sustain manatees through cold winter periods.

- *AERIAL SURVEYS OF MANATEES* — Mote staff participated in the statewide synoptic survey in February 2017. Mote also participated in the east coast abundance survey that took place in early December 2016.

- *PROGRAM OVERSIGHT* — The program leader is responsible for periodic reports, coordination with State scientists and managers for activities associated with manatee recovery planning, and oversight of manatee research projects conducted by Mote.

MANATEE FORUM

management activities

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 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.

Photo of manatees at the FPL Ft. Meyers power plant (Lee County).

MANATEE PROTECTION PLANNING AND PERMIT REVIEWS

management activities

FWC reviews proposed development projects and provides biological opinions to State regulatory agencies for Environmental Resource Permits, Sovereign Submerged Land leases, State Clearinghouse projects, Comprehensive Everglades Restoration Plan projects and Developments of Regional Impact. FWC is also heavily involved in the development and implementation of county-specific Manatee Protection Plans (MPPs), and provides comments concerning manatees for various types of planning documents such as county Comprehensive Plans. See Chapter 7 "Management Actions" in the Manatee Management Plan for further details about these programs (p.45 for Permit Review and p. 49 for MPPs).

FY 2016-17 HIGHLIGHTS

- FWC reviewed and provided comments on 325 requests to provide manatee protection recommendations for actions being taken by the Department of Environmental Protection (DEP), Water Management Districts (WMDs), State Clearinghouse, Florida Department of Transportation (DOT), U.S. Army Corps of Engineers (USACOE), and USFWS.
- Management staff assisted on 3 separate events of manatees becoming trapped in culverts or storm water pipes that required rescue or recovery. FWC management assists research staff with these incidents through the permitting process to ensure that adequate barriers are installed, if necessary, to prohibit future manatee entrapment.
- Eleven boat facilities coordinated with FWC for manatee education materials or manatee informational signs for use at their facilities. Technical assistance and approval of manatee observers was provided for three projects conducting in-water work that was in important manatee habitat.
- Staff assisted in the finalization of new consultation procedures with U.S. Coast Guard Sector Miami and with USFWS.
- Staff assisted USFWS with the development of the online planning tool (Information for Planning and Consultation; IPaC) for federal permit applicants. This online tool will include the Army Corps of Engineers and USFWS dichotomous key for consultation for impacts to manatees from permitting activities. These new online planning tools will assist in expediting many federal permit applications.

Florida Port Activities

- FWC staff provided recommendations on how to offset expected impacts to manatees for thirteen port projects.

Manatee Protection Plans

- **Charlotte County MPP**: The draft Charlotte County Manatee Protection Plan was approved by the Board of County Commissioners on February 14, 2017. FWC sent a concurrence approval letter in early July 2017 and a similar concurrence letter is expected from the USFWS. Charlotte County became the sixteenth Florida County to develop a Manatee Protection Plan.

- **Miami-Dade County MPP:** FWC continues to provide technical assistance to the County in their efforts to revise their existing plan.

Photo of manatee exclusion grates on box culverts at Crystal River National Wildlife Refuge.

MANATEE PROTECTION ZONES

management activities

FWC establishes manatee protection rules, including boat speed zones and restricted access areas, and administers activities related to these rules. Staff evaluates data and develops proposed rules for consideration by the FWC Commission, as well as reviews and comments on local manatee protection ordinances developed by city and county governments (See Chapter 7, "Management Actions," p. 36, Manatee Management Plan).

FY 2016-17 HIGHLIGHTS

- **Collier County** (68C-22.023, F.A.C.) — FWC staff continued to work on modifications to the existing Collier County Manatee Protection Zone rule. After receiving recommendations from the Collier County LRRC in May 2016, FWC staff provided a response in August that agreed with the majority of recommendations made by the LRRC. Staff brought the proposed rule to the November 2016 FWC Commission meeting where it was approved by the FWC Commissioners. At this meeting, the FWC Commissioners also directed staff to meet with two homeowner groups located on Clam Bay to continue discussions on the best course of action related to manatee protection for the bay. In January 2017 staff held a public hearing on the proposed rule and held separate meetings with the two Clam Bay homeowner associations. The final rule was approved by the FWC Commissioners, with changes, on April 20, 2017. At this meeting FWC Commissioners agreed with the staff recommendation to not add manatee speed zones in Clam Bay. A Notice of Change for the final rule was published in late April, but the final rule has been delayed due to a rule challenge that was filed in May regarding Clam Bay. An administrative hearing is currently scheduled for next fiscal year.

- **Pinellas County** (68C-22.016, F.A.C.) — The Florida Manatee Management Plan identified western Pinellas County as an area to be evaluated for consideration of new manatee protection zones. FWC staff began working on this project in late 2010 and the final rule was adopted in December 2015. Posting of regulatory markers began in June of this fiscal year and is expected to be completed by the end of 2017.

- **Local Ordinances** — FWC staff coordinated with staff from several local governments on issues related to potential or existing local manatee protection ordinances.

- Wakulla County considered a local ordinance to formally establish manatee protection and boating safety zones on portions of the Wakulla and St. Marks rivers. Zones were already marked on these rivers, but the existing markers were not permitted by FWC so the county worked with FWC to correct this issue. The county adopted a local ordinance (16-17) in November 2016 and FWC formally approved the ordinance in February 2017.

Boating Compliance Studies — The first year of a recreational boating study in western Pinellas County was completed in August 2016. These data collection efforts represent "pre-manatee zone rule" surveys that were completed in advance of the posting of regulatory markers in western Pinellas County, which were adopted in December 2015. This study will be repeated at least six months after the regulatory markers are in place to determine if the new speed zone regulations resulted in changes in vessel distribution or travel patterns and to gauge compliance with the zones.

Regulated Areas — FWC staff continued work to develop county-specific GIS data layers that combine FWC manatee protection zones, boating safety zones, and USFWS manatee protection zones. These GIS data layers will allow for accurate calculations of acres of regulated water for each county and will eventually allow composite maps to be produced that show all three zones on the same maps (with the maps depicting the most restrictive zone if more than one apply to the same area). These efforts have been completed for counties on the Atlantic coast of Florida and are in process for the Gulf coast of Florida. During the past year, the USFWS manatee protection zone map for Charlotte County was completed and the Lee County map has been started.

Variances and Waivers — The variance and waiver process is governed by s. 120.542, F.S., and Chapter 28-104, F.A.C. FWC received one request for a variance from manatee protection rules during FY 2016-17.

- In May 2017, FWC received a request from Halifax Rowing Association for a variance from the Volusia County manatee protection rule. The variance request was to allow faster speeds for safety vessels in a portion of one zone in the Halifax River for activities associated with an annual rowing regatta. The variance was granted by FWC in July 2017.

Permits — Rule 68C-22.003, F.A.C., allows FWC to issue different types of permits for activities that would otherwise be prohibited by the manatee protection rules. Most of these permits are for commercial fishing, professional fishing guides and research activities. There are approximately 150 of these permits in effect at any given time. FWC worked on eight requests for other types of permits during FY 2016-17.

- In February 2016, Mote Marine Laboratory submitted a request to renew a permit allowing higher speed boat operation during dolphin research activities in portions

of Manatee County and Sarasota County, as covered by a federal authorization issued by the National Marine Fisheries Service. A permit was issued to Mote in August 2016.

- In September 2016, a permit was issued in response to a request from the Fish and Wildlife Research Institute (FWRI) for a permit to allow authorization to enter No Entry zones at the FPL Cape Canaveral and Port Everglades Energy Centers to conduct manatee photo-ID research activities.

- In October 2016, FWRI submitted a second request for a permit to allow access to multiple No Entry and Motorboat Prohibited zones in Brevard, Broward, Citrus, Collier, Hillsborough, Indian River, Lee, Dade, Palm Beach, Sarasota, St. Lucie, and Volusia Counties to conduct manatee health assessments and to conduct manatee rescue and recovery activities. A permit was issued in December 2016.

- An application for access to the Pansy Bayou No Entry zone in Sarasota County was received by FWC staff in December 2016. A permit authorizing access to this area for dock construction was issued later that month. At the completion of the dock construction project, the resident of that address applied for and received a permit for Resident Access to Limited Entry Areas in April 2017.

- In January 2017, Sea to Shore Alliance submitted a request for authorization to access several No Entry zones to conduct manatee captures and research activities. Access was requested for several power plant facilities in Broward, Citrus, Collier, Hillsborough, Lee, Palm Beach, Sarasota, St. Lucie, and Volusia Counties. A permit was issued in February 2017.

- In April 2017, Florida Power and Light Company submitted a request for access to the year-round No Entry zone at the Lauderdale Power Plant in Broward County to conduct maintenance and inspection of equipment and to conduct bathymetric surveys. A permit was issued to FPL that same month.

HABITAT CHARACTERIZATION, ASSESSMENT, AND PROTECTION

management activities

The long-term conservation of manatees relies on having enough healthy, suitable habitats available throughout their range in Florida. Human-related activities over time have resulted in habitat degradation, reduced water quality, and decreased spring flows. These activities have caused loss of seagrasses – the manatee's primary food. Reductions in the flow of warm spring waters threaten significant natural warm-water refuges. Anticipated operational changes at power plants and future power plant retirements also pose threats to established artificial warm-water refuges. Understanding the manatee's habitat needs and assuring habitat health and stability is a primary focus of habitat protection programs (See Chapter 7, "Management Actions," p. 55 Florida Manatee Management Plan).

FY 2016-17 HIGHLIGHTS

WARM-WATER HABITAT

- FWC continued to work with Florida Power & Light (FPL) to ensure the protection of manatees during the conversion of their existing facilities from oil burning turbines to the more efficient combined cycle natural gas units. Data collected during these conversions will provide information regarding how manatees responded to changes in warm water availability along the east coast of Florida during winter seasons. The monitoring that was conducted through the efforts of FPL and FWC will be useful to FWC and agency partners in developing future warm-water habitat plans. During 2016 and 2017, FPL completed the conversion of the Port Everglades Energy Center and began the permitting process to convert the Lauderdale power plant.

- FWC staff, in coordination with USFWS, and other partner agencies, are leading an effort to review and update The Warm Water Action Plan, now entitled "Recommendations for Future Manatee Warm-Water Habitat". This document provides a long-term planning tool for manatee warm-water habitat and an updated version is expected to be available by the end of the year.

- FWC is working with a variety of partners to develop and complete a project to restore and enhance Warm Mineral Springs' downstream run (Sarasota County),

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. FWC staff also worked collaboratively with the SWFWMD, USFWS, and the City of Crystal River 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. Construction on this project began in May 2016 and was completed in November 2016.

AQUATIC VEGETATION

- FWC staff continues working to address the protection of Florida's seagrass resources. These efforts have provided seagrass protection protocols and recommendations for coastal construction permits as well as initiating restoration and monitoring projects. Additionally, FWC staff continues to work with FDEP to revise the Uniform Mitigation Assessment Method for submerged aquatic habitat.

- FWC works to control invasive, nonnative aquatic plants and encourage the establishment of native species, particularly in springs systems used by manatees. This is achieved by participation on various aquatic plant working groups. The Kings Bay and Blue Spring Aquatic Plant Working Groups are interagency groups that work to implement invasive aquatic plant management plans, and address warm and cold season treatment activities and other protection measures for manatees. FWC is also working with the SWFWMD to develop revegetation and living shoreline projects within the Kings Bay system.

MINIMUM FLOWS AND LEVELS

- Coordination continues with the Water Management Districts in the development of Minimum Flows and Levels (MFLs) for river and spring systems that provide warm-water habitat for manatees. During 2017, FWC staff provided technical assistance and information related to manatee use of De Leon, Crystal River and Silver Glen Springs.

WATER-CONTROL STRUCTURES

- FWC coordinates the Interagency Task Force for Water Control Structures, which is comprised of USFWS, Miami-Dade County, USACOE, the SFWMD, FDEP and SWFWMD. This working group addresses central and south Florida water control structure-related manatee mortality issues. This past year, one manatee died as a result of an interaction with a water control structure. This death increased the overall total of water control structure-related deaths to 228 since 1974. The average annual number of structure-related deaths before retro-fitting structures

with manatee protection devices was 6.2 manatees per year from 1974-2000. That number has decreased to a post-retrofitting average of 3.6 manatees per year (2001-2016).

PUBLIC OUTREACH – FY 2016-17 HIGHLIGHTS

management activities

Public outreach regarding manatee conservation programs is important so that the public is well informed about manatees and understands the reasons for various manatee protection activities. Knowledge of manatee habitat requirements, behavior, and general biology can help the public and waterway users understand ways they can reduce human-related risks to manatees such as harassment, entanglement in discarded monofilament line, and obeying posted speed zones to reduce injury and death from boat collisions.

MANATEE AWARENESS MONTH ONLINE ENGAGEMENT

- November is Manatee Awareness Month in Florida. In 2016, FWC's online community engagement goal was to get people informed and excited about helping conserve manatees during this month by celebrating their presence in springs, rivers, and coastal waters across the state. 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. The following social media outreach posts occurred in November:

1. Press release with link to Flickr file – Watch out for migrating manatees - 30,000 GovDelivery subscribers
2. Photo contest announcement – Facebook (~30,000 viewers)
3. Manatee quiz – Facebook (~30,000 viewers)
4. Video – Manatees on our mind – Facebook (~30,000 viewers)
5. Video – It takes a team – Facebook (81,000 people reached)
6. Live video – Looking for manatees on the move – Facebook (~30,000 viewers)
7. Press release – Manatees on a quest for winter 'hot tub' - Instagram
8. Rescue – Epic journey of a rescued pregnant manatee – Facebook (53,000 people)
9. Rescue – Manatee stuck in a storm drain – Facebook (100,000 people reached)
10. Photo contest voting and results – Manatees looking mighty fine! – Facebook (65,000 people viewed images and voted)
11. License plate awareness and promotion - Twitter

MANATEE OUTREACH

- Manatee resource boxes were created for six FWC law enforcement locations around the state providing staff with manatee 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 imperiled species.

- A new page was added to the manatee program web pages this year. Coordination between the manatee program and staff in the marine debris program resulted in posting new more comprehensive explanation of entanglement issues related to manatees: fishing line, crab traps/buoys, nets, plastics, etc. http://www.myfwc.com/wildlifehabitats/managed/manatee/entanglement/

- The Manatee Cultural Art Treasure Quest was developed this year for a few North Florida counties that promotes the discovery of lesser known manatee-related cultural or art items to participants willing to search for these items and locations. The quest debuted in June 2017 and is part of the WFSU Summer Passport program. Currently, the quest is available online at http://www.myfwc.com/education/wildlife/manatee/where-to-see/.

- FWC staff viewed and responded to 443 Ask FWC online requests. Staff fulfilled 101 manatee-related bulk order or individual publication requests from schools, eco-tour businesses and visitor centers.

MANATEE DECAL

- In June 2016, the 2016-17 manatee decal with the caption, "Tracking Manatees" and a focus on the FWRI manatee research program, was sent to tax collectors for statewide distribution and sales starting July 1. The decals annually raise approximately $23,000 for the manatee program. This decal design also received a national award for Second Place in the Advertising/Display category from the Association of Conservation Information.

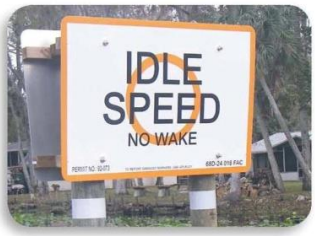
APPENDIX A
ACRONYMS AND ABBREVIATIONS

°C — degrees Celsius
cm — centimeters
Commission, Commissioners — members of the FWC Commission
DEP—Florida Department of Environmental Protection
DTAG — Digital Acoustic Recording Tag
°F — degrees Fahrenheit
FAC — Florida Administrative Code
FPL – Florida Power and Light Company
F.S. — Florida Statutes
FWC — Florida Fish and Wildlife Conservation Commission
FY — Fiscal Year
FYCCN – Florida Youth Conservation Center Network
GIS — Geographic Information System
GPS — Global Positioning System
kg — kilogram
m – meter
MFL — Minimum Flows and Levels
MIPS — Manatee Individual Photo Identification System
MMPL — Marine Mammal Pathobiology Laboratory
Mote — Mote Marine Laboratory
MPP — Manatee Protection Plan
NOAA Fisheries Service — National Oceanic and Atmospheric Administration, National Marine Fisheries Service
Plan — Florida Manatee Management Plan
Trust Fund — Save the Manatee Trust Fund
UF – University of Florida
USFWS — U.S. Fish and Wildlife Service
USGS — U.S. Geological Survey
WMD— Water Management District

APPENDIX B
BOAT SPEED DEFINITIONS

All boat operators must comply with posted signs

S = Spanish - Español
F = French - Français
G = German



Lowest speed needed to maintain steerage and forward motion. (Speed ~2-3 mph/3-5 kph*)

S: La velocidad más lenta que se necesita para mantener gobierno.
F: Vitesse la plus basse nécessaire pour maintenir le steerage et le mouvement avant.
G: Die niedrigste Geschwindigkeit, um das Boot auf Kurs zu halten und vorwärts Bewegung zu machen.

Little or no wake. Vessel must be completely settled in the water. (Speed ~5-7 mph/8-11 kph*)

S: Asentado en el agua, sin surcar, estela mínima que no ponga en peligro a otras embarcaciones.
F: Peu ou pas de sillage. Le bateau doit être complètement arrangé dans l'eau.
G: Das Boot ganz im Wasser mit Kielwasser das nicht andere Fahrzeugen oder Wasser Strasse Benutzeren gefährden.

Resume normal safe speed according to current water traffic conditions.

S: Reanude velocidad normal.
F: Reprenez une vitesse sûre selon des états de transport par voie navigable.
G: Fangen Sie eine sichere geschwindigkeit an.

***Note: The specific speed may vary with the size and hull design of the vessel.**

Florida Fish and Wildlife Conservation Commission
MyFWC.com

In an emergency:
Wildlife Alert: 1-888-404-FWCC (3922)
Mobile: #FWC, *FWC VHF Radio: Channel 16

APPENDIX C
MANATEE LICENSE PLATE AN DECAL PROGRAM

Manatee License Plate

The manatee license plate was created in 1990 as per s. 320.08058(1)(c), F.S., and s. 379.2431(4)(d), F.S., to raise funds for manatee research and protection. The manatee license plate generated $1,238,810 for FY 2016-17. These revenues are deposited in full into the Save the Manatee Trust Fund.

Manatee Decal

Section 328.72, *Florida Statutes*, provides that a sticker or decal can be given to citizens who donate $5 or more to the Save the Manatee Trust Fund. Each year tax collectors participate by selling decals at their offices. Revenues from the decals support manatee protection efforts such as rescue, rehabilitation, research, and outreach. During FY 2016-17, 3,549 manatee decals were sold for manatee conservation. This year's decal was designed by FWC staff.