



*Responsible Conservation of Florida's Wildlife Heritage*  
**SAVE THE MANATEE TRUST FUND**  
**ANNUAL REPORT**  
**FISCAL YEAR 2021-22**



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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 manatee rescue operations

**Photographs** Courtesy of FWC, unless otherwise noted

**Research activities involving live manatees were conducted under Federal permit #MA773494-11**



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## EXECUTIVE SUMMARY

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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 (s.) 379.2431(4)(b), Florida Statutes (F.S.). 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, 2021 through June 30, 2022.

Through the long-term public support of the Trust Fund, the FWC actively implements science-based conservation programs and engages partnerships that are making a difference for manatees and habitat. The FWC's guiding conservation goal for the Florida manatee is to effectively manage the wildlife resource in perpetuity throughout Florida. In order to accomplish this goal, the species must recover from a threatened status and be effectively managed so that manatees can endure future impacts that can affect their population including: large-scale die-offs from red tide and cold stress, human-related impacts and continued degradation and loss of important habitats. Over the past decade, the Indian River Lagoon (IRL) has experienced significant water quality degradation, leading to the repeated occurrence of harmful algal blooms and widespread loss of seagrass, the preferred food for manatees. An Unusual Mortality Event (UME) caused by starvation due to lack of forage in the IRL started in December 2020 and is ongoing on the Atlantic coast. The Atlantic region event is the 14th officially declared mortality event in Florida since 1996, roughly an event every other year over the past two decades. The IRL is central in manatee migration patterns on the Atlantic coast, and health effects of starvation and chronic malnutrition were documented in all of the Atlantic management region. This event is unprecedented, both in numbers and cause, and the U. S. Fish and Wildlife Service (USFWS) delegated authority to manage the response with a Unified Joint Command of USFWS and FWC in November 2021. During FY 2021-22, 589 carcasses (from all causes of death) were reported and 75 manatees were rescued (all causes) within this region. Sufficient recovery of the IRL and seagrass resources are not anticipated in the immediate future and therefore staff expect manatee winter mortality to remain high in the region. FWC and the USFWS partnered to lead proactive efforts including habitat restoration projects and implementation of a supplemental



feeding trial. The supplemental feeding program aimed to reduce the negative health impacts of prolonged starvation and possibly reduce the numbers of deaths and manatees needing rescue. Please find more information on our FWC website: [Manatee Mortality Event Along The East Coast: 2020-2022 | FWC \(myfwc.com\)](#).

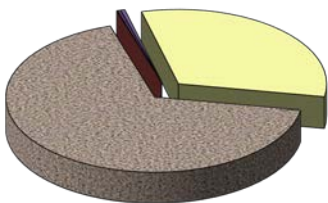
The long-term impacts of such large-scale die-offs on the manatee population in Florida are not currently known. Investigating these events is key to understanding the cause, understanding potential impacts on the population as well as developing conservation measures that protect the species affected and the marine environment where the UME is taking place. To help address this, the FWC monitors multiple aspects of the manatee population including: prevalence of certain reasons for death, adult survival rates, and reproduction that, when taken in context of each other, improve our understanding of population dynamics. As with all species, future resiliency is associated with population size and distribution, growth rate, health, and habitat quality. Together these factors will impact the ability of manatees to cope with future changes and are the focus of conservation work.

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 2021-2022 totaled \$4,262,088. Appropriations from the Trust Fund for the same period were \$4,089,957 with \$313,310 provided for manatee research activities at Mote Marine Laboratory (Mote), and a service charge to General Revenue of \$338,006 that most trust funds are required by law to pay. In FY 2021-2022, FWC's Division of Habitat and Species Conservation expended \$1,086,435 for conservation activities and the Fish and Wildlife Research Institute expended \$1,960,830 on research and monitoring. Details of revenues, appropriations, and expenditures are shown on page 6 of this report.



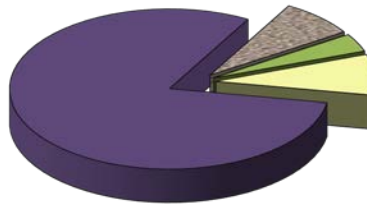
# TRUST FUND FY 2021-22 REVENUES AND EXPENDITURES

## REVENUES \$4,262,088



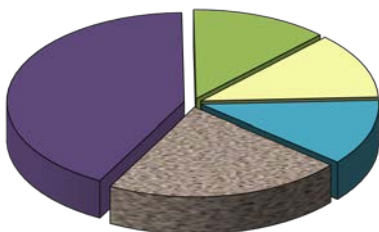
- Vessel Registrations (\$2,872,708)
- Misc. Receipts (\$2,830)
- Save the Manatee Donations (\$13,732)
- Interest (\$18,460)
- Manatee License Plate Sales (\$1,354,358)

## APPROPRIATIONS \$4,089,957



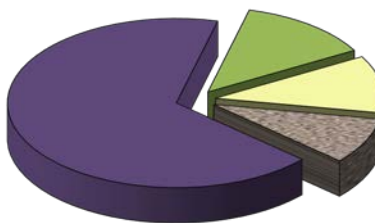
- FWC Manatee Program (\$3,288,641)
- Mote Marine Laboratory (\$313,310)
- Administrative Overhead (\$150,000)
- Service Charge to General Revenue (\$338,006)

## FWC MANATEE PROGRAM CONSERVATION MANAGEMENT EXPENDITURES \$1,086,435



- Manatee Protection Zones (\$236,438)
- Plan and Permit Reviews (\$455,176)
- Habitat Protection (\$136,159)
- Data Distribution (\$130,288)
- Public Outreach (\$128,375)

## FWC MANATEE PROGRAM RESEARCH EXPENDITURES \$1,960,830



- Behavioral Ecology (\$172,927)
- Mortality and Rescue (\$1,320,835)
- Photo Identification (Life History) (\$251,911)
- Population Assessment and Monitoring (\$215,157)



## MANATEE BASICS

COMMON NAME	Florida manatee
SCIENTIFIC NAME	<i>Trichechus manatus latirostris</i> (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	5,733 in 2019
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

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*"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

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### *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 was transferred to the State of Florida by the United States Fish and Wildlife Service (USFWS) in 1985.

Staff from FWC's Fish and Wildlife Research Institute (FWRI) are located in five coastal field stations and respond to all reported carcasses as well as public reports of manatees in distress. These stations are located around the State: Jacksonville, Melbourne Beach, Tequesta, Port Charlotte, and St. Petersburg. Using objective-driven criteria, carcasses are selected for transport by field personnel from recovery locations to FWC's Marine Mammal Pathobiology Laboratory (MMPL) in St. Petersburg or are examined in the field. Staff perform consistent, high quality, post-mortem examinations to determine cause of death. Field staff also coordinate rescues, and when necessary, transport manatees to rehabilitation facilities. 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<sup>1</sup> (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 and rescue information available on the FWC website (<https://myfwc.com/research/manatee/rescue-mortality-response/statistics/>).

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 Rescue and Rehabilitation Partnership consists of representatives from Federal and State agencies (USFWS, U.S. Geological Survey - USGS, Department of Environmental Protection - DEP, FWC), academic institutions (University of Florida - UF), non-governmental organizations (Save the Manatee Club), and private oceanaria (Cincinnati Zoo, Clearwater Marine Aquarium, Columbus Zoo, Pittsburgh Zoo, Dallas World Aquarium, Jacksonville Zoo and Gardens, Miami Seaquarium, Mote Marine Laboratory, SeaWorld Orlando, South Florida Museum, ZooTampa at Lowry Park, Walt Disney World's The Seas, and others).

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<sup>1</sup> 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 <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-unusual-mortality-events> for more information.



## FY 2021-22 HIGHLIGHTS

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- Statewide, there were 883 manatee carcasses documented in Florida during FY 2021-22. Additionally, two carcasses were documented in Georgia, one in Alabama, two in Mississippi, one in North Carolina, one in South Carolina, one in Texas, and three in Louisiana.
- Statewide, 134 rescues were performed in Florida during FY 2021-22. As of 9 August 2022, of the 134 manatees rescued, 69 were released back into the wild (*37 were Assist & Release*), 34 died and the remaining 31 animals are still being rehabilitated. Additionally, there were six out-of-state rescues due to cold stress syndrome, one in Alabama, three in South Carolina, one in North Carolina, and one in Texas.
- An Unusual Mortality Event (UME) associated with mass starvation was declared for the Atlantic Management Unit in the winter of FY 2020-21 and is ongoing. During FY 2021-22, 589 carcasses (from all causes of death) were reported and 75 manatees were rescued (all causes) within this region. The cause of the UME is centered in the Indian River Lagoon (IRL) where a decade of significant water quality degradation and repeated occurrence of harmful algal blooms led to widespread loss of seagrass. The IRL is central in manatee migration patterns on the Atlantic coast, and health effects of starvation and chronic malnutrition were documented in all of the Atlantic management region. This event is unprecedented, both in numbers and cause, and the USFWS delegated authority to manage the response with a Unified Command of USFWS and FWC on 4 November 2021. Mortality in this event peaks during winter because colder temperatures add extra health stressors to manatees that are already compromised by chronic malnutrition. The investigation into the cause for the 2013 IRL *Clostridium* UME was completed and this UME was officially closed in FY 2021-22.

Please visit <https://myfwc.com/research/manatee/rescue-mortality-response/ume/> and <https://myfwc.com/research/manatee/rescue-mortality-response/statistics/mortality/ume-carcass/> for more information regarding the Atlantic coast manatee UME.



Manatee Rescues FY 2021-22 (preliminary numbers)

<i>Type of Rescue</i>	<i>Number of Rescues</i>
Calf—Alone	8
Calf—With Rescued Mother	3
Mother of Rescued Calf	1
Human—Entanglement	4
Human—Entrapment*	22
Human—Watercraft-Related	32
Human-Other	1
Natural—Includes Red Tide	60
Undetermined; Other	3
<b>Total</b>	<b>134</b>

Manatee Mortality FY 2021-22 (preliminary numbers)

<i>Cause of Death</i>	<i>Number of Deaths</i>
Human-Flood Gate or Canal Lock	10
Human - Other	12
Human-Watercraft Related	78
Natural - Cold Stress	9
Natural - Other	190
Perinatal	63
Undetermined	44
Verified, Not Recovered	477
<b>Total</b>	<b>883</b>

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

## POPULATION MONITORING AND ASSESSMENT

### *Research Activities*

Long-term research and monitoring of the Florida manatee population by FWC and our key partners has provided a solid foundation of high-quality data from which we can make sound inferences about manatee population status and trends throughout Florida. 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 aerial surveys to determine regional abundance and distribution of manatees and estimating survival and reproductive rates through photo-identification and genetic identification. Assessments also include estimates of risk to the population, including projected and past population growth and probability of persistence into the future (i.e., risk of extinction).

FWC conducted six aerial surveys from October 2021 to May 2022 in the Indian River Lagoon, from Ponce Inlet to Jupiter Inlet, as part of the response to the unprecedented manatee Unusual Mortality Event (<https://myfwc.com/research/manatee/rescue-mortality-response/ume/> for more information regarding the Atlantic coast manatee UME). These surveys were conducted in partnership with Mote Marine Laboratory and the USFWS to document manatee numbers and distribution during the declared UME. Counts of manatees



in the Indian River Lagoon ranged from 458 in October to 1,370 in March. Most manatees were sighted in the northern portion of the survey area in Mosquito Lagoon, with the exception of the January survey when most manatees were sighted at warm-water sites.

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.

A different survey approach called an abundance survey represents a significant improvement over the traditional synoptic survey by providing a sound estimate of the Florida manatee population. An analysis using surveys from 2015 and 2016 produced the latest population abundance estimate to date and is described in Technical Report TR-23 at

<https://f50006a.eos-intl.net/F50006A/OPAC/Details/Record.aspx?BibCode=1864664>. In

December 2021, an abundance aerial survey was flown on the west coast of Florida. Surveys were conducted over 6 days in 13 aircrafts. Data entry, verification, and analysis for this survey are on-going, and preparations were made for a survey on the Atlantic coast in December 2022. Results of these surveys will be used to estimate statewide manatee abundance and track population changes over time. They can also be used as part of population projection models, like the Core Biological Model (CBM; Runge et al 2017), which are designed to forecast Florida manatee population dynamics, understand the relative influence of the threat's manatees face, and evaluate concerns around potentially emerging threats.

An integrated population model (IPM) for the Florida manatee was also recently developed to reconstruct population dynamics in the southwest region of the state over the past 20 years. In contrast to the CBM, the IPM is designed to reconstruct historical population dynamics and abundance, filling in gaps in observation data by integrating information from multiple sources (e.g., survival, abundance, mortality). The IPM also provides estimates of population abundance in years when abundance surveys were not flown. The IPM framework is being adapted to other regions in the state to assess population status as new data become available.

Monitoring efforts in the Port of the Islands (POI), Collier County, FL continued in winter 2022. FWC developed an innovative mark-recapture method to estimate manatee abundance and detection from count data at aggregation sites using an Unmanned Aerial System (UAS). This information is being used as a baseline measurement for mapping distribution and



abundance to help determine the impact of the Comprehensive Everglades Restoration Plan's Picayune Strand Restoration Project on manatee use of warm-water sites in the POI region.

Long-term data on survival of individuals and reproductive performance of mature females are included within manatee 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. 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 2021-22 HIGHLIGHTS

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-  FWC conducted 6 aerial surveys in the Indian River Lagoon as part of the response to the ongoing manatee Unusual Mortality Event (UME).
-  FWC and partners conducted a manatee abundance aerial survey in December 2021 on the west coast of Florida, from Franklin to Monroe County. The survey occurred over 6 days and was conducted by 10 observers in 13 aircrafts. An abundance survey on the east coast of Florida will be conducted in December 2022.
-  FWRI staff members and interns spent 140+ days conducting land and boat-based photo-ID research during 400+ visits to sites used by manatees. Other research partners and volunteers also provided additional photo-documentation of manatees. 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, 2021, were made available for analyses.
-  46 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 5,143 animals and more than 121,000 sighting records.
-  Transfer of responsibility for the longstanding Manatee Individual Photo-Identification System database, including data, responsibilities, and leadership, from USGS to FWC continued.
-  Genetic sampling surveys were conducted in southwest Florida. A total of 453 samples were collected from free swimming manatees during the 2022 winter: 56 samples at Port of the Islands (Collier County), 197 samples in the Orange River (Lee County), and 200 samples in the Tampa Bay area.
-  The manatee genetic-ID database currently includes 2,981 unique individuals identified by skin samples collected from live manatees in our southwest Florida study area through the 2021 winter.





Photo-ID cataloged manatee known as TB645 with calf at the TECO Big Bend Power Plant.





## BEHAVIORAL ECOLOGY

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### *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. For more information on FWC's manatee telemetry program—including photos, maps, and an animated movement track—please see: <http://myfwc.com/research/manatee/research/radiotelemetry-tracking/>.

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 currently undergoing restoration in southwest Florida is Warm Mineral Springs, which flows via Salt Creek into the lower Myakka River in Sarasota County (see Habitat Management highlights). 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, Collier County, is expected to disappear once hydrologic restoration of sheet flow in the Picayune Strand is completed as part of the Comprehensive Everglades Restoration Plan. 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.







Another serious habitat-related threat to manatees is the large-scale loss of seagrass in the Indian River Lagoon and along much of Florida’s east coast. Although manatees feed on a variety of aquatic vegetation, they rely primarily on seagrass and macroalgae in estuarine environments. The unprecedented loss of forage in this crucial region has led to widespread malnutrition and starvation of manatees. FWC’s investigation into this manatee unusual mortality event includes research into manatee health, ecology, behavior, and population impacts.



Emaciated subadult manatee feeding on green macroalgae in the northern Indian River, Brevard County, where most seagrass has disappeared (Chip Deutsch, FWC).



## FY 2021-22 HIGHLIGHTS

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 As part of the Atlantic coast Unusual Mortality Event investigation, FWC collaborated with the U.S. Geological Survey (USGS) to conduct health assessments, track manatees with satellite-linked GPS tags, and evaluate submerged aquatic vegetation used by tagged manatees in the northern Indian River Lagoon. FWC continued its collaboration with USGS and Clearwater Marine Aquarium Research Institute to track experienced rehabilitated manatees with GPS tags along the east coast after their release from facilities. Manatee movement data in relation to environmental information is providing insights into manatee behavioral response to seagrass loss.
- 
 FWC initiated work on a NOAA-funded actionable science grant for a project entitled, “Creating Secure Warm-water Habitat Networks for Manatees along Florida’s Gulf Coast: Developing a Vision, Identifying Gaps, and Prioritizing Restoration Sites.” The goal of this interdivisional and interagency project (including USFWS and USGS) is for state and federal managers and researchers to jointly develop plans to identify and address the highest research priorities to meet management needs regarding the restoration, enhancement, creation, or protection of warm-water habitats for manatees.
- 
 Manatee distribution and abundance in Salt Creek, which is the outflow from Warm Mineral Springs, was investigated in relation to ambient temperature during winter using ground surveys. Continuous monitoring of water temperatures and tidally-influenced water levels within the creek provide a baseline for future comparison to the system after restoration.
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 Monitoring of manatee use of manmade passive thermal basins near Port of the Islands, as well as at nearby warm-water sites, continued during winter 2021-22. High-resolution video acquired with an unmanned aerial system was used to map manatee distribution and to estimate abundance during mid-winter cold periods at aggregation sites by accounting for imperfect detection with an innovative sight-resight method. This will provide insights into the effects of restoration and mitigation projects on manatee use of regional warm-water refugia.
- 
 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 (e.g., dredged basins or canals) were investigated for their potential to provide sufficient warmth to sustain manatees through cold winter periods.
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 Multiple FWRI staff contributed to four chapters on sirenian foraging, diving, movement behavior, and effects of climate change for a book on *Ethology and Behavioral Ecology of*



*Sirenia*, one in a highly acclaimed series of scholarly books on the behavior of marine mammals.

## RIGHT WHALES

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### *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); 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 and develop rigorous analytical products. Efforts to protect this species are outlined in the North Atlantic Right Whale Recovery Plan<sup>1</sup> and NOAA Fisheries 2021-2025 Priority Action Plan<sup>2</sup>.

The North Atlantic right whale is one of the most endangered large whales in the world with fewer than 350 individuals<sup>3</sup>. The population has been in decline since 2010 and an Unusual Mortality Event (UME)<sup>4</sup> has been in effect since 2017. Entanglement in fishing gear and vessel collisions are the leading known causes of death in this species and 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. Since 1994, portions of Florida and Georgia coastal waters have been designated as critical habitat by NOAA Fisheries. 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

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<sup>1</sup> <https://www.fisheries.noaa.gov/resource/document/recovery-plan-north-atlantic-right-whale-eubalaena-glacialis>

<sup>2</sup> <https://www.fisheries.noaa.gov/resource/document/species-spotlight-priority-actions-2021-2025-north-atlantic-right-whale>

<sup>3</sup> <https://www.fisheries.noaa.gov/species/north-atlantic-right-whale#overview>

<sup>4</sup> <https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2022-north-atlantic-right-whale-unusual-mortality-event>



Implementation Team (SEIT), a multi-agency and citizen advisory group. FWC has been a member of the SEIT since its inception in 1993 and currently serves as Team Leader.

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 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 2021-2022 HIGHLIGHTS


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 During the North Atlantic right whale calving season (November 15<sup>th</sup> - April 15<sup>th</sup>), four




research teams conducted aerial surveys in coastal Atlantic waters from North Carolina to Florida. In total, 64 unique right whales, including 15 newborn calves, were documented. FWC collaborated with the Georgia Department of Natural Resources and the Clearwater Marine Aquarium Research Institute to survey the area between Canaveral National Seashore, Florida, and Tybee Island, Georgia, out to approximately 30 nautical miles offshore. FWC conducted 64 aerial surveys and detected 84 right whale sightings between December 1<sup>st</sup> and March 31<sup>st</sup>. Preliminary photo analysis indicates FWC documented 36 unique right whales, including 14 calves. Select photos from the calving season can be viewed here: <http://myfwc.com/research/wildlife/right-whales/images/>

 Genetic sampling was conducted in collaboration with NOAA Fisheries Service and the Georgia Department of Natural Resources. During the calving season, 43 vessel trips were conducted, resulting in samples from thirteen right whale calves, three adult females, and one juvenile right whale. The skin samples will be used to determine individual identification, sex, and parentage. This genetic data helps identify carcasses, improve population estimates and close demographic information gaps.

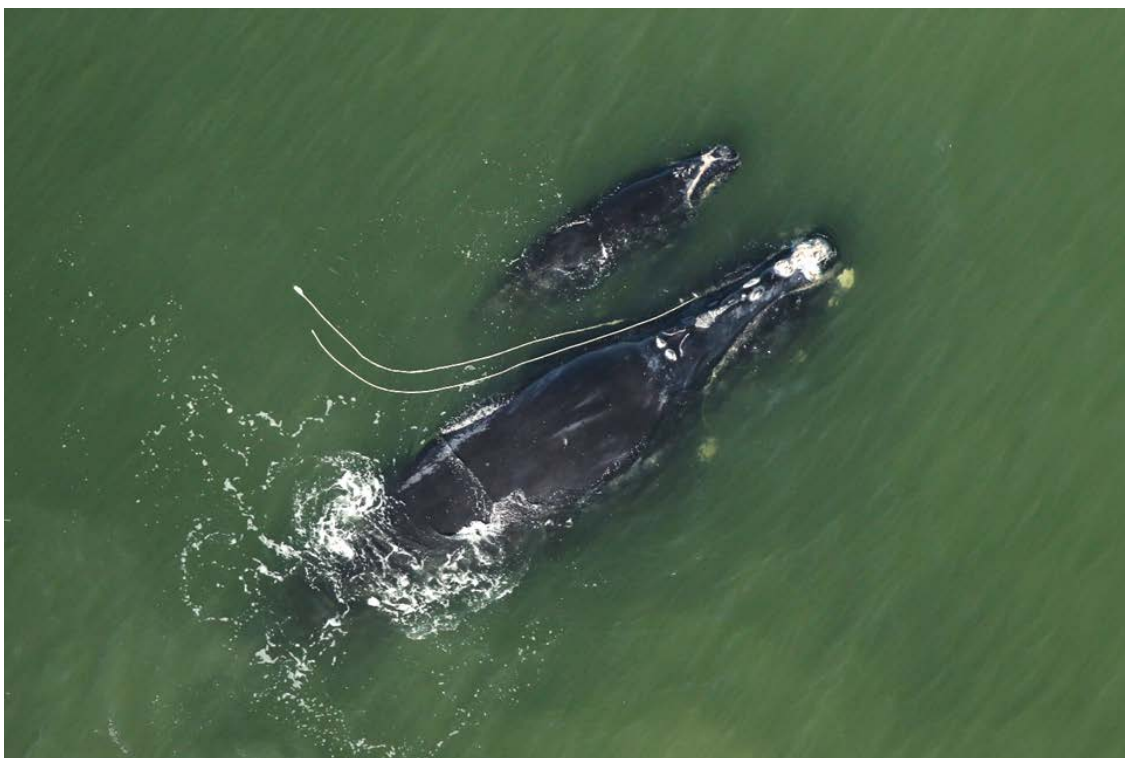
 One entangled right whale was observed off Florida, a female with a dependent calf. Catalog #3560 was first seen entangled in March 2021 and was the subject of multiple disentanglement interventions in New England and Canada prior to arriving in the calving grounds and giving birth in November 2021. During these initial interventions, approx. 400 feet of rope was removed by trained responders, alleviating most of the excess drag from the entanglement. What remained were two relatively short lengths of rope trailing from the mouth and a deep, unresolved wound with embedded rope across the rostrum. A right whale with a life-threatening, chronic entanglement and newborn, dependent calf was an unprecedented event. Female right whales face high energetic demands associated with nursing and the calving season is an especially vulnerable time for both mother and calf. Therefore, the advantages and disadvantages for various types of documentation and continued intervention were weighed and assessed by responders in real-time. The calf gained weight and progressed through developmental changes as expected. Like most other mother-calf pairs visible from shore in Florida, several sightings of #3560 and calf drew interest from the public, including an unauthorized and unsafe event where a citizen paddled out to the whales and cut a small portion of rope from #3560. This led to additional outreach with the public and coordination with law enforcement about this case. Catalog #3560 remains entangled and in fair to poor condition as of July 2022.

 Right whale Catalog #1301 was sighted with a newborn calf four times from January 18-31. The calf's health deteriorated markedly over the course of these sightings, and it is presumed dead.

 FWC researchers gather information from the public about reports of whales and collaborate with local volunteer sighting networks. These efforts are especially helpful in areas with little or no aerial survey coverage (including Central and Southeast Florida) and



contribute to the overall understanding of right whale demographics, distribution, and habitat use in the southeastern U.S.



Entangled right whale Catalog #3560 'Snow Cone' and calf, sighted December 17, 2021 just offshore of Ponte Vedra Beach, FL. Biologists are monitoring the entanglement configuration and the wound across her rostrum, as well as the health of mother and calf.

Photo: FWC, NOAA Fisheries permit #20556

## RESEARCH PUBLICATIONS AND REPORTS

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### *Research Activities*

2021-22 PUBLICATIONS: (*FWC authors in bold type*)



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

Managing fish and wildlife resources for their long-term well-being and the benefit of people.



- Castelblanco-Martinez, D. N., Alvarez-Aleman, A. Torres, R., Teague, A. L., Barton, S. L., Rood, K. A., Ramos, E. A., and Mignucci-Giannoni, A. A. 2021. First documentation of long-distance travel by a Florida manatee to the Mexican Caribbean. *Ethology Ecology & Evolution*. Doi: 10.1080/03949370.2021.1967457
- Deutsch, C. J., D. M. Castelblanco-Martínez, R. Groom, and C. Cleguer. 2022. Movement behavior of manatees and dugongs: I. Environmental challenges drive diversity in migratory patterns and other large-scale movements. Pp. 155-231 in: H. Marsh (ed.), *Ethology and Behavioral Ecology of Sirenia*. Springer Nature, Cham, Switzerland. [https://doi.org/10.1007/978-3-030-90742-6\\_5](https://doi.org/10.1007/978-3-030-90742-6_5)
- Deutsch, C. J., D. M. Castelblanco-Martínez, C. Cleguer, and R. Groom. 2022. Movement behavior of manatees and dugongs: II. Small-scale movements reflect adaptations to dynamic aquatic environments. Pp. 233-298 in: H. Marsh (ed.), *Ethology and Behavioral Ecology of Sirenia*. Springer Nature, Cham, Switzerland. [https://doi.org/10.1007/978-3-030-90742-6\\_6](https://doi.org/10.1007/978-3-030-90742-6_6)
- Marsh H, Albouy C, Arraut E, Castelblanco-Martínez DN, Edwards H, James C, and Keith-Diagne L. 2022. How might climate change affect the ethology and behavioral ecology of dugongs and manatees? Pp. 351-406 in: H. Marsh (ed.), *Ethology and Behavioral Ecology of Sirenia*. Springer Nature, Cham, Switzerland.
- Keith-Diagne, L. W., M. E. Barlas, J. P. Reid, A. J. Hodgson, and H. Marsh. 2022. Diving and foraging behaviors. Pp. 67-100 in: H. Marsh (ed.), *Ethology and Behavioral Ecology of Sirenia*. Springer Nature, Cham, Switzerland.
- Hamilton, P.K., Frasier, B.A., Conger, L.A., George, R.C., Jackson, K.A., Frasier, T.R. 2022. Genetic identifications challenge our assumptions of physical development and mother-calf associations and separation times: a case study of the North Atlantic right whale (*Eubalaena glacialis*). *Mamm Biol* (2022). <https://doi.org/10.1007/s42991-021-00177-4>
- T.C. Weisbrod, M. de Wit, J.A. Hernandez, A.L. Panike, D. Rotstein, N.I. Stacy. 2021. Manatee *Trichechus manatus latirostris* calf mortality in Florida: a retrospective review of pathology data from 2009-2017. *Diseases of Aquatic Organisms* 147: 111-126. doi: 10.3354/dao03639
- J.H. Landsberg, M. Tabuchi, D.S. Rotstein, K. Subramaniam, T.C.S. Rodrigues, T.B. Waltzek, N.I. Stacy, P.W. Wilson, Y. Kiryu, F.A. Uzal, M. de Wit M. 2022. Novel



Lethal Clostridial Infection in Florida Manatees (*Trichechus manatus latirostris*): Cause of the 2013 Unusual Mortality Event in the Indian River Lagoon. *Frontiers in Marine Science*. 9: 841857. doi: 10.3389/fmars.2022.841857




McHugh, K. A., A. A. Barleycorn, J. B. Allen, K. Bassos-Hull, G. Lovewell, D. Boyd, A. Panike, C. Cush, D. Fauquier, B. Mase, R. C. Lacy, M. R. Greenfield, D. I. Rubenstein, A. Weaver, A. Stone, L. Oliver, K. Morse and R. S. Wells. 2021. *Staying Alive: Long-term success of bottlenose dolphin interventions in southwest Florida*. *Frontiers in Marine Science* 7: 624729

## MOTE MARINE LABORATORY MANATEE RESEARCH PROJECTS

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### *Research Activities*

The following projects were funded in FY 2021-22 (\$313,310):

-  Photo-Identification and Genetic Sampling Studies of Manatees in Southwest Florida—The objectives of this project were to: 1) ensure that an updated photographic catalog and data are thoroughly checked for quality and completeness and are provided to the FWC, USGS, and other partner organizations; 2) continue field effort for photo-identification and other data collection efforts in southwest Florida; and 3) contribute to genetic sampling of wild manatees.
-  Manatee Rescue and Verification—Mote researchers work under direction of the FWC to verify and transport carcasses using a custom trailer provided by the FWC and assist in responses to reports of injured or ill manatees within a defined response area.
-  Aerial Surveys of Manatees— Mote staff conducted aerial survey of manatees. The survey's contributed to understanding of manatee abundance, habitat, and distribution.





-  Program Oversight— The program leader is responsible for periodic reports and coordination with State scientists and managers regarding contracted activities conducted by Mote.

## MANATEE FORUM

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### *Management Activities*

In 2004, FWC and USFWS staff 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 2021-22, the Manatee Forum met virtually, once in November 2021 and a second time in May 2022. Presentation topics in both of these meetings were related to the ongoing manatee Unusual Mortality Event (UME) along the Atlantic coast. Specifically, updates were provided on agency response efforts, manatee tracking studies, and Indian River Lagoon habitat monitoring. Additionally, an update was provided on manatee habitat restoration projects as well as a presentation summarizing the NOAA- funded actionable science grant. Both meetings included updates and discussion on FWC and USFWS research and management activities. For both meetings this fiscal year, all participants viewed the presentations by Adobe Connect and listened to the presentations by phone. Pending the status of the COVID-19 pandemic, future plans are for the Manatee Forum to return to meeting in-person. Based on feedback, a modified approach will be taken with one meeting each year in person and one using virtual technology. The new format will provide efficiencies and save resources for Forum members and participating agencies. The 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 valuable to all parties.

## MANATEE PROTECTION PLANNING AND PERMIT REVIEWS

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### Management Activities

FWC staff review proposed development projects and provide 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. The 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 2021-22 HIGHLIGHTS

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-  The FWC reviewed and provided comments on 498 requests for manatee protection measures for actions being taken by the Florida Department of Environmental Protection (DEP), Water Management Districts (WMDs), State Clearinghouse, Florida Department of Transportation (FDOT), U.S. Army Corps of Engineers (USACOE), and USFWS.
-  Staff have continued conversations with the City of Oldsmar Engineering Division regarding the most recent entrapment event where three manatees entered the Mobbly Bayou retention pond by swimming over a city-owned weir structure in summer 2020. Similar entrapment events have taken place in 2012, 2017, and 2018. FWC staff met on-site with the City of Oldsmar and Pinellas County to finalize plans to retrofit the weir through special project funding obtained by the city. FWC staff continue to offer technical assistance in pre-permitting discussions with the regulatory agencies. The weir is expected to be retrofitted in FY 2022-23.
-  In response to a manatee entrapment in a stormwater culvert at Sunwest Park in Hudson, staff contacted the Pasco County Parks Department to discuss opportunities to retrofit the culvert. Pasco County sought technical assistance from FWC staff and installed a grating system on the exposed culverts in June 2022.
-  Staff contacted the City of St. Augustine Public Works regarding access into a stormwater system after a manatee swam through a culvert and became entrapped on the other side in October 2020. Additionally, attempts to contact staff in Pinellas County were made



after the second incident of manatee entrapment behind a small weir in McKay Creek. At the time of this report, neither municipality has requested technical assistance to modify the structures, but FWC staff will continue to communicate with the municipalities to assist where needed.




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 In response to a manatee entrapment behind a living shoreline revetment, FWC staff contacted property managers at a residential community on Brickell Key in Miami-Dade County. Technical assistance on how to remedy the issue was provided and as of February 2022, the proposed plans to modify the living shoreline are under review by the property owner.
- 
 Staff continued conversations with the City of St. Petersburg Water Resources Department regarding the modification of a concrete spillway structure that allowed for manatee access into Clam Bayou and multiple entrapment cases in 2014 and 2020. In FY 2021-22, City staff allocated funding to the project and completed construction of the exclusion device in January 2022.




Photo of weir at Mobbly Bayou Wilderness Preserve in Oldsmar, Pinellas County (left). Photo of grated culvert in Sunwest Park, Pasco County (right).



### *Florida Port Activities*

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 FWC staff provided recommendations on how to offset expected impacts to manatees for six port projects including Port Everglades, Port of Miami, Port of Tampa Bay, and Port Canaveral.

### *Manatee Protection Plans*

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**Duval County MPP:** Duval County staff have initiated correspondence with FWC staff regarding slip allocation tracking and future revisions to their existing plan including development of a Public Service Announcement.



-  **Miami Dade County MPP:** FWC staff have continued to meet regularly and provide technical assistance to the County in their efforts to revise their existing plan.
-  **Sarasota County MPP:** FWC and Sarasota County staff continued discussions on data collection efforts and needs that would aid in the review of their existing plan.

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## MANATEE PROTECTION ZONES

### *Management Activities*

The 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).


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## FY 2021-22 HIGHLIGHTS


-  **Rule Development** - In response to the ongoing Atlantic Coast manatee Unusual Mortality Event (UME), an emergency, temporary No Entry Zone in Brevard County was prepared and filed under the provisions in Chapter 120.54(4), Florida Statute. The temporary zone was in effect from December 31, 2021 through March 31, 2022 and was marked with temporary buoys.
-  **Monitoring Activities** – FWC staff coordinate some data collection activities that assist in the program’s monitoring of existing manatee habitat. This information includes manatee distribution data, vessel use patterns and speed zone compliance. These data aid in the review of existing or potential manatee protection areas in addition to manatee protection planning and agency permit reviews. FWC staff participated in several monitoring activities in FY 2021-22.
  - Eastern Panhandle Region – FWC staff continued a two-year manatee distribution aerial survey in the eastern Florida panhandle covering portions of Franklin, Gulf, Jefferson, Taylor, and Wakulla counties. Partnering with The Nature Conservancy, who provided funding to the FWC, to survey this area that has little information about seasonal manatee distribution in this region. The survey is expected to conclude in spring 2023 and will provide valuable information about manatee distribution and habitat. A funding extension has been granted.



- Withlacoochee River - Staff completed a vessel compliance study at the mouth of the Withlacoochee River in Levy County through FY 2021-22. The one-year study will aid in the review of an existing manatee protection zone that may no longer be serving the purpose of manatee protection as intended when the zone was adopted in 1985. Findings from this study will be evaluated in tandem with a one-year manatee distribution survey that was conducted in the same time period.
- Sarasota County - Staff conducted a one-year vessel distribution and adjoining vessel compliance study in partnership with Sarasota County. Information gathered from these studies will aid in potential revisions to the local Manatee Protection Plan and future assessments of Sarasota County manatee protection zones.

 **Local Ordinances** – FWC staff coordinated with representatives from local governments on issues related to potential local manatee protection ordinances.

- In FY 2021-22, staff from the Citrus County inquired about the potential for establishment of year-round idle and slow speed zones within portions of the Homosassa River. FWC staff provided guidance on the local ordinance process, including the development of a draft ordinance to present to the Board of County Commissioners. After evaluation of the proposed local zones and a best available data, the FWC approved language to both ordinances in April 2022 and May 2022.
- In May 2022, staff from the Lee County inquired about the potential for the County to establish local manatee protection zones in various locations where year-round protections are warranted. FWC staff provided guidance on the local ordinance process, including preliminary review of draft ordinance language. At the time of this report, a formal request for approval of the local zones has not been submitted to the FWC.

 **Permits** – Rule 68C-22.003, F.A.C., allows the FWC to issue permits for activities that would otherwise be prohibited. Most of these permits are for residential access, commercial fishing and professional fishing guide activities occurring within some manatee protection zones. There are approximately 175 of these permits in effect at any given time. FWC staff worked on two additional requests for other types of permits during FY 2021-22.

- In July 2021, the FWC received a request from the Broward County Port Authority for exemption from the Florida Power & Light Port Everglades No Entry Zone to conduct bridge inspections for future repairs. A permit was issued later that month.



- In October 2021, the FWC received a request from Sea & Shoreline Aquatic Restoration for exemption from the seasonal Motorboats Prohibited zone in Blue Spring to allow for completion of an ongoing shoreline restoration project. A short-term permit was issued later that month.
- In December 2021, the FWC received a request from the Clearwater Marine Aquarium Research Institute for exemption from certain No Entry and Motorboats Prohibited zones, in ten counties, to conduct manatee captures and monitoring of tagged manatees at warm-water sites. A permit was issued in January 2022.

**Variations or Waivers** - The variance and waiver process is governed by s. 120.542, F.S., and Chapter 28-104, F.A.C. The FWC did not receive any new requests for a variance from manatee protection rules during FY 2021-22.

## 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 ensuring habitat health and stability is a primary focus of habitat protection programs (See Chapter 7, “Management Actions,” p. 55 Florida Manatee Management Plan).

## FY 2021-22 HIGHLIGHTS



### WARM-WATER HABITAT

- The Atlantic Coast Manatee Unusual Mortality Event (UME) has brought renewed attention to existing watershed and ecosystem issues in places like the Indian River





Lagoon. In response more resources have become available for efforts to support manatee habitat. FWC staff and partners have worked together to identify projects and collaborative opportunities related to the restoration of aquatic habitats to benefit manatees. In FY 2021-22, eight projects were identified in collaboration with stakeholders and partners around the State for funds authorized by the legislature (SB 2500). These projects include restoration of manatee access to critical warm-water habitat in natural springs and habitat restoration in manatee concentrated areas including seagrass habitat enhancement and nursery infrastructure throughout Atlantic coastal estuaries where seagrass declines have occurred. Additional information and updates relating to these projects can be found on our webpage at: <https://myfwc.com/wildlifehabitats/habitat/ahcr/manatee-projects/>

- FWC staff continued to work with Florida Power & Light, Duke Energy, and the Tampa Electric Company to ensure the protection of manatees during the conversion of their existing facilities along Florida’s coastline from oil or coal burning turbines to the more efficient combined cycle natural gas units. Data collected during these conversions will assist FWC staff in monitoring the health of manatees in those areas during the conversion process and provide information regarding how manatees respond to changes in warm water availability during winter seasons. The monitoring conducted through these efforts will be useful to the FWC and agency partners in developing future warm-water habitat plans. During FY 2021-22, the Tampa Electric Company’s Big Bend Power Plant continued the biological monitoring required as part of their efforts to repower an existing coal and gas fired unit with a combined-cycle natural gas unit.
- FWC staff, in coordination with the USFWS, completed the revision to *The Florida Manatee Warm Water Habitat Action Plan* in November of 2020. This document provides a long-term planning tool for manatee warm-water habitat. A workshop composed of representatives from partner agencies, nonprofit organizations, universities, and others will be hosted by the Florida Power & Light Company (FPL) to develop strategies for implementing the Action Plan. In coordination with USFWS and FPL, staff are working to plan this workshop which is scheduled for October of 2022.
- FWC staff are working with a variety of partners to develop and complete a project to restore and enhance Warm Mineral Springs’ downstream outflow (Sarasota County), considered the most important natural manatee warm-water refuge along Florida’s southwest coast. This project will improve warm-water access and habitat quality for manatees. Through funding and assistance from The Nature Conservancy, the Coastal and Heartland National Estuary Partnership, the U.S. Army Corps of Engineers and FWC’s Aquatic Habitat Conservation and Restoration



Section, final design plans were completed and permits acquired in Fall 2020. Construction, funded through Senate Bill 2500, commenced in June of 2022 and is expected to be completed in October of 2022. Additionally, outreach activities within the local community have been led by the National Wildlife Federation through a grant from the Gulf Coast Community Foundation and include informational signage and brochures, community events and messaging.



Photos of Warm Mineral Springs restoration project, Sarasota County.

- FWC staff are also working collaboratively with DEP’s Division of Recreation and Parks and a variety of other partners to stabilize severely eroding banks along the Blue Spring Run (Volusia County), a high use recreational area and critical manatee warm-water refuge. Data collection and survey work began in April 2018, Phases I and II of project construction have been completed, and Phase III is anticipated to commence in Spring of 2023.



MINIMUM FLOWS AND LEVELS

- Coordination continues with the WMDs in the development of Minimum Flows and Levels for river and spring systems that provide warm-water habitat for manatees.



WATER-CONTROL STRUCTURES

- FWC staff coordinate the Interagency Working Group for Water Control Structures, which is comprised of USFWS, Miami-Dade County, USACOE, FDEP, the South Florida WMD, Southwest Florida WMD and St. Johns River WMD. This Working Group addresses central and south Florida navigational lock and water control





structure-related manatee mortality issues. The Interagency Working Group met virtually in February 2022 to discuss issues and concerns that occurred during the previous year.

- During FY 2021-22, FWC staff reviewed nine structure manatee mortality events at Working Group structures. Mortality notification letters were sent to three structure managers to request operational data and provide technical assistance to prevent future manatee mortality at these sites.
- This past FY, six manatees died due to interactions with the above-mentioned structures. These deaths increased the overall total of navigational lock and water control structure-related deaths to 253 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 3.9 manatees per year (2001-2022).

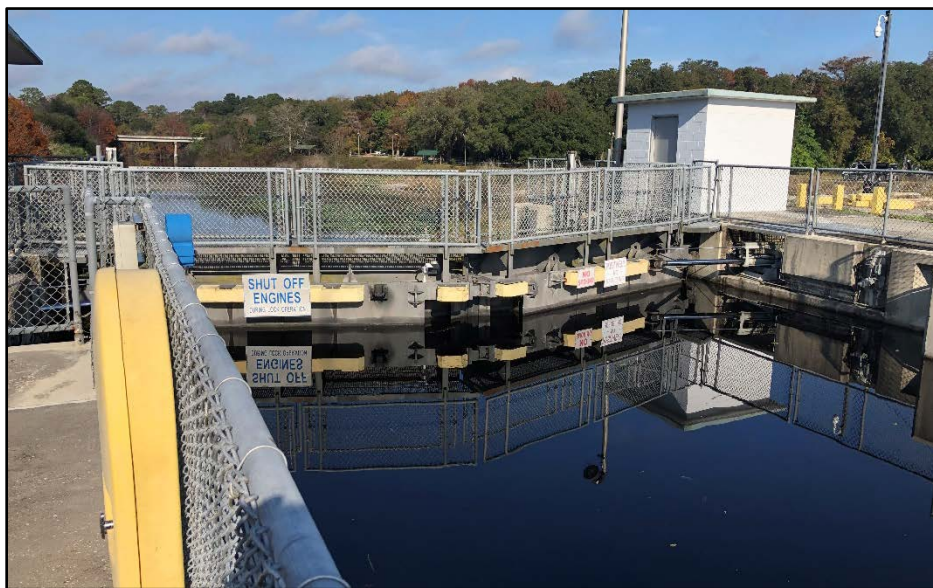


Photo of Moss Bluff Lock in Marion County



### AQUATIC VEGETATION

- FWC staff continue 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. In addition to the projects described above, FWC staff began working with partners to develop eelgrass restoration at several locations within tributaries of the Indian River Lagoon with construction anticipated for FY 2022-23.



- FWC staff work 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 two such 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.



## PUBLIC OUTREACH - FY 2021-22 HIGHLIGHTS

### *Management Activities*

Public outreach regarding manatee conservation programs is important so the public is well informed about manatees and understands the reasons for various 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 or entanglement in discarded monofilament line and why boaters must comply with posted speed zones to reduce manatee injury and death from boat collisions.

During FY 21-22, the Imperiled Species Management Section expanded their existing Bear Management Internship to include manatee and marine turtle related projects. In the fall and spring semesters, students from Florida universities earned course credit while completing various projects, such as updating outreach material, that moved manatee conservation forward.



### MANATEE AWARENESS ONLINE ENGAGEMENT

- Press releases: 7
- **March 23, 2022 - Go slow, look out below; Manatees need your help**
- **March 14, 2022 - Help conserve Florida wildlife as they become more active this spring**
- **December 9, 2021 - FWC: Governor Ron DeSantis' Freedom First budget promotes natural resource restoration and supports Florida's law enforcement officers (The budget reaffirms Governor DeSantis' commitment to high priority conservation items including red tide research and manatee rescue, and provides additional resources and support for law enforcement.)**
- **December 8, 2021 - USFWS, FWC, and FPL expand efforts to address Florida manatee mortality event**
- **November 18, 2021 - FWC and U.S. Fish and Wildlife Service coordinate to protect manatees**
- **November 4, 2021 - Manatees are in motion, it's Manatee Awareness month**
- **July 8, 2021 - Just released! FWC's 2021-2022 manatee and sea turtle decals**
- FWC staff reviewed both the manatee related MyFWC.com webpages to make sure all areas where the Wildlife Alert information was posted had the current information for reporting dead, injured or distressed manatees. The [Tip@MyFWC.com](mailto:Tip@MyFWC.com) information was removed from these areas to prevent a delay in the reporting from this service, leaving the Wildlife Alert phone numbers. Wildlife Alert text was reworded so that



when translated to Spanish through the Google Translator app embedded on the website, the translation was clearer.

- Social Media - Staff continued regular and frequent social media engagement through platforms such as Facebook, Instagram, and Twitter. Important messaging included awareness about moving manatees during seasonal migration, "Go Slow, Look Out Below!" aimed at protecting manatees from waterway vessels, and information and updates related to the ongoing manatee UME.



### MANATEE OUTREACH

Due to COVID-19 pandemic concerns, in-person events between July 2021 and June 2022 were limited, but additional outreach occurred through online meetings, networking and through the creation of materials targeted to different groups. ISM staff participated and presented on manatee conservation at the following events:

- Osher Lifelong Learning Institute at Florida State University - The Study of Florida Manatees (3-week term; virtual)
- Florida Sierra Club - Manatee Conservation and Population Status (virtual)
- Wakulla Springs Alliance - Manatee Distribution in the Northern Gulf of Mexico (virtual)
- Sanibel Sea School - Kindergarten and First Grade Manatee Presentations (in-person classroom; Sanibel, FL)
- Florida State University Coastal & Marine Lab Open House - Manatees (in-person table display; St. Teresa, FL)
- Museum of Florida History's 39th Annual Children's Day - Manatees (in-person table display; Tallahassee, FL)
- Right Whale Festival - Manatees (in-person table display; Fernandina Beach, FL)
- Homosassa Springs Wildlife State Park (exhibit design; Homosassa, FL)
- Fish and Wildlife Foundation of Florida - Manatee Conservation & Unusual Mortality Event (virtual)
- Wildlife Viewing and Nature Tourism Academy - Appropriate Manatee Viewing (in-person conference; Tucson, AZ)

Educational materials about manatees were distributed to these groups to assist with their manatee awareness efforts in their communities:



- Several public and charter school teachers received education materials for their science programs throughout Florida, Ponchatoula, LA, and Springfield, IL.
- Choctawhatchee Basin Alliance in Santa Rosa Beach, FL, received materials to distribute with a youth food backpack program.
- Amelia Island Kayak Excursions in Fernandina Beach, FL, received materials for their Florida Youth Conservation Center Network camps.
- Tarpon Bay Explorers in Sanibel, FL for ecotours in the J.N. Ding Darling National Wildlife Refuge.
- Halifax Sportfishing Club received materials for their Kids Can Fish Too Carnival in Port Orange, FL.
- Friends of Manatees in Wimauma, FL, received materials to distribute at a charity event.
- The Fort Myers Beach Town Marine Resource Task Force received materials for their educational outreach program.
- Celebrate State, LLC, in Orlando, FL received materials to send educational materials to subscribers.
- At the Gulf Shore magazine in Spring Hill, FL, received materials for article information.
- USCG Auxiliary received materials to pass out at Vessel Safety Checks.
- Florida Maritime Museum in Cortez, FL
- Friends of the Gulf Beaches Historical Museum in Pass-a-Grille, FL
- Museum of the Islands in Pine Island, FL
- Manatee Springs State Park in Chiefland, FL
- Blue Spring State Park Visitor Center in Orange City, FL
- Hillsborough County Parks in Tampa, FL
- Orange County Parks and Recreation Tibet Butler Preserve in Orlando, FL
- City of Safety Harbor in Safety Harbor, FL
- City of Dunedin Nature Center in Dunedin, FL
- West Florida Public Library in Molino, FL
- Trading Post Flea Market in Okeechobee, FL





## MANATEE DECAL

- The manatee decal available at Florida tax collector offices this year was titled, “Go Slow - Look out below”, and was an awareness reminder that manatees live in Florida’s waterways year-round. Boaters, including personal watercraft operators, can do their part to protect manatees by going slow near shallow areas, seagrass beds, and sanctuaries and looking out below by wearing polarized sunglasses. Florida’s tax collector offices distributed 4,814 decals through the annual vehicle/vessel registration period and helped raise approximately \$13,732 for the Save the Manatee Trust Fund. [Note: at the time of this report, nine counties had not reported their decal sales, accounting for 1170 decals.]
- In addition to the decal sales at the tax collector office, individuals may order manatee decals through the Manatee Management Program office. Decal order forms are available to download from the manatee program’s web page: [Manatee Decals | FWC \(myfwc.com\)](https://myfwc.com/manatee/decals). The manatee decals continue to bring in additional funds to the Save the Manatee Trust Fund. Decals from 1992 to the present fiscal year are available for donation at \$5 each.
- Surplus manatee decals from previous years are also distributed to groups to use at their education events or programs. A total of 1,705 older decals were given away during the year.



## MANATEE INFORMATION - UPDATES AND NEW RESOURCES

A new educational manatee sign was developed with the assistance of Imperiled Species Management Section interns and listed on the manatee program web page. The sign is designed to be installed at locations where manatees are present and waterway users are interested in observing them. The Nature Conservancy funded the purchase of 18 aluminum signs that will be distributed to state parks and nature preserves around the state.





Photo of "Respect Florida Manatees" Educational Signage

Staff maintain a webpage for boat facilities to obtain access to the signage and educational material. All manatee educational signage is available for download here: <https://myfwc.com/wildlifehabitats/wildlife/manatee/education-for-marinas/>

FWC staff finalized updates and printed the brochure, "Guidelines for protecting Florida Manatees", which had been under review since the last fiscal year. After the brochure was printed, agency research staff assisted with translating the text to Spanish and an ADA version of the translated brochure was posted online. This timely translation allowed research staff in Mexico to use the information for educational purposes when it was discovered that a tagged manatee from Florida was observed using the navigational channels in Cancun, Mexico. The translated information was shared with researchers monitoring the manatee, the protected area administrators, local not-for-profit organizations, tourist guides and the navigation authority of the Port of Cancun. A digital version of this brochure can be downloaded here: <https://myfwc.com/media/25256/guidelinesprotectingmanatees.pdf>



New this year is a sticker that can be handed out at outreach events or by law enforcement when interacting with the public. The sticker, “Go Slow - Look Out Below”, will aid in reminding water users of the importance of paying attention to nearby manatees who may be in the vicinity of their vessel.



Photo of “Go Slow - Look Out Below” Sticker





## APPENDIX A ACRONYMS AND ABBREVIATIONS

°C — degrees Celsius
cm — centimeters
<b>Commission, Commissioners</b> — 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
<b>NOAA Fisheries Service</b> — National Oceanic and Atmospheric Administration, National Marine Fisheries Service
<b>Plan</b> — Florida Manatee Management Plan
<b>Trust Fund</b> — 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

ES = Spanish - Español  
FR = French - Français  
DE = German - Deutsch



Lowest speed needed to maintain steering and forward motion. (Speed ~2-3 mph/3-5 km/h\*)



ES: La velocidad más lenta necesaria para mantener gobierno y dirección (velocidad de ~2-3 mph o 3-5 km/h).

FR: Vitesse la plus basse tout en maintenant la gouverne et la direction. (Vitesse ~2-3 mph ou 3-5 km/h)

DE: Die niedrigste Geschwindigkeit, um das Boot auf Kurs zu halten.



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



ES: La embarcación debe estar asentada y nivelada en el agua, sin surcar mientras se mueve con una estela mínima (velocidad de ~5-7 mph o 8-11 km/h).

FR: Peu ou pas de sillage. L'embarcation doit être complètement positionnée dans l'eau. (Vitesse ~5-7 mph ou 8-11 km/h)

DE: Langsame Fahrtgeschwindigkeit, kein Kielwasser, Boot muss vollständig im Wasser sein.



Resume normal safe speed according to current water traffic conditions.



ES: Reanude la velocidad normal y opere de manera segura tomando en cuenta el tráfico en el agua.

FR: Reprendre une vitesse normale et prudente, selon les conditions de transport nautique en vigueur.

DE: Normale und an die Wasserbedingungen angepasste Fahrtgeschwindigkeit wieder aufnehmen.

**\*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**



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

Managing fish and wildlife resources for their long-term well-being and the benefit of people.

## What can you do to protect Florida's manatees?

ES: ¿Qué puede hacer para proteger a los manatíes de la Florida?  
FR: Que pouvez-vous faire pour protéger le lamantin de la Floride?  
DE: Was können Sie tun, um Floridas Manatees zu schützen?

**Wear polarized sunglasses while operating a boat.**  
**Polarized lenses make it easier to see things under the surface.**

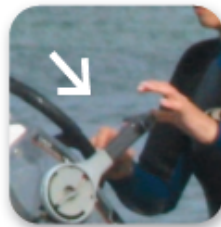


ES: Use lentes de sol polarizados mientras opera una embarcación. La polarización facilita ver cosas debajo del agua.

FR: Portez des lunettes solaires polarisées quand vous opérez une embarcation. Les lentilles polarisées facilitent la vision des objets situés sous la surface de l'eau.

DE: Polarisierte Sonnenbrillen tragen, wenn Sie im Boot unterwegs sind. Mit polarisierten Brillengläsern kann man leichter etwas unter der Wasseroberfläche erkennen.

**Slow down and observe all manatee speed zones and caution areas.**



ES: Reduzca la velocidad en las zonas de manatíes y respete todas las áreas de velocidad restringida o de precaución.

FR: Ralentissez et respectez toutes les zones de vitesse et les zones de prudence concernant les lamantins.

DE: Langsam fahren und alle Geschwindigkeitsbeschränkungen und Warnungen für Manatees beachten.

**While swimming or diving, do not approach or chase a manatee.**



ES: Mientras nade o bucee no se acerque o persiga a los manatíes.

FR: Lorsque vous nagez ou plongez, n'approchez pas et ne pourchassez pas un lamantin.

DE: Beim Schwimmen oder Tauchen den Manatees nicht zu nahe kommen oder sie verfolgen.

**Don't pollute. Pick up trash such as fishing line and plastic bags.**



ES: ¡No contamine! Recoja la basura, tal como el hilo de pescar y las bolsas plásticas.

FR: Ne polluez pas! Ramassez les déchets tels que les lignes de pêche et les sacs de plastique.

DE: Die Umwelt nicht verschmutzen! Abfall, z.B. Angelleinen und Plastiktüten, aufheben.

**Give a proper lookout for manatees when boating**



A manatee's snout will break the water's surface when the animal comes up to breathe.



A manatee's back may break the surface before a dive.



A flat swirl on the water's surface, called a manatee "footprint," is created by a manatee's paddle-shaped tail. The edge of the tail may be visible.



Depending on the time of day, water clarity, and reflection of the sun, manatees may be hard to see. Use caution when boating in waters where manatees may be present.



**Wildlife Alert Hotline:**  
**1-888-404-3922**



02/21



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

Managing fish and wildlife resources for their long-term well-being and the benefit of people.



## APPENDIX C MANATEE LICENSE PLATE AND 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. In FY 2021-22, the manatee license plate generated \$1,354,358. 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, County 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 2021-22, 4,814 manatee decals were sold for manatee conservation. This year's decal was designed by FWC staff and acknowledges 28 years of manatee conservation efforts by recently retired FWC staff Bonnie Abellera.



You can be the solution! Visit: [MyFWC.com/Help-Manatees](http://MyFWC.com/Help-Manatees)



#### Manatees in Motion

Manatees travel throughout Florida's waterways and move between freshwater rivers and springs, brackish waters, and coastal salt waters. They even use canals and lock systems to enter lakes or may be found in other inland waterways when storm surges provide access from nearby waterbodies.

While the Florida manatee range is mostly within Florida, some manatees have traveled as far north as Rhode Island, as far west as Mexico, and as far south as Puerto Rico. Researchers place tracking units on the Florida manatees discovered in these distant locations, which help biologists collect information on travel behavior and preferred habitat use.

When boating in Florida, you may share the waterways with manatees. While manatees are difficult to see when water is not clear or when there is a glare on the surface, you can still look out for them. The up and down motion of a manatee's tail creates a round plume on the water's surface when the manatee swims, which looks like a series of

circles known as 'manatee footprints.' If you see a manatee footprint or other signs of a manatee in the water (snout, back or tail), slow your vessel or shut off your engine until you locate the manatee(s) and are far enough away to safely move forward again.

#### When looking out for manatees:

- Wear polarized sunglasses to reduce glare and see below the water's surface.
- Get someone to assist you as a proper lookout to help you avoid manatees while boating.

We can all protect our **Manatees in Motion**.

Report manatee deaths, injuries, harassment, accidents, orphaned or distressed manatees to the FWC Wildlife Alert Hotline 888-404-FWCC (3922). #FWC or \*FWC on your cell phone.

This decal recognizes **Bonnie J. Abellera**, who left her own footprint at the FWC by coordinating the manatee decal designs for 28 years.



Florida Fish and Wildlife Conservation Commission  
820 S. Meridian Street, 6-A  
Tallahassee, FL 32399-1600  
[MyFWC.com/Manatee](http://MyFWC.com/Manatee)

Thank you for your contribution to the **Save the Manatee Trust Fund**. 22-

