Save the Manatee Trust Fund

Fiscal Year Annual Report

July 1, 2010— June 30, 2011

Florida Fish and Wildlife
Conservation Commission

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Cover photo *Manatees in Wakulla River*

SAVE THE MANATEE TRUST FUND

Annual Report
2010-2011

Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
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http://MyFWC.com

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

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Executive Summary

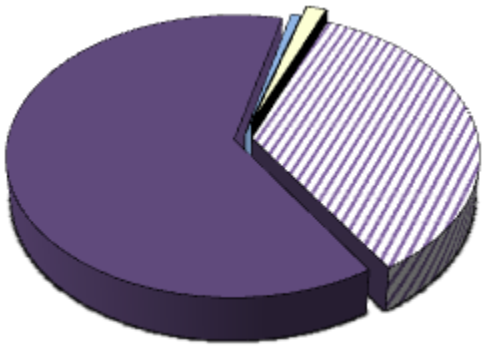
The Florida Fish and Wildlife Conservation Commission (FWC) is pleased to submit this annual report on the expenditures from the Save the Manatee Trust Fund (Trust Fund), per §379.2431(4)(b), Florida Statutes (F.S.). The report covers the period from July 1, 2010 through June 30, 2011. As required by 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, each year. The Trust Fund is the primary source of funding for the State's manatee-related research and conservation activities. Revenues for Fiscal Year (FY) 2010-2011 totaled $3,946,789. Appropriations from the Trust Fund for the same period were $4,412,673, with $325,000 provided for manatee research activities at Mote Marine Laboratory and a service charge to General Revenue of $158,281 that most trust funds are required by law to pay. In FY 2010-2011, the Division of Habitat and Species Conservation expended $1,038,220 for conservation activities and the Fish and Wildlife Research Institute expended $1,807,245 on research and monitoring. Details of revenues, appropriations, and expenditures are shown in pie charts.

Once again the State experienced a period of extreme cold weather during the 2010-11 winter. Record cold temperatures in December 2010 took a toll on manatees as reflected in elevated mortality and rescues. As in the previous winter, an Unusual Mortality Event (UME) was declared--the cause related to ecological factors. The winter 2010-2011 event lasted approximately 58 days and during that period 202 carcasses (all causes) and 28 rescues were reported. The FWC will rely on data from monitoring programs over the next few years to better understand population level implications of the recent unprecedented number of deaths. Certainly the past two winters have underscored the importance of warm-water habitat to manatees.

Accordingly, a major focus of the FWC Manatee Management Plan is addressing long-term availability of warm-water habitat. Generally, warm-water habitat consists of natural springs and the warm-water effluent produced by power plants. Working with conservation partners, the FWC is focusing on restoration and enhancement projects for Florida springs. Included in this report is an overview of progress towards important spring restoration work that will result in a gain of natural warm-water refuge habitat. An exciting event this year involved the installation of a special gate at Homosassa Springs State Park that allowed containment of captive manatees while providing spring access to wild manatees. The public can view wild manatees in winter from an underwater viewing area. Through partnerships with state and federal agencies, local governments, non-governmental organizations and the business community, FWC is working to ensure that manatees will remain a unique and treasured part of Florida.

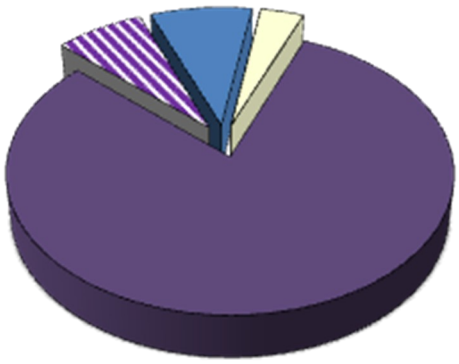
Trust Fund 2010–2011
Revenues and Expenditures

REVENUES
$3,946,789



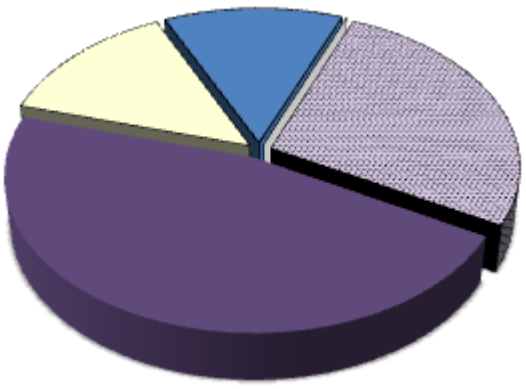
- Save the Manatee License Plate ($1,373,751)
- Vessel Registrations ($2,478,659)
- Interest ($30,786)
- Decals and Donations ($63,593)

APPROPRIATIONS
$4,412,673



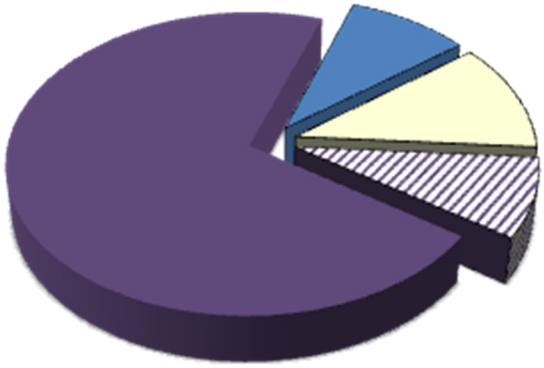
- FWC Manatee Program ($3,557,620)
- Mote Marine Laboratory ($325,000)
- Administrative Overhead ($371,772)
- Service Charge to General Revenue ($158,281)

FWC MANATEE PROGRAM CONSERVATION MANAGEMENT EXPENDITURES
$1,038,220



- Manatee Protection Zones ($279,094)
- Plan and Permit Reviews ($481,733)
- Habitat Protection ($141,610)
- Public Outreach ($135,783)

FWC MANATEE PROGRAM RESEARCH EXPENDITURES
$1,807,245



- Behavioral Ecology ($152,755)
- Mortality and Rescue ($1,277,946)
- Photo Identification (Life History) ($166,687)
- Population Assessment and Monitoring ($209,857)

Manatee Basics

COMMON NAME Florida manatee

SCIENTIFIC NAME *Trichechus manatus latirostris*

STATUS Endangered (federal and state)

RANGE Throughout Florida (summer months into southeastern states but reported as far north as Cape Cod and as far west as Texas)

MAXIMUM CENSUS 5,076 in 2009–2010

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

UNUSUAL FACT Manatees have 3-4 remnant toenails on each flipper.

A CLOSER LOOK

Adult manatees average 8-10 feet (2.5-3 meters) in length and weigh around 1,000 pounds (450 kg). The largest manatees may reach 14 feet (4.2 m) in length and weigh over 3,500 pounds (1,450 kg). 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 m) 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. They 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 20°C (68°F). This warm water may be in south Florida or may be from an artesian spring or industrial discharge. Manatee habitat loss, including future changes in artificial warm-water refuges and reductions in natural spring flows, is also of concern.

Manatee Management Plan

GOAL

"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."

FWC Manatee Management Plan, December 2007

Approved at the December 2007 FWC Commission meeting, the Florida Manatee Management Plan (Plan) guides key conservation work supported through the Save the Manatee Trust Fund. The 267-page document 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 and the transfer of that data into information and knowledge in order 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

This annual report serves as a way to present progress in implementing key conservation strategies described in the Plan. Copies of the Plan can be downloaded from the Commission Web site:

http://www.myfwc.com/wildlifehabitats/imperiled/management-plans

Mortality and Rescue

research activities

FWC staff participate in a manatee rescue

A network of researchers and law enforcement agencies was established in 1974 to recover manatee carcasses and assist injured manatees. In 1985, the responsibility of the manatee carcass salvage, necropsy, and rescue program was transferred to the State of Florida by the U.S. Fish and Wildlife Service (USFWS) and therefore now rests largely with the Florida Fish and Wildlife Conservation Commission's (FWC) 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 Manatee Management Plan. These stations are located around the state: Jacksonville, Melbourne, 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' (UME's). 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 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 and coordinate a network of personnel from various agencies and organizations to work with FWC biologists to rescue and, when necessary, transport manatees to rehabilitation facilities.

[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.

2010–2011 highlights

- Statewide, there were 470 manatee carcasses documented in Florida during FY 2010-2011. All but 8 were recovered and examined. Additionally, one carcass was documented in Texas, one in Louisiana, one in Mississippi, one in Alabama, and two in Georgia.

- Researchers collected tissue samples for genetic analysis from most carcasses. Other tissues were collected for toxicology, histology, aging and for requests from external researchers.

- A cold-related Unusual Mortality Event was declared by the federal Working Group for Marine Mammal Unusual Mortality Events for the central-east and central-west regions of Florida. Record cold temperatures during December 2010 resulted in unprecedented numbers of cold-related mortality and numerous rescues of cold stressed animals. Preliminary data demonstrate that at least 71 manatees died from exposure to cold during this event in these two regions. The cold temperatures affected all sizes of manatees. Some of the animals died from acute exposure to cold whereas later on others suffered from chronic cold stress, a more complex disease process.

- MMPL staff members conducted several necropsy training workshops and classes.

- Ninety-seven rescues were performed statewide during FY 2010-2011. As of June 2011, 54 of these rescued manatees were released back into the wild, 21 died, and the remaining 22 animals were still being rehabilitated in facilities around the State.

- Twenty-eight of the 41 rescues within the "Natural" category were related to cold stress. Three of the eight rescues within the "Calf- alone" category were related to cold stress.

Manatee Mortality FY 2010-2011

Cause of Death	*Number of Deaths*
Human -- flood gate or canal lock	2
Human -- other (entanglements, etc.)	2
Human – watercraft related	78
Natural -- cold stress	145
Natural – other (includes red tide)	18
Perinatal (total body length less than 150 cm or about 5 feet)	84
Undetermined (decomposed or other)	133
Verified, Not Recovered	8
Total Carcasses July 1, 2010 – June 30, 2011	470

Manatee Rescues FY 2010-2011

Type of Rescue	*Number of Rescues*
Calf—Alone	8
Calf—With Rescued Mother	4
Mom—With Rescued Calf	2
Human—Entanglement	17
Human—Entrapment*	3
Human—Watercraft Related	15
Human-Other	8
Natural—Includes Red Tide	40
Total	97

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

Population Monitoring and Assessment

research activities

Manatees gather at TECO's Big Bend Powerplant

FWRI 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 distribution of manatees and to assess habitat use, and c) estimating survival, population growth, and reproductive rates through photo-identification and genetic-identification. Assessments also include estimates of risk to the population, including projected declines in population size and probability of persistence into the future (i.e., risk of extinction).

FWC traditionally uses two types of aerial surveys to monitor manatees. These surveys provide minimum counts and information about habitat use and seasonal distribution. The first type of survey (known as the synoptic survey) is flown statewide and provides a minimum count of manatees at known aggregation sites and other sites in winter. These surveys are conducted annually pursuant to §379.2431(4)(a), F.S., requiring an impartial scientific benchmark census of the manatee population in the State. The counts are flown after cold fronts, and under specific weather conditions, when animals aggregate at natural springs and thermal discharges from power plants. The traditional synoptic survey design yields minimum counts of the number of manatees using these warm-water sites. Because weather and water conditions (among other factors) change year-to-year, the ability to see and detect manatees on any given day, at any given site, may change appreciably. Therefore, statistical estimates of population size are not possible from these surveys. On January 20 and 24, 2011, a team of 20 observers from 11 organizations counted 2,432 manatees on Florida's east coast and 2,402 on the west coast for a total of 4,834 manatees state-wide.

The second type of survey is flown on a regional basis, and FWC uses these distributional surveys to determine the seasonal distribution and habitat use of manatees. These surveys usually are flown twice monthly in a specified county (or counties) for a period of two years. The location of the survey (or surveys) is determined based on management needs.

Currently, FWC researchers are developing new techniques for both surveys with the goal of providing precise and reliable estimates of population size and improved information on manatee distribution. These new methods and resulting data will incorporate information about how well observers detect manatees from the air and will relate environmental variables to the number of animals counted by observers.

In FY 2010-2011, FWC staff conducted an abundance survey of the west coast of Florida testing these newly developed methods. Sixteen areas were surveyed by 21 different observers, including partners from six agencies. These new methods are not as dependent on cold weather as the traditional methods. Following successful testing, the new methodology will replace the existing synoptic survey methods. In the interim, preparatory activities will include expanding and adapting the methods to other areas in the State. Details are described in the Manatee Management Plan (see Chapter 9, Monitoring Activities p. 86 and Chapter 10, Ongoing and Future Research p .114).

In addition, distributional surveys were conducted in east Pinellas County (in partnership with the County) and Martin and St. Lucie counties twice monthly.

Information on manatee life history is essential for assessing manatee population dynamics and recovery. Specifically, long-term data on growth and survival of individuals, reproductive performance of mature females, and health of manatees are important to the development of reliable 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 usually are the result of encounters with boats, but they can be caused by entanglement in fishing gear and by infections. This research is conducted through a partnership between FWC, the U. S. Geological Survey (USGS), and Mote Marine Laboratory (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 rates, and reproductive parameters such as calving intervals (time between births) and length of calf dependency.

Critical data gaps still exist in Florida manatee population assessments. Three demographic parameters are in need of refinement to better model manatee status and recovery: annual reproductive rates, annual gender-specific movement between the northwest and southwest regions, and gender-specific adult survival rates in the southwest region. In parts of the southwest region, these vital statistics have been 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 statewide, particularly in the southwest. 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. The Manatee Management Plan identified the need to implement a genetic identification program (see Chapter 10, Ongoing and Future Research, p.115). During the winters of 2009, 2010 and 2011, FWC conducted dedicated genetic sampling surveys in southwest Florida. Additionally, FWC is collaborating with USGS to develop statistical models that integrate population data from photo-identification, genetic-identification surveys, and the carcass recovery program.

2010–2011 highlights

- During the annual statewide manatee synoptic survey, 4,834 manatees were counted.
- FWC staff conducted an abundance survey of the west coast of Florida testing newly developed methods. An evaluation of the performance of the methods is underway.
- In October 2010, FWC held an aerial survey safety workshop to improve the safety of FWC aerial observers.
- FWC staff members and interns spent over 100 days conducting land- and boat-based photo-identification research during 300+ visits to sites used by manatees in the Tampa Bay area and southwest Florida. Additionally, other FWC volunteers, outside organizations, and field lab staff statewide photo-documented manatees with unique features. More than 16,000 images documenting the unique features of individual manatees were taken and archived.
- FWC and Mote manatee photo-identification data through the 2007-2008 winter season were analyzed this FY and will yield an updated estimate of adult survival rate for southwest Florida.
- Fifty-nine manatees meeting specific photo-documentation criteria were added to the southwest portion of the MIPS catalog of uniquely identifiable animals.
- Genetic sampling surveys were conducted in southwest Florida. A total of 273 samples were collected from free swimming manatees: 68 samples at Port of the Islands (Collier County) during four survey days, 100 samples in the Orange River (Lee County) during one survey day, 102 during two survey days at the Big Bend Power Plant discharge canal (Hillsborough County), and three samples during photo-ID surveys at the Bartow Power Plant discharge area (Pinellas County).

FWC researcher tracking a manatee

Behavioral Ecology

research activities

Researchers with manatee tracking device

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 GPS (Global Positioning System) locations provide a detailed record of manatee movements over long periods. In the field, biologists locate these study animals by homing in on the tag's unique radio and ultrasonic signals in order to obtain data on behavior, group size, habitat, and movements. 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 of both industrial and natural spring sources is deemed a key long-term threat to the manatee population. With the shutdown of three power plants along the east coast during the past two years, one permanently and two for repowering, the warm-water network that manatees have relied on is changing. The focus of multi-agency monitoring efforts during winter 2010-2011 was on how manatees respond to a change in primary warm-water habitat associated with the modernization of the former Florida Power & Light (FPL) Cape Canaveral power plant in the northern Indian River near Titusville. This winter was the first year of a three-year construction period, during which FPL provided a temporary warm-water refuge for manatees. In partnership with the U.S. Geological Survey (USGS) and primarily funded by FPL, FWC conducted a tracking study to characterize manatee movements and use of warm-water sources and foraging habitat in the region. Temperature monitoring of known and potential warm-water sites is also a crucial part of the effort. The Manatee Management Plan provides further information on this issue (see Chapter 10, "Ongoing and Future Research" pp. 102-3).

Watercraft collision is the single greatest human threat to manatees in Florida. In collaboration with researchers at Florida State University (FSU), Duke University, and Woods Hole Oceanographic Institution, FWC conducted a study on interactions between tagged manatees and motorized boats in southwest Florida. The goal of the project is to create a combined picture of manatee behavior, acoustics, and vessel trajectories to document manatee responses to approaching boats and the acoustic cues that may elicit such responses. The research combined state-of-the-art, manatee-borne electronic tags with boat-based observations and aerial videography. During the 2007 and 2008 spring-summer field seasons, 20 tagged manatees carried multi-sensor digital acoustic recording tags (DTAG) and GPS tags. The DTAG provided a continuous record of sound (ambient noise, vocalizations and boat noise) and recorded a suite of behavioral parameters, allowing a three-dimensional reconstruction of movements, depth, and orientation underwater. This project is a key component identified in the Manatee Management Plan (see Chapter 10, "Ongoing and Future Research" p. 107).

2010–2011 highlights

- Ten manatees were captured, tagged, and released at the site of the former FPL Canaveral power plant to investigate winter attendance patterns and foraging movements around the interim warm-water refuge and passive thermal basins in the northern Indian River Lagoon. The manatees carried satellite-linked GPS tags and temperature loggers that provided data on fine-scale movements, habitat use, and thermal regime experienced throughout the winter.

- A team of scientists and veterinarians from FWC, USGS, and the University of Florida (UF) assessed the health and body condition of captured and released manatees to further understand the health of the wild population.

- Researchers tracked manatees in northern Brevard County through mid-March 2011, when they recovered all tagging gear. Tagged manatees showed strong site fidelity to the FPL refuge during cold weather, and two also visited passive thermal basins in canals off the southern Banana River.

- FWC monitored water temperature during the 2010-2011 winter with data loggers placed at many warm-water and associated ambient sites throughout much of the manatees' winter range. Several 'passive' thermal sites (i.e., non-discharge sites such as canals) are being investigated for their potential to provide sufficient warmth to sustain manatees through cold winter periods.

- FWC and FSU staff entered, verified, and processed a large amount of manatee, boat, and acoustic data collected during a two-year field study to characterize manatee response to moving vessels. This included the review of more than 4000 vessel paths calculated with data from a laser rangefinder.

- Development of analytical techniques is ongoing to objectively identify behavioral changes from the DTAG sensor data and to reconstruct movement paths underwater. The acoustic and behavioral records are being analyzed to assess manatee response in relation to characteristics of approaching boats and sound levels experienced by the manatee.

- FWC participated as a contributing organization to multi-agency efforts to release and track rehabilitated manatees that were rescued due to injury, cold stress, or other problems. The Manatee Rehabilitation Partnership (http://www.wildtracks.org) consists of representatives from federal and state agencies (USFWS, USGS, FWC), academic institutions (UF), non-governmental organizations (Caribbean Stranding Network, Hubbs-Sea World Research Institute, Save the Manatee Club, Sea to Shore Alliance), and private oceanaria (Cincinnati Zoo, Columbus Zoo, Lowry Park Zoo, Miami Seaquarium, The Seas at Epcot, Sea World Orlando, South Florida Museum). As part of that partnership, FWC staff participated in pre-release health assessments, releases of rehabilitated manatees, and assisted in monitoring tagged manatees after release in various parts of the State.

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 (§379.2431 (4) F.S). FWC is dedicated to assisting NOAA Fisheries Service in its efforts to protect this species as outlined in the North Atlantic Right Whale Recovery Plan. With a population estimated at fewer than 500 individuals, the North Atlantic right whale is one of the most endangered large whales in the world. 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.

In 1994, NOAA Fisheries Service designated portions of Florida and Georgia coastal waters as critical habitat for the right whale, the only known calving area of the North Atlantic right whale. Federal and state efforts to protect right whales in their critical habitat have resulted in the formation of the Southeast U.S. Right Whale Recovery Plan Implementation Team, a multi-agency and citizen advisory group. FWC has been a member of the Southeast U.S. Right Whale Recovery Plan Implementation Team since its 1993 inception and FWC staff has chaired the team for the past nine years.

Since 1987, FWC has conducted aerial surveys to monitor seasonal presence of right whales, mitigate vessel-whale collisions, and assess population dynamics. An Early Warning System (EWS) communication network, coordinated by NOAA Fisheries Service with assistance from FWC staff, is designed to protect right whales from vessel collisions by notifying key agencies, ports, and mariners via email, text message, or pager when and where right whales have been sighted. This near real-time information allows ships to take action if necessary to avoid whales. Photographs taken by aerial observers 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 natural marks and human-related scars. Over time, population demographics, reproductive success, mortality, and trends in health are monitored in part through this photo-identification research. FWC is one of a handful of major contributors to the North Atlantic Right Whale Catalog—the central repository for archiving and maintaining photographs and sighting data on right whales. FWC has also worked closely with federal, state, and non-governmental organization partners to compile years of aerial-survey data into a GIS program. Analyses of these spatial data helps 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. Commercial vessels are required by U.S. federal regulations to be equipped with an Automatic Identification System transponder and to broadcast their location and speed as determined by GPS. On-going analyses characterize vessel traffic patterns and estimate compliance with federal speed regulations.

Data on whale distribution, habitat preferences, environmental conditions, and vessel traffic provide a framework for quantifying the risk of vessel strikes and inform and evaluate the effectiveness of proposed management plans.

2010–2011 highlights

- FWC received a grant award to add a second survey team and cover a larger area during right whale aerial surveys in the 2010-2011 season. FWC teams covered the Central Early Warning System and the Southern Early Warning System survey areas. Combined, these two teams regularly surveyed the northeast Florida coast from Crescent Beach to the GA/FL border up to approximately 35 nautical miles offshore. Preliminary photo analysis indicates FWC documented 115 individual right whales (excluding calves) between the two surveys. In addition, the FWC team sighted 1,003 leatherback sea turtles, 27 humpback whales, one fin whale, and 11 large sharks.

- In total, twenty cow-calf pairs were documented in the southeastern U.S. during the 2010-2011 North Atlantic right whale calving season. One additional cow-calf pair was sighted for the first time in Rhode Island Sound in April 2011.

- Four right whale carcasses were reported in the southeastern U.S.

- Six entangled whales were sighted in the southeastern U.S. during the reporting period, four off Florida. One of the entangled whales was a female with a newborn calf which was also unusual. FWC as well as the Eco-Health Alliance, Georgia Department of Natural Resources, New England Aquarium, NOAA Fisheries Service, Provincetown Center for Coastal Studies, and others participated in the documentation and disentanglement responses for these animals.

- FWC documented three juvenile whales with healing wounds on their bodies and heads. The wounds observed on all three whales vary in size, shape, and location; but, all are similar to injuries caused by a vessel's propeller, skeg, keel, or rudder observed on Florida manatees.

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- In collaboration with NOAA Fisheries Service and the Georgia Department of Natural Resources, FWC conducted 22 right whale biopsy sampling trips, resulting in samples from 13 calves, several previously unsampled juvenile and adult right whales, and two humpback whales. The skin samples will be used for individual identification and gender determination, as well as information on kinship, stock identity, and genetic variability within the population. The blubber portion of the samples will be used to determine contaminant levels and to gain information about feeding ecology and nutritional condition.

Right whale on St. Augustine Beach (Catalog #3911)

Research Publications and Reports

research activities

2010

Tripp, K. M., J. P. Verstegen, **C. J. Deutsch**, R. K. Bonde, **M. de Wit**, C. A. Manire, J. Gaspard, and K. E. Harr. 2010. Evaluation of adrenocortical function in Florida manatees (*Trichechus manatus latirostris*). Zoo Biology 29: 1-15.

2011

Barlas, M. E., C. J. Deutsch, M. de Wit, and **L. I. Ward-Geiger** (editors). 2011. Florida Manatee cold-related unusual mortality event, January - April 2010. Final report to USFWS (grant 40181AG037). Florida Fish and Wildlife Conservation Commission, St. Petersburg, FL. 138pp.

Deutsch, C. J. and **M. E. Barlas.** 2011. Manatee response to the conversion of the FPL Cape Canaveral power plant: Movements, warm-water habitat use, and thermal regime of satellite-tagged manatees during winter 2010-2011. Annual report to Florida Power & Light Company. FWC/FWRI file F2864-10-A1. 61pp.

Deutsch, C. J. and J. E. Reynolds III. *In press.* Florida manatee status and conservation issues: a primer. *Sirenian Conservation: Issues and Strategies in Developing Countries.* Edited by E. Hines, J. E. Reynolds III, L. V. Aragones, A. A. Mignucci-Giannoni, and M. Marmontel. University of Florida Press, Gainesville.

Ward-Geiger, L., A. Knowlton, A. Amos, **T. Pitchford,** B. Mase-Guthrie, and B. Zoodsma. 2011. Recent sightings of the North Atlantic right whale in the Gulf of Mexico. Gulf of Mexico Science 29(1), pp. 74-78.

Mote Marine Laboratory Manatee Research Projects

research activities

Manatee at Homosassa Springs

The Legislature annually appropriates $325,000 from the Save the Manatee Trust Fund for the Manatee Research Program at Mote Marine Laboratory (Mote). The following projects were funded in FY 2010-2011:

- 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 partner organizations FWC's Fish and Wildlife Research Institute and U.S. Geological Survey; 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 free-ranging manatees.

- Manatee Rescue and Verification—Mote acts as 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.

- Aerial Surveys—Mote collaborated with FWC to fly distributional surveys of manatees in Martin and St. Lucie counties. The purpose of the surveys was to determine the spatial and temporal distribution of manatees within these two counties. The surveys began in August and were conducted twice a month during FY 2010-2011.

- Effects of Cold Stress on Manatees and Conservation Applications of Biomarkers —Mote initiated the use of several biomarkers for Florida manatees with the goal to develop appropriate baselines for normal assay levels in order to better understand the effects for stressed manatees. Ongoing goals include using selected biomarkers to assess effects of cold stress in manatees; assess rehabilitation time requirements for cold-stressed manatees; and to shed light on impacts of cold stress on exposed manatee populations.

- Program Oversight—Programmatic oversight includes salary and operational support for the program leader who is responsible for periodic reports, coordination with state scientists and managers for activities associated with manatee recovery planning, and over-sight of manatee research projects conducted by Mote.

Management Activities

Manatee Forum

In 2004, the Florida Fish and Wildlife Conservation (FWC) and the U.S. Fish and Wildlife Service (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 2010-2011, the Manatee Forum met twice, once in November and once in February. During the November meeting, many research updates were provided and the February meeting focused on speed zone discussion and legislative updates from the forum members. 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.

Artwork: Casey Cofer

Manatee Protection Plans and Permit Reviews

management activities

The FWC reviews proposed development projects and provides biological opinions to state regulatory agencies for Environmental Resource Permits, Sovereign Submerged Land Leases, State Clearinghouse 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).

2010–2011 highlights

- FWC coordinated with the USFWS regarding the revisions to the U.S. Army Corps of Engineers (ACOE) Manatee Key as well as a new USFWS programmatic biological opinion. FWC also reviewed and provided comments on the ACOE's reauthorization of federal regional and nationwide permits. All these efforts should help to streamline permit review and processing.

- FWC continued development of a state consultation guide for manatees similar to the federal "Manatee Key" focused on dredging projects. Once completed, this guide should facilitate state permitting and provide predictability for applicants regarding needed manatee conservation measures for many projects.

- FWC reviewed and provided opinions on 265 requests for comments regarding potential adverse impacts to manatees for permits received from the Department of Environmental Protection (DEP), the Water Management Districts, the Department of Community Affairs, and the State Clearinghouse. Ongoing and final reviews included Port of Miami, Port Everglades, Port Canaveral, Harborview DRI, Lockheed Martin, Palm Island, Harbor Club, Oslo boat ramp and the Navy's test for high frequency sonar. Staff also provided expertise as a witness during an administrative hearing, regarding the Bocilla Seaport application in Lee County.

- FWC staff completed work on an MPP Template to be used by counties developing MPPs. The template will standardize the layout and content of future MPPs, making them easier to use.

- **Charlotte County** – FWC staff attended several Manatee Protection Plan Advisory Committee Group meetings, and presented information in order to help them assess whether the County should develop an MPP. The Charlotte County Board of County Commissioners approved the development of an MPP in February 2011 at the recommendation of the advisory group. FWC is partnering with the County to help develop and draft the MPP.

- **Duval County -** Work continues on revisions to the MPP and some portions have been drafted and are under review. A complete draft is expected in late 2011.

- **Miami-Dade County** – FWC continues to provide assistance to the county on review of draft MPP revisions.

- **Sarasota County** – The County drafted revisions to their MPP with assistance from FWC. The revised plan is scheduled for consideration by the Board of County Commissioners in July 2011.

Manatee Protection Zones

management activities

The FWC oversees promulgation of 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 Commission and also reviews and comments on local manatee protection ordinances developed by city and county governments. (See Chapter 7, "Management Actions", p. 36, Manatee Management Plan)

2010–2011 highlights

- **Broward County** (68C-22.010, FAC) – The Manatee Management Plan identifies this rule for review. FWC work on this review began in late 2009 and continued into FY 2010-11. The Local Rule Review Committee (LRRC) that was formed by Broward County in April 2010 pursuant to §379.2431(2)(f), F.S. met 13 times through August 2010 and submitted its report. FWC attended the LRRC meetings to provide assistance with data interpretation and answer questions. FWC reviewed the LRRC report and re-evaluated all potential rule changes before preparing the required written response to the LRRC report. In December 2010, FWC staff presented a draft rule to the FWC Commissioners. A proposed rule was published in March 2011 and FWC conducted a public hearing in Pompano Beach in April. FWC Commissioners are scheduled to consider final rule amendments in September 2011.

- **Flagler County (and coastal St. Johns County)** – The Manatee Management Plan identifies this area for consideration of new manatee protection zones. The FWC review began in late 2009 and continued into FY 2010-2011. The LRRC that had been formed by Flagler County in May 2010 pursuant to §379.2431(2)(f), F.S. met seven times through July 2010 and submitted its report. FWC attended the LRRC meetings to provide assistance and answer questions. FWC reviewed the LRRC report and re-evaluated all potential zones before preparing the required written response to the LRRC report. FWC met numerous times with County and city representatives and others between October 2010 and June 2011 to discuss possible zones and try to reach more agreement. In June 2011, FWC staff presented a draft rule to the FWC Commissioners. The Commissioners directed staff to continue working with the County and USFWS to develop a revised draft to be brought back for consideration later in 2011.

- **Collier County** (68C-22.023, FAC) — The Manatee Management Plan identifies this existing rule for review. FWC began reviewing new and old data and other information in late 2010. Identification and evaluation of areas that may warrant consideration for possible changes is ongoing.

- **Pinellas County** (68C-22.016, FAC) — The Manatee Management Plan identifies the western portion of the county for consideration of new manatee protection zones. FWC had new boat and manatee data to use in the review along with other data and began this effort in late 2010. Identification and evaluation of areas that may warrant further consideration for potential speed zones is ongoing.

2010–2011 highlights continued

- **Sarasota County** (68C-22.026, FAC**)** – Amendments to this rule were adopted in June 2010. Sign posting work, which was a cooperative effort between FWC and Sarasota County, began in April 2011 and was completed in July 2011.

Variances and Waivers – The variance and waiver process is governed by §120.542, F.S. and Chapter 28-104, FAC. FWC worked on two requests for variances from manatee protection rules during the fiscal year.

- FWC completed its review of a request submitted by a "wakeskater" in March 2010 for a variance allowing higher speeds in western portions of Manatee County while he trained and performed other activities associated with his professional wakeskating career. FWC coordinated with various law enforcement agencies and other interested parties and reviewed extensive information provided by the applicant to evaluate the request. In July 2010, FWC issued an order denying the petition because issuance of the requested variance was not consistent with statute and because it would not meet the purposes of the (§379.2431(2), F.S.) Florida Manatee Sanctuary Act.

- In July 2010, FWC received a request from Sarasota Crew for a variance allowing higher speeds in portions of Sarasota County for support boats associated with training for and holding rowing events. A Notice of Receipt was published in the Florida Administrative Weekly in August 2010. FWC requested additional information; however, the applicant ultimately withdrew the request in February 2011.

Permits – Rule 68C-22.003, FAC, allows FWC to issue a number of different types of permits for activities that would otherwise be prohibited by the manatee protection rules. The most numerous of these permits are for commercial fishing or professional fishing guide activities. There are typically 150 – 200 of these permits in effect at any given time. FWC worked on a few requests for other types of permits during the fiscal year. A request from Florida Power and Light (FPL) for a permit to allow access to a No Entry zone adjacent to their Port Everglades power plant in Broward County was issued. The permit allows them to conduct maintenance and other essential operations.

St. Lucie Inlet

Habitat Characterization, Assessment and Protection

management activities

Wakulla

The long term conservation of manatees relies on having enough healthy, suitable habitat available throughout their range in Florida. Human-related activities have over time resulted in habitat destruction and reduced water quality. These activities have caused loss of seagrasses – the manatee's primary food. Reductions in the flow of warm spring waters, due to human uses, 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 habitat carrying capacity and assuring habitat health and stability is a primary focus of habitat protection programs. (See Chapter 7, "Management Actions," p.55 Manatee Management Plan)

2010–2011 highlights

- FWC worked with Florida Power and Light (FPL) to ensure that the heating systems that create interim warm-water refuges during the conversions of the Cape Canaveral and Riviera Beach power plants provided the necessary refuge to manatees. This was the first winter when the plants would no longer discharge warm water due to their plant reconstruction projects. Although there were initial difficulties creating a sufficient warm-water site at the Cape Canaveral plant, FWC and FPL partnered on solutions that quickly resolved the issues and manatees survived an extremely cold winter at this refuge. Manatee distribution data were collected via aerial surveys and manatee movement data were collected from satellite tagged manatees. These data will provide information regarding how manatees responded to the changes in warm water availability during the winter cold season. In addition, daily health assessments at the interim warm-water refuge were conducted to monitor manatees for cold-stress symptoms.
- FWC coordinated with power companies during this past winter to ensure that individual power plants were adhering to their operational Manatee Protection Plans. Although the power plants maintained warm-water discharges through most of the winter, the extreme cold of 2010-2011resulted in numerous mechanical difficulties that complicated the operation of power plants throughout the State. These complications provided additional difficulties for manatees seeking consistent warm-water habitat. FWC will hold annual meetings with the power companies to facilitate ongoing communication.

Teco's Big Bend Powerplant

Fanning Springs

- FWC is working with the Water Management Districts in the development of Minimum Flows and Levels (MFLs) for spring systems that provide warm-water habitat for manatees. MFLs for Volusia Blue Spring, Manatee Springs, Fanning Springs, and the Weeki Wachee Spring system have all been developed using criteria to protect winter warm-water manatee use. MFLs for the Homosassa River and the Chassahowitzka River were reviewed and FWC comments were provided in 2010.

- FWC is working with The Nature Conservancy (TNC) and the USFWS to identify and complete restoration and enhancement projects for Florida springs systems that will improve manatee access to natural warm-water habitat. To date, FWC has identified a potential restoration project at Fanning Springs that will enhance access to the spring for manatees and Gulf sturgeon. TNC has provided funding for an engineering feasibility study and FWC will provide funding to complete the project during the 2011-2012 funding cycle. The Fanning Spring restoration project has completed the engineering design phase and received construction permits. The project is on schedule to be completed by the end of 2011.

- FWC worked with a private restoration biologist on a spring restoration project in Hillsborough County that will also benefit manatees. Funding has been acquired to restore and reconnect the Ulele Spring to the Hillsborough River making it accessible to manatees. FWC is providing assistance on the project design so the restoration project can have maximum benefits for manatees.

- In fall of 2010, a new gate opening was installed at the bridge across the Homosassa Springs State Park spring run allowing wild manatees access to the main spring boil for the first time in years. Fencing was added inside the main spring area to provide a separate and secure area for the captive manatees at the park. Opening up the main spring in winter to wild manatees has been a long time goal of FWC and other agencies in order to increase natural warm-water habitat for manatees. In the winter of FY 2010-2011 after the gate was opened, more wild manatees found their way into the spring. Park staff recorded as many as 80 manatees using the spring. This represents a significant gain of natural warm water refuge habitat, an important goal in the State Manatee Management Plan.

- FWC continued 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.

- FWC assisted in conducting seagrass surveys throughout the Big Bend region of Florida, specifically in St. George Sound (Franklin County), St. Andrews Bay (Bay County) and St. Joe Bay (Gulf County). Staff coordinated with federal partners on

damage assessments to seagrasses related to the Deepwater Horizon oil spill as they relate to the Natural Resource Damage Assessment process. FWC completed the final report for a seagrass restoration project in St. Andrews Bay that looked at repairing prop scars in shallow seagrass beds and using non-regulatory signs to inform vessel operators of the presence of seagrass beds in hopes of reducing future seagrass damage.

- FWC is jointly working to review the use of mooring fields throughout the State as a way to enhance boating in State waters and to reduce adverse effects to marine resources such as seagrass. The use of moorings has been beneficial in reducing adverse effects to hardbottom and coral resources, so the agency is developing a research project to determine whether the same benefits can be verified for seagrasses. FWC is working with DEP staff to identify potential study sites in various locations in the State.

- FWC worked to control invasive, non-native aquatic plants and encourage the establishment of native species, particularly in springs systems used by manatees. This is achieved by participation on various working groups including the Blue Spring Aquatic Plant Management Working Group and the Crystal River Aquatic Plant Management Working Group. Interagency coordination continued with the conservation and restoration of submerged aquatic vegetation in Kings Bay (Citrus County).

- Manatees can be killed in water control structures and navigation locks. FWC works with agencies responsible for these structures to eliminate these types of deaths. One manatee died as a result of interactions with a water control structure during this past year. This death increases the overall total of water control structure –related deaths to a total of 198 since 1974. The average annual number of structure-related deaths before retrofitting structures with manatee protection devices was 6.5 manatees per year from 1974-1999. That number has decreased to a post-retrofitting average of 2.1 manatees per year (2000-2010). There is only one remaining water-control structure requiring the installation of a manatee protection device and this structure will begin retrofitting during September 2011. Overall, coordinated efforts are having a significant influence on reducing structure-caused mortality at retrofitted structures.

- FWC coordinates with the ACOE, the South Florida Water Management District and the Southwest Florida Water Management District to address central and south Florida water control structure-related manatee mortality issues through the Interagency Task Force for Water Control Structures. Members of the Task Force continued working to resolve issues related to the replacement of the acoustical array at the Cape Canaveral Locks. Concerns raised by other stakeholders including recreational boaters, the U.S. Coast Guard and NASA have been resolved and the needed repairs are complete.

Repairs to Canaveral Locks

Public Outreach

Public outreach regarding manatee conservation programs is important so that the public is well-informed about manatees and understands the reasons for the 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.

The agency developed a new "Where are Florida's Manatees" brochure to assist Florida visitors and residents in finding locations to see manatees in captivity and the wild. Routine updates and reprinting of materials is an ongoing task for staff. The "Ask FWC" service on the agency's website generated 2040 hits for manatee-related questions. FWC fulfilled 175 requests for printed materials such as brochures and coloring books mostly for schools and visitor centers.

FWC assisted with several events around the State to distribute manatee information to the public such as the 25th Anniversary of Tampa Electric Company's Manatee Visitor Center.

25th Anniversary at TECO's Manatee Visitor Center

Appendix

Appendix A: Acronyms and Abbreviations
Appendix B: Boat Speed Definitions
Manatee License Plate and Decal Program

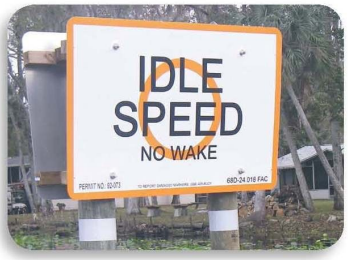
Appendix A:
Acronyms and Abbreviations

ACOE — U.S. Army Corps of Engineers
°C — degrees Celsius
cm — centimeters
Coast Guard— U.S. Coast Guard
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
Forum — the Manatee Forum, a group of 22 stakeholder organizations organized by FWC and USFWS to address manatee issues
FPL – Florida Power and Light Company
F.S. — Florida Statutes
FSU — Florida State University
FWRI — FWC's Fish and Wildlife Research Institute
FWC — Florida Fish and Wildlife Conservation Commission
FY — Fiscal Year
GIS — Geographic Information System
GPS — Global Positioning System
kg — kilogram
LRRC—Local Rule Review Committee
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
SEIT — Southeast U.S. Right Whale Recovery Plan Implementation Team
TNC—The Nature Conservancy
Trust Fund — Save the Manatee Trust Fund
UF—University of Florida
USFWS — U.S. Fish and Wildlife Service
USGS — U.S. Geological Survey

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

Manatee License Plate And Decal Program

Manatee License Plate

The manatee license plate was created in 1990 as per §320.08058(1)(c), and §379.2431 (4)(d), F.S., to raise funds for manatee research and protection. As of June 30, 2011 806,469 manatee license plates have been issued and $38,524,399 collected to fund manatee conservation in Florida. Recently redesigned by Florida artist Nancy Blauers, the manatee license plate is now the fifth most popular plate in the State, generating $1,333,425 in FY 2010-2011.

Manatee Decal

Section 328.72, F.S., 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. Money from the decals supports manatee protection efforts such as rescue, rehabilitation, research, and outreach. During FY 2010-2011, 5713 manatee decals were sold and raised approximately $28,565 for manatee protection.

2010-2011 Decal