

EXECUTIVE SUMMARY

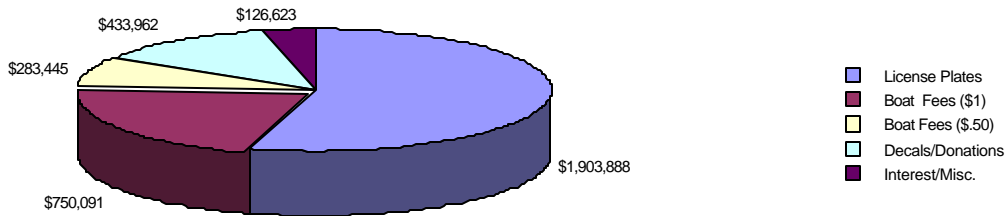
Manatees are marine mammals that can be found in Florida's coastal and riverine waters throughout the year. The Florida manatee is listed as an endangered species. Protection of manatees in Florida has been legislatively mandated since 1892. Current state efforts to recover the population are guided by the Florida Manatee Sanctuary Act of 1978 and the federally approved Florida Manatee Recovery Plan of 1995. The Florida Manatee Sanctuary Act declared the state to be a refuge and sanctuary for the manatee and subsequent amendments have given the Florida Fish and Wildlife Conservation Commission (FWC) a wide range of responsibilities. The Recovery Plan lists 126 separate tasks that need to be accomplished. Many of these tasks are addressed through a cooperative effort between federal, state, and local governments.

Florida's manatees typically average around 8-10 feet in length and weigh around 1,000 pounds. The largest manatees may reach 13 feet in length and weigh over 3,500 pounds. Manatees are aquatic plant eaters and are most commonly seen eating, resting, or traveling. Female manatees are pregnant for 12-14 months and usually give birth to a single calf measuring about 3-4 feet in length. The calves remain with their mothers for up to two years. Manatees face a variety of threats including deaths from human-related causes (collisions with watercraft, crushings in water control gates and locks, and entanglements in fishing gear), as well as destruction and degradation of their habitat. Manatees have also died as a result of exposure to harmful algal blooms, the effects of cold water, and natural disease.

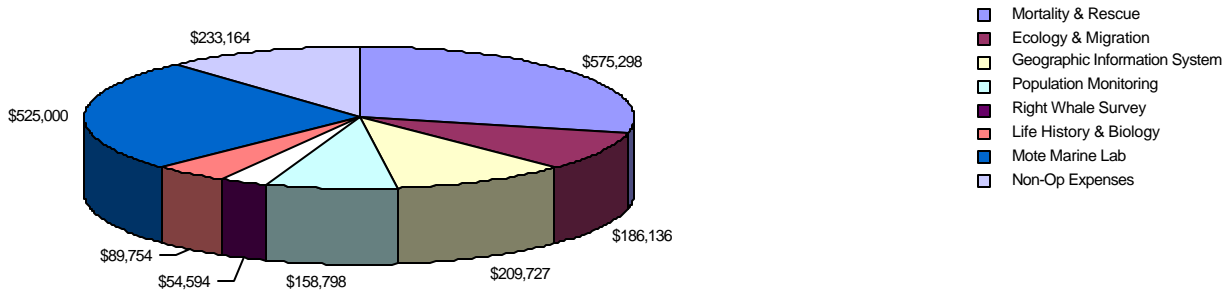
Funding for the State's research and management activities is provided primarily from the Save the Manatee Trust Fund, which receives money from sales of a manatee license plate, boat registration fees, decal sales, voluntary contributions, and interest income. Revenues for the Save the Manatee Trust Fund for Fiscal Year 1998-99 totaled only \$3,498,009 as shown in the accompanying pie chart. Environmental education programs were funded through a \$499,500 appropriation to the Florida Game and Fresh Water Fish Commission (GFC). The 1998-99 legislative appropriation for manatee and marine mammal programs was allocated to the Florida Department of Environmental Protection's (FDEP) research and management programs within the Division of Marine Resources, contracts to non-governmental research organizations, to oceanaria participating in the rescue and rehabilitation of manatees, and to a private educational facility. Research activities coordinated by the Division's Florida Marine Research Institute (FMRI) in St. Petersburg totaled \$2,032,471. Management activities conducted by the Division's Bureau of Protected Species Management (BPSM) totaled \$1,925,962. Budgetary breakdowns for individual program units for both the research and management efforts are depicted on the next page, followed by summaries of the work performed by personnel at the FMRI and the BPSM. The 1999 legislature transferred both FMRI and BPSM to the new FWC effective July 1, 1999.

The human-related problems that manatees and their aquatic habitat face did not develop suddenly, nor will they be solved quickly. Through the cooperation of local, federal, and state agencies, private organizations, and corporations, effective partnerships have been created to constructively address the recovery of the manatee population. The FWC recognizes that a complete approach will include regulation, research, and raising the environmental awareness of Florida's citizens and visitors. Individuals utilizing Florida's waterways for recreation or business have a unique opportunity to make a significant contribution to the preservation of manatees and their habitat by being aware of and complying with waterway regulations. These regulations have been designed by balancing the protection of this endangered species with the needs of Florida's human population.

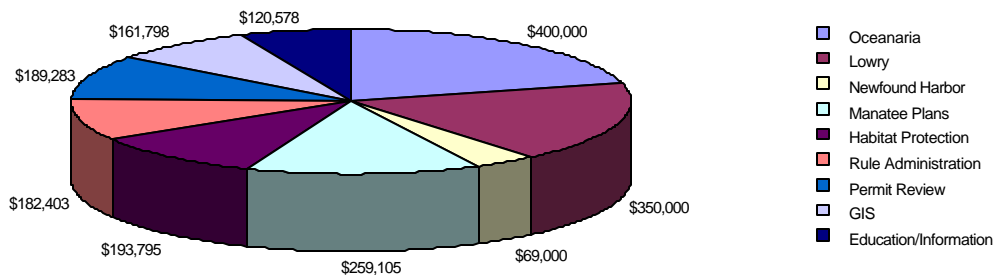
**Save the Manatee Trust Fund
Fiscal Year 1998-
Total Revenues =**



**Expenditures for
Fiscal Year 1998-1999
Total Expenditures =**



**Expenditures for Management/Environmental
Fiscal Year 1998-1999
Total Expenditures = \$1,925,962**



**FLORIDA MARINE RESEARCH INSTITUTE
MARINE MAMMAL RESEARCH**

The Marine Mammal Research Program is headquartered at the Florida Marine Research Institute (FMRI) in downtown St. Petersburg. Additional staff are located at the FMRI Marine Mammal Pathobiology Laboratory (MMPL) in St. Petersburg and at field stations in Port Charlotte, Jacksonville, Melbourne, and Tequesta. Manatee research is organized into five projects: mortality and rescue; population monitoring; ecology and migration; life history and biology; and the marine mammal geographic information system (GIS). Research on the endangered North Atlantic right whale is coordinated by program staff at the Jacksonville field station.

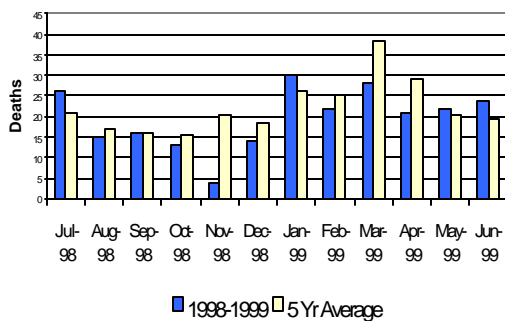
MORTALITY AND RESCUE

The US Fish and Wildlife Service (USFWS) and researchers at the University of Miami initiated a network of researchers and law enforcement agencies in 1974 to recover manatee carcasses and respond to and assist injured manatees. Over time, the program continued to expand and now rests largely with the FWC. A dedicated staff statewide collects carcasses and conducts research on statewide or regional issues involving manatees. A thorough examination (necropsy) is conducted on every carcass in order to determine the cause of death. Most necropsies occur at the state-of-the-art Marine Mammal Pathobiology Laboratory, opened in 1993 in St. Petersburg.

cases including 84 deaths from collisions with watercraft the highest level recorded. Eleven manatees were killed in flood gates and canal locks and nine were caused by other anthropogenic factors such as entrapment in drainage pipes or entanglement in monofilament line. Thirty-nine carcasses were categorized as perinatal and 32 animals died from natural causes such as prolonged exposure to cold water or inhalation and/or ingestion of brevetoxin from red tide events. A cause of death could not be determined for 57 cases and three manatee carcasses were verified but not recovered. Diagnostic improvements include a recent characterization of the epidural veins surrounding the spinal cord that has improved diagnosis of impact trauma, forensic examination of manatee skeletons and quantification of vascular changes in perinatal carcasses.

- FMRI actively participates in the U.S. Fish and Wildlife Service's manatee rescue program. State rescue activities are headquartered at MMPL and four regional field laboratories. Thirty-nine manatees were rescued during the 98-99 fiscal year. Of these, 10 animals died and 18 recovered sufficiently to be released. Most of the manatees were rescued because of entanglement in crab traps or discarded monofilament line. Other reasons for rescue include collisions with watercraft, unaccompanied dependent calves, and manatees trapped in man-made structures.

**Florida Manatee Mortality
All Causes by Month
Fiscal Year 1998-1999**



1998-1999 Highlights

- The carcasses of 235 dead manatees were documented in Florida during the 98-99 fiscal year. Cause of death was determined for 175

- A veterinary student from the University of Tennessee worked with MMPL, Mote Marine Laboratory (MML), Lowry Park Zoo and Miami Seaquarium to develop and detail an additional blood-sampling site for manatees. This refinement of blood sampling techniques was based on anatomical studies conducted at MMPL that illustrated the proximity of nerves to vascular structures targeted for blood collection. The new site allows blood to be drawn from the lateral aspect of the flipper, which minimizes danger to the nerves. A manuscript describing this work is in preparation.

- Using experience gained in observing thermal responses in dolphins during live captures at MML, MMPL staff has designed an analysis of internal temperature distributions in

manatees. Preliminary measurements of deep-body temperature variations have been made using captive manatees at MML. These deep temperature measurements seem to support anatomical evidence that manatees possess an unusual reproductive cooling mechanism. A preliminary description of this cooling mechanism was presented at the January 1999 meeting of the Society for Comparative and Integrative Biology.

- A manuscript describing the structure and function of the manatee diaphragm is under review for publication in *Anatomical Record*. This manuscript, the result of a collaboration with Eckerd College, describes the potential for muscular contractions in the manatee diaphragm influencing gas compression in the lungs and gut. Another manuscript describing sexual dimorphism in the manatee pelvic bone is under review for publication in *Florida Scientist*.
- A protocol was developed and tested that has been incorporated in the investigation of all perinatal manatee deaths. This new protocol quantifies anatomical changes that occur in the circulatory system at or near birth and allows us to discriminate between stillborn and live births. This protocol will be presented at the 13th Biennial Conference on the Society for Marine Mammalogy in December 1999 in a special perinatal mortality workshop organized by MMPL staff. This protocol will form the basis for a national standard used in evaluating marine mammal perinatal deaths throughout the United States.

POPULATION MONITORING

Aerial surveys are invaluable in acquiring information on manatee distribution, relative abundance, and use of habitat types. State-wide winter aerial surveys of all manatee wintering habitats in Florida and southeast Georgia are conducted after cold fronts, when the animals aggregate at warm springs and thermal discharges from power plants and industries. These surveys are useful in determining minimum estimates of manatee populations. Other aerial surveys are done year-round to map seasonal distributions of manatees.

Population models are being developed using data from aerial surveys and from mortality, life history, and ecology studies, to estimate trends

in regional population sizes. While population models are preliminary, most point toward a slowly increasing population of manatees. However, there is no reason to believe that manatees are any less endangered than before or that any ongoing manatee conservation strategies should be halted. The record number of deaths in recent years remains a major impediment to the recovery of the species. Continued high rates of mortality from watercraft collisions, as well as habitat loss and environmental degradation are serious, ongoing concerns.

1998-1999 Highlights:

- Three interagency, statewide "synoptic" aerial surveys of manatees were conducted in 1999, funded by FMRI. The highest count was 2,353 manatees on March 6, 1999 (East Coast, 956; west coast, 1,397). Manatees were counted on 25 survey routes. A total of 41 biologists from 15 state, federal, county and private agencies and research labs and universities participated. A total of 50 flights was made.
- FWC staff and contractors in Brevard and Charlotte counties, and Apalachicola Bay conducted twice-monthly aerial surveys of manatee distribution. A total of 103 distribution flights was made in 1998-1999.
- Surveys in Apalachicola Bay were conducted by FDEP's Apalachicola National Estuarine Research Reserve from May 1997 to August 1998. The highest count was 28 manatees in June 1997.
- Surveys in Brevard County were initiated in September 1997. These surveys take two days to cover the county, and ended September 1999. Brevard County contains a high proportion of all East Coast manatees. The highest count was 790 manatees in March 1999.
- Surveys in Charlotte County were conducted by MML, under contract to FWC, from September 1997 to October 1999. The highest count was 260 manatees in April 1999.
- Sightings from all of these surveys were rapidly entered into the GIS system for assessment of manatee distribution for management decisions. Maps of all the aerial

survey counts and the flight paths are now widely available on the FMRI Atlas of Marine Resources CD-ROM (FDEP 1998).

- A manuscript on strip-transect aerial surveys in Brevard County 1993-94 was published (Miller et al. 1998). A manuscript on aerial surveys in Tampa Bay 1987-94 was accepted for publication (Wright et al.).
- FMRI and MML are cooperating on innovative aerial surveys in Sarasota County funded by FMRI. Tandem surveys are conducted twice monthly in warm months from July 1998 to November 1999. Two planes cover the same survey route 30 minutes apart to compare the counts made by the two observers. The proportion of manatees missed by observers (visibility bias) will be estimated.
- Population modeling research continues, incorporating 1998 mortality and 1999 synoptic survey counts. Population status information was provided to the interagency Population Status Working Group and the Manatee Recovery Team. A paper on population models was presented at the Conference on Population Viability Analysis, at San Diego in March 1999.
- Adult survival rates were estimated from photo-identification data from Tampa Bay and southwest Florida (6000 sightings of 550 recognizable individuals). State-of-the-art "sight-resight" statistics were used to estimate survival based on whether individuals are seen at least once during each winter. This is the first time that these survival rates have been estimated for these regions, and they are integral to the development of recovery criteria for the Manatee Recovery Plan.

ECOLOGY AND MIGRATION

Research on how manatees use the coastal habitats of Florida is essential to understanding what resources the population requires to expand and flourish. By following the movements of individual manatees in fresh, brackish, and saltwater habitats, valuable information is obtained about manatee behavior, migratory routes, and preferred habitats. Researchers place satellite and radio transmitters on manatees using a belt fastened around the narrow part of the tail stock and attach a floating transmitter

housing to the belt. Signals from the satellite transmitters are processed by a commercial satellite service and delivered to FMRI daily via the Internet. Research teams working in the field use the satellite locations to determine general areas where manatees are located and then use the VHF radio signals to find the individual manatees. Staff can then observe the manatee and record its behavior and movements.



Rehabilitated manatees were tagged and monitored in order to assess the success of their introduction or reintroduction into the wild. Three rehabilitated manatees were monitored this year, including 2 orphaned females and an adult female with a calf. The two orphaned females were released into Everglades National Park in the spring. They were monitored primarily by park biologists. The 2 manatees were captured two months after their release in order to assess their physical condition and were determined to be in good condition. Both manatees subsequently lost their tags. The adult female was a rehabilitated manatee that had been previously tagged, lost her tag and was retagged when she returned to her primary wintering habitat. Important information was obtained on her and her calf's winter and spring activities.

1998-1999 Highlights:

- A draft of a technical report summarizing the 6-year (1991-1996) FDEP West Coast Telemetry project was completed.
- Lotek Marine Technologies Inc., in conjunction with the U. S. Geological Service (USGS) Sirenia project and FDEP developed a prototype GPS tag, for acquisition of more accurate animal locations. The tag is being tested prior to its deployment on a manatee.

LIFE HISTORY AND BIOLOGY

Information on aspects of manatee life history is essential in formulating an assessment of manatee population dynamics and recovery. Data on long-term growth and survival of individuals, reproductive capability of mature females, and health of wild manatees are essential to a population model and are gathered from a variety of research projects: the photo-identification catalog, use of passive integrated transponders (PIT tags), and non-invasive body condition indices.

Many individual manatees are recognized both by natural markings and scars inflicted mainly by interactions with powerboats or entanglement with fishery gear. The USGS Sirenia Project developed the photo-identification protocols and the image-based computerized database, the Manatee Individual Photo-identification System (MIPS), currently used by the Sirenia Project, the FDEP, and MML. Federal, state, and local organizations contribute data to a southeastern U.S. manatee photo-identification catalog. The FMRI coordinates and maintains the portion of the catalog for west-central and southwest Florida. In addition, FMRI field station staff photo-document manatees statewide.

PIT tags are small, unpowered microchips that are placed under the skin of a manatee to provide long-term marking of individuals for identification purposes. All manatees handled for rescue, rehabilitation or radio tagging are marked with PIT tags. All dead manatees are scanned for PIT tags before necropsy in order to identify known individuals for life history and distribution data and to assess the success of the reintroduction of rehabilitated animals to the wild.

1998-1999 Highlights:

- Currently, the west-central and southwest MIPS catalog consists of approximately 3000 images and 6000 sightings representing 550 manatees.
- FMRI photo-identification staff worked cooperatively with MML, Lee County Parks, Florida Gulf Coast University and private citizens to photo-document animals in southwest Florida. In addition, staff collaborate with MML on photo-identification related contracts.

- Tampa Electric Company provided funds (approximately \$4,000) for an OPS research staff position for the 3rd consecutive winter.
- In cooperation with Save the Manatee Club, FMRI photo-identification staff has assisted in the initiation of the Adopt-a-Tampa-Bay Manatee project. Funds donated are used for manatee-related research, education, and outreach programs. Since inception, Tampa Bay manatees have been adopted over 1,200 times.



- FMRI staff, in cooperation with the Tampa Bay Estuary Program and the subsequent Manatee Awareness Coalition, initiated a study comparing regulation and education/voluntary speed zones in Tampa Bay. This study assesses manatee distribution patterns, boating activity, and public perceptions regarding manatees, boating, and the environment. During the winter, photo-identification crews work with aerial assistance at one of the primary aggregation sites in Tampa Bay, also a study site for the comparison project.
- The FMRI photo-identification internship program continues to grow. Interns collect photographic, geo-spatial, behavioral, biological, and environmental manatee-related data year-round. FMRI photo-identification has employed 12 interns since July 1, 1998.
- A technique for reading PIT tags remotely, without having to capture the animals, was pursued. Design concepts were developed

and manufacturers were obtained in order to build a remote controlled device that will house a PIT tag scanner. The scanner will be used to read the tag numbers of wild animals, primarily when they are aggregated during the winter.

MARINE MAMMALS GEOGRAPHIC INFORMATION SYSTEM

A geographic information system (GIS) is a computer-based mapping system designed to manipulate, analyze, and display large volumes of geographically referenced data called coverages. Staff working on the Marine Mammals GIS (MMGIS) have created numerous manatee data coverages including carcass recovery sites, aerial survey locations, and locations of animals tracked by satellite. The MMGIS is a module of the comprehensive Marine Resources GIS (MRGIS), which facilitates access by scientists and managers to a wide variety of data on the marine environment. The MRGIS is a primary tool for marine resource research and management. GIS applications facilitate an ecosystem approach to coastal resource management by allowing users to combine and query coverages representing different data themes relevant to the coastal environment. For example, GIS users can map and analyze manatee locations in relationship to habitat features such as depth contours, seagrass, aids to navigation, and managed areas. The MMGIS facilitates the exchange of ideas and information by interfacing both management and research activities. The MMGIS staff works with both research and management project teams to provide manatee data in GIS format to the public and to develop spatial analyses and modeling capabilities for manatee protection and ecosystem management.

1998-1999 Highlights:

- Over 500 Version 1.2 Atlas of Marine Resources CD-ROM's were provided to scientists, managers, educators, and consultants. Version 1.3 of the CD-ROM was completed and is now available to GIS users at no charge. The new release includes new and updated coverages, graphics, and information designed to serve the needs of organizations interested in manatee and sea turtle research and management. Data are stored as ArcView® shapefiles for use in

GIS. Data are provided on manatee mortality, results of aerial surveys, aerial survey flight paths, manatee density polygons, and protection zones. Base data include the Florida shoreline, depth contours, seagrass distribution, aids to navigation and other habitat-related features. The Marine Resources CD-ROM version 1.3 may be obtained by contacting Kathy Smith at (727) 896-8626 or e-mail SMITH_KD@EPIC7.DEP.STATE.FL.US.



- MRGIS environmental data were used to produce a preliminary habitat suitability index model for manatees in Charlotte Harbor, Florida. The models are of interest to compare observed manatee occurrence and delineated suitable habitat with human-use to indicate potential areas of risk. The preliminary model was to be presented at the Environmental Systems Research Institute (ESRI) Annual Users Conference in July 1999.
- The computer model developed by FMRI MMGIS staff for estimating manatee travel patterns from satellite and visual locations was refined to estimate areas that manatees visit frequently for extended periods of time. The model results are being evaluated, and so far, the model was verified to identify places where field biologists know to look when searching for manatees. This work was represented at the World Congress of Landscape Ecology held in Colorado during July 1998.

RIGHT WHALES

In addition to manatee recovery efforts, the FWC is involved in recovery efforts for other endangered marine mammals, including the northern right whale, *Eubalaena glacialis*, the most endangered

of the world's large whales. Efforts have been heightened to prevent human-caused mortality in this species, where even one death per year has a significant impact on the population estimated to number less than 350 individuals. Northeast Florida and Georgia coastal waters were designated as critical habitat for the right whale in 1994 by the NMFS. This region is the only known calving ground of the northern right whale. FWC is dedicated to assisting NMFS in its efforts to protect the northern right whale as outlined in the 1991 Northern Right Whale Recovery Plan.

Efforts to protect right whales in the Florida/Georgia critical habitat have resulted in the formation of the Southeastern U.S. Implementation Team for the Recovery of the Northern Right Whale, a multi-agency/citizens advisory group. The Team makes management and research recommendations and assists in implementing the Recovery Plan. FWC staff has been a member (originally as FDEP) of the Implementation Team since its inception in 1993, and in 1997 the right whale principal investigator was appointed vice-chairperson of the Team. In addition, FMRI staff have conducted aerial surveys of right whales in Florida waters since 1987 to monitor seasonal presence of whales and to determine the number of calves born during the season.

1998-1999 Highlights:

- The 1998-99 winter season resulted in comprehensive aerial survey coverage of the right whale calving grounds and surrounding areas. This included over 85 coastal and offshore surveys flown by FMRI.
- FMRI, the New England Aquarium, and the Georgia Department of Natural Resources (GDNR) sighted only three mother/calf pairs and five other individual animals this season, documenting the lowest calving numbers on record.
- FMRI received a \$40,000 grant from NMFS to assist in right whale recovery efforts. Funding was used for nearshore aerial surveys, for confirming public sighting reports along Florida's east coast, for funding the early warning system communication network, and for management and education activities. FWC continues work to establish an agreement with NMFS that will provide additional funding for right whale recovery efforts.

- A cooperative offshore survey effort between FMRI and GDNR was also funded by NMFS, who provided \$77,000 to FMRI for aircraft services to cover 50-60 offshore flights.
- FMRI Staff gave presentations at scientific meetings as well as to the general public in order to educate Floridians about the northern right whale.
- FMRI continued to coordinate a complex communication network utilizing 25 alphanumeric pagers that facilitate the dissemination of right whale sighting locations to all mariners in the southeastern United States in an effort to prevent ship collisions with right whales.



- The MMGIS at FMRI continued to be an integral part of the right whale program, incorporating results of FMRI right whale aerial surveys, ocean surface water temperatures, and water depths. Additional funding was received from NMFS to substantially increase the right whale activities of the MMGIS.

SCIENTIFIC AND PUBLIC OUTREACH

During the year, four manuscripts were submitted for publication, five publications are currently in press and six have been published. Marine Mammal staff hosted many students, interns, externs and volunteers.

A photogrammetric study of remotely sensed and measured body lengths of a local population of manatees was completed. The study was a cooperative effort with Mote and incorporated video data from a tethered airship to document the number of calves, sub-adults and adults as well as manatee/human interactions at Homosassa Springs. An article describing the feasibility of the methods for documenting life-stage composition of manatee populations is in review. Video data were provided to management staff.

BUREAU OF PROTECTED SPECIES MANAGEMENT

The Bureau of Protected Species Management (BPSM), based in Tallahassee, serves as the management component of the FWC marine mammals program. It is responsible for the planning and implementation of management activities directed toward the protection and recovery of manatees, of other marine mammals such as the endangered right whale, and of marine turtles and their essential habitats. During the 1998-1999 fiscal year, BPSM's marine turtle activities were funded from the Marine Resources Conservation Trust Fund and a grant from the GFC. As of July 1, 1999, BPSM was transferred to the FWC as a bureau within the Office of Environmental Services. BPSM serves as the Commission's primary liaison on manatee issues by working closely with appropriate federal, state, and local governments to facilitate strong comprehensive planning, including mandates of federal endangered species recovery plans. Protection activities are principally implemented in four ways: state rules are developed, permit applications for resource development are reviewed and commented on, manatee protection plans are developed and implemented with the assistance of local governments, and Floridians and visitors are informed and educated about how manatees and their habitat can be protected.

MANATEE PROTECTION PLANS

Manatee protection plans (MPPs) are one tool that can assist in the long-term preservation of manatees and their habitat. In concept, MPPs should address boat-facility siting policies, habitat protection, local educational campaigns, and waterway-use regulations. County-specific boat speed zones should also be referenced as a primary component of these plans, although state rule making must implement state zones. The plans can also address solutions for manatee mortality caused by locks, gates, large vessels and ships, and prevention of any adverse effects from commercial fishing practices. Indirectly, MPPs may also increase the safety of boaters, facilitate recreational planning, and protect aquatic habitat critical to many other species. Because of the complexity of issues a county must address in its plan and the range of information that must be collected, plans can take several years to develop. The preferred mechanism for implementing plans is for each

local government to adopt them as an amendment to their comprehensive plan or adopt appropriate implementing regulations. In 1989, the Governor and Cabinet set priority in developing these plans in 13 counties where manatee mortality rates and essential habitat protection needs were the greatest. MPP staff coordinate assistance with protection planning for these counties and others as requested by local governments. Staff also reviews local comprehensive plan amendments, state park management plans, and other documents where manatee protection needs are relevant.

1998-1999 Highlights

- MPP staff participated in meetings with the Brevard County Board of County Commissioners and County staff to discuss future revisions to the manatee protection plan. BPSM staff participated in a public meeting held in Viera in May 1999. A final report entitled "Canaveral Barge Canal Boater Activity and Compliance Study Brevard County, Florida Including a Summary of Manatee Activity" was completed and submitted to BPSM by independent contractors.
- MPP staff continued monthly involvement in the Charlotte County Manatee and Seagrass Task Force meetings. This task force drafted recommendations regarding countywide manatee and seagrass protection initiatives and prepared them for submittal to the Charlotte County Board of County Commissioners. These initiatives included recommendations for selected regulatory speed zones as well as comprehensive education and outreach.
- MPP staff attended Citizen's Advisory Committee meetings on the Citrus County MPP in May and July. In October, a presentation on the state's management efforts and the manatee protection study at Blue Waters was given at the annual Citrus County law enforcement coordination meeting. Along with the USFWS, MPP staff made site visits to all launch and boat rental facilities on the Homossassa River to distribute public education materials and stress the need for cooperation regarding manatee-human interaction in Blue Waters.

- The Dade County Department of Environmental Resource Management staff, Save the Manatee Club, other local groups, and MPP staff worked cooperatively to develop education initiatives for the County related to the Dade County Manatee Education Advisory Group. MPP staff chaired several meetings of the Dade County Manatee Education Advisory Group (DMAG) which focused on promoting Manatee Awareness Month in November, 1998. Much of the work in Dade County involved the organization of a volunteer effort, identification of volunteer duties and a schedule for bringing on an official Volunteer Coordinator. MPP staff developed the prototype design for an educational kiosk.
- On March 9, 1999, the Council of the City of Jacksonville adopted a local ordinance approving the Duval County Manatee Protection Plan. After examination of the City of Jacksonville's newly adopted ordinance 97-651-E along with the revised December 1996 version of the MPP, DEP Secretary David Struhs approved the ordinance and the Duval County Manatee Protection Plan in June 1999. With this approval, Duval County became the 4th of the 13 key counties to have a state-approved manatee protection plan.
- Manatee protection efforts in the Tampa Bay area were facilitated by a non-traditional approach during the year. A paper entitled "Position Paper, Summary of Issues and Recommendations Concerning Protection of the West Indian Manatee (Trichechus manatus) in Tampa Bay", June 1998" was published by the Tampa Bay Manatee Protection Strategies Task Force and later approved by the Tampa Bay Estuary Program. This paper formed the basis of the strategy implemented by the Tampa Bay Manatee Awareness Committee (TMAC). MPP staff assisted this committee's production of an education brochure entitled "Look Out Below! Where seagrasses grow, manatees go!" This brochure encourages the observance of non-regulatory slow speed zones within Tampa Bay and provides habitat protection information. TMAC efforts also included: promoting the implementation of regulatory zones at the power plants, the establishment of a monitoring program for regulatory and non-regulatory (education-based) zones, the development of an on-water education volunteer program called Manatee Watch, funding issues, and preparing for inclusion of local tagged animals in the Save the Manatee Club's Adopt a Manatee Program.
- Indian River County staff submitted the second draft of the County's Manatee Protection and Boating Safety Comprehensive Management Plan to BPSM for review. Based on this review, some revisions were made to the plan. The Marine Advisory Narrows Watershed Action Committee (MANWAC) endorsed the revised plan on June 21, 1999, for submission to the Indian River County Board of County Commissioners.
- MPP staff initiated a contract with PRIDE Industries for production of the 1996 and 1997 Palm Beach County seagrasses survey maps. The contract would produce a complete series of GIS maps, which could then be used by anyone interested in locating seagrass habitat in Palm Beach County.
- MPP staff provided general comments on Volusia County's revised manatee protection plan in July 1998 and additional detailed text edits in June 1999. No substantive progress was made during the year, however, because county staff was working on other priorities.

LAW ENFORCEMENT COORDINATION

BPSM and FMRI staff continued to increase involvement and coordination with federal, state, and local law enforcement agencies. This was done by providing training to law enforcement recruits, distributing maps and educational materials to on-water officers, and holding coordination meetings with applicable law enforcement agencies, especially the Florida Marine Patrol (FMP).

1998-1999 Highlights

- BPSM developed information packages, that included general manatee information materials, laminated speed zone maps with appropriate citations, and speed zone reference wall maps.
- Staff coordinated law enforcement training activities, including the organization of BPSM and FMRI presentations at the FMP

Academy in 1999. Information packets were made available to the new officers.

- On January 13, 1999, staff gave a presentation and presented educational materials to outreach officers from around the state at a FMP meeting in Tallahassee.
- Waterproof speed zone citation maps and other education information was distributed to officers of the FMP Districts 1-B (Titusville), 2A (Miami), 2B (Jupiter), 3A (Marathon), 3B (Ft. Myers), 4A (Tampa), and 4B (Crystal River). Many local law enforcement officers also received these important tools to enhance their on-water efforts.
- Arrangements were finalized in December 1998, to initiate a new "Manatee Alert" Program in 1999. The concept was the result of FMP officer input that was received during training and coordination meetings. The program involves relaying data on manatee use patterns in specific areas to the officers that patrol those areas. BPSM believes that manatees will benefit from this increased enforcement presence.

ENVIRONMENTAL EDUCATION

During this fiscal year, the legislature provided \$499,500 from the STMTF to support the environmental education programs of the Game and Fresh Water Fish Commission (now the FWC). Use of these funds was administered by staff of the Advisory Council on Environmental Education (ACEE). Since 1996, the ACEE has served as a forum for the discussion and study of problems that affect the environment, which could be improved with environmental education. The Council is directed to solicit and select proposals for manatee related environmental education projects for funding with money from the Save the Manatee Trust Fund. A separate report to the legislature details activities of ACEE. For more information regarding the report and the Environmental Education Grant Program, contact Ms. Madeline Strong at (850) 487-0123.

STRUCTURE-RELATED MANATEE DEATHS

More manatee deaths are attributed to structures (navigation locks and water control gates) than any other human cause except for watercraft. From 1974-1998, 145 manatees were crushed or drowned by navigation locks or water control

structures. Structure-caused manatee deaths were up slightly, with nine reported in calendar year 1998. Staff has taken an active role in coordinating with the U. S. Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD) to develop solutions to this serious problem. The Task Force recognizes that a number of actions will be needed, the most important of which is the development of technology that would make locks and water control structures "manatee-safe."



1998-1999 Highlights:

- The SFWMD installed piezo electric manatee protection devices at gate S-27 in the Little River and on one of the four gates at S-20F on the Mowry Canal. In addition the USACE installed the same protection system on S-25B on the Tamiami Canal.
- A project cooperative agreement (PCA) between the SFWMD and the USACE was jointly prepared and submitted to the prospective agency leadership. This PCA will facilitate the installation of piezo electric manatee protection devices on the remaining vertical lift gates that are a threat to manatees in south Florida.
- Harbor Branch Oceanographic Institute, under contract to the USACE, developed and installed a prototype acoustic manatee protection device on the St. Lucie Lock. This device uses a series of paired transmitters and receivers that are attached to the leading edge of the lock gates. When a manatee breaks the beam of sound, the gates stop, then begin to open. After the initial trial period a number of problems with this new technology were identified. The system was removed, modified, and reinstalled.
- Funding to install acoustic manatee protection devices on the Canaveral Lock in

Brevard County was secured by the USACE. Port Canaveral has agreed to be the local sponsor of this project. Design specifications were developed and plans are underway to install this device in fiscal year 99/00.

- In February 1999 a manatee was crushed inside the Buckman Lock and in March 1999 a manatee carcass was recovered from within the internal workings of the Inglis Lock. FDEP closed the Inglis Lock to boat traffic and reduced the number of openings and closings at the Buckman Lock in an effort to reduce the possibility of additional manatee deaths at these structures.

GEOGRAPHIC INFORMATION SYSTEM

The BPSM-GIS section provides management staff with the most recent marine mammal research data with the cooperation of the FMRI staff in St. Petersburg. Most data layer updates are acquired from FMRI, although some are created in the BPSM-GIS section or obtained from other governmental sources. All data layers created within the BPSM are forwarded to FMRI-GIS staff for inclusion in the Marine Resources GIS. Graphic materials for presentation are developed and produced utilizing various software, printers, plotters, and other resources.

1998-1999 Highlights:

- Manatee GIS data were updated for use in rule making, protection planning, permitting, and public information response activities. The statewide geospatial coverage of manatee protection zones was updated to reflect current changes in rules. Several core map series were also updated and provided to appropriate agencies. The section distributed 103 GIS maps and 844 AutoCAD maps, and 73 digital data sets to external customers; 65 GIS maps, 1485 AutoCAD maps, and 12 illustrative posters and presentations were created for staff in the BPSM.

HABITAT CHARACTERIZATION, ASSESSMENT AND PROTECTION

A viable population of manatees will not persist without suitable habitat. Florida's increasing human population, and particularly the associated coastal development, is a long-term threat to the manatee's habitat. Historically, coastal development has resulted in degradation of water

quality and destruction of seagrasses - the manatee's primary food. Ways to minimize negative effects of coastal development are being explored. The first step is to better understand the manatee's habitat needs and to monitor and assess habitat health and stability.

1998-1999 Highlights:



- BPSM staff continued to serve on the Crystal River and Blue Spring Interagency Working Groups to establish plans for using aquatic herbicides in these systems. The working groups continued prohibitions from October to April on aquatic plant management activities in the vicinity of these critical manatee refuges. Studies indicate that a reduction of 7-10% of the water flow has occurred at Blue Spring due largely to water withdrawals by regional residents. This places at question the long-term status of Blue Spring as an important natural warm-water refuge for the St. Johns River manatee population. BPSM staff is working with the St. Johns Water Management District to establish minimum spring flow levels needed to maintain this natural warm-water refuge for manatees.
- Manatee use and dependence on power plant thermal discharges as warm water refuges is well known. In order to address protection of manatees using these sites, BPSM staff coordinated with the FDEP's National Pollution Discharge Elimination System (NPDES) program to address short and long-term concerns regarding industrial thermal discharges. The formal review process involves development of manatee protection plans for each plant that address: (a) disruption to warm-water outflows during winter; (b) inadequate discharge temperatures to sustain manatees at intake and outfall areas; and (c) timely communication to manatee recovery program personnel of any long-term changes in the availability of warm

water discharges and/or unanticipated problems that may effect manatees using plant outfall areas. These plans are provided to the FDEP and reviewed by BPSM. To date, four power plant manatee protection plans have been established with several more near completion.

- BPSM has also coordinated with USFWS, USGS Sirenia Project, and the power production industry to plan future research into the continued use of these sites by manatees in an effort to focus on addressing the long-term effect of such sites on manatee populations. Changes in the power generating industry have heightened concerns that the consistency of warm water delivery at established manatee warm water refuge sites provided by coastal power plants might be in jeopardy. BPSM staff coordinated a public meeting in Fort Myers to address concerns for the long term effects of the continued warm water discharge of the Florida Power and Light's (FPL) Orange River plant on manatees. Coordination with USFWS on the development of a warm water refuge task force to address both artificial and natural warm water refuge issues resulted in a USFWS/FPL sponsored workshop. The workshop was designed to allow the free exchange of information regarding manatees and their use of warm water refuge sites. Staff presentations were made by BPSM and FMRI. This was the first step in effectively addressing concerns about maintenance of these sites or development of alternative warm water sites as part of the manatee recovery effort.
- BPSM and FDEP's Bureau of Coastal and Aquatic Managed Areas (BCAMA) continued to investigate the effect of docks and piers on seagrass. Analyses of collected data indicate that higher docks with grating used as decking material permit greater light transmittance, that relates to improved seagrass growth under and around these structures. The focus of this research effort is to develop innovative designs and construction criteria that will allow seagrasses to persist below these structures.
- Staff performed a regional assessment of seagrass loss due to single family docks in Palm Beach County. Two hundred docks

were randomly selected and surveyed for effects on the seagrass community. Study estimates applied to known seagrass coverage for the county and known dock numbers indicate that over 50 of the approximately 2,000 acres of seagrass in Palm Beach County waters have been lost due to single family docks. Much of this loss is due to an identified "halo" effect, where seagrass within several meters of the dock are also affected by the shadow around docks. This loss of seagrass on a county-wide basis is comparable to loss from propeller scarring, but is low when compared to the effects of diminished water quality and past dredge and fill operations. These losses may be controlled or reversed through the institution of dock criteria, such as grating and a minimum dock height, that allows seagrass persistence after dock development.

RULE ADMINISTRATION

The Rule Administration Section focuses primarily on establishing comprehensive manatee protection boat speed zones and administering activities related to these zones such as signposting, permit issuance and variance reviews. The first state-designated boat speed zones for manatee protection were established in 1979. There were 13 counties identified in 1989 by the Governor and Cabinet as a priority for establishment of county-wide speed zones: Brevard, Broward, Citrus, Collier, Dade, Duval, Indian River, Lee, Martin, Palm Beach, Sarasota, St. Lucie, and Volusia. At the close of the fiscal year, efforts had resulted in implementation of zones in 12 counties. Publication of the zone proposal for the 13th county (Lee) was done however, the rule was still pending because of a rule challenge.



1998-1999 Highlights:

- Development of proposed amendments to the Lee County rule (62N-22.005, Florida Administrative Code) was completed early in the fiscal year, but the rule was not adopted by the end of the fiscal year due to pending litigation. The rule proposal was published in August 1998 and staff held a public hearing in Ft. Myers in early September. Two separate rule challenges were filed after the public hearing, one by Bonita Bay Properties and one by the Southwest Florida Marine Trades Association (SWFMTA). Both challenges were settled by early 1999. Bonita Bay withdrew their challenge, while SWFMTA agreed to withdraw their challenge as soon as the Notice of Change was published and it was confirmed that no other challenges were filed. The Notice of Change was published in April 1999. Unfortunately, this was not followed by rule adoption because a third rule challenge was filed in May, by a group of residents from the North Estero Bay area of southern Lee County. On July 2, the petitioners withdrew their challenge because of the manatee program's transfer to the newly created FWC.
- Amendments were made to the Brevard County rule (62N-22.006, FAC) to add seasonal No Entry and Motorboats Prohibited zones in the vicinity of the power plants on the Indian River between Titusville and Cocoa. The new zones, which are in effect from November 15 through March 31, were adopted in December 1998 and signs were posted by the Florida Inland Navigation District by the end of January 1999.
- Staff coordinated posting of signs to mark the amendments to the Collier County rule (62N-22.023, FAC) adopted in May 1997. Posting was completed in October 1998, following extensive consultations with the contractors and staff from the department's Division of Law Enforcement, Collier County, the city of Naples, and the Rookery Bay National Estuarine Research Reserve.
- Staff continued reviewing changes to the Indian River County rule (62N-22.007, FAC) that are being recommended by the county in its MPP. Numerous discussions were held with county staff and local law enforcement officers (mainly by MPP staff). An on-water and aerial evaluation was conducted by MPP and Rules staff in March 1999.
- Staff reviewed a local ordinance adopted by the city of Jacksonville in March 1999 and submitted to BPSM in April. The ordinance approved the county's MPP and established local manatee protection speed zones in addition to the existing state rule (62N-22.027, FAC). The department approved the ordinance (and MPP) in late June, as required by §370.12(2)(o), Florida Statutes (1999). There are several areas where the ordinance differs from the state rule. Until and unless the state rule is amended, the more restrictive of the overlapping speed zones will apply.
- Staff began evaluating the need to amend the Volusia County rule (62N-22.012, FAC) in response to recommendations contained in the county's MPP. Several on-water trips were taken to evaluate the existing zones as well as the suggested changes. More visits will likely be needed during the 1999-2000 fiscal year.
- A variance was issued (pursuant to §120.542, Florida Statutes) to The Airboat Experience of the Everglades in July 1998 to allow airboat tours to move at 20 mph along specific routes in Collier County that are currently designated as Slow Speed zones. The variance was challenged by Save the Manatee Club (SMC). A settlement was reached in December 1998 when DEP agreed to consult with SMC on all future variance requests as well as consider the need to amend the rule (62N-22.003, FAC) that allows for permits to be issued from the manatee protection rules.
- Staff continued to issue permits (in accordance with 62N-22.003, FAC) for commercial fishing and professional guiding activities in several counties (predominately Volusia, Brevard, Indian River, and Collier). Many of the requests were for professional fishing guide permits in Collier County.
- Several other permits were also issued during the fiscal year. The vessel-testing permit issued in 1997 to Sea Ray Boats for testing in Brevard County was renewed in November 1998, while the vessel-testing permit for Bombardier Corporation in Brevard County was renewed in June 1999. Another vessel-testing permit was issued in March 1999 to Vectorworks to allow testing of personal

watercraft in Brevard County; however, this permit was challenged by SMC and the request was eventually withdrawn. Outboard Marine Corporation applied in June 1999 for renewal of its vessel-testing permit for portions of St. Lucie, Martin, and Palm Beach counties, but no decision had been made by the end of the fiscal year. Finally, a permit was issued to the Port Everglades Authority in September 1998 to allow access to the No Entry zone at the Port Everglades power plant to allow activities associated with bridge construction in the area. A few other permits were issued to allow residents to access various limited-entry areas around the state.

PERMIT REVIEW

Activities permitted by state agencies (FDEP, Water Management Districts, and Department of Community Affairs) can produce adverse impacts to the endangered manatee. BPSM staff reviews these projects and offers opinions to reduce or eliminate potential negative effects.

1998-1999 Highlights

- Staff performed 398 reviews during the 1998-1999 fiscal year. Of these reviews, BPSM recommended denial of only three projects. Staff also participated in a deposition for the River Palms permit application in Brevard County.
- Atlantic Dry Dock in Duval County submitted an application to DEP for creating deep-water access in order to secure a Navy contract to repair vessels. Staff attended a meeting with the applicant, their attorney and the USFWS to discuss the conditions necessary to protect manatees, since underwater explosives were to be used for part of the work. Contentious discussions were abated through the assistance of MMPL staff.
- The USACE disagreed with a recommended condition for dredging at Port Sutton, Hillsborough County. Port Sutton is located next to a minor power plant effluent that produces intermittent warm water, attracting manatees in the wintertime. Bureau staff recommended a no-construction window for the coldest winter months. Negotiations with the USACE resulted in restrictions on particular equipment and nighttime dredging.

- Staff attended the Submerged Lands and Environmental Resource Permitting Workshop, and presented a poster on impacts to manatees. Staff also participated in coordination meetings with the USFWS in Vero Beach, and the West Palm Beach offices of DEP and the SFWMD. A coordination meeting was also held with the Venice office of the SFWMD. The Bureau was also represented at the "Anti-drift" meeting held between the permitting administrators of the DEP and all of the Water Management Districts. A revision of the permanent manatee educational sign, required by permits and leases, was finalized. A list of sign suppliers were compiled and distributed via the Internet and handouts.

PUBLIC EDUCATION AND INFORMATION

An integral component of the Florida Manatee Recovery Plan involves educating the public. In addition to Florida's citizens, we also target the state's 40.5 million annual visitors to increase public awareness of manatees. BPSM continues to participate in the development of public service announcements, television messages, brochures, teacher's guides, posters, pamphlets, and information and marketing displays for public education purposes.

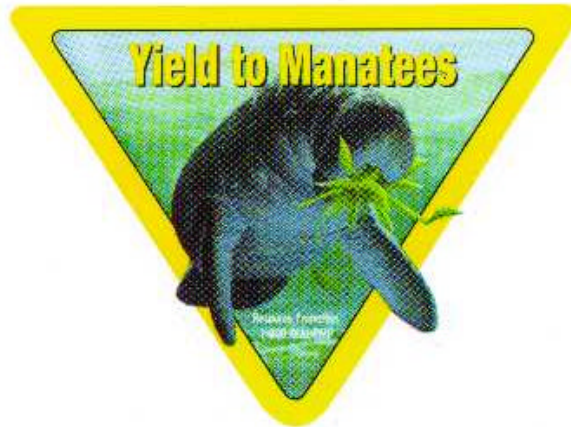
1998-1999 Highlights

- Post cards continue to be distributed to Save the Manatee license plate holders. The targeted audience was individuals whose license plates were up for replacement/renewal during the year. The post card describes the Save the Manatee Trust Fund accomplishments and encourages license plate owners to renew in support of manatees. Approximately 4,000 postcards were mailed out each month.
- More than 1,000 manatee information requests were answered from individuals, teachers or other educational staff. Manatee information was sent to all Florida libraries and Chambers of Commerce at least once this year. Additional information was provided to these places as requested.
- Staff devoted many hours to updating and developing BPSM's Internet pages. Each

section has an index page that covers the various functions and major reports available to the public. The information was collected, edited, formatted and released at the end of this fiscal year. The pages were developed to focus on what management and research staff do to help manatees.

- The new multi-lingual waterproof boater's card was completed this year. One side of the card shows graphics of the basic waterway signs along with what the boat should look like in the water. The other side gives the guidelines for protecting Florida manatees in English, Spanish, French and German.
- Eleven of the state's toll plazas were targeted for the distribution of manatee information. The date selected was the 25th anniversary of the Endangered Species Act. Toll plazas were selected based on their proximity to the coast and location to high manatee mortality areas. About 55,000 travelers received a brochure titled "Miss Her Now" on this one-day event.
- The technical/research newsletter, the *Manatee News Quarterly* was printed four times this year. This newsletter has grown to over 280 recipients from its original distribution of 10-20 recipients.
- The Voluntary Contribution Campaign occurs each year in June during the state's vessel registration period. County tax collection offices provide a manatee decal to each person who donates \$5 or more to the Save the Manatee Trust Fund. A portion of the funds collected from decal donations (the third and fourth dollar of each donation) goes to the oceanaria facilities (Lowry Park Zoo, Miami Seaquarium, and Sea World) engaged in the rescue, rehabilitation and release of wild manatees. Tax collectors around the state sold 18,358 of the 1998-1999 decals and brought in over \$100,000 to the manatee program.

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION



Attractive manatee decals may be purchased through county tax offices when registering a boat or by contacting the Bureau of Protected Species Management at the address listed below. All proceeds go directly into the Save the Manatee Trust Fund.

Bureau of Protected Species Management
620 South Meridian Street, OES-BPS
Tallahassee, FL 32399-1600

Phone: (850) 922-4330
Fax: (850) 922-4338

Internet: <http://www.fcw.state.fl.us/gfc/psm>

Florida Marine Research Institute
100 Eighth Avenue, SE
St. Petersburg, FL 33701-5095

Phone: (727) 896-8626
Fax: (727) 823-0166

Internet: <http://www.fmri.usf.edu>



Florida residents can buy manatee license plates for their vehicles. Receipts from tag sales are available for marine mammal research and management efforts through the Save the Manatee Trust Fund.

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