

***BREVARD COUNTY
MANATEE PROTECTION PLAN***



***Approved by:
The Brevard County Board of County Commissioners
January 16, 2003***

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EXECUTIVE SUMMARY

Florida is third in the United States, behind Hawaii and California, in having the largest number of endangered and threatened species listed by the U.S. Fish and Wildlife Service (USFWS {Endangered Species Act}). For many of these Florida animal and plant species, Brevard County's location along the east-central coast of Florida provides optimal weather and habitats for their populations to grow and reproduce. The Indian River Lagoon's watershed also harbors more endangered and threatened species than any other area of Florida. One of the most well known and popular of these listed species in Florida is the endangered Florida manatee (*Trichechus manatus latirostris*).

Brevard's weather and natural settings attract many people to relocate to this area permanently, and draws tourists by the thousands to its beaches and estuaries. The Indian River Lagoon in Brevard affords ideal opportunities for commercial and recreational fishing, boating, and other water sports. The presence of a warm water refuge, ample seagrass beds for forage, and protected areas in the north Banana River also make Brevard County attractive habitat for manatees. In fact, Brevard County has been described as the hub of the east coast manatee population with both a large year-round and migratory transient manatee population present throughout the year. The largest spring and winter manatee aggregations in the state of Florida have been recorded in Brevard County. Spring aggregations in the north Banana River alone have exceeded 365 manatees, while winter surveys at Brevard's warm water refuges have documented at least 529 manatees.

From June of 1974 through 2001, there were 4,367 manatee mortalities documented in Florida. Of the 4,367 total manatee mortalities 1,069 were a result of watercraft collisions. Approximately 19% (835) of the manatee mortalities recovered in Florida were from Brevard County waters. Human-related causes of death include: watercraft collisions, deaths due to water control structures, ingested debris, and entanglement in fishing line or marine debris. Of the manatee mortalities recovered from Brevard County from June 1974-2001, 29% (243) were undetermined, 27% (229) were attributed to perinatal mortality, 23% (191) were attributed to watercraft collisions, 11% (92) were attributed to other natural causes, 5% (49) were attributed to natural cold stress, 2% (17) were attributed to other human causes, and 2% (14) were attributed to flood gate/canal locks. For the majority of manatee mortalities recorded as "undetermined," the manatee carcass was too badly decomposed to make any determination as to the cause of death.

This many human-related deaths and human activity related impacts to manatee habitat, combined with the manatee's slow reproductive rate, contributes to the Florida manatee being in jeopardy of extinction. Protection and recovery of the Florida manatee population focuses primarily on the short-term goal of reducing human-related manatee mortality and the long-term goal of protecting manatee habitat, but does not focus on the major causes of manatee mortality, namely disease, hypothermia, pollution, and perinatal (calf) death.

The escalating problems associated with manatees being killed by boats led the Governor and Cabinet on October 24, 1989, to approve recommendations for protecting the manatee and its habitat, and increasing boating safety in the state's waterbodies. The state recognized thirteen coastal counties, including Brevard County, as being important for the manatee's survival. In

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early 1993, the state agreed to help Brevard County's manatee protection efforts by funding the development of a species management plan that included as its primary purpose maintaining a viable manatee population. This was to be accomplished through the protection and rehabilitation of its habitat, enhanced boating regulation, the development of a boat facility siting plan, and the development of a manatee education program.

A major objective of this plan was to allow a level of reasonable use of the lagoon by Brevard's power boaters, while still maintaining the overall goal of manatee protection. On May 5, 1993, the Florida Department of Environmental Protection (FDEP), and the Brevard County Board of County Commissioners entered into a contract to develop the Manatee Protection Plan (MPP). (Note: manatee protection, and the Bureau of Protected Species Management were shifted to the reorganized Florida Fish and Wildlife Conservation Commission (FWC) in 1999).

During the early contract negotiations, both the FDEP and Brevard County recognized that all parties with interests in the Indian River Lagoon must be active participants in developing a species protection plan for it to have any chance of success. To insure a broad based participation in the development of the MPP, representatives of the following groups were included: all municipalities bordering the lagoon, Port Canaveral, Patrick Air Force Base, the Sebastian Inlet Commission, boating, law enforcement, commercial fishing, the marine industry, environmental groups, and Federal and State agencies involved with manatee protection.

In addition to the creation of a management plan by the MPP Management Ad-Hoc Committee (MPPMAHC), the contract also stipulated the development of an educational program by representatives of the environmental and education communities and boating awareness groups such as the U.S. Power Squadron and Marina industry. The MPP Education Ad-Hoc Committee (MPPEAHC) was charged with designing manatee education materials targeted at all interest groups in Brevard.

Representatives of the MPPMAHC (34 members) and the MPPEAHC (13 members) met over a period of two and one half years in an effort to accomplish the goals and objectives of the MPP. The Committee's membership lists are included in Appendix 5. The final MPP produced by this effort is a two part report that presents the MPPMAHC recommendations including:

- A brief description and history of the manatee in Florida
- Reducing threats to the manatee's survival including habitat loss, support for existing and new legislation, and enhanced law enforcement
- Boating and boat facility siting issues
- Habitat preservation and enhancement measures

The second part of the MPP includes 20 education recommendations and initiatives developed by the MPPEAHC. These include:

- Provide boat speed zone maps and brochures with boat registrations
- Inclusion of manatee information in boating safety courses
- Public service announcements, workshops, and education programs

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- Public displays, including kiosks, signs, computer bulletin boards, and newspaper announcements

The recommendations included in this plan do not pertain to the St. Johns River as there is no data documenting regular or frequent manatee use of the St. Johns River in Brevard County.

Our goal is to provide for direction and management of our waterways, ensuring that Brevard County is 100 % compliant with the Florida Manatee Sanctuary Act (370.12 FS).

To the extent that this plan proposes, or describes, or implicates changes to the County's Land Use Regulations or Comprehensive Plan, the adoption of this MPP shall not serve as nor commit the County to make such changes.

Rather, the Board of County Commissioners shall undertake appropriate public hearings to consider such changes, and shall only adopt such changes if determined that it is in the public's best interest. Further, nothing in this plan requires the Board of County Commissioners to spend tax dollars on improvements recommended or described unless a specific fund for construction or purchase is designated.

I. INTRODUCTION

PURPOSE

On October 24, 1989, the Governor and Cabinet approved recommendations submitted by the Florida Department of Environmental Protection (now the Florida Fish and Wildlife Conservation Commission, FWC) to protect the manatee and its habitat and to increase boating safety in the state's waterways. In these recommendations, thirteen key counties with high levels of manatee mortality, including Brevard County, were identified, but not mandated, to develop comprehensive management plans to reduce manatee mortality and establish boat facility siting policies.

The purpose of Brevard County's Manatee Protection Plan (MPP) is to present a summary of existing information about the Florida manatee (*Trichechus manatus latirostris*), a subspecies of the West Indian manatee, in Brevard County and to develop a strategy that when implemented will equitably balance endangered species issues, resource protection, water resource uses, and boating safety. The principal focus of this effort is the identification and implementation of protection and management practices necessary to ensure the survival of the Florida manatee.

The plan will address issues such as: identification and protection of manatee habitat, boat facility siting and design standards, manatee protection boat speed zones, development of manatee awareness, and educational materials and workshops. Additionally, recommendations for important land acquisitions, enhanced coordination and sensitization of law enforcement agencies, and intergovernmental coordination initiatives will be included.

GOAL

The goal of this plan is to protect the manatee and its habitat and to increase boating safety in Brevard County.

OBJECTIVE

The objective of this plan is to allow for reasonable recreational and commercial use in the coastal zone consistent with the protection of manatees.

OVERVIEW

Brevard County is located on the central east coast of Florida, and is approximately 72 miles long (north-south) and 20 miles wide, with over one-quarter of its total area consisting of water (Figure 1). The county is bordered on the east by the Atlantic Ocean and on the west by the north-flowing St. Johns River. A short distance inland of the Atlantic Ocean lies the Indian River Lagoon (IRL) System, an expansive complex of three bar-bounded estuarine lagoons (the Mosquito, Banana, and Indian River Lagoons). This estuarine system is reported as being one of the most diverse estuaries in North America (Gilmore et al. 1985, Fernald et al. 1982). The sub-

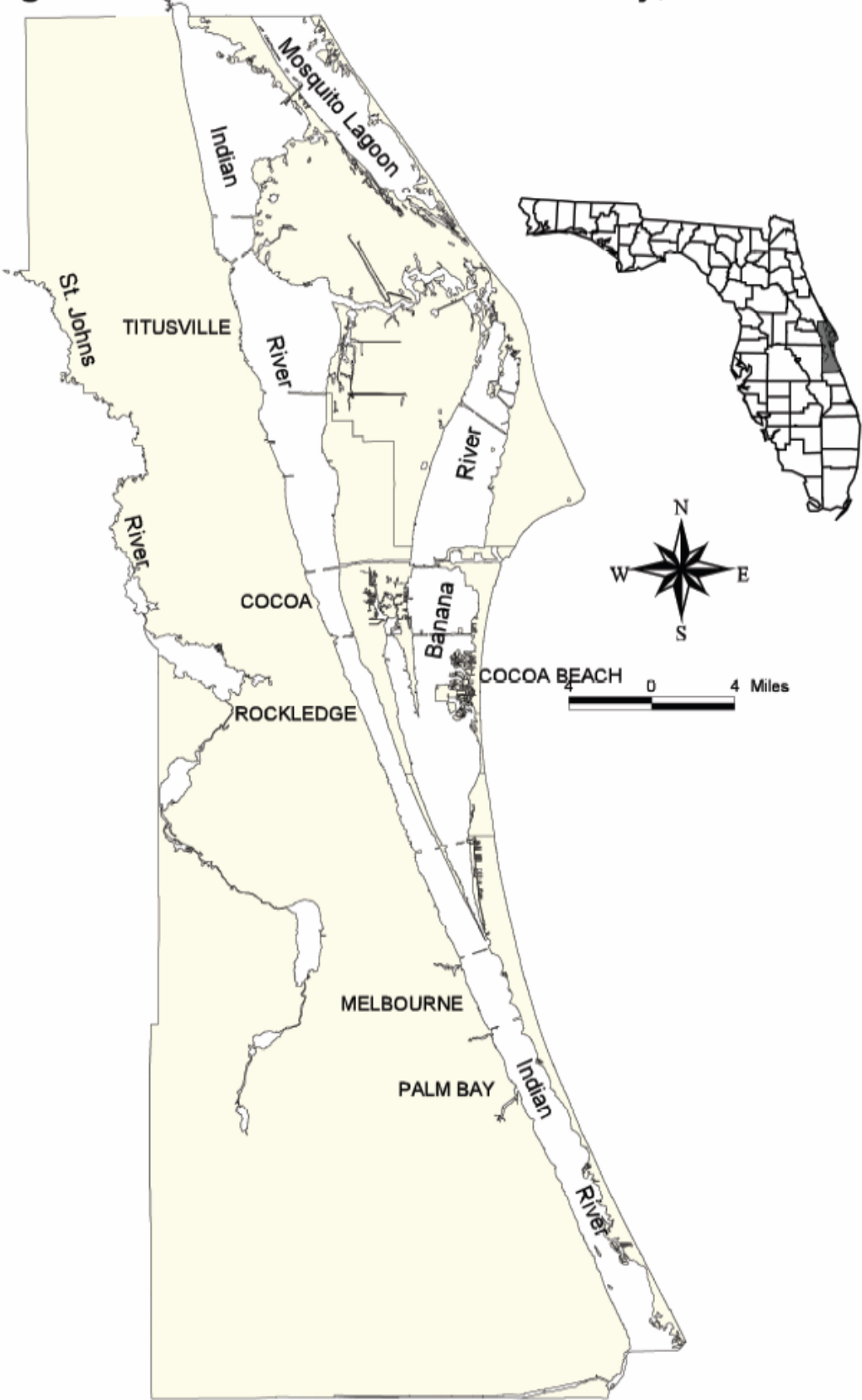
tropical Eastern Caribbean and the temperate Carolinian biogeographic zones converge near Cape Canaveral. The convergence plays a role in the diversity of this unique region. Brevard County is also home to one of the largest aggregations of Florida manatees (*Trichechus manatus latirostris*) in the state (FDEP 1992, Jane Provancha, personal communication, Marine Mammal Commission 1988). Sub-tropical seagrass meadows, the primary food source for manatees in Brevard, reach the northern extent of their range on the Atlantic coast within this ecotone.

Historically, the majority of manatees on the east coast of Florida were believed to be limited in their distribution during cold winters to the warmer sub-tropical waters south of the Sebastian River (Moore 1951). Because of their limited ability to conserve heat, manatees cannot survive exposure to water temperatures below approximately 68 degrees Fahrenheit (20°C) for extended periods of time (Marine Mammal Commission 1988). In north and central Florida, winter water temperatures will periodically drop below 68 degrees for short periods. During these periods, manatees will seek out warm water sources. The construction of power plants and other industries that discharge large volumes of warm water into Florida's coastal bays and estuaries provide manatees with warm water refuge areas (Campbell and Irvine 1981, O'Shea et al. 1985). Since the introduction of these warm water sources, more manatees use Brevard County waters during winter months.

With the presence of a warm water refuge, ample forage, and protected areas in the north Banana River, Brevard County hosts a significant year-round manatee population. Spring and winter aggregations are the largest documented in the State. Spring aggregations in the north Banana River, alone, have exceeded 365 manatees (Jane Provancha, personal communication), while winter surveys at Brevard's warm water refuges (during cold fronts) have documented at least 529 manatees (Bruce Ackerman, personal communication).

Brevard County also has the highest number of manatee mortalities, including the highest number of watercraft-related manatee mortalities, of any county in the State. From 1991-1997 the synoptic survey numbers recorded by the State ranged from 51-581 manatees counted in Brevard County. From June of 1974-2001, there were 4,367 manatee mortalities documented in Florida. Of these, approximately 19% (835) were recovered from Brevard County waters. Manatee mortalities are divided into seven major categories: "Watercraft," "Flood Gate/Canal Lock," "Other Human," "Perinatal," "Other Natural," "Natural Cold Stress," and "Undetermined." Human-related causes of death include: watercraft collisions, deaths due to water control structures, ingested debris, and occasional human inflicted injuries or poaching. Of the manatee mortalities recovered from Brevard County from 1974-2001, 29% (243) were undetermined, 27% (229) were attributed to perinatal mortality, 23% (191) were attributed to watercraft collisions, 11% (92) were attributed to other natural causes, 5% (49) were attributed to natural cold stress, 2% (17) were attributed to other human causes, and 2% (14) were attributed to flood gate/canal locks. For the majority of manatee mortalities recorded as "Undetermined," the manatee carcass was too badly decomposed to make any determination as to cause of death (Donna Banowitz, Marine Mammal Pathobiology Lab, personal communication).

Figure 1. Location of Brevard County, Florida



Many of the “Other Natural” manatee mortalities are attributed to cold stress (FDEP 1995a). Power plant discharges provide a critical warm water refuge for manatees during cold weather events. However, the ability of the discharge to raise the surrounding water temperature is limited. Manatees that remain at the warm water refuges in Brevard may still be susceptible to cold stress during prolonged and/or severe cold periods. During the 1989-1990 winter season, record low temperatures over an extended period of time in conjunction with reduced warm water discharge from the power plants (due to repairs) resulted in 31 cold stress mortalities (FDEP 1995a). The USFWS has accepted MPP’s for both the Reliant Energy Corporation Indian River Plant and the Florida Power and Light Corporation (FPL) Cape Canaveral Plant. These MPP’s will help to prevent the reduction of available warm water during winter months in the future (Jim Valade, USFWS, personal communication).

A major threat to the long-term survival and recovery of the manatee population is loss of habitat (USFWS 1995). Brevard County has experienced rapid population growth since the development of the Kennedy Space Center in the mid-1960’s. Most of this growth is concentrated along the shores of the IRL and the Atlantic barrier islands. As the human population grew, the seagrass beds in the nearby IRL declined. Extensive development with poor soil conservation practices, stormwater runoff, and the discharge of a large volume of wastewater into surface waters has, over time, degraded the water quality of the estuary.

Studies on seagrasses in the IRL system indicate approximately 47% loss of seagrass from the Indian River proper between the 1970’s and 1990’s (Morris and Tomasko 1993). Implicated in the loss is reduced light transmittance, increased particulate loading, and epiphytic growth (Thompson 1976; 1978, White 1986, Conrad White, NRMO, personal communication) and the impounding of marshes for mosquito control (IRL Joint Reconnaissance Report 1987).

Seagrasses and other attached plants (collectively called submerged aquatic vegetation, or SAV) are important to the ecology of the IRL. They provide high primary productivity, trap sediments, reduce erosion, and feed and shelter numerous species. Nearly all sport and commercial fish species rely on seagrass beds for some portion of their life cycle. An estuary with good water quality and healthy functioning seagrass habitat is important for both manatees and the citizens of Brevard County.

By protecting and caring for the fragile estuarine ecosystem that is home to manatees, the quality of life that attracts so many people to Florida’s coast will also be preserved. If the Florida manatee population is to survive, active commitments must be made to protect the manatee’s habitat areas *and* reduce levels of human-related manatee mortality. As a first step, the establishment of an effective protection plan for manatees, and their habitat, in Brevard County is of paramount importance for the protection of the local manatee population and the continued long-term viability of the East Coast manatee population.

II. RECOMMENDATIONS

Brevard County has been described as one of most important counties for manatee protection in the State of Florida. With habitat areas throughout the State declining due to increasing population and development pressures, the protection of key manatee habitat areas in the County's waterways becomes increasingly important. The goal of this plan is to protect the manatee and its habitat and to increase boating safety. In order to meet that goal recommendations have been developed that address the following issues:

- Habitat Protection
- Boat Facility Siting
- Manatee Protection Boat Speed Zones
- Other Recommendations to Reduce Manatee Mortality
- Law Enforcement
- Manatee-Human Interactions
- Education and Awareness

A. HABITAT PROTECTION

Brevard County is supporting the efforts of the St. Johns River Water Management District (SJRWMD), the Conservation and Recreational Lands Program (CARL), the Brevard County Environmentally Endangered Lands Program (EEL), the FWC, and other entities which work to improve the quality of the IRL.

Brevard County has accepted the goals of the Indian River Lagoon National Estuary Program (IRLNEP), Comprehensive Conservation and Management Plan (CCMP) and recognizes it as a planning tool. Implementation of the CCMP has the potential to achieve the habitat protection recommendations of the MPP. Brevard County has taken significant positive steps to reverse the degradation of the water quality of the estuary.

Brevard County is currently pursuing, or has completed, the following activities which implement Action Plans developed as part of the IRLNEP CCMP.

POINT SOURCE DISCHARGES:

PS-1 Insure compliance with the IRL Act (Chapter 90-262, Laws of Florida).

- County operated wastewater treatment plants are in full compliance with the IRL Act.

ON-SITE SEWAGE DISPOSAL:

OSDS-1 Continue or complete projects related to OSDS in the 1994 Surface Water Improvement Management (SWIM) Plan update and the IRL Act.

- Completed a study of OSDS usage in Brevard County, and identified potential problem areas where additional studies are needed (funded by SJRWMD grant).

OSDS-3 Undertake further studies of OSDS in the IRL region to quantify the impact of OSDS on the lagoon and further refine the extent of "problem" and "potential problem" areas.

- A Brevard County community (Port St. John) is included in a study to quantify the pollutant loading from OSDS. Monitoring wells and water sampling will be used to determine the extent, or lack thereof, of pollutants generated from a community with a high density of OSDS (Est. cost ~\$150,000).

FRESH AND STORMWATER DISCHARGES:

FSD-1 Complete the freshwater or stormwater discharge projects in the 1994 SWIM Plan update.

- Designed and constructed >\$5.8 million in stormwater retrofit projects.
- Developed and implemented a Stormwater Utility Assessment credit program for owners of stormwater treatment systems (includes compliance inspection).
- Developed and implemented a strong financial incentive program for adoption of soil conservation plans on agricultural lands (in conjunction with the National Resource Conservation Service).

FSD-2 Implement the National Pollutant Discharge Elimination System (NPDES) nonpoint source (stormwater) permitting program throughout the IRL region.

- Conducting countywide inventory of drainage systems and structural controls (>4,000 structures identified, inspected, and mapped to date).
- Continuing efforts to define drainage basins in unincorporated areas.
- Approved ~\$300,000 to develop a comprehensive countywide stormwater master plan, to be compiled in Geographical Information Systems (GIS) format.

FSD-3 Develop and implement pollutant load reduction goals (PLRGs) for all areas of the IRL.

- Partnering with other agencies in a water quality monitoring effort to help develop and calibrate modeling to establish PLRGs.

FSD-4 Develop new or improved best management practices (BMPs) for management of freshwater discharges or stormwater management.

- Continuing efforts to develop new and innovative treatment methods, supported by some \$700,000 to date in grant funding.
- Installed the first baffle box sediment trap in 1992; continuing efforts to improve the efficiency and design of these projects.
- Installed, evaluated, and assisted in the development of innovative stormwater inlet collection devices, oil absorbent devices, and wet retention ponds and weirs.
- Installed over 140 sediment removal devices in areas where no treatment existed and little or no land was available for other BMPs.
- Constructing an alum injection demonstration project for discharges into brackish water.

MARINA AND BOAT IMPACTS:

MB-2. Develop and implement an incentive program to assist in the implementation of improved marina operating practices.

- Appointed a “Liveaboard Task Force” to address issues related to liveaboard vessels and anchorages, and develop recommendations for implementation.

MB-3 Complete and implement boat facility siting plans.

- County Commission adopted a MPP in September 2000, which included an attached section on boat facility siting.

SEAGRASS RESTORATION:

SG-1 Implement a program of restoration and management activities needed to maintain, protect, and restore the SAV community of the IRL.

- Participating in the semiannual seagrass coverage inventory with SJRWMD.

IMPOUNDED MARSH RESTORATION AND MANAGEMENT:

IM-1 Complete the diagnostic, management, or feasibility projects related to marshes impounded for mosquito control found in the 1994 SWIM Plan.

IM-2 Continue acquisition of privately owned impounded marshes or obtain conservation easements allowing restoration of their natural functions.

- Cooperating with SJRWMD to reconnect impounded marshes (received >\$300,000 for work from 5/95 through 5/97).
- Initiated a marsh acquisition effort in 1992 using Mosquito Control District funds.

LAND ACQUISITION:

LA-1 Develop a coordinated strategy to identify, classify, acquire, and manage environmentally sensitive lands throughout the IRL watershed.

- Established EEL acquisition program in 1991 (voter approved 0.25 mill ad valorem tax).
- Implemented numerous acquisition initiatives protecting lands in the IRL watershed.
- Water quality considerations are included in the development and implementation of management plans.
- (NOTE: The County’s EEL program also implements ETS-3 (protect critical habitats), IM-2 (acquire and restore impoundments), W-4 (acquire essential wetlands), BD-2 (land acquisition to protect biodiversity), BD-3 (control of exotic plants), and others).

LA-2 Implement the process to acquire ownership or management of wetlands adjacent to the IRL.

- Several County projects have acquired, or are in the process of acquiring, wetlands adjacent to the IRL.
- The County has obtained partners (SJRWMD, CARL, Federal agencies, and private organizations) for cost sharing of acquisitions.

ENDANGERED AND THREATENED SPECIES:

ETS-1 Develop, update, or refine management of recovery plans for the endangered, threatened, or species of special concern found in the IRL region.

- Adopted a MPP in September 2000.

FISHERIES:

F-1 Improve management of the fisheries of the IRL through coordination of fisheries research and management activities.

- Working with FWC to coordinate aquaculture leasing activities, the County adopted an Aquaculture Leasing Plan in January 1997.

PUBLIC AND GOVERNMENT SUPPORT AND INVOLVEMENT:

PIE-3 Increase public and government awareness of programs which protect and restore the IRL.

PIE-4 Increase public and government involvement in activities designed to protect and restore the resources of the IRL.

- Stormwater management requirements implemented in 1978 for commercial and industrial developments.
- Established Stormwater Utility in 1991.
- Public education included in the utility's scope of services.
- Cooperating with Brevard Community College in a public education program involving elementary and high school students in stormwater sampling (involving 300 students at six schools).
- Using volunteers to assist with identifying illegal discharges into the stormwater system.

DATA AND INFORMATION MANAGEMENT STRATEGY:

DIM-1 Continue or complete projects related to data and information management found in the 1994 SWIM Plan.

DIM-2 Continue implementation of data and information management strategies.

- Historical data has been proofed and entered into a new database management system to allow more efficient reporting and evaluation of water quality data.
- Continuing efforts to improve GIS capabilities.

DIM-4 Ensure that all data and information concerning the IRL is entered into and available through the storage and retrieval (STORET) system.

- Water quality monitoring data is compliant with STORET requirements.

MONITORING:

MON-1 Complete or continue projects related to monitoring the resources of the IRL found in the 1994 SWIM Plan update.

MON-3 Provide support for the development of a biennial report on the state of the IRL.

- Continued monitoring efforts in support of the IRL Water Quality Monitoring Network.

- Continuing monitoring of selected non-point sources which began in 1992.

The Brevard County Board of County Commissioners will continue to implement a variety of projects that achieve the goals of the IRLCCMP for the protection of manatee habitat.

B. COUNTY MANATEE SANCTUARY RESOLUTION

In 1997, a resolution which amends the Brevard County Resolution (04-01-76), which established all of Brevard County as a Manatee Sanctuary Zone was adopted. This resolution recognized Brevard County as significant manatee habitat without using language that has State or Federal regulatory significance (Appendix 2).

C. BOAT FACILITY SITING

1. DEFINITIONS

For the purpose of this Manatee Protection Plan, the following definitions shall apply:

Marina (general): All boating facilities with ≥ 3 wet and/or dry slips (consistent w/current County definition). A Marina is a facility or structure, which provides mooring, docking, anchorage, fueling repairs, launching, or other related services for watercraft. Private boat docks associated with single family dwellings are exempt from this category.

- **Residential Marina** - Community docks serving subdivisions, condominiums, duplexes, or other multi-family developments with between and including three (3) and thirty (30) slips. No fueling, or repair facilities shall be associated with these marinas.
- **Commercial/Recreational Marina** - Facilities with greater than thirty (30) slips, or those facilities with less than thirty slips which have fueling facilities, and/or which include utilities and services available for the general public, or facilities which provide docking for vessels of private, non-residential usage and which are not associated with a subdivision, condominium, duplex, or other multi-family development. Permitted uses may include dockage, fueling facilities, repairs, utilities, custom recreational boat building and wastewater pump-out facilities, commercial sales and handling of fish and farmed/harvested seafood, along with similar services.
- **Industrial Marina** - Facilities serving largely commercial interests, including commercial boat building, ship repairs or construction, and commercial seafood harvesting and processing. Permitted uses may include fueling facilities, repairs and construction, boat production, ship repairs up to 100 feet or 100 tons, wastewater pump-out facilities, utilities, and commercial sales of fish and farmed/harvested seafood.

Existing linear shoreline: For the purpose of the Brevard County Manatee Protection Plan, the high water line in tidally-influenced areas and the ordinary high water line along waterways that are not tidally influenced. This definition shall not apply to shoreline artificially created through dredge or fill activities (such as boat basins or canals) after January 01, 1996. Such artificially

created shoreline created after January 01, 1996 shall not be considered in the calculation of linear shoreline. Artificially created shoreline that was created prior to January 01, 1996 must have received the proper permitting authorization required at the time of construction. Man-made drainage ditches (such as mosquito control, flood control ditches or any non-navigable waterway) shall not qualify as linear shoreline, regardless of their date of construction. Linear shoreline shall be calculated using survey quality aerial photographs or by accurate field survey. The calculation of linear shoreline is based upon contiguous shoreline that is owned or legally controlled by the applicant. Exception to include non-contiguous shoreline within the sphere of influence of the proposed project will be considered if the federal, state, and local permitting agencies agree that inclusion of that shoreline will not result in significant adverse impacts to manatee or manatee habitat.

Existing Boating Facilities: For the purpose of the Brevard County Manatee Protection Plan, existing boating facilities shall be defined as those facilities which have all active and required permits or those facilities that were in operation up to ten (10) years prior to the date of the final adoption of the Plan (01/16/03). All existing boating facilities shall be allowed to continue with the existing use and may renovate according to permitting guidelines, provided there is no change in facility size, including no increase in the number of wet or dry slips, unless the facility meets the expansion criteria as provided in the Brevard County Manatee Protection Plan. Boating facilities are generally defined as those structures or operations where boats are moored or launched, such as a dock (excluding single-family), pier, marina, dry storage facility with launching capability, or a boat ramp, which is contiguous to the waters of the state of Florida. For the purpose of this plan, boating facility shall be synonymous with “marina facility”.

% Seagrass Coverage: Seagrass coverage shall be determined on a project site during the months of May through October. The percent coverage of seagrass is determined by counting short shoots in a one square meter (1m²) plot frame that has been evenly subdivided into one hundred square cells. The plot is placed every five meters (5m) along a minimum of three (3) transect lines perpendicular to the shoreline, extending to the end of the project site, and including ingress and egress pathways. The transect lines are to be evenly spaced along the project site shoreline with one transect located at the middle of the site, one at each end of the project site and a minimum of three transects along ingress and egress pathways extending lengthwise from the shoreline to an authorized marked navigational channel. Transects shall be no greater than fifty meters (50m) apart. If the project site is greater than one hundred meters (100m) in width, additional transects shall be added at a rate of one for every fifty meters (50m) of shoreline. If ten of the sample plot frames contain ten percent (10%) or more seagrass, then the final coverage for the site is greater than or equal to ten percent (10%). The project site is defined as all docks, access walkways, finger piers, mooring areas, turning basins, and ingress and egress pathways. If the project site and the shoreline are not contiguous then the first plot frame shall be placed at the intersection of the project site and the transect line.

Powerboat: Any vessel which is primarily propelled or powered by an internal combustion engine and which is used or is capable of being used as a means of navigation or transportation on water. Sailboats with auxiliary engines are not considered powerboats for the purpose of this plan.

Boat Facility Siting Zones:

- **Zone A** -The Banana River basin south to Mathers Bridge, the Sykes Creek/Newfound Harbor basin north to the Lambert Drive bridge; that portion of the Indian River Lagoon

between the NASA Causeway and the S.R. 528 Causeway; Mullet Creek (Sections 26, 35 and 36 of Township 29, Range 38); and that portion of the following tributaries lying west of the existing railroad bridges: St. Sebastian River, Turkey Creek, Crane Creek, and the Eau Gallie River.

- **Zone B** - The Barge Canal from the west shoreline of Merritt Island to the east shoreline of Merritt Island.
- **Zone C** - The Port Canaveral Harbor lying east of the S.R. 401 Bridge.
- **Zone D** - The remainder of the County not under federal jurisdiction and not included in boat facility siting zones A, B, or C.

Manatee Habitat Features: The following manatee habitat features are to be applied in Boat Facility Planning Zone D and shall be determined using the map series and data update schedule identified in Appendix 6.

A. Each of the following increases the number of habitat features by 1.

1. **Seagrass - 5% or more seagrass** present on the proposed project site is considered significant.
2. **Manatee Abundance** – Level 1 = 10 or more manatees observed/overflight within a 5 mile radius equals 1 point. Level 2 = 25 or more manatees observed/overflight within 5 mile radius equals 2 points.
3. **Significant Manatee Mortality** – Level 1 = the number of watercraft mortality within a 5 mile radius, divided by the total number of watercraft mortalities in Brevard County. A value greater than 0.05 is considered significant and is equal to 1 point. Level 2 = the number of watercraft mortalities within a 5 mile radius, divided by the total watercraft mortalities in Brevard in the last 5 years. A value greater than 0.10 is equal to 2 points.
4. The proposed site is in a **Class II Waterbody, Outstanding Florida Waterway (OFW), or an Aquatic Preserve.**

B. Each of the following reduces the number of habitat features by 1.

1. The proposed site is presently located in a year-round “slow speed” or “idle speed” manatee zone as authorized by the Florida Manatee Sanctuary Act Chapter 68C-22.003 F.A.C., other Federal designation or local ordinance.
2. The proposed site is within 3 miles of Sebastian Inlet.

2. MARINAS

All proposed marina siting projects in unincorporated areas of Brevard County shall come before the Board of County Commissioners for their review.

A. COUNTY PERMITTED USES

It is recommended that the current zoning regulations be changed to allow residential marinas as a permitted use, subject to the boat facility siting criteria established in Sections B, C, and D below, in all of the current conditional use zoning classification for residential/recreational marinas, except Recreational Vehicle Park (RVP) and Government Managed Lands (GML).

B. PRELIMINARY ASSESSMENT CRITERIA

The following listed criteria are recommended as the preliminary test of suitability for boat facility siting.

Water Depth

1. Water depth at the proposed mooring area of the site shall be at least four (4) feet mean low water (*Existing policy FDEP 17-312-420(2)(a), F.A.C. Permitting Requirements for Piers, would require new county policy*).
2. Water depth at the site must be adequate for the proposed vessel use such that there be a minimum of one foot clearance between the deepest draft of the vessel (including the engine) and the bottom at mean low water (*Existing policy FDEP Chapter 18-20 5, c, (4) Aquatic Preserves; would require expansion of the policy to areas outside of Aquatic Preserves*).
3. Proposed boat facilities in areas that contain seagrass shall not be approved unless water depth at the site's turning basin, access channel, and other such areas which will accommodate the proposed vessel use in order to insure that a minimum of one (1) foot clearance is provided between the deepest draft of the vessel (including the engine) and the top of the resources at mean low water (*Existing Policy Chapter 18-20(5)(b) 8, and (c) 4., F.A.C. would require expansion from Aquatic Preserves to all areas containing seagrass*).

Seagrass

1. Marinas shall not be located in areas containing 10% or more seagrass (*Expansion of Existing Policy Brevard County Comprehensive Plan, Coastal Management Element, Objective 5, Policy 5.4*).

C. DEVELOPMENT GUIDELINES/RECOMMENDATIONS

Dredging

1. The creation of new navigation canals or expansion (widening and/or deepening) of existing ditches, drainage right-of-ways, drainage easements and stormwater facilities connected to the Indian River Lagoon to accommodate boat traffic shall be prohibited unless it is in the public interest, as defined in the Glossary, and does not adversely impact water quality or natural habitat, or unless the activity is an approved maintenance dredging on existing public navigational channels and public canals, or an existing marina's maintenance dredging (*Would require a modification to Existing policy 3.6, Brevard County Comp Plan, Conservation Element; and Brevard County LDR, Division 3, Surface Water Protection Ordinance, Section 62-3666, (5)*).

2. Dredging shall not be permitted in or connected to Class II Waters, OFW's, Aquatic Preserves, areas that contain ten percent (10%) seagrass or more, and conditionally approved shellfish harvesting waters unless the activity is a federal navigation project, in the best public interest, such as approved maintenance dredging of existing public or private navigational channels, or where dredging may improve water quality by removing accumulated silt or improving circulation, or for maintenance of existing structures and utility structures and utility crossings, or for shoreline hardening as allowed by this division (Modification of *Existing policy to include seagrass, Brevard County LDR, Brevard County LDR, Division 3, Surface Water Protection Ordinance, Section 62-3666, (5); F.S. 163.3202(2)(F); Environmentally Sensitive Lands F.S. 163.3202(2); F.S. 373.403 et seq., Management and Storage of Surface Waters; and F.S. 403.91 Warren S. Henderson Wetlands Protection Act of 1984*).
3. All dredging activities must be done with effective turbidity controls. Where turbidity screens or similar devices are used, they should be secured and regularly monitored to avoid manatee entrapment (*Existing Policy, Brevard County Comp Plan, Coastal Management Element, Policy 5.4 I, and would require an expansion to include provisions to protect manatees from entrapment*).

Seagrass

1. Designated boat docking areas shall not be located over seagrasses (*Existing Policy FDEP Permitting Requirements for Piers , 17-312.420(2)(e), F.A.C. and 17-312.430, F.A.C. Would require new policy to expand application to include all facilities with 3 or more slips. Presently the rule limits facilities with three (3) to nine (9) slips from having mooring areas over seagrass if water depths are five (5) feet or less, and prohibits facilities with 10 or more slips from having mooring areas over seagrass at any depth*).
2. Covered boat slips, covered walkways, or covered terminal platforms shall not be permitted in areas containing seagrass (*Would require new policy*).
3. Boat docks using open mesh grating and pilings made from recycled materials (plastic/wood composites for example) are preferred to pressure treated wood. Any materials or permitted construction techniques proven to allow a minimum of 75% light transmittance may be exempt from remaining design criteria 4 and 5 below in this subsection (*Seagrass, subsection B, numbers 2-6 - Would require new policy*).
4. For Residential Marinas, main access docks and connecting or cross walks shall not exceed six (6) feet in width (*Existing policy in aquatic preserves, Chapter 18-20 5)(c)5.-7., F.A.C., and would require new policy to expand rule from Aquatic Preserves only to all seagrass areas*).

5. Access piers should be located and designed to minimize their shadowing impact on seagrass.
6. Reasonable alteration to these criteria may be authorized to accommodate persons with disabilities (*Existing policy in aquatic preserves, Chapter 18-20 (5)(c) 5.-7., F.A.C., and would require new policy to expand rule from Aquatic Preserves only to all seagrass areas*).

Manatee Related Best Management Practices for Marinas

1. All existing and new marinas shall erect manatee education and awareness signs, which will be posted and maintained in a prominent location (*Existing Policy 9.9, A and C, Brevard County Comp Plan, Conservation Element with deletion of speed zone signs on access channels*).
2. Dock designs shall not entrap manatees or otherwise prevent them from accessing forage areas (*Would require new policy*).
3. Docks with exposed reinforcement structures on floating docks shall be prohibited due to their potential to entrap or entangle manatees in the structure itself or in the marine debris that commonly occurs in these areas (*Would require new policy*).

Water Quality

1. Marinas shall be located in areas with good flushing and circulation (*Existing policy 5.4 J, Brevard County Comp Plan, Coastal Management Element*).
2. New seawalls or bulkheads should be prohibited along the Indian River Lagoon except as provided in Ordinance 91-37 or when the project would improve the water quality by acting as a swale and reducing the amount of pollutants which would enter the Indian River Lagoon where the placement of a seawall does not disturb existing native vegetation, prohibit the reestablishment of native vegetation, or where the reestablishment of native vegetation is not viable (See Appendix 3, *would require modification of Existing Brevard County LDR, Division 3, Surface Water Protection Ordinance 91-37*).
3. All facilities shall adhere to the provisions for surface water protection per the guidelines set forth in Brevard County Ordinance 91-37. The provisions for a shoreline protection buffer established in the ordinance include the following (See Appendix 3, *existing policies 3.2, 3.3, and 3.4 Brevard County Comp Plan, Conservation Element; and Brevard County LDR, Division 3, Surface Water Protection Ordinance, Section 62-3666, (5)*).
 - ™ Class I waters - 200 foot buffer Policy 3.2 A
 - ™ Class II waters - 50 foot buffer Policy 3.3 A
 - ™ Class III waters - 25 foot buffer Policy 3.4 A

- TM On lots with unarmored shorelines the waterward extent of the buffer is the mean high water line. On bulkheaded lots, the waterward extension of the buffer is established by the bulkhead line. A maximum width of 25 feet or 20% (whichever is greater) may be cleared for access.

Upland Issues

1. The proposed site shall be compatible with existing land use (*Would require new policy*).
2. Uplands at the site shall be greater than or equal to one acre. (*Brevard County LDR Subdivision III, Section 62-1937*).

D. POWERBOAT-TO-SHORELINE RATIOS

Boat Facility Siting Zone A:

In Boat Facility Siting Zone A, powerboat siting ratios shall be limited to one powerboat slip per 100 feet of contiguous linear shoreline that is owned or legally controlled by the applicant, as applied to all new and expanding boating facilities. Boat facilities in Zone A may qualify for a variance under Section E, Variance Criteria. Also, the establishment of new boating research, design, development or manufacturing facilities whose operations include on-water testing of motorized watercraft, are prohibited from locating in uplands within Boat Facility Siting Zone A.

Boat Facility Siting Zone B (Barge Canal):

In Boat Facility Siting Zone B along the Barge Canal (as defined), powerboat siting ratios shall be limited to a 1:100 powerboat-to-shoreline ratio (tied to a parcel's deed). Any boat facility, which desires to exceed the 1:100 powerboat-to-shoreline ratio, must acquire additional development rights from other properties, which have linear shoreline parallel to the Barge Canal and adjoin the Port Canaveral control easement. Any development rights transferred must be recorded on both the selling and receiving parcels deeds.

Boat Facility Siting Zone C (Port Canaveral Harbor):

In Boat Facility Siting Zone C, there shall be no powerboat-to-shoreline restrictions within the Canaveral Harbor provided current slow speed regulations remain in effect.

Boat Facility Siting Zone D:

In Boat Facility Siting Zone D, the following table illustrates the powerboat-to-shoreline ratios per 100 feet of contiguous linear shoreline owned or controlled:

# Manatee Habitat Features	Existing Facility	New Facility
0	5:100	4:100
1	5:100	4:100
2	3:100	2:100
3	2:100	1:100
4	1:100	1:100
5	1:100	1:100
6	1:100	1:100

Manatee Habitat Feature Summary: (See detailed Manatee Habitat Features definitions above - to be determined using map series and map update schedule specified in Appendix 6).

Limiting Habitat Features	Criteria for Evaluation (each increases # habitat features by 1, unless otherwise specified)
Manatee Abundance	1st level: 10 or more manatees observed/overflight within 5 mile radius (1 point) 2nd level: 25 or more manatees observed/overflight within 5 mile radius (2 points)
Manatee Mortality	1st level: # of watercraft mortalities within a 5 mile radius/total number of watercraft mortalities in Brevard (≥ 0.05 is significant) (1 point) 2nd level: # of watercraft-related deaths within a 5 mile radius in the last 5 years/total number of watercraft mortalities in Brevard in the last 5 years (> 0.10 is significant) (2 points)
Seagrass	5% or more present on the project site is significant
Class II, OFW, or Aquatic Preserves	Site is located in one of these designated areas
OFFSETTING FEATURES	Criteria for Evaluation (each decreases # of habitat features by 1)
Speed Zones	Site is located within a year-round “Slow Speed” or “Idle Speed” Zone
Within 3 miles of Sebastian inlet	Site is located within 3 mile radius of Sebastian Inlet

E. VARIANCE CRITERIA

It is recommended that a variance may be given to the powerboat-to-shoreline ratio for those existing marina and boat launching facilities subject to the 1 powerboat slip to 100 feet of owned contiguous shoreline restriction (1:100), provided the facility meets all the variance criteria listed below and can demonstrate that it will not have an adverse impact on manatees. If an existing facility meets all of the variance criteria, it may be permitted to increase the powerboat-to-shoreline ratio by 1:100 if the waters in and adjacent to the channels leading to the facility are designated "slow speed" or "idle speed" year-round as authorized by the Florida Manatee Sanctuary Act Chapter 68C-22.003, F.A.C. or other federal regulations or local ordinances, or if the facility is within 3 miles of the Sebastian Inlet. The facility may be allowed to increase the powerboat-to-shoreline ratio by 2:100 if both are applicable. In no case shall the maximum total buildout of 3 powerboat slips per 100 feet of owned contiguous shoreline (3:100) be exceeded. However, adherence to these criteria does not automatically ensure the applicant's ability to exceed the allowable powerboat restrictions as defined above. The plan restrictions will remain in effect, if at the time of review, additional information about manatees or the proposed facility indicates threats not addressed by these criteria. Consideration can be given for additional site-specific factors or operating practices (e.g. seasonal operation, etc.) that may be proposed by either the applicant or the County that may result in improved conditions for manatees or manatee protection. Nothing in this section shall exempt any marina from obtaining the usual required permits and/or authority from all applicable reviewing agencies with proper jurisdictional authority. The criteria are:

1. The facility is not located within a manatee aggregation area (using the Manatee Abundance Habitat Feature as defined on page 21 and in the Table on page 26), or other area where sensitive manatee activities occur.
2. The facility must provide net benefit to manatees and/or their habitat. For example, facilities may include a manatee "refuge" space as part of the design, a conservation easement, restoration of adjacent wetlands such as mangrove or seagrass restoration to increase the net coverage of the nearby area, reduced nutrient input to receiving waters, requiring prop guards on any high traffic vessels such as water taxis or dive boats or rental boats, etc. The marina construction and subsequent uses will neither destroy nor negatively impact mangrove and benthic (seagrass, hard bottom, etc.) communities and the water quality.
3. The facility must have sufficient water depth, as defined in Section B, Preliminary Assessment Criteria on page 22, in the marina basin and in any access channel, and does not require any new dredging or filling that would degrade shallow water habitat (this may exclude maintenance dredging, or pile installation). Entrance/exit channels near marinas shall be adequately marked if marina repairs or expansion are proposed.
4. The site shall contain appropriate signage (including vessel speed and manatee information signs), and provide educational material advising boaters of essential manatee habitats in the vicinity.
5. Multi-family residential docking facilities will require that all vessels moored at the site be registered to individuals residing at the site.

6. The marina has adequate water circulation, tidal flushing, and meets State of Florida and local water quality standards.
7. Before expanding and exceeding the allowable powerboat slips defined above, an existing facility must demonstrate not less than 85% occupancy over the previous 2 years of operation. New facilities should be able to demonstrate the need for additional boat slips in the vicinity based on occupancy of existing marina slips within the boater sphere of influence. The boater's sphere of influence shall be a five (5) mile radius.

3. Boat Ramps

In order to minimize adverse impacts to manatees, boat ramps are best located in areas with few natural resources, with relatively low manatee abundance and relatively low watercraft-induced manatee mortalities, and with deep water access and marked navigation channels.

Boat ramp siting or expansion in Brevard County shall be evaluated using the following criteria:

1. All sites considered by Brevard County for new or expanded boat ramp facilities shall be evaluated for site suitability prior to acquisition and development.
2. All proposed new boat ramps or the expansion of existing boat ramps in the unincorporated areas of Brevard County shall be brought before the Board of County Commissioners for their review.
3. The siting of new or the expansion of existing boat ramp facilities shall be limited to areas that meet the Preliminary Assessment Criteria for water depth included in this plan under Section II, C, 2, B.
4. The siting of new or the expansion of existing boat ramp facilities shall be prohibited in areas that meet or exceed the 2nd level of manatee abundance or the 2nd level of manatee mortality as defined in this plan under Section II, C, 1 (Definitions);
5. The siting of new or expansion of existing boat ramp facilities shall be prohibited in areas with greater than 5% seagrass coverage including all ramps, docks, access walkways, finger piers, mooring areas, turning basins, and ingress and egress pathways.
6. The siting of new or the expansion of existing boat ramp facilities shall be required to meet the criteria included in this plan in Section II, C, 2, C (Development Guidelines/Recommendations) with the exception of Seagrass (criterion 4), Manatee Related Best Management Practices (criterion 1), Water Quality (criterion 1), and Upland Issues (criterion 2).
7. All sites considered for the siting of new or the expansion of existing boat ramp facilities shall be evaluated for the number of habitat features present using the Boat Ramp Feature Assessment table below and using the manatee mortality and abundance criteria as defined in this plan under Section II, C, 1 (Definitions):

Boat Ramp Feature Assessment:

<p>LIMITING HABITAT FEATURES Manatee Abundance</p> <p>Manatee Mortality</p> <p>Class II, OFW, or Aquatic Preserves</p>	<p>Criteria for Evaluation (each increases # habitat features by 1, unless otherwise specified) 1st level: 10 or more manatees observed/overflight within 5 mile radius (1 point) 2nd level: 25 or more manatees observed/overflight within 5 mile radius (2 points) 1st level: # of watercraft mortalities within a 5 mile radius/total number of watercraft mortalities in Brevard (≥ 0.05 is significant) (1 point) 2nd level: # of watercraft-related deaths within a 5 mile radius in the last 5 years/total number of watercraft mortalities in Brevard in the last 5 years (> 0.10 is significant) (2 points)</p> <p>Site is located in one of these designated areas</p>
<p>OFFSETTING FEATURES Speed Zones</p> <p>Within 3 miles of an inlet</p>	<p>Criteria for Evaluation (each decreases # of habitat features by 1) Site is located within a year-round “Slow Speed” or “Idle Speed” Zone Site is located within 3 mile radius of Sebastian Inlet</p>

8. Boat Facility Siting Zone A is not considered preferable for additional boat ramp siting due to the high number of habitat features present. In Boat Facility Siting Zone A, a site that has less than 2 habitat features based on the criteria in the Boat Facility Feature Assessment may be considered for a new or expanded boat ramp with up to a maximum of 15 parking spaces.
9. In Boat Facility Siting Zone B (Barge Canal), the establishment of a new public or private boat ramp for public use shall be the same requirements as for the development of a new or expanded marina as described in Boat Facility Siting Zone B (Section II, C, 2, D). For the purposes of boat ramps, one boat-trailer parking space shall be considered the equivalent of one power boat slip. New or expanded boat ramps on the Barge Canal which are associated with a marina and which are to be used solely by the tenants of that marina for the launching of boats stored at that marina shall not be limited in the number of parking spaces.
10. In Boat Facility Siting Zone C (Port Canaveral Harbor), the siting of new or expansion of existing boat ramps shall be unrestricted.
11. In Boat Facility Siting Zone D, a site with no more than 2 habitat features shall be considered suitable for siting of a new boat ramp or the expansion of an existing boat ramp. Sites with 0 or 1 habitat feature shall be eligible for a boat ramp with up

to a maximum of 40 boat trailer parking spaces. Sites with 2 habitat features shall be eligible for a boat ramp with up to a maximum of 15 boat trailer parking spaces.

A. VARIANCE CRITERIA

The ability to secure additional parking slots at public ramps could be reconsidered by the FWC if additional law enforcement, additional preservation, or impact reduction along the lagoon is demonstrated.

SITE SPECIFIC RECOMMENDATIONS:

Three areas in the County were identified as deficient in public boat launching facilities; Pineda Landing in Melbourne, the southern portion of the County's mainland, generally south of and including Palm Bay, and the County's south barrier island, south of the Town of Indialantic.

The growing population on the County's south mainland is increasing the need for boat launching facilities in this area. Presently there are few public boat launching facilities in this area and the existing facilities are periodically overcrowded. Combined, these factors indicate the need for improvements to existing public boat ramps, and the potential establishment of new boat ramps in this area.

The County's barrier island south of the Town of Indialantic on the east shore of the Indian River also has few available boat launching facilities. The lack of available public boat launching sites in this area suggests a need to establish a new facility. However, the shallow shoreline, rapid silting characteristics and lack of suitable public waterfront property in this area have made past efforts to establish an additional boat ramp unsuccessful.

The following specific sites are identified individually to address existing boat ramp deficiencies in Brevard County and are exempted from the boat ramp siting criteria above:

1. It is recommended that Brevard County's relocation of the Pineda Landing facility include 36 parking spaces.
2. It is recommended that Brevard County provide 50 additional parking spaces by expanding existing public ramp facilities or by developing a new location in the south mainland area. The expansion of an existing facility or the siting of a new facility, as provided for above shall minimize impacts to manatees and natural resources and should be evaluated by the Boat Ramp Manatee Habitat Feature Assessment as defined above. It is recommended that the evaluation result in a score of no greater than two habitat features. The County will screen sites to select the most appropriate and coordinate with FWC staff on the site selection.

D. MANATEE PROTECTION BOAT SPEED ZONES

The Brevard County Board of County Commissioners acknowledges the FWC's adoption of manatee protection speed zones in Brevard County. Brevard County expresses its intent to participate in the State's process (conducting public workshops, gathering additional scientific data and other information, etc.) regarding any future rule changes.

E. MANATEE ZONE SIGN MAINTENANCE

It is recommended that Brevard County request a detailed proposed 5-year budget and projected construction and maintenance schedule from the Florida Inland Navigation District (FIND) for Brevard County waters.

In addition, it is recommended that:

1. Brevard County request that FIND provide the County with a yearly progress/status report for their ongoing projects and budget expenditures within Brevard County.
2. FIND and Brevard County cooperatively develop a mechanism for reporting missing or damaged manatee zone signs so that they may be replaced in a timely manner.

F. MOORING BUOYS

It is recommended that Brevard County request funding support from FPL, the Reliant Energy Corporation, and other corporate sponsors to fund the cost and maintenance of mooring buoys for fishing activity outside the perimeter of the proposed no-entry zone for each respective power plant. Funding should also be requested for other boating improvements and kiosk development.

G. NAVIGATION CHANNEL MARKINGS

It is recommended that marked navigation channels be established to improve boating safety and manatee protection in the following areas:

1. Newfound Harbor from S.R. 520, past George Island to the main Banana River Channel.
2. Sykes Creek from S.R. 528 to the Sykes Creek Parkway Bridge with channel markers on both sides of the channel.

H. CAUSEWAYS AND RELIEF BRIDGES

It is recommended that the Florida Department of Transportation (DOT) replace the existing causeways in Brevard County with clear span bridges when major sections of the causeways are due for repair or replacement. Any new bridges that will cross a portion of the IRL shall be a clear span design. Until the replacement of existing causeways is possible, all causeway relief bridges should be regularly evaluated and dredged as needed. The S.R. 520 causeway relief bridges shall have the highest priority.

I. MAINTENANCE DREDGING PROJECTS

It is recommended that access channels be dredged and maintained for the purpose of navigation and manatee mobility, unless it is proven to be detrimental to the public interest.

J. LAW ENFORCEMENT RECOMMENDATIONS

The FWC is responsible for the majority of manatee regulation enforcement that occurs in Brevard County. The extensive area of waterways to be patrolled combined with a large boating public and a limited number of law enforcement officers dedicated to on-water patrols greatly restricts the amount of time that can be dedicated to boating safety and environmental enforcement. On average there are 2 or 3 FWC officers operating on Brevard County's 281 square miles of waterways. There are no officers patrolling overnight. It is recommended the FWC continue to work with the Legislature and the Governor to increase the budget of the FWC Division of Law Enforcement to allow for additional officers in Brevard County for the purpose of providing greater law enforcement for boating safety, manatee protection, and boater education.

Brevard County presently allocates \$467,243 to the Sheriff's Aquatic Law Enforcement Division consisting of five officers, a full-time secretary, and boats. From this total, the Brevard County Sheriff deploys 2.5 officers and 3 boats on coastal waters as the marine unit.

K. PROBLEM HUMAN INTERACTION AREAS

The number of human interaction areas around the state and in Brevard County is increasing. There are presently five known problem interaction sites in Brevard County. They are located at Haulover Canal, Cape Canaveral Sewer Plant, Berkley Canal in Cape Canaveral, Turkey Creek, and Crane Creek. The most common human interaction problems are feeding, watering, and entering the water to swim with the manatees. All known human interaction areas should be posted with manatee educational signs that explain the reasons why these activities are harmful to manatees. Local police and sheriff deputies that patrol these areas should be contacted and informed of the locations of these sites and the legal limitations placed upon public interaction with manatees. For some of the most problematic sites, physical barriers (including vegetative barriers) may be required to restrict human access.

L. WAYS TO REDUCE OTHER CAUSES OF MANATEE MORTALITY

CANAL LOCKS

It is recommended that the United States Army Corps of Engineers (USACE) continue with the present lock-down procedures. In addition, it is recommended that USACE continue to investigate the use of devices such as pressure sensors to enhance manatee protection during lock operation.

PESTICIDES AND HERBICIDES

It is recommended that the pesticide and herbicide issues be addressed through education programs identified in the Education Initiative.

CONVEYANCE STRUCTURES

It is recommended that Brevard County staff coordinate with the National Biological Survey (NBS) staff to develop a list of outfalls in Brevard County that pose a threat to manatees. Once identified, it is recommended that the SJRWMD, the Brevard County Stormwater Division, and the Brevard County Mosquito Control Division outfit the identified outfalls with manatee exclusion devices similar to those used by the Indian River County Mosquito Control Division.

MONOFILAMENT LINE

Brevard County has established and implemented a monofilament line recycling program (MRRP). This program is coordinated and operated by staff of the Natural Resources Management Office (NRMO). Staff have applied for, and received grants from FWC of \$57,000 to establish monofilament line recycling sites and \$67,680 to develop boating and manatee educational kiosks.

CRAB TRAP LINES

It is recommended that a cooperative study between the FWC, the NBS, and the crabbing industry be undertaken to investigate different materials for crab trap lines that reduce the likelihood of entangling a manatee.

M. PORT CANAVERAL SPECIAL PLANNING AREA

The following special manatee protection recommendations were developed for Port Canaveral due to its unique features, function, and location. These criteria do not apply to federal facilities located within the Port.

Manatee Protection Criteria:

- The Port shall develop a wharf repair and replacement schedule within six months of the FWC approval of the Brevard County MPP. All docks or bulkheads that are utilized by vessels 100 feet in length or larger and do not presently have three foot fenders under maximum operational compression should have highest priority.
- All existing bulkheads that dock vessels 100 feet in length or more shall have a minimum of three foot standoffs under maximum operational compression. Future cargo and cruise terminal berths that are constructed of bulkhead walls shall provide a minimum of four foot standoff under maximum operational compression. For open pile structures that provide sufficient escape room for manatees, three foot standoff shall be provided between the hull of the vessel and the nearest pile face.
- Due to the unique structural design of the bulkhead wall at the Marginal Wharf which prevents the retrofitting of fenders providing a minimum of three foot standoff under

maximum operational compression, the three foot fendering requirement does not apply to the existing pier design. Until the redesign of this pier is complete (circa 2015) manatee safety and awareness and line handler training courses shall be emphasized and conducted yearly for users of this pier. The redesign of this pier shall include fenders providing three foot standoff under maximum operational compression.

- Fender mounting elevation shall not be restricted. However, when technically feasible, the Port shall make efforts to minimize the amount of fender area placed below mean high water.
- The Canaveral Port Authority shall be responsible for the maintenance of the fenders. Fenders shall be inspected at least every two years and repairs shall be performed as necessary.
- Fenders on bulkhead wall structures shall be positioned so that the clear space between the fenders does not exceed 50 feet. Fender spacing on open pile structure or isolated breasting dolphins shall not be restricted.
- The Canaveral Port Authority shall request and encourage tenants to use fenders providing three foot standoff under maximum operational compression between all vessels when moored at a bulkhead, between two rafted vessels, or between a fueling vessel and a receiving vessel.
- New stormwater outfalls shall be designed and placed to minimize adverse impact to manatees. Existing stormwater outfalls shall be grated to prevent manatees from entering.
- Existing manatee protection efforts shall be maintained:
 - a) Continue development of the MPP.
 - b) Continue Lock Operator manatee education and awareness.
 - c) Continue Port Authority manatee education and awareness program for Port users including development of educational brochures.
 - d) Continue installation of fenders, as described herein.
 - e) Implement yearly awareness training for line handlers.
- Consistent with permit requirements, manatee observers shall be posted during dredging, the movement of construction related work boats, or any other water based construction activity.
- Propeller guards are not required by the Canaveral Port Authority for commercial or recreational vessels. The FWC shall work with private industry to address this issue.

N. EDUCATION INITIATIVE

EXISTING EDUCATIONAL PROGRAMS

An inventory of existing manatee-related educational programs or materials is listed in the Inventory and Analysis section (See page 141).

RECOMMENDED EDUCATIONAL PROGRAMS

1. Establishment of a Brevard County Manatee Education Committee and Volunteer Program

Description: In addition to the other current programs with regard to manatee awareness and education, Brevard County will establish a Brevard County Manatee Education Committee and a Manatee Volunteer Program. The Brevard County Manatee Education Committee would consist of one volunteer appointee from each County Commissioner's district. The Volunteer Program should be patterned after the Volusia County Volunteer Program. In addition, Brevard County will request that FWC and other appropriate State agencies provide funding to create and maintain a full-time Brevard County staff education coordinator. The Brevard County Manatee Education Committee shall work in conjunction with this coordinator. If funds cannot be provided, the County requests the State to provide a staff person to work in Brevard County to assist with MPP implementation. They shall be responsible for implementing the MPP Education Initiative, seeking and applying for grant funds for Initiative items recruiting and coordinating the volunteers, and developing and implementing ideas for volunteer projects. Volunteers would be required to attend training classes for the projects, as appropriate. Volunteers could assist with programs including but not limited to:

- A Manatee Awareness Speakers Bureau (MASB). MASB members will make presentations, answer questions, and disseminate information about manatees at schools, clubs, organizations, festivals, libraries, and meetings that request a speaker. Bureau volunteers would be required to attend a training program.
- An Information Resource Team. This team would visit boat ramps and marinas to insure the informational signs are present, and disseminate and restock other educational materials.
- Marine Debris Clean-Up Programs. This program should be coordinated with Keep Brevard Beautiful and Center for Marine Conservation shoreline clean-ups. Additionally, this program could be linked with fishing tournaments as an ancillary competition in which the boat that brings in the most marine debris wins a prize.
- Habitat Protection and Restoration Projects. Manatee Project Volunteers could coordinate and conduct shoreline revegetation and exotic plant removal projects like the "Pepper Busters" program.

Target Audience: All Brevard County residents and visitors.

Potential Funding Sources: A potential partnership matching fund program is presently being evaluated to fund this position. Potential participants for the cash match to support the position include FWC, USFWS, and the Florida Sea Grant Assistance Program.

2. *Distribution of Manatee Information and Maps with Boat Registrations*

- A) **Description:** Manatee education brochures shall be developed and distributed to all registered boaters with their boating registration. Information addressed in the brochures will include at minimum: manatee protection boat speed zone maps (waterproof), descriptions of slow and idle speed, how to identify a manatee in the water, how to reduce the likelihood of having a collision with a manatee, how to minimize the impacts of boating on the IRL (water quality, seagrass, marine debris, and manatees), how to operate in areas that contain seagrass, and what to do if you hit a manatee or see a manatee that is dead, injured, orphaned, or being harassed.

Target Audience: Boat owners and operators (including personal watercraft).

Potential Funding Sources: Advisory Council on Environmental Education (ACEE), FIND, IRLNEP, Save the Manatee® Club (SMC), and other private foundations.

- B) **Description:** A manatee shaped key chain float should be developed for inclusion with every boat registration. Printed on the floats will be the 1-888-404-FWCC phone number, VHF Channel 16, and who to contact if a manatee is observed that is dead, injured, orphaned, or being harassed.

Target Audience: Boat operators (including personal watercraft).

Potential Funding Sources Available: SMC, ACEE, FIND, NEP, Citizens for Florida Waterways, cellular phone companies, and FWC Bureau of Protected Species Management (BPSM).

- C) **Description:** Manatee informational stickers or plastic coated cards shall be developed for placement on all rental vessels. In addition, a Manatee and Habitat Briefing Checklist shall be developed and should be signed by the rental operator and the renter of the vessel prior to leaving the dock. These stickers could be modeled after Citrus County which has developed a program where all rental boats are equipped with resource information stickers.

Target Audience: Boat and personal watercraft rental businesses.

Potential Funding Sources Available: SMC, ACEE, FIND, NEP, FWC BPSM, FWC Office of Waterway Management, Tourism Development Council (TDC), and other private foundations.

3. *Distribution of Manatee Educational Brochures to Residents*

Description: A variety of manatee education brochures shall be developed and distributed to residents in coordination with existing IRL protection brochures. Information to be addressed in the brochures will include at minimum: general manatee information, habitat protection, marine debris entanglement and ingestion (including crab traps and monofilament line), pesticide and herbicide application issues and guidelines, manatee interaction guidelines, and what to do if a manatee is observed that is dead, injured, orphaned, or being harassed. There are several existing brochures already developed that

address some of the habitat protection issues for the IRL. Where possible, existing brochures should be used.

Target Audience: All Brevard County residents. The Education Coordinator will develop specific brochure packages for specific target audiences.

Potential Funding Sources Available: SMC, ACEE, FIND, NEP, FWC BPSM, FWC Office of Waterway Management, TDC, and other private foundations.

4. Development of a Manatee Education Segment for Boating Safety Courses

Description: A manatee/habitat education segment shall be developed and can be included in the U.S. Coast Guard Auxiliary and U.S. Power Squadron's safe boating courses. The content of the segment should include: how to identify manatees in the water, where manatees are most likely to be present, the location of manatee protection boat speed zones, the location of important manatee habitat areas, how to minimize the impacts of boating on the IRL (water quality, seagrass, marine debris, and manatees), how to operate in areas that contain seagrass, how to minimize the likelihood of having a collision with a manatee, and what to do if you hit a manatee or see a manatee that is dead, injured, orphaned, or being harassed.

The presentation format of the information for these courses should be a slide show or video accompanied by a teacher's guide. The informational brochures and maps described in Item 1 above should be distributed to the course participants. A Brevard County manatee educational video has been developed and is available for distribution. In addition to the video, a slide presentation with a script should be developed.

Target Audience: Boat owners and operators (including personal watercraft) and boating regulation violators.

Potential Funding Source: SMC, FWC, or Brevard County (staff time).

5. Development of a Public Service Announcement Series

Description: A series of Public Service Announcements (PSAs) will be developed, each focusing on a different aspect of manatee protection and boating safety and shall be presented to the Brevard County Manatee Education Committee for approval. The PSA series should include at a minimum: Manatee Education (5-7), Resource Friendly Boating (2), Boating Safety, and Safe Personal Watercraft Operation.

- a) *Manatee Minutes PSA Series (5-7 PSAs)* - Production complete.
- b) *Resource Friendly Boating (2 PSAs)* - Ways boaters can minimize the adverse impacts of boating on the county's waterways.
- c) *Boating Safety (2 PSA's)* - Basic Rules of the Boat Operation and Boating Safety, and how to contact the U.S. Coast Guard Auxiliary, U.S. Power Squadrons, or Red Cross (Boating Safety) for more information on boating safety.

- d) *Safe Personal Watercraft Operation* - Basic guidelines for safe and responsible personal watercraft operation including but not limited to: operation around other watercraft, operation near shore, operation in areas containing seagrass, and operation around important habitat areas (areas of high manatee use, bird rookeries, etc.).
- e) *Manatee and Boating Safety Slides* - A slide or series of slides to be shown at local theaters during movie previews. The slide should illustrate key information on manatee protection and boating safety. Cobb and Roxi Theaters have provided this service free of charge for other public education projects.
- f) Two ten minute environmental education videos were recently produced by Diane Wilkins Productions, Inc., with assistance from FWC BPSM, SMC, and ACEE. The videos are entitled “The State of Manatees” and “A Closer Look at Manatees. “The State of Manatees” is a boater awareness video that discusses tips for safe boating (i.e., how to read signs, how to spot manatees, how to avoid causing injury to manatees and their habitat, etc.), while “A Closer Look at Manatees” focuses on manatee biology basics. Copies of both videos are available by contacting: Bonnie Abellera, Education Coordinator, Florida Fish and Wildlife Conservation Commission, 620 South Meridian St. OES-BPS, Tallahassee, FL. 32399-1600 or call (850) 922-4330.

Target Audience: All Brevard County residents and visitors, and boat owners and operators (including personal watercraft).

Potential Funding Sources: The “Manatee Minutes” PSA’s have been developed and may be available for distribution after review of the Brevard County Manatee Education Committee. Other potential funding sources include: FIND, NEP, ACEE, SMC, FWC, FWC Office of Waterway Management, and other private sponsors (Marine Industry sponsors etc.).

6. Development of Manatee Information Kiosk Displays at High Use Boat Ramps

Description: At high use boat ramps and/or key manatee areas visited by the public (areas with good seagrass coverage, high manatee presence) Brevard County has developed and constructed covered kiosks with graphic illustrations of manatee awareness information (habitat, behavior, interaction regulations, location of speed zones, what to do if you observe a manatee that is dead, injured, orphaned, or being harassed). These kiosks could also provide slots for brochures and other informational materials. The kiosk displays were designed with input from Brevard County, Miami-Dade County, and Pinellas County.

The assistance of service groups such as the Boy Scouts may also be investigated for future kiosk construction and maintenance. An “Adopt-a-Kiosk” or “Adopt-a-Ramp” program is proposed to involve private groups and corporations. Sponsorship would

include funding the cost of a kiosk, and regular visits to make sure brochures are available and the kiosk is in good condition. Less frequently used boat ramps will be addressed with informational signs (see Item 7 below).

Target Audience: Boat operators (including personal watercraft) using Brevard County boat ramps, and residents and visitors who use boat ramps for accessory uses (picnicking, bird watching, etc.).

Potential Funding Sources: FWC, FIND, ACEE, SMC, NEP, corporate and private sponsors.

7. Improvement of Manatee Zone Signs at Boat Ramps

Description: The existing “Attention Boaters” signs located at boat ramps will be replaced with a sign that contains a map illustrating the location of manatee protection boat speed zones with the ramp’s location and other manatee information as soon as the new speed zones are finalized. The signs will be placed so that they are visible from the boat ramp lanes. The boat ramp and other State authorized manatee signs are the responsibility of FIND. FIND and FWC plan to improve the information signs placed at boat ramps. There are several small, less frequently used boat ramps throughout the County that are often associated with a residential subdivision or condominium. These sites will be addressed with smaller informational signs to be posted at the ramp and by the yearly distribution manatee informational brochures and maps to homeowner associations. Brevard County Comprehensive Plan, Conservation Element, Policy 9.9, Criteria C states that Brevard County shall maintain well marked speed limit signs at all public boat launch facilities.

Target Audience: All boat operators (including personal watercraft) using Brevard County boat ramps.

Potential Funding Sources: FIND and FWC will fund the improvement of signs at the frequently used boat ramps. Informational signs for less frequently used boat ramps would require additional funding. Additionally, staff time would be required to coordinate distribution of informational materials to homeowner associations.

8. Development of an Incentive Program to increase Manatee Information Displays at Marinas

Description: Presently, the Brevard County Comprehensive Plan, Conservation Element, Policy 9.9, Criteria A requires all marina operators to display manatee educational information. However, the marina survey conducted in 1993 found just 17% of the documented marinas in the County display manatee signs or information. The majority of these locations have signs posted to meet the requirements of a FDEP permit, not the County policy. An incentive program should be established to increase compliance of the Comprehensive Plan policy.

A standard manatee information display will be developed to insure that consistent and comprehensive manatee information is available throughout the county. In addition,

marinas with fueling stations should place manatee zone and information signs with maps at their fueling docks.

Target Audience: All marina patrons.

Potential Funding Sources: ACEE, FIND, Brevard Marine Association, SMC, and other private educational grants.

9. *Inclusion of a Manatee Awareness Alert on National Oceanic and Atmospheric Administration (NOAA) Weather Radio broadcasts*

Description: A Traveler's Information Manatee Alert (30 second broadcast) will be developed and included in FM radio weather advisories for boaters. This should provide basic information for non-resident boaters to make them aware that manatees are in the area, to watch for marked manatee protection boat speed zones, where additional information on manatees and manatee protection zones is available, and what to do if a manatee is observed that is dead, injured, orphaned, or being harassed. This would provide an opportunity to educate the large transient boating population that travels through Brevard in late fall and early spring. The development of a broadcast should be coordinated and requested jointly with the other counties along Florida's East Coast.

Target Audience: All boat operators in Brevard County waters.

Potential Funding Sources: No additional funding needed.

10. *Distribution of Manatee Information at State Line Welcome Stations, Interstate Toll Booths, and Marinas*

Description: Manatee educational brochures shall be distributed to the Welcome Stations, Interstate toll booths, and marinas along the state line as an educational opportunity for seasonal residents and tourists. In the recent past, a welcome station for boaters was located at the City Marina at Fernandina Beach which distributed a variety of information. Two marinas located along the Florida/Georgia border have been contacted by FWC and are willing to display FWC produced manatee information brochures for their patrons. The FDOT should be contacted to see if it would be possible to distribute brochures at Florida Turnpike toll booths.

Target Audience: Tourists and transient boat operators (including personal watercraft).

Potential Funding Sources: There is no additional funding needed.

11. Initiation of On-water Resource Law Enforcement Reports for the Newspaper

Description: A regular column in the newspaper should be developed that would announce areas to be targeted by FWC for education and enforcement. Also a reporting of on-water violations cited by law enforcement officers should be included under the “Crime Line” section of the newspaper.

Target Audience: All residents of Brevard County and visitors; especially manatee zone violators.

Potential Funding Source: No funding source required.

12. Development of Coloring Books/Placemats with manatee information for Restaurants

Description: Placemats or tray liners with activities and manatee information shall be developed and distributed to restaurants. These placemats could be two sided with one side having general information for adults and the other side having manatee related activities and puzzles for children.

Target Audience: All Brevard County residents and visitors.

Potential Funding Sources: SMC and other private sponsors.

13. Development of a regular Manatee Awareness Workshop

Description: A Manatee Awareness Workshop should be developed and offered annually for local law enforcement personnel, judges, local officials, and resource management personnel. Topics for the workshop should include but are not limited to: manatee abundance, distribution and mortality in Brevard County, habitat protection needs, enforcement of manatee protection regulations, dispelling common manatee “myths”, and a resource list for obtaining manatee data and information.

The workshop’s format could include morning presentations and afternoon field experiences through a cooperative effort with the USFWS and the NBS at the Manatee Rehabilitation Project (during summer months) in the north Banana River.

Also, the expanded use of the FWC Coast Watch Workshops and SMC In-Service Workshop and Manatee Messages should be pursued. The FWC offers a Coast Watch Program in which citizen volunteers are trained in how to document and report resource violations.

The SMC offers a free In-Service Workshop for teachers on manatee educational information. SMC has also produced a video series called Manatee Messages. These videos are available free of charge through a loan program from SMC, or may be purchased for \$9.00. At a minimum, bi-annual notification of the workshops and the Manatee Messages video should be mailed to both public and private schools in Brevard County.

Target Audience: Law enforcement personnel, judges, local officials, resource management personnel, teachers, and the general public.

Potential Funding Sources: SMC will donate 10 videos to be kept by the Brevard County School Board and loaned upon request. Funding for the workshops could be shared between SMC, NEP, FWC, Brevard County, and others.

14. Development of an Interactive Manatee Education Computer Program

Description: Adopt/assist with the development of an interactive manatee educational computer program to be used in the schools at varying grade levels. This program should include key information on habitat, behavior, biology, the effects of warm water discharges, human-manatee conflicts, rules for interaction with manatees, and avenues for getting involved with existing manatee clubs and programs. This could be linked as a segment of FWC “Ecoventures” or other interactive computer programs on estuaries and Florida’s environment. Manatee educational information to be included in the interactive computer program will be reviewed by the Brevard County Manatee Education Committee.

Target Audience: Students at varying grade levels.

Potential Funding Sources: NEP, FWC, SMC, SJRWMD, and other private or corporate sponsors.

15. Development of a Manatee Education and Information Segment on Computer Bulletin Board/Internet

Description: A manatee education and information section should be developed for posting on Computer Bulletin Boards (Volusia County and Brevard Community College (BCC) both have a free service). Information should include basic manatee information, status of manatee protection efforts, upcoming events, a speakers listing, and where to get additional manatee information. All manatee education segments created by staff or Brevard County government committees for the Internet or bulletin boards shall require approval of the Brevard County Manatee Education Committee.

Target Audience: All residents in the local area with access to the BCC and Volusia County Bulletin Board Systems.

Potential Funding Sources: Volusia County and BCC both provide bulletin board services free of charge. The only cost would be Brevard County staff time required to develop the information to be posted and update the posting monthly. No outside funding is required.

16. Addition of Manatee Information Sources to NEP’s Environmental Education Resource Directory

Description: Manatee educational resources should be incorporated into the NEP’s Environmental Education Resource Directory Catalog. The Directory should be made available to the Brevard County School Board and local libraries so that they are easily accessible to teachers.

Target Audience: All residents and educators.

Potential Funding Sources: No outside funding is required. The only cost would be Brevard County staff time required to develop a list of manatee educational resources.

17. Establishment of a Monofilament Line Recycling Program (MRRP)

Description: The Monofilament Line Law states that it is illegal for any person to dispose of monofilament line in any waterbody. Brevard County is currently recycling monofilament line through the placement of monofilament line collection receptacles paired with educational information at high use boat ramps and marinas. By having a convenient location to dispose of monofilament line and possibly other marine debris, the likelihood of collection and proper disposal of marine debris is increased. Partnership with private non-profit organizations such as “Keep Brevard Beautiful” should be pursued for maintenance of the receptacle, collection of the monofilament line, and delivery of the line to an existing monofilament line recycling location.

Target Audience: All commercial and recreational fishermen (both on-water and shoreline), boat operators (including personal watercraft), residents, and visitors.

Potential Funding Sources: Monofilament line companies presently involved with recycling, fishing gear manufactures, FIND, waste disposal companies such as Waste Management and private or corporate sponsors. In fiscal year 1999/2000, Brevard County received grant funding from ACEE for this program. This program was so successful that Brevard County received additional grant funds in fiscal year 2001-2002 to disseminate the program statewide via development of a “How to start your own MRRP” web site and through workshops offered to interested groups around the state.

18. Posting of No Feeding/Watering Signs at Boat Ramps, Marinas, and Problem Human Interaction Areas

Description: An education sign has been developed and can be posted at problem human interaction areas and at high use marinas and boat ramps. The sign explains why feeding and watering manatees is detrimental to them, that it is against the law, and what to do if a dead, sick, injured, or orphaned manatee, or a manatee being harassed is observed.

Target Audience: All Brevard County residents and visitors.

Potential Funding Sources: Funding already dedicated by SMC and the Florida Audubon Society for approximately 100 signs to be placed statewide. If signs are requested for **all** marinas and boat ramps an additional funding source would be required.

19. Development of Manatee Educational Curriculum

Description: Adopt/assist with development of manatee education curriculum for all grades at compulsory schools (K-12) and adult education programs offered through BCC. This curriculum should include key information on habitat, behavior, biology, need for safe warm water refuges, human-manatee conflicts, rules for interaction with manatees, and

avenues for getting involved with existing manatee clubs and programs. A partnership with BCC will be sought through the development of the curriculum for adult education classes and the possible inclusion of the curriculum on BCC's tele-course program. Private schools will also be notified of the curriculum packages which could be provided them at material cost. Currently, some curriculum guides are available from Endangered Species Publications, P.O. Box 441684, Aurora, CO. 80044-1684. In addition, coloring books and workbooks (middle and high school) are currently available from FWC BPSM.

Target Audience: Adults and Kindergarten through 12th grade school age children.

Potential Funding Sources: ACEE, FWC, SJRWMD, NEP, SMC, other private or corporate sponsors.

20. Require Mandatory Education for Boat Operators

Description: Due to the increasing number of boating accidents and fatalities and the increasing number of boat operators registered in both Brevard County and state wide, it is recommended that the State of Florida develop a mandatory education program for boat operators including manatee and habitat information. Many boating accidents are attributed to the inexperience of the boat operator. These education programs could be provided through existing U.S. Coast Guard Auxiliary and U.S. Power Squadrons boating safety courses.

Target Audience: All boat operators (including personal watercraft).

Potential Funding Sources: Boat registration fees, FWC, other private or corporate sponsors.

EDUCATION INITIATIVE IMPLEMENTATION RECOMMENDATIONS

Implementation Schedule:

The majority of the proposed MPP Education Initiative items will be under way within one year.

O. WATERSPORTS AREAS

Available and potential watersports locations at alternative inland sites have been identified. A concerted effort should be made to locate existing sites that meet watersports needs and are in areas that will have the least impact on manatees and their habitat. The following borrow lakes have been identified as potential inland watersports sites:

- west of Fay Boulevard near U.S. 1 in Port St. John
- north of Rinker's canal on north Merritt Island
- two disconnected borrow lakes at the County-owned King's Park on north Merritt Island
- northwest side of the intersection of I-95 and Eau Gallie Boulevard

- west of Valkaria Airport (County-owned)

P. RESEARCH

POWER PLANTS:

- It is recommended that the FWC conduct a study to determine the overall benefit or detriment of the warm water discharges on manatees.
- If the power plants are found to be an overall detriment to the manatee, it is recommended that the FWC develop a methodology for returning manatees to their pre-power plant migratory patterns.
- The Warm Water Task force has been formed to deal with tasks associated with the network of warm water refuges. The FWC has representatives on both the Warm Water Task force and the Springs Task force. The Warm Water Task force includes representatives from various governmental agencies, the power industry, and non-government organizations. The Springs Task force includes representatives from governmental agencies, private water bottlers, agricultural interests, and a citizens advisory group.

MANATEE MORTALITY:

- It is highly recommended that the USFWS, the FWC and other appropriate agencies participate in and fully fund research to develop programs to eliminate or substantially reduce manatee mortality due to perinatal death, disease, bacterial infection, and cold stress. Research funding should be substantially increased for the development of hybrid, fast growing grasses the manatee ingest.

Q. CANAL WATER QUALITY

Because dead-end canals are frequently used by manatees for calving and resting, it is recommended that FWC and Brevard County work together to improve the water quality of our canals where manatees frequent.

R. LIVEBOARDS

It is recommended that Brevard County investigate the feasibility, advisability, and cost/benefit analysis of requiring pumpout stations in marinas.

S. MPP RE-EVALUATION POLICY

This plan shall be re-evaluated by the Brevard County Board of County Commissioners and FWC two years from the date of final adoption.

T. IMPLEMENTATION SCHEDULE FOR MPP

1. Habitat Protection:

Brevard County has accepted the goals and objectives of the Indian River Lagoon Conservation and Management Plan Habitat Protection Recommendations. Brevard County is already working on many of these action items (see pages 15-19 of the Brevard County MPP).

2. Education Initiatives:

Twenty education initiatives were recommended in the MPP (pages 35-44 in Brevard County MPP). Numbers 6 (Development of Manatee Information Kiosk at High Use Boat Ramps) and 17 (Establishment of a Monofilament Line Recycling Program or MRRP) were implemented in 2000 and 2001. The remaining educational initiatives outlined in the MPP will be completed as funding becomes available.

3. Law Enforcement:

New State and Federal speed zones were adopted in Brevard County in 2002 and Florida Inland Navigation District was subsequently directed to post signs that will mark these new zones. With the updates to the MPP new watercraft-related mortality data is available from 1974-2001. As new watercraft-related mortality data is received a copy will be provided to the Sheriff's office to help identify problem areas within the County. Periodic follow-ups (every 6 months) will then be made with the law enforcement agencies to track the number of citations issued in these areas in an effort to further reduce mortality.

4. Boat Facility Siting:

Marina and boat ramp information in the MPP were last updated in 1994. In 2003, Brevard County NRMO staff, with the assistance of FWC, will update Brevard County's marina and boat ramp databases by conducting on-site surveys.

5. Boating Safety:

Boating Safety is addressed in the twenty education initiatives outlined in the MPP (pages 35-44).

6. *Speed Zones*

The FWC adopted new manatee protection speed zones in Brevard County in 2002. Brevard County will fully participate in the State's process (conducting public workshops, gathering additional scientific data and other information, etc.) regarding any future rule changes.

7. *Adoption of MPP into Comprehensive Plan*

The enactment of House Bill 1243 makes the completion of MPP a statute requirement, which must be incorporated in part (Boat Facility Siting) into the County's Comprehensive Plan. Because of this new statutory requirement, staff proposes to add the MPP to the next available amendment cycle.

III. INVENTORY AND ANALYSIS

A. *THE FLORIDA MANATEE*

This plan was developed through an extensive review of available information on the Florida manatee's natural history, habitat needs, distribution, mortality trends, and population status. Additionally, the plan considers other aspects important to manatee protection, such as boat facility expansion criteria, location of high boating traffic areas, economic requirements of plan implementation, enhanced public education, and alternative protection strategies. Brevard County Natural Resources Management Division (formerly ONRM, currently, and hereafter referred to as NRMO) staff collected and reviewed information from FWC, FDEP, USFWS, the NBS, the Bionetics Corporation, SMC, and other counties actively developing their respective Plans.

This section incorporates information within the following general categories:

- Natural History
- Physical Characteristics
- Diet
- Social Behavior
- Reproduction
- Longevity
- Habitat Requirements

The development of a meaningful plan to protect manatees requires a practical knowledge and understanding of their life history and behavior. The following sections explain elements of the natural history of the manatee.

1. NATURAL HISTORY

The West Indian Manatee (*Trichechus manatus*) falls within the order of marine mammals called Sirenia, and the genus *Trichechus*. Approximately 60 million years ago, Sirenians evolved from four legged land mammals (Hoenstine 1980). Sirenian fossils, found in Florida, date back forty-five million years (Domning 1982). The fossil record indicates that both manatees and dugongs were once present in the new world. Dugong ribs have been documented in marine and estuarine sediment deposits around the state, and manatee bones have been found in pre-Columbian Indian middens in southeast Florida (Hoenstine 1980, Larson 1969). The genus *Trichechus* has been recorded in North America since the Pliocene, some five million years ago (Domning 1982, Reynolds and Odell 1991).

West Indian manatees are one of four living species of Sirenia (Figure 2). There are two subspecies of the West Indian manatee: the Florida manatee (*Trichechus manatus latirostris*), which is the subject of this plan, and the Antillean manatee (*Trichechus manatus manatus*). The Florida and Antillean manatees are nearly identical in exterior physical appearance, but differ by certain cranial features and most notably by the geographic distribution. Florida and Antillean manatees remain genetically isolated due to deep water and strong currents in the Florida Straits, and winter temperatures in the northern Gulf coast (Domning and Hayek 1986).

West Indian manatees are also closely related to the West African manatee (*Trichechus senegalensis*), and the Amazonian manatee (*Trichechus inunguis*). Other Sirenians include the dugong (*Dugong dugon*) of the Indo-Pacific basin, and the now extinct Steller's sea cow (*Hydrodamalis gigas*) of the Bering Sea (Figure 2). The Steller's sea cow was a large Sirenian that weighed up to five tons, reached lengths of 25 feet, and was hunted to extinction within 27 years of its discovery.

2. PHYSICAL CHARACTERISTICS

a. Size

Adult West Indian manatees typically reach a length of 10 feet and weigh from 800 to 1,200 pounds. Large individuals may reach lengths of 13 feet and weight up to 3,500 pounds. Calves are born generally weighing between 60 and 70 pounds and are approximately 4 to 4.5 feet long.

b. Body Shape and Coloration

Florida manatees are gray to grayish-brown in color, have sparse hairs scattered over their torso, and often have attached organisms such as algae or barnacles growing on their skin. Manatees have a streamlined shape. Their body is full about the middle and narrows down to a paddle-shaped tail. The two small pectoral flippers on their upper body are primarily used for steering, movement along the bottom of waterways, bringing food up to their mouths, lifting their bodies to feed on shorelines, and in mating behavior. Florida manatees have three to four small toenails on the ends of their pectoral flippers, similar to their distant relative the elephant. The pectoral flippers are covered with a thick layer of skin, similar to

toothed whales, seals, and sea lions. The manatee's paddle-shaped tail is its primary means of propulsion (Figure 3).

The manatee lacks any discernible neck or ear flaps. Its nostrils are located on the top end of the snout. The bristled upper lip is large and flexible, and has the ability to guide vegetation into its mouth. Manatee eyes are small, approximately 1 inch in diameter, located on the sides of the head. The eyes have a nictitating membrane that helps to protect the eye from injury.

c. Teeth

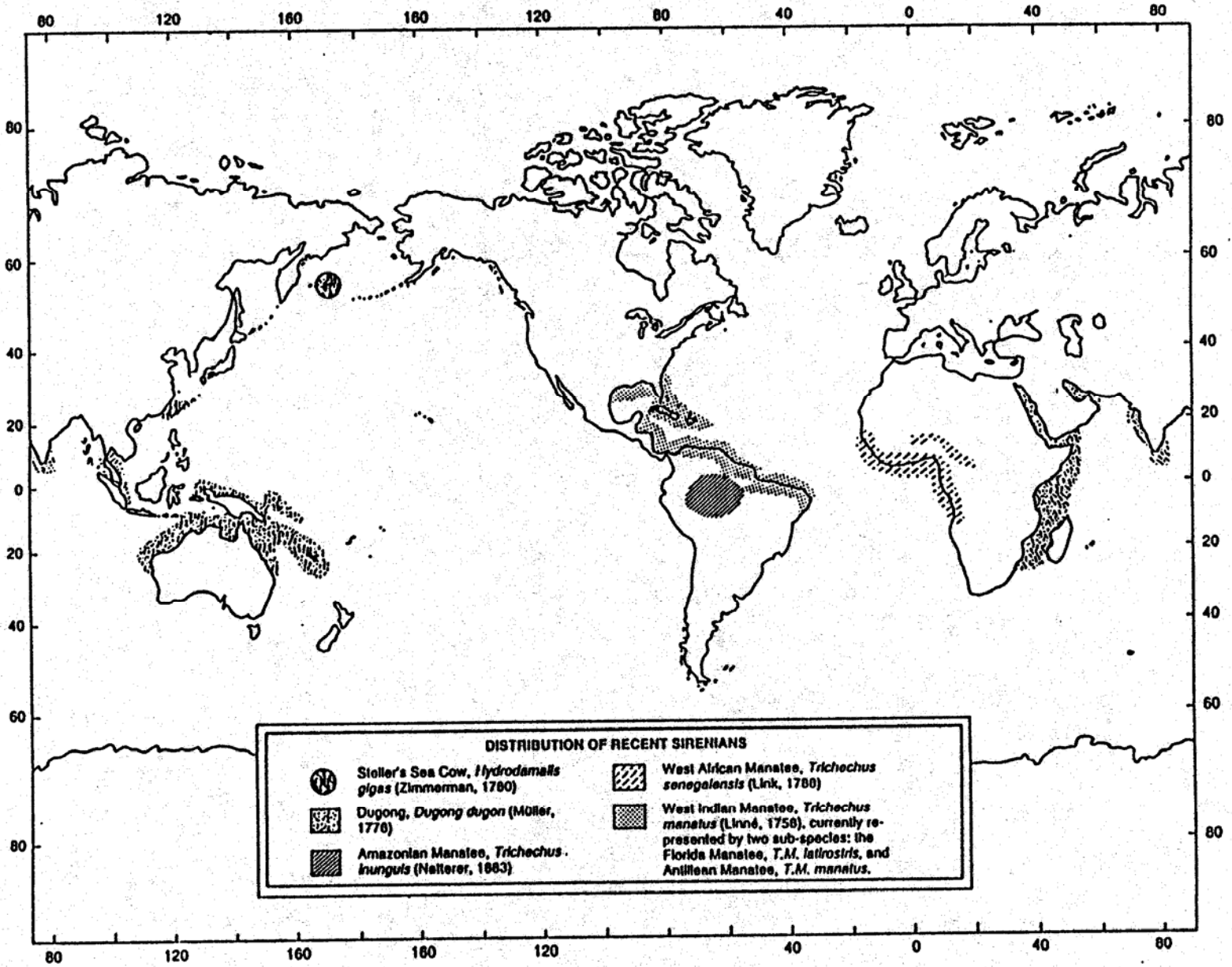
Manatees have a horny ridged pad on the front of the upper and lower jaws. Their only teeth are 24 to 32 molars in the back of the mouth. The abrasive plants and associated sediment the manatee eats wear down the front molars. The worn teeth are continually replaced with new molars that grow in the back of the mouth and move forward. The frequency of replacement depends upon the abrasiveness of the plant matter and the amount of sediment consumed (Domning and Hayek 1984, Domning and Magor 1977).

d. Hearing and Sight

Manatees are well adapted for hearing both high and low frequencies in the range of 0.015 to 46 kilohertz (kHz). They hear with the greatest sensitivity in the 6 to 20 kHz range. Manatees' sensitivity to low frequency sound below 3 kHz is unique among studied audiograms of marine mammals (Gerstein et al. 1994). Their large ear bones are well developed at birth. Hearing is important for calves, as vocalizations between a mother and calf play an important role in keeping them together. It has also been suggested that the main area of sound reception for manatees may be an area near its cheek bone, instead of the small ear opening. The cheek bones are full of oil and are in direct contact with the ear bones (Sea World 1992). The full extent of manatees' hearing capabilities has not been well documented.

Manatee eyes are well developed and are capable of distinguishing objects from over 10 yards away (Sea World 1992). They are believed to be able to see in both bright light and dim light, since their retinas contain both rod and cone cells (Reynolds and Odell 1991). Their ability to distinguish color has not yet been determined. Their eye is equipped with a nictitating membrane, similar to an extra eyelid, that serves to protect the eye from injury.

Figure 2. World-wide Distribution of Modern Sirenia



n from: Introducing the Manatee, by Warren Zelller

Figure 3. Physical Characteristics of Florida Manatees

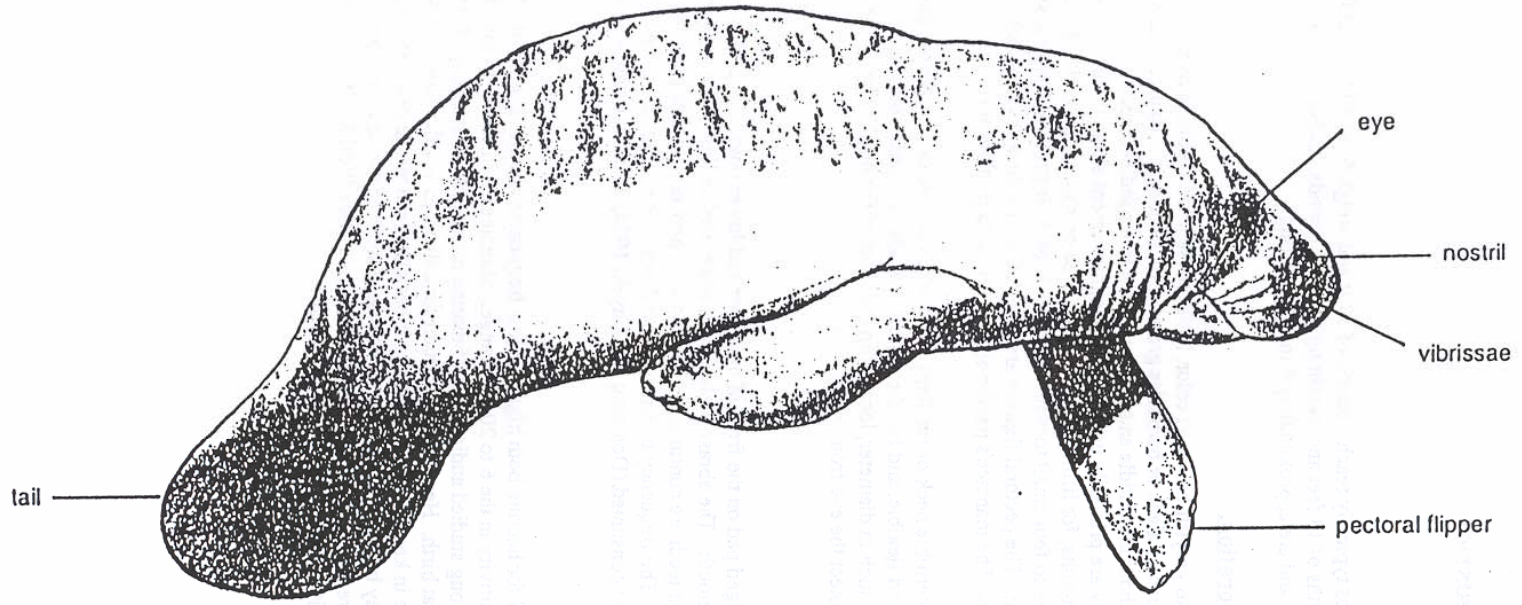


ILLUSTRATION FROM: SEA WORLD OF FLORIDA

3. DIET

Manatees are generalist herbivores, feeding on a wide variety of submerged, floating and emergent plants. Adult manatees feed an annual average of 5.1 hours per day. The amount of time spent foraging was found to increase in late autumn (6.9 hours/day) and decrease in the early spring (3.2 hours/day) (Bengtson 1983). This seasonal fluctuation of foraging times may be in response to the nutritional quality of the vegetation consumed. In the fall seagrasses store the majority of their nutrients in their rhizomes as they prepare to drop their leaf shoots. So manatees feeding on the floating or still attached seagrass shoots would be required to consume a larger volume to extract the same nutritional value. Conversely, in the spring, the vegetation is of a higher quality and the plant growth is at its peak. Bengtson also found that during these daily foraging sessions, manatees could consume 4 to 9% of their total body weight in wet-weight vegetation. However, during prolonged or extreme cold periods in winter, manatees may greatly reduce the amount of vegetation consumed or cease eating completely.

In brackish waters, the preferred forage plants of manatees are several species of seagrass that include: Widgeon grass (*Ruppia maritima*), Manatee grass (*Syringodium filiforme*), Turtle grass (*Thalassia testudinum*), and Shoal grass (*Halodule wrightii*). Manatees also eat green algae (*Acetabularia*, *Ulva*, *Enteromorpha*, *Halimeda*, *Udotea*, *Penicillus*, *Polysiphonia*), brown algae (*Sargassum*), and red algae (*Hypnea*) (Husar 1977, Zoodsma 1991). Algae from boat hulls and dock pilings are occasionally nibbled, as are mangroves (leaves, roots, and seeds), and various upland or wetland-fringing salt marsh and other grasses (Ledder 1986, Hurst and Beck 1988, O'Shea and Kochman 1990, Zoodsma 1991).

Manatees also incidentally eat quantities of insect larvae, amphipods, mollusks, shrimp, and other invertebrates that develop in the seagrass habitat. These small invertebrates are believed to be an important source of protein in the manatee's diet (Hurst and Beck 1988).

Though it has not been scientifically established whether manatees require freshwater, they are rarely sighted in areas with limited accessible freshwater. It has been suggested that manatees may need freshwater to osmoregulate (Moore 1951, Hartman 1974; 1979). Manatees aggregate at freshwater sources and have been observed drinking from sewage outfalls, water hoses, artesian springs, culverts, and other surface water sources (O'Shea and Kochman 1990).

4. SOCIAL BEHAVIOR

As previously stated, manatees spend a majority of their time feeding and resting. They may rest at the surface, on the bottom, or just below the surface, coming up frequently to breathe. While manatees can hold their breath for up to 20 minutes, they normally breath much more frequently. They are loosely social, not territorial and generally aggregate in small groups of individuals. These small aggregations occur at freshwater sources, while feeding and resting. Larger manatee aggregations are typically associated with warm water refuge areas and breeding behavior (Sharon Tyson, personal communication).

Touch seems to be important for manatees; body contact is common between manatees (especially mothers and calves). Mutual contact of individuals consists of mouthing, muzzling, nudging, and embracing. Muzzle to muzzle contact (called "kissing") is usually initiated beneath the surface and continues until both muzzles are above the surface. This is often accompanied by embracing with the flippers and is thought to be a form of mutual identification (Hartman 1979). Manatee physiological research has found that the manatee's brain contains surprisingly large areas for tactile and auditory reception (Johnson et al. 1994).

Vocalizations (chirps, squeals, groans, and screams) are believed to be used for communication with one another. The most common vocalizations occur between a cow and calf. Calves vocalize immediately after birth. Research indicates that vocalization between a cow and calf are an integral part of the bonding process. Cows respond to squeals of their calves from over 200 feet away (Hartman 1979). Vocalizations are also emitted in contexts of fear, aggravation, protest, sexual arousal, and play. Manatees exhibit playing behavior in the form of kissing, mouthing, burping, and chasing. These play behaviors often draw other manatees into the activity.

5. REPRODUCTION

Information relating to manatee behavior and reproduction in the wild is now emerging with telemetry data and other studies. Direct observation is difficult in many areas due to murky conditions of their habitat areas. Reproductive studies on captive manatees also have provided insight into manatee breeding behavior. Manatees do not form permanent mating bonds. Mating occurs during a rather short (1 week to a month) estrus (or ovulation) period of the females (Bengtson 1981). During this period, the females often become the nucleus for an "estrus herd" composed of a single, fleeing female with a group of a dozen or more pursuing males. When receptive, the female will mate with several males. Mating often occurs in shallow waters, making them more vulnerable to boat collisions.

Manatees breed year-round with an apparent spring calving peak. The gestation period is approximately 13 months, (typically 385 to 400 days). Manatees usually bear only one calf; however, twins have been recorded. In a healthy female, births occur in approximately 2-1/2 to 3 year intervals. Female Florida manatees become sexually mature between three to six years of age, and typically do not produce their first calf until age five (Marmontel 1993). Manatees that become pregnant at a young age may be more susceptible to miscarriages that result in stillbirths or abortions (Newson 1966, Sowls 1966, Marmontel 1993). Calves may be born head or tail first. After birth, mothers begin nursing their offspring from the mammary glands located behind the pectoral flippers. The cow assumes total responsibility for care of the calf. Cows may be floating or lying on the bottom when approached by a hungry calf. While cruising, the calf swims alongside the mother behind her flipper, or may ride on her back. The mother's milk is highly nutritious and calves are dependent on it for rapid growth, even though calves may begin feeding on plants a short time after birth (Husar 1977, Marmontel 1993).

Young manatees may wander away for short times to explore or to investigate other manatees, but will typically remain dependent upon the mother for up to two years. During this period, calves learn migratory routes, forage sources, location of warm water refuges, approach-avoidance skills (boats), and other important lessons (O'Shea and Shane 1985).

6. LONGEVITY

Manatees appear to live long lives, probably as long as 50 to 60 years (Marmontel 1993). In captivity, one manatee has survived over 40 years (Van Meter 1989). Because manatees constantly replace their teeth, it is not possible for scientists to use their teeth for accurate age estimation. Recently, research by Marmontel (1993) led to the development of a technique for determining a manatee's age, postmortem, using annual growth-layer groups found inside the earbones. The idea is similar to counting the growth rings to age date trees. This technique was found to be the most accurate for individual manatees between 10 and 15 years of age, with body lengths up to three meters. In older manatees, calcium resorption makes distinguishing growth-layer groups more difficult. However, even with calcium resorption, one manatee in Marmontel's study was found with approximately 59 growth-layer groups (indicating an age of 59 years), which is consistent with previous longevity estimates for Florida manatees and longevity estimates for the dugong (Marsh 1992).

7. HABITAT REQUIREMENTS

Manatees are usually found in shallow, slow-moving rivers, bays, and estuaries. They can live in fresh, brackish, or salt water. Their basic habitat requirements include a steady and easily obtainable food supply (primarily seagrasses), quiet, sheltered areas for resting, breeding and calving, warm water temperatures (20 degrees C or 68 degrees F and above), and possibly fresh drinking water.

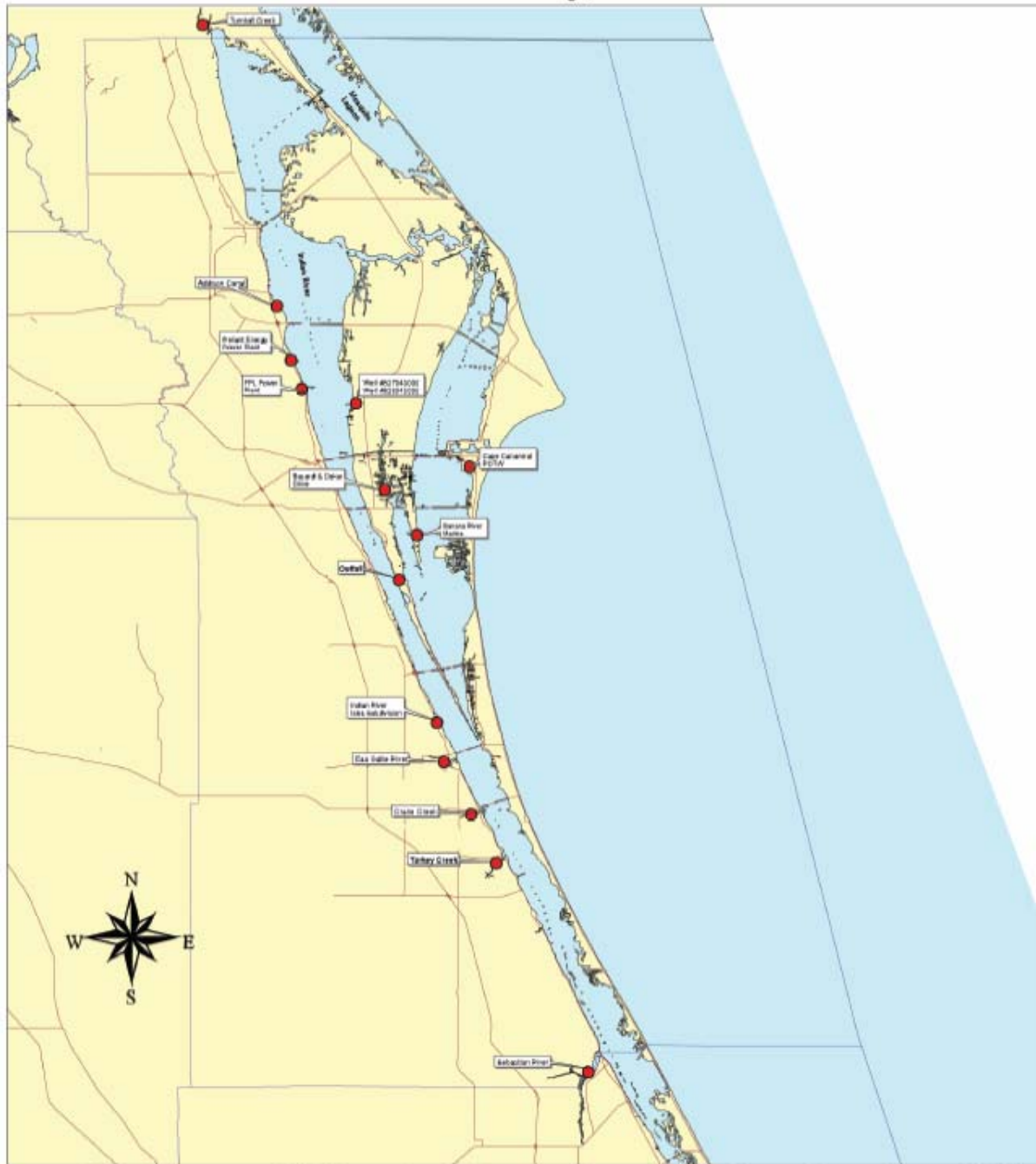
The Marine Mammal Commission (MMC), in 1988, reported that the most important summer manatee habitats on the east coast are the Banana River and Indian River Lagoons. In their analysis, concentrations of manatees were consistently observed at the northernmost end of the Banana River, the City of Cape Canaveral wastewater treatment plant outfall, Bairs Cove off the Haulover Canal, and the basin at the Banana River Marine Service on Merritt Island. Most of the small creeks, and many areas of artificial canals were also considered of particular importance to manatees. These areas serve as havens during inclement weather, as well as areas where freshwater is most likely available for consumption. Figure 4 illustrates significant freshwater sources for manatees in Brevard County. These include the Eau Gallie River and Crane Creek in Melbourne; the Cape Canaveral sewage outfall, Grand Canal, Turkey Creek, the Sebastian River, and Turnbull Creek. Manatees are also seen frequently in channels adjacent to the Mullet Creek Islands.

Brevard County NRMD mapped SAV areas in the county in 1986 and 1989. Studies on seagrass abundance in the IRL system show a 47% decline in seagrass coverage between 1970 and 1992 in the Indian River proper (Thompson 1976; 1978, White 1986, Natural Systems Analysts 1993, Conrad White, NRMO, personal communication). Figures 5a-5c illustrate seagrass coverage throughout Brevard County waters.

B. MANATEE DISTRIBUTION AND ABUNDANCE

Much of the information that follows, which pertains to the distribution of manatees in Brevard County, was compiled from work done by Beeler and O'Shea (1988), the Brevard County Manatee Report (Brevard County ONRM 1987), the Marine Mammal Commission (1988, 1992, 1993), aerial survey data from the FWC, FPL, the Bionetics Corporation, and aerial survey and telemetry data from the NBS, Sirenia Project. Other information was gathered from personal communications with manatee researchers and resource managers around the state.

Figure 4. Significant Freshwater Sources for Manatees in Brevard County, Florida



Data Source: Florida Caribbean Science Center, Biological Resources, U.S. Geological Survey, Sirenia Project Field Researchers
 Data Compiled By: Brevard County NRMO. Brevard County NRMO, in cooperation with other agencies, prepares and uses this information for its own purposes. It may not be suitable for other purposes, and is provided "as is". Documentation can be obtained by contacting Brevard County NRMO at (321) 633-2016.



NOTE: These are some of the major freshwater sources used by manatees. Freshwater sources available to manatees do change.

Figure 5a. 1994 Submerged Aquatic Vegetation (SAV) Coverage for North Brevard County

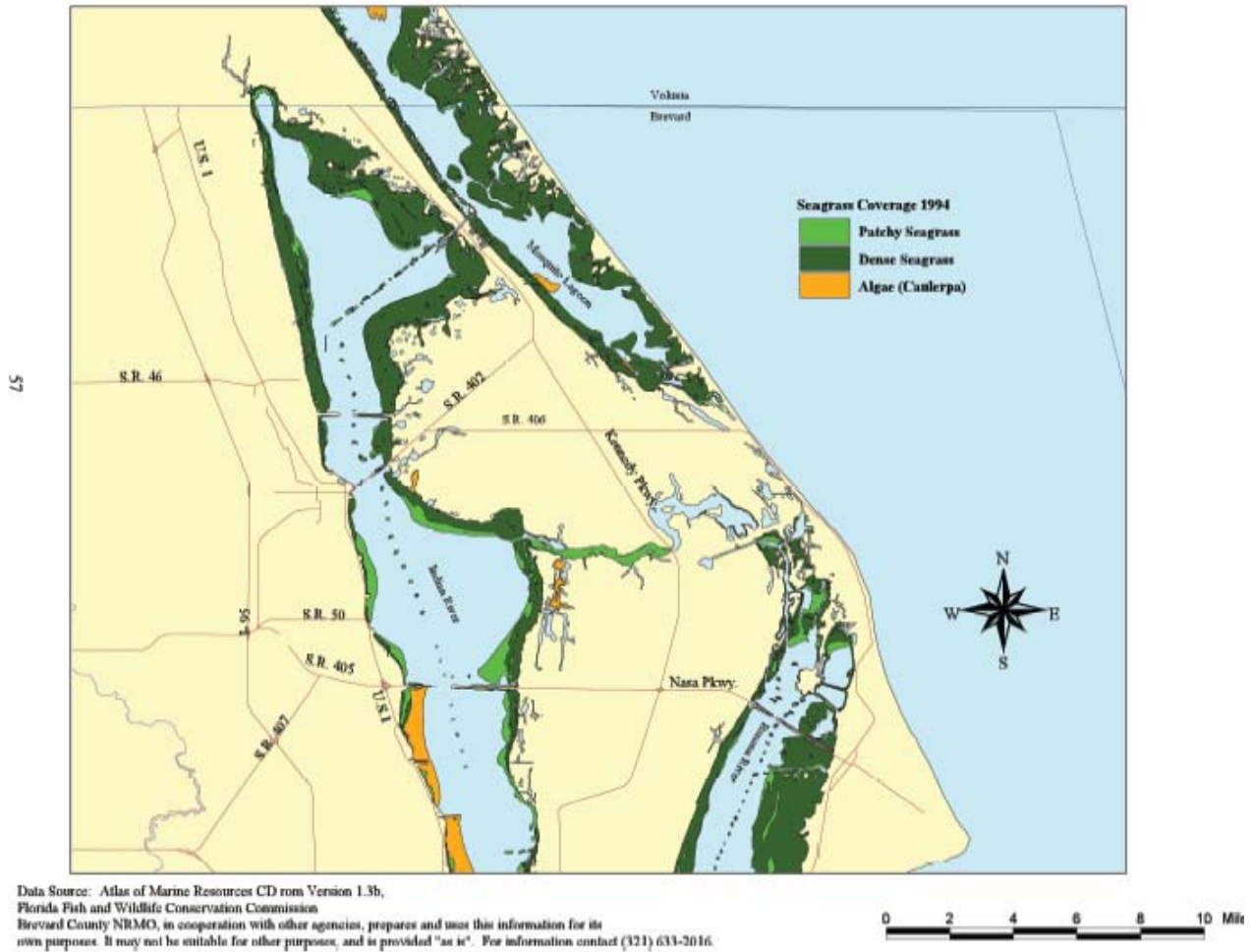
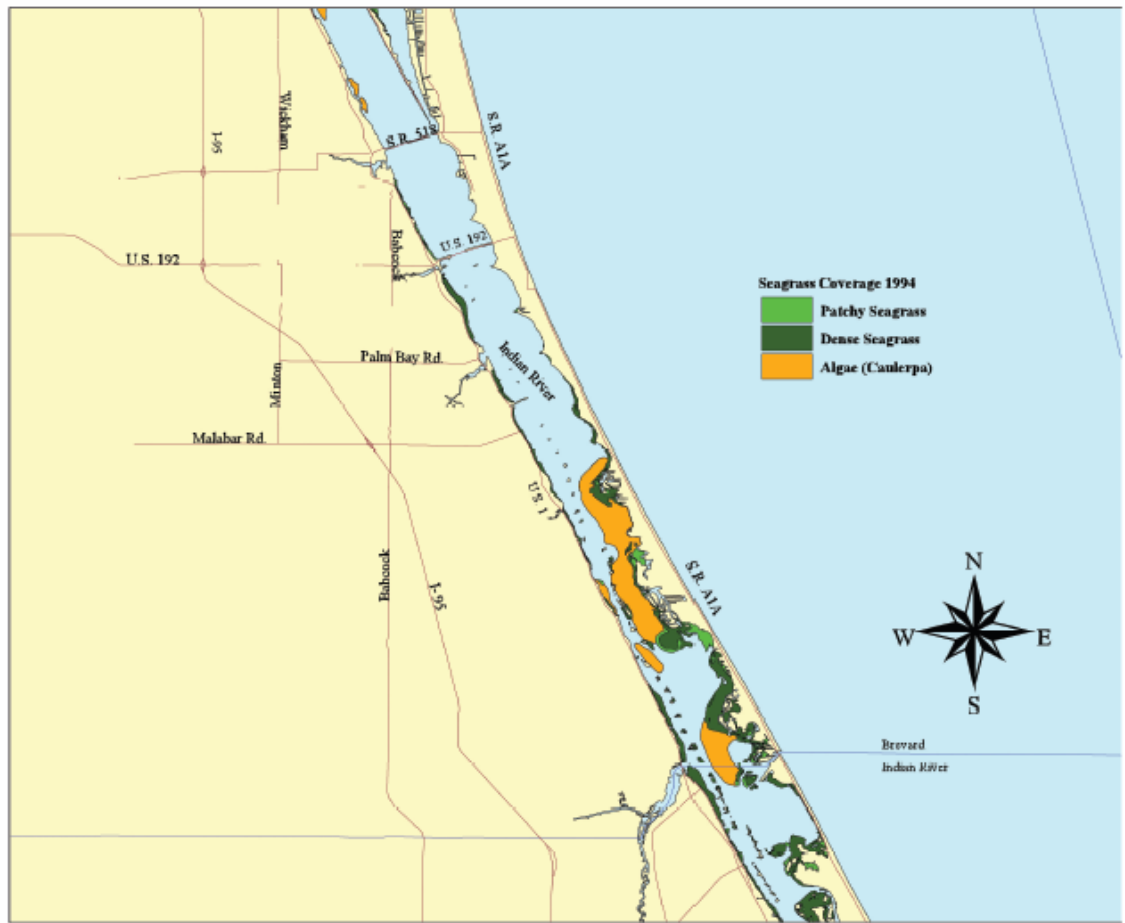


Figure 5c. 1994 Submerged Aquatic Vegetation (SAV) Coverage for South Brevard County



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Data Source: Atlas of Marine Resources CD rom Version 1.3b,
 Florida Fish and Wildlife Conservation Commission
 Brevard County NRMCO, in cooperation with other agencies, prepares and uses this information for its
 own purposes. It may not be suitable for other purposes, and is provided "as is". For information contact (321) 633-2016.



1. U.S. DISTRIBUTION

Florida manatees are found within the tropical and sub-tropical latitudes along the coast of the Atlantic Ocean and its adjacent tributaries. Because of the manatee's low metabolic rate, and limited ability to conserve heat, their year-round range is largely confined to peninsular Florida and the coast of Georgia (Irvine 1983). Small numbers of manatees have been documented, during the winter and spring months of January to May, using warm water outfalls from the Gilman Paper Company on the North River in southeast Georgia and the Container Corporation of America on the Amelia River in northeast Florida (Zoodsma 1991). Infrequent records of stray manatees, during warm seasons, were reported along the Atlantic Coast from as far north as the Carolinas and even Virginia (Rathbun and Bonde 1982). In 1995, a manatee was observed as far north as Rhode Island. Between March and November manatees migrate along both coasts of Florida. Movement between the east and west coasts occurs infrequently with only one documented occurrence. A female manatee equipped with a satellite transmitter traveled from Franklin County (September 1996) through the Everglades to Marathon Key before heading up the east coast to Brevard County (March 1997). Manatees were also reported along the northern Gulf Coast from Pensacola to New Orleans. Sightings in southeastern Texas and the mouth of the Rio Grande River have also been recorded. These sightings, however, are more likely to be Antillean manatees from Mexico (Domning and Hayek 1986).

2. FLORIDA DISTRIBUTION

Florida manatees are found along both coasts of Florida and in associated interior rivers. Some of the first efforts to estimate the manatee population only documented 750 to 850 manatees. Aerial surveys conducted in January/February 1996, however, indicated a minimum population of 2,639 manatees (Bruce Ackerman, FMRI, personal communication), while aerial surveys in January 2001 documented a minimum of 3,276 manatees (Terri Calleson, FWC, personal communication). The increase in the minimum manatee population may be due to more comprehensive surveys, improved survey techniques, particularly favorable weather conditions during the 1992 and 1996 aerial surveys, and possibly an increase in the manatee population in some areas (Ackerman 1992, Bruce Ackerman, FMRI, personal communication).

3. BREVARD COUNTY DISTRIBUTION

Manatee distribution in Brevard County varies depending on the season. Large numbers of manatees occur in the County's waters year-round. The highest abundance occurs during the spring as groups and individuals travel north from south Florida, in response to rising water temperatures. Some manatees remain in Brevard County throughout the summer, while others migrate on as far as northern Florida and southern Georgia. Generally from March to November, manatees may be found dispersed throughout Brevard County and the entire IRL system. During colder months, manatees will either move south out of Brevard County, or aggregate in the warm water refugia created by the County's two power plants -- the Reliant Energy Corporation Plant and the FPL Plant. Depending on the severity and timing of cold fronts, winter manatee aggregations can be larger than the spring aggregations. There is no data documenting regular or frequent use of the St. Johns River in Brevard County. Occasional manatee sightings have been reported as far south as Lake Washington.

a. Factors Affecting Distribution

The overall distribution of manatees in Brevard County is a function of a variety of natural and anthropogenic factors. The complex individual and social dynamics of the species make it very difficult to precisely identify, on a consistent basis, the location of manatees in the waters of Brevard County. However, ground and aerial surveys have documented several factors that can be used to predict, on seasonal and temporal scales, the areas where manatees are known to carry out portions of their life cycles. Manatee occurrence in Brevard County can be affected by location of preferred foraging habitat, adequate water depth for traveling and/or resting, location of deep water areas adjacent to shallow water seagrass beds utilized for feeding, availability of freshwater sources, ambient water temperature, location of warm water refugia, availability of areas protected from weather (wind), and availability of quiet areas for calving and resting.

The earliest written records of manatees in Brevard County were made in the late nineteenth century (Bangs 1895, Moore 1951). Climate was likely responsible for limiting the historical cold-season distribution of manatees to the Sebastian River area in Brevard County. During severe winters, cooler water temperatures in the IRL likely prevented a significant wintering population of manatees in the county (Beeler and O'Shea 1988). Since the 1960's, warm water effluents produced by the County's two power plants have provided manatees with cold-season refugia. The warm water refugia at the Reliant Energy plant is approximately 1.9 miles north of the FPL Cape Canaveral plant. There are no other primary industrial warm water refugia located to the north of Brevard County. Blue Spring on the St. John's River is located north of Brevard County but appears to represent a separate manatee population, and no evidence indicates movements of manatees between Brevard and Blue Spring during the winter months. There are three primary industrial warm water refugia located to the south of the Brevard County power plants. The FPL Riviera power plant is the closest, approximately 130 miles to the south, in Palm Beach County. Two additional industrial warm water refugia are located another 50 miles south of the Riviera plant in Broward County. The FPL Lauderdale and Port Everglades power plants have also been identified as areas known to be used by manatees that also use Brevard County warm water refugia. In fact, a single aerial survey identified 585 manatees at the Brevard power plants on 8 December 1997, indicating that during some years, Brevard County can host one of the largest winter aggregations of manatees in the state of Florida (FDEP Synoptic Surveys 1991; 1992; 1995b; 1996, FDEP unpublished data, Bruce Ackerman, personal communication, Reynolds and Wilcox 1994). The winter aggregation at these power plants has fluctuated annually however, since 1990 there has been an increase in the percentage of Atlantic coast manatees that have used these power plants. The importance of these power plants to wintering manatees has been further established through studies of tagged manatees. Telemetry studies have confirmed that 25 percent of tagged manatees on the Atlantic coast used only Brevard County warm water sites (Beck 1999).

Rose and McCutcheon (1980) concluded that manatees using the then Reliant Energy plant and the FPL Cape Canaveral plant thermal effluents should be considered extremely dependent on these sites because of their northern location. These conclusions

were substantiated during a cold stress mortality incident during the winter of 1989-1990 when 33 manatees were recorded as cold stressed deaths. Since 1976 the state's mortality database was started a total of 49 manatees have been identified as cold stress related deaths in Brevard County.

After winter ends and the waters of the IRL warm, manatees begin dispersing to many areas of coastal Florida and southern Georgia. Animals moving north follow the Intracoastal Waterway (ICW) in the Indian River through the Haulover Canal, and then north through Mosquito Lagoon (Marine Mammal Commission 1988). During major migrations, manatees within the County are observed most frequently moving along the margins of the ICW. Manatees frequently move along shorelines and causeways, seldom crossing open water to get from one point to another (Sharon Tyson, personal communication). Important travel corridors include Mosquito Lagoon, Haulover Canal, the Indian River ICW, the central Banana River, Newfound Harbor, Sykes Creek, and the Barge Canal (Marine Mammal Commission 1988).

4. TELEMETRY STUDIES

Information for the following section was provided with direct written consent of the NBS, Sirenia Project, for the development of Brevard County's MPP. This information is not to be used for any other purpose without specific authorization by the Sirenia Project.

The technology to track manatee movement patterns and locations was first developed in the late 1970's (Bengtson 1981) and has been continually modified and improved since that time (Rathbun et al. 1987). Early tracking efforts were accomplished using very high frequency (VHF) transmitters, which field researchers could locate using portable receivers and directional antennas. More recent transmitters incorporate an ultra high frequency (UHF) platform transmitter terminal (PTT), which is monitored by polar-orbiting satellites, in conjunction with the VHF transmitter (Reid and O'Shea 1989). The transmitters are cylindrical in shape and are linked to an adjustable belt attached around the base of the manatee's tail (peduncle) by a flexible nylon tether (approximately 5 feet long). The tracking assembly contains several features to ensure the safety of the manatee wearing the transmitter. These features include corrodible nuts and bolts in the belt and a weak link in the tether which attaches the transmitter to the belt.

Researchers track and monitor manatees in the field by triangulating on the VHF signal and, whenever possible, sighting the animal. PTT data are obtained from a satellite data collection and location processing service (Service Argos). The following data are associated with each manatee location: date, time, location, temperature, transmitter identification number, transmitter activity, signal strength, and accuracy of the locations.

The Sirenia Project, has recorded the daily activities and migratory patterns of 78 individual manatees on the east coast of Florida from 1986 through June of 1998. Of these, 41 manatees were tagged in Brevard County waters. Since 1986, more than 83,276 manatee locations have been recorded for PTT tags and over 10,539 locations have been recorded for VHF tags (Dean Easton, USGS, personal communication). Several generalizations about

manatee movements have arisen from the study, and the following text summarizes the findings in the NBS, Sirenia Project Atlantic Coast Manatee Telemetry 1986-1993 Progress Report, Volume I.

- Some manatees return to the same warm water refuge sites (e.g., power plant effluents) in winter and to the same warm season feeding areas from year to year. The preferred warm season sites contain habitat features such as accessible submergent and emergent vegetation, feeding areas adjacent to deeper water for travel and escape from threats, and quiet water areas with limited human activity for resting and calving.
- Some manatees travel among warm water refuges during winter, even those hundreds of kilometers apart, indicating a spatial awareness of numerous warm water locations. The manatee's use of the warm water refuge sites is dependent on factors such as the ambient temperature, the time of day, and human activity in the vicinity of the effluent.
- Timing of migrations and the migratory routes vary among individuals. Some individuals overwinter in the upper Indian River, utilizing the warm water effluents of the Reliant Energy Corporation and FPL power plants during cold periods, while others migrate to south Florida for winter and return to Brevard County during the warm season. The individual variation among manatee migrations may be attributed to variability in cold tolerance among individual manatees.
- Manatee migratory routes may encompass the entire east coast of Florida up to the southern coast of Georgia. Manatees typically travel quickly and directly between seasonal high-use areas, sometimes traveling distances of 40 kilometers per day. The ICW is frequently used by manatees for travel.
- Some manatees spend considerable periods of time where boating traffic and human activity are limited or have been prohibited.
- The coastal and estuarine waters of Brevard County probably provide the most important habitat for manatees on the east coast of Florida during the spring, summer, and autumn seasons. The Indian and Banana Rivers (particularly along Merritt Island) and the Sebastian River are frequently used by manatees.

5. ABUNDANCE STUDIES

The exact number of Florida manatees is not known, mainly because most of the manatee's habitats contain murky water with limited visibility. In order to obtain a minimum manatee population estimate, the FDEP, now FWC, began a series of aerial surveys (called synoptic surveys) that focus on warm water refuges in Florida and southern Georgia immediately after the passage of a cold front. Cold weather causes manatees to aggregate near warm water refuges, thus facilitating the survey process.

In January 1991, the first of these manatee aerial surveys of warm water aggregation sites in Florida and southern Georgia was completed. This first synoptic aerial survey was conducted after a passing cold front, preceded by a relatively mild weather period (FDEP 1991). The results for Brevard County indicated that most of the manatees were confined to warm water refuges. Statewide, 1,268 manatees were recorded, with 679 on the east coast and 589 on the west coast. Of the documented manatees on the east coast, 271 individuals, or 40%, were observed in Brevard County. All but one manatee were found near the County's two power plants.

A second synoptic aerial survey was completed during February 1991. This survey reported a minimum of 1,470 manatees. Of this total number, 813 manatees were observed on the east coast, with 316 (39% of the east coast population) reported within the warm water discharges of Brevard's power plants. Seven manatees were also reported in southern Brevard County, with three in the Eau Gallie River and four in Crane Creek. Two additional manatees were observed in the upper Banana River.

During the January 1992 aerial synoptic survey, a total of 1,856 manatees were counted. Of the 907 manatees documented on the east coast, 236 (26 %) were recorded at the warm water refugia in Brevard County. On the west coast 949 manatees were documented (FDEP 1992, Ackerman 1995).

The January 1995 synoptic survey documented 1,443 manatees statewide, with 665 manatees on the east coast (70 in Brevard) and 778 on the west coast. The February 1995 synoptic survey documented 1,822 manatees statewide, with 915 on the east coast (51 in Brevard County) and 907 on the west coast (FDEP 1995b).

The January 1996 synoptic survey documented 2,274 manatees statewide, with 1,223 on the east coast (430 in Brevard County) and 1,051 on the west coast. The February 1996 synoptic survey documented the 2,639 manatees, with 1,457 documented on the east coast and 1,223 on the west coast. Five hundred and twenty nine (36%) of the manatees observed on the east coast were documented in Brevard County (FDEP 1996).

In January of 1997 there were 2,229 manatees documented statewide, with 900 on the east coast (301 in Brevard County) and 1,329 on the west coast. The synoptic survey conducted in February of 1997 documented 1,709 manatees statewide, with 791 on the east coast (581 in Brevard County) and 918 on the west coast.

The January 1998 synoptic survey documented 2,022 manatees statewide, with 1,112 on the east coast (XXX in Brevard County {awaiting data from FMRI}) and 910 on the west coast.

In January 1999 there were 1,873 manatees documented statewide, with 848 on the east coast (XXX in Brevard County {awaiting data from FMRI}) and 1,025 on the west coast. The February 1999 synoptic survey documented 2,034 manatees statewide, with 905 on the east coast (XXX in Brevard County {awaiting data from FMRI}) and 1,129 on the west coast. March of 1999's synoptic survey documented 2,353 manatees statewide, with 956 on the east coast (653 in Brevard County) and 1,397 on the west coast.

Two synoptic surveys in January 2000 documented 1,630 and 2,223 manatees statewide. Of the 1,630 manatees statewide, 621 were on the east coast (XXX in Brevard County {awaiting data from FMRI}) and 1,009 on the west coast. Of the 2,223 manatees statewide, 1,132 were on the east coast (XXX in Brevard County {awaiting data from FMRI}) and 1,091 on the west coast.

The January 2001 synoptic survey documented the largest number of manatees to date at 3,276 statewide, with 1,520 on the east coast (519 in Brevard County) and 1,756 on the west coast.

There is a large amount of fluctuation between the minimum number of manatees documented during the synoptic surveys. Variability in environmental factors including air and water temperature (severity of the cold front), wind/chop, water clarity, and power plant operation are largely responsible for the variation observed.

Countywide manatee aerial surveys were conducted for most waterbodies believed to be used by manatees in Brevard between December 1985 and January 1987 (USFWS, NBS 1987). These surveys were conducted by the NBS Sirenia Project (then USFWS Sirenia Project), the FDEP (then FDNR), and Brevard County NRMCO for most waterbodies believed to be used by manatees in Brevard County. The surveys excluded the Sebastian River and the Indian River south of Grant Farm Island to the Brevard/Indian River county line which were surveyed as part of the Indian River County aerial surveys flown from June 1985 through December 1987 (FDNR 1987).

Manatee use was documented throughout the lagoon in varying levels during the Brevard County aerial surveys with numerous manatee observations recorded for the areas around the Titusville railroad bridge, the Titusville Causeway (S.R. 402), NASA Causeway (S.R. 405), the FPL and Reliant Energy Corporation power plants, the entire Banana River, Crane Creek, Turkey Creek, and the Indian River Shores subdivision canals. During the Indian River County aerial surveys, heavy manatee use was documented throughout the Sebastian River and the southern IRL portion of Brevard County.

Manatee aerial survey counts from the countywide aerial surveys are provided in Table 1 and are mapped in Figures 6a-6c (NASA unpublished data). These countywide surveys revealed information on both manatee abundance and distribution patterns within the County.

a. North Banana River.

Provancha and Provancha (1988) reported increasing utilization by manatees of the protected waters of the Banana River north of the NASA causeway. This area is closed to boat traffic due to security for the space shuttle operations complex. During non-winter censuses between 1977 to 1986, manatee density (expressed as the number of manatees per square kilometer) increased five-fold. The maximum count of manatees sighted for each year over the portion of the Banana River north of S.R. 528, peaked in March and April, and ranged from 56 to 297 animals. This figure exceeded all counts for previous censuses that incorporated the entire Banana River and the northern Indian River (Provancha and Provancha 1988). In April of 1993, the maximum count increased to a record high of 366 manatees (Jane Provancha, Bionetics, personal communication).

The authors identified several likely causes for this increase. Primarily, they recognized the extensive seagrass and other SAV, and the presence of deep water access. The authors supported a "learned behavior" premise, that manatees were responding to the protected nature of the Banana River north of the NASA causeway and migrating to this area to avoid high boat traffic areas. Manatee abundance in the Banana River study area appears to correlate with Provancha and Provancha's (1988) assumptions of predicted manatee use areas. The highest manatee use was noted in the areas surrounding the Hangar AF channel and boat basin; the large seagrass beds northeast of the NASA causeway; and the dredged basins and channels used by barges to shuttle equipment into and out of the shuttle operations complex. Additionally, this study indicates that portions of the upper Banana River are essential to manatees in the spring. Aggregations during April, for example, reached a high of 206 manatees. After May, however, about 70 animals were regularly seen in the Banana River north of S.R. 528.

A follow-up study was conducted in the spring of 1987 and 1988, and twice monthly since that time (Provancha and Provancha 1989). Manatee distribution patterns were similar to those found prior to 1987. Extremely high numbers of manatees were observed during the spring, especially north of the NASA Causeway.

The "learned behavior" theory, in relation to manatees, was originally coined by Kinnaird (1983), who reported that manatees were seen less frequently in areas of high boat traffic during the summer months. In contrast, Packard (1981) reported that manatees did not avoid areas of heavy boat traffic in southern Florida. However, Packard's (1981) study was limited to wintering manatees whose typical behavior patterns may be modified while seeking refuge from the stress of cold weather.

Table 1. Major Manatee Aggregation Areas Brevard County, Florida

(Compiled from USFWS/NBS, FDEP/FDNR 3/12/85 through 6/1/87)

WATERBODY SEGMENT	# OF MANATEES OBSERVED
<i>INDIAN RIVER AND TRIBUTARIES</i>	
Turnbull Basin to RR Bridge	341
RR Bridge N. of Titusville to S.R. 402	332
S.R. 402 to NASA Causeway	297
NASA Causeway to S.R. 528	5,021
S.R. 528 to S.R. 520	89
S.R. 520 to Pineda Causeway	361
Pineda Causeway to Eau Gallie	49
Eau Gallie Causeway to U.S. 192 (including Eau Gallie River)	282
U.S. 192 South to Turkey Creek (including Crane and Turkey Creeks)	480
Turkey Creek to Sebastian Inlet (excluding Sebastian River)	950
Sebastian River	430
<i>BANANA RIVER</i>	
KSC property boundary to S.R. 528 (including Port Canaveral)	238
S.R. 528 to S.R. 520	1,108
S.R. 520 to Pineda Causeway	1,862
Pineda Causeway to Indian River	875
<i>OTHER AREAS</i>	
Mosquito Lagoon	99
Barge Canal and Sykes Creek	605
Newfound Harbor	219
<i>TOTAL</i>	13,638

NOTE: The geographic areas are not of equivalent size. * Incomplete overflights on 1/30/98, 2/10/98, 5/29/98, 11/23/98, and 12/22/98.

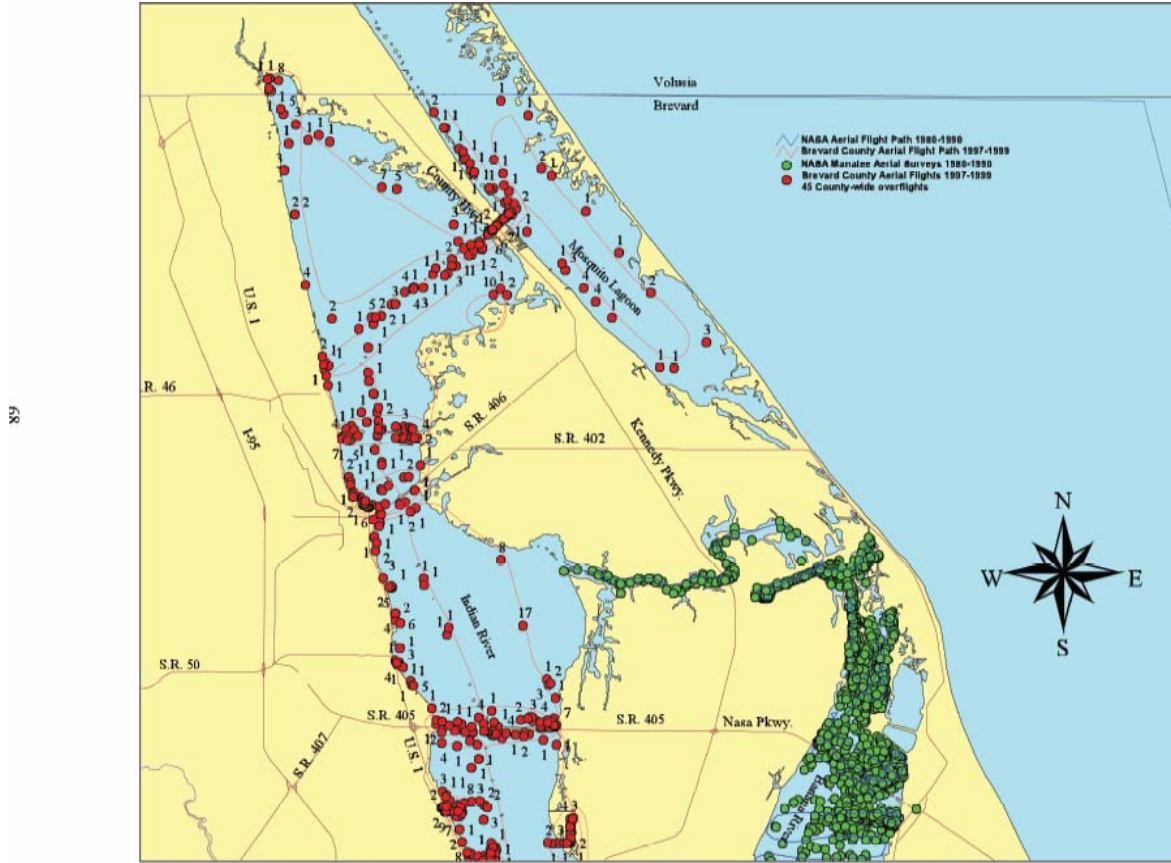
This data could reflect multiple sightings observed on numerous occasions during the flights.

Data Source: Florida Fish and Wildlife Conservation Commission Atlas of Marine Resources CD rom Version 1.3b.

Data Compiled by: Brevard County NRMO. Brevard County, in cooperation with other agencies, prepares and uses this information for its own purposes.

It may not be suitable for other purposes, and is provided "as is." For more information contact Brevard County NRMO at (321) 633-2016.

Figure 6a. Manatee Aerial Survey Data in North Brevard County, Florida (1997-1999)

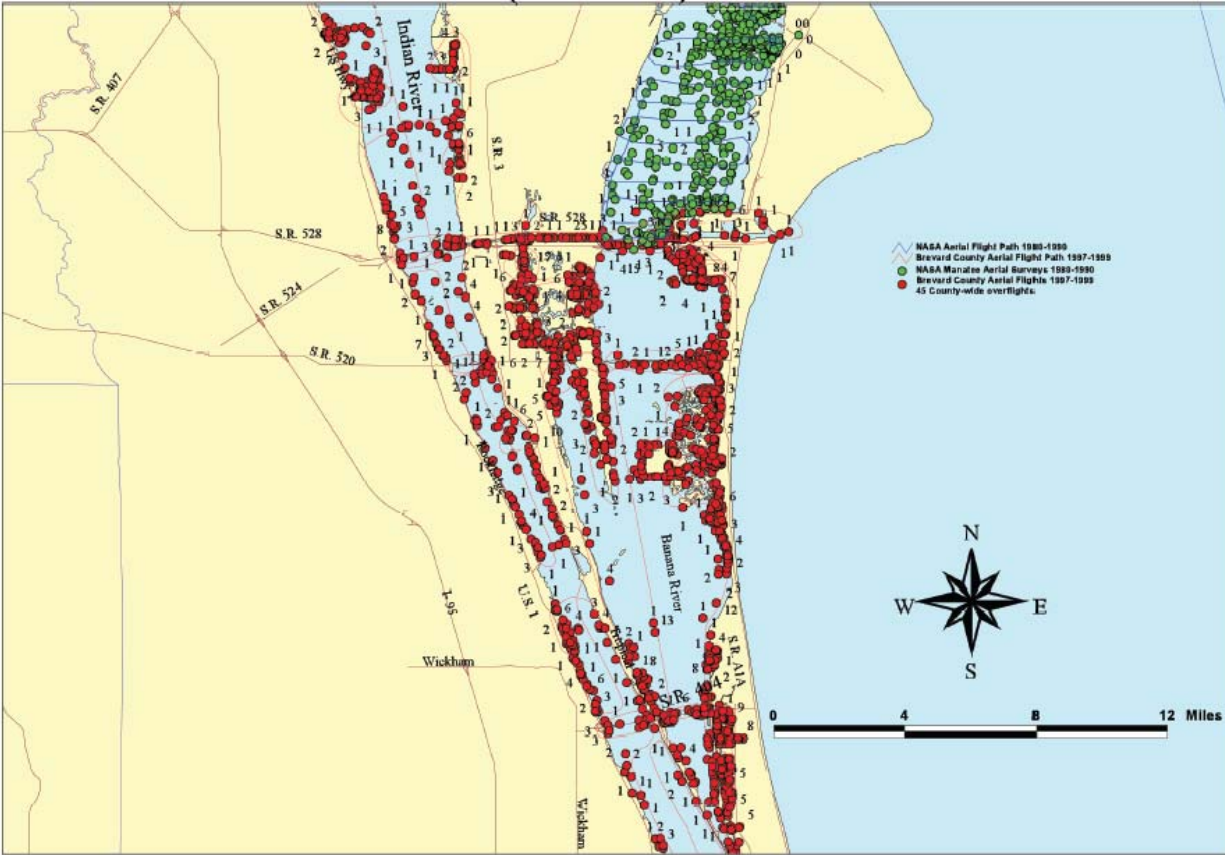


Data Source: Atlas of Marine Resources CD rom Version 1.3b,
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NOTE: This data could reflect multiple sightings observed on numerous occasions during the flights.

0 4 8 12 Miles

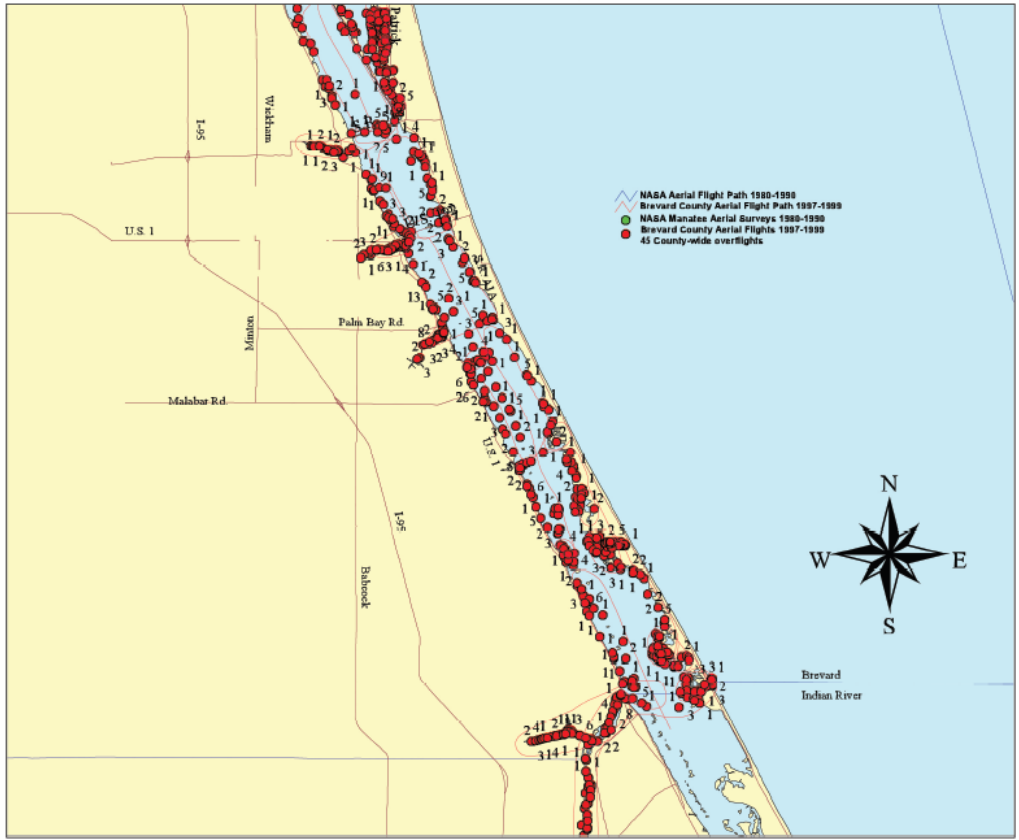
Figure 6b. Manatee Aerial Survey Data in Central Brevard County, Florida (1997-1999)



Data Source: Atlas of Marine Resources CD rom Version 1.3b,
 Florida Fish and Wildlife Conservation Commission
 Brevard county NRMCO, in cooperation with other agencies, prepares this information for its
 own purposes. It may not be suitable for other purposes, and is provided "as is." For information contact (321) 633-2016.

NOTE: This data could reflect multiple sightings observed on numerous occasions during the flights.

Figure 6c. Manatee Aerial Survey Data in South Brevard County, Florida (1997-1999)



Data Source: Atlas of Marine Resources CD rom Version 1.3b,
Florida Fish and Wildlife Conservation Commission

Brevard county NRMCO, in cooperation with other agencies, prepares this information for its
own purposes. It may not be suitable for other purposes, and is provided "as is." For information contact (321) 633-2016.

NOTE: This data could reflect multiple sightings observed on numerous occasions during the flights

0 4 8 12 Miles

C. PRESENT THREATS TO MANATEES

There is general agreement among the scientists and agencies that the fundamental threat to manatee survival is human activity, both through direct impacts and habitat destruction. The Florida Manatee Recovery Plan (USFWS 1995) also indicates human activities as the major threat to the survival of the Florida manatee. These activities directly or indirectly affect:

- **Mortality**
- **Abundance and distribution of forage sources**
- **Distribution**
- **Condition and availability of warm water refugia**
- **Reproduction**
- **Levels of contaminants and pathogens**
- **Recruitment**
- **Other vital physical/chemical/biological processes**
- **Behavior**
- **Other habitat alterations**

The following activity categories were identified in the USFWS Florida Manatee Recovery Plan, and some have been added to tailor these categories for Brevard County:

1. ACTIVITIES DIRECTLY RESULTING IN MORTALITY AND/OR SERIOUS INJURY.

The major causes of human-related mortality and serious injury include collisions with watercraft, entrapment, and crushing in flood control structures, entanglement or ingestion of marine debris (mostly related to fishing activity), poaching, and vandalism (rare). Some factors influencing watercraft collisions include boat size and type; boat density, boat traffic patterns and their overlap with manatee travel and feeding areas, channel depth and configuration of water bodies, and marina, boat ramp, and docking facility siting.

2. ACTIVITIES AFFECTING REPRODUCTION AND RECRUITMENT.

Death of dependent calves approximately 4 feet (150 cm) in length or less (perinatal calves) is the second most prevalent category of manatee mortality, excluding the "undetermined" category. The nearly two years a mother and calf are together is critical to the development of the calf. During this period, the cow will teach the calf migratory routes, location of forage sources, location of warm water refuges, approach-avoidance skills (boats), and other survival skills (O'Shea and Shane 1985).

Recent analysis of the mortalities indicated that watercraft mortalities tends to affect sub-adult (age class 2-3) and adult portions of the population in the highest proportions (Marmontel 1993). The reduction in the number of reproductive adults in the population is of the most concern for an endangered population. High adult survival is imperative for establishing and maintaining a positive rate of population increase in large mammals (Eberhardt and Siniff 1977). Not only is the loss of reproductive adults damaging, the loss of older experienced mothers is also detrimental, since young mothers are more susceptible to miscarriage that result in stillbirth or abortions (Newson 1966, Sowls 1966). Contributing factors to manatee calf mortality may include: disturbances at birth, separation of mothers and calves by human harassment, and the natural death of the mother.

3. ACTIVITIES THAT ALTER DISTRIBUTION AND BEHAVIOR.

Harassment by boaters, SCUBA divers, snorkelers, fishermen, swimmers, and jet-ski operators often disrupts essential behavioral patterns, including feeding and breeding. Such harassment can drive manatees away from warm water areas into colder waters where they are more susceptible to disease or cold stress (Packard 1983). Feeding of manatees is another human-related activity that is increasing in frequency in Brevard County and statewide. Feeding manatees can harm them by reducing their natural fear of humans, altering their normal migration to warm water refuges, interfering in the mother-calf relationship (it has been observed that mother manatees may not nurse their calves while begging), the increased potential for ingesting items harmful to them, and the attraction of manatees to high human use areas (Sharon Tyson, personal communication).

Location of docks, boat ramps, marinas and other forms of development can also affect manatee distribution and behavior. Because SAV areas and undisturbed quiet areas for manatees are rapidly decreasing, it is important to direct new boating traffic and other human activities away from these areas.

4. ACTIVITIES THAT DIRECTLY AND INDIRECTLY IMPACT VEGETATION AND WATER QUALITY.

The loss of habitat is a major threat to the future survival of the Florida manatee (USFWS 1995). Dredging and filling, improper construction of docks, piers, and seawalls, aquatic weed control, and boating activities such as bottom scraping, propeller scouring, or anchor dragging, directly destroy manatee food resources. These activities can also indirectly affect aquatic vegetation by increasing turbidity and nutrient overloading, which result in reduced light penetration. Although the available forage is not presently a limiting factor to the recovery of the Florida manatee, continued destruction of mangrove, saltmarsh, and seagrass communities will affect the long-term recovery and survival of the sub-species.

Large pulses of nutrients enter the estuary through stormwater runoff and poor soil conservation practices. Wastewater discharges also contribute elevated levels of nutrients to the system. These introductions begin a chain reaction that often ends in the further loss of valuable SAV beds. For example, the chain reaction may begin with a nutrient pulse. Rainfall events, typical in Brevard during the spring and summer, wash lawn fertilizers and soils from cleared land into the estuary through canals and overland runoff. The nutrients cause microscopic algae (phytoplankton), which are always present in the system, to reproduce quickly by capitalizing on the additional nutrients. During this population growth phase, the phytoplankton can reproduce to the point of reducing the essential sunlight available to the seagrasses. Without sufficient sunlight, the seagrasses become stressed and eventually die. If the phytoplankton bloom becomes excessive, dissolved oxygen in the water is depleted and the phytoplankton begin to die. In summer months, when water temperatures are warm, the bacteria and fungi decomposing the dying phytoplankton can consume all available oxygen from the water column. The end product of this series of events is often a fish kill.

Alteration of drainage patterns from wetlands and uplands, land development, and stormwater run off also degrade water quality. Water contaminants associated with industrial and sewage treatment discharges also impact water quality and SAV. All these factors lead to a reduction in available forage for manatees, and cause a general decline in the health of the estuary.

5. ACTIVITIES THAT INCREASE CONTAMINANT AND PATHOGEN LEVELS.

To date, knowledge regarding the effects of contaminants and pathogens on manatees is incomplete. Manatees may be susceptible to a number of viruses, bacteria, and parasites present in human and animal wastes. Heavy metals, organochlorine pesticides, polychlorinated biphenyls, petroleum products, and radioactive wastes are some of the more persistent contaminants that could adversely affect manatees. Aquatic weed control activities, wastewater and industrial effluents, and agricultural and stormwater runoff are other sources of contaminants. In areas where the use of herbicidal copper was common, copper was found in manatee's livers in levels that causes toxic effects in some domestic species. It was recommended that copper herbicides be carefully managed in areas with high manatee use due the potential harm to manatees. Copper herbicides are now banned from use in Florida waterways. Copper is also a component of anti-fouling paints used on the bottom of boats. In the IRL, elevated copper levels are typically associated with marina basins.

6. ACTIVITIES THAT INFLUENCE THE CONDITION, AVAILABILITY OF WARM WATER REFUGIA.

Power plant overhauls and shutdowns, alteration of industrial and power plant cooling streams, water withdrawals from the aquifer, alteration of recharge areas, vessel traffic within warm water discharge areas, and restriction of physical access to refugia are some threats that could seriously impact manatees. During extreme cold periods manatees will fast in order to remain in the warm effluent from the power plants. Any disturbance that would frighten or drive the manatees away from this warm water refuge would expose the manatee to a greater risk of hypothermia/cold stress. No Entry zones have been established at both power plants to reduce the risk of disturbance to manatees during this critical winter period.

The maintenance of seagrass for forage in close proximity to the warm water refugia is particularly important during prolonged cold periods. Some manatees may reduce feeding activities or cease eating during extreme cold periods. If cold temperatures persist, the manatees may need to forage to maintain their body temperature and basic caloric requirements. Some manatees will maintain reduced feeding activities during the warmest part of the day. The distance manatees may travel away from the refugia is dependent upon the ambient temperature of the air and water as well as the length of time the cold front has persisted.

These same warm water refuges are popular for fishing in winter months, which often creates a conflict for manatees. Research shows that activity, in the vicinity of discharges, frightens manatees and causes some to leave the critical warm water refuges or move further out in the plume to cooler waters where they will be more susceptible to cold stress. Also, manatees using the warm water discharges were physically injured from monofilament line and fishing hooks, including lures hooked in manatees eyes (Sharon Tyson, personal communication).

D. ANALYSIS OF MANATEE MORTALITY DATA

From 1974-1985, the USFWS maintained an extensive manatee carcass collection program in an attempt to document the time of year, location, and cause of manatee deaths. The FDEP, now FWC, assumed this role in 1985. The waterways of Brevard County have had the highest number of manatee deaths since the inception of the manatee carcass recovery program. Out of 4,367 confirmed manatee deaths in the state, for the period of June 1974 through December 2001, Brevard County accounted for 19% (835) of Florida's total manatee deaths and Brevard accounts for 26% of all mortality among the 13 key counties (Figure 7). The total number of manatees recorded in Florida by the State synoptic surveys from 1991-1997 ranged from 1,268-2,639 manatees. The total number of manatees recorded in Brevard County for the same period of time ranged from 51-581 manatees. Trend analysis conducted by FMRI, indicates that the number of manatee deaths has continued to rise, especially within the last ten years (Ackerman et al. 1992) (Figure 8).

Figure 7. Total Manatee Mortality among the 13 "Key" Counties 1974-2001

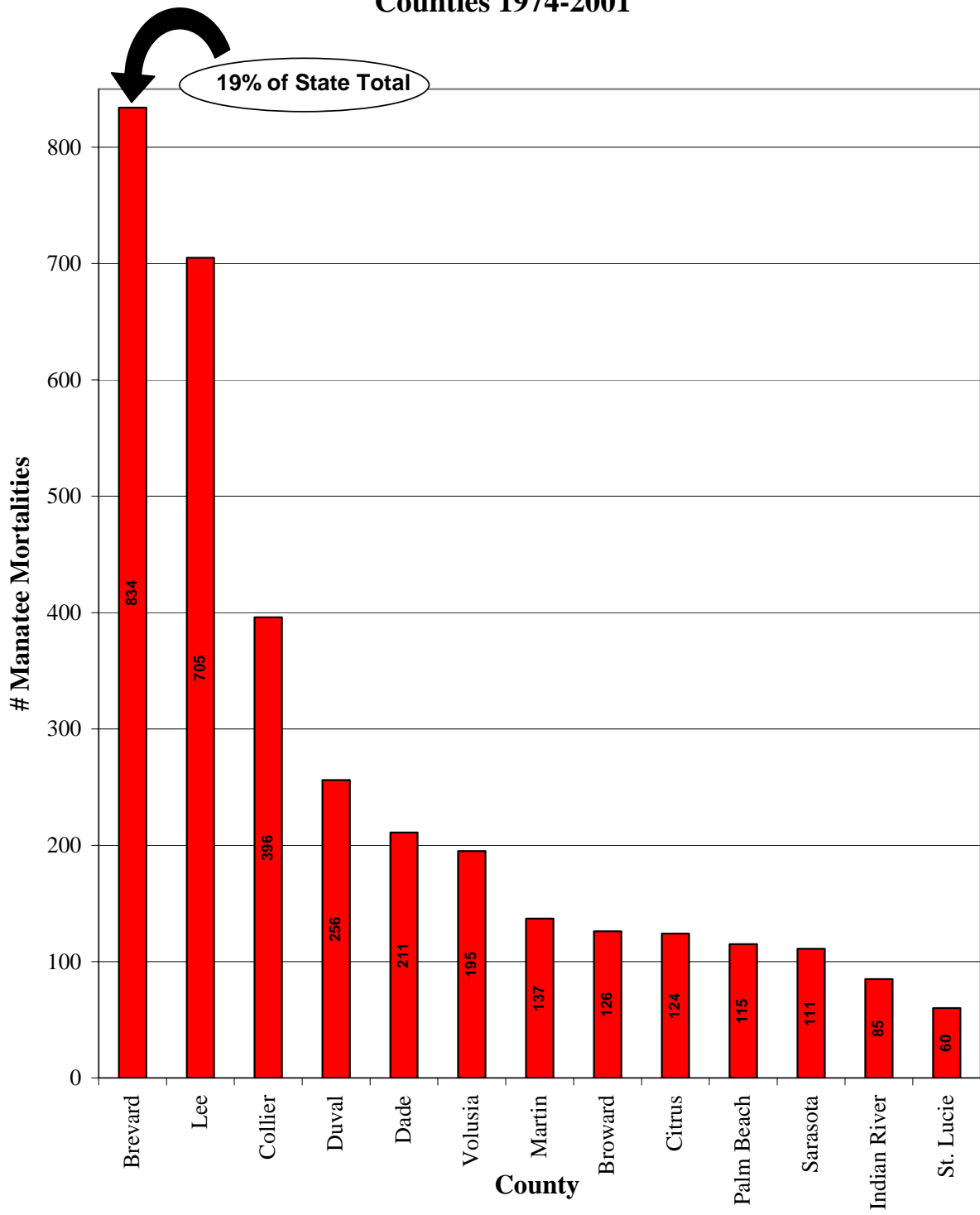
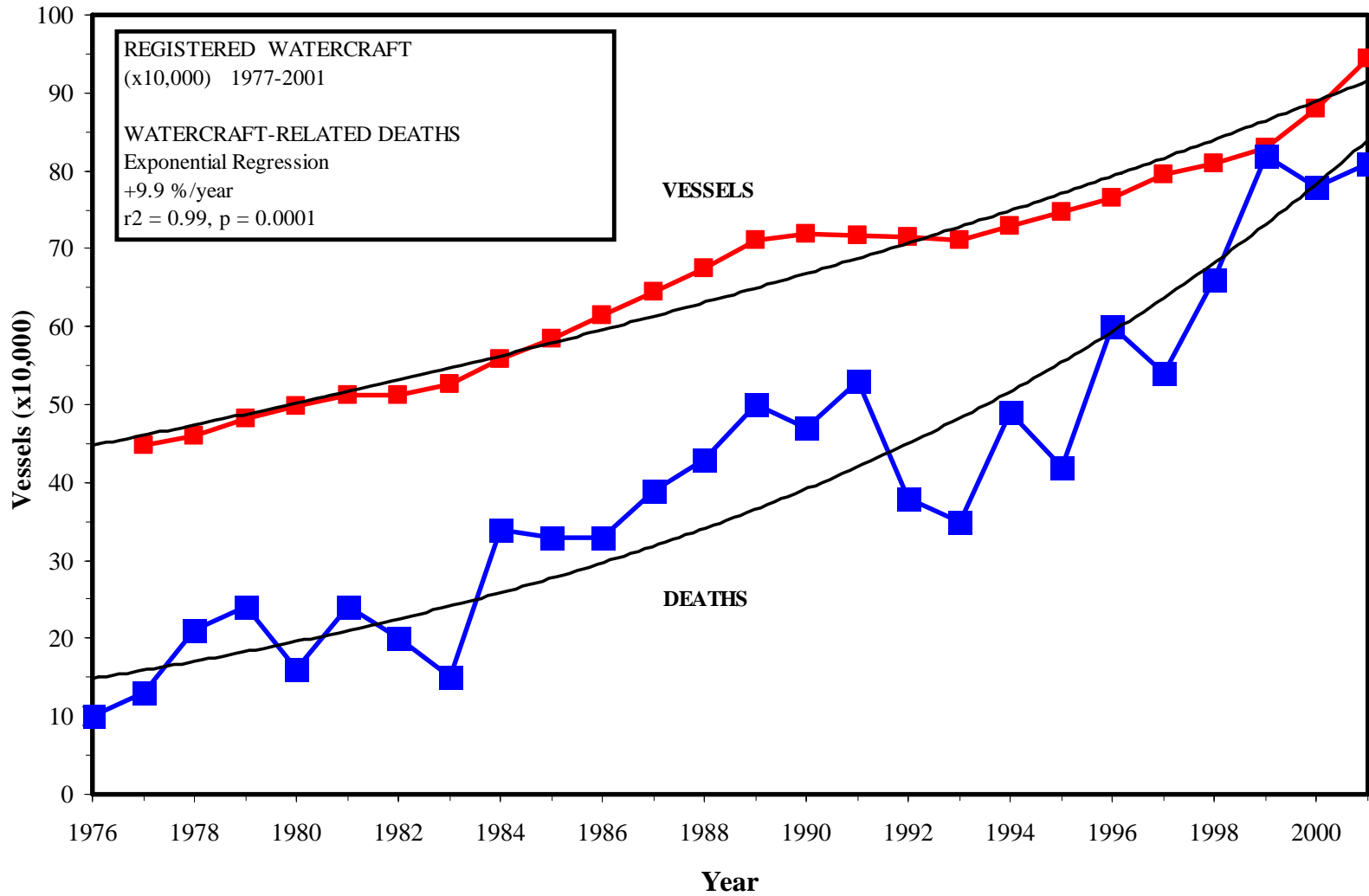


Figure 8. Trend Analysis of Manatee Mortality in Florida 1976-2001
Watercraft Mortality vs. Vessel Registration



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1. CAUSES OF MANATEE MORTALITY

The FWC's carcass collection program documents the time of year, location, and cause of manatee deaths. Manatee mortality is divided into seven major categories:

1. "Watercraft collisions;"
2. "Flood gate/canal locks" (crushing in);
3. "Other human-related (e.g., ingestion/entanglement in monofilament, crab trap lines, other);"
4. "Perinatal (dependent calf 4.9 feet in length or less);"
5. "Other natural (e.g., gastric torsion, other);"
6. "Undetermined (including verified but (carcass) not recovered)" and
7. "Natural cold stress."

From 1974-2001 there were 4,367 manatee mortalities documented in Florida (Table 2). Of these approximately 19% (835) were recovered in Brevard County (See Table 3 and Figures 9a-9c). Necropsy results determined that approximately 29% (243) could not be expressly identified and were reported as undetermined, 27% (229) were attributed to perinatal mortality, 23% (191) were attributed to watercraft collisions, 11% (92) were attributed to other natural causes, 5% (49) were attributed to natural cold stress, 2% (17) were attributed to other human causes, and 2% (14) were attributed to flood gate/canal locks. For the majority of mortalities recorded as "Undetermined," the manatee carcass was too badly decomposed to make any determination as to the cause of death.

The majority of identified natural deaths are due to cold stress. Analysis of past mortalities has shown that the natural causes of death most commonly affect pre-adult (age class 1-3), non-reproductive members of the population (Marmontel 1993). Most mammalian species experience high rates of mortality during the juvenile life phase, followed by a pronounced reduction in mortality rate during middle age and the reproductive years, and high mortality again during old age (Eberhardt and Siniff 1977).

Of the 222 human-related manatee mortalities in Brevard County, the majority 86% (191) were due to collisions with watercraft (Figures 10a-10c). "Other human-related" (17) and "Flood gate/canal locks"(14) accounted for 8% and 6% of the human-related manatee deaths, respectively. Figure 11 illustrates human-related mortalities in each of the 13 key counties during the years 1974-2001.

Approximately 44% (366) of the manatee deaths were located in IRL, followed by the Banana River with 29% (241) of the mortalities. Sykes Creek/Barge Canal area and Port Canaveral accounted for 12.9% (108) and 4% (34) deaths, respectively. Sykes Creek and the Barge Canal combined account for 19% of all watercraft-related manatee mortality in Brevard County through 2001. The Barge Canal is the primary travel route between the Indian River (the manatees' critical warm water refuges) and the Banana River, as well as a frequently used travel corridor for manatees during daily and seasonal migrations. Sykes Creek is used as a travel corridor and for resting and calving.

A seasonal analysis of manatees killed by watercraft in Brevard from 1976-2001 reveals most deaths occurred between the months of April and September, inclusive (average of over 17 manatee recoveries in each month) (Table 4). Data from 1974 and 1975 were excluded from analysis because of spotty data collection. The seasonal association seems intuitive, when one considers that during the spring and summer months there is an increased number of boaters and that manatees are widely dispersed throughout the estuary, or cruising the ICW. The data appear to indicate that manatees are most vulnerable during migration, and when they are dispersed during the spring, summer, and fall.

Table 2. Total Manatee Mortality in Florida by Year and Category (1974-2001)

	TOTAL	YEAR																											
		74*	75*	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
Watercraft Collisions	1069	3	6	10	13	21	24	16	24	20	15	34	33	33	39	43	50	47	53	38	35	49	42	60	54	66	82	78	81
Flood gate/Canal lock	169	0	1	4	6	9	8	8	2	3	7	3	3	3	5	7	3	3	9	5	5	16	8	10	8	9	15	8	1
Other Human	115	2	1	0	5	1	9	2	4	1	5	1	3	1	2	4	5	4	6	6	6	5	5	0	8	6	8	8	7
Perinatal¹	913	0	7	14	9	10	9	13	13	14	18	25	23	27	30	30	38	44	53	48	39	46	56	61	61	53	53	58	61
Cold Stress	175	0	0	0	0	0	0	0	0	0	0	0	0	12	6	9	14	46	1	0	2	4	0	17	4	9	5	14	32
Natural	565	0	1	2	1	3	4	5	9	41	6	24	19	1	10	15	18	21	13	20	22	33	35	101	42	12	37	37	33
Undetermined²	1361	2	13	32	80	40	23	19	64	35	30	41	38	45	22	25	40	41	39	46	36	40	55	166	65	76	68	70	110
TOTAL	4367	7	29	62	114	84	77	63	116	114	81	128	119	122	114	133	168	206	174	163	145	193	201	415	242	231	268	273	325

¹"Perinatal" (Dependent Calf) corresponds to the size class of the manatee recovered and is not a cause of death.

²"Undetermined" includes carcasses that were verified-not recovered, undetermined decomposed, and undetermined, and is not a cause of death.

For the majority of manatees in the "Undetermined" category, the carcass was too decomposed to determine the cause of death.

*1974 and 1975 data should not be used for comparison due to the patchy data collection during the program's start-up.

Table 3. Manatee Mortality by Year and Category in Brevard County 1974-2001

YEAR	Watercraft	Flood gate Canal Lock	Other Human	Perinatal ¹ (Dependent Calf)	Natural Cold Stress	Other Natural	Undetermined ²	Total	Florida Synoptic Totals ³
1974*	-	-	1	-	-	-	-	1	-
1975*	1	-	1	5	-	1	6	14	-
1976	1	-	-	6	-	-	8	15	-
1977	3	-	-	1	-	1	24	29	-
1978	4	-	-	2	-	-	2	8	-
1979	10	-	1	1	-	2	7	21	-
1980	7	1	-	1	-	1	3	13	-
1981	5	1	1	3	-	1	9	20	-
1982	2	-	-	3	-	-	4	9	-
1983	1	-	-	3	-	-	7	11	-
1984	4	-	-	2	-	2	3	11	-
1985	8	-	-	7	-	8	9	32	-
1986	4	-	-	5	2	-	4	15	-
1987	6	-	1	8	-	5	3	23	-
1988	8	-	1	5	3	2	1	20	-
1989	10	1	-	10	4	7	5	37	-
1990	7	1	-	15	28	6	5	62	-
1991	13	2	2	7	1	3	10	38	1,268; 1,470
1992	7	-	-	12	-	1	11	31	1,856
1993	9	-	-	9	-	7	5	30	-
1994	9	-	-	17	-	9	7	42	-
1995	6	-	1	15	-	4	14	40	1,443; 1,822
1996	13	4	-	15	3	6	15	56	2,274; 2,639
1997	12	3	3	22	1	5	16	62	2,229; 1,709
1998	9	0	2	14	4	1	17	47	2,022
1999	12	1	1	13	0	8	11	46	1,873; 2,034; 2,353
2000	13	0	1	15	-	6	14	49	1,630; 2,223
2001	7	0	1	13	3	6	23	53	3,276
TOTAL	191	14	17	229	49	92	243	835	

¹"Perinatal" (Dependent Calf) corresponds to the size class of the manatee recovered and is not a cause of death.

²"Undetermined" includes carcasses that were verified-not recovered, undetermined decomposed, and undetermined, and is not a cause of death. For the majority of manatees in the "Undetermined" category, the carcass was too decomposed to determine the cause of death.

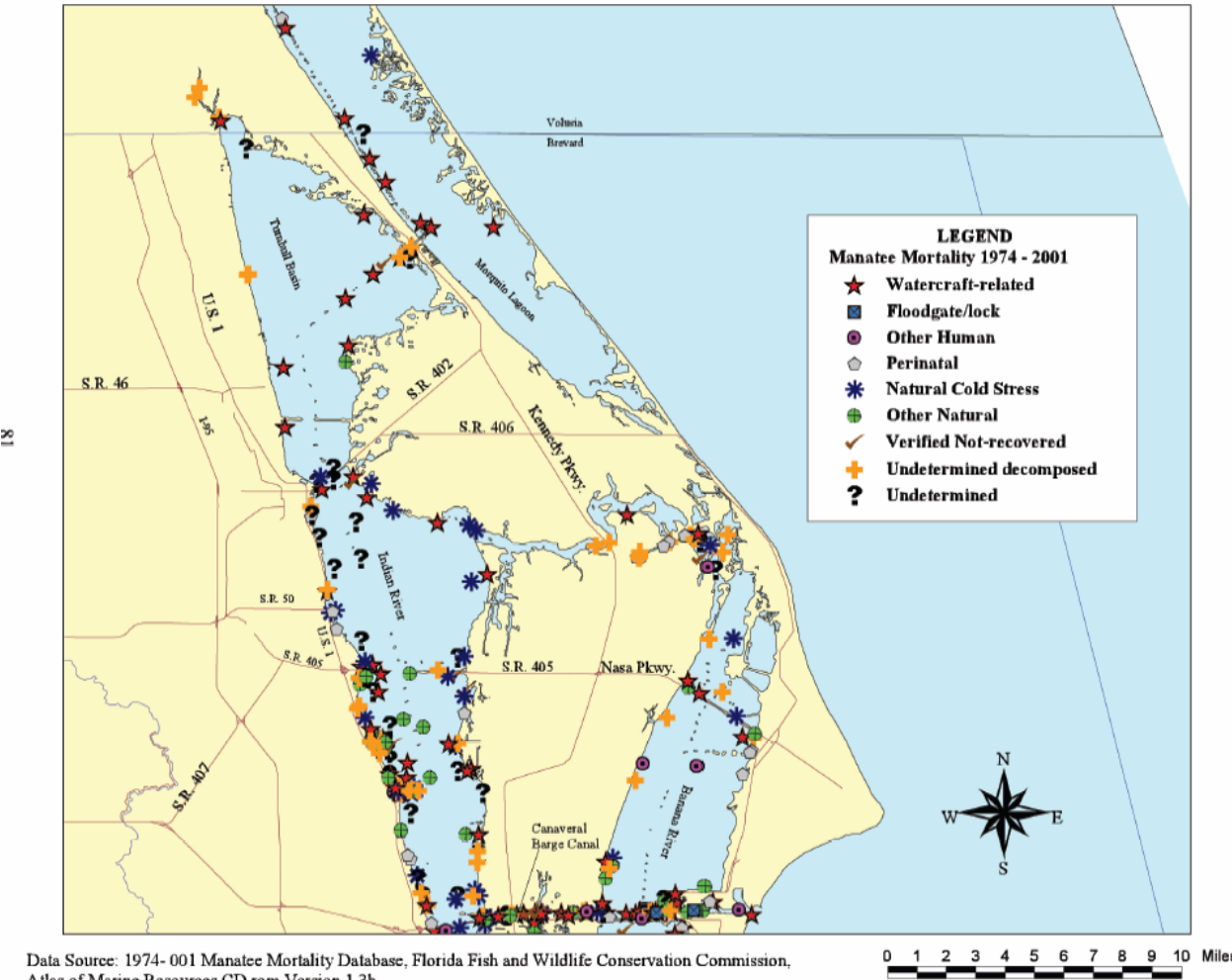
³ The synoptic surveys are winter aerial surveys that cover all of the manatees' wintering habitats in Florida and southeast Georgia. These surveys do not represent a population estimate but are useful in determining minimum estimates of manatee populations.

*1974 and 1975 data should not be used for comparison due to the patchy data collection during the program's startup.

Brevard County NRMCO

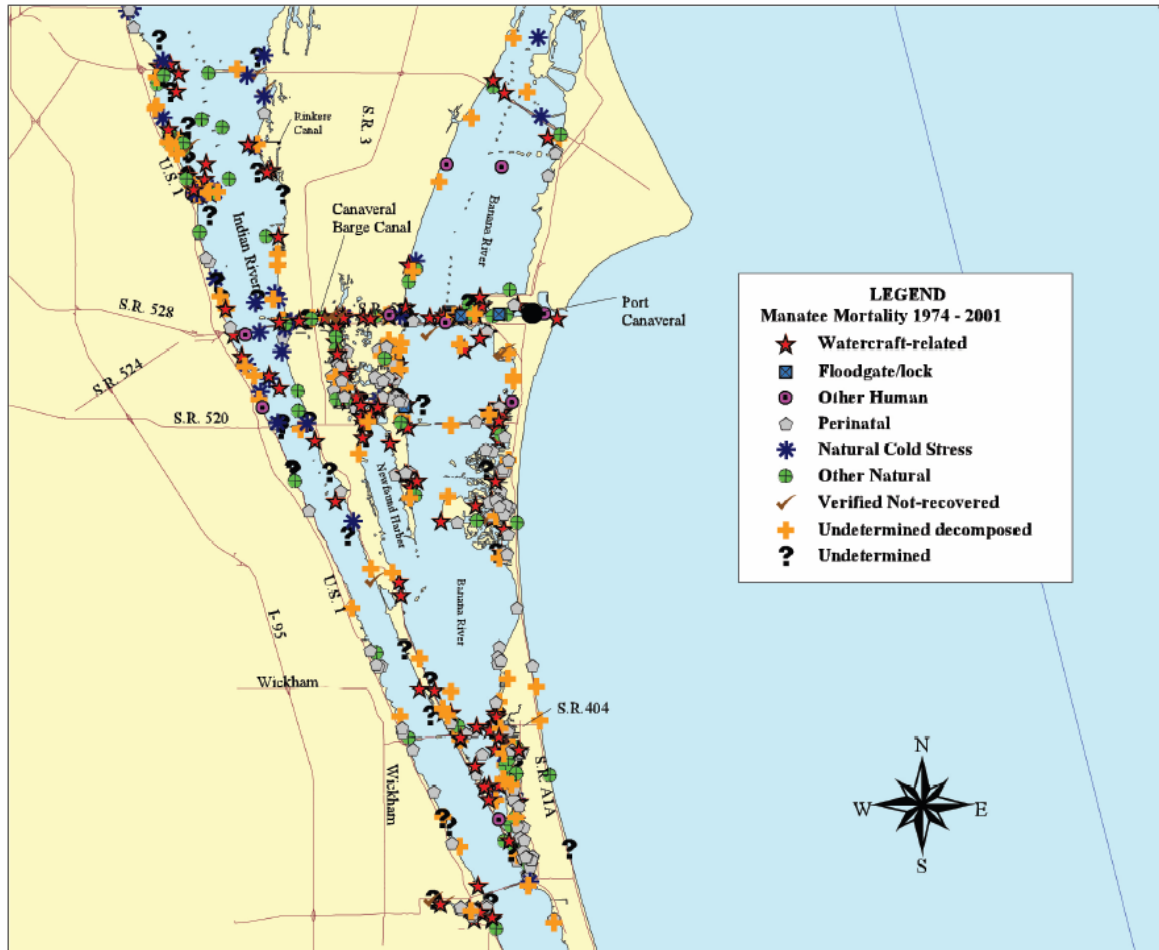
Data Source: 1974-2001 Manatee Mortality Data from the Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute.

Figure 9a. Manatee Mortality in North Brevard County, Florida by Category 1974-2001



Data Source: 1974- 001 Manatee Mortality Database, Florida Fish and Wildlife Conservation Commission, Atlas of Marine Resources CD rom Version 1.3b.

Figure 9b. Manatee Mortality in Central Brevard County, Florida by Category 1974-2001



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Data Source: 1974-2001 Manatee Mortality Database, Florida Fish and Wildlife Conservation Commission, Atlas of Marine Resources CD rom Version 1.3b, Florida Fish and Wildlife Conservation Commission
 Brevard County NRMO, in cooperation with other agencies, prepares and uses this information for its own purposes. It may not be suitable for other purposes, and is provided "as is." For further information contact (321) 633-2016

0 1 2 3 4 5 6 7 8 9 10 Miles

Figure 9c. Manatee Mortality in South Brevard County, Florida by Category 1974-2001

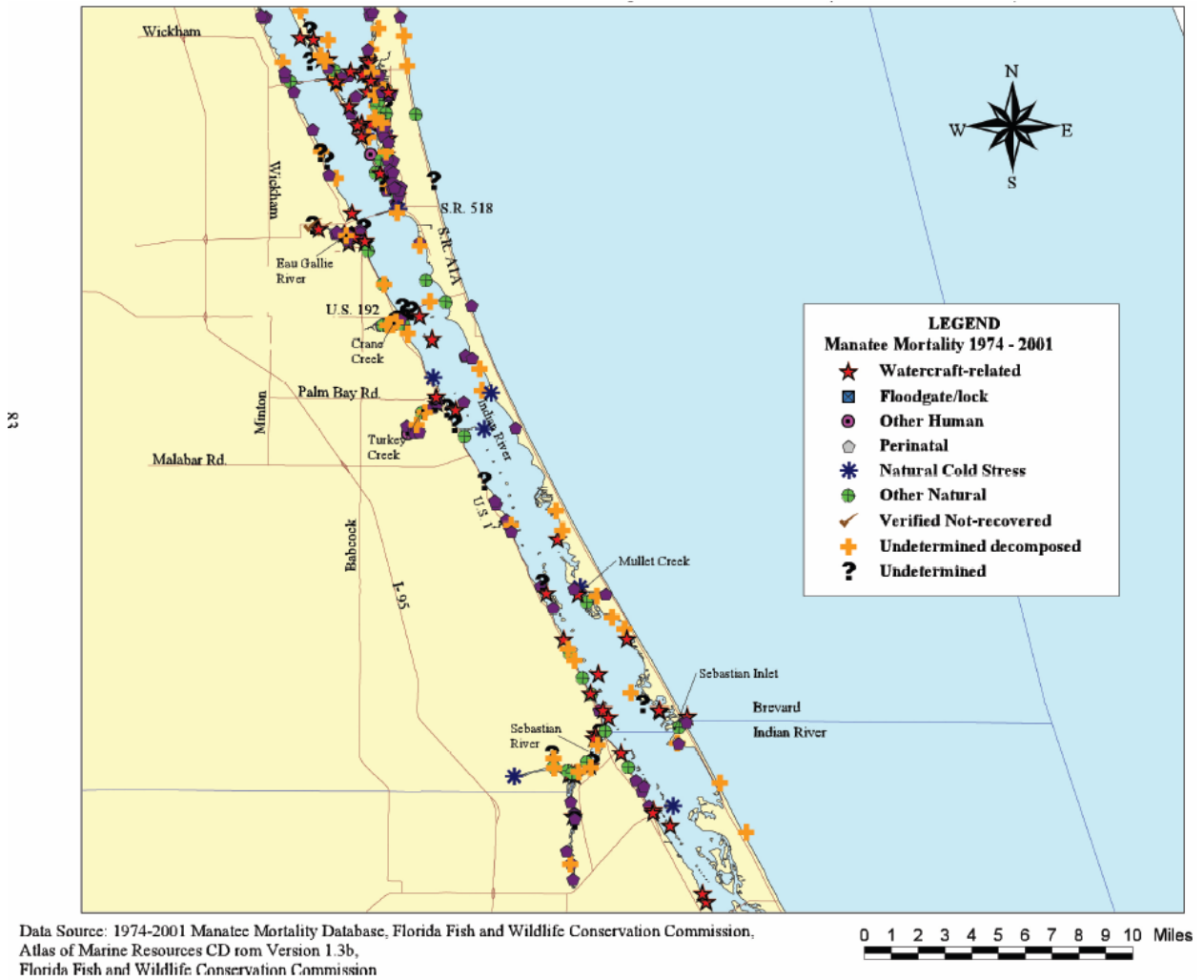
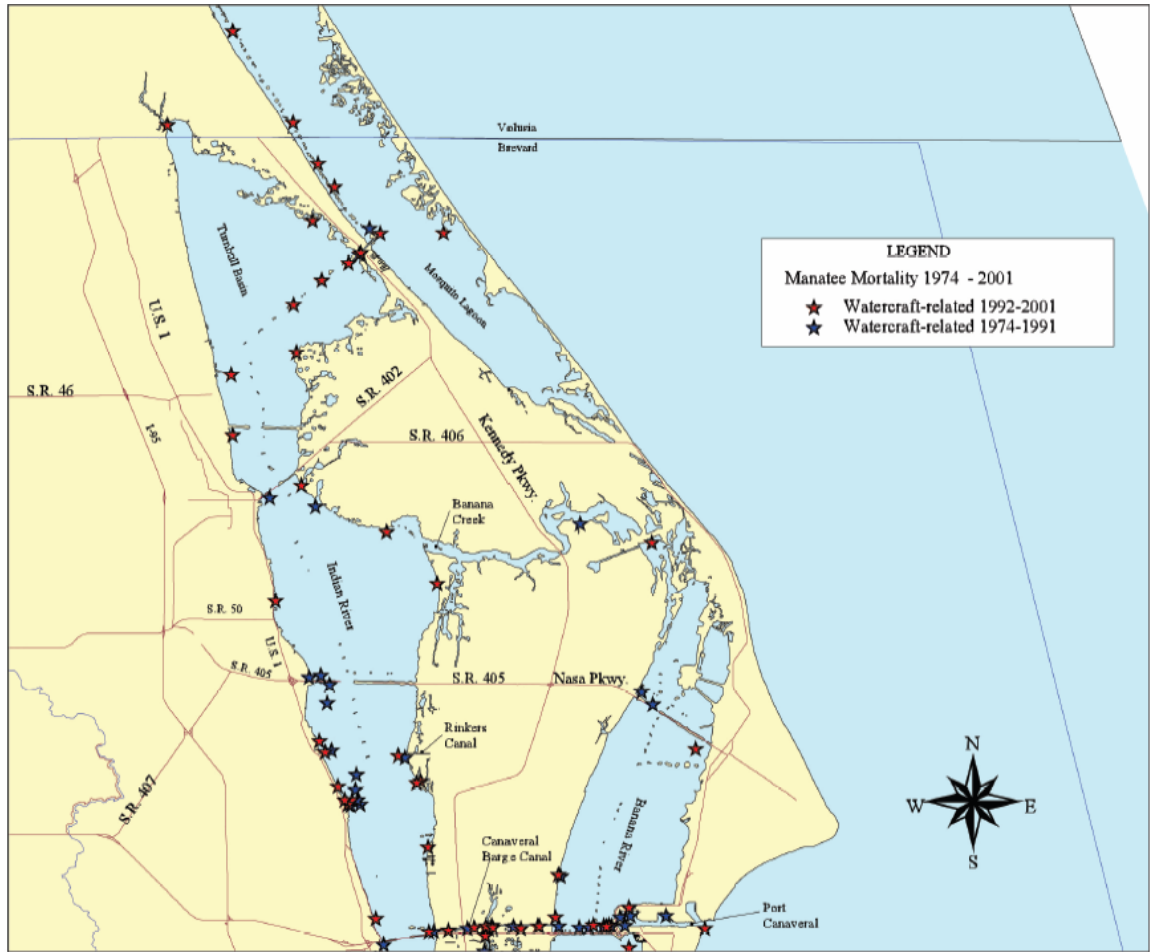


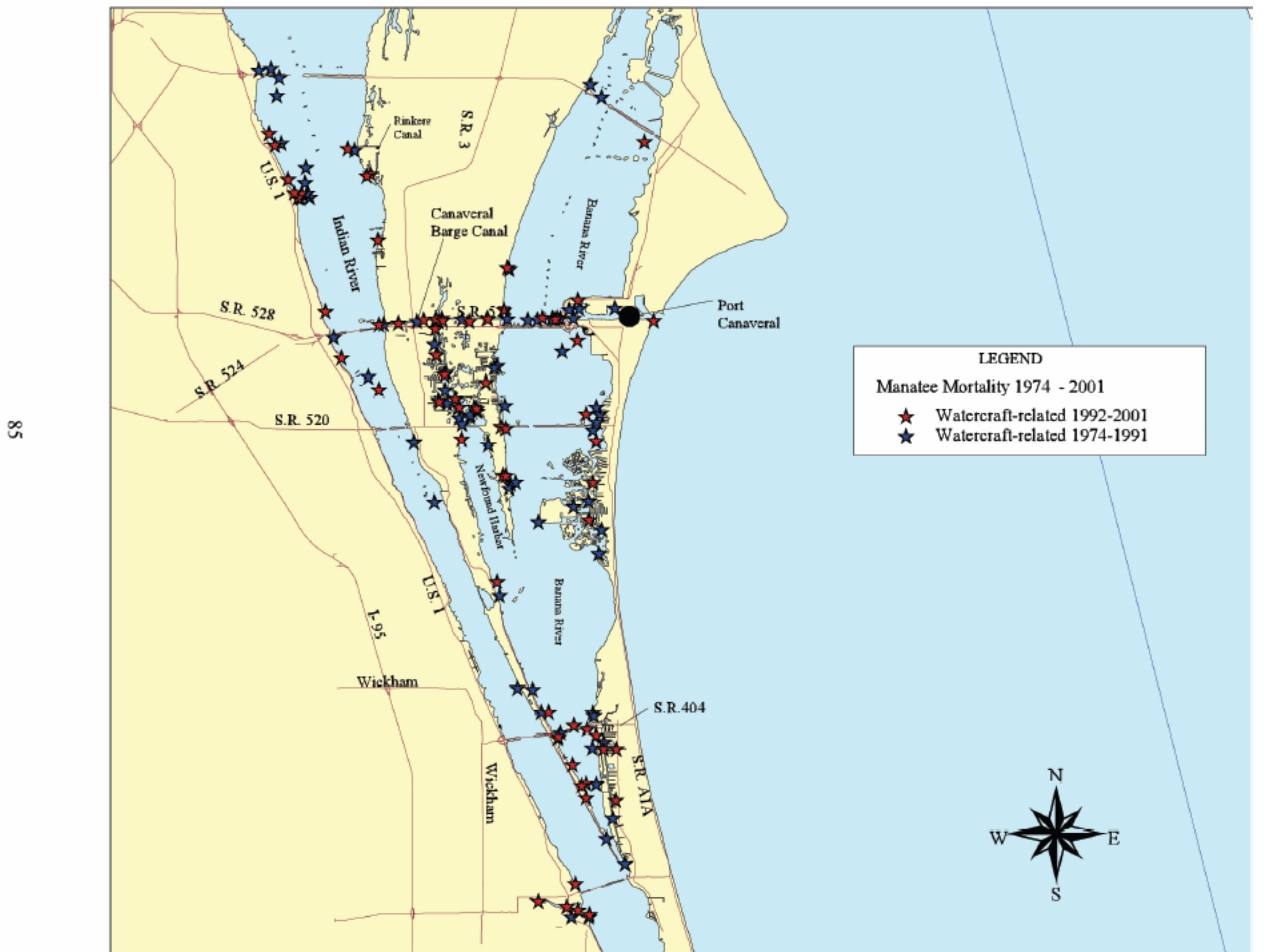
Figure 10a. Watercraft-related Manatee Mortality in North Brevard County, Florida 1974-2001



Data Source: 1974-2001 Manatee Mortality Database, Florida Fish and Wildlife Conservation Commission, Atlas of Marine Resources CD rom Version 1.3b, Florida Fish and Wildlife Conservation Commission
 Brevard County NRMO, in cooperation with other agencies, prepares and uses this information for its own purposes. It may not be suitable for other purposes, and is provided "as is." For further information contact (321) 633-2016

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Figure 10b. Watercraft-related Manatee Mortality in Central Brevard County, Florida 1974-2001



Data Source: 1974-2001 Manatee Mortality Database, Florida Fish and Wildlife Conservation Commission, Atlas of Marine Resources CD rom Version 1.3b, Florida Fish and Wildlife Conservation Commission
 Brevard County NRMO, in cooperation with other agencies, prepares and uses this information for its own purposes. It may not be suitable for other purposes, and is provided "as is." For further information contact (321) 633-2016

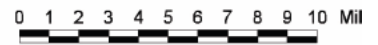
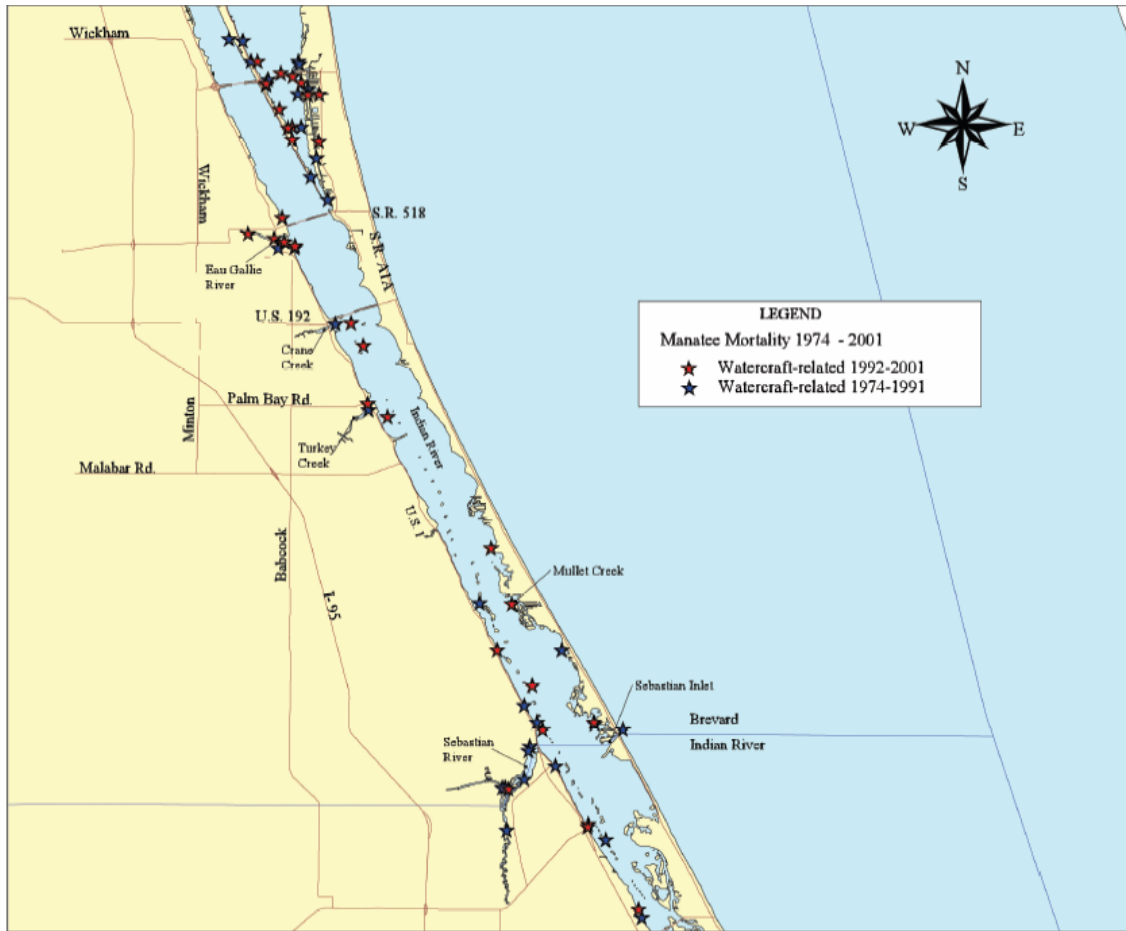


Figure 10c. Watercraft-related Manatee Mortality in South Brevard County, Florida 1974-2001



Data Source: 1974-2001 Manatee Mortality Database, Florida Fish and Wildlife Conservation Commission, Atlas of Marine Resources CD rom Version 1.3b, Florida Fish and Wildlife Conservation Commission
 Brevard County NRMO, in cooperation with other agencies, prepares and uses this information for its own purposes. It may not be suitable for other purposes, and is provided "as is." For further information contact (321) 633-2016

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Figure 11. Human-related Manatee Mortality among the 13 "Key" Counties 1974-2001

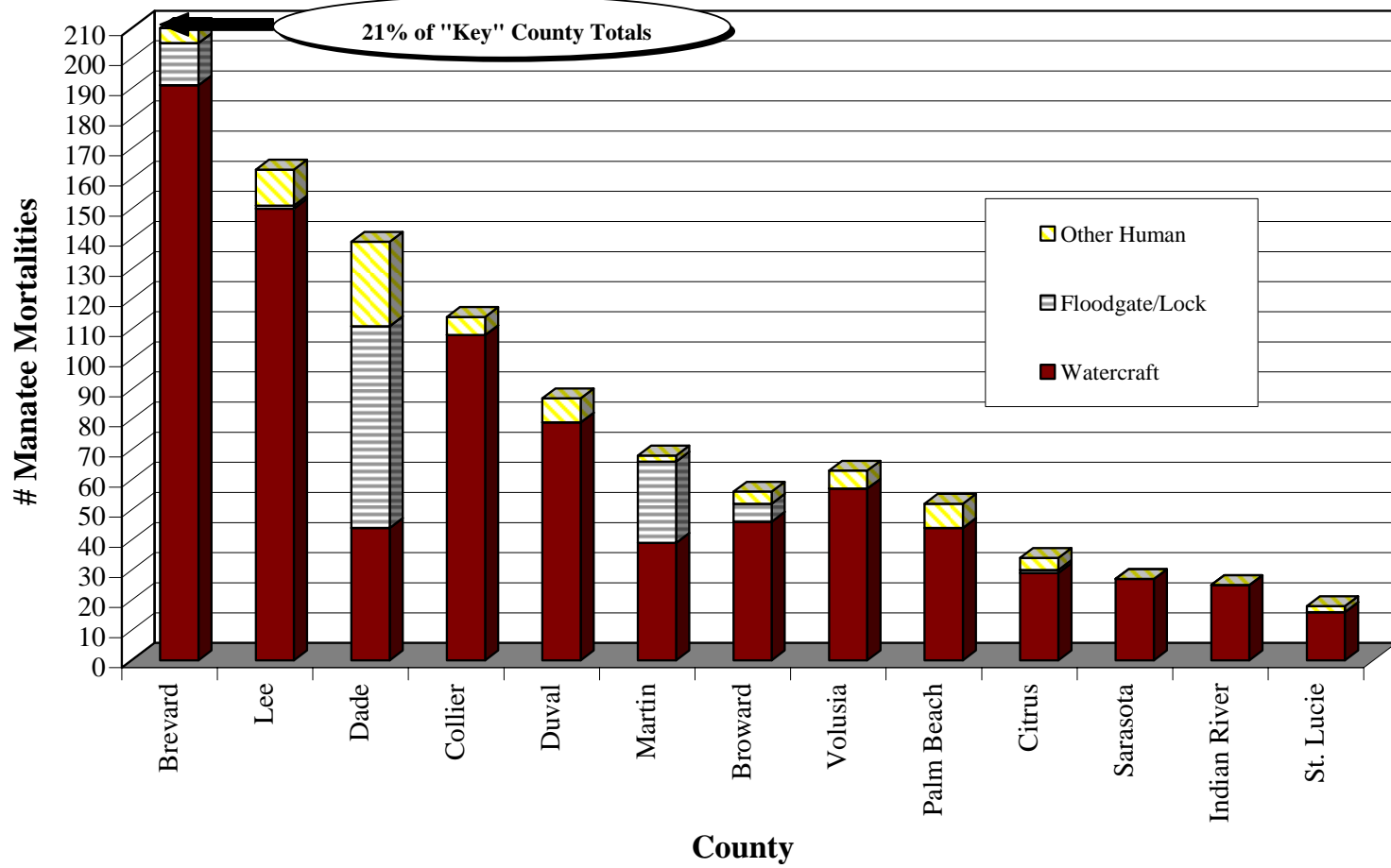
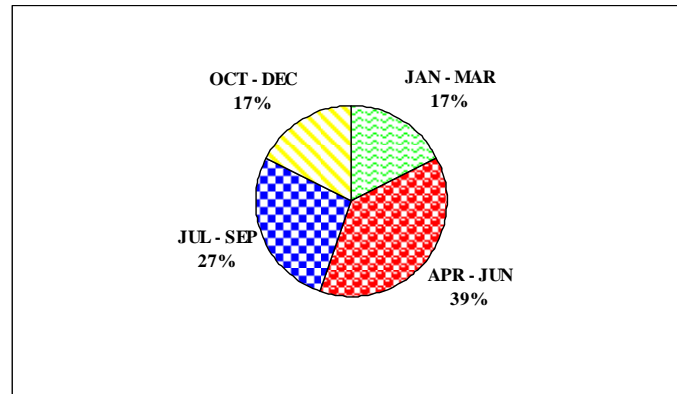


Table 4. Seasonal Analysis of Manatee Mortality in Brevard County, Florida 1974-2001

Y E A R

MONTH	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	TOTAL
JAN						1								1				1					1	1		1	2	1	9
FEB							1							1		1			1				3				1	2	10
MAR								1				1		1		2			2		1		1	1		2	2		14
APR						1		2					1	1	1	4	1	2		1	2		1	4		2	5		28
MAY		1		1	1	1	1		1		1	3				3	1	1		1		1	2			1	1	2	23
JUN					3	2	1					1			1			2	2	1	1		2		2	2	1	1	22
JUL							1		1		2	1	3		1					1	3	1				2			16
AUG						1	1	1				2		2	1		2	3		1	1	1		2	1	1	1		21
SEP				2		1	1				1			1		1			1	3	1	1	2						15
OCT			1			2	1								1	1		1	1				1	1			1		11
NOV														1	1									3	2	1			8
DEC						1		1		1				1				3		1		2			4				14
TOTAL	0	1	1	3	4	10	7	5	2	1	4	8	4	6	8	10	7	13	7	9	9	6	13	12	9	12	13	7	191



Note that watercraft-related manatee deaths during the winter months (November through March) were in fact the lowest of any season. The Brevard County Boating Survey, (Section 3.3.3.), found that fall and winter are the peak use period for Intracoastal transient boating activities in the IRL. Although many boaters are using the IRL during this period, they are typically operating in a linear pattern within the ICW, and manatees are generally concentrated at or near the power plant effluent zones, or they have migrated out of Brevard County to escape the cooler water temperatures. This combination of factors may offer one possible explanation of the observed inverse ratio of ICW boating activity and manatee deaths in the winter months. Non-linear boat traffic has been proposed as a prime reason for manatee boat strikes. Random boating patterns and the multi-directional nature of sound in water, combined with the structure of the manatee ear may not allow the manatee to determine which direction the boat is traveling. Other explanations include: manatees not having enough time between hearing a fast moving boat and finding an escape route, and multiple boats operating in the same area causing the manatee to be unable to locate the direction of the on-coming boat and take evasive action (Gerstein et al. 1994, Weigle et al. 1994).

Large mammals like the manatee, which have a long potential life span and slow reproductive rate, normally have a low adult mortality rate. Presently for manatees, watercraft-related manatee mortality affects all age classes of manatees, but is the leading cause of death of adult manatees (Marmontel 1993). This loss of adult manatees is particularly problematic. High adult survival is crucial for growth in a population of large mammals (Eberhardt and Siniff 1977), and adult mortality has the greatest effect on the annual rate of population increase (Eberhardt and Siniff 1977, Fowler and Smith 1973, Marsh et al. 1984, Packard 1985). Figure 11 illustrates the positive correlation between number of registered watercraft and watercraft-related manatee mortality.

Manatee population viability analysis and population modeling completed by Marmontel (1993) indicated that an increase in adult mortality increased the probability of extinction. Marmontel concluded that reducing adult manatee mortality is the most effective method to increasing the manatee's recovery rate, and that the reduction of watercraft-related mortality is the most productive and reliable means to reduce adult manatee mortality. Other causes of manatee mortality do not affect the adult age class in numbers as large or significant as watercraft mortality. A reduction in watercraft-related mortality would allow more female manatees to live to older age classes, at which reproductive success improves, as well as the population's rate of increase and recovery (Marmontel 1993).

The high number of watercraft-related deaths in Brevard County has prompted several detailed studies that attempted to define cause-effect relationships between the physical factors of the IRL, existing boating patterns, and manatee habitat preferences. A discussion of these studies was reported in Beeler and O'Shea (1988) and is summarized below:

In a statewide analysis of mortality data gathered over a five year period ending in 1981, O'Shea, et al. (1985) noted that boat-caused mortality was greatest in northeastern Florida, particularly in Brevard County. Boat-caused mortality in this region was independent of sex, year, or season.

However, adult-sized manatees constituted a disproportionate percentage of boat deaths in comparison with other causes. This finding could have serious implications because of a potential negative effect on population dynamics (O'Shea et al. 1985).

Kinnaird (1983) investigated a variety of factors that influenced the probability of manatees being killed by boats in northeastern Florida. Brevard County was studied in detail. The county was divided into 12 zones. Within each zone, values were calculated for mortality density (based on March 1976 through July 1983 mortality data), manatee density (based on data from Shane {1981}), boat facility density, boat traffic density, boat size, linearity of travel, salinity, channel width, channel depth, and seagrass bed bottom coverage. Manatee mortality among all zones was not correlated with any factor other than percent bottom coverage with aquatic vegetation. However, when the analysis was limited to only those zones in which mortality had occurred (zones with zero deaths excluded) mortality density was positively correlated with boat density and slip density, and negatively correlated with salinity.

Higher amounts of vegetation, non-linear patterns of boat traffic, and lower density of large (> 7.3 m) boats characterized zones in which mortality had occurred (Kinnaird 1983). Manatees avoided high boat density zones except in winter, when water temperature may impose limits on manatee's distribution. Previous strikes by boats (based on healed scar pattern counts) and sex had no relationship with mortality due to boat strikes.

Manatees killed by propeller wounds were killed by the largest propellers in the vicinity of the Barge Canal, propellers of intermediate size in the Indian River, and propellers of smaller size in the Banana River. Kinnaird (1983) stated that small boats were as likely to kill manatees as large boats in Brevard County, probably due to the greater non-linearity of boat traffic patterns characteristic of small boats.

The Brevard County findings indicated a correlation between density of aquatic vegetation and manatee mortality. In addition, the occurrence of food in the mouths of boat-killed manatees supported a position that proximity of boat traffic to beds of aquatic vegetation can lead to increased manatee deaths (Kinnaird 1983).

More recent analysis of mortality data indicates a strong correlation between season and watercraft mortality in Brevard County. The data show that the majority of watercraft-related mortality is due to impacts, rather than prop cuts, and that fatal impact injuries often occurred as a result of fast-moving small to medium-sized watercraft (Ackerman et al. 1992, Wright et al. 1992).

E. MANATEE LEGISLATION AND PROTECTION

1. FEDERAL PROTECTION

The USFWS is given authority to manage and protect manatees through the Endangered Species Act of 1973, as amended (16 U.S.C. 1531) (the Act) and the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407). West Indian manatees (*Trichechus manatus*) were among the first species to be listed as an endangered species in 1967. This listing action made sure that the manatee would be protected by:

- enforcing protection measures described in the Act. The act specifically prohibits any human activities which harass, hunt, capture, or kill manatees. Harassment is defined as "...an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (USFWS 1989; 1995).
- ensuring that Federal activities do not jeopardize the continued existence of the manatee. Biological opinions are provided by the USFWS to Federal agencies in order to protect manatees from their respective activities; these opinions typically recommend actions which, if taken, will reduce impacts to the manatees and their habitat. This process specifically protects habitat which is known to be critical to the survival of the species.
- protecting habitat through the designation of sanctuaries and refuges.

The Endangered Species Act defines sanctuaries, refuges, and critical habitats as mechanisms to identify areas in need of special management and protection, in order to help preserve populations of manatees. "Sanctuaries" are protected areas where human activities are completely prohibited. In these areas manatees can breed, nurse, and rest without human disturbance. "Refuges" are areas where human presence is allowed, but activities deemed to cause disturbance or harassment to manatees are restricted. "Critical habitats" are defined as areas that are essential to the conservation of the species. Development and other human activities in designated critical habitats are subject to regulation and review by the USFWS. [NOTE: The entire estuarine area of Brevard County, including all natural and man-made waterbodies connected to the IRL complex, is considered critical habitat by the USFWS.]

The USFWS has other responsibilities under the Act. These include oversight of manatee recovery activities, providing grants to states to assist with manatee conservation activities and, most importantly, an obligation to recover the species to the point where it can be removed from the endangered species list.

Activities necessary to recover the species were first described in 1980 in the USFWS's Florida Manatee Recovery Plan. This document, subsequently revised in 1989, and again in 1995, describes actions which, if taken, should result in the recovery of the species. The long range goal described in this plan is to "maintain the health and stability of the marine

ecosystem and to determine and maintain the manatee's numbers at optimum sustainable population levels in the southeastern United States."

In 1988, the USFWS designated the north Banana River as a "Manatee Sanctuary" in which no power boats are allowed. Research has shown this area to be increasingly important to the local and transient manatee population for feeding, resting, and calving (Marine Mammal Commission 1988, Provancha and Provancha 1989).

2. STATE PROTECTION

The Florida Manatee Sanctuary Act, Subsection 370.12 (2), Florida Statutes (F.S.), provides for manatee protection by the State of Florida. State responsibilities for manatee protection fall under the jurisdiction of the FWC. The implementing policies and procedures of this agency are found in Title 68 of the Florida Administrative Code.

In an October 24, 1989 action that recognized the relationship between boating safety, education, and manatee protection, Florida's Governor and Cabinet made several recommendations. Conceptual approval was given to the FDEP (now the FWC) to proceed with legislative proposals for amendments to the Florida Manatee Sanctuary Act. These amendments sought to increase protection for manatee habitat, to protect manatees from harmful acts, and to authorize local governments to protect manatees through local ordinances (FDNR 1989). The adoption of a boating facility expansion policy for 13 key counties, including Brevard, was also approved. This policy limits construction of new or expanded boating facilities to one power boat slip per 100 feet of shoreline, until an approved MPP and boat facility siting policy have been implemented by the affected local government. Further, the Governor and Cabinet directed the FWC to present recommendations for priority acquisition of critical manatee use areas under the CARL program and to strengthen aquatic preserve management plans for seagrass protection.

3. OBJECTIVES FOR COUNTY PROTECTION PLANS

State recommendations for manatee protection objectives developed by local governments include: protecting manatee habitat, reducing the number of human-related manatee mortalities, achieving an optimal sustainable manatee population, promoting boating safety, and increasing public awareness of the need to protect manatees and their environment. By having Brevard County's Manatee Protection Plan developed by a local ad-hoc committee, a balance should be reached between endangered species protection, boating safety, and public resource use.

4. COUNTY PROTECTION

In 1976, Brevard County Board of County Commissioners passed a resolution declaring all waters of Brevard County to be Manatee Sanctuaries. In 1997, a resolution revising the Brevard County Manatee Sanctuary Resolution was adopted (Appendix 2). This new resolution recognized Brevard County as significant manatee habitat without using language that had State or Federal regulatory significance. In 1985, the State of Florida passed the Growth Management Act that required all local governments to develop Comprehensive

Growth Management Plans. These plans require all local governments to develop a strategy that would guide and control future growth. In 1988, Brevard County became the first county to submit a comprehensive plan (Comp Plan) for State approval. The Board of County Commissioners approved a variety of policies within the Comp Plan that would protect the aquatic and wildlife resources of the County. The development of a MPP was specifically identified in the Coastal Management Element, Policy 14.8. Appendix 3 lists pertinent policies and criteria addressing manatee protection.

5. MANATEE PROTECTION BOAT SPEED ZONES

The State rationale behind the establishment of the manatee zones is to reduce the high numbers of watercraft-related manatee mortality in the 13 key counties, and statewide (FDNR 1989). All key counties are under evaluation for implementation of manatee zones. Manatee zones in Brevard County have been established on Federal, State, and County levels. Manatee zones may be designated as “Idle Speed,” “Slow Speed,” “25 MPH,” “30 MPH,” “35 MPH,” “Motorboats Prohibited,” or “No Entry” as established in the Florida Manatee Sanctuary Act. Manatee zones may also have seasonal regulations that vary depending on manatee use.

a. Current Federal Manatee Zones

NORTH BANANA RIVER (NORTH OF S.R. 528)

Motorboats Prohibited Zone

The Banana River Manatee Sanctuary was established in 1990 by the USFWS in Banana River north of the Barge Canal. The southeast terminus of the zone is marked by the power pole line that extends east-west across the Banana River. The southwest terminus is a line extending from KARS Park to the navigation channel. This zone was established due to the high number of manatees (365 manatees in one survey) that have been documented using this region each spring. The zone joins the previously restricted NASA Security zone north of NASA Causeway (Figure 12).

The Haulover Canal, Barge Canal, Sykes Creek, and Cocoa Beach Manatee Refuges are also protected by State speed zones (see Current State Manatee Protection Zones below).

HAULOVER CANAL

Slow Speed Zone Minimum Wake (All Year)

The Haulover Canal Manatee Refuge is described as all waters lying within Haulover Canal in Brevard County, Florida; containing approximately 8.95 ha (22.11 acres). The slow speed zone extends the length of the canal (Figure 13).

Figure 12. Federal Motorboat Prohibited Zone, North Banana River

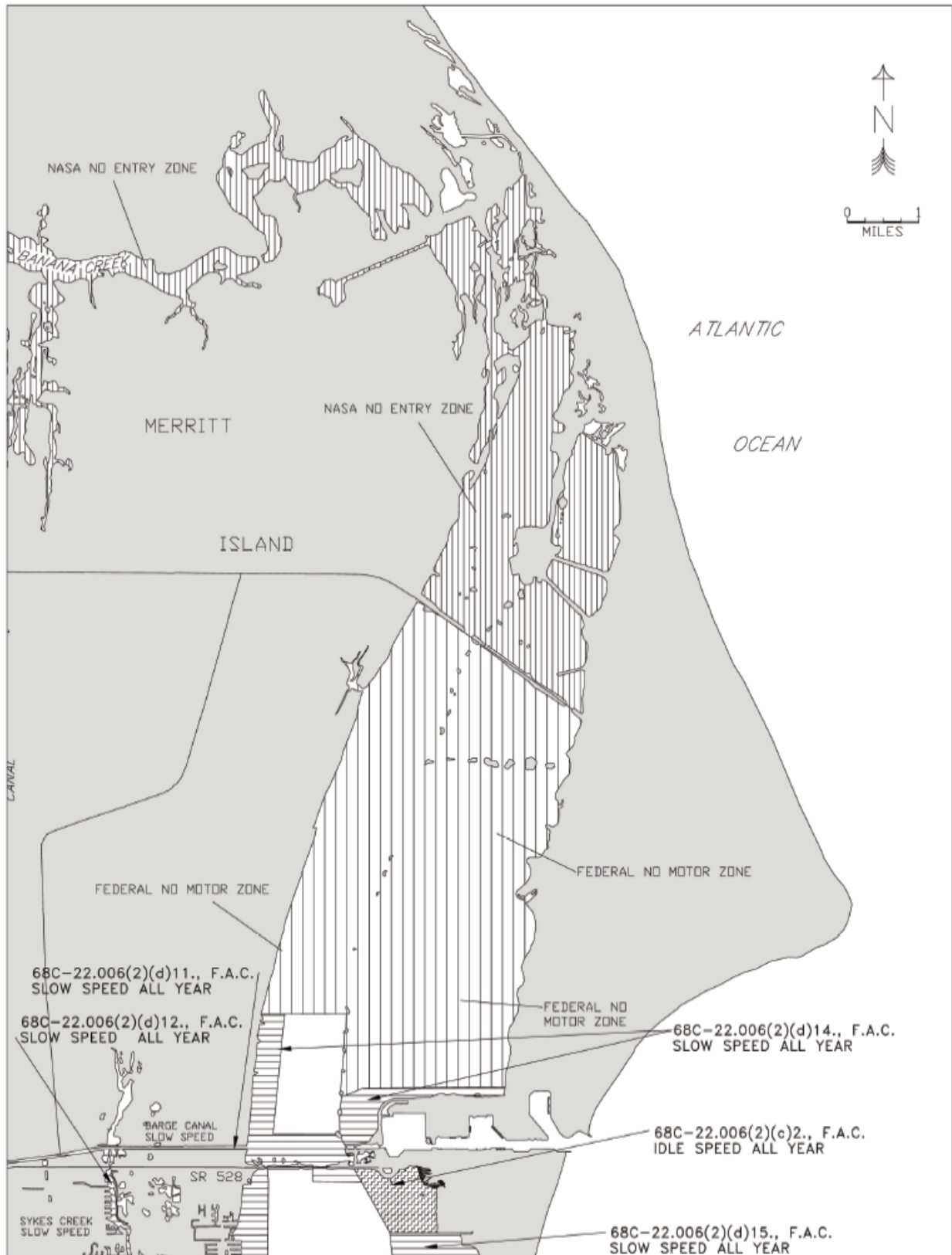
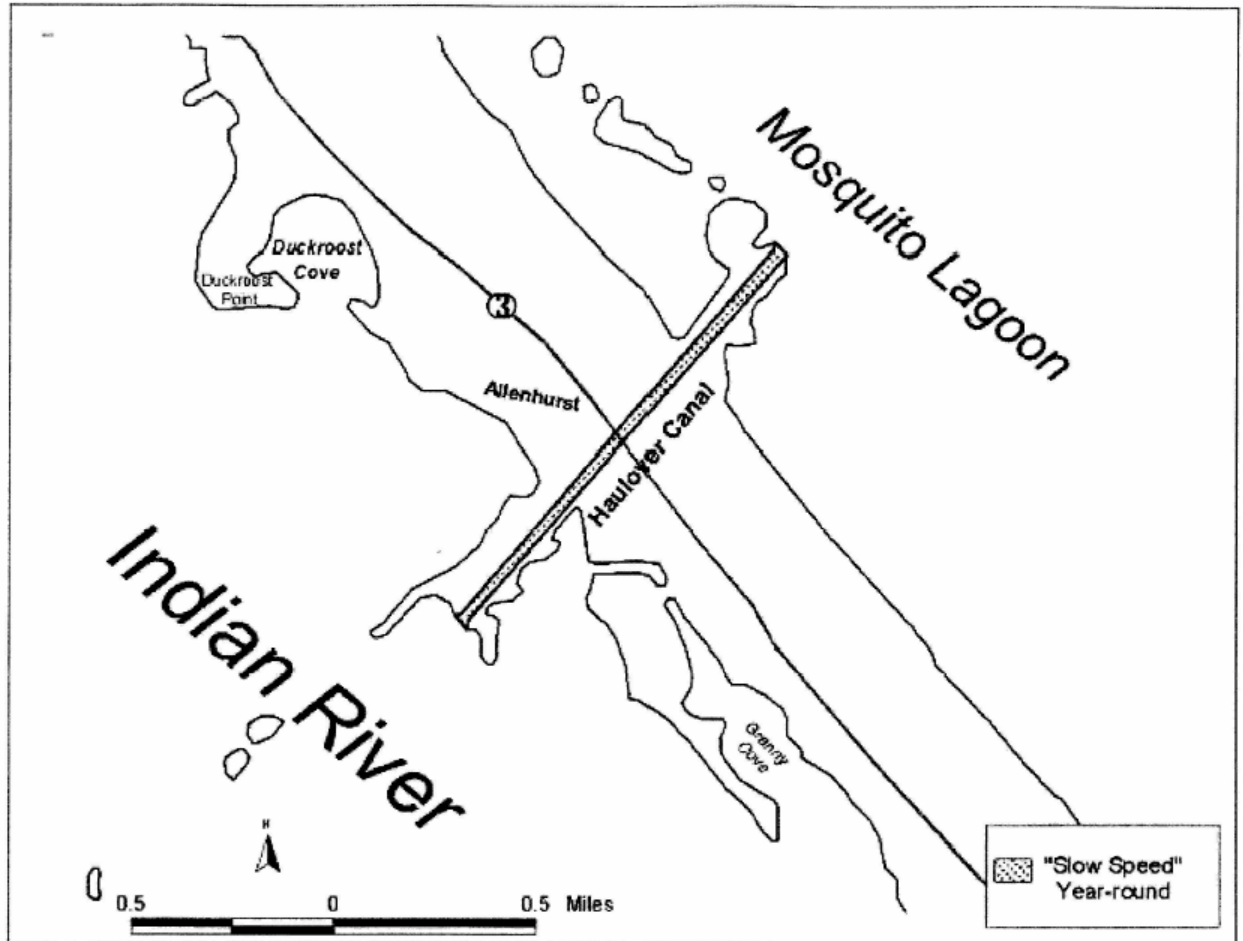


Figure 13. Federal Manatee Refuge, Haulover Canal



BARGE CANAL

Slow Speed Zone (All Year)

The Barge Canal Manatee Refuge is described as all waters lying within the banks of the Barge Canal, Brevard County, including all waters lying within the marked channel in the Banana River that lie between the east entrance of the Barge Canal and the Canaveral Locks; containing approximately 276.3 ha (682.7 acres) (Figure 14).

SYKES CREEK

Slow Speed Zone (All Year)

The Sykes Creek Manatee Refuge is described as all waters, including the marked channel in Sykes Creek, Brevard County. In particular, the portion of Sykes Creek southerly of the southern boundary of that portion of the creek commonly known as the “S” curve (said boundary being a line bearing East from a point on the western shoreline of Sykes Creek at approximate latitude 28° degrees 23' 24" North, approximate longitude 80° degrees 41' 27" West) and northerly of the Sykes Creek Parkway; containing approximately 342.3 ha (845.8 acres) (Figure 15).

COCOA BEACH

Slow Speed Zone (All Year)

The Cocoa Beach Manatee Refuge is described as the waterbody west of Municipal Park within the City of Cocoa Beach, Florida, commencing at a point 45.7 meters (150 feet) west of the southwest corner of the canal running between Willow Green and Country Club Roads, thence southerly (and parallel to the golf course shoreline) to a point 45.7 meters (150 feet) west of the southwest corner of the Municipal Golf Course shoreline, thence south to marker “502,” thence westerly (inclusive of the area known as the “400 Channel”) to Red marker “500,” thence northerly to Red marker “309,” inclusive of the “400 Channel,” thence southeasterly to the southwest corner of the canal referenced as the point of origin, all these waters being within the eastern half of Sections 8 and 17, Township 25 South, Range 37 East; containing approximately 23.9 ha (59.1 acres) (Figure 16).

b. Current State Manatee Protection Zones

The following is a brief description of the existing manatee zones within Brevard County as described in Rule 68C-22 Florida Administrative Code. Areas outside the zones may be unregulated for speed, unless a boating safety zone is in effect. All described zones are year-round unless otherwise stated. FWC may issue permits that affect the stated restrictions within a specific manatee zone for the following: residents who must pass through a “Motorboat Prohibited” zone or a “No Entry” zone, commercial fishermen and professional fishing guides who meet a set of requirements and can demonstrate that the speed restriction creates a

Figure 14. Federal Manatee Refuge, Barge Canal

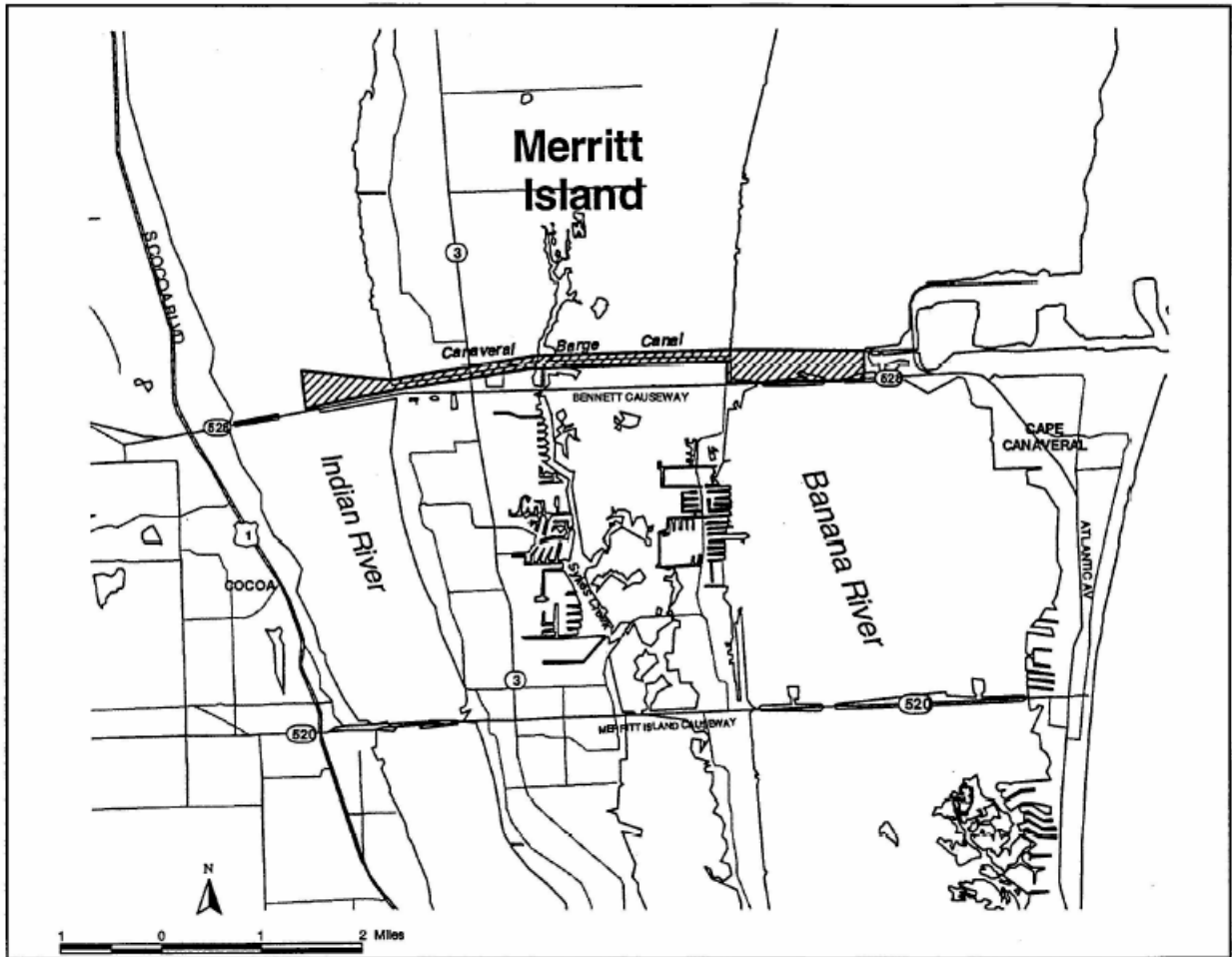


Figure 15. Federal Manatee Refuge, Sykes Creek

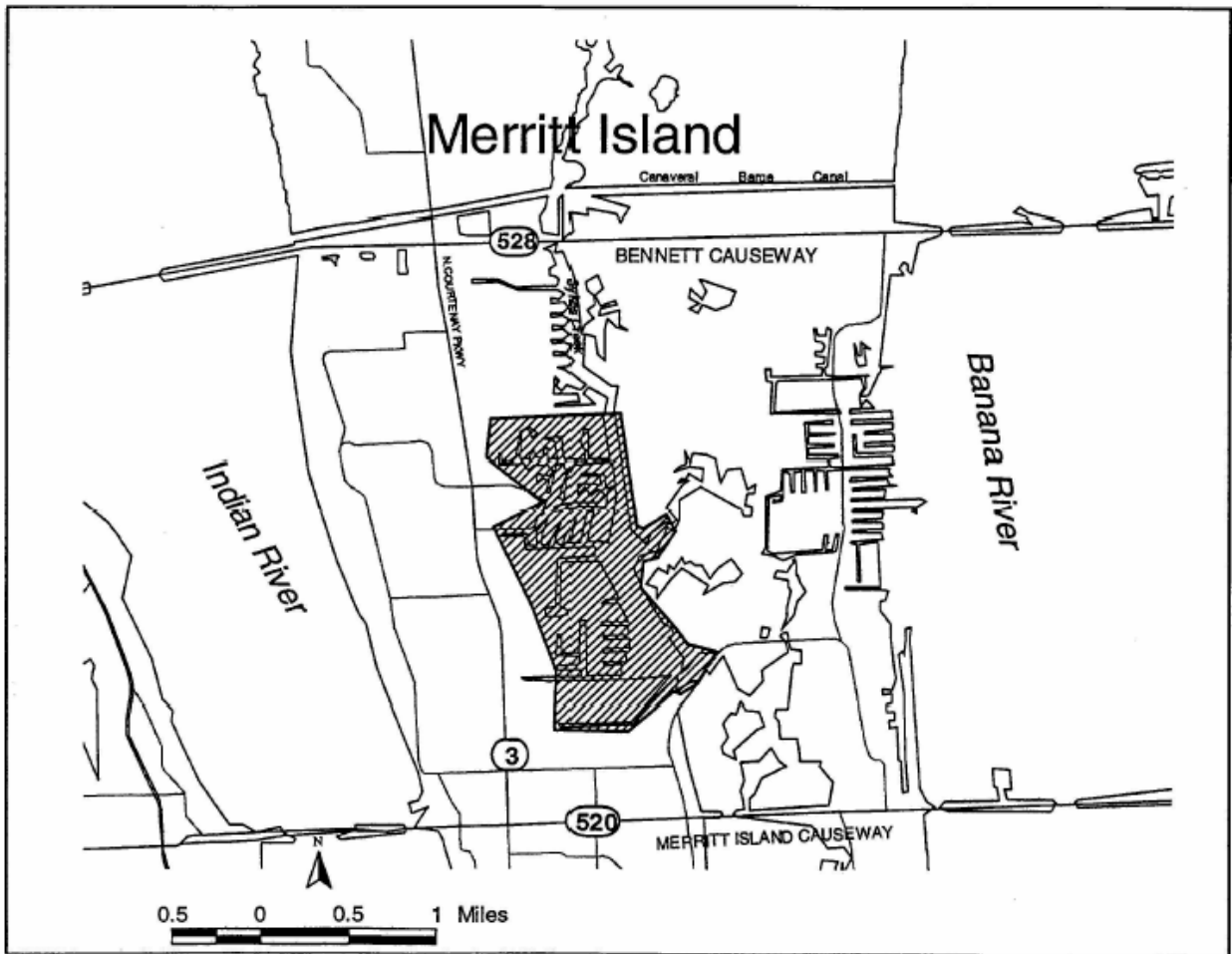
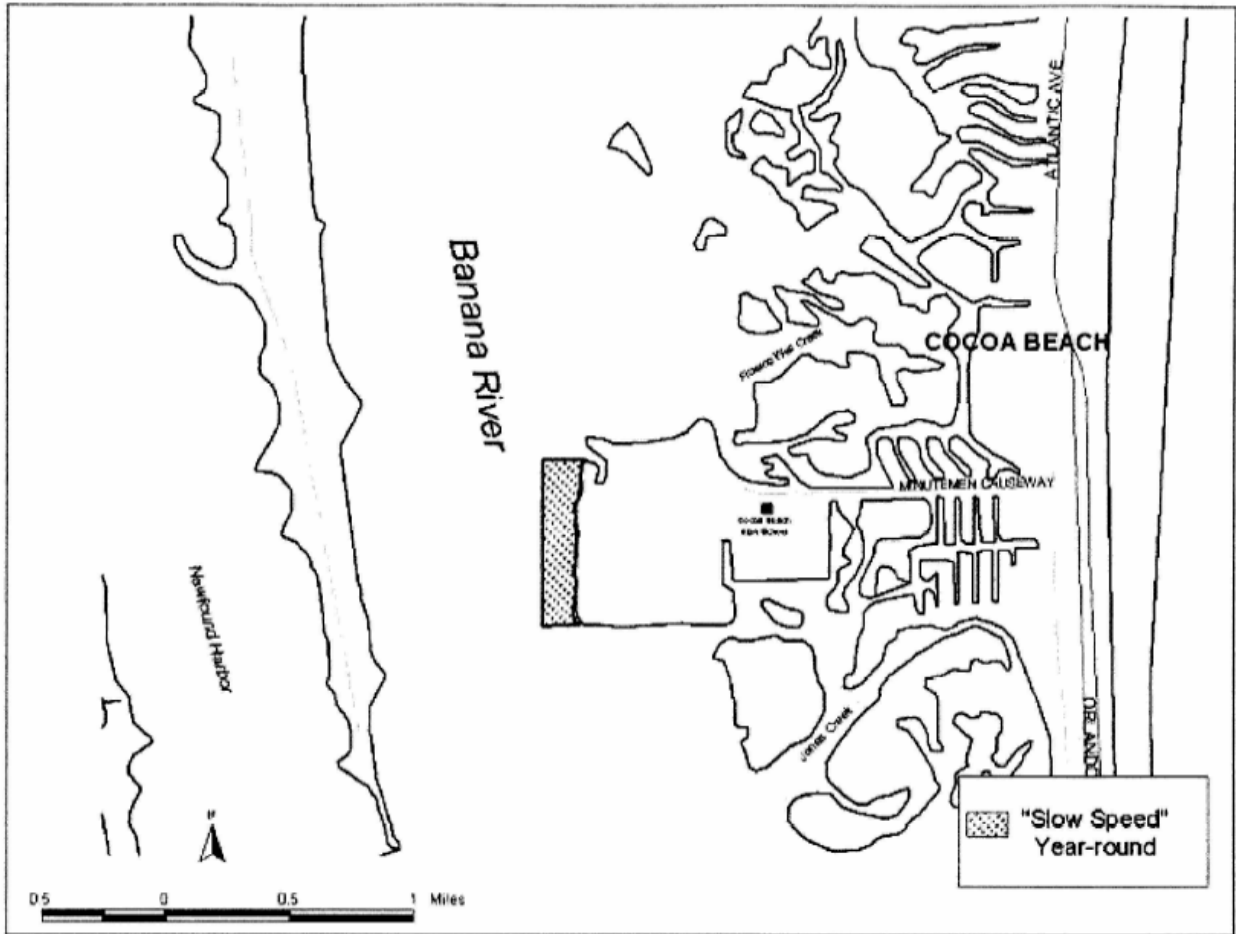


Figure 16. Federal Manatee Refuge, Cocoa Beach



substantial hardship, boat motor and/or vessel manufacturers who can demonstrate a hardship in relation to testing operations, or for scientific and educational purposes. Requirements for permits are set forth in Rule 68C-22.003, F.A.C. Any person, or company wishing to be considered for a permit may do so using the appropriate application procedure identified in 68C-22.003, F.A.C.

MOSQUITO LAGOON

In the Mosquito Lagoon, the speed regulation applies to the waters from the Volusia County Line south to Haulover Canal (Figure 17).

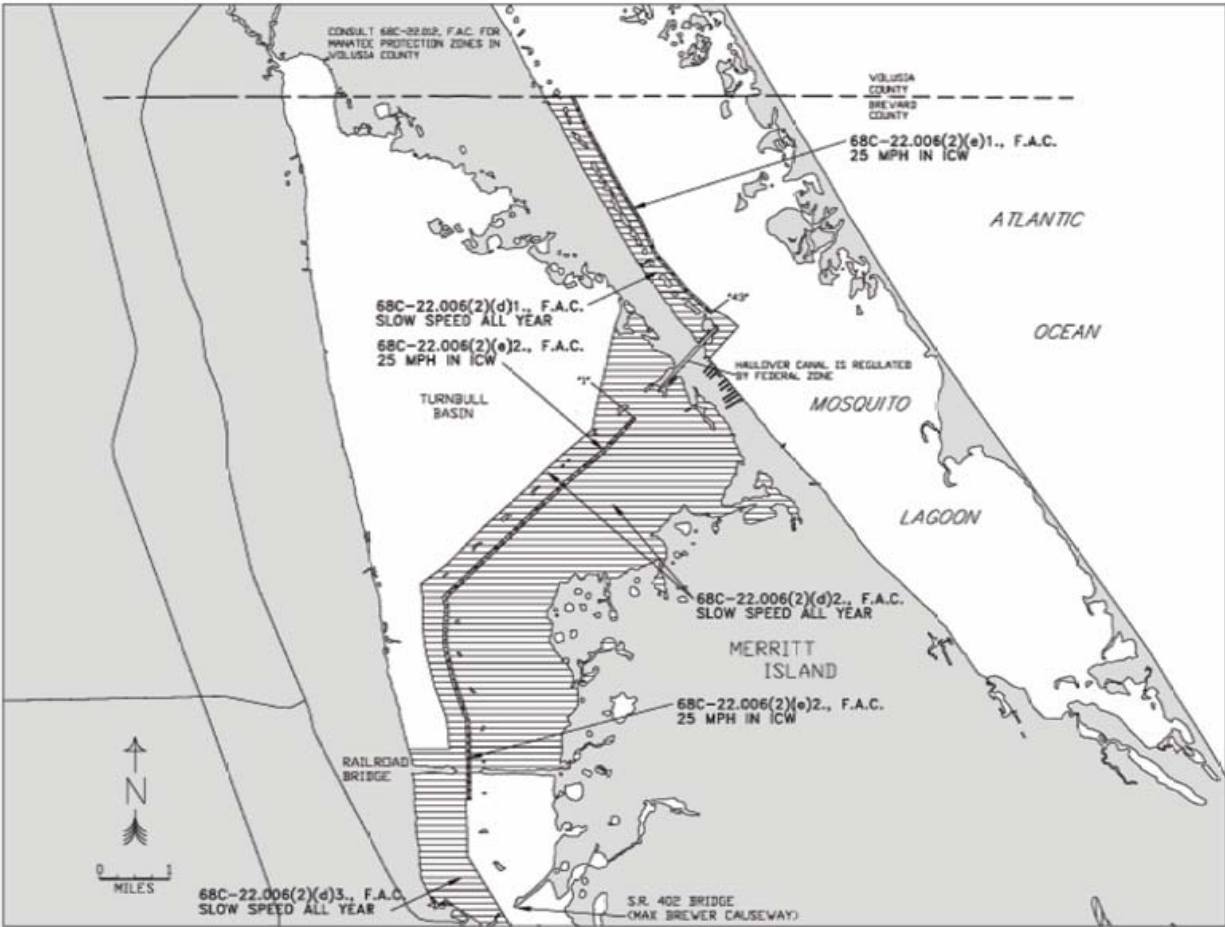
25 MPH Zone (All Year)

All waters in the ICW channel south of the Volusia County/Brevard County line and north of ICW channel marker “43” (north of Haulover Canal).

Slow Speed Zone (All Year)

All waters of the Mosquito Lagoon west of the ICW channel, south of the Volusia County/Brevard County line, and north of ICW channel marker “43,” and; All waters of Mosquito Lagoon (including the ICW channel) south of ICW channel marker “43,” southwest of a line commencing at ICW channel marker “43” and then running to ICW channel marker “45” and then on a bearing of 132° for a distance of 1,000 feet to the line’s terminus at a point in Mosquito Lagoon (approximate latitude 28° 44’ 35” North, approximate longitude 80° 44’ 35” West), and north of a line running from said point in Mosquito Lagoon on a bearing of 221° to the western shoreline of Mosquito Lagoon.

Figure 17. Manatee Speed Zones in the Mosquito Lagoon and the North Indian River (Turnbull Basin)



INDIAN RIVER NORTH (TURNBULL BASIN TO S.R. 528)

No Entry Zone (November 15 – March 31)

- a) Reliant Corporation Delspine Power Plant Area: All waters within the discharge canal of the Reliant Corporation Delspine power plant, and; All waters southerly of a line extending eastward from and following the same bearing as the southernmost seawall of the power plant discharge canal, with said line bearing approximately 70°, westerly of a line 250 feet east of and parallel to the western shoreline of the Indian River, and northerly of the jetty on the north side of the power plant intake canal (Figures 18 and 19).
- b) Florida Power and Light (FPL) Power Plant Area: All waters in the vicinity of the FPL power plant southerly of a line connecting the northern guy wires of the power poles immediately north of the FPL Unit 2 discharge area from the western shoreline of the Indian River to the third power pole east of the western shoreline (approximately 1,650 feet east of the shoreline), and westerly of a line running from said third power pole to the easternmost point (approximate latitude 28° 28' 07" North, approximate longitude 80° 45' 19" West) of the jetty on the north side of the FPL intake canal (Figures 18 and 19).

Motorboat Prohibited Zone (All Year, except as noted)

Reliant Corporation Delspine Power Plant Area: All waters in the vicinity of the Reliant Corporation power plant southerly of a line bearing 90° from a point (approximate latitude 28° 29' 41" North, longitude 80° 46' 35" West) on the western shoreline of the Indian River 95 feet north of the northernmost seawall of the power plant discharge canal, westerly of a line extending 250 feet east of and parallel to the western shoreline of the Indian River, and northerly of a line extending eastward from and following the same bearing as the southernmost seawall of the power plant discharge canal, with said line bearing approximately 70°. This zone is in effect from November 15-March 31 (Figures 18 and 19).

25 MPH Zone (All Year)

- a) Turnbull Basin and Titusville Area: All waters in the ICW channel southwest of ICW channel marker "1" (southwest of Haulover Canal) and north of an east-west line 1,200 feet south of the point where the Florida East Coast Railroad Bridge crosses over the ICW (Figure 17).
- b) State Road 405 (NASA Parkway) Area: All waters in the ICW channel south of an east-west line 3,400 feet north of the point where the State Road 405 Bridge crosses over the ICW and north of an east-west line 3,000 feet south of a point where the State Road 405 Bridge crosses over the ICW (Figure 18).

Figure 18. Manatee Speed Zones in the North Indian River (Titusville to S.R. 528)

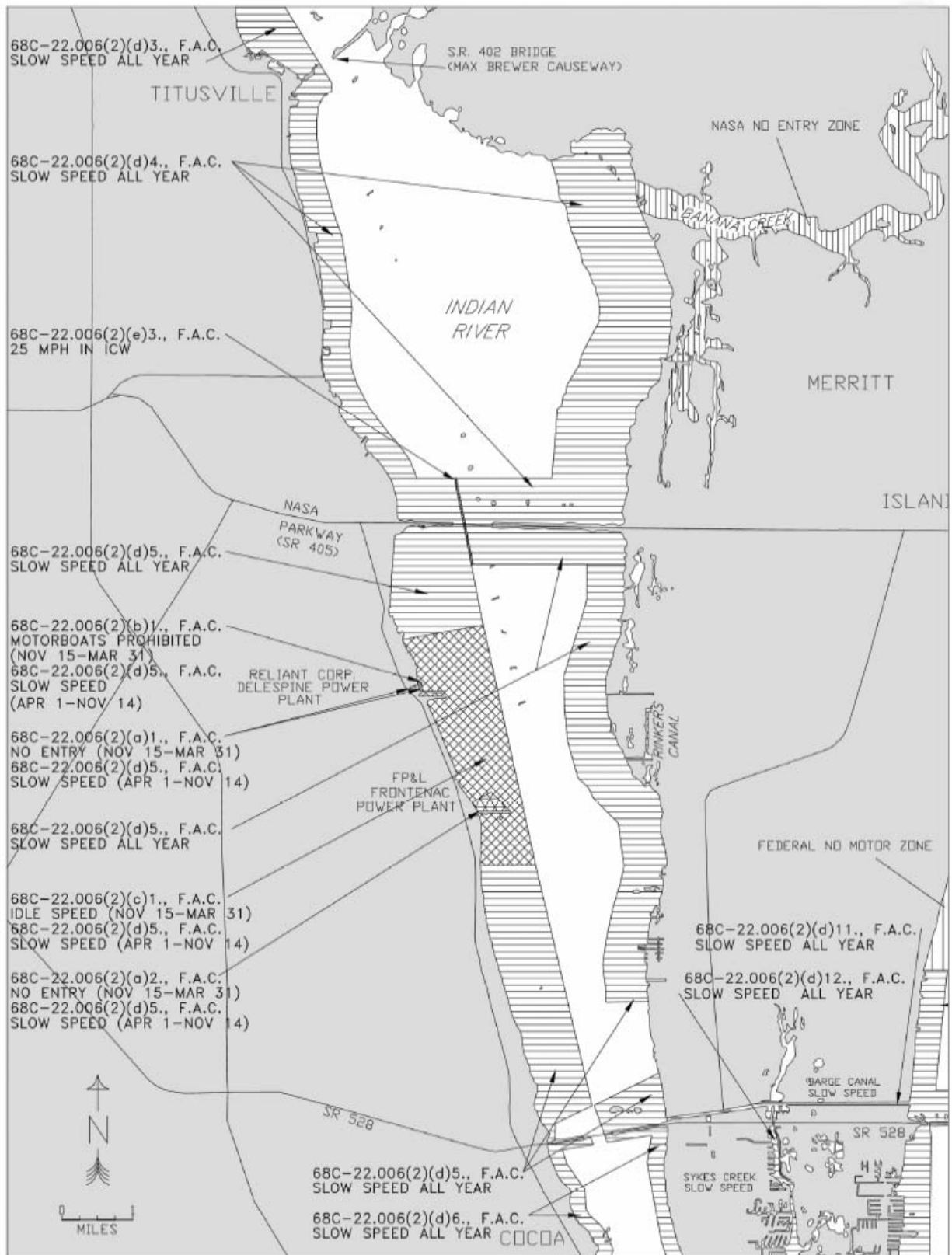
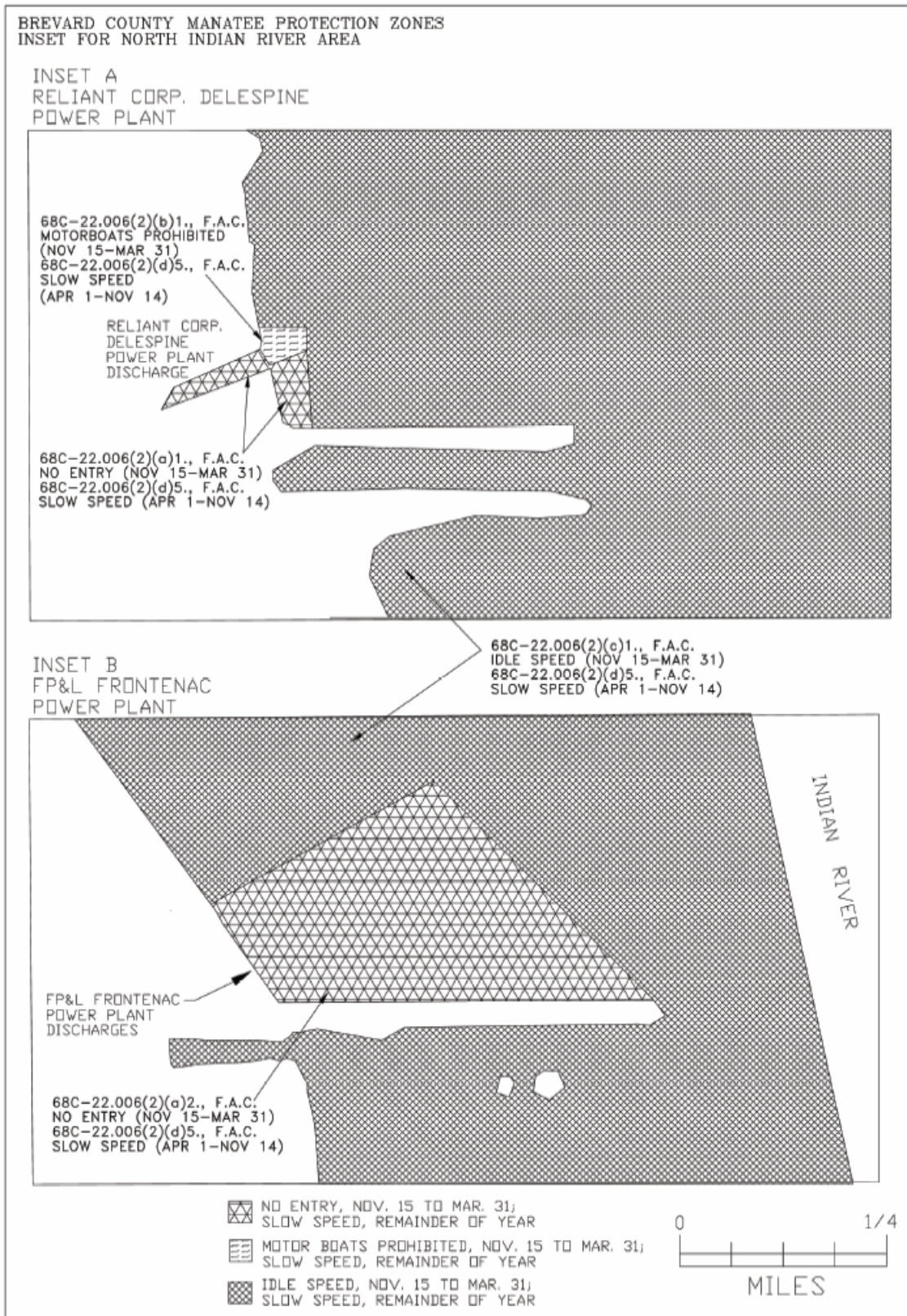


Figure 19. No Entry and Motorboat Prohibited Zones in the North Indian River



Slow Speed Zone (All Year)

Note: The City of Titusville has appealed the implementation of slow speed zones in Mosquito Lagoon and the Turnbull Basin Area.

- a) Turnbull Basin Area: All waters south and east of a line commencing at a point (approximate latitude 28° 44' 36" North, approximate longitude 80° 46' 19" West) on the eastern shoreline of Turnbull Basin (about one mile north of Haulover Canal and then bearing 193° to a point 1,500 feet northwest of the ICW, then running in a southwesterly direction 1,500 feet northwest of and parallel with the ICW to a point (approximate latitude 28° 41' 22" North, approximate longitude 80° 49' 05" West) 1,500 feet northwest of ICW channel marker "12," and then running in a southerly direction 1,500 feet west of and parallel with the ICW channel to the Florida East Coast Railroad Bridge, including all waters west of the ICW channel and south of an east-west line 1,500 feet north of the point where the Florida East Coast Railroad Bridge crosses over the ICW, but excluding the ICW as designated under (2) (e) 2 (Figure 17).
- b) Titusville Area: All waters west of the ICW channel south of the Florida East Coast Railroad Bridge and north of the State Road 402 Bridge and Causeway (Figure 17).
- c) State Road 402 (Max Brewer Causeway) to State Road 405 (NASA Parkway): All waters within 2,000 feet of the general contour of the western shoreline of the Indian River, excluding the ICW channel where the channel is less than 2,000 feet from the western shore; All waters within one mile of the general contour of the eastern shoreline of the Indian River south and east of a point (approximate latitude 28° 36' 04" North, approximate longitude 80° 44' 44" West) on the western shoreline of Peacock's Pocket (northwest of Banana Creek), and; All waters south of an east-west line 3,400 feet north of the point where the State Road 405 Bridge crosses over the ICW, excluding the ICW channel as designated under (2) (e) 3 (Figure 18).
- d) State Road 405 (NASA Parkway) to State Road 528 (Bennett Causeway): All waters north of an east-west line 3,000 feet south of the point where the State Road 405 Bridge crosses over the ICW, excluding the ICW channel as designated under (2) (e) 3; All waters west of the ICW channel and north of the overhead power transmission line that crosses the western shoreline of the Indian River approximately 1,200 feet north of State Road 528, excepting those areas otherwise designated for seasonal regulation under (2) (a), (b) 1, and (c) 1 when said seasonal zones are in effect; All waters south of said overhead power transmission line west of a north-south line running through the second power pole east of the western shoreline; All waters within one-half mile of the eastern shoreline of the Indian River north of a point (approximate latitude 28° 25' 47" North, approximate longitude 80° 43' 24" West) on the eastern shoreline of the Indian River 1,500 feet south of the canal on the southern side of Meadow Lark Lane, excluding all waters of Rinkers Canal, and; All waters of the ICW channel and south of the overhead

power transmission line that crosses the eastern shoreline of the Indian River approximately 3,900 feet north of State Road 528 (Figure 18).

Idle Speed Zone (November 15 - March 31)

All waters west of the western boundary of the ICW channel, south of a line bearing 90° from a point (approximate latitude 28° 30' 13" North, approximate longitude 80° 46' 48" West) on the western shoreline of the Indian River approximately three-fourths of a mile north of the Reliant Corporation Delspine power plant discharge canal, and north of a line bearing 90° from a point (approximate latitude 28° 27' 27" North, approximate longitude 80° 45' 43" West) on the western shoreline of the Indian River approximately three-fourths of a mile south of the Florida Power and Light Frontenac power plant discharge canal, except as otherwise designated under (2) (a) and (b) 1 (Figure 18).

INDIAN RIVER CENTRAL (S.R. 528 - S.R. 192)

Slow Speed Zone (All Year)

- a) State Road 528 (Bennett Causeway) to State Road 518 (Eau Gallie Causeway): All waters within 1,000 feet of the general contour of the western shoreline of the Indian River; All waters south of State Road 528 and within 500 feet of the State Road 528 Causeway, within 500 feet of the State Road 520 Causeway, within 500 feet of the State Road 404 Causeway, and north of State Road 518 and within 500 feet of the State Road 518 Causeway; All waters within 1,000 feet of the general contour of the eastern shoreline of the Indian River between State Road 528 and State Road 520; All waters east of the ICW channel from State Road 520 to an east-west line 300 feet south of the southernmost point (approximate latitude 28° 19' 22" North, approximate longitude 80° 42' 00" West) of the spoil island east of ICW channel marker "80" and; All waters within 500 feet of the general contour of the eastern shoreline of the Indian River south of the aforementioned east-west line and north of State Road 404 (Pineda Causeway) (Figures 20 and 21).
- b) State Road 518 (Eau Gallie Causeway) to Cape Malabar: All waters within 1,000 feet of the general contour of the eastern shoreline of the Indian River; All waters south of State Road 518 and within 500 feet of the State Road 518 Causeway and within 500 feet of the State Road 192 Causeway; All waters within 1,000 feet of the general contour of the western shoreline of the Indian River south of State Road 518 and north of the easternmost point (approximate latitude 28° 02' 24" North, approximate longitude 80° 34' 48" West) of Castaway Point (including all waters of the Eau Gallie River and Crane Creek), and; All waters south of said easternmost point of Castaway Point, north of Cape Malabar, and west of a line commencing at a point (approximate latitude 28° 02' 29" North, approximate longitude 80° 34' 38" West) in the Indian River 1,000 feet northeast of said easternmost point of Castaway point, then bearing 130° to the westernmost point

(approximate latitude 28° 02' 15" North, approximate longitude 80° 34' 19" West) of the spoil site west of the ICW channel marker "14", then bearing 153° to the westernmost point (approximate latitude 28° 01' 32" North, approximate longitude 80° 33' 55" West) of the spoil site southwest of the ICW channel marker "15," then bearing 138° to the line's terminus at a point (approximate latitude 28° 01' 12" North, approximate longitude 80° 33' 35" West) in the Indian River approximately 2,400 feet northeast of Cape Malabar (Figure 21).

INDIAN RIVER SOUTH (S.R. 192 TO THE BREVARD/INDIAN RIVER COUNTY LINE)

25 MPH Zone (All Year)

All waters in the ICW channel south of the ICW channel marker "59" and north of the Brevard County/Indian River County line. (Figure 22).

Slow Speed Zone (All Year)

- a) Cape Malabar to Grant: All waters within 1,000 feet of the general contour of the eastern shoreline of the Indian River south of Cape Malabar and north of a point (approximate latitude 27° 55' 59" North, approximate longitude 80° 30' 30" West) on the eastern shoreline of the Indian River (north of Mullett Creek); All waters south of Cape Malabar, north of the spoil island between ICW channel markers "25" and "27," and west of a line commencing at a point (approximate latitude 28° 01' 12" North, approximate longitude 80° 33' 35" West) in the Indian River approximately 2,400 feet northeast of Cape Malabar, then bearing 157° to the easternmost point (approximate latitude 28° 00' 26" North, approximate longitude 80° 33' 13" West) of the spoil site between ICW channel markers "16" and "17," then bearing 152° to the easternmost point (approximate latitude 27° 59' 21" North, approximate longitude 80° 32' 35" West) of the spoil island west of ICW channel marker "22," then bearing 166° to the line's terminus at the easternmost point (approximate latitude 27° 57' 50" North, approximate longitude 80° 32' 10" West) of the spoil island between ICW channel markers "25" and "27," All waters within 1,000 feet of the general contour of the western shoreline of the Indian River south of said island between ICW channel markers "25" and "27," and north of ICW channel marker "35," and; All waters west of the ICW channel between ICW channel markers "35" and "38" (Figures 21 and 22).

Figure 20. Manatee Speed Zones in the Central Indian River, North Banana River, Barge Canal, and Sykes Creek

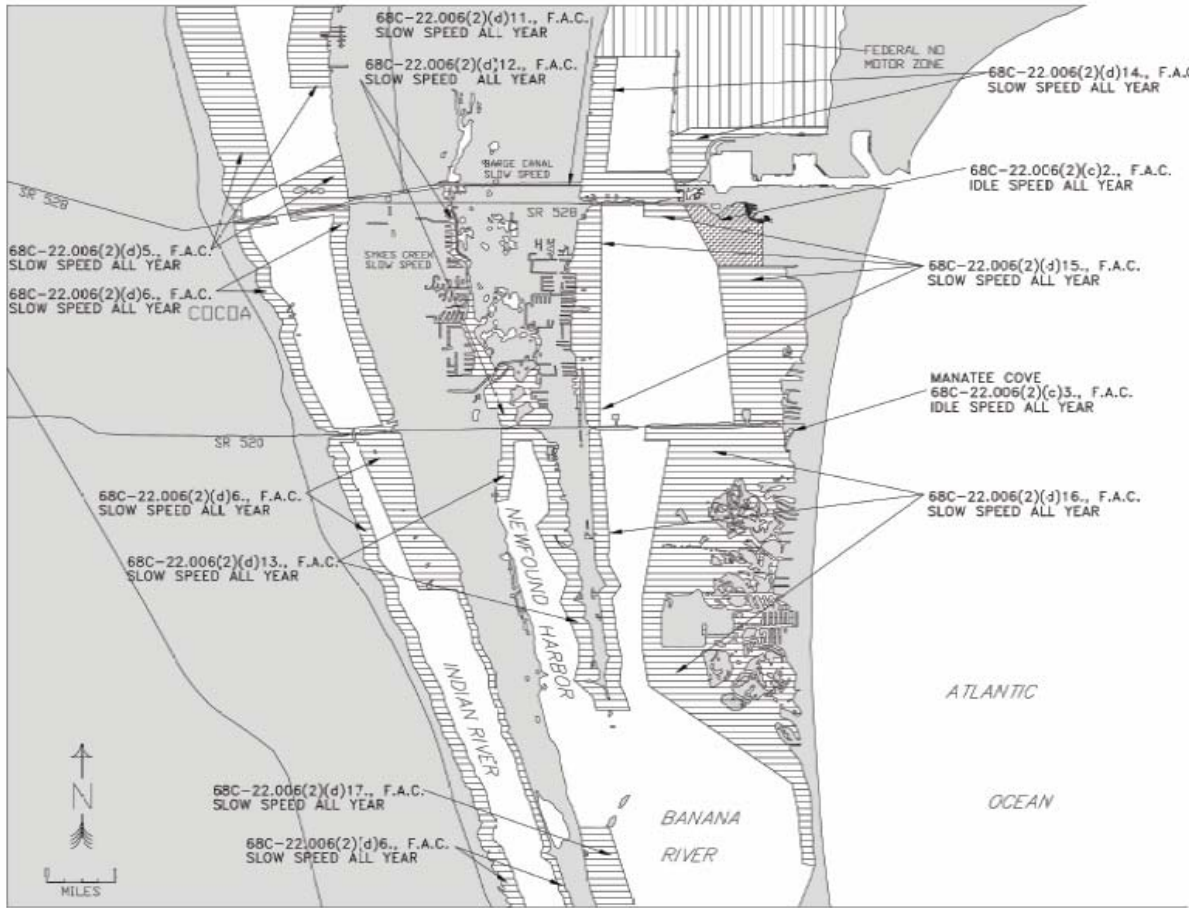


Figure 21. Manatee Speed Zones in the Central Indian River (S.R. 404 to Cape Malabar) and the South Banana River

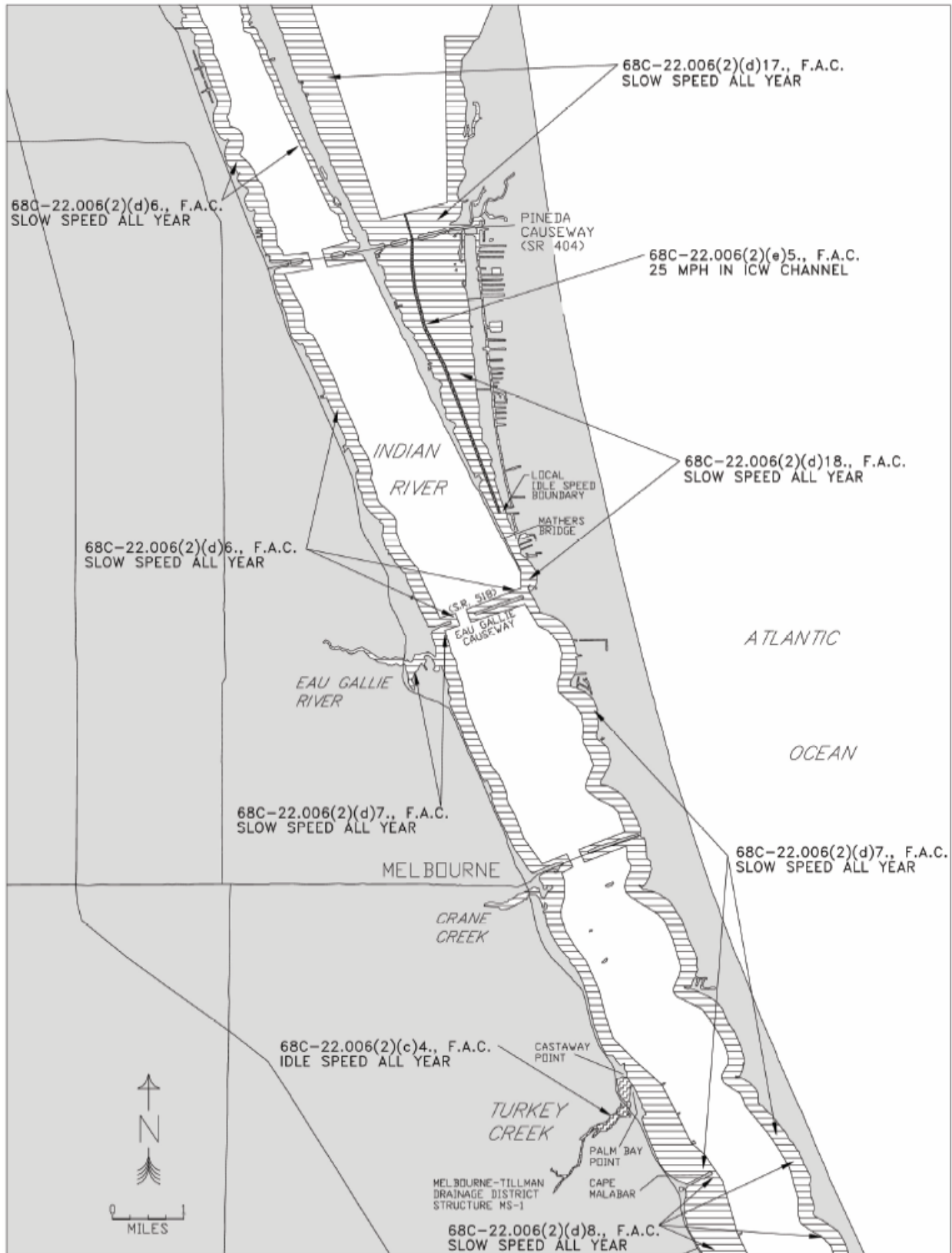
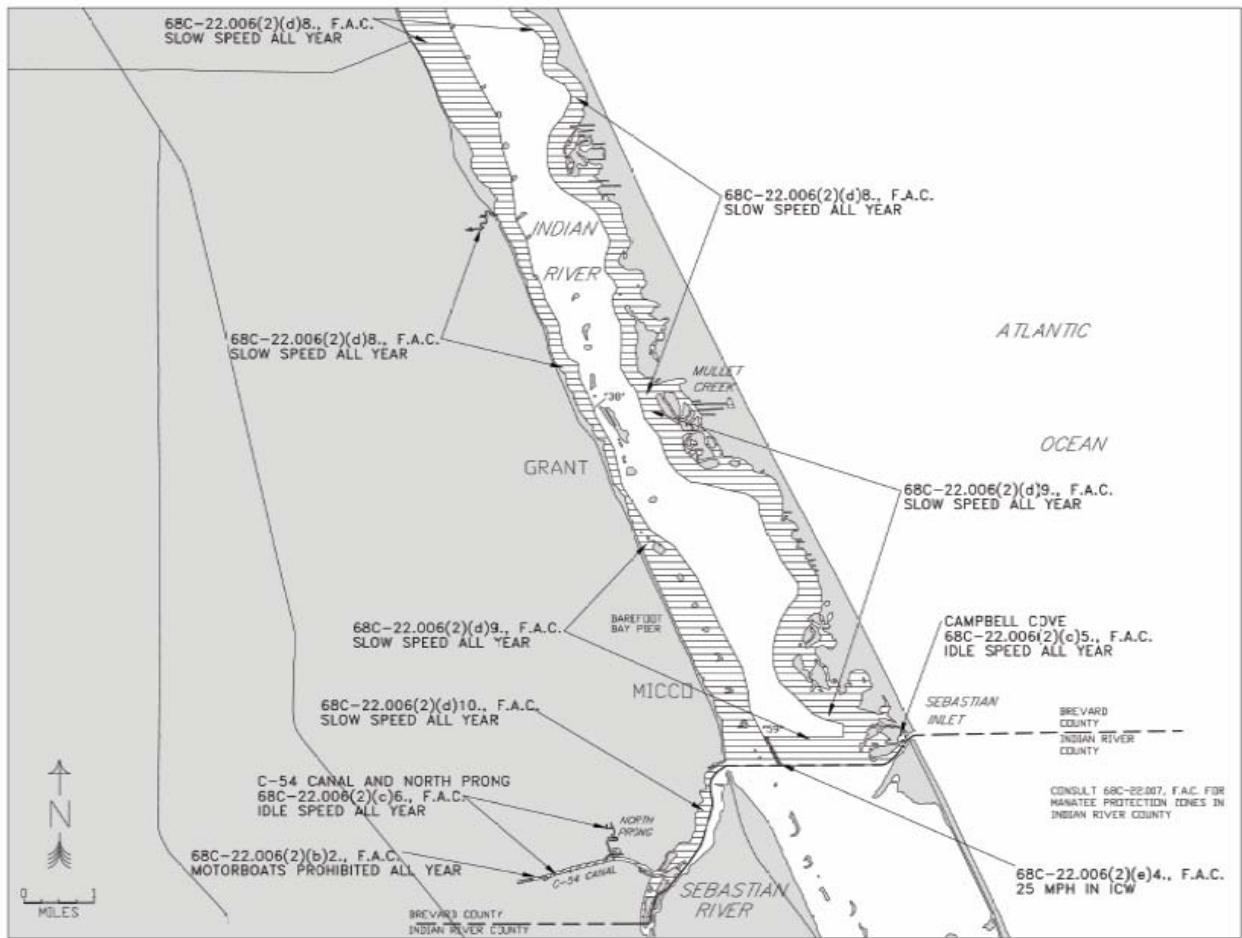


Figure 22. Manatee Speed Zones in the South Indian River and the Sebastian River



- b) Grant to Indian River County Line: All waters west of the ICW channel between ICW channel marker “38” and the Brevard County/Indian River County line, including those waters east of the centerline of the U.S. 1 Bridge over the Sebastian River, and: All waters within 1,500 feet of the general contour of the eastern shoreline of the Indian River, south of a point (approximate latitude 27° 55' 59" North, approximate longitude 80° 30' 30" West) on the eastern shoreline of the Indian River (north of Mullett Creek) and north of an east-west line running through ICW channel marker “59” (approximate latitude 27° 51' 38" North, approximate longitude 80° 28' 57" West), including those waters within 1,500 feet west of the westernmost edge of the Mullett Creek Islands, within 1,500 feet west of the westernmost edge of the islands south of Mathers Cove, within 1,500 feet west of the westernmost edge of Long Point, and within 1,500 feet west of the westernmost extensions of Campbell Pocket south to said east-west line running through ICW channel marker “59,” and; All waters of the Indian River and Sebastian Inlet east of the ICW channel, south of said east-west line running through ICW channel marker “59,” north of the Brevard County/Indian River County line, and west of a line 200 feet southwest of and parallel with the centerline of the State Road A1A Bridge, except as otherwise designated under (2) (c) 5 and excluding the marked Sebastian Inlet channel (Figure 22).

BANANA RIVER

25 MPH Zone (All Year)

- a) South Banana River Area: All waters in the main Banana River channel south of a point in the channel 2,000 feet north of the State Road 404 Bridge, and north of a point (approximate latitude 28° 09' 15" North, approximate longitude 80° 36' 32" West) in the channel on the northern boundary of the local Idle Speed Zone approximately 1,900 feet north of the Mathers Bridge (Figure 21).

Slow Speed Zone (All Year)

- a) Newfound Harbor: All waters south of State Road 520 and within 1,000 feet of the State Road 520 Bridge and Causeway; All waters within 1,000 feet of the general contour of the western shoreline of Newfound Harbor north of the runway for the Merritt Island Airport (approximately one mile south of State Road 520), and; All waters within 1,000 feet of the general contour of the eastern shoreline of Newfound Harbor and an extension of said shoreline to a point 1,000 feet south of Buck Point (Figure 20).
- b) North of State Road 528: All waters within 1,500 feet of the general contour of the western shoreline of the Banana River south of a point (approximate latitude 28° 26' 10" North, approximate longitude 80° 39' 35" West) on the shoreline near Kars Park on the boundary of the federal No Motor Zone; All waters south of an east-west line running through the westernmost point (approximate latitude 28° 24' 42"

North, approximate longitude 80° 38' 34" West) of the first spoil island north of the Canaveral Locks (commonly known as Ski Island), including those waters in Port Canaveral west of State Road 401, and; All waters east and south of a line commencing at the northernmost point (approximate latitude 28° 24' 44" North, approximate longitude 80° 38' 32" West) of Ski Island, then running to the southernmost point (approximate latitude 28° 24' 55" North, approximate longitude 80° 38' 31" West) of the second spoil island north of the Canaveral Locks, then following the eastern shoreline of said spoil island to its northernmost point, then bearing 6° to a point (approximate latitude 28° 25' 09" North, approximate longitude 80° 38' 29" West) in the Banana River underneath the overhead power transmission line south of the third spoil island north of the Canaveral Locks, then following said transmission line (which is the boundary of the federal No Motor Zone) in an easterly direction to the line's terminus at a point (approximate latitude 28° 25' 16" North, approximate longitude 80° 36' 13" West) on the eastern shoreline of the Banana River (Figure 20).

- c) State Road 528 to State Road 520: All waters south of State Road 528, east of a line bearing 180° from the easternmost point (approximate latitude 28° 24' 18" North, approximate longitude 80° 38' 53" West) of the central State Road 528 Causeway, and north of an east-west line 1,000 feet south of the point where the State Road 528 Bridge crosses over the main Banana River channel, except as otherwise designated under (2) (c) 2.; All waters west of a line running from a point (approximate latitude 28° 24' 16" North, approximate longitude 80° 39' 30" West) on the State Road 528 Causeway east of the western State Road 528 Relief Bridge to a point (approximate latitude 28° 21' 26" North, approximate longitude 80° 39' 32" West) on the State Road 520 Causeway approximately 1,200 feet west of the water storage tanks, and; All waters south of a line bearing 270° from the southernmost point (approximate latitude 28° 23' 29" North, approximate longitude 80° 37' 10" West) of Long Point in Cape Canaveral to a point (approximate latitude 28° 23' 29" North, approximate longitude 80° 37' 49" West) in the Banana River approximately 3,500 feet west of Long Point, and east of a line bearing 174° from said point in the Banana River to a point (approximate latitude 28° 21' 28" North, approximate longitude 80° 37' 35" West) on the State Road 520 Causeway approximately 1,000 feet west of Cape Canaveral Hospital Complex (Figure 20).
- d) Cocoa Beach Area: All waters east of a line bearing 186° from the westernmost point (approximate latitude 28° 21' 26" North, approximate longitude 80° 38' 52" West) of the State Road 520 Causeway east of the main Banana River channel, and within 1,000 feet south of the State Road 520 Causeway; All waters within 1,000 feet of the general contour of the western shoreline of the Banana River, south of State Road 520 and north of Buck Point and an extension of said shoreline to a point 1,000 feet south of Buck Point, excluding the main Banana River channel where the channel is less than 1,000 feet from the western shoreline, and; All waters east of a line commencing at a point (approximate latitude 28° 21' 25" North, approximate longitude 80° 38' 30" West) on the State Road 520

Causeway (approximately 2,000 feet east of the State Road 520 Bridge over the main Banana River channel), then bearing 190° to a point (approximate latitude 28° 19' 15" North, approximate longitude 80° 38' 55" West) in the Banana River approximately 1,900 feet west of the northernmost point of the Cocoa Beach Municipal Park, then bearing 270° to a point (approximate latitude 28° 18' 38" North, approximate longitude 80° 38' 55" West) in the Banana River approximately 1,700 feet west of the southwesternmost point of the Cocoa Beach Municipal Park, then bearing 171° for approximately 3,000 feet to a point (approximate latitude 28° 18' 07" North, approximate longitude 80° 38' 50" West) in the Banana River east of channel marker "15", then bearing 124° to a point (approximate latitude 28° 16' 52" North, approximate longitude 80° 36' 45" West) in the Banana River 1,000 feet west of the eastern shoreline of the Banana River, then heading in a southerly direction 1,000 feet west of and parallel with the eastern shoreline of the Banana River to the line's terminus at a point (approximate latitude 28° 15' 51" North, approximate longitude 80° 36' 38" West) in the Banana River near the northern boundary of Patrick Air Force Base (Figure 20).

- e) South of Cocoa Beach to State Road 404 (Pineda Causeway): All waters south of an east-west line running through the southernmost point (approximate latitude 28° 16' 19" North, approximate longitude 80° 39' 25" West) of the more southerly of the two islands east of Macaw Way (on Merritt Island) and west of a line bearing 162° from said southernmost point to State Road 404; All waters south and east of the overhead power transmission line in the Banana River adjacent to Patrick Air Force Base, and; All waters north of the centerline of State Road 404 and within 2,000 feet of the State Road 404 Bridges and Causeway, excluding the main Banana River channel as designated under (2) (e) 5 (Figures 20 and 21).
- f) South of State Road 404 (Pineda Causeway): All waters south of the centerline of State Road 404, including those waters east of a line bearing 270° from the southernmost point (approximate latitude 28° 08' 32" North, approximate longitude 80° 36' 15" West) of Merritt Island (commonly known as Dragon Point) to the Eau Gallie Causeway, excluding the main Banana River channel as designated under (2) (e) 5 (Figure 21).

Idle Speed (All Year, except as noted)

- a) Cape Canaveral Area: All waters north of a line bearing 270° from the southwesternmost point (approximate latitude 28° 23' 29" North, approximate longitude 80° 37' 10" West) of Long Point in Cape Canaveral to a point (approximate latitude 28° 23' 29" North, approximate longitude 80° 37' 49" West) in the Banana River approximately 3,500 feet west of Long Point, and east of a line bearing 331° from said point in the Banana River to a point (approximate latitude 28° 24' 16" North, approximate longitude 80° 38' 19" West) on the State Road 528 Causeway (west of State Road 401) (Figure 12).

- b) Manatee Cove Area: All waters of Manatee Cove (on the east side of the Banana River, just south of State Road 520) east of a line at the mouth of the cove running between a point (approximate latitude 28° 21' 21" North, approximate longitude 80° 36' 52" West) on the northern shoreline and a point (approximate latitude 28° 21' 09" North, approximate longitude 80° 36' 51" West) on the southern shoreline (Figure 20).

BARGE CANAL

Slow Speed Zone (All Year):

All waters of the Barge Canal east of the general contour of the eastern shoreline of the Indian River and west of the general contour of the western shoreline of the Banana River (Figures 14 and 20).

SYKES CREEK

Slow Speed Zone (All Year)

- a) All waters of Sykes Creek and Kiwanis Basin south of the Barge Canal and north of the centerline of State Road 520, and all associated and navigable waters, southerly of the southern boundary of that portion of Sykes Creek (Figures 15 and 20).

TURKEY CREEK

Idle Speed Zone (All Year, except as noted)

All waters of Turkey Creek north and east (downstream) of Melbourne-Tilliman Drainage District structure MS-1 and south and west of a line at the mouth of Turkey Creek that runs from the southeasternmost point (approximate latitude 28° 02' 21" North, approximate longitude 80° 34' 48" West) of Castaway Point to the northeasternmost point (approximate latitude 28° 02' 14" North, approximate longitude 80° 34' 43" West) of Palm Bay Point (Figure 21).

SEBASTIAN RIVER

Slow Speed Zone (All Year)

All waters of the Sebastian River (including waters also known as San Sebastian Bay), the South Fork of the San Sebastian River (also known as the St. Sebastian River, Sebastian River, and Sebastian Creek), and the North Fork Sebastian River (also known as Sebastian Creek) within Brevard County west of the centerline of the U.S. 1 Bridge and east of a north-south line from a point (approximate latitude 27° 50' 08" North, approximate longitude 80° 31' 02" West) on the northern shoreline of the North Fork Sebastian River at the intersection of the river and the North Prong of Sebastian River (Figure 22).

Idle Speed Zone (All Year, except as noted)

- a) Sebastian Inlet Area: All waters of the cove on the northern side of Sebastian Inlet (commonly known as Campbell Cove) northwest of a line running between the two rock jetties at the entrance to the cove (Figure 22).
- b) Sebastian River Area: All waters of the North Prong of Sebastian River, and; All waters of the North Fork Sebastian River (also known as Sebastian Creek) and the C-54 Canal west of a north-south line from a point (approximate latitude 27° 50' 02" North, approximate longitude 80° 31' 02" West) on the northern shoreline of the North Fork Sebastian River at the intersection of the river and the North Prong and east of a line drawn perpendicular to the northern shoreline of the C-54 Canal at a point (approximate latitude 27° 49' 55" North, approximate longitude 80° 32' 00" West) on the northern shoreline 2,500 feet east of the spillway (Figure 22).

Motorboats Prohibited Zone (All Year, except as noted)

All waters of the C-54 Canal (South Florida Water Management District Canal 54) east of the spillway (approximate latitude 27° 49' 50" North, approximate longitude 80° 32' 24" West) and west of a line drawn perpendicular to the northern shoreline of the C-54 Canal at a point (approximate latitude 27° 49' 55" North, approximate longitude 80° 32' 00" West) on the northern shoreline 2,500 feet east of the spillway (Figure 22).

6. BOATING SAFETY AND PROPERTY PROTECTION BOAT SPEED ZONES

The following areas have boat speed restrictions established for boating safety or property protection. These areas and the governing body that established the zones are:

- a) The Canaveral Port Authority established a "Slow Speed" Zone for its waters from the locks east to the Atlantic Ocean.
- b) The City of Melbourne designated the Eau Gallie River and Crane Creek as "No Wake" Zones in Section 7-31 of their city code. These were established in narrow or congested waterways for boating safety and to prevent excessive or damaging wakes.
- c) Brevard County designated the section of the Banana River south of Mathers Bridge as an "Idle Speed, No Wake" Zone.

F. LAW ENFORCEMENT

In Brevard County, the enforcement of boat speeds and manatee protection regulations is performed by multiple agencies. The primary agency that provides regular on-water patrols and enforcement is the FWC, the Brevard County Ag-marine Unit, and the City of Cocoa Beach Marine Unit. Table 5 identifies all agencies with the capability of on-water enforcement, the number of officers allocated to each agency, and the area they patrol.

Table 5. Manatee Regulation Enforcement

<i>AGENCY</i>	<i>AREA COVERED</i>	<i># OF OFFICERS</i>
1. Merritt Island National Wildlife Refuge	Boundaries of MINWR	1 Officer
2. Canaveral National Seashore	Boundary of the Canaveral National Seashore	4 Officers in Brevard No regular patrol schedule
3. FWC - District 1-B	Brevard, Volusia, Indian River, Orange, Osceola, and Seminole Counties	25 with 2-3 on the water in Brevard County per day
4. FWC - Central Area	<u>Only</u> freshwater areas of Brevard and 11 other central Florida Counties	1 officer in Brevard County No regular patrol schedule
5. Brevard County Sheriff -Ag-marine Unit and its Aviation Unit	All unincorporated waters in Brevard County. Mainly during summer months if officers are available, or during emergencies. Concentrates on waterfront and marine thefts	2 officers on Indian River Lagoon No regular patrol schedule
6. City of Cocoa Beach Marine Unit	Waters within the jurisdictional boundary of the City of Cocoa Beach	1 officer part time
7. City of Satellite Beach Police Department	Waters within the jurisdictional boundary of the City of Satellite Beach. Mainly during summer months if officers are available, or during emergencies.	25 volunteers who go out 2-3 times/day and report violations No assigned sworn officers
8. City of Indian Harbor Beach Police Department	Waters within the jurisdictional boundary of the City of Indian Harbor Beach. Mainly during summer months if officers are available, or during emergencies	No assigned officer

G. HABITAT ISSUES

Habitat protection is the most essential element for a successful, long-term protection plan for manatees. Areas that need to be monitored, managed, or otherwise protected include feeding areas, travel corridors, warm water refuge areas, freshwater sources, and areas that manatees find attractive for resting, mating, calving, and nursing. Protection of these areas has been identified by the USFWS (1989; 1995) as essential for the recovery of the species.

1. SEAGRASS PROTECTION AND MANAGEMENT

Within the IRL system, SAV comprises the most important contribution to the IRL's productivity. The protection of seagrass beds is imperative for the survival of the manatee (Marine Mammal Commission 1992). Seagrasses, the primary food source for manatees, are sensitive to development activities. Protection of seagrass beds is imperative to ensure an adequate food supply for all resident and transient manatees, as well as a healthy, functioning estuarine system.

The Marine Mammal Commission (1988) recommended the following actions, with regard to habitat protection for manatees:

- a. Identify and map seagrass beds used by manatees.
- b. Prohibit new bulkheads, marinas, and other development in or near these areas that could decrease grass bed productivity or otherwise be hazardous to manatees.
- c. Acquire more undeveloped areas within essential manatee habitat to add a system of refuges and parks.
- d. Restore and enhance manatee habitats (Seagrass areas).

Comprehensive mapping and assessment studies on the seagrasses of the Indian and Banana Rivers were completed in 1986 and in 1989. These studies documented area coverage of seagrass communities in the IRL.

Currently, the County's protection efforts consist of implementation of the following regulations: The Brevard County Wetlands Ordinance requires no net loss of functional wetlands, which are also important to the overall health of the estuary. In addition, development activities in, or affecting seagrasses will require review by County staff through the recently revised Surface Water Protection Ordinance. This land development regulation requires environmental setbacks (25 foot shoreline buffers) on any new developments adjacent to the IRL, and protection of wetland fringing vegetation of the IRL.

Additionally, the SJRWMD SWIM Plan, developed for the entire IRL Complex, declares seagrass protection, restoration, and enhancement as a top program goal. The IRL has also received national attention, through its federal designation by the Environmental Protection Agency (EPA) into the NEP, as an estuary of national significance. The NEP acknowledges the value of wetland habitats and seeks a multi-faceted planning and management approach to protection of these valuable resources. SAV is the focal point for the IRL NEP, and the program has developed a Submerged Aquatic Vegetation Initiative (SAVI).

2. MANATEE PROTECTION/REGULATORY SIGNS

Non-regulatory manatee signs and informational displays aid in increasing public awareness and education. Only 22% of all existing boat ramps and 21% of marinas are currently displaying manatee education signs. Regulatory signs have similar display percentages with only 10% of marinas and 27% of boat ramps in Brevard County posting manatee or boating safety regulatory signs.

Private marinas or other water-dependent developments may be required to install manatee informational displays and signs as part of their permit approval and/or mitigation requirements. In addition to these efforts, both the SWIM and NEP projects have indicated the need to post protection signs for seagrass areas. Prop scarring of seagrass beds is evident throughout the IRL. From these observations, it was determined that the seagrass beds that would most significantly benefit from a protection program, including appropriate signage, would be those that met the following three criteria: 1) shows evidence of damage by boat traffic; 2) are in high boat traffic areas; and 3) are in areas known to be frequented by manatees.

Several SWIM and NEP initiatives are focused on protecting valuable SAV areas through the development of a boater's guide, potential sign posting to delineate seagrass beds, and other informational displays. Brochures could be developed that would include information regarding the rationale for the sign posting program, the ecological significance of SAV areas, the importance of maintaining their integrity, how seagrasses are damaged by man's activities, and information about manatee mortality caused by collisions with boats.

Additionally, as required by the Brevard County Comprehensive Plan (Coastal Management Element Objective 2, Policy 2.1), the County will continue to periodically monitor the SJRWMD's data on the condition, extent, and composition of seagrass beds and use this baseline information to ascertain the success of any posting and protection programs.

3. WATER QUALITY CONCERNS

Within Brevard County's jurisdictional boundaries are three aquatic preserves: the Mosquito Lagoon Aquatic Preserve, the Banana River Aquatic Preserve, and the Indian River Aquatic Preserve (Malabar to Vero Beach) (Figure 23). Aquatic Preserves are portions of state-owned lands that have been set aside in order to be protected and preserved in an essentially natural or existing condition so that their aesthetic and scientific values may remain in perpetuity. Brevard County also contains several State classified Class II waters. These areas include: Mosquito Lagoon, Turnbull Basin, the Indian River from just north of Honeymoon Lake to south of Pineda Causeway, and the Indian River from south of Turkey Creek (Figure 23). In addition, the waters within the boundaries of MINWR, CNS, the Banana River Manatee Sanctuary, and waters within the boundaries of the Sebastian Inlet State Park have been designated as Outstanding Florida Waters (OFW). OFW's, Class II waters, and Aquatic Preserves identify areas with special resource values so that they may be afforded necessary protection.

Even with these designations existing in the IRL, pressure from a growing population has had a negative affect on water quality in the IRL. Over the past forty years, large portions of Brevard County's lagoon waters were used for point and non-point discharges. Wastewater and stormwater discharges over this period (billions of gallons), introduced millions of pounds of nitrogen, phosphorus, sediments, and chemicals into a series of waterbodies that are essentially landlocked. Unlike other estuarine systems, the IRL has limited access to oceanic waters, and without the large tidal flushing characteristics of typical estuaries, what is placed into the system is in most cases there permanently. These two factors, large volumes of introduced pollutants and extremely limited flushing, have profound implications for the long-term health of the lagoon.

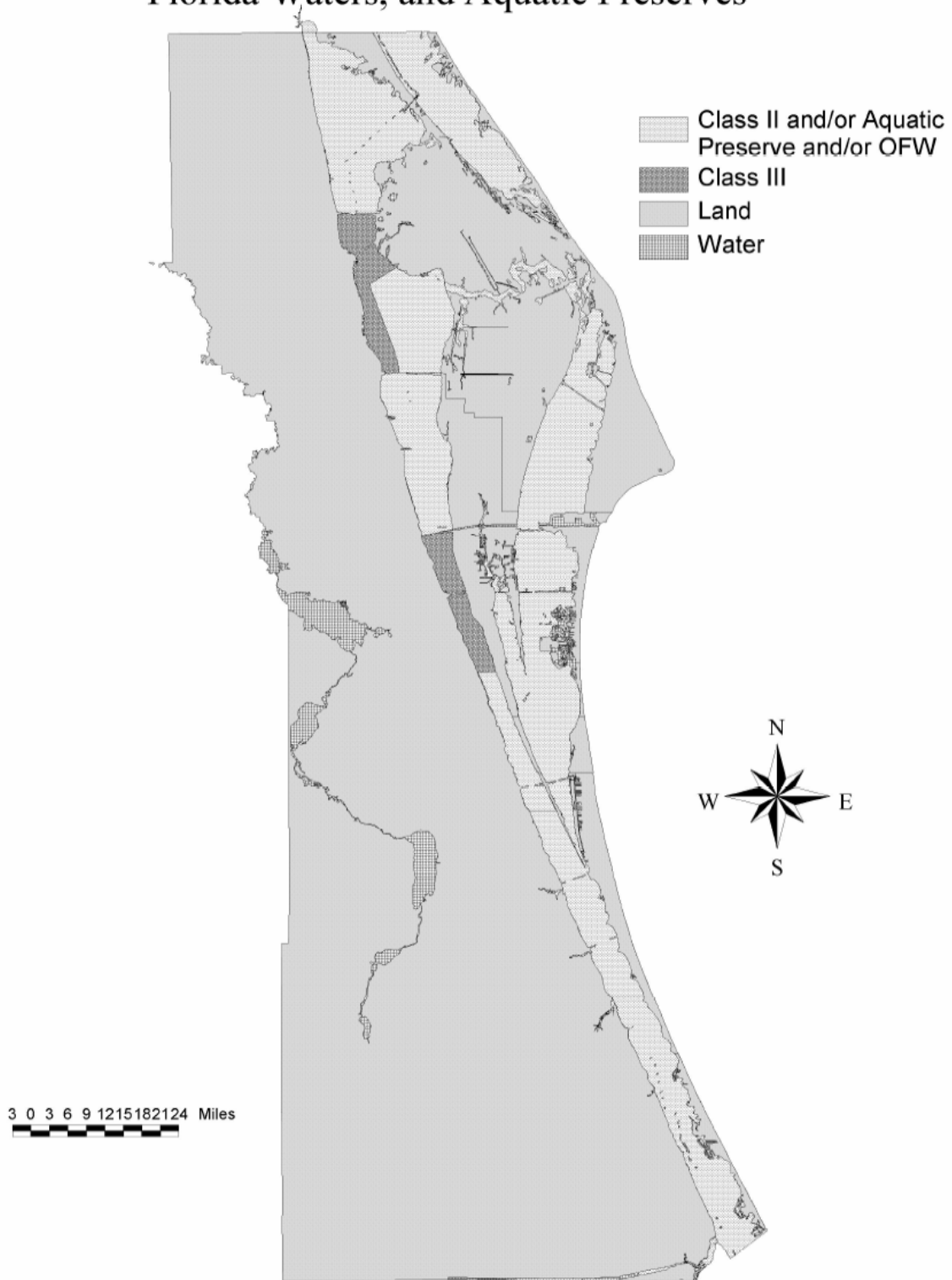
The sediments introduced from rapid urban and agricultural development, combined with the million of pounds of nutrients, have reduced submerged light levels in many areas of the IRL. The excessive nutrients (primarily nitrogen and phosphorus) from wastewater have fueled the rapid population growth of the small microscopic plants in the lagoon known as “phytoplankton.” When these phytoplankton populations grow in excess of background levels, sunlight passing through the water is absorbed and scattered. Additionally, the fine silt and clay particles that make up a portion of the sediment discharged to the lagoon also attenuate the sunlight in the water column.

Over the forty years of Brevard County’s rapid growth, the water became more cloudy, and the submerged plants that are so critical for the health of the IRL could no longer photosynthesize efficiently. Within a relatively short period of years (mid 1960s to early 1970s) the seagrass beds in the southern portion of Brevard County (in the Melbourne-Palm Bay area) either disappeared altogether, or became greatly reduced in size. Between 1980 and the 1990, the central portion of Brevard County also experienced significant seagrass loss, or bed reduction. Significant seagrass losses also occurred in the Titusville area during this period. A number of programs have directly addressed wastewater discharges since the late 1980s. Several discharges to the lagoon have been ceased including: Brevard County, Rockledge, and Melbourne. In addition, the Florida Legislature passed Chapter 87-97, FS, which required that all surface water discharges to the IRL cease by April 1, 1996. Non-point (stormwater) discharges are currently being addressed in the county by the establishment of stormwater utilities. It is imperative that these new programs move quickly to reduce or eliminate the remaining introduction of pollutants. Reversing the current trend of continued water quality degradation in the IRL is key for the long-term survival of the manatee, and for the recreation and commercial enterprises dependent on the County's large surface waters.

4. AVAILABILITY OF WARM WATER REFUGIA

The effluent zones of the two power plants in Brevard County are considered essential wintering habitat for the majority of manatees wintering on the middle east coast of Florida. A major concern is the continued reliance of the manatee upon this artificial and unpredictable winter shelter

Figure 23. Class II Waters, Outstanding Florida Waters, and Aquatic Preserves



The USFWS is presently consulting with both the Reliant Corporation and FPL to insure a consistent and adequate supply of thermal discharge during winter months and particularly during extreme cold weather events. Mechanisms must be developed to ensure that scheduled power plant overhauls and shutdowns, alteration of power plant cooling streams, or other management activities which could adversely affect the artificially created warm water manatee refugia associated with Brevard's power plants are reduced. Necessary communication lines among the various government agencies, public utilities, and interested citizens must be established and maintained.

H. EXISTING BOATING FACILITIES

1. PORT CANAVERAL

Brevard County contains one deep water commercial dock facility, Port Canaveral. Construction of this facility was begun in the 1950's by the U.S. Army Corps of Engineers, under authority of the U.S. River and Harbors Act of 1903. The Canaveral Harbor Port District was established in 1953 by the Florida Legislature, in House Bill No. 1136, Chapter 28922, of the Florida Special Acts. This Act established a special taxing district governed by a commission with five elected members. In 1986, the Canaveral Port Authority Commission abolished the district's ad valorem tax collections, and the Port began operating solely on revenues generated by Port activities.

The Canaveral Port Authority (CPA) is a quasi-public body which is not governed by local jurisdiction (Port Canaveral 2002). The CPA grants long-term leases to tenants for portions of the 3,300 acres under its jurisdiction. Approximately 800 acres surround the actual Port harbor, with the remaining acreage situated along the Barge Canal and among submerged lands and wetlands (Port Canaveral 2002). The Port operates five cruise ship terminals and two cargo areas with two piers each. In addition, the Port also has facilities for cement storage, lumber transportation, citrus and other fruit import and export, salt processing and transportation, and fuel oil storage and transportation. There is a large cold storage facility operating at the Port, in addition to several large warehouses. The Port's average tonnage is estimated around 3 million tons per year.

There are several commercial fishing vessels operating out of Port Canaveral, and in the late 1970's and early 1980's one of the largest calico scallop industries was based here. The Port is served by rail (FEC railroad in Cocoa) and major highways and is within close proximity to both the Melbourne Regional Airport, the Orlando International Airport, the Space Center Executive Airport, and KSC.

Port Canaveral also includes Foreign Trade Zone #136. The concept of foreign trade zones was created by the Federal Government in 1934, to allow U.S. companies to compete in foreign markets. In 1987, 55 acres of the Port were designated as a Foreign Trade Zone (Port Canaveral 2002). This trade zone is a particular benefit to commercial space operations.

The Port is also a major military facility, serving KSC, CCAFS, and the Navy's Trident Submarine operations. KSC utilizes the Port and its locks for ocean access for solid rocket booster recovery, in addition ocean-based tracking and testing operations. In addition, the Port serves as a base for the U.S. Coast Guard.

The U.S. Navy operates a Trident submarine basin at the Port, which is located along the north shore of the harbor. The Port's entrance channel is maintained at a minimum depth of -44 feet to accommodate submarines and other large vessels accessing the Navy's turning basin. The remainder of the harbor is maintained to a minimum -35 feet to accommodate cruise and cargo ship traffic.

The large amount of activity surrounding the Port Canaveral harbor has the potential to impact several endangered wildlife species, notably marine sea turtles and the West Indian manatee. The Port is governed by both State and Federal regulations. Several measures have already been undertaken by the Port to minimize potential impacts to manatees (and sea turtles, not covered in this discussion), including manatee education and awareness (including Port operating personnel), and the installation of bumpers on new bulkheads. Manatees also benefit from the property protection boat speed zones established in Port Canaveral.

2. OTHER COMMERCIAL BOAT FACILITIES

There are two watercraft manufacturing and/or testing facilities within Brevard County. These facilities include Sea Ray Boats, Inc. located along the Barge Canal on Merritt Island, and Bombardier, Inc. located on U.S. 1 in Grant. Bombardier, Inc.'s local operation tests personal, jet-propelled watercraft and small jet boats. The company's local office is in Melbourne, while the testing operation is located on U.S. 1 near Grant. At the Grant facility, the company maintains a State-licensed, buoyed testing site west of the ICW.

Sea Ray Boat's Brevard County operation is primarily a mid-size power boat manufacturing and testing facility with 20 wet slips on the Barge Canal. Sea Ray makes extensive use of the Barge Canal and the IRL for testing operations.

3. MARINAS

Existing Marinas:

There are an estimated 37,625 registered boats in Brevard County (State of Florida Vessel Registration 2001). However, only a small percentage of these boats is usually located in a marina. For the purposes of this Plan, any boating facility having more than three wet or dry slips is a marina. This definition is consistent with State policy, whereby the FDEP reviews all facilities that have more than one boat dock (up to two boats on a single dock are exempt from review). As of 1994, there were 70 operating marinas within Brevard County and two closed marinas (Green's Marina and South Beach Marina). In 2003, with FWC's assistance, NRMO staff will update Brevard County's marina database by conducting on site surveys.

These marinas vary from private, multiple slip condominium docks, to large, full-service public marinas. With the exception of the Mosquito Lagoon and some of the smaller tributaries to the IRL, marinas are found on every major estuarine waterbody in Brevard County. Marinas are distributed from the Sebastian Inlet area in the southern portion of the County, to Mims in the northern portion of the County. The highest concentration of marinas, however, tends to echo population centers located near major waterways, including Cocoa, Cocoa Beach, Melbourne, Merritt Island, Port Canaveral, and Titusville.

In 1994, there were 39 active marinas located along the Indian River in Brevard County, seven in the northern segment (north of the S.R. 528 Causeway and including the Sand Point Inn Restaurant Moorings), 14 in the central segment, (between the 528 Causeway and the Eau Gallie Causeway), and 18 in the southern segment (south of the Eau Gallie Causeway) (Figure 24). There are presently three marinas along the Barge Canal. Also, in 1994, 18 marinas were situated along the Banana River basin from the southern tip of Merritt Island to KSC. Four marinas were located in the Port Canaveral basin, three in Crane Creek, two in the Eau Gallie River, and one each in Turkey Creek, the Sebastian River, Sykes Creek, and Mullet Creek.

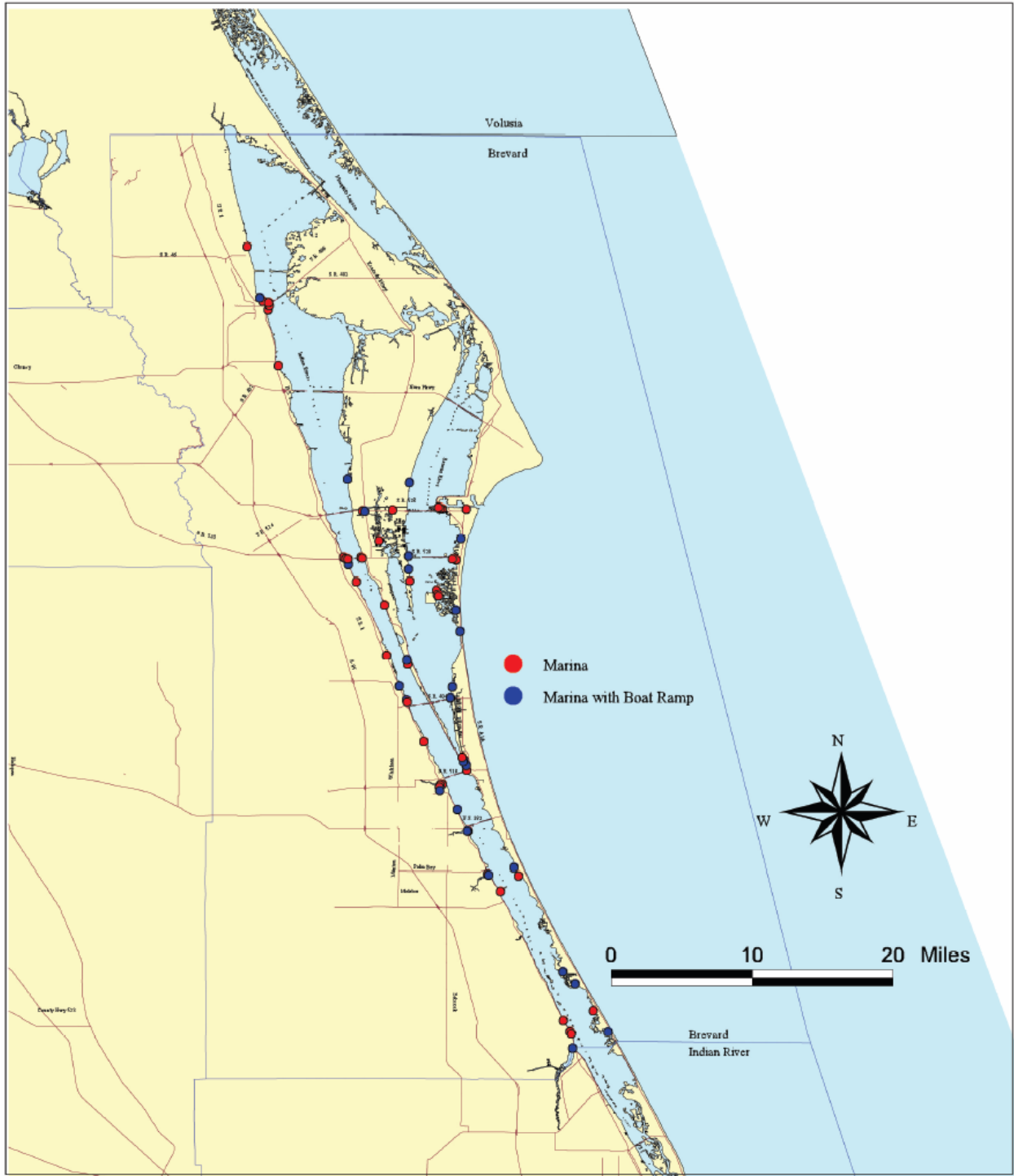
Three of the 72 marinas located in the County in 1994 were Federally owned and maintained. There were no State or County marinas in Brevard County as of 1994, and Titusville Municipal Marina was the only municipal marina in the County. In November of 1994, there were an estimated 42 private, commercial marinas operating in the County. These marinas account for the majority of the total surveyed wet and dry storage (2,776 and 2,210 slips, respectively) in Brevard. There are seven private club marinas in the County, and 19 marinas (greater than three slips) associated with condo/residential development. A summary of the NRMO marina database from 1994 is listed in Table 6.

In the fall of 1994, County staff from NRMO conducted field surveys of all existing, operating marinas. The County's 70 identified active marinas exhibited an estimated total of 3,460 wet slips. An estimated 1,224 sailboats and 997 power boats were observed during these visits.

Covered dry storage counts tend to be more accurate, since the surveyor was usually counting well-defined, dry-dock slips much like wet slip storage. However, open-yard storage capacity was more variable and required some interpretation. Yard storage can be affected by several factors, including boat size and placing. Therefore, it became more difficult to quantify total dry storage vessel capacities. In this survey, no distinction was made between open-yard storage and dry dock slips. NRMO staff have suggested the State of Florida adopt a general standard by which open-yard storage could be calculated for total watercraft capacity. This would help to standardize dry storage estimations throughout the State.

A total of 2,304 dry storage slips were identified for the surveyed marinas, including open-yard storage, as applicable. Observers counted 209 sailboats and 1,281 power boats in dry storage during the survey period.

Figure 24. Marinas in Brevard County, Florida - 1994



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Map scale does not allow the display of canals less than 100 feet wide 124

Of the 72 marinas surveyed, 32 marinas had no designated dry storage area, 13 had boat lift facilities, and 22 included a boat ramp. Twenty of the surveyed marinas operated fueling facilities and 57 provided some type of utilities. Available utilities ranged from water only, to all services such as electric, phone, and, in some cases, cable. Twenty-one marinas reported some type of repair facilities available. All of these services tend to contribute to the overall utilization of the marina. For example, those marinas offering the most services generally exhibited greater watercraft traffic. However, other factors, such as, economics, marina location, and site conditions, if not favorable, could discourage additional business. Therefore, marina services were itemized to indicate a potential for increased boating traffic, as well as for overall comparison purposes.

One hundred thirty-seven liveaboards were reported during the survey period, distributed among 13 marinas. Indian Harbor Marina reported the highest number of liveaboards (30), while other marinas reported between 10 and 15 liveaboards (Abby Marina, Cocoa Beach Yacht Club, Dolphin's Leap Marina, Port Canaveral Marina, and the Titusville Municipal Marina). The remaining marinas with liveaboards reported only four or less, and many of these marinas reported only one liveaboard. Often, those marinas reporting only one liveaboard listed that person as providing security for the operation.

Sixteen of the marinas reported some type of sewage disposal system, which varied between a dumping station, a portable system, or a fixed system. Indian Harbor Beach Marina, with the largest reported liveaboard contingent (30), operated a sewage disposal system, while other marinas with numerous liveaboards reported no available sewage disposal facilities (notably, Cocoa Beach Yacht Club and Dolphin's Leap Marina).

The Brevard County Marine Sanitation Device Survey - Final Report (Brevard County ONRM 1990), reported 256 liveaboards in 20 marinas during their surveys. However, this survey included boats moored near marinas as well as those moored in the marina (For example, liveaboards were included from the south Banana River basin, where many boats are moored along the waterway outside of Anchorage Marina, The Eau Gallie Yacht Club, and Indian Harbor Beach Marina). In this study, 80% of the liveaboards were identified in the following areas: south Banana River/Indian River, Port Canaveral, Crane Creek, Banana River south of S.R. 520, the Barge Canal, the Indian River near S.R. 520, Titusville Harbor, Turkey Creek, and the Eau Gallie River (Brevard County ONRM 1990).

Table 6. Marinas in Brevard County, Florida - 1994

NUM	MARINA NAME	PHONE	CITY	WATERBOD Y	WET	DR Y	LIFT	RAMP	FUEL	REPAI R	PUMP	LIVA B	UTIL
1	Wiley Fish Camp	267-1716	Mims	Indian River	15	4	No	No	No	Yes	No	0	No
2	Sand Point Inn Moorings (closed)		Titusville	Indian River	5	0	No	No	No	No	No	0	No
3	Titusville Municipal Marina	269-7255	Titusville	Indian River	197	0	No	No	Yes	No	Yes-P	18	E,W
4	Westland Marina	267-1667	Titusville	Indian River	73	155	Yes	No	Yes	No	No	1	E,W
5	Harbor Towne Marina	267-6649	Titusville	Indian River	42	0	No	No	No	No	Yes-F	6	All
6	Bay Point Condos		Titusville	Indian River	28	0	No	No	No	No	No	0	E,W
7	Kennedy Point Yacht Club	383-0280	Titusville	Indian River	92	40	No	No	Yes	No	Yes-F	2	E,W
8	River Moorings	454-6900	Merritt Island	Indian River	10	0	No	Yes	No	No	No	0	No
9	KARS Park	867-3891	Merritt Island	Banana River	12	10	No	Yes	No	Yes	Yes-P	0	E,W
10	Dolphins Leap Marina	783-9535	Port Canaveral	Port Canaveral	15	100	Yes	No	Yes	Yes	No	15	E,W
11	Port Canaveral Marina		Cape Canaveral	Port Canaveral	31	280	Yes	No	Yes	Yes	Yes-DS	15	E,W
12	Abby Marina	453-0160	Merritt Island	Barge Canal	93	30	No	No	No	No	Yes-HT	10	E,W
13	Cape Marina	783-8410	Cape Canaveral	Port Canaveral	107	100	No	No	Yes	Yes	Yes-F	3	E,W
14	Cocoa Beach Yacht Club	784-3089	Cape Canaveral	Port Canaveral	50	0	No	No	No	No	No	14	E,W
15	Harbor Square Marina	453-2464	Merritt Island	Barge Canal	115	15	No	No	No	No	Yes-DS	0	No
16	Tinglys Marina and Fish Camp	452-0504	Merritt Island	Barge Canal	35	30	No	Yes	Yes	No	Yes-DS	1	E,W
17	Cape Shores Association	783-5742	Cape Canaveral	Banana River	50	0	No	Yes	No	No	No	0	E,W
18	Town & Country Mobile Lodge		Merritt Island	Sykes Creek	15	15	No	No	No	No	No	4	E,W
19	Island Point Marina	452-0541	Merritt Island	Indian River	44	0	No	No	Yes	No	No	5	E,W
20	Indian Cove Marina	452-8540	Merritt Island	Indian River	91	20	Yes	No	No	Yes	No	4	All
21	115 River Drive Condos	636-3650	Cocoa	Indian River	22	0	No	No	No	No	No	0	E,W
22	Marina Isles Club	777-4411	Indian Harbor Beach	Banana River	106	0	No	No	No	No	No	0	E,W
23	Whitley Marina	632-5445	Cocoa	Indian River	52	25	Yes	No	No	Yes	No	3	E,W
24	Orange Cove Marina	783-8349	Cocoa Beach	Banana River	30	10	No	No	No	No	No	0	E
25	Funtime Boats	453-1111	Merritt Island	Banana River	16	20	No	Yes	No	Yes	No	0	E
26	Mariners Square	664-8500	Cocoa	Indian River	55	0	No	No	Yes	Yes	No	0	E,W
27	Gatsby's	783-2380	Cocoa Beach	Banana River	26	0	No	No	No	No	No	0	E
28	Indian River Yacht Club	636-4520	Rockledge	Indian River	62	0	No	Yes	No	No	No	0	E,W
29	Inland Marina		Merritt Island	Banana River	45	30	Yes	Yes	Yes	Yes	Yes-F	0	All
30	Indian River Club Condos		Rockledge	Indian River	12	0	No	No	No	No	No	No	E,W
31	Banana River Marina	452-8622	Merritt Island	Banana River	60	44	No	No	No	No	No	0	E,W
32	Landings Condo		Cocoa Beach	Banana River	18	0	No	No	No	No	No	0	E,W
33	Anchorage Condos		Cocoa Beach	Banana River	15	0	No	No	No	No	No	0	W
34	River Club Condos		Cocoa Beach	Banana River	18	0	No	No	No	No	No	0	W
35	Jays Harbor Light Marina	453-6354	Merritt Island	Indian River	33	0	No	No	No	No	No	0	E,W
36	River Lakes Condos	784-1029	Cocoa Beach	Banana River	52	20	No	Yes	No	No	No	0	E
37	Oceanus Mobile Village	783-3871	Cocoa Beach	Banana River	19	8	No	Yes	No	No	No	0	E
38	River Way Condos		Melbourne	Indian River	24	0	No	No	No	No	No	0	W
39	Egrets Cove		Merritt Island	Indian River	10	0	No	Yes	No	No	No	0	No
40	Patrick AFB Boat House	494-2042	PAFB	Banana River	20	15	No	Yes	No	Yes	No	0	No
41	Tequesta Harbor		Merritt Island	Indian River	16	0	No	No	No	No	No	0	W

Table 6. Marinas in Brevard County, Florida - 1994 (continued)

NUM	MARINA NAME	PHONE	CITY	WATERBODY	WET	DR Y	LIFT	RAMP	FUEL	REPAIR	PUMP	LIVAB	UTIL
42	Sun Harbor Marina	254-6155	Melbourne	Indian River	45	50	No	Yes	No	No	No	0	E
43	Pineda Point Marina	254-4199	Melbourne	Indian River	51	30	No	No	No	No	No	0	E,W
44	Suncove Fish Camp	242-2754	Rockledge	Indian River	7	8	Yes	Yes	No	No	No	0	No
45	Diamond 99 Marina	254-1490	Melbourne	Indian River	70	26	Yes	No	Yes	Yes	No	0	E,W
46	Manatee Cove Marina	494-7455	PAFB	Banana River	223	160	No	Yes	No	No	No	0	E,W
47	Pines & Marina Isles		Indian Harbor Beach	Banana River	40	0	No	No	No	No	No	0	E,W
48	Indian Harbor Marina	773-2468	Indian Harbor Beach	Banana River	200	100	No	Yes	Yes	Yes	Yes	30	All
49	Eau Gallie Yacht Club	773-2600	Indian Harbor Beach	Banana River	74	0	No	Yes	No	No	No	0	E,W
50	Anchorage Marina	773-3620	Melbourne	Indian River	65	180	Yes	No	Yes	Yes	Yes-P	2	E,W
51	Eau Gallie Yacht Basin	254-1766	Melbourne	Indian River	81	0	No	No	No	Yes	Yes-P	6	E,W
52	Harbor Marina	725-9054	Melbourne	Eau Gallie River	20	0	No	No	No	No	No	0	E,W
53	Eau Gallie Harbor Club	259-4218	Melbourne	Eau Gallie River	81	0	No	No	No	No	Yes - F	3	All
54	Keels and Wheels Marina	254-5211	Melbourne	Indian River	0	20	No	Yes	No	Yes	No	0	No
55	Intracoastal Marina	725-0090	Melbourne	Indian River	117	150	Yes	Yes	Yes	Yes	Yes	3	E,W
56	Melbourne Harbor Marina	725-0090	Melbourne	Crane Creek	85	0	No	No	Yes	No	Yes-F	7	All
57	Melbourne Yacht Club	768-9921	Melbourne	Crane Creek	48	5	No	Yes	No	No	No	0	E,W
58	Captains Cove Condo		Melbourne	Crane Creek	20	0	No	No	No	No	No	0	W
59	Florida Institute of Technology	768-8000	Melbourne	Indian River	5	5	No	No	No	No	No	0	E,W
60	Outdoor Resorts	724-6056	Melbourne Beach	Indian River	5	0	No	Yes	No	No	No	0	No
61	Hamptons Condominiums		South Beachs	Indian River	42	0	No	No	No	No	No	No	E,W
62	Pelican Harbor Marina	725-4040	Palm Bay	Turkey Creek	56	52	Yes	No	No	Yes	No	0	E,W
63	Palm Bay Marina	723-0851	Palm Bay	Indian River	55	100	No	Yes	Yes	No	No	0	E,W
64	Rhum Cove		Palm Bay	Indian River	72	0	No	No	No	No	No	0	All
65	Bills Discount Marine	724-5153	Valkaria	Indian River	9	60	No	No	No	Yes	No	0	E,W
66	Honest Johns Fish Camp	727-2923	Melbourne Beach	Indian River	9	60	No	Yes	Yes	No	No	0	W
67	Aquarina		Melbourne Beach	Mullet Creek	0	50	No	Yes	No	No	No	No	No
68	Green's Marina		South Beachs	Indian River	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A
69	Sebastian River Marina	664-3029	Micco	Indian River	60	0	Yes	No	Yes	Yes	No	0	All
70	South Beach Marina (closed)		Melbourne Beach	Indian River	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A
71	Miners Marina	664-8500	Micco	Indian River	39	270	Yes	No	Yes	Yes	No	0	E,W
72	Sand Point Marina		Micco	Sebastian River	59	0	No	Yes	Yes	No	No	0	E,W

DEFINITION OF ABBREVIATIONS

Num: Map location number of facility

Wet: Wet slips at the facility

Dry: Dry slips at the facility

Lift: If the facility has a boat lift

Ramp: If the facility has a boat ramp

Fuel: If the facility sells fuel

Pump: If the facility provides pumpout (P=portable, F=fixed, DS=sewer, HT=holding tank)

Repair: If the facility provides repair service

Livab: Number of livaboards at the facility

Util: The utilities provided by the facility

The Marine Sanitation Survey (Brevard County ONRM1990) listed eight watercraft sewage-pumpout facilities located in the County, with three more reported to be built in the summer of 1990. The Report continued by noting that marina facilities such as bathrooms and showers appeared to be highly utilized in marinas with liveaboards, while pumpout facilities were not as widely used. The lack of utilization of existing pumpout facilities was attributed to inconvenience and associated costs.

As part of the current FDEP State permitting process, all new and/or expanding marinas are required to post manatee awareness signs. In addition, Policy 9.9 (A) of the Conservation Element of the Brevard County Comprehensive Plan requires marina operators to establish and maintain a permanent manatee educational display at a prominent location at each marina. During the 1994 survey, NRM staff observed only 10 marinas posting manatee educational signs, and only six marinas with regulatory signs. Of these, only the Melbourne Harbor Marina, the Eau Gallie Yacht Club, the Pines Apartments, and the Marina Isles Condominiums displayed both educational and regulatory signs (the last three are adjacent to each other along the Banana River at Mather's Bridge, where FIND, and FDEP have posted regulatory signs).

The majority of educational signs observed displayed various manatee information. Regulatory signs were usually of the boating safety type, including minimum speed and no wake zones. A total of 14 marinas posted some type of sign. Seventy-nine percent of the observed signs were listed to be in fair to good condition.

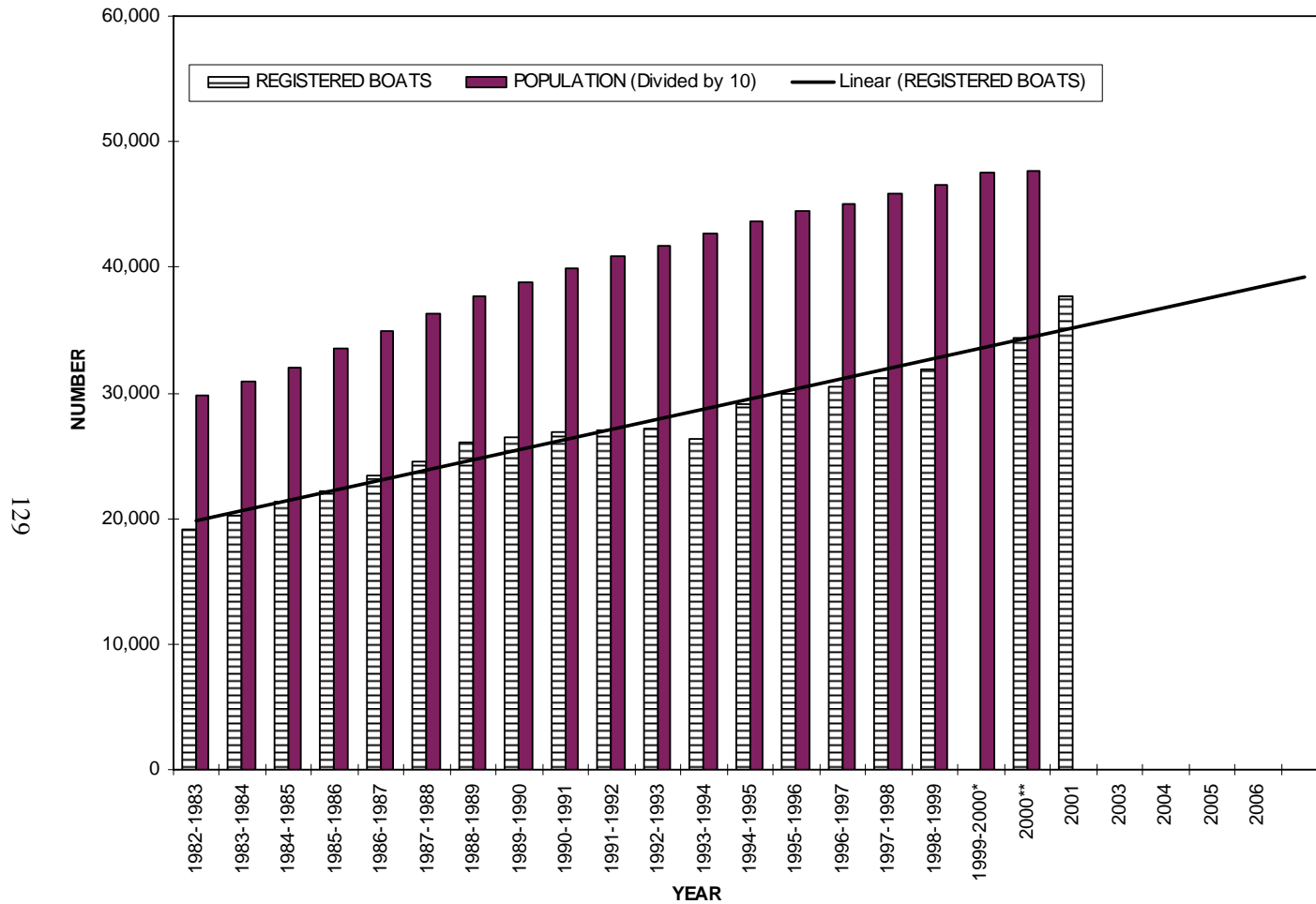
Projected Demand:

In 2000, the latest year for comparison data, there were 34,316 registered boats in Brevard County. This number corresponds to a 2000 estimated County population of 476,230, or about one registered boat for every 14 people living in the County. Thus, approximately, 7.2% of the County's total population is estimated to be registered boat owners, assuming one registered boat per owner. Perhaps a more accurate comparison can be made between the estimated number of Brevard County residents between the ages of 18 and 74.

In 2000 (latest available data), there were 328,796 people between the ages of 18 and 74 in the County (Brevard County Geographic Research 2000). Assuming this age group represents the majority of boat owners in the County, then the 34,316 boats registered in the County in 2000 equate to approximately one boat for every 10 people in the County between the ages of 18 and 74.

Regression trend analysis is a method used to estimate future demand. This method projected approximately 40,000 registered boats by the year 2006, based on past numeric ratios (Figure 25).

**Figure 25. Vessel Registrations in Brevard County.
Projected to the Year 2006**



Note: * In 1999-2000, The Florida Department of Motor Vehicles (FLDMV) recorded the number of registration transactions, allowing vessels sold to be recorded multiple times in that year and was omitted. ** In 2000, FLDMV switched the registration cycle to the calendar year instead of mid-year.

Observed occupancy rates for Brevard marinas varied from a low of 0% (or unoccupied) to roughly 100%. The current overall occupancy rates for wet and dry slips were estimated at 54% and 62%, respectively (Brevard County NRMD 1994). However, these averages also include all residential, multi-slip docks and other non-commercial marinas which usually displayed significantly lower overall occupancy rates.

Staff observations and comments made during the survey suggest that marina capacity is probably based on several factors including location (including adjacent waterbody and channel access), costs, available facilities, and marina management. Therefore, while it is probably accurate to assume that a marina would exhibit a higher occupancy rate located near a population center or near a desired boating destination. However, the primary factors affecting the construction of new, or the expansion of existing marinas should include economic and environmental considerations.

Environmental criteria are utilized to provide recommendations for marina siting and expansion in the Boat Facility Siting Recommendations section of this plan. However, an economic analysis was beyond the scope of this plan. Therefore, a more accurate projection of the demand for future marinas slips, both wet and dry, may be better accomplished through a Countywide, economic analysis for marina siting which takes into account environmental factors.

4. BOAT RAMPS

Existing:

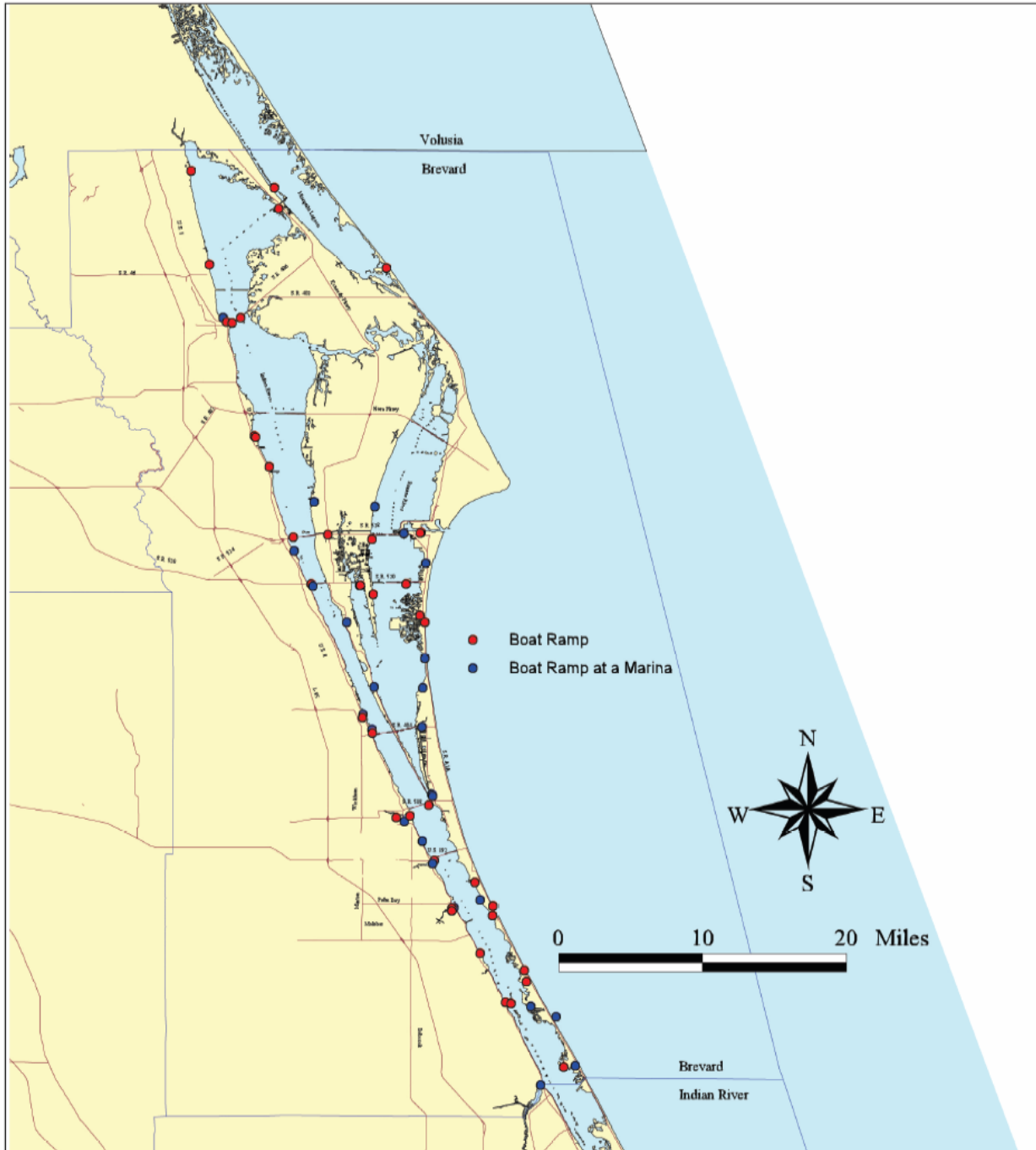
In 1994, there were an estimated 12,000 trailerable boats in the County. This translates to a demand for boat ramp facilities. In 1994, there were 65 identified boat launching facilities located along the IRL basin in Brevard County. In 2003, with FWC's assistance NRMO staff will conduct an updated survey of the number of boat ramps present in Brevard County. In 1994, these 65 sites included 96 boat ramp lanes, with 30 % of the sites having either multiple ramps, multiple lanes, or both. The boat launching facilities include private ramps associated with condo/residential developments, boat clubs and marinas, and publicly maintained launching facilities. Brevard County owns and maintains 27 boat ramps along the IRL. The remaining public launching facilities are maintained between the Federal government (5), and municipal governments (6).

Boat ramp locations are fairly well distributed throughout the County. There is one boat ramp site serving Mosquito Lagoon. In the IRL there are 11 ramp sites located north of the S.R. 528 Causeway, nine ramps located between S.R. 528 and the Eau Gallie Causeway, and 21 boat ramps located south of the Eau Gallie Causeway (including the Sebastian River). In the Banana River, there are 18 boat ramps. There is one boat ramp located on Sykes Creek at Kiwanis Basin, one boat ramp located on the central Barge Canal, and there are three boat ramps in Port Canaveral Harbor. All boat ramp locations as of 1994 are shown in Figure 26 and described in Table 7.

While many existing boat ramps are located near population centers in the north, central, and south portions of the County, overall boat ramp locations do not correlate with population as well as marinas. Within the Titusville area there were three boat ramp locations in 1994. In

1994, there were four boat ramp locations near downtown Cocoa, three within the Port Canaveral basin, and four near the Cocoa Beach area. The Melbourne area contained seven boat ramp locations, three public and four private in 1994. In 1994, there were only two ramp locations in the Palm Bay area, one public and one private, and both were located on Turkey Creek. The remaining ramp locations were scattered throughout the IRL as noted above.

Figure 26. Boat Ramps in Brevard County - 1994



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Map scale does not allow the display of canals less than 100 feet wide

Table 7. Boat Ramps in Brevard County - 1994

NUM	RAMPNAME	CITY	WATERBODY	# RAMPS	#LANES	PARKING	MARINA
1	Old Scottsmore Boat Ramp	Scottsmoor	Indian River	1	1	30	N
2	Beacon 42 Fish Camp - Canaveral National Seashore	Canaveral Nat. Seashore	Mosquito Lagoon	1	1	50	N
3	Bairs Cove - Merritt Island National Wildlife Refuge	Merritt Island Nat. Wildlife Ref.	Haulover Canal	1	1	45	N
4	Mims Boat Ramp	Mims	Indian River	1	1	5	N
5	Eddy Creek Ramp - Canaveral National Seashore	Canaveral Nat. Seashore	Mosquito Lagoon	1	1	10	N
6	Sand Point Inn Moorings (Closed)	Titusville	Indian River	1	1	0	Y
7	Parrish Park	Titusville	Indian River	3	6	46	N
8	Andrew Jackson Marina Park	Titusville	Indian River	2	2	30	N
9	Titusville Yacht Club Ramp	Titusville	Indian River	1	1	15	N
10	Palm Harbor	Bellwood	Indian River	1	1	5	N
11	Manatee Hammock Park	Bellwood	Indian River	1	1	120	N
12	Port St. John Boat Ramp	Port St. John	Indian River	2	2	40	N
13	River Moorings Subdivision	Merritt Island	Indian River	1	1	0	Y
14	KARS Park Ramp	Merritt Island	Banana River	1	1	30	Y
15	Central Park	Cape Canaveral	Port Canaveral	3	6	100	N
16	Port Canaveral Ramp (un-named)	Port Canaveral	Port Canaveral	1	2	0	N
17	Ports End Park	Cape Canaveral	Port Canaveral	1	2	28	N
18	Tingly's Marina and Fish Camp	Merritt Island	Barge Canal	2	2	15	Y
19	High Point Subdivision	Cocoa	Indian River	1	1	0	N
20	Kelly Park	Merritt Island	Banana River	2	4	58	N
21	McFarland Park	Cocoa	Indian River	1	1	8	N
22	Cape Shores Condo	Cape Canaveral	Banana River	1	1	5	Y
23	Indian River Yacht Club	Cocoa	Indian River	1	1	20	Y
24	Bicentennial Park	Cocoa Beach	Banana River	1	2	40	N
25	Kiwanis Island Park	Merritt Island	Newfound Harbor	1	2	10	N
26	Funtime Boats	Merritt Island	Banana River	1	1	0	Y
27	Lee Wenner Park	Cocoa	Indian River	4	4	50	N
28	Inland Marina	Merritt Island	Banana River	1	1	5	Y
29	Ramp Road Park	Cocoa Beach	Banana River	1	1	25	N
30	Cedar Avenue Ramp	Cocoa Beach	Banana River	1	1	0	N
31	Merritt Estates Boat Ramp	Merritt Island	Indian River	1	1	0	N
32	River Lakes Condos	Cocoa Beach	Banana River	1	1	0	Y
33	Oceanus Mobile Village & RV Park	Cocoa Beach	Banana River	1	1	5	Y
34	Sun Harbor Marina	Melbourne	Indian River	1	1	5	Y
35	Egrets Cove	Merritt Island	Indian River	1	1	5	Y

36	Patrick Air Force Base Boat House	Patrick AFB	Indian River	2	2	5	Y
37	Select Seafood, Inc	Rockledge	Indian River	1	1	5	N
38	Manatee Cove	Patrick AFB	Indian River	2	2	15	Y
39	Suncove Fish Camp	Rockledge	Indian River	1	1	5	Y
40	Pineda Landing	Melbourne	Indian River	1	1	5	N
41	Indian Harbor Marina	Indian Harbor Beach	Banana River	1	1	5	Y
42	Eau Gallie Yacht Club	Indian Harbor Beach	Banana & Indian	1	1	6	Y
43	Eau Gallie Causeway Park Southeast	Melbourne	Indian River	2	4	75	N
44	Keels and Wheels Marina	Melbourne	Indian River	1	1	5	Y
45	Ballard Park	Melbourne	Eau Gallie River	2	4	50	N
46	Hidden Harbor Condominiums	Melbourne	Eau Gallie River	1	1	5	N
47	Intracoastal Marina	Melbourne	Indian River	1	2	20	Y
48	Front Street Park	Melbourne	Indian River	2	4	60	N
49	Melbourne Yacht Club	Melbourne	Crane Creek	1	1	15	Y
50	6th Avenue Boat Ramp	Melbourne Beach	Indian River	1	1	5	N
51	Outdoor Resorts of America	Melbourne Beach	Indian River	1	1	10	Y
52	Riviera Estates Subdivision	Melbourne Beach	Indian River	1	1	5	N
53	Palm Bay Marina	Palm Bay	Indian River	1	1	15	Y
54	H.E. Pollak Park	Palm Bay	Turkey Creek	1	1	10	N
55	Alex J. Goode Park	Palm Bay	Turkey Creek	1	1	25	N
56	Beachwoods Condominiums	Melbourne Beach	Indian River	1	1	0	N
57	Aquarius Mariculture	Malabar	Indian River	1	1	5	N
58	Lighthouse Cove Subdivision	Melbourne Beach	Indian River	1	1	0	N
59	Melbourne Shores Subdivision	Melbourne Beach	Indian River	1	1	0	N
60	John Jorgensen Landing	Grant	Indian River	1	1	25	N
61	1st Street Boat Ramp	Grant	Indian River	1	1	35	N
62	Honest John's Fish Camp	Melbourne Beach	Mullet Creek	1	1	6	Y
63	Aquarina Subdivision	Melbourne Beach	Indian River	1	1	30	Y
64	South Beach Marina (Closed)	South Melbourne Beach	Indian River	1	1	N/A	Y
65	Long Point Park	Melbourne Beach	Indian River	1	1	20	N
66	Sand Point Marina	Micco	Sebastian River	1	1	10	Y

Many of the existing County public boat ramps are in good to fair condition, with adequate water depth, good ramp surfaces and design, and adequate parking. Some of the public ramps which currently are in fair to good condition include: The Eau Gallie Causeway boat ramp, the Front Street Park boat ramp, Parrish Park boat ramp (although some lanes need minor dredging), the Kiwanis Island boat ramp, the Lee Wenner boat ramp, and the Kelly Park boat ramp. Although these ramps are in fair to good condition, many of these sites experience periodic problems such as crowded parking and maintenance requirements.

Other ramps in the County are in poor condition and are not utilized to their full potential. These ramps include, but are not limited to: Long Point Park boat ramp (unimproved and shallow), Mims boat ramp (unimproved and shallow), Manatee Hammock Park boat ramp (unimproved and shallow), Andrew Jackson Marina Park boat ramp (drop off), Jorgensen Landing Park boat ramp (small parking area and shallow) and the 1st Street boat ramp (minimal parking).

5. MULTI-SLIP DOCKS AND SINGLE FAMILY DOCKS

In 1993, NRMO staff assessed the approximate number of multi-slip and single family docks using aerial photographs. There are approximately 6,067 single family and 125 multi-slip docking facilities in Brevard County.

6. BOAT RENTAL FACILITIES

There are 16 known boat rental businesses operating along the IRL basin in Brevard County. The majority of these businesses operate in conjunction with an established commercial marina. These include:

- Bill's Discount Marine - Located along the west shore of the IRL in Grant, this boat rental business is part of the marina operations at this location.
- Boat America - This operation rents several types of vessels, including ski boats, fishing boats, and pontoon boats. They are located in Mariner's Square marina on the Indian River on S.R. 520 on Merritt Island.
- Brevard's First Water Sport Center - This boat rental business is located in the Intracoastal Marina next to Skipper's Restaurant. They rent ski boats, personal watercraft, and windsurfers.
- Club Nautico of Melbourne - Located adjacent to Anchorage Marina on the Eau Gallie Causeway, this business rents various sized power boats for water skiing and cruising.
- Diamond 99 Marina - This marina rents sailboats and offers sailing instruction.
- Dolphin's Leap Marina - This marina in Port Canaveral has power boats available for rental.
- Jet Ski Rental of Melbourne - Located adjacent to Club Nautico of Melbourne, this business rents personal watercraft.
- Honest John's Fish Camp - This marina has a few power boats available for rent, as well as canoes.
- Palm Bay Marina - This marina has a few power boats available for rental.

- Patrick Air Force Base Boathouse - This facility has several power boats available for water-skiing and cruising. This facility is available to military personnel only.
- Port Canaveral Marina, Inc. - Power boats are available for lease at this location.
- Suncove Fish Camp - This business offers sailboats and some personal watercraft for rent, and indicated plans to offer pontoon boats in the near future.
- Sun Harbor Marina - This business rents sailboats only.
- Wave Craze, Inc. - This boat rental business is located at Funtime Boats marina, on the Banana River off the S.R. 520 Causeway, Merritt Island. This business rents personal watercraft; power boats and sailboats are also available.

The remaining businesses are not associated with established marina operations. These include:

- Banana River Water Sports, Inc (includes Coconut Willies) - Located along the Banana River on the S.R. 520 Causeway, Merritt Island, this business rents personal watercraft, and sailboats, and offers windsurfing, para-sailing, and water-skiing.
- New Waverunners Jet Ski Rental - This personal watercraft rental business is located along the IRL in Grant.

Boat rental businesses have been identified by the Brevard County Manatee Education Committee to be included in manatee education and awareness efforts. These businesses may cater to customers with little boating experience and/or no local knowledge of Brevard's waterways. Education efforts at these businesses may help to reduce the potential for boating accidents and manatee collisions among this user group.

Special consideration should be given to boat time-share facilities, as boats in these programs would tend to be used more frequently than privately owned boats. These facilities should be located in areas where their affect on manatees and their habitat will be minimized.

7. TEMPORARY MOORINGS FACILITIES

Within Brevard County, in 1994 there were five identified restaurant facilities with greater than five temporary mooring slips. These facilities varied in associated boating activity. Restaurants which were identified with higher boating activity included Gatsby's Restaurant (now vacant), located off the S.R. 520 Causeway in Cocoa Beach, and Shooter's Restaurant (now called Coral Bay) in Melbourne located at the Intracoastal Marina. Restaurants attributed to moderate boating activity included Conchy Joe's Restaurant at the Eau Gallie Causeway, Gizmo's Reef Restaurant located off U.S. 1 between the Eau Gallie and Pineda Causeways, The Pineda Inn located off U.S. 1 just north of the Pineda Causeway, and the Sand Point Inn Restaurant located just north of the Titusville Municipal Marina. At the time of this writing in 1994, the Sebastian River Marina, formally known as the Summit Restaurant and Marina, was initiating renovations and may be expected to see a subsequent increase in restaurant-associated boating traffic. Other restaurants located along Brevard's waterways may receive occasional boating patrons; however, these restaurants are usually not associated with boating traffic. In addition, a few of the marinas in the County include small restaurants which may

draw some boating traffic independent of marina operations. Those restaurants with temporary boat mooring facilities in 1994 are listed in Table 8 below. In 2003, with FWC's assistance NRMO staff will update its database of restaurants with temporary mooring slips by conducting a field survey of all such facilities.

Table 8. Restaurants with Temporary Mooring Slips - 1994

RESTAURANT	# Moorings
Conchy Joe's	10
Gizmo's Restaurant	10
Gatsby's Restaurant (now vacant)	26
Mathers Bridge Restaurant (now vacant)	10
Pineda Inn	10
Skipper's Restaurant (Intracoastal Marina)	20
<i>TOTAL</i>	76

8. WATERSPORTS AREAS

Brevard County's estuarine waters are popular for a variety of watersports and related activities. Certain areas of the County's water basins provide conditions which encourage a particular activity. For water-skiing and related activities, a basin which provides moderate water depth, good wind protection, moderate boat activity, protection from boat wakes, and easy access is desirable. Personal watercraft enthusiasts, or jet-skiers, usually look for similar characteristics in a water basin, although these craft are able to operate in shallower waters. Windsurfers usually seek an area with a smooth, shallow (2-3 foot) bottom, which is easily accessible, protected from boat traffic, and convenient to wind direction.

The following is a list of favorite watersports areas located in the IRL basin in Brevard County. It has been compiled through local knowledge and input and does not represent a comprehensive listing of all areas of the County that, dependent upon conditions, may be favorable for watersports recreation. There may be other areas of the lagoon system which experience periodic watersports activities depending upon weather conditions and boat traffic. Generally however, those areas which appear the most favorable to watersport enthusiasts seem to be regularly utilized.

Mosquito Lagoon

There are generally no areas recognized for watersports recreation in the Mosquito Lagoon basin. In 1994, the Manatee Plan Ad-Hoc Committee requested comment from the MINWR concerning the designation of a watersports area just south of the ICW on the west side of the

basin. It was the opinion of the MINWR manager and the USFWS that such a designation was not consistent with the management plan for the refuge.

The IRL from the NASA Causeway north through the Turnbull basin.

Generally, the areas east the ICW both north and south of the Max Brewer Memorial Causeway (S.R. 402) in Titusville are recognized for a wide variety of watersports. Activities include: waterskiing, knee boarding, tubing, and personal watercraft operation.

The IRL from the NASA Causeway south to S.R. 528 Causeway

Formerly, the waters immediately north of the S.R. 528 Causeway were utilized by recreational boaters preceding the implementation of boat speed zones. In addition, there are numerous borrow lakes and/or other small lakes in this planning zone that could be utilized primarily by personal watercraft. These include: borrow lakes off Fay Boulevard near U.S. 1; several borrow lakes along I-95; a large borrow lake north of Rinker's canal; the County-owned borrow lake located in King's Park which now prohibits watercraft operation, and a large borrow lake located off of Canaveral Groves Boulevard west of I-95.

The IRL between the S.R. 528 Causeway and the S.R. 520 Causeway.

Both the east and west sides of the basin immediately south of S.R. 528 have been utilized for watersports recreation depending upon wind conditions.

The IRL south from the S.R. 520 Causeway to the Eau Gallie Causeway.

Areas frequently used for watersports in this area include: the west shore of the IRL near Rockledge; the east shore of the IRL along the central reach of Merritt Island between the S.R. 520 Causeway and the Pineda Causeway; the northeast corner of the Pineda Causeway on the IRL; and the east and west corners of the IRL north and adjacent to the Eau Gallie Causeway.

The IRL from the Eau Gallie Causeway south to the Sebastian Inlet.

Watersports areas periodically utilized in this area include the east side of the IRL south of the Eau Gallie Causeway and north and south of the Melbourne Causeway and the area surrounding the spoil islands east of the ICW off Malabar Road. In addition, the east IRL, along the barrier island from Melbourne Shore through Floridana Beach, was formally utilized for watersports recreation prior to implementation of boat speed regulations. Also, a small borrow lake northwest of the intersection of I-95 and Eau Gallie Boulevard is regularly utilized by personal watercraft. A large borrow lake west of the Valkaria Airport that is currently owned by the County has been requested for access by personal watercraft operators.

The Banana River north of the S.R. 528 Causeway.

The first spoil island located north of S.R. 528 in the Banana River is generally referred to as “Ski Island” due to its use for waterskiing access. This area became one of the most heavily used skiing sites in the county after the establishment of manatee protection boat speed zones in Sykes Creek and Kiwanis Basin.

The Banana River and Sykes Creek Basins south of the S.R. 528 Causeway.

The Sykes Creek basin, previously heavily utilized by recreational boaters for watersports, is now regulated by manatee protection boat speed zones. The shallow basin of Newfound Harbor is still used for watersports by vessels with shallower drafts. The unregulated area in the middle of the Banana River between the S.R. 528 Causeway and the S.R. 520 Causeway is generally regarded as an area of watersports activity. In addition, the east and west expanses of the Banana River adjacent to and north of the S.R. 520 Causeway were formally utilized for watersports recreation before the implementation of boat speed restrictions.

The southwest side of the S.R. 520 Causeway in the Banana River along Merritt Island is heavily used for waterskiing. The County’s only designated waterski area was located in the east central part of the Banana River off the west shore of the Cocoa Beach Recreational Complex. It is now regulated by a manatee protection boat speed zone.

When conditions allow, the east shore of the Banana River north of PAFB (outside the manatee zones) is used by various watersports enthusiasts. In the channel in the southern reach of the Banana River basin south of the Pineda Causeway to just north of Mather’s Bridge is often utilized for watersports activity. Previously, the waters south of the Minuteman Causeway, and in Grand Canal were used by waterskiers prior to boat speed restrictions.

I. BREVARD COUNTY BOATING ACTIVITY PATTERNS

A boating study was conducted in 1990 for the IRL area of Brevard County. This study, entitled "Brevard County Boating Activity Study" was prepared by Dr. John Morris of the Department of Biological Sciences at the Florida Institute of Technology (FIT). This study focused on boat launches from public boat ramps and overall utilization of the IRL by the boating public. The survey used a variety of assessment tools, including periodic aerial surveys, boater intercept surveys, and a network of both on-shore and on-water observers.

The primary conclusions of this study include:

- The ICW in Brevard County experiences a large amount of transient traffic during the winter months, during late fall and winter. The boats traveling the Intracoastal during the winter months are typically Class 1 (16 to 25 feet) or Class 2 (26 to 40 feet). There is also an increase in the number of out-of-state boats in the county during this time.
- Use of boat launching facilities and general boating activity throughout Brevard County waterways is highest in the spring and summer. The most prevalent type of boat using the launch facilities was a power boat Class 1, followed by a power boat Class A (less

than 16 feet). Parrish Park boat ramp, in north Brevard, had the highest number of recorded launches.

- On-water and launch time activities were concentrated in the morning.
- Most of the boaters were residents of the County, although there was significant out of county use at most of the larger ramps.
- The majority of boating activities occurred during weekends. Weekday activities were low with commercial use being more significant. A general reduction in waterskiing activities, accompanied by an increase in commercial fishing activities was observed during weekdays.
- The major activities for the boaters using Brevard County waters in order of preference were: traveling (cruising), recreational fishing, and waterskiing related activities.
- The dominant type of boat observed in the IRL is the power boat. The study further documented an increase in the larger boats in the ICW during the fall and winter season. The study suggests this increase is the result of out-of-state boaters who winter in Florida.
- A concentration of activity was documented in southern Brevard County south of S.R. 192. This concentration included large numbers of boats observed on the water and a large number of boats launched from boat ramps. The study's author attributed this phenomenon to population distribution and boater preferences for nearby ocean access (Sebastian Inlet). An additional factor was the proximity to the spoil islands which offer extensive recreational opportunities.
- The study suggested the seasonal and spatial trends described for south Brevard varied over the sample period. These variations resulted from events being conducted in different regions of the IRL and adjacent offshore waters. These events included: regattas, fishing tournaments, boat parades, and ski competitions. These events resulted in temporary changes in boat-traffic patterns of the IRL.
- Boaters tended to concentrate in specific areas. Greater boat-density rates were recorded for the following areas: NASA Causeway, the Barge Canal, S.R. 520 and the Banana River, the Pineda Causeway and the Banana River, Mathers Bridge, the Eau Gallie Causeway, the Melbourne Causeway, Grant (in the vicinity of Grant Farm Island), the Sebastian River, and Sebastian Inlet. Of the listed high-density sites, both the Barge Canal and the Mathers Bridge areas contain small, narrow channels. Within these confined areas, increases in watercraft-related collisions with manatees, as well as with other boaters, are likely. The remaining heavily-used areas are more open and less congested.

- A major concern identified by interviewed boat operators was the unsafe conditions that currently exist at many of the public ramps in Brevard County. The authors recommended that the upgrading of present launching facilities could reduce safety hazards and may facilitate more launches from the present facilities. This action could reduce the future demand for additional public boat-ramp facilities, or delay the demand until funding is available for construction.

J. INVENTORY OF PRESENT MANATEE EDUCATIONAL PROGRAMS

The following manatee-related education programs or items are available through the following agencies:

1. Florida Fish and Wildlife Conservation Commission (FWC) Bureau of Protected Species Management (BPSM)

- Pamphlets/brochures
- Manatee training sessions for Law Enforcement Officers
- Curriculum (assisted SMC and FPL with programs)
- Boat ramp signs
- Posters
- Slide shows
- Manatee videos

2. Save the Manatee @ Club (SMC)

- Teacher's Guide/Teacher In-Service Program
- Display for festivals/fairs
- Volunteer speakers bureau
- Video
- “No Feeding/Watering” signs and brochures
- Coloring book
- Manatee awareness waterway signs

3. Florida Power and Light (FPL)

- Annual workshops free to public
- Pamphlets/brochures

4. Merritt Island National Wildlife Refuge (MINWR)

- Manatee awareness and training for barge operators working in the Banana River for KSC

5. Brevard County School Board

- No directed programs, only individual teachers’ efforts

6. National Estuary Program (NEP)

- The Environmental Education Resource Directory
- The Summer Institute Programs - summer workshop series for teachers (1991)
- The Boater's Guide to the Indian River Lagoon
- The Indian River Lagoon Owner's Guide
- Pamphlets/brochures
- Posters
- Program's slide show
- Lagoon Partner Fund grant program for environmental education projects (\$2,500 - \$5,000)

7. **St. Johns River Water Management District (SJRWMD)**

- Estuaries are Exceptional study guide
- Waterways curriculum
- Monsters of the Indian River Lagoon brochure

8. ***Florida Department of Environmental Protection (FDEP)***

- Interpretative centers

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APPENDIX 1

GLOSSARY

“Authorized Resident” means any person owning a fee or leasehold interest in real property or a boating facility immediately adjacent to motorboats prohibited zone or a no entry zone.

“Boating Facility” means a facility where boats are moored, or launched such as a dock, pier, marina, dry storage facility with launching capability, or a boat ramp which is contiguous to the waters of the state of Florida. For the purposes of this rule, boating facility shall be synonymous with marine facilities.

“Boating Facility Siting Plan” means a county-wide or locally based siting plan for determining the preferred locations for boating facility development based on an evaluation of water quality, flushing characteristics, natural resources, manatee protection needs, and recreation and economic demands.

“Boat Facility Siting Zones ”

- **Zone A** -The Banana River basin south to Mathers Bridge, the Sykes Creek/Newfound Harbor basin north to the Lambert Drive bridge; that portion of the Indian River Lagoon between the NASA Causeway and the S.R. 528 Causeway; Mullet Creek (Sections 26, 35 &36 of Township 29, Range 38); and that portion of the following tributaries lying west of the existing railroad bridges: St. Sebastian River, Turkey Creek, Crane Creek, and the Eau Gallie River.
- **Zone B** - The Barge Canal from the west shoreline of Merritt Island to the east shoreline of Merritt Island.
- **Zone C** - The Port Canaveral Harbor lying east of the S.R. 401 Bridge.
- **Zone D** - The remainder of the County not under federal jurisdiction and not included in boat facility siting zones A, B, or C.

“Caution Zone” means an area where manatees frequently inhabit on a somewhat regular basis and motorboat operators are advised to use caution so as not to strike a manatee.

“Channel” means a marked navigation channel, unless otherwise described or designated, and is not intended to mean an access or side channel unless otherwise designated for the purpose of regulation.

“Critical Areas” means portions of waters of the State of Florida as defined by subsections 370.12(2)(f), (g), (h), (I), (j), (k), (n), and (o), F.S.

“Department” means the Florida Fish and Wildlife Conservation Commission.

“Ditch” means a man-made trench that was not built for navigational purposes.

“Dock” means a fixed or floating structure, including moorings, used for the purpose of berthing buoyant vessels either temporarily or indefinitely.

“Dredging” means mechanical or other methods used to remove sovereign submerged land.

“Erosion” means the gradual and imperceptible wearing away of riparian or littoral land due to natural causes. Artificial erosion refers to erosion caused by man-made projects and operations.

“Existing Linear Shoreline” for the purpose of the Brevard County Manatee Protection Plan, means the high water line in tidally influenced areas and the ordinary high water line along waterways that are not tidally influenced. This definition shall not apply to shoreline artificially

created through dredge or fill activities (such as boat basins or canals) after January 01, 1996. Such artificially created shoreline created after January 01, 1996 shall not be considered in the calculation of linear shoreline. Artificially created shoreline that was created prior to January 01, 1996 must have received the proper permitting authorization required at the time of construction. Man-made drainage ditches (such as mosquito control, flood control ditches or any non-navigable waterway) shall not qualify as linear shoreline, regardless of their date of construction. Linear shoreline shall be calculated using survey quality aerial photographs or by accurate field survey. The calculation of linear shoreline is based upon contiguous shoreline that is owned or legally controlled by the applicant. Exception to include non-contiguous shoreline within the sphere of influence of the proposed project will be considered if the federal, state, and local permitting agencies agree that inclusion of that shoreline will not result in significant adverse impacts to manatee or manatee habitat.

“Existing Boating Facilities” for the purpose of the Brevard County Manatee Protection Plan, means existing boating facilities shall be defined as those facilities which have all active and required permits or those facilities that were in operation up to ten (10) years prior to the date of the final adoption of the Plan (01/16/03). All existing boating facilities shall be allowed to continue with the existing use and may renovate according to permitting guidelines, provided there is no change in facility size, including no increase in the number of wet or dry slips, unless the facility meets the expansion criteria as provided in the Brevard County Manatee Protection Plan. Boating facilities are generally defined as those structures or operations where boats are moored or launched, such as a dock (excluding single-family), pier, marina, dry storage facility with launching capability, or a boat ramp, which is contiguous to the waters of the state of Florida. For the purpose of this plan, boating facility shall be synonymous with “marina facility.”

“General Contour of the Shoreline” means a line defined as the most waterward of the outside edge of emergent aquatic vegetation, if present, or a line of Mean Low Water as defined in Chapter 177, Part II, Florida Statutes, as approximated on NOAA nautical charts. Waters lying landward of this line are to be included up to the shoreline, as defined under paragraph (14), above. Emergent aquatic vegetation shall include plants rooted in the ground that extend above the surface of the water.

“Idle Speed” means the minimum speed that will maintain the steerageway of a motorboat.

“Idle Speed Zone” means an area where vessels may not be operated at greater than Idle Speed, as defined in 62N-22.002(2), F.A.C.

“Linear Shoreline” means the mean high water line in tidally influenced areas and the ordinary high water line along waterways that are not tidally influenced. This definition shall not apply to shorelines artificially created through dredge and fill activities (such as boat basins or canals) after October 24, 1989. Such artificially created shorelines created after October 24, 1989 must have received the proper permitting authorization required at that time. Man-made drainage ditches (such as mosquito control ditched) shall not qualify as linear shoreline regardless of their date of creation. Linear shoreline shall be calculated using survey quality aerial photographs or by field survey.

“Main Access Dock” means that walkway which connects a riparian owner's property to a terminal platform.

“Maintenance Dredging” means mechanical or other methods used to remove sovereign submerged land in existing channels where navigation by vessels presently occurs. For the purpose of this rule, requests to dredge previously dredged areas that have regained natural characteristics due to lack of use, lack of upkeep, or other factors or requests to change the design specification of previously dredged areas shall not be considered as maintenance dredging but shall be considered new dredging.

“Manatee Habitat Features” The following manatee habitat features are to be applied in Boat Facility Planning Zone D and shall be determined using the map series and data update schedule identified in Appendix 10.

A. Each of the following increases the number of habitat features by 1.

1. Seagrass - 5% or more seagrass present on the proposed project site is considered significant.
2. Manatee Abundance - Level 1 = 10 or more manatees observed/overflight within a 5 mile radius equals 1 point. Level 2 = 25 or more manatees observed/overflight within 5 mile radius equals 2 points. If more than one survey falls within the 5 mile radius, the number of manatees observed will be counted for each survey, divided by the number of overflights and then the normalized values will be summed.
3. Significant Manatee Mortality - Level 1 = the number of watercraft mortality within a 5 mile radius, divided by the total number of watercraft mortalities in Brevard County. A value greater than 0.05 is considered significant and is equal to 1 point. Level 2 = the number of watercraft mortalities within a 5 mile radius, divided by the total watercraft mortalities in Brevard in the last 5 years. A value greater than 0.10 is significant and is equal to 2 points.
4. The proposed site is in a Class II Waterbody, Outstanding Florida Waterway (OFW), or an Aquatic Preserve

B. Each of the following reduces the number of habitat features by 1.

1. The proposed site is presently located in a year-round “Slow Speed” or “Idle speed” manatee zone as authorized by the Florida Manatee Sanctuary Act Chapter 62N-22 F.A.C., other Federal designation or local ordinance.
2. The proposed site is within 3 miles of Sebastian Inlet.

“Manatee Protection Plan” means a comprehensive plan developed adopted and implemented by a county, local government, or port authority (pursuant to Chapter 315 F.S.), and approved by the Department of Environmental protection for the purpose of reducing manatee mortalities, protecting manatee habitat, promoting boating safety, and increasing public awareness.

“Marina (general)” means all boating facilities with ≥ 3 wet and/or dry slips (consistent with current County definition). A Marina is a facility or structure, which provides mooring, docking, anchorage, fueling repairs, launching, or other related services for watercraft. Private boat docks associated with single family dwellings are exempt from this category.

- **Residential Marina** - Community docks serving subdivisions, condominiums, duplexes, or other multi-family developments with between and including three (3)

and thirty (30) slips. No fueling, or repair facilities shall be associated with these marinas.

- **Commercial/Recreational Marina** - Facilities with greater than thirty (30) slips, or those facilities with less than thirty slips which have fueling facilities, and/or which include utilities and services available for the general public, or facilities which provide docking for vessels of private, non-residential usage and which are not associated with a subdivision, condominium, duplex or other multi-family development. Permitted uses may include dockage, fueling facilities, repairs, utilities, custom recreational boat building and wastewater pump-out facilities, commercial sales and handling of fish and farmed/harvested seafood, along with similar services.
- **Industrial Marina** - Facilities serving largely commercial interests, including commercial boat building, ship repairs or construction, and commercial seafood harvesting and processing. Permitted uses may include fueling facilities, repairs and construction, boat production, ship repairs up to 100 feet or 100 tons, wastewater pump-out facilities, utilities, and commercial sales of fish and farmed/harvested seafood.

“Maximum 25MPH Speed Zone” means a controlled area within which a boat’s speed made good over the bottom measured in statute miles, shall not exceed 25 miles per hour. Although it is the intention of the Department to allow those vessels capable of attaining a planing configuration at 25 MPH to do so, this speed limit shall not be construed as authorizing any vessel to travel an unsafe speed, in violation of 33 U.S.C. s. 2006, as adopted pursuant to subsection 327.33(3), F.S., by reason of:

- a) An elevated bow which restricts visibility, and/or
- b) An excessive wake which unreasonably or unnecessarily endangers other vessels or natural resources of the state.

“Maximum 30 MPH Speed Zone” means a controlled area within which a boat’s speed made good over the bottom measured in statute miles, shall not exceed 30 miles per hour. Although it is the intention of the Department to allow those vessels capable of attaining a planing configuration at 30 MPH to do so, this speed limit shall not be construed as authorizing any vessel to travel an unsafe speed, in violation of 33 U.S.C. s. 2006, as adopted pursuant to subsection 327.33(3), F.S., by reason of:

- a) An elevated bow which restricts visibility, and/or
- b) An excessive wake which unreasonably or unnecessarily endangers other vessels or natural resources of the state.

“Maximum 35 MPH Speed Zone” means a controlled area within which a boat’s speed made good over the bottom measured in statute miles, shall not exceed 35 miles per hour.

“Mean High Water Line” means the plane or local elevation of mean high water or high tides with the shore. Mean high water is the average height of the high waters over an approximate 19 year period (Section 18-2.003, F.A.C.)

“Miles” means statute miles.

“Mooring” a place or structure to which a vessel or aircraft can be moored.

“Motorboats Prohibited Zone” means an area in which it is posted or it is apparent that because of the density of manatees or the condition of the area, motorboat activity shall be hazardous to the manatees and shall be prohibited.

“No Entry Zone” means a limited area of critical importance as a safe haven for manatees to rest, feed, reproduce, give birth, nurse, or otherwise habituate undisturbed by human activity. No vessel of any kind, whether power-driven or non-motorized, as referenced in Section 1(b), Article VII, of the Florida Constitution, including every description of watercraft, barge, and airboat, shall be permitted within the designated area. No other vessel or floatation device, including but not limited to a seaplane, sailboard, surfboard, raft, or any other water toy or other like object intended for or capable of use as a means of transportation of the water, shall be permitted within the designated area, nor shall other human activities including but not limited to diving, snorkeling, swimming, fishing (except by pole from an adjacent bank or bridge), and the introduction by persons of food or other objects, that involves disturbance of these waters or the manatees so inhabiting them, be permitted within such a designated area, except as provided under 62N-22.003(5), F.A.C.

“One to One Hundred (1:100)” means one powerboat slip for every one hundred feet of contiguous linear shoreline that is owned or controlled by the applicant. Exceptions include non-contiguous shoreline within the sphere of influence of the proposed project will be considered by the Department if it can be demonstrated that inclusion of that shoreline will no result in significant adverse impacts to manatees or manatee habitat. For the purpose of calculating powerboat slips, linear shoreline footage will be rounded up to the nearest increment of 100.

“Ordinary High Water Line” means the boundary between uplands and submerged lands beneath non-tidal navigable natural water bodies (Section 18-2.003, F.A.C.).

“Planing” means riding on or near the water’s surface as a result of the hydrodynamic forces on a vessel’s hull, sponsons, foils or other surfaces. A vessel is considered “on plane” when it is being operated at or above the speed necessary to keep the vessel planing.

“Powerboat” Any vessel which is primarily propelled or powered by an internal combustion engine and which is used or is capable of being used as a means of navigation or transportation on water. Sailboats with auxiliary engines are not considered powerboats for the purpose of this plan. For the purpose of this plan powerboat and motorboat are synonymous.

“Private Residential Single-family Dock” means a dock, which is used for private, recreational or leisure purposes for a single family residence, cottage or other such single dwelling unit.

“Public Interest” means demonstrable environmental, social, and economic benefits which would accrue to the public at large as a result of a proposed action, and which would clearly exceed all demonstrable environmental, social, and economic costs of the proposed action. In determining the public interest in a request for use, sale, lease, or transfer of interest in sovereignty lands or severance of materials from sovereignty lands, the board shall consider the ultimate project and purpose to be served by said use, sale, lease, or transfer of lands or materials.

“Public Navigation Project” means a project primarily for the purpose of navigation which is authorized and funded, by the United States Congress or by port authorities as defined in Section 315.02(2), F.S.

“Public Utilities” means those services, provided by persons requested by the Public Service Commission, or which are provided by rural cooperatives, municipalities, or other governmental agencies, including electricity, telephone, public water and wastewater services, and structures necessary for the provision of these, services.

“Rights of Boaters, Fishermen, and Waterskiers (as they apply under 370.12(2)(j), F.S.) means that boaters, fisherpersons and waterskiers have the right to use the waters of the State of Florida for recreational or commercial purposes in a manner consistent with all applicable federal, state and local laws and regulations. Such laws and regulations include, but are not limited to, those governing the operation and safety of vessels on the water to promote public safety, environmental/natural resource protection, and/or responsible use of the waters of the State.

“% Seagrass Coverage” Seagrass coverage shall be determined on a project site during the months of May through October. The percent coverage of seagrass is determined by counting short shoots in a one square meter ($1m^2$) plot frame that has been evenly subdivided into one hundred square cells. The plot is placed every five meters (5m) along a minimum of three (3) transect lines perpendicular to the shoreline and extending to the end of the project site. The transect lines are to be evenly spaced along the project site shoreline with one transect located at the middle of the site and one at each end of the project site. Transects shall be no greater than fifty meters (50m) apart. If the project site is greater than one hundred meters (100m) in width, additional transects shall be added at a rate of one for every fifty meters (50m) of shoreline. If ten of the sample plot frames contain ten percent (10%) or more seagrass, then the final coverage for the site is greater than or equal to ten percent (10%). The project site is defined as that area within which boats will be docked. If the project site and the shoreline are not contiguous then the first plot frame shall be placed at the intersection of the project site and the transect line.

“Seawall” means a vertical structure built along a portion of a coast, retaining earth against its landward face and designed to prevent erosion and other damage by wave action.

“Shoreline” means the point where the water meets the land at any point in time.

“Significant Adverse Impacts” means that within the sphere of influence of a proposed boating facility, death or injury to manatees or destruction of manatee habitat can be reasonably expected to occur as a result of the construction, expansion, or increase in powerboat densities and activities associated with boating facility.

“Slow Speed” means the speed at which a vessel proceeds when it is fully off plane and completely settled into the water. Vessels shall not be operated a speed that creates an excessive wake or other hazardous condition, which is unreasonably or unnecessarily, endangers other vessels under the existing circumstances. This requiring level of protection for the safety of vessels and vessel operators is also intended to provide adequate protection for manatees and is therefore adopted because of its familiarity to vessel operators. Due to the different speeds at which vessels of different sizes and configurations may travel while in compliance with this definition, there is no specific numerical speed assigned to Slow Speed.

A vessel is not proceeding at Slow Speed if it is:

1. On a plane;
2. in the process of coming off plane and settling into the water or coming up onto plane;
3. creating an excessive wake or other hazardous condition which unreasonably or unnecessarily endangers other vessels.

A vessel is proceeding at Slow Speed if it is fully off plane and completely settled into the water and not creating an excessive wake or other hazardous condition which unreasonably or unnecessarily endangers other vessels

“Slow Speed Zone” means an area where vessels may not be operated at greater than Slow Speed, as defined above and in 62N-22.002(7), F.A.C.

“Sovereignty Lands” means those lands including, but not limited to: tidal lands, islands, sandbars, shallow banks, and lands waterward of the ordinary or mean high water line, to which the State of Florida acquired title on March 3, 1845, by virtue of statehood, and of which it has not since divested its title interest. For the purposes of this rule sovereignty lands shall include all submerged lands within the boundaries of the preserve, title to which is held by the Board.

“Sphere of Influence” means those waters where powerboats from a boating facility are reasonably expected to operate.

“Slip”, “Wet Slip”, or “Dry Slip” means an area within a boating facility which is intended for the mooring storage of a vessel.

“Terminal Platform” means that part of a dock or pier, including finger piers, that is connected to the access walkway, is located at the terminus of the facility, and is designed, to secure and load or unload a vessel or conduct other water dependent activities.

“Turning Basin” means the area of sovereign submerged land which is required to maneuver a vessel into or out of a facility.

“Wake” means all change in the vertical height of the water’s surface caused by the passage of a vessel including, but not limited to, a vessel’s bow wave, stern wave, and propeller wash.

APPENDIX 2

***RESOLUTION TO THE BREVARD COUNTY
MANATEE SANCTUARY RESOLUTION OF 1976
ADOPTED AUGUST 26, 1997***

RESOLUTION NO. 97-165

WHEREAS, Section 370.12(2), Florida Statutes, provides that it is unlawful to kill, capture, possess, annoy, injure, molest, or torture a manatee (*Trichechus manatus*) except that the United States Fish and Wildlife Service may grant a permit to capture a manatee under specific circumstances; and

WHEREAS, the United States Fish and Wildlife Service, under the Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1541, officially designated manatees as an endangered species which may become extinct unless afforded protection; and

WHEREAS, the State of Florida is currently the only State in this country which has a significant population of manatees and the minimum number of the manatees in the State has been estimated at 2,639; and

WHEREAS, this Board recognizes the desirability of protecting manatees in order to insure that this unique species of mammal does not become extinct; and

WHEREAS, this Board recognizes that the largest aggregations of manatees in the State have been documented in the waters surrounding Brevard County, Florida, and that these waters form a favorite habitat for manatees on the East Coast of Florida.

NOW, THEREFORE BE IT RESOLVED, BY THE BOARD OF COUNTY COMMISSIONERS OF BREVARD COUNTY, FLORIDA, as follows:

1. The Board of County Commissioners of Brevard County, Florida, hereby recognizes that the waters of Brevard County form the habitat of a significant number of manatees which currently exist in the State of Florida.

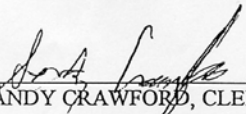
2. The Board of County Commissioners of Brevard County, Florida, hereby recognizes the fact that the manatee has been classified under the Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1543, as an endangered species.

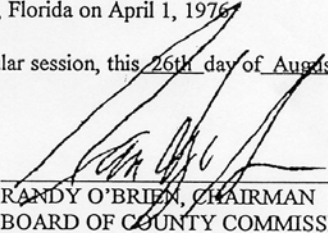
3. In recognition of their status as an endangered species and of the danger that they may become an extinct species, the Board of County Commissioners directs the County Manager to cause signs to be placed along the edge of appropriate bodies of water within this County in which manatees are known to exist, which signs will inform the public of the fact that manatees are an endangered species of mammal and will inform the public of the provisions of Section 370.12(2), Florida Statutes, which prohibits anyone from annoying, possessing, disturbing, mutilating, destroying, selling, molesting, hunting, wounding, or killing manatees and will also inform the public that portions of the waters surrounding Brevard County have boat speed zones established for manatee protection.

4. This Resolution supersedes and replaces the Resolution previously adopted by the Board of County Commissioners of Brevard County, Florida on April 1, 1976.

DONE, ORDERED AND ADOPTED, in regular session, this 26th day of August, 1997.

ATTEST:


SANDY CRAWFORD, CLERK


RANDY O'BRIEN, CHAIRMAN
BOARD OF COUNTY COMMISSIONERS
BREVARD COUNTY, FLORIDA

(S E A L)

STATE OF FLORIDA
COUNTY OF BREVARD

This is to certify that the foregoing is a true and correct copy of Resolution
No. 97-165 witness my hand
and official seal this 27th day of
August 19 97

SANDY CRAWFORD

Clerk Circuit Court

BY E. M. Ely D.C.

-2-

APPENDIX 3

BREVARD COUNTY COMPREHENSIVE PLAN POLICIES AND ORDINANCES RELATING TO MANATEE PROTECTION

COMPREHENSIVE PLAN POLICIES

I. COMPREHENSIVE PLAN OBJECTIVES AND POLICIES

A. COASTAL MANAGEMENT ELEMENT

ESTUARINE POLLUTION

OBJECTIVE 1

POLICIES: 1.1, 1.2, 1.3, 1.6

- 1.1: Brevard County shall continue to implement and update, as needed, a Master Stormwater Management Plan and perform water quality monitoring to identify areas within the Indian River Lagoon of poor and fair water quality and establish priorities for correcting deficiencies. The management plan shall consider the cumulative impacts of development on water quality, and shall include recommendations to reduce or mitigate such impacts.
- 1.2: Brevard County shall review management practices recommended by the SJRWMD for reducing pollutant loads entering the Indian River Lagoon and provide local input into the development of the SJRWMD's adopted Pollution Load Reduction Goals (PLRGs).
- 1.3: Brevard County shall continue to cooperate with other agencies and municipalities that perform fisheries studies and submerged aquatic vegetation mapping and use this data to assist in establishing priority areas for surface water improvement efforts. In addition, Brevard County shall coordinate the manatee protection plan with municipalities and appropriate agencies.
- 1.6: Brevard County shall coordinate surface water management and protection efforts with Indian River National Estuary Program (IRNEP), FDEP, SJRWMD and other appropriate agencies.

WATER QUALITY/SEAGRASS

Brevard County no longer maps submerged aquatic vegetation but continues to monitor water quality within the Indian River Lagoon. The County created a stormwater utility and has adopted landscaping, land clearing, and surface water improvement ordinances to address stormwater runoff concerns.

OBJECTIVE 2: Improve existing water quality to enhance seagrass and other submerged aquatic vegetation quantity, health, diversity, and distribution within the Indian River Lagoon.

POLICIES: 2.1, 2.3, 2.5

- 2.1: Brevard County shall support the St. Johns River Water Management District's (SJRWMD) mapping of submerged aquatic vegetation within the Indian River Lagoon system. Evaluation results shall be made available to municipalities and other agencies or programs. Areas that show decline should

be targeted for increased watershed management, including non-point source pollution, and restoration. Management strategies shall be coordinated with the municipalities and other agencies.

- 2.3: Brevard County shall continue to protect SAV from the impacts of local land development by implementing the Surface Water Protection Ordinance. At a minimum, the following criteria shall be addressed:

Criteria:

- A. Maintain upland vegetation within required setbacks to reduce runoff.
 - B. Require proper use of turbidity screens during construction activities.
 - C. Control discharge rates to promote on-site settlement of sediment loads and meet minimum retention requirements for runoff from storm events.
 - D. Coordinate with FDEP Aquatic Preserve staff when development is within or adjacent to an aquatic preserve.
- 2.5: Brevard County supports the goals of the National Estuary Program's Comprehensive Conservation and Management Plan (CCMP) for recovery of the Lagoon prepared by the National Estuary Program. This support is reflected in the strategies identified in the County's Action Plan Implementation Status Report for the CCMP.

WATER-DEPENDENT LAND USES

Note: Once the draft Manatee Protection Plan (MPP) has been adopted and included in the Comprehensive Plan, this objective and its supporting policies should be evaluated for duplication with the Manatee Protection Plan. Any criteria, which are superseded by or duplicate the provisions in the MPP should be deleted. Other criteria found to be effective and not duplicative should be incorporated into the MPP so that all policies and criteria relating to boat facility siting (boat ramps and marinas), manatee protection and manatee-related education are consolidated in one location.

The draft Manatee Protection Plan's effectiveness is due to the synergistic relationship of its individual elements. Therefore, it is important that the criteria included in the Manatee Protection Plan be adopted as a unit. The most beneficial mechanism for the adoption of the draft Manatee Protection Plan is as a special amendment to the Comprehensive Plan, as opposed to being adopted piecemeal through other existing Comprehensive Plan elements or land development regulations.

OBJECTIVE 5: By 2002, Brevard County shall develop and adopt guidelines which direct the location and management of water-dependent, water-related and water-enhanced facilities, giving highest priority to water-dependent uses along the Indian River Lagoon System in order to provide for the increased demand for these facilities.

POLICIES: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.10, 5.12, 5.13, 5.14, 5.16, 5.17

- 5.1: Brevard County shall continue to implement performance standards for marinas and marine-related facilities within the coastal zone which include at a minimum: setbacks, height limitations, parcel size, architectural guidelines, seagrass protection, and the protection of water quality including the maintenance and containment of stormwater runoff and wash-down water for dry storage areas. Marina performance standards shall include the following minimum criteria:

Criteria:

- A. Existing marina facilities should be allowed to continue their operation provided these facilities meet the County's adopted operational standards.
 - B. While the expansion of existing facilities is preferred over construction of new facilities, the development of new marinas must remain a viable alternative as many existing marinas will not be capable of meeting adopted operational and environmental standards.
 - C. Policies and incentives should encourage new and expanded marina facilities to utilize dry storage to the fullest extent possible.
 - D. New marina facilities shall retain all work area runoff in a separate retention area. In addition, the first inch of stormwater runoff from a 10-year 24-hour storm shall be retained on site.
 - E. Prior to operation of any new marina fueling facility, a fuel management/spill contingency plan will be developed and provided to the Office of Natural Resources Management for review. The plan shall describe methods to be used in dispensing fuel and all the procedures, methods, and materials to be used in the event of a fuel spill and shall meet Brevard County Fire Prevention Codes and Rules of the State Fire Marshall's office.
- 5.2: Brevard County should continue to develop and implement regulations governing liveaboards within the coastal zone. The regulations shall include the following criteria at a minimum:

Criteria:

- A. Floating structures shall be considered within live-aboard regulations. Floating structures shall be defined as: A vessel with no means of operative propulsion which is inhabited for thirty (30) consecutive days or more.
- B. Motorized live-aboard vessels shall be defined as vessels which are occupied for more than seven (7) consecutive days within Brevard County. These shall not include floating structures (as defined in Criterion A).

- C. The County shall investigate designating certain areas of the Indian River Lagoon for mooring of motorized live-aboard vessels which are not docked within marinas. Live-aboard vessels moored outside of marinas shall be required to utilize pump-out facilities or a municipal sewer facility if they are moored for over three (3) days.
- D. The County shall coordinate with the Marine Patrol to eliminate liveaboards permanently anchored outside of a marina or area specially designated for liveaboards.
- E. Floating structures shall be required to moor within marinas or to privately owned riparian property, and shall be connected to pump-out facilities or a municipal sewer facility.
- F. Liveaboards shall be considered as part of the community and will be considered as residential units when assessing impacts of such development on community facilities and services.
- 5.4: Brevard County shall develop and adopt standards for marina siting within the coastal zone which shall address the following criteria at a minimum:

Criteria:

- A. Marina development may be considered within any appropriate zoning classification, if it is consistent with the performance standards developed by the County.
- B. At the beginning of the zoning process, all marina development proposals must submit a conceptual plan to be reviewed by the Office Natural Resources Management
- C. Commercial/industrial and commercial/recreational marina development within commercial, heavy and light industrial, and planned industrial park land use designations shall require a Conditional Use Permit. Residential/recreational marinas shall be a permitted use in these land use designations.
- D. Residential/recreational marinas may be considered within residential land use designations with a Conditional Use Permit and a Binding Concept Plan.
- E. No fueling, repair or pumpout facilities are permitted within residential zoning classifications.
- F. When locating new marinas or expanding existing marinas, biologically productive habitats shall be preserved to the fullest extent possible.

Mitigation is the last resort for habitat destruction, and shall be of a two-to-one or greater ratio of in-kind replacement.

- G. Marina facilities shall be located where maximum physical advantage for flushing and circulation exists, where the least dredging and maintenance are required, and where marine and estuarine resources will not be significantly affected.
- H. Marina basins shall be sited where there is an existing basin and access channel with an average water depth of three (3) feet below mean low water, except at the shoreline.
- I. Marinas and docking facilities should be approved which require minimal or no dredging or filling to provide access by canal, channel or road. Preference shall be given to marina sites with existing channels. In the event that dredging is required, the mooring areas and the navigation access channels shall not be dredged to depths greater than eight (8) feet. Any required dredging operations shall utilize appropriate construction techniques and materials to comply with state water quality standards, such as turbidity screens, hydraulic dredges, properly sized and isolated spoil deposition area to control spoil dewatering.
- J. New marina or substantially expanded facilities shall be designed to take advantage of existing water circulation and shall not adversely affect existing circulation patterns. Improvement of circulation shall be a consideration when expanding or upgrading existing facilities. However, any buffer zone established by the Florida Department of Environmental Protection Shellfish Environmental Assessment Section (FDEP-SEAS) shall be maintained.
- K. Marinas shall demonstrate that they have sufficient upland areas to accommodate all needed support facilities. These standards include, but should not be limited to, adequate parking, work areas and retention areas for stormwater and work area runoff, and shoreline protection buffers.
- L. Marina facilities shall not degrade water quality below existing Florida Department of Environmental Protection water classification standards.
- M. Marinas shall not be located in approved or conditionally approved shellfish harvesting waters or Class II waters, or other environmental areas designated by the County so as to substantially and materially have a negative impact on these waters.
- N. Commercial/recreational and commercial/industrial marinas shall not be located in Aquatic Preserves, or Outstanding Florida Waters, or other

environmental areas designated by the County so as to substantially and materially have a negative impact on these waters.

- O. Construction of multislip docking facilities and boat ramps shall be directed to locations where there is quick access to deep, open water at least eight (8) feet in depth (dredgeable), where the multi-slip docking facilities take the place of several single-slip docks and allow public access to the water, and where the associated increase in boat traffic will be outside of known manatee aggregation areas, and where seagrass beds or other wetlands supporting manatee habitat will not be disturbed.
- P. All marina facilities shall comply with marina siting guidelines and manatee protection measures established in Conservation Element Policy 9.9.
- 5.5: Brevard County shall require hurricane plans to be submitted to the Emergency Management Division in conjunction with marina site plans for review.
- 5.6: Marinas within the coastal zone shall be inspected annually by Brevard County and results of these inspections shall be coordinated with other agencies. Inspections shall be coordinated with existing programs and duplication with existing inspection programs shall be avoided. It is recommended that inspection of commercial marinas occur as part of the business license renewal procedure. Items to be inspected and reviewed may include the following.

Criteria:

- A. Pumpout facilities/marine sanitation devices, if required.
- B. Compliance with power/sailboat mix, if required.
- C. Spill prevention, control, containment and cleanup plans.
- D. Waste collection and disposal methods.
- E. Required fire fighting equipment, if required.
- F. Monitoring of marina basin water quality for bacteriological levels to insure compliance with state and federal standards. Liveaboards at marinas shall be inspected to ensure that marine sanitation devices (MSDs) are present and operational. If a water monitoring program is required, water-dependent uses shall be assessed an annual fee adequate to fund a water quality monitoring program, if required.
- 5.10: Brevard County shall review shoreline development within the coastal zone in order to maximize opportunities for water-dependent land uses. The following criteria, at a minimum, shall be utilized.

Criteria:

- A. Water-related uses shall be built on uplands.
- B. Development which is feasible only through creation of land by dredging and filling of areas below the mean high water line shall not be approved. Exceptions may be considered where overriding benefit to the natural resource can be demonstrated.
- C. Water-dependent commercial and industrial uses may be considered for siting adjacent to the Indian River Lagoon.
- D. Water-related commercial and industrial uses may be considered for siting only adjacent to Class III waters of the Indian River Lagoon.
- 5.12: By 2004 Brevard County shall develop and implement a water and sediment quality monitoring program for water-dependent users, man-made canals and other selected areas with significant upland runoff within the coastal zone.

Criteria:

- A. Brevard County shall establish a classification program for the various water dependent uses.
- B. Brevard County shall establish a water quality monitoring program for each of the designated classes of water dependent uses.
- C. Water dependent uses shall be assessed an annual fee adequate to fund the required water quality monitoring program.
- D. The County shall require the activity to cease if adopted water quality standards are not maintained.
- E. Continued operation resulting in degradation of the water quality below accepted standards shall result in a fine, as established by Brevard County.
- F. Waiver provisions should be included for operations below an established threshold.
- G. This program shall be in coordination with the Florida Department of Natural Resources, and other appropriate agencies.
- 5.13: Brevard County shall support environmentally and economically sound development of Port Canaveral and related facilities, which is consistent with this Comprehensive Plan (See Policy 5.4 of the Transportation Element).
- 5.14: Brevard County should continue to monitor boating activity and boat facility demand.
- 5.16: Brevard County should encourage the construction of marine sanitation device (MSD) pumpout facilities.

- 5.17: Brevard County shall utilize available management plans in developing standards for marina siting and other water-dependent uses. These management plans include, but are not limited to, Aquatic Preserve Management Plans, the Surface Water Improvement Management (SWIM) Plan and the IRLCCMP.

B. CONSERVATION ELEMENT

SURFACE WATER

OBJECTIVE 3: Improve the quality of surface waters within Brevard County and protect and enhance the natural functions of these waters.

POLICIES: 3.1, 3.3, 3.4, 3.5, 3.7, 3.9, 3.12

- 3.1: Brevard County shall cooperate with the Florida Department of Environmental Protection (FDEP) to require small package treatment plants adjacent to surface waters to comply with existing federal, state, or regional rules and regulations, and to ensure that the necessary renovations to achieve compliance are completed in a timely manner.
- 3.3: Brevard County shall continue to make efforts to prevent negative impacts of development in and adjacent to the Indian River Lagoon and its tributaries designated as Class II waters, Aquatic Preserves and Outstanding Florida Waters by implementing and revising as necessary, the Surface Water Protection Ordinance, including the following minimum criteria:

Criteria:

- A. Maintain a fifty (50) foot shoreline protection buffer from the mean high water line or the safe upland line as determined by the FDEP Bureau of Survey and Mapping.
- B. No more than twenty (20) percent of the lot width or twenty-five (25) linear feet, whichever is greater, of any shoreline protection buffer of a project or parcel, or the offshore emergent vegetation associated with a project or parcel may be altered for reasonable access or for allowable development. Within the shoreline protection buffer, allowable development shall be limited to docks, boat ramps, pervious walkways, elevated walkways, and approved accessory uses, as set forth by the County land development regulations. Accessory uses shall be allowable only on existing bulkheaded lots utilizing required stormwater management techniques.

The remainder of the shoreline protection buffer shall be maintained in unaltered vegetation, except for noxious species, as permanent open space. This shall not preclude mitigation projects or the planting of native species. Provisions for the alteration and/or removal of non-native noxious vegetation shall be established by the Brevard County Natural Resources Management Division.

- C. For residential lots platted or established by deed on the official record books of Brevard County prior to September 8, 1988, an alternative to the fifty (50) foot shoreline protection buffer described above shall be available for those lots which have insufficient lot depth to construct a primary structure or pool with its associated decking and features. In the case where there is insufficient lot depth to construct a primary structure, this alternative shall allow the shoreline protection buffer to be reduced to twenty five (25) feet if additional measures are taken to preserve water quality and natural habitat within the adjacent surface water body. In the case where there is insufficient lot depth to construct a pool with its associated decking and features, an encroachment of up to 720 square feet within the shoreline protection buffer shall be available if additional measures are taken to preserve water quality and natural habitat within the adjacent surface water body. These additional measures should, at a minimum, be consistent with DEP 17-25 and 17.302 F.A.C. and may include but are not limited to the provision of a stormwater system which is capable of preventing the first inch of runoff from a 25 year, 24 hour storm from entering surface waters and revegetation with native shoreline vegetation. Within the shoreline protection buffer, development shall be limited to those activities outlined in 3.4 (B).
- D. Prohibit shoreline alteration other than that allowed for reasonable access or approved accessory uses, unless the alteration is in the public interest and does not adversely impact water quality, natural habitat and adjacent shoreline uses.
- E. Prohibit channelization, dredging and filling, and impoundment of natural waters of the State unless the activity is clearly in the public interest and does not adversely impact water quality, natural habitat and adjacent shoreline uses.
- F. Prohibit discharges of any substances below ambient water quality standards.
- G. Within the shoreline protection buffer the maximum amount of impervious surface is thirty (30) percent.
- 3.4: Brevard County shall continue to prevent negative impacts of development in and adjacent to Class III waters (except Outstanding Florida Waters and Aquatic Preserves) along the St. Johns River and Indian River Lagoon and its tributaries by implementing and revising as necessary, the Surface Water Protection Ordinance including the following minimum criteria:

Criteria:

- A. A twenty five (25) foot shoreline protection buffer from the mean high water line or the safe upland line as determined by the FDEP Bureau of Survey and Mapping shall be established.
- B. No more than twenty (20) percent of the lot width or twenty-five (25) linear feet, whichever is greater, of any shoreline protection buffer of a project, parcel, or the offshore emergent vegetation associated with a project or parcel may be altered for a reasonable access or for allowable development. Within the shoreline protection buffer, allowable development shall include docks, boat ramps, pervious walkways, elevated walkways, and approved accessory uses, as set forth by the County land development regulations. Accessory uses shall be allowable only on existing bulkheaded lots utilizing required stormwater management techniques. The remainder of the shoreline protection buffer shall be maintained in unaltered vegetation, except for noxious species, as permanent open space. This shall not preclude mitigation projects or the planting of native species. Provisions for the alteration and/or removal of non-native, noxious vegetation shall be established by the Brevard County Office of Natural Resources.
- C. For residential lots platted or established by deed on the official record books of Brevard County prior to September 8, 1988, an alternative to the twenty five (25) foot shoreline protection buffer described above along Class III waters shall be available for those lots which have insufficient lot depth to construct a primary structure or pool with its associated decking and features. In the case where there is insufficient lot depth to construct a primary structure, this alternative shall allow the shoreline protection buffer to be reduced to fifteen (15) feet if additional measures are taken to preserve water quality and natural habitat within the adjacent surface water body. In the case where there is insufficient lot depth to construct a pool with its associated decking and features, an encroachment of up to 720 square feet within the shoreline protection buffer shall be available if additional measures are taken to preserve water quality and natural habitat within the adjacent surface water body. These additional measures should, at a minimum, be consistent with DEP 17-25 and 17.302 F.A.C. and may include but are not limited to the provision of a stormwater system which is capable of preventing the first inch of runoff from a 25 year, 24 hour storm from entering the surface waters and revegetation with native shoreline vegetation. Within the shoreline protection buffer, development shall be limited to those activities outlined in this policy.
- D. Prohibit shoreline alteration other than that allowed for reasonable access or approved accessory uses, unless it is in the public interest; or prevents or repairs erosion; or does not adversely impact water quality, natural habitat and adjacent shoreline uses.

- E. Prohibit discharges of any substances below ambient water quality standards.
- 3.5: Vertical seawalls and bulkheads shall be prohibited along the Indian River Lagoon system, excluding man-made canals. Hardening of the estuarine shoreline shall be allowed only when erosion is causing a serious (significant) threat to life or property. Rip-rap material, pervious interlocking brick systems, filter mats and other similar stabilization methods combined with vegetation shall be used in lieu of vertical seawalls and bulkheads when hardening of the shoreline is approved.
 - 3.6: New man-made canals connected to the Indian River Lagoon system are prohibited.
 - 3.7: Septic tanks and drain fields shall be set back at least one hundred (100) feet from the shoreline of the Indian River Lagoon. In those cases where there is insufficient lot depth, except where a variance has been granted by the state, the septic tank and drainfield shall be placed the maximum distance possible from the edge of the lagoon, a minimum of seventy-five (75) feet.
 - 3.9: Brevard County shall continue to work with the St. Johns River Water Management District (SJRWMD), FDEP, and Indian River Lagoon Program (IRLP) and other appropriate agencies in developing appropriate water quality standards for estuarine waters within the Indian River Lagoon.
 - 3.12: Brevard County strongly supports the designation of the Indian River Lagoon from SR 405 north to the County line an Aquatic Preserve.

WILDLIFE

OBJECTIVE 9: Protect endangered and threatened wildlife species and species of special concern from adverse impacts due to loss of crucial habitat.

POLICIES: 9.1, 9.9, 9.14, 9.15

- 9.1: Brevard County shall continue to obtain and utilize information from the U.S. Fish and Wildlife Service, Florida Game and Freshwater Fish Commission, Florida Department of Environmental Protection, Florida Natural Areas Inventory, East Central Florida Regional Planning Council and other agencies to inventory and identify crucial habitat for endangered or threatened wildlife species and species of special concern within the County, and to determine loss rates and rarity of such habitat.
- 9.9: Brevard County shall continue to develop the Manatee Protection Plan (MPP) in consultation with the U.S. Fish and Wildlife Service, Florida Department of Environmental Protection, Brevard Marine Association, and other agencies or groups as appropriate. The MPP shall include the following major components at a minimum: habitat protection, education, boat facility siting, manatee protection boat speed zones, manatee mortality, law enforcement, and boating safety. In addition to the criteria established in the MPP, the following criteria shall also apply:

Criteria:

- A. Each marina operator shall establish and maintain a permanent manatee educational display at a prominent location at their marina. Brevard County shall establish and maintain a display at public boat launch facilities and license tag agencies.
 - B. Those involved in the sale of boats and motors should provide manatee information to the buyer at the time of delivery of boats or motors.
 - C. Brevard County shall maintain well-marked speed limit signs, in accordance with the uniform waterway marker program, for manatee protection and boating safety speed zones established by local ordinance only.
 - D. Brevard County, or other appropriate agencies, shall develop a standardized information packet containing information regarding manatees and regulations protecting manatees for distribution by the above mentioned parties. This will include information concerning the existing manatee slow speed or idle zones, and any additional zones which may be deemed necessary within areas frequented by manatees.
 - E. The Brevard County staff continue to monitor manatee protection measures to determine their effectiveness.
 - F. Brevard County shall identify areas containing significant manatee habitat features. Marinas with powerboat slips should not be sited within these areas.
- 9.14: Brevard County shall continue to assist in the application of, and compliance with, all state and federal regulations which pertain to endangered, or threatened species and species of special concern.
 - 9.15: By 2002, the County shall develop education programs to promote the preservation of endangered and threatened species and species of special concern as well as their habitat, with the assistance of the Florida Department of Environmental Protection, the Florida Game and Fresh Water Fish Commission, and the U.S. Fish and Wildlife Service, and other agencies or groups as appropriate. Brevard County encourages the development of post-development wildlife management plans which would enhance the wildlife potential of existing developments.

BREVARD COUNTY CODE
Surface Water Protection Ordinance
Division 3, 62-3661

**CHAPTER 62, ARTICLE X,
DIVISION 3.**

SURFACE WATER PROTECTION*

* **State Law References:** Provisions for protection of environmentally sensitive lands required, F.S. § 163.3202(2)(e); water resources, F.S. ch. 373; management and storage of surface waters, F.S. § 373.403 et seq.

Sec. 62-3661. Definitions.

For the purpose of this division, certain terms and words are defined as follows:

Accessory use means a building, structure or use as defined in, and consistent with, article VI of this chapter. Accessory uses shall include but not be limited to all impervious surfaces within the shoreline protection buffer requiring a county building permit.

Alteration of mangroves means the cutting, removing, defoliating, disturbing or otherwise damaging or destroying of mangroves.

Aquatic preserves means those sovereignty lands established by the state and managed under the provisions set forth in F.S. chs. 253 and 258.

Best public interest means public projects which clearly demonstrate a net benefit to the public, as determined by the board of county commissioners, and which adequately mitigate adverse environmental impacts.

Boat slip means a space designed for the mooring of a single watercraft and usually projecting from a dock or shoreline.

Bulkhead and *seawall* mean a manmade shoreline wall, breakwater or encroachment, excluding riprap, designed or positioned to break the force of waves or to hold back or protect the shoreline from erosion. Headwalls and other similar minor structures necessary for the implementation of permitted stormwater management systems shall not be considered bulkheads.

Canal means a manmade channel which conveys water and which may be used for navigation.

Class I waters means waters designated by the state as a source of potable water supply and defined within F.A.C. ch. 17-3.

Class II waters means waters designated by the state for shellfish propagation and harvesting as determined by the state department of environmental regulation and defined

within F.A.C. ch. 17-3.

Class III shellfishing areas means those areas within class III waters designated suitable for shellfish harvesting by the state department of natural resources under F.A.C. ch. 16R-7.

Class III waters means waters designated by the state for recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. This includes all waters within the county, except:

- (1) Those designated as class I or class II waters, class III shellfish areas, Outstanding Florida Waters and aquatic preserves as described in this section;
- (2) Those waters which are part of a designated stormwater management system, which are utilized only for stormwater management and are not considered class III waters by the state department of environmental regulation;
- (3) Those waters that are manmade water bodies that do not have a direct surface water connection to natural water bodies;
- (4) Existing manmade water bodies not connected to the Indian River lagoon system which are incidental to bona fide agricultural operations utilizing best management practices (BMP's), on lands having been granted an agricultural tax exemption; and
- (5) Those existing manmade water bodies defined in subsection (4) of this definition which are undergoing conversion during development, as evidenced by an approved development order, to approved designated stormwater management systems not designed to outfall to waters of the state, and which do not increase sediment or pollutant loading to the receiving water body during construction.

Degrade means to discharge or release, through direct or specific manmade activities or events, any substance into the waters within the county which reduces, lowers or contaminates existing receiving water quality.

Designated stormwater management system means the manmade features of the property which collect, convey, channel, store, inhibit or divert the movement of stormwater and are identified as drainage easements or stormwater facilities on plats or subdivision plans and site plans. Common features include retention and detention basins.

Direct surface water connection means a situation where the single point of connection of a water body to class I, II or III waters is 35 square feet or greater in cross

sectional area and normally has a water depth of three feet or greater.

Dock, private means a fixed or floating structure, including moorings, used for berthing buoyant vessels or for shoreline access or water-oriented recreation. A private dock shall contain no more than two boat slips, and shall not be utilized for the purpose of producing or as an inducement to producing income.

Elevated means those structures designed, constructed and located above the ground surface so as to not impede the natural flow of water on the ground surface.

Erosion means the wearing away of a shoreline or side slopes through the operation of currents, boat wakes, tides or the natural activity of rainfall.

Hardening means alteration of the shoreline from its natural state utilizing riprap material, interlocking brick systems, rock revetments, seawalls and bulkheads or similar structures.

Hazardous material means any material which is either a hazardous substance or hazardous waste as defined in this section. A hazardous material includes any solution, mixture or formulation containing such material.

Hazardous substance means any material defined, listed or classified as a hazardous substance or toxic substance according to any of the following state or federal codes or regulations:

- (1) F.A.C. ch. 38F-41 (the Florida Substance List); or
- (2) Title 40 of the Code of Federal Regulations part 302.4 (Designation of Hazardous Substances).

Hazardous waste means any material defined, listed or classified as a hazardous waste according to the following state or federal codes or regulations:

- (1) Title 40 of the Code of Federal Regulations part 261 (Identification and Listing of Hazardous Substances); or
- (2) F.A.C. ch. 17-30 (Hazardous Waste).

Impervious surface means a surface which has been compacted or covered with a layer of material so that it is highly resistant to infiltration by water. This shall include but not be limited to semi-impervious surfaces such as compacted clay, as well as most surfaced areas, roofs, sidewalks and other similar structures.

Indian River lagoon system includes the Indian River, the Banana River, Mosquito Lagoon, Newfound Harbor and Sykes Creek, and their tributaries.

Mangrove means any specimen, or any portion of any specimen, living or dead, of the species *Avicennia germinans* (black mangrove), *Laguncularia racemosa* (white mangrove), *Rhizophora mangle* (red mangrove) or *Conocarpus erectus* (buttonwood).

Minor structures means non-habitable structures such as storage sheds, pump houses and gazebos, and which do not exceed 400 square feet in total area.

Mitigation means restoration, reclamation or compensation for manmade or man-induced environmental damage or adverse conditions. All mitigations for environmental impacts shall be reviewed and approved by the natural resources management division as subject to section 62-3662.

Native vegetation means vegetation originating, found or usually occurring within a particular region, area, climate or ecosystem. Native vegetation shall not include non-native, noxious or nuisance species such as Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarinaceae* spp.), *Melaleuca* (*Melaleuca* spp.) or other similarly recognized species. In addition, ornamental, landscape or typical crop vegetation, including sod and lawn grasses, shall not be included as native vegetation.

Outstanding Florida Waters means those water bodies afforded special protection and described within F.A.C. 17-3.041, and designated under the authority of F.S. ch. 403.

Overriding public benefit means the result of a development action by a private property owner that substantially preserves, restores or enhances those natural functions which define areas of critical concern, environmentally sensitive areas, shorelines or water bodies, identified by the county comprehensive plan, the natural resources management division or state or federal agencies. An overriding public benefit shall include but not be limited to proposals which preserve, restore or enhance floodplain, wetland, shoreline or prime aquifer recharge functions and provide for the dedication of associated lands to the county or other acceptable public entity or agency.

Petroleum means oil of any kind and in any form and derivatives thereof, to include but not be limited to crude petroleum or liquid products that are derived from crude petroleum by distillation, cracking, hydroforming or other petroleum refinery processes, including gasoline.

Reinforced rock revetment habitat means an approved bulkhead or seawall established between existing seawalls on each immediately adjacent shoreline, with a required rock revetment adjoining the structure on the seaward (waterward) side, designed to allow for aquatic habitat and additional shoreline benefits.

Release means any sudden or gradual spilling, leaking, pumping, pouring, emitting, emptying, discharging, injection, escaping, leaching, dumping or disposing of substances or wastes, including the abandonment or discarding of barrels, containers and other receptacles containing any substances or wastes, into the environment, in such a manner as to endanger the public health, safety, aesthetics or welfare or the environment,

or in violation of any federal, state or local law, rule or regulation.

Riprap means any shoreline hardening, revetment or structural alteration utilizing rock, concrete or other similar material, which alters the naturally occurring shoreline for the purpose of stabilization or erosion protection. Riprap shall not include bulkheads, seawalls or approved reinforced rock revetment habitats.

Safe upland line means a boundary line determined by the state department of natural resources (FDNR), bureau of survey and mapping, in consultation with the applicant. The safe upland line is normally located landward of either the mean or ordinary high-water line and is based upon the location of known or approximated mean high-water lines, ordinary high-water lines and mature upland vegetative communities, whichever is applicable.

Seawall. See Bulkhead.

Shoreline protection buffer means the protected area adjacent to and landward of the surface waters of the county as established by this division. On nonbulkheaded lots, the waterward extent of the shoreline protection buffer shall be the mean high-water line or the safe upland line, as agreed upon by the applicant. On bulkheaded lots, the waterward extension of the shoreline protection buffer shall be the established or existing bulkhead line.

Structure means anything constructed or erected, the use of which requires rigid location on the ground or attachment to something having a permanent location on the ground, including but not limited to supporting walls, signs, covered screened enclosures and any other covered area; provided, however, neither a fence, a permitted stormwater management system nor an elevated boardwalk shall be considered a structure for the purposes of this division.

(Code 1979, § 14-78)

Cross References: Definitions generally, § 1-2.

Sec. 62-3662. Penalty; additional remedies; restoration of disturbed areas.

Penalties for violations of this division shall be as specified in F.S. § 125.69 or F.S. ch. 162, or as provided in this Code. In addition, mitigation or restoration of the area may be required in order to restore disturbed areas to the previously existing state prior to the unpermitted disturbance, or to allow for off-site mitigation, as applicable. The director of the natural resources management division shall be responsible for reviewing and approving all restoration or mitigation plans, which shall be subject to approval by the board of county commissioners. The provisions of this section are an additional and supplemental means of enforcing county codes and ordinances. Nothing in this section shall prohibit the county from enforcing this Code by injunctive relief, or by any other means provided by law.

(Code 1979, § 14-82(2))

Sec. 62-3663. Purpose and intent.

It is the purpose and intent of this division to improve the quality of surface waters within the county, and protect and enhance the natural functions of these waters. It is also the intent of this division to apply the standards set out in this division for development in and adjacent to class I, II and III waters, Outstanding Florida Waters and aquatic preserves.

(Code 1979, § 14-77)

Sec. 62-3664. Administration.

The director of the natural resources management division, or his designee, shall be responsible for the general administration of this division of this article. The director shall be responsible for all reviews of all applications, in addition to providing the administrative decisions which pertain to this division. Upon request, the director shall provide written confirmation of any decision or findings relating to applications or reviews made pursuant to this division and letters of interpretation or intent.

(Code 1979, § 14-82(1))

Sec. 62-3665. Appeals.

(a) The county local planning agency shall hear appeals relating to any administrative decision or determination concerning implementation or application of the provisions of this division, and shall submit recommendations to the board of county commissioners for approval or denial.

(b) Such appeals shall be taken within 30 days from the date of rendition of such decisions or determination by filing with the director from which the appeal is taken and with the local planning agency a notice of appeal, specifying the grounds thereof. The director from whom the appeal is taken shall forthwith transmit to the local planning agency all the papers constituting the records upon which the action appealed from was taken. Appeal procedures shall be the same procedures as specified in section 62-507.

(Code 1979, § 14-82(3))

Sec. 62-3666. General provisions.

The following provisions shall apply to all class I, II and III waters within the county:

- (1) New seawalls and bulkheads shall be prohibited along the Indian River lagoon system, except as provided in this division for private bulkheaded canals adjoining class III waters. Applications for permits for any seawall or bulkhead on private canals adjoining class III waters shall be submitted in writing to the county office of natural resources management for consideration. All applications must meet all of the following minimum criteria:

- a. The permitted activity shall not be adjacent to state department of environmental regulation (FDER) class I waters, FDER class II waters, FDER/FDNR class III shellfishing areas, FDNR aquatic preserves or Outstanding Florida Waters;
 - b. The applicant shall clearly demonstrate that the subject property is experiencing continued and significant shoreline loss as recognized by the office of natural resources management pursuant to subsection (4) of this section and alternatives to bulkheading have been correctly employed without success, or the particular shoreline under consideration cannot structurally or functionally support alternative shoreline stabilization methods;
 - c. The lot shall be immediately adjacent to and between existing bulkheaded lots on either side of the subject property, or be located in private canals exhibiting greater than 75 percent existing bulkheaded lots with the subject property less than 150 feet from existing bulkheaded lots on either side of the adjoining shoreline;
 - d. Shoreline areas existing in a naturally vegetated state and not demonstrating significant shoreline erosion shall not be considered for bulkheading;
 - e. On those lots where bulkheads may be permitted, the establishment of the bulkhead shall not increase the waterward extension of the existing shoreline. Permitted bulkheads on lots with existing adjacent bulkheads on each adjoining shoreline shall be allowed to locate parallel and in line with the existing established bulkhead line; and
 - f. The applicant shall design and install the permitted bulkhead system as to provide reasonable assurance that the erosion of the abutting properties will not be accelerated by the establishment of the applicant's bulkhead.
- (2) For shorelines not within the criterion of subsection (1) of this section, hardening of the shoreline shall be allowed only when the applicant can demonstrate that erosion is causing a significant shoreline loss as recognized by the natural resources management division, pursuant to subsection (4) of this section. All requests for shoreline hardening must be submitted to and approved by the natural resources management division prior to any hardening activities. Riprap material, pervious interlocking brick systems, filter mats and other similar stabilization methods, combined with vegetation, shall be used in lieu of seawalls and bulkheads when hardening of the shoreline is approved under this subsection. For

those properties on the Indian River lagoon immediately between two adjacent existing seawalls, the natural resources management division may permit reinforced rock revetment habitats, provided all additional required permits and reviews from appropriate agencies have been obtained. All permitted structures shall be subject to the additional requirements of this division. When feasible, the seawall portion of the structure shall be located above the mean high-water line.

- (3) For any proposed shoreline hardening, the natural resources management division must be provided with plans, test results or other professionally accepted information that affirmatively demonstrates that any proposed shoreline hardening project will not:
 - a. Adversely impact water quality.
 - b. Result in the loss of shoreline and aquatic vegetation.
 - c. Adversely affect adjacent properties.
 - d. Adversely affect biological communities.
 - e. Increase the waterward extension of the existing shoreline, except as provided in subsection (1)e of this section.
 - f. Adversely affect the flow of water or create a navigational hazard.

- (4) Utilizing the following minimum criteria, the natural resources management division shall assess each estuarine or riverine shoreline under application for shoreline hardening for significant shoreline loss. Shorelines must exhibit one or more of the following criteria to qualify for local approval of stabilization alternatives other than the establishment of native vegetation:
 - a. Clear and convincing evidence of increasing destructive loss of existing established native vegetation due to wave, wake or stormwater activity;
 - b. Clear and convincing evidence of properly designed, permitted and installed alternatives to shoreline hardening which have failed to stabilize the shoreline, such as but not limited to the establishment of native vegetation, gently sloping or tiered shorelines, or other similar alternatives;
 - c. Clear and convincing evidence of lawfully existing permanent structures which face imminent threat of destruction from continued shoreline loss; or

- d. Clear and convincing evidence of continuous historical accelerated shoreline loss greater than one foot per year, for a period of not less than ten consecutive years.

Clear and convincing evidence shall be the responsibility of the applicant or his authorized agent. The criteria set out in this subsection shall be the minimum required. All applicants shall be subject to and responsible for obtaining all additional necessary approvals or permits, prior to local approval. State or federal approval of shoreline hardening shall not exempt the applicant from local approval or denial of a project. All appeals of decisions of the natural resources management division shall be subject to the provisions of section 62-3665.

- (5) New navigation canals connected to the Indian River lagoon system are not permitted. Existing ditches, drainage rights-of-way, drainage easements and stormwater facilities which connect to the Indian River lagoon system shall not be widened or deepened to accommodate boat traffic. New boat docks, boathouses and other related structures, or the expansion of these existing structures, shall not be allowed or permitted within or adjacent to existing ditches, drainage rights-of-way, drainage easements or stormwater facilities which connect to the Indian River lagoon system. Existing ditches, drainage rights-of-way, drainage easements or stormwater facilities which connect to the Indian River lagoon system that have been specifically designated for boat traffic on subdivision plats or site plans, or which have been historically and effectively utilized for buoyant vessel navigation prior to the effective date of the ordinance from which this division is derived, shall be exempt from this subsection.
- (6) For lots platted or established by deed on the official record books of the county after April 3, 1989, septic tanks and drainfields shall be set back at least 100 feet from the ordinary high-water line or the safe upland line of the Indian River lagoon.
- (7) For lots with no existing septic system and drainfield platted or established by deed on the official record books of the county before April 3, 1989, septic tanks and drainfields shall be set back at least 100 feet from the ordinary high-water line or the safe upland line of the Indian River lagoon. In those cases where there is insufficient lot depth, the septic tank and drainfield shall be a minimum of 75 feet from mean high water or the safe upland line, except where a variance has been granted by the state, or where the state allows the setback to be 50 feet and there is insufficient room to increase the setback.
- (8) Approved alteration pursuant to this division that occurs within the

shoreline protection buffers shall be reviewed by the county natural resources management division. The natural resources management division shall have the authority to require the applicant to utilize temporary sediment or turbidity control methods during construction. All erosion control methods shall be submitted in writing, shall be approved by the natural resources management division and shall be installed by the applicant. Sediment and turbidity control methods shall be in place and maintained throughout the alteration process. One of the following erosion control methods may be used by the applicant in most circumstances. Combinations of these methods or other methods may be required depending upon site-specific characteristics:

- a. *Baled hay or straw barriers.* Bales, approximately 1.5 feet by 1.5 feet by three feet or 40 to 50 pounds in size, shall be placed in a line (end to end) that is perpendicular to the runoff flow from the alteration site. Each bale shall be firmly staked with a minimum of two stakes approximately two inches by two inches by four feet in dimension. A small amount of loose soil, of a size approximately six inches by six inches by the length of the hay bales, shall be placed by shovel and lightly compacted along the landward edge of the bales. If the baled hay or straw barrier is breached during the alteration process, the breach must be repaired immediately. It is recommended that extra bales and stakes be kept at the alteration site to make any necessary repairs.
- b. *Silt fence.* Filter fabric, in conformance with section 985 of the specifications of the state department of transportation, shall be placed in a line that is perpendicular to the runoff flow from the alteration site. The fabric shall be firmly attached to wooden posts, two inches by four inches by four feet in size, or having a 2.5-inch diameter, spaced at a maximum distance of six feet. Posts may be positioned either vertically or canted 20 degrees toward flow direction and the alteration site.
- c. *Vegetative buffer.* A densely vegetated buffer may effectively prevent sedimentation of the surface water body if the vegetation completely or nearly completely covers the ground. Vegetation buffers shall consist of existing vegetation with a greater than 75 percent understory cover and shall remain undisturbed. The removal of existing native vegetation for the replacement of non-native vegetation as a buffer requirement shall be prohibited. Minimum required buffer depths shall be 50 percent of the required shoreline protection buffer depth. Additional erosion control methods may be required in conjunction with approved vegetation buffers.

- (9) For structures that existed prior to the effective date of the ordinance from which this division is derived, remodeling and other types of development which do not increase the amount of impervious surfaces within or threaten the integrity of the shoreline protection buffer will be allowed.
- (10) The release of petroleum or hazardous materials into class I, II and III waters, aquatic preserves, Outstanding Florida Waters and designated stormwater systems shall be prohibited.
- (11) Upon review, the natural resources management may authorize the removal or alteration of non-native noxious vegetative species, such as Brazilian pepper or Australian pine, within the shoreline protection buffer, provided the allowed disturbance does not:
 - a. Remove, destroy or damage existing native vegetation, wetland habitats, floodplains, required erosion control or stormwater management systems, or endangered or threatened species or their habitats;
 - b. Undermine shoreline integrity or promote increased shoreline or upland erosion; or
 - c. Increase sediment or nutrient loading to the adjacent water body.
- (12) All improvements, mitigations and special conditions approved or set forth by this division shall be required to be installed, constructed and maintained in a viable, approved, functional working order.
- (13) The provisions of this division shall not prohibit the location or construction of public utility crossings or other similar public structures by public utilities, provided these utilities have received all additional required permits or approvals.

(Code 1979, § 14-79)

Sec. 62-3667 Class I waters.

The following regulations shall apply to development in and adjacent to class I waters:

- (1) There shall be a 200-foot shoreline protection buffer extending landward from the ordinary high-water line or the safe upland line as determined by the bureau of survey and mapping of the state department of natural resources, whichever the applicant prefers.
- (2) Alteration within the shoreline protection buffer other than that which is permitted under this division shall be prohibited, unless it is shown to be in the best public interest and does not adversely impact water quality and natural habitat. Acceptable uses within the shoreline protection buffer are passive recreation, hunting, fishing, fish and wildlife management, open space and nature trails, and similar uses. Development within the buffer is limited to structures for water access such as docks, boat ramps and pervious walkways and elevated minor structures.
- (3) No more than 20 percent of the lot width or 25 linear feet, whichever is greater, of any shoreline protection buffer of a project or parcel, or the offshore emergent vegetation associated with a project or parcel, may be altered for reasonable access. This shall not preclude mitigation projects or the planting of native vegetation.
- (4) All discharges into class I waters shall not degrade existing water quality below existing conditions, or those outlined in F.A.C. 17-302 for class I water bodies.
- (5) Dredging or filling of class I waters shall be prohibited, except for permitted utility crossings, publicly owned recreational projects which do not degrade water quality, environmental restoration projects, necessary maintenance of existing projects, and projects with an overriding public benefit.
- (6) Development of mining operations shall not degrade water quality of class I waters. No commercial borrow pits or mining operations shall be permitted within the ten-year floodplain of class I waters.

(Code 1979, § 14-80)

Sec. 62-3668. Class II waters, Outstanding Florida Waters, aquatic preserves, conditionally approved Class III shellfishing waters and Class III waters.

The following regulations shall apply to development in and adjacent to class II waters, Outstanding Florida Waters, aquatic preserves, conditionally approved class III shellfishing waters and class III waters:

- (1) Along class II waters, Outstanding Florida Waters, aquatic preserves and conditionally approved class III shellfishing waters, a 50-foot shoreline protection buffer extending landward from the mean high-water line or the safe upland line as determined by the bureau of survey and mapping of the state department of natural resources, whichever the applicant prefers, shall be established.
- (2) Along class III waters, except conditionally approved class III shellfishing waters, a 25-foot shoreline protection buffer extending landward from the mean high-water line or the safe upland line as determined by the bureau of survey and mapping of the state department of natural resources, whichever the applicant prefers, shall be established.
- (3) Alteration or construction within the shoreline protection buffer other than that which is permitted under this division shall be prohibited, unless it is shown to be in the best public interest and does not adversely impact water quality and natural habitat.
- (4) Properties shall, through the use of swales, berms, native vegetation or other appropriate methods, detain stormwater runoff prior to discharge to the surface water. A professional engineer shall design a stormwater system to retain the first one inch of runoff from impervious surfaces which drain to the shoreline. All requirements for stormwater management shall be reviewed and approved by the division of stormwater management and shall be inspected by the natural resources management division, as necessary.
- (5) Development within the shoreline protection buffer is limited to fences, docks, boat ramps, pervious walkways and elevated walkways. In addition, approved accessory uses are permitted in private nonvegetated bulkheaded canals adjacent to class II and class III waters which utilize approved stormwater management techniques.
- (6) For projects or parcels without mangroves, no more than 20 percent of the lot width or 25 linear feet, whichever is greater, of any shoreline protection buffer of a project or parcel, or the offshore emergent vegetation associated with a project or parcel, may be altered for reasonable access. The remainder of the shoreline protection buffer shall be maintained in unaltered vegetation, except for noxious species, as permanent open space. This, however, shall not preclude mitigation projects, the planting of native vegetation, or the development described in applicable sections of this division within the shoreline protection buffer areas.
- (7) For projects or parcels with mangroves, alteration of mangroves is

prohibited unless the applicant can demonstrate to the satisfaction of the office of natural resources management that reasonable access and development described in subsection (5) of this section cannot occur without the alteration of mangroves. If alteration is allowed by the natural resources management division, no more than ten percent or six feet, whichever is less, of the mangroves may be altered for reasonable access and development described in subsection (5) of this section. The remainder of the shoreline protection buffer shall remain unaltered, except as provided in this division for the removal of noxious species. This shall not preclude mitigation projects or the planting of native vegetation.

- (8) For residential lots platted or established by deed on the official record books of the county prior to September 8, 1988, the following shall apply: Structures may be built within the shoreline protection buffer only if it can be shown that there is insufficient lot depth to allow the development of primary and accessory structures permitted and defined by the existing zoning classification of the property, and if all other alternatives and remedies are not applicable.
- a. Within class II waters, Outstanding Florida Waters, aquatic preserves and conditionally approved class III shellfishing waters, structures may be built within the landward 25 feet of the shoreline protection buffer if all other requirements of this division are met.
 - b. Within class III waters, structures may be built within the landward ten feet of the shoreline protection buffer if all other requirements of this division are met.
 - c. Within existing non-native vegetated bulkheaded lots on private canals adjacent to class II and class III waters, accessory structures as permitted by article VI of this chapter may be permitted up to ten feet from the existing bulkhead line, provided that:
 1. The structure or use is approved in accordance with the additional provisions of this division, including the requirements for a functional stormwater management system, as approved by the division of stormwater management utilities;
 2. The structure or use does not result in the removal of existing native vegetation within the shoreline protection buffer;
 3. The structure or use does not endanger or interfere with the integrity or function of existing or required structures or buffers, including but not limited to vegetation and

shoreline protection buffers, stormwater management tracts, bulkheads, docks and walkways; and

4. All plans involving structures or uses in the required shoreline protection buffer of existing bulkheaded lots with existing native vegetation shall be reviewed and approved by the county natural resources management division for compliance with the additional provisions of this division.
- (9) Within the shoreline protection buffer, the total amount of alteration, including all impervious surface, within the shoreline protection buffer shall be limited to 30 percent of the required shoreline protection buffer area, excluding the approved removal of non-native noxious vegetation.
- (10) A surface water protection plan must be submitted to and approved by the natural resources management division prior to the establishment of structures or uses described in subsection (8) of this section. The surface water protection plan must include:
- a. A survey of the property, signed and sealed by a surveyor registered in the state, locating the mean high-water line, the ordinary high-water line or the safe upland line.
 - b. A sketch, drawn to scale, on the survey described in subsection (10)a of this section, indicating the location and building dimensions of the structures, and any proposed alteration of the shoreline protection buffer.
 - c. A description of the type of structures proposed and the construction materials to be used.
 - d. A description of how the surface water quality will be protected. The following methods may be used by the applicant in most circumstances. However, combinations of these methods or other methods may be required, depending upon site-specific characteristics:
 1. A stormwater system shall be designed by an engineer registered by the state. The stormwater system must be capable of retaining the first one inch of runoff from all impervious surfaces which drain to the shoreline. The stormwater system may be located within the shoreline protection buffer, but shall not be located or designed to require the removal of existing native shoreline vegetation within ten feet of the shoreline without approval by the county office of natural resources.

2. A densely planted shoreline of viable native vegetation, a minimum of ten feet in width for the entire length of the shoreline, may be utilized. The types and numbers of plants must be determined and approved by the county office of natural resources on a site-specific basis, however, total ground cover must be maintained. The ground must be stabilized with mulch or similar material to protect against erosion until plant material completely covers the ground.
- (11) Dredging and filling shall not be permitted in or connected to class II waters, Outstanding Florida Waters, aquatic preserves and conditionally approved class III shellfishing waters unless the activity is clearly in the best public interest, such as approved maintenance dredging on existing public navigational channels, or where dredging may improve the water quality by removing accumulated silt or improving circulation, or for maintenance of existing structures and utility crossings, or for shoreline hardening as allowed by this division.
 - (12) Discharges into class II waters, Outstanding Florida Waters, aquatic preserves and conditionally approved class III shellfishing waters shall not degrade existing water quality below existing conditions, or those standards outlined in F.A.C. ch. 17-3 for class II water bodies, whichever provides for better water quality.
 - (13) Discharges into class III waters shall not degrade existing water quality below existing conditions, or those standards outlined in F.A.C. ch. 17-3 for class III water bodies, whichever provides better water quality.
 - (14) Within the shoreline protection buffer, the storage of fertilizers, pesticides, hazardous materials or other pollutants which may run off into surface waters shall be prohibited unless the storage system is an above ground vehicular fuel system meeting the requirements of Chapter 62-761 Florida Administrative Code.

(Code 1979, § 14-81; Ord. No. 02-18, § 1, 4-30-02)

BREVARD COUNTY CODE

Boat Speed Regulation

Chapter 122, Article II, Section 122.26 - 122.29

CHAPTER 122, ARTICLE 2.

BOATS AND WATER SAFETY*

*State law reference(s)--Watercraft and water safety, F.S. ch. 327; restrictions on local water safety regulations, F.S. § 327.60.

Sec. 122-26. Idle speed zones.

(a) The following words, terms and phrases, when used in this section, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning: Idle speed means the minimum speed that will maintain the steerageway of a watercraft. Idle speed zones means those waterways within the unincorporated area of the county in which watercraft traffic shall not exceed idle speed. Those waterways shall be as follows:

- (1) That waterway commonly known as the Grand Canal and all canals connecting to the Grand Canal, between the north section line of section 34, township 26 south, range 37 east, and the northern terminus of the Grand Canal immediately south of State Road 404, commonly known as the Pineda Causeway.
- (2) That waterway beginning at the intersection of the extended centerline of Venetian Way with the city of Indian Harbour Beach/Brevard County boundary; thence southerly along the city of Indian Harbour Beach/Brevard County boundary to the intersection of the city of Melbourne/Brevard County boundary; thence westerly along the city of Melbourne/Brevard County boundary approximately 500 feet; thence northerly to the southern tip of Merritt Island; thence northerly along the eastern shore of Merritt Island to the intersection of the extended centerline of Venetian Way; thence easterly along the extended centerline of Venetian Way to the point of beginning.
- (3) All waters of Sykes Creek between SR 528, commonly known as the Bennett Causeway, and the south line of section 13, township 24 south, range 36 east.
- (4) The easterly 200 feet of the entrance canal into the Lake Washington Acres subdivision, the canal lying between the western terminus of the northern canal and the western terminus of the southern canal, and the canal south of Evinrude Road located in section 15, township 27 south, range 36 east, according to the replat of Lake Washington Acres, section 1, plat book 2153.
- (5) The canals associated with the Indian River Isles Subdivisions (First Addition, Second Addition, Third Addition, and South Indian River Isles). Being further described as: the southeast 1/4 of section 1, township 26, range 36; and the northeast 1/2 of section 12, township 26, range 36.
- (6) The canal lying north of Laguna Vista Drive located in Lakewood Manor, plat book 20-20, page 50, located in section 10, township 27 south, range 36 east.

Watercraft means any vessel that travels on, in or under the water regardless of its method of propulsion.

- (b) The idle speed zone area shall be posted by appropriate signs stating "IDLE SPEED NO WAKE." Such signs shall be made of materials which will retain, despite the weather and other exposures, the information required to convey the intended regulation. Reflectorized materials will be used. The sign shall be colored white with a circle of international orange with white center. The words "IDLE SPEED NO WAKE" shall be set forth in black letters inside the circle. The sign may be attached to another object such as a piling, buoy, structure or land and shall be no smaller than three feet by three feet. The signs shall be placed not more than 500 feet apart throughout the idle speed zone and at the beginning of each idle speed zone.
- (c) For the purpose of regulating the speed and operation of watercraft traffic within idle speed zones:
 - (1) It shall be unlawful for any person, by any means or in any manner, to intentionally or negligently injure or harm a manatee.
 - (2) It shall be unlawful for any person operating a watercraft to exceed the speed restrictions established in this section for idle speed zones. Any person who violates the provisions of this subsection shall be punished as provided in subsection (d) of this section.
- (d) In accordance with F.S. § 327.73, any violation of the speed restrictions within the designated restricted areas as specified in this section shall be considered a noncriminal infraction punishable by a civil penalty of \$35.00. Enforcement of this section shall be as specified in F.S. § 327.70, and all infractions of this section shall be issued on a uniform boating citation as provided by F.S. § 327.74, by those agencies authorized to enforce vessel speed regulations. Pursuant to F.S. § 327.72, any person failing to pay the civil penalty as designated in this section or to utilize the remedies provided in F.S. § 327.73 shall be considered guilty of a misdemeanor of the second degree, punishable as provided in F.S. § 775.082 or 775.083. (Code 1979, §§ 24-44--24-47; Ord. No. 96-55, § 1, 12-10-96)

Sec. 122-27. Use of vessels in residential areas.

- (a) Definition. As used in this section the word "vessel" is synonymous with "boat" and shall mean any motor or artificially propelled vehicle, including air boats, swamp boats and every other description of watercraft, used or capable of being used as a means of transportation on water.
- (b) Speed restrictions. All vessels operated within 1,000 feet of any building or structure temporarily or permanently occupied by any person for residential purposes shall be operated at idle speed, not to exceed five miles per hour. In accordance with F.S. § 327.73 any violation of this subsection is a noncriminal infraction punishable by a fine of \$100.00.

(c) Affected areas. The provisions of this section shall apply only to vessels operated on Lake Poinsett.

(Code 1979, § 151/2-1; Ord. No. 2000-019, § 1, 3-14-00)

Sec. 122-28. Operation of airboats in restricted area on Lake Poinsett.

(a) Definitions. For the purpose of this section the following words and phrases shall have the meanings respectively ascribed to them in this subsection unless otherwise specifically stated: Airboat means any watercraft which operates on a water surface or water body and which is propelled by an engine, motor or other propulsion system which utilizes a propeller, fan or blade which is not normally submerged below the water surface upon which the craft operates.

Lake Poinsett Subdivision Area means the subdivision in that portion of the county located within section 34, township 24 south, range 35 east and section 3, township 25 south, range 35 east, Brevard County, Florida.

Nighttime means the period from sunset to one-half hour after sunrise, as sunrise and sunset are officially determined by the National Weather Service.

Operate means the exercise of the physical control of an airboat involving the launching or flotation, and engagement or activation of the propulsion system of any airboat on a waterway in the restricted area encompassed within this section.

Restricted area means that part of Lake Poinsett and adjoining canals lying in section 34, township 24 south, range 35 east and section 3, township 25 south, range 35 east, Brevard County, Florida and lying northerly and easterly of the following described control line:

Commence at the northeast corner of plat book 19, page 144 and run south 0°03' west along the east line of southwest 1/4 of section 34, a distance of 400 feet to the southeast corner of the plat; thence run south 20°00' east, a distance of 1,125 feet to the point of beginning; thence for a first course run north 65°00' west, a distance of 2,050 feet; thence for a second course run north 38°00' west a distance of 1,900 feet more or less to the northerly shore of Lake Poinsett which is the termination point of the control line.

(b) Prohibited acts.

- (1) It shall be unlawful under the provisions of this section for any person to launch or load any airboat on Lake Poinsett in the county during the nighttime hours within the restricted area on Lake Poinsett, including canals within the Lake Poinsett Subdivision.
- (2) It shall be unlawful for any person to operate any airboat at greater than an idle speed not to exceed five miles per hour at any time within the restricted area.
- (3) It shall be unlawful to operate an airboat at greater than idle speed within the canals of the Lake Poinsett Subdivision located in the county at any time.
- (4) It shall also be unlawful for any person to launch or load any airboat from the Lake Poinsett Subdivision or any public or private property located on or adjacent to Pluckebaum Road and the Lake Poinsett Lodge areas within the restricted area during the nighttime hours.
- (5) It shall be unlawful for any person to intentionally remove or destroy any sign, marker or buoy defining or announcing the control line of the restricted area.

(c) Exemption. The provisions of this section shall not prohibit the operation, launching or loading of an airboat within the restricted areas and adjacent to the Lake Poinsett Subdivision or within the canals of the Lake Poinsett Subdivision by any state, county or federal officer on official public business.

(d) Penalties. In accordance with F.S. § 327.73, any person convicted of a violation of any of the provisions of subsection (b)(1) or (b)(2) of this section shall be guilty of a noncriminal infraction punishable by a fine of \$100.00. All other violations of this section shall be punished as provided in section 1-7.

(Code 1979, § 151/2-6; Ord. No. 2000-019, § 2, 3-14-00)

Sec. 122-29. Sykes Creek and Kiwanis Island Basin and Scottsmoor Landing Park.

(a) Definitions. For the purposes of this section the following definitions shall apply: Channel exempt more specifically defines what portion of a described waterway is being regulated or restricted, and shall remove or exempt the posted portion of the marked channel of Sykes Creek from restriction or regulation.

Kiwanis Island Basin means that body of water commonly known by such name and existing within the confines of Merritt Island between the Sykes Creek Parkway Bridge and State Road 520.

S curve area means that body of water described as all of those waters of Sykes Creek bounded by Merritt Island within section 13, township 24 south, range 36 east.

Scottsmoor Landing Park area is that body of water in the Indian River outside the marked "channel" extending 2,000 feet perpendicular to the shoreline of Scottsmoor Landing Park and two miles south of the park and an additional two miles (to extent of the county limits) north of the park.

Slow speed means that speed at which a motorboat is not on a plane, rides level in the water and produces a minimal wake.

Sykes Creek means the whole of Sykes Creek which may be defined as that body of water commonly known as Sykes Creek within the confines of Merritt Island, existing between the Canaveral Barge Canal and that certain roadway commonly known as Sykes Creek Parkway.

Water skiing means the towing or pulling of a person in or on the water by a motorboat (or other watercraft capable of doing so) while such person is mounted on water skis or other similar devices.

(b) Use regulations. The use of watercraft and of water skiing in Sykes Creek and the Kiwanis Island Basin shall be regulated as follows:

(1) A permanent slow speed-channel exempt zone is hereby established for the entire Sykes Creek and Kiwanis Island Basin, extending south from the entry of Sykes Creek into the Canaveral Barge Canal and north from that certain roadway known as State Road 520.

(2) The maximum speed of a watercraft within the posted channel of Sykes Creek shall be 25 miles per hour.

- (3) Notwithstanding the canal exempt provision established in subsection (b)(1) above, a permanent slow speed zone is hereby established in the following areas:
- a. That portion of Sykes Creek extending south from the entrance of the Canaveral Barge Canal into Sykes Creek to the State Road 528 Bridge.
 - b. The entire S curve area.
 - c. The entire Kiwanis Island Basin area.
 - d. The Scottsmoor Landing Park area.
- (4) Water skiing shall be prohibited within the waters of Sykes Creek north of State Road 520 and south of the entry of Sykes Creek into the Canaveral Barge Canal.
- (d) Posting of restricted areas. The restrictions as created by this section shall be posted by county personnel with appropriate signs. Such signs shall be made of materials which will retain, despite the weather and other exposure, the information which conveys the intended regulation. The sign may be attached to another object such as a piling, buoy, structure or land and shall be no smaller than three feet by three feet.
- (e) Penalty.
- (1) In accordance with F.S. § 327.73, any violation of the speed restrictions within this section shall be considered a noncriminal infraction punishable by a civil penalty of \$35.00. Enforcement of the section shall be as specified in F.S. § 327.70, and all infractions of this section shall be issued on a uniform boating citation as provided by F.S. § 327.74, by those agencies authorized to enforce vessel speed regulations. Pursuant to F.S. § 327.72, any person failing to pay the civil penalty as designated in this section or to utilize the remedies provided in F.S. § 327.73 shall be considered guilty of a misdemeanor of the second degree, punishable as provided in F.S. § 775.082 or 775.083.
- (2) Any person violating any other provisions of this section shall be punished as provided in section 1-7.
(Code 1979, § 24-48; Ord. No. 96-04, § 1, 2-6-96)

Sec. 122-30. Vessels in ocean.

(a) Definitions: For the purposes of this section the following definitions shall apply:

Bather means any person who is in the same water as a vessel, whether said person is swimming, wading, or engaged in any other activity.

Person means any individual, firm, partnership, corporation, association, or any other entity.

Slow speed/minimum wake means the speed of a vessel shall be such that the vessel is completely off plane and fully settled into the water. Vessels may then proceed at a speed which is reasonable and prudent under the existing conditions. Large displacement hull vessels shall not create a large, damaging or potentially dangerous wake, even though settled in water they must compensate by reducing speed.

Vessel means a boat, as referenced in Article VII, Section 1(b), Florida State Constitution, and includes every description of watercraft, barge, and airboat, other than a sea plane on the water, used or capable of being used as a means of transportation on water. This includes all types of personal watercraft.

(b) Area encompassed. The provisions of this section shall be applicable within the unincorporated areas of the county. These provisions shall be construed to supplement federal and state laws and regulations, when not expressly inconsistent therewith, on all waterways where such federal and state laws and regulations are applicable.

(c) Operation near shoreline. No vessels, except, human or wind powered vessels, shall be operated within 500 feet of the Atlantic Ocean shoreline, except when launching and landing, and in such cases the vessel shall proceed through the aforesaid 500 feet substantially in a line perpendicular to the shore and the watercraft shall not be maneuvered within the 500 feet except for the purpose of launching or landing. No vessel shall be operated otherwise unless allowed to do so under a permit obtained from the United States Coast Guard, as required by F.S. § 327.48.

(d) Right-of-way of persons in water. All swimmers and bathers in the ocean shall be given the absolute right-of-way over vessels. All vessels within 100 feet of any swimmer or bather in the water shall proceed with extreme caution in such a manner as not to endanger such persons in the water.

(e) Exemptions. United States Coast Guard, Florida Marine Patrol, county law enforcement, or other official vessels operating under emergency conditions or while performing official duties shall be exempted from the provisions of this section.

(f) Enforcement. It shall be unlawful to violate any provisions of this section. A citation shall be issued pursuant to F.S. §§ 327.72 and 327.73 for any such violation.

(Ord. No. 98-36, § 1, 7-7-98)

APPENDIX 4

INDIAN RIVER LAGOON CONSERVATION AND MANAGEMENT PLAN HABITAT PROTECTION RECOMMENDATIONS

BIODIVERSITY RESEARCH AND MANAGEMENT Action Plan

Overview of Actions

BD-1: Coordinate biodiversity activities within the Indian River Lagoon region.

BD-2: Continue the acquisition of environmentally sensitive lands to preserve, protect and restore the biological diversity, integrity and productivity of the Indian River Lagoon region.

BD-3: Control or eradicate invasive exotic (non-native) fauna and flora in the Indian River Lagoon region.

OBJECTIVE

Develop and implement a coordinated research and management strategy to preserve, protect, and restore biodiversity in the Indian River Lagoon.

PRIORITY PROBLEM

Although the Indian River Lagoon region has been found to have high biological diversity, efforts to research, manage or protect these biological resources are often lacking in coordination and focus. Some species or communities have been the subject of a number of studies while little information is available on many other species or communities. Current management and protection of biodiversity is a complicated, confusing and occasionally contradictory maze of agencies, policies, and regulations.

There has been some progress in addressing biodiversity management issues, however. Recently, the concept of ecosystem management has been adopted by certain state and federal resource management agencies. Under this concept, permitting staff will consider the impacts (both individual and cumulative) of proposed projects on the integrity of regional ecosystems rather than the present piecemeal approach of simply considering the impacts of individual projects on wildlife and habitat in the immediate vicinity of the project. Management activities undertaken by the agencies will be similarly focused. While ecosystem management will include elements of biodiversity management, at present these agencies only have jurisdiction over limited aspects of biodiversity management, such as wetlands, water quality, or threatened and endangered species.

A comprehensive biodiversity management strategy for the Indian River Lagoon should consider all aspects of biological productivity, diversity, and integrity. Developing and implementing a comprehensive biodiversity management plan will require better knowledge of the elements of this regional ecosystem and how they interact. Acquiring the needed knowledge, developing policy and implementing a comprehensive management strategy for biodiversity in the Indian River Lagoon region will require the cooperation and coordination of academia and government agencies.

LIVING RESOURCES NATURAL COMMUNITIES

Seagrass Action Plan

Overview of Actions

SG-1 Implement a program of restoration and management activities needed to maintain, protect, and restore the seagrass/SAV community of the Indian River Lagoon.

OBJECTIVE

To protect and restore the seagrass integrity and functionality in the Indian River Lagoon by attaining and maintaining water quality capable of supporting a healthy submerged aquatic vegetation community to a depth of 1.7 meters.

PRIORITY PROBLEM

Seagrasses and macroalgae are perhaps the most important habitat in the Indian River Lagoon. SAV ecosystems (seagrass and macroalgae) are highly productive areas exhibiting levels of primary productivity that often exceed highly manipulated crop lands (Zieman, 1982). SAV also provides: (1) crucial habitats for numerous invertebrates and fishes; (2) a major contribution to the detrital food web of the Lagoon; (3) critical areas for nutrient cycling; and (4) sediment stabilization and shoreline protection.

The increasing human population of the coastal zone has impacted water quality of rivers, estuaries, and nearshore waters. Water transparency, which dictates the amount of light available to support primary production, is highly affected by man's activities. The relationship between declines in water transparency and declines in the abundance and distribution of seagrasses is well documented (Lewis et al., 1983; Orth and Moore 1983; Wetzel and Penhale 1983; Cambridge and McComb 1984; Livingston 1987). Examples include overall declines in seagrass coverage of 50 percent in Tampa Bay and 75 percent in Virginia's portion of Chesapeake Bay. In the Indian River Lagoon certain areas have seen declines in SAV coverage exceeding 95 percent over the last 20 years while other areas have remained relatively stable (Haddad and Harris 1985). More recent studies show declines in coverage of up to 50 percent over large segments of the Lagoon between the 1970s and 1992 (Woodward-Clyde 1994g).

The transparency of water depends upon its optical properties which, in turn, are dependent upon the suspended and dissolved constituents in the water, such as sediments, chlorophyll and dissolved organic matter (Preisendorf 1961, Kirk 1983; Kirk 1988). Those characteristics which affect the ability of water to attenuate light have the greatest impact on water clarity. Irradiance in the photosynthetically active wavelengths (400-700 nm) is known as Photosynthetically Active Radiation (PAR). For seagrasses, the availability of PAR determines how productive seagrasses will be and to what depth they will grow (Duarte, 1991; Kenworthy and Haurert 1991; Goldsborough and Kemp 1988; Stevenson et al., 1993; Dennison et al., 1993).

The recognition of the relationship between seagrass growth, light availability and water quality has led to the realization that existing water quality criteria and water quality standards and/or their enforcement is inadequate to protect seagrasses. The Submerged Aquatic Vegetation

Initiative (SAVI) is the instrument through which a strategy to increase the amount and quality of seagrasses in the Indian River Lagoon will be carried out.

In general, SAVI may be understood as follows:

Beyond the technical goals of SAVI is the intention of building a link in the public's mind between activities occurring in the watershed, clean water, and the health of the Lagoon. The premise of this plan is based on the following conceptual model depicting relationships between management, water quality, SAV and biological productivity.

This model is based on the assumption that biological productivity is dependent on healthy seagrasses which depend on good water quality, and which, in turn, is dependent on the establishment and use of good management practices within the watershed. Included in this assumption is the belief that a healthy SAV community will result in desirable animal productivity and diversity.

By defining the water quality-to-SAV link, it should be possible to predict the response of SAV to changes in water quality parameters. By coupling this model with the continued monitoring of the seagrass community and water quality, management activities may be reassessed and refined based upon their effectiveness in reaching water quality goals. Therefore, the majority of the SAVI effort will be expended in determining which management practices are needed to provide water quality sufficient to protect seagrass.

As previously stated general scientific consensus shows that light availability is the single most important factor affecting the distribution and vigor of seagrasses. However, no such consensus exists concerning the factors affecting light availability. Therefore, SAVI concentrates on determining the factors which have the greatest effect on light availability and upon determining what practices must be implemented to provide sufficient light for seagrasses (Virnstein and Morris 1996).

The preliminary goal of SAVI is to improve or maintain water clarity to a point that SAV could increase bottom coverage throughout the Indian River Lagoon (as modified by local conditions) to a depth of 1.7 meters (approximately six feet). This goal not only includes areal coverage, but also diversity, such as number of species within segments or depth zones.

The depth target of 1.7 meters is based upon the depth of SAV found in "good" areas but would be modified to meet local conditions. Currently, on a Lagoon-wide basis 38 percent of the bottom areas which are less than 1.7 meters in depth are covered by seagrass. Coverage within specific segments varies from 0 percent to 96 percent (Woodward-Clyde 1994g). This depth is an approximation of the photosynthetically active zone and is being used in other estuarine management programs, such as those in Chesapeake Bay and Tampa Bay (Orth 1993, Ries 1993).

Sub-objectives of SAVI include the following:

- Coordination and definition of the roles and funding resources of the agencies and institutions involved in management, regulation and research of the SAV community;
- Development and implementation of resource-based (SAV) water quality targets for the Indian River Lagoon;
- Use of resource-based (SAV) water quality targets in the development and implementation of watershed management practices; and
- Monitoring to support reporting on the effectiveness and progress of watershed management practices in meeting the overall SAV goal.

The *Seagrass Preservation and Restoration Diagnostics Plan for the Indian River Lagoon* (Virnstein and Morris 1996) has identified the steps necessary to protect, restore and enhance seagrasses throughout the Indian River Lagoon. Only after the source of the problem is identified can specific, targeted solutions be sought. Linking seagrass “health” to water quality is the major thrust of the SAVI diagnostic studies. Development of a model which relates the relative impacts of various water quality parameters in light extinction will be the primary vehicle providing this link. The five general steps included in the *Seagrass Preservation and Restoration Diagnostics Plan* are:

1. Identification of “healthy” and “problem” areas through Lagoon-wide mapping.

Lagoon-wide maps, based on aerial photographs, provide an overall picture of seagrass resources in the Lagoon. The maps identify: (a) potential “healthy” areas that may deserve special protection efforts and (b) potential “problem” areas that require further investigation. Comparisons with maps of historical seagrass distribution will be used to help detect changes and set targets for seagrass distribution. The maps can also document recovery of a large area due to management actions.

Lagoon-wide maps, however, have limited application for the following reasons: (1) the interval between mapping is 2-3 years; (2) beds smaller than a half-acre are not mapped; (3) *Halophila* species or areas of sparse SAV often are not visible in aerial photos and thus are not usually mapped; and (4) locating the “edge” of a bed may have errors of tens or occasionally even hundreds of meters. Lagoon-wide maps are not suitable for detecting short-term or local changes or species composition. Yearly mapping or, at a minimum, yearly aerial photography would improve resolution of temporal patterns or trends.

Because of these limitations, additional methods of monitoring seagrass coverage are needed. The following three steps describe methods to obtain more detailed information on seagrass coverage.

2. Local inspection and confirmation through fixed transects and mapping.

This step will determine whether local areas (selected from aerial photos and Lagoon-wide maps) are healthy or stressed, and whether conditions are stable, improving or declining and by how much. Transects also provide ground-truth information for Lagoon-wide mapping. More than 70 fixed transects have been established in seagrass areas throughout the Lagoon. Seagrass transects are monitored bi-annually (summer and winter) using non-destructive ground-truthing

methods including video. Underwater video is used to collect data rapidly and inexpensively and to provide a permanent archival record of the distribution and condition of seagrass along the transect.

Measurements are made every 10 meters along each transect. These measurements include water depth, percent coverage and canopy height of each seagrass species present, and shoot counts conducted at the center and deep edge of the seagrass bed. Repeated monitoring of these same transects is a powerful tool for detecting short-term or local change. Seagrass changes could then be correlated with changes in water quality.

3. Determining causes of the problem by site-specific monitoring.

At sites identified in the previous steps, intensive site-specific monitoring is used to determine the “health” of seagrasses and the causes of stress. The objective of this component is to examine the ecological status of seagrasses (e.g., density, growth rate, epiphyte load) and their relationship with specific water quality parameters (e.g., nutrients, turbidity, color, suspended solids, light extinction).

Besides the water column effects on light attenuation, epiphytes growing on seagrass blades typically have greater biomass than the seagrass beds themselves (Zimba and Hanisak 1994) and reduce the amount of light reaching seagrass blades by 50-80 percent (Nelson, pers, comm.). High concentrations of water column nutrients and low populations of epiphyte grazers (snails, amphipods, small shrimps) exacerbate the problem.

Monitoring will provide the major effort in linking water quality to seagrass health and abundance. Once fully developed, these site-specific techniques will need to be applied to all problem areas in the Lagoon. However, only after the source and components of a local problem are identified can specific, targeted solutions to the problem be developed and applied.

4. Relating PAR and water quality through models.

This step will define and model the linkages between light attenuation and water quality. These linkages are mediated through water column light attenuation due to epiphytes. The primary vehicle providing this link will be an optical model developed to relate the impacts of various water quality parameters (e.g., suspended solids, phytoplankton chlorophyll, and color) to light extinction in the water column.

In addition to light attenuation in the water column, epiphytes also reduce light reaching the surface of seagrass blades. An optical model and an epiphyte model will be incorporated into a larger integrated hydrodynamic/water quality model to provide the final linkages among watershed pollutant inputs, water quality and light attenuation. Optical water column and epiphyte models predict light attenuation based on water quality. Using this integrated model it will be possible to predict the effects of a decrease in loading of a particular pollutant on conditions for seagrass growth.

5. Setting management targets.

After identifying “healthy” and “problem” areas and determining what causes “problems,” setting restoration targets will be the next step. Targets for seagrass coverage will be set segment-by-segment. These targets will be based on an evaluation of available information on present and historical seagrass coverage, water quality, sub-basin characteristics and bathymetry. Seagrass targets will be described by a combination of acreage, maximum growth depth and maps of targeted seagrass distribution.

Areal coverage targets will then be translated into water quality targets necessary to protect or restore seagrass. Water quality targets will be based on the results of site-specific monitoring and output of the optical model.

The main management use of the seagrass/water quality link will be to establish Pollutant Load Reduction Goals (PLRGs). For most sub-basins, PLRGs will be based on the light requirements of seagrass. PLRGs could then be translated into basin-specific rule criteria by the water management districts or local governments. The establishment of consistent policies at all levels of government and in all aspects of resource management (e.g., water quality, watershed land-use planning, habitat protection, land acquisition) is a crucial strategy in the seagrass initiative.

One of the first applications will be to develop total suspended solids (TSS) and nutrient PLRGs to reduce excessive loadings of these pollutants to the Lagoon. Initial loading reductions will be accomplished through reduction of freshwater discharge volume. TSS and nutrient PLRGs will be further refined when a quantitative understanding of the relationship between TSS and nutrient concentrations and seagrass health is determined.

Actual management steps to protect and restore seagrass decline will require the involvement and action of other agencies, local governments and the residents of the Lagoon region. Because impacts to seagrass come from many sources, often from locations remote from the Lagoon, management practices must be multi-faceted and directed at the sources; that is, a fence around a seagrass bed will not protect it; rather, solutions must be sought “upstream.”

These solutions will depend largely on other components of the IRLCCMP and will involve several steps, including:

1. Formulating goals, policies and watershed management strategies;
2. Setting water quality targets;
3. Implementing watershed management plans; and
4. Monitoring the effectiveness of watershed management.

LIVING RESOURCES NATURAL COMMUNITIES Wetlands Restoration and Preservation Action Plan

Overview of Actions

W-1 Improve implementation of wetlands protection programs.

W-2 Undertake a regular review of wetlands protection rules and regulations.

- W-3 Establish wetlands or shoreline setback or buffers.
- W-4 Acquire ownership or control of wetlands.
- W-5 Reconnect impounded wetlands to the Indian River Lagoon.
- W-6 Restore wetlands and shorelines.
- W-7 Remove trash and litter from wetlands and shorelines.

OBJECTIVE

Preserve, protect, restore and enhance the wetlands resources of the Indian River Lagoon basin.

PRIORITY PROBLEM

The wetlands of the Indian River Lagoon system are a key element of the Lagoon's ecosystem. Primarily, these wetlands serve as habitat for various species and protect water quality, but these wetlands also provide a number of other functions. Some of these functions include support of the detrital food chain, buffering the Lagoon from the impacts of activities on adjacent uplands, protecting the uplands from erosion by absorbing wave energy and providing flood storage.

Wetlands in the Indian River Lagoon system are found in marine, estuarine and freshwater environments. Many freshwater wetlands and streams are found adjacent or connected to the Lagoon system. Freshwater swamps and marshes are found in the Lagoon region. Freshwater swamp habitat in the Lagoon region is largely confined to bands of riverine swamps along the larger tributaries. Many freshwater swamps are small, linear marshes found in the swales and depressions between old dune ridges. The most extensive of these marshes may be found in the Merritt Island National Wildlife Refuge and the Savannas State Reserve south of Fort Pierce.

Another type of freshwater marsh often found in the Lagoon watershed is the flatwoods marsh or prairie. These are generally round depressions found in poorly drained flatwood communities. Many of these marshes are small, often five acres or less in size. Although normally isolated from other water bodies, many of these marshes have been connected by man-made ditches to drainage systems leading to the Indian River Lagoon.

Marshes and swamps are also found in the estuarine portion of the Indian River Lagoon. Salt marshes, typical of the cooler, temperate, Carolinian biotic province, are the dominant wetland type found in the northern portion of the Lagoon system. Mangrove forests (or swamps), typical of the warmer, subtropical, Caribbean biotic province, are the dominant wetland type in the southern portion of the Lagoon system. A transition from predominantly saltmarsh to predominantly mangrove forest occurs between Mosquito Lagoon and Sebastian Inlet.

Many square miles of wetlands have been destroyed as the result of development. Brantly (1980) estimated 8 percent of Florida's estuarine habitat had been lost to development. Within the Indian River Lagoon region, Hoffman and Haddad (1988) estimated 27 percent of the mangrove acreage in the Fort Pierce area was lost between 1940 and 1987. While not documented, it is likely similar losses of wetlands acreage occurred in the vicinity of other urban centers in the Indian River Lagoon region.

In addition to direct losses caused by wetlands destruction, more than 62 square miles of remaining wetlands were impounded for mosquito control purposes in the Indian River Lagoon region (Rey and Kain 1989). While these wetlands were not destroyed, their connection to the Indian River Lagoon was severed. As a result, wetland functions benefiting Indian River Lagoon water quality and wildlife were largely lost. Efforts are presently underway to restore the functional and physical connections between these impoundments and the Indian River Lagoon. These activities are discussed in the companion action plan *Impounded Marsh Restoration and Management*.

Recognizing the importance of the remaining wetlands in the preservation and protection of biological resources and water quality, a number of laws, regulations, rules and ordinances have been enacted in recent years to provide protection for wetlands and their functions. These regulations have been implemented by federal, state, regional and local governments. Following passage of these legislative actions, the rate of wetlands loss has been significantly reduced but not eliminated.

Continuing losses of wetland acreage are the result of permitted, unpermitted and exempt activities. Permits for construction in wetlands generally require the permittee to replace or mitigate for the wetlands acreage and functions impacted as a result of these projects. Wetlands creation, enhancement and acquisition of wetlands are all considered as potential mitigation measures. While wetlands creation does replace acreage lost to construction, enhancement or acquisition results in a net loss of wetlands acreage. In addition, wetlands created as mitigation projects have not always been successful, resulting in a loss of wetland acreage and function.

The Environmental Resources Permitting program became effective in October 1995 and is implemented in the Indian River Lagoon region by the Florida Department of Environmental Protection, St. Johns River Water Management District and South Florida Water Management District. This permitting program combines several permitting programs, such as dredge/fill, state lands, and management and storage of surface waters under one permit where many aspects of natural resource impacts, including wetlands impacts, will be considered as part of the permitting process.

Certain activities in wetlands are specifically exempted from permitting requirements at the state/federal level. While most of these activities are thought to have little impact on wetlands function, some may result in the loss of wetlands acreage and function.

Unpermitted activities include actions which are violations of wetlands protection legislation. Presently, most violations are resolved and brought into compliance.

Many activities which affect wetlands extent and function are not addressed by wetland protection legislation and, as a result, could be considered "unpermitted." These include wetlands impacts such as erosion from boat wakes, impacts of activities on adjacent uplands, fouling by oil spills or trash, invasion of exotic vegetation and natural causes, such as severe storms. These activities may result in a loss of wetlands acreage and function.

LIVING RESOURCES NATURAL COMMUNITIES

Impounded Marsh Restoration and Management Action Plan

Overview of Actions

IM-1 Complete or continue the diagnostic, management or feasibility projects related to marshes impounded for mosquito control found in the 1994 SWIM Plan.

IM-2 Continue acquisition of privately owned impounded marshes or obtain conservation easements allowing restoration of their natural function.

OBJECTIVE

Restore the functions of marshes impounded for mosquito control.

PRIORITY PROBLEM

Starting with initial projects in the 1930s, more than 62 square miles of Indian River Lagoon wetlands were impounded (diked) for mosquito control purposes. While impoundment was an effective method of controlling mosquitoes, it also isolated 75 percent of the Lagoon's wetlands from the open waters of the Lagoon. As a result, the water quality and habitat benefits of these wetlands to the Indian River Lagoon were largely lost.

For many years, management of these impoundments was primarily limited to water level control during mosquito breeding season. This control was generally accomplished through the use of pumps or artesian wells.

While little consideration was given to wildlife, in many impoundments this form of management appeared to result in improved habitat for waterfowl and wading birds. However, since the marshes remain isolated from the Lagoon, many aquatic species dependent on marsh or wetlands habitat during certain portions of their life cycle were adversely affected.

Changes in the vegetative community from a herbaceous high marsh to a mangrove forest occurred in many impoundments as a result of water level management. These changes typically occurred in impoundments south of Melbourne where high water levels were maintained by pumps drawing water from the Lagoon.

In other impoundments, particularly those where water levels were maintained by artesian wells, salinities decreased to virtually freshwater levels which often resulted in a loss of estuarine species and an abundance of freshwater plant and animal species. In many of these impoundments the vegetative community became a cattail (*Typha* sp.) monoculture.

In recent years, most publicly owned impoundments in the Indian River Lagoon from Brevard County south are now under what is known as rotational impoundment management (RIM). As part of RIM, numerous water control structures (gated culverts) have been installed in the berms of impounded marshes throughout the Indian River Lagoon basin. Many of these installations were sponsored by the Indian River Lagoon SWIM program in cooperation with local mosquito control districts and the U.S. Fish and Wildlife Service.

While there are several variations of RIM, generally water levels are maintained at levels adequate to control mosquitoes during the breeding season, which is roughly from April through October. During the remainder of the year, the structures are opened, restoring the connection between the impoundments and the Indian River Lagoon.

In Volusia County, most publicly owned impoundments have been converted to open marsh water management (OMWM). Under this management protocol, marshes are connected to the Lagoon throughout the year through open culverts or breaches in the impoundment berm. Ponds or ditches connected to tidal waters may be used to control mosquito production.

RIM and OMWM have been beneficial to the Indian River Lagoon in many respects. A number of studies have documented changes in water quality and species composition of impoundments under RIM. Lagoonal species which are normally found in unimpounded marshes are now found in impoundments under RIM. Studies have documented heavy use of RIM impoundments by snook, tarpon and many other important Lagoon species. Cattails, when subjected to increased salinities found in RIM or OMWM impoundments, do not thrive. As a result, impoundments which were largely freshwater and dominated by cattails are now returning to saltmarsh habitats, as they were historically.

RIM or OMWM has not been implemented in all impounded marshes because many of the impoundments in the Lagoon region are privately owned. Often the local mosquito control district simply has a verbal agreement with the property owner to “use” his property for mosquito control. While verbal agreements may have been appropriate in the past, many present-day impoundment owners believe that their lands have development potential. As a result, these owners are often reluctant to allow revised management practices which may improve impoundment productivity and subsequently increase the difficulty of obtaining development permits for these properties.

Through the SJRWMD land acquisition program, Conservation and Recreation Lands (CARL) program, Preservation 2000 (P2000) and local environmental land acquisition programs, several privately owned impoundments have been acquired and RIM or OMWM established. An inventory of impoundments and their ownership has been developed for use in acquisition or management. Acquisition of impoundments is ongoing and should continue through the coming years with the goal of either acquiring all privately owned impoundments or obtaining conservation easements allowing RIM or OMWM.

The implementation of RIM or OMWM has provided many benefits to the Indian River Lagoon when compared to past management practices. Additional improvements in impoundment management practices are possible, however, which may further restore the functional relationship between impounded marshes and the Lagoon.

The implementation of improved impoundment management strategies, as well as the continued refinement of these strategies to provide mosquito control while further restoring the functional relationship between the Indian River Lagoon and impounded marshes, will be a vital element in the maintenance of a healthy and diverse Indian River Lagoon system.

LIVING RESOURCES NATURAL COMMUNITIES Land Acquisition Action Plan

Overview of Actions

- LA-1 Develop a coordinated strategy to identify, classify, acquire, and manage environmentally sensitive lands throughout the Indian River Lagoon region.
- LA-2 Acquire ownership or management of wetlands adjacent to the Indian River Lagoon.

OBJECTIVE

Develop and implement mechanisms to acquire lands for the purposes of protecting biodiversity, enhancing critical habitat linkages and habitat integrity, and protecting environmentally endangered habitats within the Indian River Lagoon basin.

PRIORITY PROBLEM

The Indian River Lagoon is greatly influenced by land-based impacts associated with urbanization of the coastal zone, non-point source impacts, wetlands alteration and destruction. Wetlands losses and alterations have been significant along the shoreline of the Lagoon in all counties of the Lagoon region, resulting in impacts such as altered drainage patterns, disconnection of marsh ecosystems by mosquito control practices, altered hydrologic regimes and introduction of exotic species. Protection and enhancement of the remaining functional upland-wetland-Lagoon linkages is critical to the long-term protection of the quality and biological resources of the Indian River Lagoon.

Although current wetlands and other regulations provide a level of protection from development, the regulations often fail to protect these systems from functional disruption, hydrological alteration and encroachment. More importantly, it is not feasible to restore, enhance or manage these sites as long-term projects through regulation.

Along with the passage of the Preservation 2000 Act in 1990, a number of acquisition initiatives funded by local interests, water management districts and the Conservation and Recreation Lands (CARL) program enhanced the financial ability of the state to acquire endangered lands and limit environmental alteration or destruction of important natural resources. Many local governments throughout the state responded to this funding availability by passing local land acquisition referendums to purchase environmentally endangered lands. Active land acquisition programs exist in Volusia County (\$20 million), Brevard County (\$55 million), Indian River County (\$26 million), St. Lucie County (\$20 million), Martin County (\$20 million) and Palm Beach County (\$100 million).

While there are a number of land acquisition initiatives underway throughout the Indian River Lagoon region, there have been no comprehensive attempts to inventory or prioritize acquisitions throughout the Lagoon region. The lack of a strategic, Lagoon-wide, land acquisition plan is an impediment to both the prioritization of acquisition initiatives and to

responses to requests for off-site mitigation projects from development interests. The absence of a biological and ownership inventory for wetlands associated with the Lagoon creates a situation where acquisition and mitigation decisions are made on a site-specific basis without the support of a long-term, strategic acquisition and management plan.

Recently, IRLNEP and IRL-SWIM initiated a cooperative effort among the counties along the Lagoon to develop an inventory of wetland property and ownerships. A working group named the Indian River Lagoon Land Acquisition Working Group has been established which consists of representatives of various regulatory and management agencies, counties and private organizations.

The inventory, which was recently completed, will be an invaluable tool for strategic conservation and management planning. The data will help to assess the status of the protected area network along the Lagoon, highlight acquisition priority areas and illustrate the potential costs of a large-scale, multi-agency acquisition initiative for the Indian River Lagoon. In the future, this initial effort could be expanded to include critical uplands-wetlands-Lagoon linkages, as well as wetlands.

The development and implementation of a coordinated, Lagoon-wide, land acquisition program will be a critical step toward protection, preservation and restoration of the integrity, productivity and biodiversity of the Indian River Lagoon's resources for this and future generations.

LIVING RESOURCES-WILDLIFE Endangered and Threatened Species Action Plan

Overview of Actions

- ETS-1 Develop, update or refine management or recovery plans for the endangered and threatened species, and species of special concern found in the Indian River Lagoon region.
- ETS-2 Page Improve enforcement of regulations protecting endangered and threatened species or species of special concern within the Indian River Lagoon region.
- ETS-3 Protect the critical habitats of endangered and threatened species or species of special concern found within the Indian River Lagoon through land acquisition.
- ETS-4 Undertake studies of wildlife diseases occurring in the Indian River Lagoon region which may be caused by human activities.

OBJECTIVE

Protect endangered and threatened mammals, birds, fish, reptiles, amphibians and invertebrates of the Indian River Lagoon region.

PRIORITY PROBLEM

Passage of the Endangered Species Act of 1973 gave the United States one of the most far-reaching laws enacted by any country to prevent the extinction of imperiled animals and plants. Following passage of the act, the Florida Audubon Society and Florida Defenders of the

Environment jointly formed the Florida Committee on Rare and Endangered Plants and Animals (FCREPA). This committee, comprised of well-known scientists and lay persons, reviews information on Florida species and classifies them as endangered, threatened, of special concern, or rare. In 1987, the Florida Game and Freshwater Fish Commission adopted the classifications developed by FCREPA under the authority of the Florida Wildlife Code, Chapter 39, Florida Statutes.

Seventy-five species are found within the Indian River Lagoon region which are listed as either endangered, threatened, species of special concern or rare. These species include a wide variety of creatures and plants ranging from the small, seldom seen and poorly known fish known as the mangrove rivulus (*Rivulus marmoratus*) to the large and well publicized West Indian manatee (*Trichechus manatus latirostris*). The Lagoon region contains some of the largest populations in the state of many of these species.

The Indian River Lagoon's resources have played critical roles in the survival of several species. For example, during the late 1960s when DDT was in use, Pelican Island (near Sebastian) was virtually the only nesting location of brown pelicans (*Pelecanus occidentalis*) in the southeastern United States. The ocean beaches of the region provide critical nesting habitat for at least two species of marine turtles.

The Endangered Species Act requires the development of management or "recovery" plans for federally listed endangered or threatened species. Management or recovery plans have been developed for listed species in the Lagoon region. However, some of these plans are not well detailed because of a lack of information about certain species.

The primary cause for endangerment and diminishing numbers of these plants and animals in the Indian River Lagoon region is loss of habitat. As the region developed, habitats for many of the species now listed as endangered, threatened, species of special concern or rare were destroyed or altered. While regulations provide protection for the endangered plant or animal, their habitat receives little protection. Although certain critical habitats now have some degree of protection, other habitats with minimal or no protection are often lost to development.

In many cases, conflicts with man's activities are also major contributors to the endangerment of these species. As an example, a major identified cause of manatee mortality is collisions with watercraft.

Man's activities may have affected several species in the Indian River Lagoon region in other ways as well. Many of the green turtles (*Chelonia mydas mydas*) found in the Indian River Lagoon are affected with fibropapillomatosis, a debilitating disease characterized by large growths on the skin, scales, scutes, eyes, oral cavity and viscera. Although the cause of fibropapillomatosis is not known, it is suspected that habitat alteration and degradation play a role in the presence of this disease.

Although not an endangered or threatened species, the Atlantic bottlenose dolphin (*Tursiops truncatus*) is listed as a protected species under the Marine Mammal Protection Act. The Indian River Lagoon bottlenose dolphin population is also suffering from what may be a human-related

affliction. Approximately 12 percent of the dolphin population in the southern portion of the Lagoon are infected by *Lobo mycosis*, a fungal skin disease. *Lobo mycosis* creates lesions, which often lead to infection, debilitating the animal. Once again, the cause of *Lobo mycosis* is not known but it is suspected that degraded water quality may play a role in the susceptibility of dolphins to this disease.

LIVING RESOURCES-WILDLIFE Fisheries Action Plan

Overview of Actions

F-1 Improve management of fisheries in the Indian River Lagoon.

F-2 Develop a coordinated fisheries research agenda to improve the present knowledge of fisheries in the Indian River Lagoon.

F-3 Develop and implement a coordinated fisheries management strategy specific to the Indian River Lagoon.

OBJECTIVE

Conserve, protect, maintain or increase stocks of finfish and shellfish in the Indian River Lagoon.

PRIORITY PROBLEM

Fish populations within the Indian River Lagoon region are some of the richest and most diverse in the United States with more than 600 identified species. The reasons for this diversity are many. First, the Lagoon spans two biotic provinces - the temperate Carolinian and the sub-tropical Caribbean. A variety of species associated with each of these provinces is found in the Lagoon. The Indian River Lagoon also has a great variety of habitats, including ocean inlets, sand bottoms, seagrass meadows and adjacent mangrove forests and freshwater creeks.

The status of fishery resources in the Indian River Lagoon is difficult to determine. Other than information on a few of the more popular sport or commercial fish, little information is available on individual species in the Indian River Lagoon. The fishery data that are available is primarily for commercial landings which is a combination of Lagoon and oceanic landings. A minimal amount of information is available about recreational landings. There is a substantial amount of anecdotal information indicating that a decline has occurred in the populations of many fish species in the Indian River Lagoon. However, there are few studies documenting this trend.

Total fishery landings in the region have increased from 1958 to 1988, but these landings include Lagoon and oceanic landings. These landings, however, do not reflect changes in the targeted fishery and levels of effort. As an example, the catch of silver mullet increased during the mid-1970s but this increase was probably due to the fact that silver mullet was not a targeted species prior to this time (Rathjen and Bolhassen 1988). In addition, the increase in landings after 1908 was the result of increases in calico scallop (an offshore species) and hard clam landings.

One species in which a dramatic drop in reported landings has occurred is the spotted sea trout. Commercial landings in the Indian River Lagoon have declined steadily since 1952 (Virnstein, 1987). Landings in 1988 were only about 40 percent of 1958 landings. The spotted sea trout is a species largely limited to estuaries and strongly associated with seagrass beds. Seagrass beds in the Indian River Lagoon have experienced a loss of acreage, particularly in the vicinity of the region's urban centers.

Other fish species in the region may also be affected by human activities, particularly those activities which cause direct or indirect alteration or loss of habitat. Declining fishery yields in the Indian River Lagoon have been attributed to the loss of suitable habitat and a concurrent decline in water quality. In the case of certain species, however, overfishing may have also contributed significantly. Species, such as the spotted sea trout and red drum (redfish), may have experienced population declines associated with regional sport and commercial fishing activities.

From anecdotal reports based on recreational fishing, populations of Indian River Lagoon species appear to have increased in recent years. Stocks of red drum (redfish) and common snook appear to have increased. Strict limits on recreational (season, size, bag limit) and commercial (prohibited) catch of these species may have contributed to their apparent increased populations.

Efforts are under way to develop additional fisheries information for the Indian River Lagoon. FDEP is conducting a juvenile fisheries study which will assist in identifying trends in the Lagoon's fishery resources. FDEP, in conjunction with the National Marine Fisheries Service, has been conducting angler interviews and will soon undertake an analysis of this data. Additional fishery projects are being developed or are underway at Harbor Branch Oceanographic Institute, Florida Institute of Technology, and similar institutions and agencies.

In addition to finfish, the Indian River Lagoon offers good habitat for several species of shellfish. Blue crabs, stone crabs, hard clams and oysters are harvested from the Lagoon by commercial and recreational fishermen. Historically, these species were a major component of the diet of early native Americans in the region and remain important seafood products today. Of these species, blue crabs, hard clams and oysters are the shellfish species of commercial importance in the Indian River Lagoon region.

The blue crab is the predominant shellfish industry in the region, accounting for approximately 80 percent of shellfish landings in the Indian River Lagoon between 1958 and 1988. Oysters were second in landings until the late 1970s, when they were surpassed by the hard clam.

Since the late 1970s, the hard clam industry in the Indian River Lagoon region has grown dramatically. With the decline of hard clams and closure of shellfish harvesting areas elsewhere in the United States, large numbers of clam harvesters from other states migrated to the Indian River Lagoon region to harvest the abundant supply of clams available for harvest in the Lagoon.

The clamming/shellfish industry in the Lagoon grew exponentially until the mid-1980s when a peak in harvesting was reached. The tremendous increase and subsequent decline in hard clam

harvesting has resulted in the development and implementation of rules and regulations to protect this species and prevent over-exploitation of the hard clam resource.

POINT SOURCE DISCHARGES Action Plan

Overview of Actions

- PS-1 Ensure compliance with the Indian River Lagoon Act.
- PS-2 Prevent changes to the Indian River Lagoon Act which would reduce its effectiveness.
- PS-3 Reduce or eliminate industrial discharges to the Indian River Lagoon.
- PS-4 Investigate and recommend funding alternatives for the upgrading of wastewater treatment plants.
- PS-5 Investigate alternatives to deep-well disposal of domestic wastewater and industrial effluents.

OBJECTIVE

To ensure compliance with the Indian River Lagoon Act and to reduce, eliminate or mitigate industrial wastewater discharges to the Indian River Lagoon.

PRIORITY PROBLEM

Historically, the primary means of wastewater treatment in the Indian River Lagoon region were outhouses, septic tanks and, in some cases, direct discharge to the Indian River Lagoon. As more people moved to the area, concerns for public health and aesthetics prompted the construction of central sewer systems and wastewater treatment plants (WWTPs) in many urban areas.

Rapid growth during the 1950s, 1960s, and early 1970s often outpaced the treatment capabilities of many municipal WWTPs. To provide sewer services for the growing population of the region, numerous small WWTPs were constructed serving subdivisions, condominiums, trailer parks, restaurants, motels, shopping centers, and similar development. During these years, a convenient and inexpensive means of disposing of effluent was to discharge either directly to the Indian River Lagoon or its tributaries.

During the 1950s and 1960s protection of the public health was the primary concern governing the collection, treatment, and disposal of wastewater. Little thought was given to the environmental impacts of wastewater discharges on the resources within the receiving waters. This philosophy underwent major change in the 1970s with the passage of the Clean Water Act at the federal level and the creation of state and federal agencies charged with protection of water quality. This period saw the creation of the Environmental Protection Agency and the Florida Department of Air and Water Pollution Control (later the Department of Environmental Regulation and now part of the Department of Environmental Protection) to address air and water quality protection. Early efforts by these agencies were largely focused on upgrading the

level of treatment provided by existing WWTPs. Many existing WWTPs provided limited wastewater treatment or were poorly operated.

In the Indian River Lagoon region, millions of state and federal grant dollars, as well as local tax monies, were spent either constructing new WWTPs or upgrading existing facilities to meet more stringent state and federal standards for wastewater treatment. Several of the new WWTPs were designated as “regional” facilities which, in certain areas, resulted in the elimination of many smaller WWTPs.

Several studies were conducted to assess the impacts of wastewater discharges on the Lagoon. Many of these studies were federally funded water quality planning efforts. The conclusions of these studies were generally the same: the Indian River Lagoon’s water quality has been degraded by the combined loadings from stormwater (non-point sources) and WWTPs (point sources). To protect the resources of the Lagoon, these studies recommended that both sources of pollution must be addressed, starting with the removal of WWTP effluent discharges to the Lagoon.

The decision to address point-source discharges first was largely an economic decision. When compared to the costs of revising and upgrading existing drainage systems to reduce pollutant loadings, addressing wastewater loadings was less expensive.

Under the administrative rules and procedures which govern the permitting of WWTPs, a blanket prohibition on wastewater discharges was not possible. The individual impacts of each discharge to the Indian River Lagoon had to be determined on a case-by-case basis through the permitting process. This process generally involved studies to determine waste-load allocations (allowable pollutant loadings) for each individual discharge.

Virtually all individual studies confirmed the initial findings: significant pollutant load reductions would be required to meet and maintain water quality standards. Lagoon-region WWTPs were faced with the choice of ceasing discharge and finding other permissible means of effluent disposal or significantly upgrading their level of treatment. Either choice was expensive and difficult to accomplish.

The *Indian River Lagoon Joint Reconnaissance Report* (Steward & Van Arman 1987) identified 46 WWTPs which discharged 54.8 million gallons of effluent per day to the Indian River Lagoon in 1986. By 1992, the number was reduced to 41 WWTPs, which discharged 43.3 million gallons per day of effluent to the Lagoon.

In 1987, the Florida Legislature enacted the Surface Water Improvement and Management Act (Chapter 87-97, Laws of Florida). The SWIM Act directed water management districts to develop and implement plans to restore and protect the water quality of certain water bodies in the state. The St. Johns River and South Florida water management districts were directed to give priority to the restoration and protection of the Indian River Lagoon system.

The Indian River Lagoon SWIM Plan (SJRWMD & SFWMD, 1989), through new studies and available information, confirmed that the physical and ecological characteristics of the Indian

River Lagoon system, in combination with the threats posed by stormwater discharges and urbanization within the drainage basin, generally make the system unsuitable for the disposal of domestic WWTP effluent. The SWIM plan recommended that alternatives, such as reuse, land application, or deep well injection, be pursued to achieve reductions in pollutant loadings from existing WWTPs.

In 1990, at the urging of several groups concerned about the future of the Indian River Lagoon and as the result of information provided by the Indian River Lagoon SWIM program, the Florida Legislature enacted Chapter 90-262, Laws of Florida, commonly known as the Indian River Lagoon Act. The act included three objectives for WWTPs:

1. Elimination of surface water discharges;
2. Investigation of the feasibility of reuse of wastewater effluent; and
3. Centralization of sewage collection and treatment facilities.

The act established July 1, 1995, as the date for elimination of all domestic WWTP discharges from the Indian River Lagoon. The act allowed FDEP to grant exceptions to the no-discharge requirement for three reasons:

1. There is no other practical alternative to discharge to the Indian River Lagoon and the discharge will receive advanced waste treatment or a higher level of treatment.
2. The discharge will not result in violations of water quality standards or impair efforts to restore water quality in the Indian River Lagoon.
3. The discharge is intermittent, occurring during wet weather conditions and subject to FDEP requirements.

In 1994 one municipality operating a WWTP discharging to the Indian River Lagoon indicated that it could not comply with the July 1, 1995, deadline. This municipality requested the Florida Legislature consider an extension to the deadline. After much debate, a nine-month extension was granted by the Legislature, moving the effective date to April 1, 1996.

As of August, 1996 almost all WWTPs are in compliance with the requirements of the Indian River Lagoon Act. The few WWTPs, which continue to discharge, are actively working on projects which will bring them into compliance in the near future.

Compliance with this legislation is expensive for WWTPs and their customers. As growth continues in the region, wastewater treatment and disposal needs will also grow along with the costs associated with wastewater treatment and disposal. Efforts to reduce costs may result in requests for exemptions from or changes to the Indian River Lagoon Act to once again allow wastewater discharges to the Indian River Lagoon.

In addition, the Indian River Lagoon Act does not address industrial discharges. Presently, there are 27 industrial discharges. These consist of discharges of heated cooling water from power plants (4), brine discharges from reverse osmosis potable water treatment plants (17), citrus processing plants (2), a sand mine, the C-54 canal, a parachute washing facility at Kennedy Space Center, and the Union-Carbide industrial gas plant in Mims. All these discharges are

currently permitted by FDEP. As there is no prohibition on industrial discharges, future development could bring additional industrial discharges to the Indian River Lagoon.

ON-SITE SEWAGE DISPOSAL SYSTEMS Action Plan

Overview of Actions

OSDS-1 Complete or continue projects related to OSDS in the 1994 SWIM plan update and the IRL Act.

OSDS-2 Develop and implement a program to inspect OSDS.

OSDS-3 Undertake further studies of OSDS in the Indian River Lagoon region to quantify the impact of OSDS on the Lagoon and further refine the extent of “problem” and “potential problem” areas.

OBJECTIVE

To determine the impacts of on-site sewage disposal systems (OSDS) on the resources of the Indian River Lagoon and to develop and implement strategies to address these impacts.

PRIORITY PROBLEM

Within the Indian River Lagoon basin, OSDS are the primary approved method for disposing of wastewater from homes and businesses located outside service areas of central sewer systems. By rule (Chapter 10D-6, Florida Administrative Code), OSDS are limited to a treatment capacity of 10,000 gallons per day.

While wastewater treatment plants with a capacity of less than 5,000 gallons per day are included as OSDS, the vast majority of OSDS in the region are composed of a septic tank and a drain field. The tank is designed to allow settling of solids contained in wastewater. Baffles in the tank are designed to retain greases and floating solids within the tank. When properly sited, maintained and operated, OSDS can provide a high degree of treatment for wastewater. OSDS are generally designed for a 15-20 year service life.

Present OSDS siting requirements, most of which became effective in 1983, include a provision that drain fields must be constructed a minimum of 2 feet above the seasonal high water table. Prior to this date, the required distance from the water table was 6 inches. As a result, many OSDS in the Lagoon region that were constructed prior to 1983 may have limited capacity to effectively treat wastewater.

Many of the soils in the Indian River Lagoon region have high seasonal water tables, are poorly or excessively drained or have other attributes which, according to USDA Natural Resources Conservation Service soil surveys for the Lagoon region, have “severe” limitations for septic tanks. In certain areas, these limitations may be overcome by improving drainage, through the construction of elevated drain fields or other means.

Prior to the 1950s, OSDS were the primary method of disposing of wastewater in the Lagoon region. At that time, permits were generally not required for OSDS installation. While permits were required by the Florida State Board of Health (and its successor agency, the Florida Department of Health and Rehabilitative Services) for OSDS installed after the late 1950s, few readily available records exist for permits issued prior to the 1970s. As a result, there is no accurate count of existing septic tanks within the Indian River Lagoon basin and no simple way of quantifying the potential impacts of OSDS on the Indian River Lagoon.

Generally, once an OSDS is permitted and installed, there are no further inspections or review by FDHRS or other agencies. County public health units do issue repair permits for OSDS that have failed and do respond to citizen complaints concerning possible OSDS failures.

Recognizing the potential for wastewater to impact the water quality of the Indian River Lagoon, the Florida Legislature passed the Indian River Lagoon Act (Chapter 90-262, Laws of Florida) in 1990. While the primary focus of this legislation, as amended, was to require domestic wastewater plants to cease discharge to the Indian River Lagoon by April 1996, the potential impacts of OSDS on the Indian River Lagoon were also addressed in this legislation.

The Indian River Lagoon SWIM program (implemented by the SJRWMD and SFWMD) was required by this legislation to undertake a study of the impacts of OSDS on the Lagoon by identifying areas which could potentially impact the Lagoon. The IRL-SWIM program contracted with County Public Health Units in the five counties in the Lagoon basin (with the exception of Brevard County) to undertake this project. In Brevard County, the Natural Resources Management Division performed this study.

Through these projects, OSDS “problem” areas in each county were identified through the use of a Problem Area Index developed by the SJRWMD. This index considers several factors affecting OSDS performance, such as soil permeability and depth to the water table, as well as OSDS density, OSDS failures and several other factors. Each county modified the PAI slightly and, as a result, the findings of each county may not be directly comparable to other counties. Within each county, however, the results and rankings are consistent.

In Volusia County, 15 areas consisting of 32 square miles were identified as “problem” areas. Another 26.7 square miles were identified as “potential problem” areas. In Brevard County, 22 square miles were identified as “problem” areas. An additional 9.6 square miles were identified as “potential problem” areas. In Indian River County, 15.4 square miles are considered “high priority.” An additional 16 square miles were considered “medium priority” areas. In St. Lucie County, 16.5 square miles are considered “first priority.” This area contains 41 percent of OSDS in this county. “Second priority” areas include 16.4 square miles containing 20 percent of OSDS in this county. In Martin County, 17.7 square miles were designated as “high priority” areas and 16.4 square miles were identified as “medium priority.” In total, 103 square miles were identified as “problem,” “first priority” or “high priority” areas. An additional 85.1 square miles were identified as “potential problem,” “medium priority” or “second priority” areas.

The potential for OSDS to impact surface waters is not limited to the Indian River Lagoon. As part of the 1990 amendments to the Coastal Zone Management Act, Section 6217 requires states

and territories with federally approved coastal zone management programs to develop and implement enforceable policies to address coastal non-point source pollution. OSDS were specifically included as a pollution source which must be addressed. At this time, Florida's OSDS requirements appear to meet or exceed the minimum standards outlined in the guidance developed for compliance with Section 6217 requirements.

MANAGEMENT OF FRESHWATER AND STORMWATER DISCHARGES Action Plan

Overview of the Actions

- FSD-1 Complete or continue the diagnostic, management or feasibility projects related to freshwater or stormwater discharges found in the 1994 SWIM Plan update.
- FSD-2 Implement the NPDES non-point source (stormwater) permitting program throughout the Indian River Lagoon region.
- FSD-3 Develop and implement pollutant load reduction goals (PLRGs) for all areas of the Indian River Lagoon.
- FSD-4 Develop and implement new or improved best management practices (BMPs) for management of freshwater discharges or stormwater management.
- FSD-5 Develop a comprehensive drainage map of the Indian River Lagoon basin.
- FSD-6 Reduce the impacts of muck (ooze) on the Indian River Lagoon.
- FSD-7 Amend local comprehensive growth management plans or land development regulations to reduce the impact of development on the various resources of the Indian River Lagoon.
- FSD-8 Enact legislation allowing the use of state revolving trust-fund monies for non-point source control projects, such as freshwater and stormwater discharge management.
- FSD-9 Investigate the potential of strengthening existing stormwater or freshwater discharge management programs.
- FSD-10 Encourage the proper use of fertilizers, herbicides, and pesticides.
- FSD-11 Educate residents and property owners about the impacts of freshwater and stormwater discharges on the Indian River Lagoon and what they can do to reduce these impacts.
- FSD-12 Undertake a review of the plan of reclamation, standard operating procedures and project works of each large drainage system. Develop strategies to reduce discharges to the Indian River Lagoon.
- FSD-13 Upgrade existing stormwater systems.
- FSD-14 Develop appropriate mechanisms to fund and undertake the operation, maintenance and improvement of stormwater management systems.

OBJECTIVE

To develop and implement strategies to address the impacts of freshwater and stormwater discharges on the resources of the Indian River Lagoon.

PRIORITY PROBLEM

Historically the Indian River Lagoon had a long, narrow drainage basin. Most of the drainage basin was limited (with a few exceptions, such as the St. Lucie River) to the area east of the

Atlantic coastal ridge. This area, which is roughly east of present-day U.S. Highway 1, totaled approximately 1,000 square miles.

For more than a century, projects were undertaken to develop or reclaim lands for agricultural and urban development. Development, or reclamation in many cases, involved projects designed to control flood waters or lower the water table by draining these waters to the Indian River Lagoon. The size of these projects ranged from a few acres or less to hundreds of square miles. As a result of these projects, the drainage basin of the Indian River Lagoon has doubled in size to more than 2,000 square miles.

In the portion of the Indian River Lagoon from Melbourne south, several large inter-basin drainage systems associated with water control districts or federal flood control projects were constructed, extending the historic Lagoon drainage basin westward to include extensive areas which previously drained to the St. Johns River or Lake Okeechobee. Most of these projects were publicly funded. Although many of these large systems were originally constructed to serve agricultural development, some of these areas, such as the Melbourne Tillman Water Control District, the Indian River Farms Water Control District, and the North St. Lucie Water Control District, now include large areas of residential development.

Many of the development or reclamation projects were much smaller in scale and were contained entirely within the historic Indian River Lagoon drainage basin. Most of these smaller projects, which are numerous and found throughout the Lagoon region, are stormwater drainage systems serving individual residential, commercial, agricultural and industrial development projects, as well as roadways and other public works. These projects were funded and constructed by private and public interests.

Many of these smaller systems were constructed prior to present-day stormwater treatment requirements. As a result, these systems have little or no retention, detention or treatment capabilities to remove pollutants before they reach the Indian River Lagoon.

As the result of an improved drainage system and an expanded drainage basin, salinities in the Indian River Lagoon can vary more widely than they did historically. Substantially larger quantities of freshwater are discharged during the wet season. These discharges can reduce salinities in wide areas of the Lagoon. During drier times of the year, freshwater flows to the Lagoon are reduced as the result of water retention for agricultural or urban irrigation. As a result, salinities in the Indian River Lagoon may increase.

In addition to impacting the salinity regime of the Indian River Lagoon, discharges from these drainage systems also include increased amounts of suspended solids, as well as elevated levels of nutrients and other pollutants. These pollutant loadings have impacted the Indian River Lagoon water quality and resources. Freshwater and stormwater discharges represent the largest non-point source of pollution to the Indian River Lagoon. Lagoon-wide non-point sources of pollution contribute more than 60 percent of the pollutant loadings to the Indian River Lagoon.

As an example, over the years these discharges have resulted in muck (or ooze) deposits and sedimentation in the Lagoon and its tributaries. This deposition and sedimentation have caused

loss of seagrass beds with resulting impacts to fisheries (finfish and shellfish) and other valuable resources in the Indian River Lagoon. On occasion, increased loadings of nutrients from freshwater discharges have caused algae blooms and resulted in fish kills.

Several strategies have been initiated to address the impact of freshwater discharges and stormwater on the Indian River Lagoon. These strategies are being implemented at the local, state, and federal levels.

Several local governments have formed stormwater utilities to deal with flooding, maintenance, and operation of stormwater systems and water quality issues. The operation of a stormwater utility is quite similar to other utilities that provide services for a fee, such as power, sewer, water, etc. Property owners within the service boundaries of a stormwater utility are charged a fee for stormwater drainage and treatment. These funds are used for the construction, operation, maintenance, and improvement of stormwater systems.

Many of these utilities have been formed in anticipation of the implementation of National Pollutant Discharge Elimination System (NPDES) stormwater discharge permitting in the Indian River Lagoon basin. As part of the 1987 amendments to the Clean Water Act, the Environmental Protection Agency was required to develop regulations setting forth NPDES permit application requirements for stormwater discharges from industrial areas and municipal storm sewer systems serving populations of 100,000 or greater and initiate an NPDES permitting program for these discharges. The purpose of this program is to reduce the pollution of surface waters throughout the United States by non-point sources.

Presently in Florida, only counties with census-designated urbanized areas that have a population greater than or equal to 100,000 but less than 250,000, and designated areas that have a population greater than or equal to 250,000 after incorporated areas are excluded must submit NPDES stormwater permit applications. These include counties such as Orange (Orlando), Hillsborough (Tampa) or Pinellas (St. Petersburg). Additionally, the regulations also address stormwater discharges associated with industrial activities and stormwater discharges resulting from construction projects disturbing five acres or more. Within the Indian River Lagoon region, only Palm Beach County (which includes a small portion of the southern end of the Lagoon basin) is presently subject to NPDES stormwater permitting requirements. In the near future, with the further development of NPDES stormwater regulations, all counties in the Indian River Lagoon region (along with the municipalities in those counties) may be required to obtain NPDES permits and develop plans to address pollutant loadings associated with discharges of stormwater.

At the state level, FDEP and the five water management districts are implementing state water policy requirements (Chapter 62-40, Florida Administrative Code) for development of pollutant load reduction goals (PLRGs) for priority water bodies in the state. PLRGs for the Indian River Lagoon will be resource-based, and primarily based on the ecological requirements of seagrass. Seagrass is a vital component of the Indian River Lagoon ecosystem and is adversely affected by poor water quality. The goal established for the Indian River Lagoon is the reduction of pollutant loadings to ensure that adequate water quality conditions exist to promote the growth of seagrass to a depth of 1.7 meters (6 feet).

Similarly, PLRGs for the St. Lucie estuary (SLE) will be based on attaining and maintaining a salinity regime appropriate to support an ecologically viable shellfish and seagrass population. The SLE is the highest priority area for developing and implementing PLRGs in the southern end of the Lagoon (segment 4). Appendix I of the 1994 IRL-SWIM Plan update provides a complete description of SFWMD efforts to develop PLRGs for the SLE.

PLRGs are presently under development for portions of the Lagoon and its tributaries by SJRWMD and SFWMD. Further information on PLRGs and their development may be found in the *Seagrass Action Plan* and the 1994 IRL-SWIM Plan update.

RECOMMENDED FRESHWATER AND STORMWATER DISCHARGE MANAGEMENT ACTIONS

The following are actions recommended to address impacts of freshwater and stormwater. These actions have been grouped as follows:

GENERAL RECOMMENDATIONS

These recommendations apply to all freshwater and stormwater drainage systems throughout the Indian River Lagoon basin.

RECOMMENDATIONS FOR LARGE OR INTER-BASIN DRAINAGE SYSTEMS

These recommendations apply to the larger drainage systems constructed by the Corps of Engineers as part of the Central and Southern Flood Control Project or water control districts. These systems are found in the portion of the Lagoon basin from Melbourne south.

RECOMMENDATIONS FOR SMALLER OR INTRA-BASIN DRAINAGE SYSTEMS

These recommendations apply to the smaller systems which primarily provide stormwater drainage to individual development projects. These systems are located throughout the Indian River Lagoon region.

MARINA AND BOAT IMPACTS Action Plan

Overview of the Actions

- MB-1 Develop and implement an incentive program promoting the implementation of improved marina operating practices. Explore the feasibility and need for developing a marina operating permit.
- MB-2 Complete and implement boat facility siting plans.
- MB-3 Increase the protection of resources of the Indian River Lagoon from oil spills.
- MB-4 Reduce the impact of in-water hull-cleaning activities.
- MB-5 Provide education for owners and operators of boats and personal watercraft.

MB-6 Improve enforcement of boating safety and resource protection regulations through an improved Florida Marine Patrol presence.

MB-7 Minimize the impacts of waste discharges and marine sanitation devices on the public health and resources of the Indian River Lagoon.

MB-8 Establish resource protection zones in the Indian River Lagoon.

OBJECTIVE

To engage the boating public and marine industry as active participants in the protection and restoration of the resources of the Indian River Lagoon

PRIORITY PROBLEM

Boating has been a traditional use of the Indian River Lagoon. The Indian River Lagoon was the primary route of travel and commerce for the Indians and early settlers until rail transportation reached the region near the turn of the century. While the Lagoon continues to be heavily used by boaters, today boating is primarily a recreational activity.

Today, Florida is one of the largest and fastest-growing boating states in the nation. With a warm climate, year 'round fishing and numerous waterways within minutes of almost any location within the state, one of the more common first purchases of new Florida residents is a boat.

The number of recreational boats registered in four counties in the Indian River Lagoon region (Brevard, Indian River, St. Lucie and Martin) increased from 28,859 in 1978-1979 to 57,957 in 1992-1993, an increase of more than 100 percent over this period. Boat registrations in the five northern counties in the Lagoon region (Volusia, Brevard, Indian River, St. Lucie, Martin) represented approximately 11 percent of all boats registered in Florida in 1992-1993.

The increased number of boats and boaters has impacted man and the resources of the Indian River Lagoon. Threats to people, property, shallow-water habitats and wildlife are increasing as more boats use coastal waters.

- Nearly anyone, regardless of experience or knowledge, can operate a boat in Florida. Many novice boaters have little knowledge of safe boating practices or rules governing the operation of their vessel. The usage of increasingly busy coastal waters by novice, uneducated boaters has had tragic results. In 1994 there were 1,017 reported boating accidents in Florida.
- Many of the seagrass beds in the Indian River Lagoon have "prop scars" resulting from boaters attempting to cross shallow waters and running aground.
- Shorelines in certain areas are eroding as the result of wake damage. This erosion can cause turbidity and siltation.
- Since the mid-1970s, approximately 25 percent of manatee mortalities are reported to be the result of collisions with boats.

Boating activities can also impact water quality. While Florida law prohibits discharge of untreated wastewater to surface waters, discharge of untreated or minimally treated wastewater from marine sanitation devices may occur regularly in the Indian River Lagoon. These discharges can affect the public health through the transmission of diseases, as well as the water quality and resources of the Indian River Lagoon.

In addition to the impacts of waste discharges, other pollutants generated by boat operation and maintenance can impact water quality. Pollutants generated by fueling and operation of boat motors, detergents from boat cleaning, and metals and other materials leaching from anti-fouling bottom paints can affect water quality. The impacts of these pollutants can range from slight perturbations to acute toxicity in the sediments and water column.

The Florida Marine Patrol is the primary agency charged with enforcement of safe boating and resource protection regulations in the Indian River Lagoon region. The agency is, by all accounts, inadequately staffed. Following the recent merger of FDER and FDNR, the Marine Patrol has been assigned additional duties without an increase in staff. These added duties will likely decrease the time Marine Patrol officers spend “on the water” enforcing safe boating and resource protection regulations.

Numerous facilities providing support services for boats and boaters using the Indian River Lagoon have been developed in the region. These facilities are often full-service marinas, providing services such as fuel, boat storage and docking facilities, boat sales and rentals, repair facilities and boat ramps. There are also many smaller marinas and yacht clubs which may offer one or more of these services. As these facilities are located along the shore of the Indian River Lagoon, they are also important in providing public access to the waters of the Lagoon.

Because these facilities are located on the waterfront, they have a high potential to have an adverse impact on the resources of the Indian River Lagoon. These impacts can be associated with the siting, construction or operation of such facilities and range from loss of habitat due to poor siting to petroleum spills and runoff from work areas during operation.

APPENDIX 5

MANATEE PROTECTION PLAN AD-HOC COMMITTEE MEMBERSHIP

**MANATEE PROTECTION PLAN MANAGEMENT AD-HOC
COMMITTEE MEMBERSHIP-1994**

Mr. Bob Wille
Town of Melbourne Beach
Chairman

Mr. Steve Peffer
Brevard County
Vice Chairman

Mr. Bob Atkins
District 1 Boating Appointee

Mr. Ronald Balogh
City of Cocoa Beach

Ms Jeanne Benson
City of Cape Canaveral

Mr. William Blucker
Town of Palm Shores

Mr. Frank Booth
Cape Canaveral Chapter
Organized Fishermen of Florida

Mr. Bob Cochran, Jr.
City of Indialantic

Mr. Bob Day
Indian River Lagoon National Estuary Program

Mr. Clay Gordin
Patrick Air Force Base

Ms. Lorraine Guise
Canaveral Port Authority

Mr. Don Griffin
City of Rockledge

Mr. Doug Jaren
Brevard Marine Association

Mr. Wes Hoaglund
City of Titusville

Mr. Oli Johnson
City of Palm Bay

Mr. Jeffrey Jones
East Central Florida Regional Planning Council
Non-voting member

Mr. Raymond LeRoux
The Sebastian Inlet Tax District Commission
Non-voting member

Ms. Penny Levin
District 3 Boating Appointee

Mr. David Marlow
District 4 Boating Appointee

Mr. Richard Mermer
Fla. Department of Environmental Protection

Mr. Michael Miller
St. Johns River Water Management District

Mr. Mitch Needleman
Florida Marine Patrol

Mr. John Outland
Fla. Department of Environmental Protection
Intergovernmental Programs
Non-voting member

Mr. Ronald Rincones
District 5 Boating Appointee

**MANATEE PROTECTION PLAN MANAGEMENT AD-HOC
COMMITTEE MEMBERSHIP-1994**

Mr. Art Robbins
City of Melbourne

Mr. F. Terry Seawell
City of Cocoa

Mr. Bob Stowe
City of Satellite Beach

Mr. Jim Valade
U.S. Fish and Wildlife Service
Non-voting member

Ms. Bretta Woodford
District 2 Boating Appointee

Ms. Laura Ruhana
Fla. Department of Environmental Protection
Bureau of Protected Species Management
Non-voting member

Ms. Nancy St. Germain
Town of Malabar

Ms. Patti Thompson
Save the Manatee Club

Ms. Jackie White
ECO

Ms. Phyllis Woodford
Shellfish Farmers Association

***MANATEE PROTECTION PLAN EDUCATION AD-HOC
COMMITTEE MEMBERSHIP-1994***

Mr. Ira Bickham
Boating Education

Mr. Keith DeMott
Boating Education

Mr. Doug Jaren
MPP Management Ad-hoc Committee

Ms. Amy Adams
Indian River Lagoon National Estuary Program

Mr. Daniel Hayes
St. Johns River Water Management District

Ms. Brenda Maxwell
Brevard Teaching & Research Labs
Brevard Community College

Mr. Mitch Needleman
Florida Marine Patrol

Ms. Laura Ruhana
Florida Department of Environment Protection
Office of Protected Species Management

Ms. Nancy Sadusky
Save the Manatee Club

Ms. Paula Sheldon
Central Junior High School
School Board of Brevard County

Mr. Walter Bradford Smith
Brevard County At Large

Ms. Cindy Stubben
East Central Florida Environmental Service Project
Florida Department of Education

Ms. Sandra Clinger
Brevard County

APPENDIX 6

MANATEE HABITAT FEATURES MAP SERIES AND UPDATE SCHEDULES

MANATEE HABITAT FEATURE MAP SERIES AND UPDATE SCHEDULE

MAPS:

1. **Submerged Aquatic Vegetation (SAV)** - 1994 coverage supplied with the draft MPP.

Source: Dr. Robert Virnstein
St. Johns River Water Management District
(904) 329-4500

Update Schedule: As available

2. **Manatee Abundance (Aerial Surveys)** - September 1997-September 1999 map supplied with the draft MPP.

Source: Ms. Jennifer Branham
Florida Fish and Wildlife Conservation Commission
Bureau of Protected Species Management
(904) 922-4330

Update Schedule: As available.

3. **Manatee Mortality** - Watercraft-related or Total Manatee Mortality (all causes) from 1974-2001 supplied with the draft MPP.

Source: Ms. Jennifer Branham
Florida Fish and Wildlife Conservation Commission
Bureau of Protected Species Management
(904) 922-4330

Update Schedule: As available.

4. **Manatee Protection Boat Speed Zones** - October 2000 as provided with the draft MPP, or more recent data.

Source: Mr. Scott Calleson
Florida Fish and Wildlife Conservation Commission
Bureau of Protected Species Management
(904) 922-4330

Update Schedule: As needed

5. **Manatee Freshwater Sources Map** - March 1994 as provided with the MPP.

Source: Mr. Conrad White
Brevard County
Natural Resources Management Office
(321) 633-2016
Update Schedule: As available

6. **Class II Waterbody, Outstanding Florida Waterway (OFW), or Aquatic Preserve** - 2001 as provided in the MPP.

Source: Ms. Janet Klem
Florida Department of Environmental Protection
Division of Surface Water Quality
(850) 245-8427
Update Schedule: As available