

# **MANATEE PROTECTION PLAN**

## **A Comprehensive Approach to Reducing Manatee Mortalities and Protecting Manatee Habitat in Martin County, Florida**

Growth Management Department

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Approved by the Board of County Commissioners

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## LIST OF ACRONYMS

ACEE	Florida Advisory Committee on Environmental Education
ACOE	US Army Corps of Engineers
BAS	Boating Activity Study
BFSP	Martin County Boat Facility Siting Plan
BCC	Martin County Board of County Commissioners
BPSM	Bureau of Protected Species Management
CCMP	Indian River Lagoon Comprehensive Conservation & Management Plan
CERP	Comprehensive Everglades Restoration Plan
CGMP	Martin County Comprehensive Growth Management Plan
CWA	Clean Water Act
ESC	Environmental Studies Center
EPA	US Environmental Protection Agency
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FIND	Florida Inland Navigation District
FMRI	Florida Marine Research Institute
FOS	Florida Oceanographic Society
FPL	Florida Power & Light Company
FPUA	Fort Pierce Utilities Authority
FS	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
GMD	Martin County Growth Management Department
HBOI	Harbor Branch Oceanographic Institution
HSNC	Hobe Sound Nature Center
ICW	Intracoastal Waterway
IRL	Indian River Lagoon
IRLNEP	Indian River Lagoon National Estuary Program
LDRs	Land Development Regulations
LOS	Level of Service
MCSO	Martin County Sheriff's Office
MPAC	Martin County Manatee Protection Advisory Committee
MPP	Manatee Protection Plan
NMFS	National Marine Fisheries Service
PLRGs	Pollutant Load Reduction Goals
SAV	Submerged Aquatic Vegetation
SFWMD	South Florida Water Management District
SJRWMD	St Johns River Water Management District
SMC	Save the Manatee Club
TCRPC	Treasure Coast Regional Planning Council
TMDLs	Total Maximum Daily Loads
USCG	United States Coast Guard
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey

# **MANATEE PROTECTION PLAN: A COMPREHENSIVE APPROACH TO REDUCING MANATEE MORTALITIES AND PROTECTING MANATEE HABITAT IN MARTIN COUNTY, FLORIDA**

## **EXECUTIVE SUMMARY**

Located on Florida's southeast coast, Martin County consists of a varied mosaic of urban lands, agricultural lands, parks, preserves and waterways. The area is widely recognized for the opportunities available to boaters, including the Atlantic Ocean, the Indian River Lagoon (IRL), the St. Lucie Estuary, the Okeechobee Waterway and Lake Okeechobee. Residents and visitors share these waters with varying numbers of the Florida population of the West Indian manatee. Martin County has developed and adopted a Comprehensive Growth Management Plan (CGMP) and local regulations that are intended to allow growth while providing protection and habitat for native flora and fauna.

Martin County's protection of manatees began in 1982, with the adoption of the CGMP, which included elements concerning coastal protection and conservation and open space. The county's efforts to protect manatees were enhanced with the adoption and posting of vessel speed zones in the early 1990s, resulting in a reduction in the proportion of manatee deaths attributed to watercraft despite a substantial increase in registered boats. Manatee protection was further increased when Martin County adopted a Boat Facility Siting Plan (BFSP) in June 2001, and updated in March 2002.

This Manatee Protection Plan (MPP) identifies that the economic value of the marine industries is over \$500 million annually in Martin County, and then identifies and describes manatee habitat within the county. Aerial censuses and radio tracking of manatees indicate that they are present in the nearshore Atlantic Ocean, the IRL and St. Lucie River Estuary and their associated freshwater and tidal creeks, channels and tributaries and the freshwaters of Lake Okeechobee and the Okeechobee Waterway. Although manatee abundance in Martin County is difficult to quantify, manatees have been documented to be present in the county throughout the year. Although there are no major warm-water attractants, the ambient water temperatures appear to be adequate for manatee presence even during winter months.

For the time period 1974-2001, manatee mortality in Martin County has varied from zero to nine deaths per year. The causes of death include: watercraft (29%), undetermined (23%), floodgate/lock (20%), perinatal (i.e. death of dependent calves) (19%), other natural (7%) and other human-related (2%). The MPP identifies actions, which are controllable in Martin County, that are being taken and/or will be taken in Martin County to protect manatee habitat and minimize human-related manatee injury and death. It should be noted that other sources of mortality (undetermined, floodgate/lock, perinatal, and natural) total 69% and that other efforts are underway by state and federal agencies to address this statistic.

An important component of this Plan is the establishment of a Manatee Protection Advisory Committee (MPAC), a balanced, multi-disciplinary advisory committee comprised of citizens, land owners, governmental agencies and representatives from local businesses and conservation organizations. MPAC will be convened to analyze the implementation and effectiveness of the MPP and to make recommendations for revisions to the MPP as new information becomes available.

The Plan recognizes that watercraft-related manatee mortality has been substantially reduced subsequent to the adoption and posting of vessel speed zones. For nine years since speed zone implementation (1992-2000), boat related mortality has decreased to 20% of the total deaths compared to 40% for the previous nine years before speed zone implementation (1983-1991). Current speed zones are adequate, with the possible exception of the Crossroads area, where Martin County will work with the State of Florida to review the boat speed limits in this area (presently 25 mph) for manatee protection and/or boating safety

The MPP also includes a description of the agencies that are involved with enforcement of marine regulations, and makes recommendations for improving compliance with vessel speed zones. An important element of increasing compliance is elevating the knowledge and awareness of boat operators, and the MPP identifies that Martin County will develop educational materials that will be distributed to the owners of all vessels that are registered in Martin County

The Plan requests that the Florida Fish and Wildlife Conservation Commission (FWC) recognize that there is a lack of scientific data concerning the use of some specific areas of the county by manatees, and recommends that the State of Florida work with Martin County to obtain additional information in these areas. Life history information is particularly needed that would include natural mortality and births.

The MPP includes a projected schedule for implementation, which includes the adoption of changes to the county's CGMP, and the development and adoption of the new land development regulations during 2002-2004. MPAC will meet periodically, based on the schedule of the Evaluation and Appraisal Review process for the county's CGMP. MPAC may be convened more frequently if human-related manatee mortality increases to the extent that it may adversely affect continued development of boat facilities as described in the county's BFSP.

It is Martin County's goal to reduce the risk of human-related harassment, injury, and death to manatees and protect manatee habitat by adoption and implementation of this MPP.

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# MANATEE PROTECTION PLAN: A COMPREHENSIVE APPROACH TO REDUCING MANATEE MORTALITIES AND PROTECTING MANATEE HABITAT IN MARTIN COUNTY, FLORIDA

## INTRODUCTION

### A. General Manatee Information

Manatees are members of the scientific Order Sirenia, large air-breathing aquatic mammals that inhabit both fresh and saltwater areas, including oceans, estuaries, rivers, canals and dredged channels. Manatees prefer warm-water areas, and in the United States are found primarily in Florida. Although they may range northward to other states during the summer, manatees migrate to south Florida and/or natural or artificial warm-water refuges during the winter.

Adult manatees average approximately 11.5 feet in length and weigh about 2,200 pounds (USFWS, 2000). They feed primarily on aquatic and floating plants and can eat 10-15% of their body weight in aquatic vegetation each day. Manatees spend 6-8 hours per day foraging, and 2-12 hours resting. Although intervals between breaths vary with the amount of activity, manatees typically come to the surface to breathe every 3-5 minutes. A resting manatee may remain submerged for as long as 20 minutes. During periods of high activity a manatee may surface to breathe as often as every 30 seconds. They have seal-like bodies, a large spatulate-shaped tail for locomotion, and two forelimbs that are often used in combination with a muscular upper lip to pull food into their mouths.

Manatees have two comparatively small eyes that are equipped with inner membranes that can be drawn across the eyes for protection. They have fairly good underwater visual acuity and can distinguish between different sized objects, different colors and patterns, although sight is significantly affected by water clarity. Despite a lack of ear lobes, manatee hearing is reasonably good within a relatively narrow low-frequency band. Observations and studies have revealed that manatees emit sounds to communicate with one another, with these vocalizations often being between a cow and its calf. Evidence suggests that despite their relatively good hearing, manatees have difficulty in localizing the source and direction of sound.

Several closely related species of Sirenia are found in tropical areas throughout the world. The subspecies that is present in Florida, the Florida manatee (*Trichechus manatus latirostris*), has been designated as an endangered species by the federal government and the State of Florida. It has also been designated as the state marine mammal of Florida.

Manatees are relatively long-lived, with estimates of maximum life expectancy being about 60 years. Females enter their reproductive cycle at 3-4 years of age, and the mean age when they first give birth is 5 years. The gestation period is approximately 11-14 months, and a calf remains dependent on its mother for approximately 1-2 years.

In October 2001, the Fish and Wildlife Conservation Commission accepted a petition from the Coastal Conservation Association of Florida to review the endangered species status of the Florida manatee based on the Commission's rules 68A-1.004 and 68A-27.003, FAC. This petition was based on an independent study by Fraser (2001) that maintains the manatee has successfully recovered to a population status that no longer warrants the species being included on the endangered list. The validity of the Fraser study, the petition, and other population data on manatees will undergo extensive review by the Commission according to its rules and the outcome is expected to be presented to the Commission in December 2002.

Although the precise number of manatees in Florida is not known, aerial censuses have documented the population to be at least 3,276 individuals statewide (FMRI, 2001). Although there may be some interchange, the federal recovery plan (USFWS, 2000) indicates that this statewide population of manatees can be separated into the following four distinct subpopulations:

- Atlantic (47% of Florida Population)
- Southwest (37% of Florida Population)
- Northwest (12% of Florida Population)
- St. Johns River (4% of Florida Population)

Martin County is part of the Atlantic Region, which includes the lower St. Johns River, the east coast of Florida and the Florida Keys. Recent analyses by manatee researchers suggest that the number of manatees in this region has remained fairly steady or decreased slightly during recent years.

Since 1991, aerial surveys conducted by the Florida Marine Research Institute (FMRI) during cold-front episodes yielded the following state-wide count of manatees:

<b>Year</b>	<b>Animals</b>
1991	1,465
1992	1,856
1995	1,882
1996	2,639
1997	2,229
1998	2,022
1999	2,353
2000	2,222
2001	3,276

A recently aerial survey in January 2001 by the FMRI during a cold-front episode produced a minimum count of 1,520 animals along the east coast of Florida. On January 9, 2002, at the Riviera Beach and Ft. Lauderdale areas, all south of Martin County, there were 819 animals recorded at Florida Power & Light Co. (FPL) power plants (J. Reynolds, personal communication). These animals are attracted from northern areas to

the warm water discharged by the power plants during cold episodes and disperse to feeding grounds and more northern habitat when the temperatures moderate. What this data indicates is that there are hundreds of animals moving north and south along the east coast of Florida and, whatever movement occurs, the animals transit through Martin County. Thus, Martin County is an important habitat resource for resident and transient animals.

A population estimate of manatees in Martin County is not possible with the existing data bases. What is known, however, is that animals are here year round, more animals are present during the winter than the summer, births occur in the county, all age classes are represented and that there are transient animals moving through in both the north and south direction.

## **B. Martin County**

### ***1. General Location***

Martin County is located on Florida's southeast coast. It includes approximately 555 square miles of land and open water, and stretches from the Atlantic Ocean on the east into Lake Okeechobee on the west (Figure 1). The C-23 canal, which extends east-to-west across much of the county, separates Martin County from St. Lucie County to the north. Palm Beach County abuts Martin County to the south.

The 2000 census reports Martin County's population as approximately 126,700. The majority of these residents live in the eastern portion of the county. In general, Interstate 95 (I-95) and the Florida Turnpike separate urban areas to the east from agricultural areas to the west.

Approximately 21 miles of the IRL is present in Martin County, extending the entire length of the eastern portion of the county. The St. Lucie Inlet is the only surface connection between the Atlantic Ocean and the IRL in Martin County. The Okeechobee Waterway or the St. Lucie Canal (C-44) is a navigational waterway that extends through a natural river and creek system and man-made channels from the IRL to Lake Okeechobee. Two locks are present on the Okeechobee Waterway to facilitate navigation and water management.

### ***2. Economic Value of Local Marine Industries***

Waterfront development and marine-related industries are extremely important components of the local economy. In FY98-99, 15,338 vessels were registered in Martin County. From trailered jon boats to ocean-going cruisers, the ownership, maintenance and use of these vessels involves a variety of businesses throughout the county, including but not limited to: boat dealers, marinas, charter services, service facilities, fueling, dock construction, bait and tackle shops, outfitters and marine supply stores. It is impossible to place a value on the registered vessels themselves because of the great variation in purchase price, age, length, condition, type of power, etc. Monetary value is not

incorporated into the vessel registration information itself; however, sales taxes are collected on each purchase and can give an estimate of the economic value of the industry.

Boaters use their vessels for a variety of commercial and recreational purposes. Commercial fishing vessels are based primarily in Port Salerno in the Manatee Pocket. Their products are served at local restaurants and fish markets or exported outside the Treasure Coast. Charter and rental vessels provide boating and recreational opportunities for both residents and visitors who are not boat owners. Recreational uses include cruising, fishing, scuba diving and water skiing.

Referred to as "The Sailfish Capital," Stuart and Martin County are widely recognized for the game fish that are caught not far offshore in the Atlantic. Numerous local fishing tournaments are held each year. However, the economic value of marine industries is not limited to ocean waters. The IRL, St. Lucie River and Loxahatchee River provide a variety of boating opportunities for non-ocean going boaters. The Okeechobee Waterway is the only cross-state corridor for boaters traveling between the Atlantic Ocean and the Gulf of Mexico.

Real estate values are significantly higher for waterfront parcels, especially if they front boat-accessible waterways. According to a study performed for the Florida Inland Navigation District (FIND) (G.E.C., Inc., 2000), waterways have increased residential property values by approximately \$584 million and boat slips in the county are estimated at a value of \$3.9 million. Without the waterway, property values in Martin County would be approximately \$588 million less than their current values.

In a recent study for Marine Industries Association of Florida, Inc. (MIA) (Thomas J. Murray & Associates, 2001), it has been estimated that marine industries have a \$529.4 million annual effect on the economy of Martin County. The local marine industry employs approximately 3,500 people and the Stuart Boat Show brings additional revenue to the area in terms of tourists and sales taxes. This revenue benefits virtually all sectors of the community, including real estate, taxes paid on vessels, marinas and bait shops, restaurants and hotels, clothing, and grocery stores.

In recognition of this vitally important component of the local economy, this MPP has been developed with an inherent desire to provide protection for manatees in compliance with state regulations and the federal Endangered Species Act, while minimizing social and economic impacts to the boating community and related marine industries.

### **C. Purpose and Goal**

Due to a variety of factors, including relatively low population numbers, low reproductive rates, a geographically restricted range of mainly Florida, and high rates of human-related mortality, the Florida manatee is particularly vulnerable to extinction. Subsequent to its designation as an endangered species, numerous programs have been initiated to protect the manatee and its habitat. The Florida Manatee Recovery Team, an interagency group of manatee experts, developed a Florida Manatee Recovery Plan. The USFWS first approved this plan in 1980. It was updated in 1989, 1996 and was revised in 2000-2001. One of the recommendations in the plan is to develop site-specific manatee

# FIGURE 1

protection plans at a local level. The Recovery Plan ranks this as a priority goal, essential for the recovery of the species in the wild. In 1989, the Florida Governor and Cabinet directed 13 key counties to develop manatee protection plans. Martin County was designated as one of those key counties.

During the early years after the Governor's 1989 directive, the focus by county governments was on the development of county-specific vessel speed zones, which have now been adopted by all thirteen key counties. In some cases, these speed zones have also been revised and updated. With the assistance of FWC staff, full manatee protection plans have been developed for five counties, and progress is being made in the development of several other county-specific MPPs. With legislatively-approved funding appropriated in 1999-2000 and 2000-2001, FWC has offered financial assistance to those counties where plans have not been adopted. Additionally, the Governor and Cabinet, sitting as the Board of Trustees of the Internal Improvement Trust Fund, have indicated their intent to deny use of state-owned submerged lands for boating infrastructure projects in key counties that do not have approved manatee protection plans or which are not making significant progress toward that goal.

A purpose of Martin County's MPP is to develop the rationale and policies needed to meet state standards for manatee protection in local waterways. To achieve this goal, the following tasks were undertaken:

1. Inventory data pertaining to manatee distribution, abundance, and mortality in local waterways and review and assess existing information pertaining to natural resources, human activity, and other factors potentially affecting the health and well-being of manatees and their habitat.
2. Identify local, state, and federal programs that benefit manatees and provide recommendations for developing new and/or improving existing programs to better protect manatees and their habitat.
3. Develop recommendations for modifying the county's Comprehensive Growth Management Plan and Land Development Regulations to implement the objectives, policies and programs recommended in Task 2 above.
4. Develop a schedule for implementing the objectives, policies and programs recommended in Task 2 above.

As discussed later in this plan, floodgate/lock and watercraft deaths for the period of 1974-2001 are two of the largest source of human-related manatee mortality (i.e. 20-29%, respectively) that are controllable. Since the county cannot control floodgate/lock mortality, the siting of new and expansion of existing boating facilities is a critical component of manatee protection. A Boat Facility Siting Plan (BFSP) was adopted in 2001 by the Martin County Board of County Commissioners (BCC), with subsequent revisions in 2002. The BFSP includes an analysis of boating patterns and boating related impacts and describes the policies the county will implement to minimize the impacts of new boating facilities on manatees. The BFSP is a stand-alone document and its contents are only briefly presented in this MPP.

As part of its strategy to develop appropriate conservation measures for manatees, the USFWS delineated areas throughout Florida based on the relative risk of

watercraft-related manatee mortality in those areas. The USFWS (2001) defined high risk areas as those averaging one or more watercraft-related manatee mortalities per year during the past ten years. Medium risk areas averaged less than one, but more than zero, watercraft-related manatee mortality per year. Low risk areas had no documented watercraft-related mortality. Martin County is currently designated by the USFWS as a high-risk county. It is the desire of the county to be reclassified to a medium-risk or a low-risk category.

It is Martin County's goal to implement this MPP and the BFSP to reduce boat-related manatee mortality, protect manatee habitat, promote boating safety, and increase public awareness of the need to protect manatees and their environment.



## INVENTORY OF EXISTING CONDITIONS

### A. Habitat

Manatees are large, air-breathing, aquatic mammals that are found in marine, estuarine and freshwater systems throughout Florida. They use these waterbodies for food, shelter, migratory pathways, and/or warm-water refugia. This section provides a description of the aquatic areas within Martin County that are accessible to manatees.

#### *1. Locations*

Manatee habitat in Martin County can be separated into four distinct areas:

- nearshore Atlantic Ocean,
- the IRL, including the Intracoastal Waterway (ICW);
- the St. Lucie and Loxahatchee River Estuaries; and
- the Okeechobee Waterway or St. Lucie Canal (C-44) and Lake Okeechobee

#### *Nearshore Waters of the Atlantic Ocean off Hutchinson and Jupiter Islands*

Martin County has approximately 21 miles of frontage on the Atlantic Ocean, with the St. Lucie Inlet near Stuart providing the only connection between the ocean and inland waterways (Figure 1). Although manatees are more frequently observed in the IRL and other inland waters, they have been observed along the coast in shallow, nearshore waters.

Much of the nearshore area in Martin County consists of barren, sandy substrate that provides no food for manatees. However, intermittent nearshore reefs and/or exposed hard bottom extend for several miles north and south of the St. Lucie Inlet. These features range in water depths from less than 3 feet to approximately 18 feet. Manatees consume a variety of plant material and may graze on algae that grow on these substrates.

#### *The Indian River Lagoon (IRL), Including the Intracoastal Waterway (ICW)*

The IRL is a natural waterbody that extends approximately 156 miles from Ponce Inlet in Volusia County to Jupiter Inlet in Palm Beach County. This water body parallels the coast for the entire length of Martin County (Figure 1). Because of its geographic location along the transition zone between warm-temperate and subtropical climates, its large size, and diverse physical characteristics, the IRL is an estuary of extremely high biological productivity. Reportedly America's most diverse estuary, the IRL is home

to over 4,000 plant and animal species, including a number that are designated as endangered or threatened by the state and/or federal governments. Consequently, it has been designated as an estuary of national significance by the federal government. Approximately 21 miles of the IRL are present in eastern Martin County, stretching continuously from the St. Lucie/Martin County line to the Martin/Palm Beach County line. Throughout its length in Martin County, the IRL is designated as an Aquatic Preserve by the State of Florida.

In Martin County, the IRL is widest north of the St. Lucie Inlet where it attains a maximum width of approximately 1.5 miles. South of the St. Lucie Inlet it narrows dramatically and in some areas is less than 0.1 miles wide. The ICW is situated near the center of the IRL. This channel, which is maintained to a depth of -10 feet by FIND, is the principal inland navigational route for watercraft along the eastern seaboard of the United States. Several spoil islands of varying sizes, created during past dredging projects, are present along the edge of the ICW channel.

Seagrasses and other submerged aquatic vegetation, although diminishing in coverage, are still present throughout much of the IRL. In addition to providing nursery habitat for a variety of sport and commercially important finfish and shellfish, seagrasses are a prime food source for manatees. Thus, the lagoon, including its various embayments and tributaries, is prime habitat for manatees.

Four man-made features separate the IRL into five interconnected yet geographically distinct components (Figures 2 and 3). These sections are located from.

- the St. Lucie/Martin County Line to the Jensen Beach Causeway;
- the Jensen Beach Causeway to the Stuart Causeway;
- the Stuart Causeway to the Crossroads at the St. Lucie Inlet;
- the Crossroads to Bridge Road (SR 707) in Hobe Sound; and
- Bridge Road to the Martin/Palm Beach County Line.

#### *Inland Estuaries and Rivers*

Two major estuarine systems are present in Martin County: the St. Lucie River Estuary and the Loxahatchee River Estuary. The St. Lucie River is a naturally-meandering waterway that meets the IRL in an area locally known as the Crossroads (Figure 2). From this location, the St. Lucie River extends generally westward (upstream) approximately 6.2 miles to the US Highway 1 corridor at the Roosevelt Bridge. West of US 1, the St. Lucie River separates into a North Fork and a South Fork. Both transition from wide, open-water bodies to narrow winding waterways as they meander upstream in their respective directions. The North Fork, much of which has been designated an Aquatic Preserve, is approximately 0.7 miles wide at the Martin/St. Lucie County line but narrows considerably further to the north in St. Lucie County. The South Fork remains wide until just south of the Palm City Bridge (CR 714), where it too narrows considerably.

# FIGURE 2

# FIGURE 3

## **FIGURE 4**

# FIGURE 5

The Loxahatchee River is a natural river system that extends from the Jupiter Inlet upstream for a length of approximately 9 miles. Although most of the Loxahatchee River is located in Palm Beach County and is therefore outside the scope of this plan, portions of two forks of the Loxahatchee, the North Fork and the Northwest Fork, extend into Martin County (Figure 3). Within Martin County, these two forks are primarily contained within Jonathan Dickinson State Park. The Northwest Fork of the Loxahatchee River has been designated by the federal government as a National Wild and Scenic River, and both of these forks have been designated as Aquatic Preserves by the State of Florida.

*The Okeechobee Waterway or St. Lucie Canal (C-44) and Lake Okeechobee*

The Okeechobee Waterway, a federally maintained navigation channel, is the only waterway that crosses through the State of Florida from the Atlantic Ocean to the Gulf of Mexico. As such, this waterway receives significant amounts of use by recreational and commercial vessels. The navigation channel generally follows the centerline of the St. Lucie River from its intersection with the IRL at the Crossroads. With the ICW being the most heavily used north-south corridor for boating along the east coast of Florida and the Okeechobee Waterway being Florida's most heavily used east-west vessel corridor, the Crossroads area is busy with boat traffic.

At a location approximately 2.3 miles south of the Palm City Bridge, the Okeechobee Waterway diverges from the South Fork of the St. Lucie River, and becomes a man-made feature, the St. Lucie Canal (C-44; Figure 4). The natural river separates from the St. Lucie Canal approximately midway between the South Fork and the upstream locks. It meanders a considerable distance to the south as a wide creek and is crossed by various man-made features (e.g., SR 76). The Okeechobee Waterway continues westerly.

The Okeechobee Waterway passes through Lake Okeechobee, the largest lake in Florida, and one of the largest lakes in the country. Vessels (and manatees) traveling between Lake Okeechobee and the St. Lucie River must pass through two sets of locks. These structures are managed and maintained by the US Army Corps of Engineers (ACOE) for navigational and water management/flood control purposes. The easterly lock, the St. Lucie Lock, is located on federal lands approximately 2.0 miles upstream of the juncture of the St. Lucie Canal and the South Fork of the St. Lucie River (Figure 4). The Okeechobee Waterway continues in a westerly direction approximately 22 miles to the Port Mayaca Lock on the eastern edge of Lake Okeechobee (Figure 5). Depending on rainfall, time of year and water levels, the gates at this lock may be kept open.

The boundary of Martin County extends approximately 16 miles into Lake Okeechobee. While portions of this large, shallow freshwater lake are natural, the shoreline in Martin County has been severely altered by the Hoover Dike, a man-made feature that encircles the lake. A significant feature in Lake Okeechobee within Martin County is the S-135 spillway located on the northeast shore of the lake (Figure 5). Surface waters from several creeks flow through this structure into the lake.

## ***2. Land Acquisition Activities***

Martin County has a long-standing history of involvement in public land acquisition projects. Through the Save Our Beaches initiative in the early 1980s, the Lands for You program of the early 1990s and the recent Lands for Healthy Rivers program, Martin County voters have passed every public land acquisition proposition that has been presented through referendum. Through these programs, Martin County has effectively used locally-generated funds in matching-fund programs administered by regional, state and federal agencies to purchase environmentally sensitive lands. Numerous parcels in public ownership include water frontage in manatee habitat in Martin County. Funds collected through December 31, 2001 with a levy of an additional one-cent in sales tax were used in part to acquire parcels as part of a program to improve water quality in the St. Lucie Estuary and IRL. Some of these funds will be used as the local contribution toward implementation of the Comprehensive Everglades Restoration Program (CERP), Save Our Rivers Program administered by the South Florida Water Management District (SFWMD), the State's Florida Forever campaign and federal land acquisition initiatives, such as the Land and Water Conservation Fund.

Land management responsibilities for properties acquired through these initiatives are decided on a case-by-case basis. The federal government, Florida Department of Environmental Protection (FDEP) Division of Parks and Recreation, SFWMD, FWC and Martin County each serve as land managers on various publicly-owned tracts. Management plans have been developed for many of these parcels. Most are managed for preservation of natural habitat and/or passive recreation. Although no tracts are managed specifically as manatee preserves, some parcels may benefit manatees by improving the quality of water runoff that enters manatee habitat.

## ***3. Water Quality and Vegetation***

Estuaries are water bodies where saline ocean waters and fresh waters mix. The distribution and abundance of submerged aquatic vegetation (seagrasses and other macroscopic marine plants attached to the bottom), oysters, and other aquatic organisms is related to salinity and other water quality patterns within the estuary. In turn, water quality is largely affected by upland land-use activities. Fertilizers, pesticides and other pollutants find their way into estuaries via freshwater tributaries, canals, and upland run-off. During periods of heavy freshwater input via the C-44 and other canals within the St. Lucie Estuary basin, large quantities of freshwater significantly alter salinity regimes and the suspended material carried with the freshwater deteriorates water clarity. Both factors can impact the natural biological communities that are present in Martin County waterways.

Water quality in the IRL, St. Lucie Estuary and Loxahatchee River is highly variable. Diurnal tides affect the IRL to the greatest extent near the St. Lucie Inlet. Southern reaches of the IRL in Martin County are affected by tidal exchange at Jupiter Inlet, which



is located approximately 1.8 mi south of the Martin/Palm Beach County line. Generally, water quality is better and the abundance of seagrasses is greater in the IRL than in other Martin County water bodies inhabited by manatees.

Over the past several decades, water quality within the St. Lucie River Estuary has been degraded by various drainage and development projects. Agricultural and urban drainage projects have enlarged the boundaries of the watershed/drainage basin and caused the loss of natural habitat. These changes have caused alterations in the timing, distribution, quality and quantity of freshwater that enters the estuary. Periodic freshwater discharges into the estuary, primarily through the C-44, C-23 and various smaller canals along the North Fork in St. Lucie County have caused large salinity fluctuations. Many aquatic organisms, such as oysters and seagrasses, are unable to tolerate these fluctuations, which sometimes occur over relatively short time periods. In addition to altering salinity regimes, freshwater discharges also introduce nutrients and suspended materials. Suspended materials increase turbidity and thereby decrease the amount of sunlight that reaches the bottom. Nutrients cause proliferation of phytoplankton in the water column further deteriorating water clarity. As sediments fall out of suspension, they accumulate on the bottom, sometimes forming a silty ooze over previously natural sediments. In some areas of the estuary, this ooze is more than a foot deep. Seagrasses cannot grow on this ooze, and cannot survive when covered by it. Thus, changes in drainage basin characteristics have impacted the ecosystem causing the loss of oysters and submerged aquatic vegetation from large portions of their historic range.

The natural salinity regime in many areas of the IRL has also been affected by increasing residential and commercial development, industry, agriculture and other human land-use activities. Natural shoreline vegetation has been altered or removed throughout much of the lagoon's shoreline in Martin County.

The Loxahatchee River has also suffered water quality degradation through alterations to the natural patterns of freshwater input. However, subsequent to the designation of the Northwest Fork as a Wild and Scenic River, attention has been given to protecting the river system from further degradation. Numerous projects have been undertaken or are being planned (e.g., establishment of minimum flows and levels) to restore this waterway.

Data on the quality of surface waters in Martin County have been collected through various federal, state, regional and local programs. Additionally, SFWMD and the St. Johns River Water Management District (SJRWMD) have mapped seagrasses in the IRL. The remainder of this section provides a summary of the information available on these issues.

### *Water Quality*

In Chapter 17-3, Florida Statutes (FS), the State of Florida designates all surface waters in Florida into one of the following classes:

- Class I Potable Water Supplies;
- Class II Shellfish Propagation or Harvesting (harvesting contingent upon results of periodic FDEP water quality monitoring);
- Class III Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife;
- Class IV Agricultural Water Supplies; and
- Class V Navigation, Utility and Industrial Use.

There are separate state water quality standards for each class of surface water. These standards identify acceptable levels for a variety of constituents (e.g., nutrients, suspended solids, turbidity, dissolved oxygen, etc.). All surface waters in Martin County are classified as Class III waters except as noted below:

- Class I Lake Okeechobee; and
- Class II Great Pocket (IRL from Crossroads to Peck Lake);  
IRL east of the ICW centerline from St. Lucie County Line to the mouth of the St. Lucie Inlet, and  
Loxahatchee River west of the Florida East Coast Railroad Bridge including the Northwest and North Forks.

Chapter 17-3 Florida Statutes (FS) also identifies surface waters that, due to their ecological value and/or sensitivity, are designated as Outstanding Florida Waters and Outstanding National Resource Waters. Outstanding Florida Waters in Martin County that are accessible to manatees include:

- waters within Hobe Sound National Wildlife Refuge;
- waters within Jonathan Dickinson State Park; and
- waters within St. Lucie Inlet State Park

While, in general, many surface waters in Martin County meet applicable water quality standards for their respective classifications, others currently do not. Section 303(d) of the federal Clean Water Act (CWA) requires that each state identify a list of impaired waterways, or surface waters that do not meet applicable water quality standards. In fulfillment of this requirement, the FDEP relied on Florida's 1996 Water Quality Assessment Report to identify impaired water bodies. The Water Quality Assessment Report utilized a variety of sources to assess watersheds based on wetland, surface and ground waters. Sources included, but were not limited to, the US Environmental Protection Agency's (EPA's) STORAGE and RETRIEVAL (STORET) database, the Statewide Biological Database (biological assessments), SFWMD, fish consumption advisory information, and input from the public. FDEP has provided the EPA with a list of the surface waters of the state where sampling and analyses indicated that applicable water quality standards were not being met. The EPA approved Florida's 303(d) list in

November of 1998. Waterbodies in Martin County that did not meet applicable standards and are therefore considered impaired are identified in Table 1.

**Table 1**  
**Surface Waters in Martin County Identified by FDEP and EPA as Impaired**

<b>Water Body</b>	<b>Major Causes of Failure to Meet Standards</b>
Portions of the IRL	Nutrients, dissolved oxygen, total suspended solids, biochemical oxygen demand, coliform bacteria, copper, and arsenic.
Portions of the St. Lucie River Estuary	Nutrients, dissolved oxygen, total suspended solids, biochemical oxygen demand, coliform bacteria, copper, arsenic, and pesticides.
Bessey Creek	Dissolved oxygen, nutrients, biochemical oxygen demand, and coliform bacteria.
Lake Okeechobee	Nitrogen, phosphorus and iron.
Myrtle Slough (discharges into Lake Okeechobee)	Dissolved oxygen, nutrients and coliform bacteria.
S-135 (discharges into Lake Okeechobee from Myrtle Slough, Lettuce Creek and Henry Creek)	Dissolved oxygen and nutrients.

Water quality analyses revealed that several other water bodies barely met applicable standards. While these surface waters have not been designated as impaired by EPA, FDEP has identified them as waters that deserve attention in order to prevent their continued degradation. These waters are identified in Table 2.

**Table 2**  
**Surface Waters in Martin County That Are Likely to be Designated as Impaired Unless They Receive Special Attention**

<b>Water Body</b>	<b>Major Causes of Degradation</b>
Danforth Creek	Dissolved oxygen and nutrients.
C-23 Canal	Phosphorus, inorganic nitrogen, copper, lead, and ethion.

In Martin County, the Florida Oceanographic Society (FOS), a non-profit, environmental education and advocacy organization based in Stuart, Florida, conducts a citizens' water

quality monitoring program on behalf of the IRL National Estuary Program (IRLNEP). Data are collected for a variety of parameters at specific locations in the IRL and St. Lucie Estuary on a routine basis. FOS compiles the data, which are then published on the group's website and in a local newspaper with a map showing sampling locations and corresponding water quality grades. An example of this is attached as Appendix A. Publication of these data is helpful in promoting public awareness of local water quality conditions.

There are various programs that are currently in place or under review that, if implemented, would improve water quality in the Martin County water bodies identified in Tables 1 and 2 above. These programs include.

#### *Surface Water Improvement and Management Plan (SWIM)*

Adopted by the Florida legislature in 1987, the SWIM Act requires that plans be prepared by the water management districts to address the following concerns:

- point and non-point source pollution;
- destruction of natural systems;
- correction and prevention of surface water problems; and
- research for better management of surface waters

#### *Comprehensive Everglades Restoration Plan (CERP)*

The CERP is a \$7.8 billion dollar project that calls for impounding about 1.1 million acre-feet of new water each year: 80% for environmental benefits and 20% for agricultural and urban water supplies. Through the Water Resources Development Act of 2000, Congress has authorized an initial \$1.4 billion package of projects that will begin implementation of the CERP. Costs will be shared, with 50% being borne by the federal government and the other 50% being incurred by state and local governments. Implementation of the CERP will be completed over a 35-year period. The plan will provide surface water storage reservoirs, water storage areas, aquifer storage and recovery wells, water quality treatment areas, removal of more than 500 miles of canals and levees which are barriers to natural sheet flow, new infrastructure to move water to meet restoration goals, wastewater reuse facilities, and project operational changes. Additionally, several local initiatives to improve water quality in the St. Lucie Estuary and IRL are being considered in conjunction with the CERP.

#### *Pollutant Load Reduction Goals (PLRGs)*

The primary purpose of PLRGs is to reduce pollutant discharges from watersheds so that the water quality in the receiving body of water meets state standards. PLRGs have been established in Lake Okeechobee for phosphorus loadings. Interim PLRG's have been proposed in the IRL for salinity, and in the St. Lucie Estuary for freshwater releases.

#### *Total Maximum Daily Loads (TMDLs)*

The federal CWA requires that TMDLs be calculated for impaired waters based on detailed effluent assessments where pollution control measures are insufficient to meet current water quality standards. The TMDLs require the use of Best Management Practices to limit the volume of nutrients or other pollutants that can be discharged into receiving water bodies. They also establish objective and enforceable standards that can be easily monitored.

#### *Lake Okeechobee Works of the District Permit Program*

In 1989, a phosphorus control program was implemented by the SFWMD to regulate land uses (except dairies) greater than 0.5 acres in size. Parcels are monitored and regulated for offsite phosphorus discharge and corrective measures are required for those lands not in compliance.

#### *Non-Regulatory Programs*

In addition to the various regulatory programs that are addressing water quality issues, several governmental and/or community groups are developing non-regulatory programs to improve the health of local waterways. These include the IRL Restoration Feasibility Task Force, the St. Lucie River Initiative and the Loxahatchee River Coordinating Council, each of which is described below.

The IRL Restoration Feasibility Task Force is a consortium of agency personnel that is co-chaired by representatives from SFWMD and FDEP. With funding appropriated annually by the state legislature, the task force accepts, reviews and prioritizes applications for turn-dirt projects that will improve water quality in the IRL and the St. Lucie River. The task force then provides funding for implementation of selected projects. Most grants are issued to local governments.

The St. Lucie River Initiative is a member-based non-profit (501c(3)) organization whose mission is to restore the St. Lucie River to health and productivity through private and public action. The organization was formed in 1991 by concerned citizens and is working to champion more effective action and communication among the 21 different agencies and organizations responsible for the protection of the fragile St. Lucie River ecosystem. The River Initiative has been successful in acquiring funding for a variety of habitat improvement projects

The Loxahatchee River Coordinating Council is a consortium of agency personnel and stakeholders who meet quarterly to discuss issues concerning the Loxahatchee River, Florida's first federally-designated Wild and Scenic River. The Council is currently chaired by the Executive Director of the Loxahatchee River Environmental Control District and consists largely of representatives from the county and local governments through which the river extends and the regional planning council. Meetings of the Coordinating Council offer opportunities for members to collaboratively discuss restoration and management issues and the potential effects of development in the river's watershed. A major responsibility of the Council is the periodic updating of the management plan for the portion of the river that has been designated as Wild and Scenic.

## *Vegetation*

Subsequent to the designation of the IRL as an Estuary of National Significance, the SFWMD and SJRWMD have collaborated in the mapping of seagrasses in the IRL. This effort, conducted since 1986, has involved analysis of aerial photography coupled with ground-truthing. Figures 6-8 show the results of the most recent grassbed mapping effort in 1999 in comparison with areas where grasses were historically present. The apparent decline in seagrass coverage in nearly all areas of the IRL probably results from deteriorating water quality. Unusually large discharges of comparatively turbid freshwater into the estuaries that occurred as a result of storm events in 1995 and 1998 likely contributed to this decline.

Although submerged freshwater vegetation such as eelgrass (*Vallisneria americana*) may have occurred at one time in upper reaches of the St. Lucie Estuary in Martin County, there are currently no known resources of this type available to manatees in Martin County. Emergent shoreline vegetation occurs along portions of the IRL and the St. Lucie Estuary and throughout much of the North and Northwest Forks of the Loxahatchee River. It is likely that this emergent vegetation and overhanging vegetation are food sources for manatees in these areas. However, there have been no efforts to map or quantify the extent of this vegetation.

One notable vegetation-related aspect of the discharges from man-made canals (e.g., from Lake Okeechobee through the St. Lucie Canal into the South Fork of the St. Lucie River) is the introduction of floating freshwater vegetation into the estuarine system. Floating vegetation, including invasive, non-native water hyacinths (*Eichhornia crassipes*), is occasionally carried into coastal waterways during periods of heavy freshwater discharges. Although manatees consume water hyacinths, the introduction of this aquatic weed into coastal waterways is problematic. Because hyacinths cannot tolerate saline waters, the plants die upon entering the estuary and sink to the bottom. As they decay, they add to the detrital muck that smothers the biota of natural sediments. In Martin County, this problem is most prevalent in the St. Lucie Canal (C-44), near the mouth of the C-23 Canal, and portions of the South Fork of the St. Lucie River.

### *Summary of Water Quality and Vegetation*

Through the efforts of various federal, state and local governmental entities, a variety of data have been collected concerning water quality in those areas of Martin County inhabited by manatees. In general, water quality in the IRL is adequate to support the submerged aquatic vegetation on which manatees feed. Water quality in Lake Okeechobee, the St. Lucie Estuary and the Loxahatchee River has been affected by alterations within their respective drainage basins. These changes have reduced the abundance and limited the distribution of submerged aquatic vegetation. The extent to which manatees currently use emergent shoreline vegetation as a food source is not known. As described above, water quality analyses have identified impaired surface waters, and programs have been implemented or planned to improve water quality.

# FIGURE 6

# FIGURE 7



# FIGURE 8

#### *4. Manatee Distribution*

Manatees are found in marine, estuarine and virtually all non-landlocked freshwater bodies in Martin County. This Section provides information on the geographic (spatial) and temporal distribution of manatees in Martin County waterways.

Data concerning manatee sightings were obtained and analyzed from three major sources:

- aerial surveys,
- radio telemetry; and
- visual observations, including reports from the general public and logs maintained by lock tenders.

##### *Aerial Surveys*

The FWC has conducted aerial surveys of manatees periodically over the past 20 years. The surveys are performed by scientists in fixed-wing aircraft at an altitude of 500 feet and consist of annual state-wide synoptic surveys and local bimonthly surveys.

Synoptic flights are conducted each year for the purpose of obtaining state-wide population estimates. The primary focus of these aerial surveys is to count manatees in places and at times when they are most concentrated. Thus, the synoptic flights are performed during the winter and are timed to coincide with the passage of major cold fronts, periods when manatees gather at various thermal refugia around the state. The number and dates of surveys vary from year to year depending on weather conditions. Water clarity/visibility, weather conditions, and time of day significantly affect observations of manatees during these surveys.

There are no springs or man-made outfalls that create significant warm-water retreats for manatees in Martin County. However, because warm-water discharges are present in counties to the north (Fort Pierce Utilities Authority Power Plant in St. Lucie County) and south (FPL Riviera Power Plant; FPL Port Everglades Power Plant; FPL Lauderdale Power Plant), the aerial surveys have included searches for manatees in Martin County. The results of these surveys suggest that manatees may aggregate near the discharge from the C-23 canal. The extent to which the attractant is freshwater, layering of warm water, or a combination of the two, has not been determined.

Bi-monthly surveys are intended to document the relative abundance and distribution of manatees on a seasonal basis in local waterways. In Martin County, the bimonthly surveys were conducted from January 1986 to January 1987 and again from August 1990 to June 1993. This is the most comprehensive scientific source of information relating to manatee abundance in Martin County.

The Treasure Coast Regional Planning Council (TCRPC) analyzed FWC's bi-monthly aerial survey data in developing Martin County's BFSP (Martin County, 2001; updated

2002) After eliminating surveys that were not completed due to inclement weather, a total of 62 aerial survey data sets were available for analyses. These data covered 44 of the 52 waterway segments used by the TCRPC in assessing manatee abundance and mortality patterns.

During the FWC overflights, a total of 670 manatee sightings were documented in Martin County. On a seasonal basis, manatees were two to four times as abundant from December through March as during other times of the year. During February, the month of greatest abundance, an average of 24 manatees was observed per overflight for the 44 waterway segments surveyed. In terms of estimating the maximum number of manatees present within the county at any one time, this number is undoubtedly conservative, as not all waterway segments were surveyed, and some of the segments that were surveyed did not lend themselves to aerial observation as well as others.

Based on aerial survey data, four general areas harbored the greatest numbers of manatees:

- Crossroads North to the Stuart Causeway (Figure 2);
- Peck Lake (Figure 3);
- IRL just south of Bridge Road (Figure 3); and
- mouth of the C-23 Canal, including Bessey Creek (Figure 4).

The first three areas are in the IRL and thus lie along the principal north-south corridor for manatees on the east coast of Florida. They also contain extensive seagrass beds. Although no submerged attached vegetation is present in the area around the C-23 canal, freshwater discharges through the canal are thought to be an attractant.

Other discussion on manatee distribution and movements as derived from aerial surveys is included in the General Manatee Information Section of the Introduction to this MPP.

### *Radio Telemetry*

One source of information on the movement of individual manatees is available from the USGS Sirenia Project (National Biological Survey, 1994). This study examined the movements of 63 manatees fitted with transmitters and tracked by satellite at various times between 1986 and 1993. Mapped satellite telemetry data from the project were examined by the TCRPC during development of Martin County's BFSP (Martin County, 2001; revised 2002). It should be noted that this data set is based on tracking results for a limited number of individuals and, thus, is not considered the best source of information for estimating population sizes or determining where manatees are most abundant in local waterways. The data does, however, provide an indication of movement patterns within the county.

The results of the Sirenia Project indicate that 34 of the 63 manatees tracked by satellite included Martin County in their range. General movement patterns, all of which occurred between October and June, were documented for 27 individuals traveling to or through Martin County. All of the movements during October and November, a period of

declining water temperatures, were to the south. Between December and March, 60% of the movements were to the south and 40% were to the north. From April through June, the reverse was true, with the majority (71%) moving to the north.

Manatees sometimes made several trips through Martin County in relatively short periods of time within the same season. For example, one individual was tracked traveling south from Cocoa Beach to the Port Everglades Power Plant in late October to mid-November 1989. This manatee then traveled to the Banana River in early to mid-February 1990, but returned to Broward County in late February to mid-March 1990. Similar occurrences of back-and-forth movements within the same season are common in the data.

None of the radio-tagged manatees were tracked into the Okeechobee Waterway upstream of the St. Lucie Lock, and the extent to which manatees travel through this waterway is largely unknown.

The TCRPC generalized manatee movement patterns along the east coast of Florida as follows:

- individual manatees often return to the same warm season site year after year;
- individual manatees may also return to previously used warm-water sites during the winter, but some manatees will travel during mid-winter to alternate sites;
- there is considerable variation among individuals concerning the timing and extent of migration and the amount of time spent at warm-water sites,
- the range of some manatees includes the entire eastern coast of Florida with seasonal movements of 525 miles;
- manatees have been tracked at a rate of about 25 miles/day for several consecutive days when moving from one area to another;
- most long-range movements are seasonal, but some long-range movements and many short-range movements do not appear to be related to temperature;
- most manatees travel within the ICW, but some individuals travel in the Atlantic Ocean near the coast,
- the inland coastal waterway from the IRL to Biscayne Bay is considered to be a high-use area frequented by many manatees during the winter;
- manatees often travel in deep water channels used by boats and vessels; they usually move along the edge of the channels.

### *Visual Observations*

The most extensive database of manatee sightings in Martin County resides with FOS. Due to strong local interest in manatees, FOS initiated a call-in system through which residents could report sightings of manatees in local waterways. Since 1990, FOS has maintained records, including the date, approximate location, and number of manatees

reported by observers. Because manatee sightings reported to FOS are not verified, and there is no way to screen out incorrect observations or to distinguish if any animal may have been reported multiple times, FWC considers these data to be anecdotal, and they are not used as a basis for rulemaking. Additional information concerning this program is included in Appendix B.

Data compiled through the FOS weekly sighting reports indicates that during the period from 1998 through 2000, manatees were present in Martin County waterways during every month of the year (Table 3). In some areas such as the IRL, they have been observed every month, while in other areas, sightings have only been reported during certain months. The fewest sightings have been reported from the creeks that empty into the St. Lucie River (e.g., Frazier Creek, Poppleton Creek, Danforth Creek, and Britt Creek; Figure 2). The extent to which this may be due to inconsistent observation effort among areas is not known.

Another source of information comes from the personnel that operate the locks on the Okeechobee Waterway. As noted previously, there are two locks on C-44 in Martin County; the St. Lucie Lock and the Port Mayaca Lock. Since 1997, lock tenders have kept records of all manatee sightings (Table 4). Although the tenders are not actively searching for the animals, they do record all sightings that occur during the course of their normal duties. Additionally, because viewing conditions and the number of observers at each location are highly variable, it is impossible to draw definitive conclusions from these data.

From month-to-month, there is wide variability in the number of manatee sightings at a particular lock, and these data do not permit any determination as to the absolute numbers of manatees present. Because sightings are reported cumulatively, a group of several manatees (e.g., four) that are observed on two successive days, would result in eight observations. Because such a group may be observed several times in one month, the total number of observations reported for that month may be significantly higher than the actual number of manatees. This anomaly of recording procedures may explain outlier data such as September 1999 and October 1998 at the Port Mayaca Lock. The ACOE has acknowledged this shortcoming and, in 2001, initiated a program to attempt to identify individual manatees by their unique features (e.g., scar patterns). ACOE personnel also currently record pertinent information (e.g., direction of travel) concerning their manatee sightings. As this program is refined and continues, in the future it may be possible to draw more definitive conclusions from these data concerning the number of individual manatees that are present at/near the locks.

Despite these challenges to interpretation, the data do provide some general insights into relative abundance and temporal distribution. During 1998 and 1999 sightings of manatees were much more prevalent at the Port Mayaca Lock than at the St. Lucie Lock, while the opposite was true in 2000. Over the 3-year period of record, the greatest number of manatee sightings at the St. Lucie Lock occurred during the spring (March through May), whereas manatee sightings were most prevalent at the Port Mayaca Lock during the fall (September and October; Table 5). This may be reflective of seasonal movements between Lake Okeechobee and the IRL. The year-to-year changes in the St. Lucie River salinity may cause manatees to seek freshwater at the St. Lucie Locks.

Table 3

Months During Which Manatees Have Been Sighted  
in Martin County Waterways, 1998-2000\*

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atlantic Ocean North of St. Lucie Inlet	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded		Shaded
Atlantic Ocean South of St. Lucie Inlet				Shaded		Shaded				Shaded		Shaded
St. Lucie Inlet	Shaded	Shaded	Shaded			Shaded	Shaded	Shaded				
Cross Roads Area		Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded
IRL. South of Crossroads	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded		Shaded	Shaded
IRL. Crossroads to Stuart Causeway	Shaded	Shaded	Shaded		Shaded	Shaded	Shaded		Shaded	Shaded		
IRL: Stuart Causeway to Jensen Beach Causeway	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded
IRL: North of Jensen Beach Causeway	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded
St. Lucie River: Crossroads to Evan's Crary Bridge	Shaded				Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded
Manatee Pocket	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded				Shaded
Willoughby Creek		Shaded	Shaded		Shaded					Shaded	Shaded	Shaded
St. Lucie River: Evan's Crary Bridge to Roosevelt Bridge	Shaded		Shaded	Shaded	Shaded	Shaded	Shaded	Shaded			Shaded	Shaded
Warner Creek	Shaded	Shaded	Shaded	Shaded	Shaded		Shaded	Shaded				
Krueger Creek			Shaded	Shaded	Shaded	Shaded	Shaded	Shaded		Shaded		
S Fork - Roosevelt Bridge to Palm City Bridge		Shaded		Shaded	Shaded			Shaded	Shaded			
Frazier Creek	Shaded		Shaded									
Poppleton Creek					Shaded	Shaded						
Danforth Creek		Shaded			Shaded							
S. Fork - Palm City Bridge to St. Lucie Canal	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded			
St. Lucie Canal to St. Lucie Locks	Shaded		Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded		Shaded
South Fork Creek	Shaded		Shaded	Shaded		Shaded	Shaded	Shaded		Shaded	Shaded	Shaded
Mapps Creek				Shaded		Shaded	Shaded			Shaded		
N Fork - North of Roosevelt Bridge	Shaded	Shaded	Shaded		Shaded	Shaded		Shaded				Shaded
Bessey Creek		Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded			Shaded	
Mouth of C-23 canal	Shaded		Shaded		Shaded	Shaded						
Britt Creek												

\* Shaded blocks indicate months during which manatees have been sighted.  
Source Florida Oceanographic Society

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**Table 4**

**Manatee Observations at Locks on the Okeechobee Waterway**

<b>Location</b>	<b>1997*</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
St. Lucie Lock	14	30	114	103
Port Mayaca Lock	45	154	212	47

\* Documentation began in October 1997

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These data also suggest that there may be considerably more manatees in C-44 and Lake Okeechobee than is evident from the aerial surveys and suggest the need for expansion of current survey protocol.

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**Table 5**

**Average Number of Manatee Sightings Per Month\* at Locks on the Okeechobee Waterway in Martin County, Florida**

<b>Lock</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
St. Lucie	4.7	5.3	9.3	12.7	13.3	7.0	6.7	3.3	4.3	4.8	3.5	7.0
Port Mayaca	9.0	6.3	14.7	9.0	6.7	2.3	14.3	8.0	32.7	20.0	5.8	6.8

Source: U S Army Corps of Engineers

\*Monthly averages for January through September are for 1998 through 2000. Monthly averages for October through December are for 1997 through 2000

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Collectively, data obtained through aerial surveys, radio telemetry and visual observations, make it apparent that manatees are found throughout all of Martin County's non-landlocked waterways and are present throughout the year. Tracking of satellite-tagged manatees has revealed that many individual manatees have seasonal movements. Due to their sensitivity to cold water, manatees that range widely during the summer months seek warm water (e.g., springs, power plant discharges, or the naturally warmer waters of south Florida) during the winter. Since there are no major warm-water refugia or other features to attract manatees in Martin County, some manatees may just be passing through during their seasonal migrations. However, within a single season, manatees have been shown to exhibit short-term, in some cases even daily, movement patterns. For example, manatees attracted to the warm-water discharge from the Riviera

Power Plant in Palm Beach County fast during the coldest times of the day, while taking advantage of the discharge's heated waters. Then, as water temperatures increase during daylight hours, these same manatees move away from the power plant to feed. Some individuals may travel as far north as Martin County waters in search of food resources.

## **B. Manatee/Human Interaction**

This Section provides information concerning interactions between manatees and humans. It includes a presentation and discussion of manatee mortality statistics, vessel speed zones and enforcement of manatee related regulations.

### ***1. Manatee Mortality***

Since 1974, FWC has maintained records of manatee injuries and deaths reported by the public. FWC staff located at the regional office in southern Martin County, the Tequesta Field Station, respond to reports from Martin County. Severely ill or injured manatees are captured and transported to rehabilitation facilities outside of the county for professional care. Those that recover are typically released back into the wild near the location where they were captured. Carcasses of deceased manatees are recovered and, if possible, necropsies are performed to determine the cause of death.

From January 1974 through December 2001, there have been 137 manatee deaths recorded in Martin County waterways (Table 6; note that Mortality Code 7 is a combination of FWC Mortality Codes 7, 8 and 9). These deaths were assigned to one of seven categories: watercraft related (FWC Category 1), floodgate/lock related (FWC Category 2), other human related (FWC Category 3), perinatal (death of dependent calves; FWC Category 4), other natural (FWC Category 6), and undetermined (FWC Categories 7, 8 and 9). FWC also has a category for cold stressed animals (Category 5), but no mortalities in Martin County have ever been assigned to this category. The location of dead manatees recovered by FWC from Martin County waterways is shown by mortality code in Figures 2-5.

Since 1974, over 90% of all mortalities in Martin County fell into the categories of watercraft related (29%), undetermined (23%), floodgate/lock related (20%), and perinatal (19%; Figure 9). Even though mortality from watercraft averages 29% of the total or about one-third, other major categories of mortality include undetermined, floodgate/lock related, and perinatal. These three sources add up to 62% of the total or about two-thirds and indicate that more effort must be exerted by federal, state, and local agencies to reduce these sources of mortality.

Manatees have died in Martin County waterways every year since 1975, with total annual counts varying from one to nine (Table 6) Years of highest mortality occurred in 1984, 1991 and 1999. On an annual basis, the relative contribution of various causes of mortality to total mortality has varied considerably (Figure 10).



**Table 6**

**Summary of Manatee Mortalities in Martin County by Year and Type, 1974-2001**

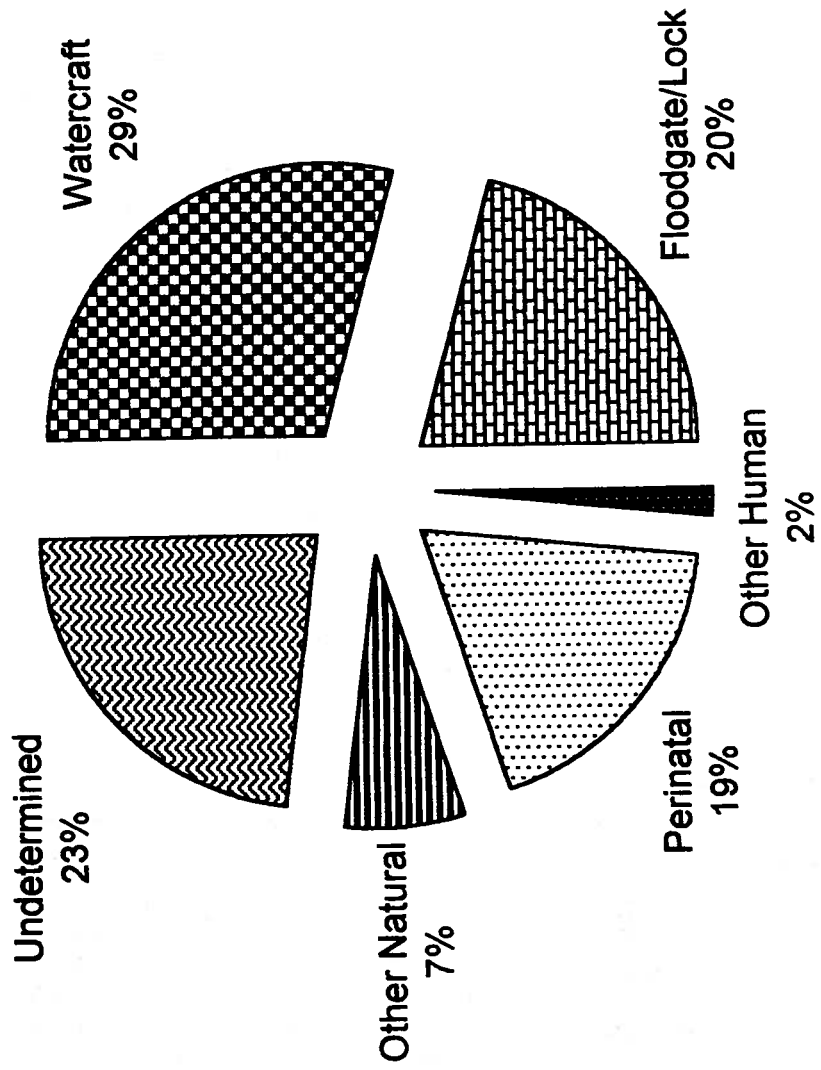
<b>Year</b>	<b>Watercraft</b>	<b>Floodgate/ Locks</b>	<b>Other human related</b>	<b>Perinatal</b>	<b>Cold related</b>	<b>Other natural</b>	<b>Undeter- mined</b>	<b>Total</b>
1974								0
1975							2	2
1976				1				1
1977							2	2
1978	1						1	2
1979	3	2						5
1980		1				1		2
1981	1						4	5
1982	1						1	2
1983		1		1				2
1984	1	1	1	2		1	3	9
1985	2						1	3
1986	3						1	4
1987	2	2						4
1988	4			1		1		6
1989	2	2		1			2	7
1990	4	1		1				6
1991	2	2		1			4	9
1992	1	2	1	2			2	8
1993		1		2				3
1994	1	2		3			1	7
1995	1	1		2		1	1	6
1996	2	1		2			1	6
1997	3					2	1	6
1998	1	2		2		1	2	8
1999	2**	4		1		2		9
2000	1	2		2			1	6
2001	1			2		2	2	7
<b>TOTAL</b>	<b>39</b>	<b>27</b>	<b>2</b>	<b>26</b>	<b>0</b>	<b>11</b>	<b>32</b>	<b>137</b>

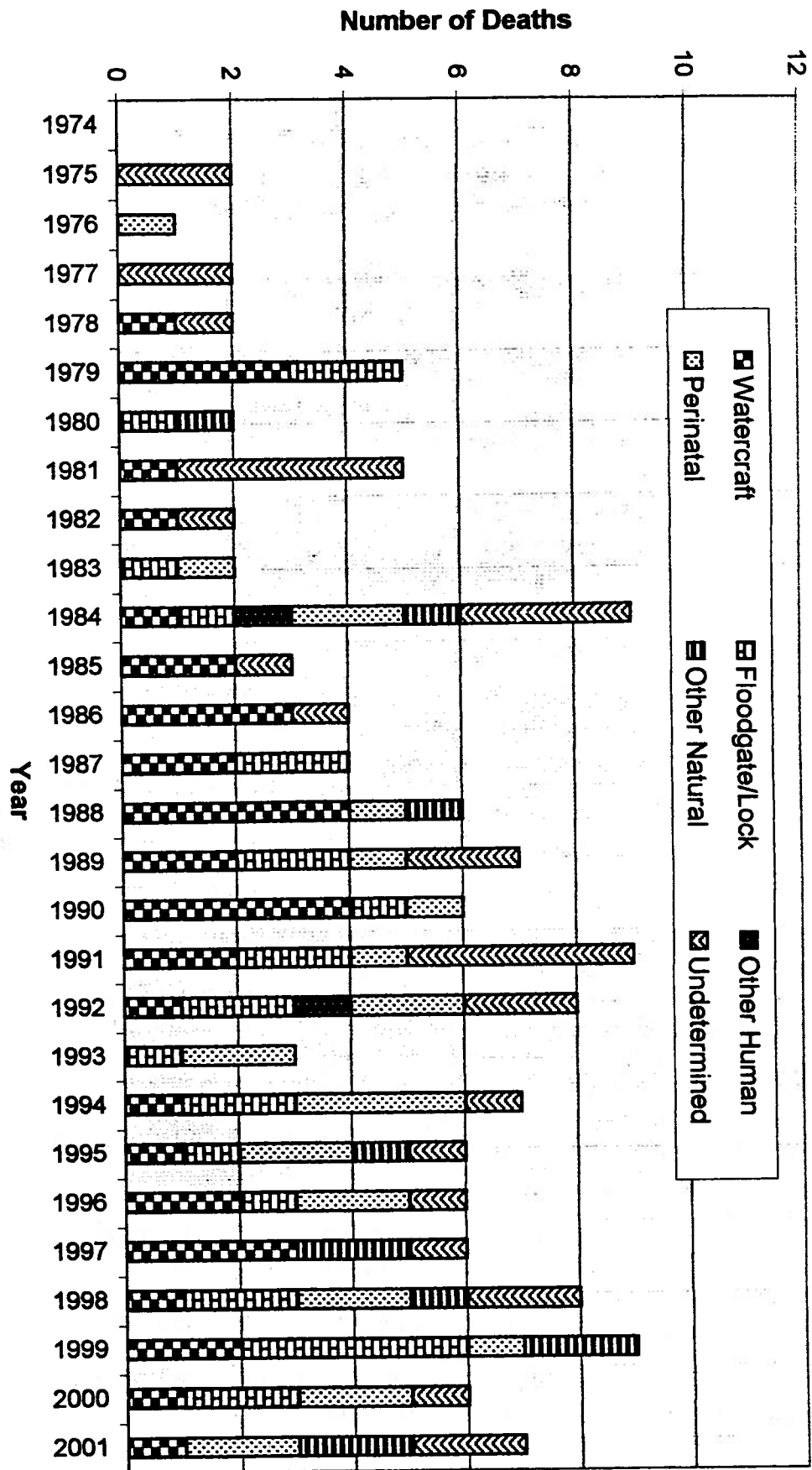
\*Mortality Codes: 1 = Watercraft, 2 = Floodgate/Lock, 3 = Other Human Related, 4 = Perinatal, 5 = Cold Stress, 6 = Other Natural, 7 = Undetermined [Note: Mortality Code 7 includes FWC Categories 7 (carcass verified by reliable source but not recovered), 8 (undetermined, too decomposed), and 9 (other undetermined).

\*\*One animal recovered alive, but euthanized due to severity of watercraft injuries.

Source: Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute. 2000. Atlas of Marine Resources. R.O. Flamm, L.I. Ward, and M. White (eds.), Version 1.3.

**Figure 9. Causes of Manatee Mortalities in Martin County (1974 - 2001)**





**Figure 10. Manatee Deaths in Martin County (1974-2001)**

Perinatal mortality, the death of newborn and dependent calves, has accounted for 19% of the total manatee mortality since 1974 (Figure 9). About half of these carcasses were recovered from the various creeks (e.g., Bessey Creek, Krueger Creek, Mapp Creek, South Fork Creek, and Northwest Fork of the Loxahatchee River) that enter into the St. Lucie and Loxahatchee River Estuaries (Figures 2-4). These sheltered areas likely provide pregnant and nursing mothers with refuge from boat traffic in adjacent waterways and may constitute important birthing and nursing locations.

## *2. Analysis of Manatee/Human Interaction*

Manatees are present in Martin County waterways throughout the year. Although, manatee/human interactions are possible wherever manatees are present, the greatest potential sources of these interactions include:

- watercraft;
- floodgates/locks;
- aggregating areas; and
- introduced sources of water and food.

### *Watercraft*

Since data have been systematically collected from 1974 to 2001, 39 manatees have died from boat collisions in Martin County waterways (Table 6). Annual mortalities from watercraft have varied from zero to four. However, since the full implementation of speed zones during the period of 1992-2000, only 12 animals ( $12/59 = 20\%$ ) have died from boat collisions. During 1992-2000, the largest contributor to mortality of any identifiable human source has been floodgates and locks with 15 animals ( $15/59 = 25\%$ ) killed.

In an attempt to reduce boat-related manatee mortalities, Martin County worked with the State of Florida to develop and adopt vessel speed restriction zones. Information concerning these zones is provided in Section C.3. The posting of signs identifying the boundaries of these zones was completed in July 1991, but not fully effective until after December 2001. FIND is responsible for installing and maintaining these signs. In determining the effectiveness of vessel speed restrictions, it is instructive to compare the number of watercraft-related manatee mortalities that occurred prior to the adoption and posting of vessel speed restriction zones and those that have occurred subsequent to these postings (Figure 11).

Looking at 9 year segments of boat-related mortality on either side of speed zone implementation, posting, and boater familiarization of the zones (i.e. starting January 1, 1992), the period of 1983-1991 (e.g. before zones) has an average annual mortality value of 2.22 (20 deaths/ 9 years) and the period of 1992-2000 (e.g. after zones) has an average annual mortality value of 1.33 (12 deaths/ 9 years). This is a substantial reduction, especially in light of the fact that boat registration in Martin County doubled from 1983 to 2000 (1983 boats = 7,632; 2000 boats = 13,497).

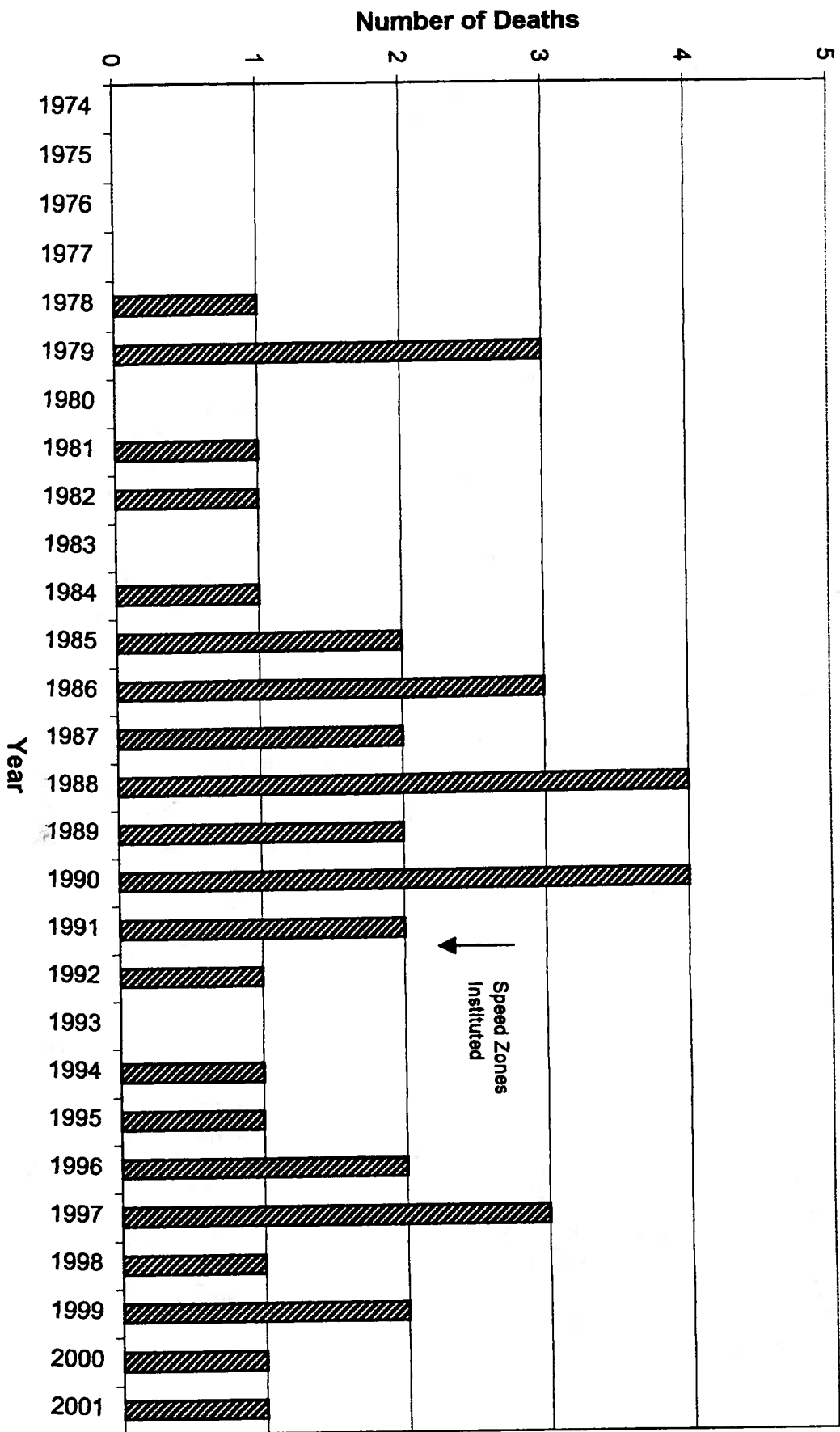


Figure 11. Martin County Watercraft-Related Manatee Mortality (1974-2001)

Another way of analyzing the mortality data is to compare the contribution of watercraft mortality to total mortality prior to and following implementation of speed zone restrictions. For the 9-year interval before the restrictions went into effect, watercraft accounted for 40% of all manatee mortality (Figure 12). Since the restrictions went into effect the contribution of watercraft mortality declined to 20% for a post-implementation 9-year interval and sources of mortality other than watercraft have increased (Figure 13). This indicates diligence by the boaters of Martin County even as the number of overall boaters increased.

Because watercraft-related manatee mortality is the largest single cause of deaths over which Martin County has some control, it is important to analyze the locations where these mortalities have occurred. The data points provided by FWC indicate the locations where manatee carcasses were recovered, not necessarily where the impacts actually occurred. There have been considerable declines in watercraft mortalities in certain waterways since the restrictions went into effect (Table 7). This is particularly evident in the IRL/ICW south of the Crossroads (Figure 3). Prior to the speed zone restrictions, an average of 0.44 boat-related mortalities per year were recorded. The average declined to 0.11 mortalities per year in that waterway after the restrictions went into effect. A considerable decline was also documented in Manatee Pocket (Figure 4). At that location, average annual mortality was reduced from 0.56 prior to speed restrictions to 0.11 after the restrictions went into effect. In contrast, mortalities have remained

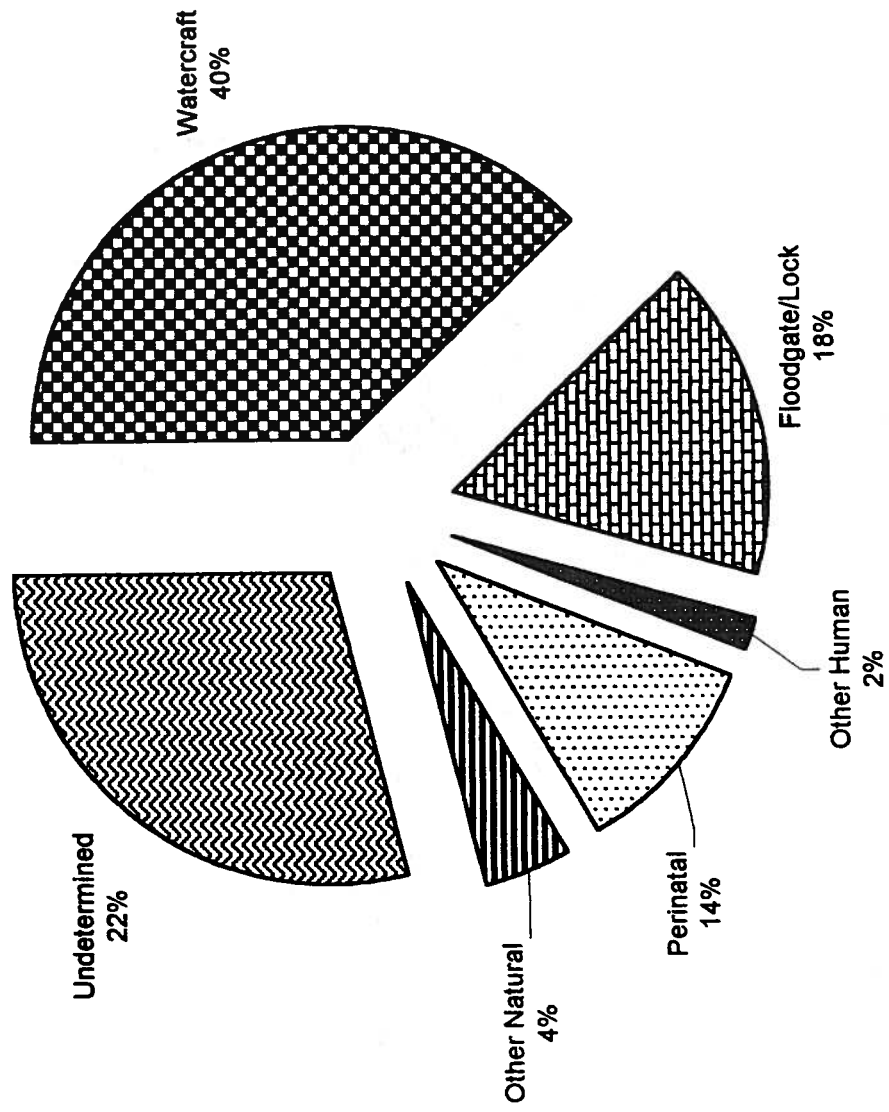
**Table 7**  
**Average Annual Number of Watercraft-Related Manatee Mortalities**  
**by General Location in Martin County**

General Location of Carcass Recovery	Number	
	Pre-Speed Zones*	Post-Speed Zones**
Atlantic Ocean	0.11	0.11
Crossroads	0.33	0.22
IRL North of Crossroads	0.11	0.11
IRL/ICW South of Crossroads	0.44	0.11
Manatee Pocket	0.56	0.11
Crooked Creek	0.11	0.00
Willoughby Creek	0.00	0.22
St. Lucie River From Crossroads to Roosevelt Bridge	0.00	0.11
North Fork St. Lucie River	0.00	0.00
Mouth of C-23 Canal & Bessey Creek	0.11	0.00
South Fork From Roosevelt Bridge to St. Lucie Canal	0.22	0.11
St. Lucie/C-44 Canal east of St. Lucie Lock	0.22	0.11
St. Lucie/C-44 Canal west of St. Lucie Lock	0.00	0.11
<b>TOTAL</b>	<b>2.22</b>	<b>1.33</b>

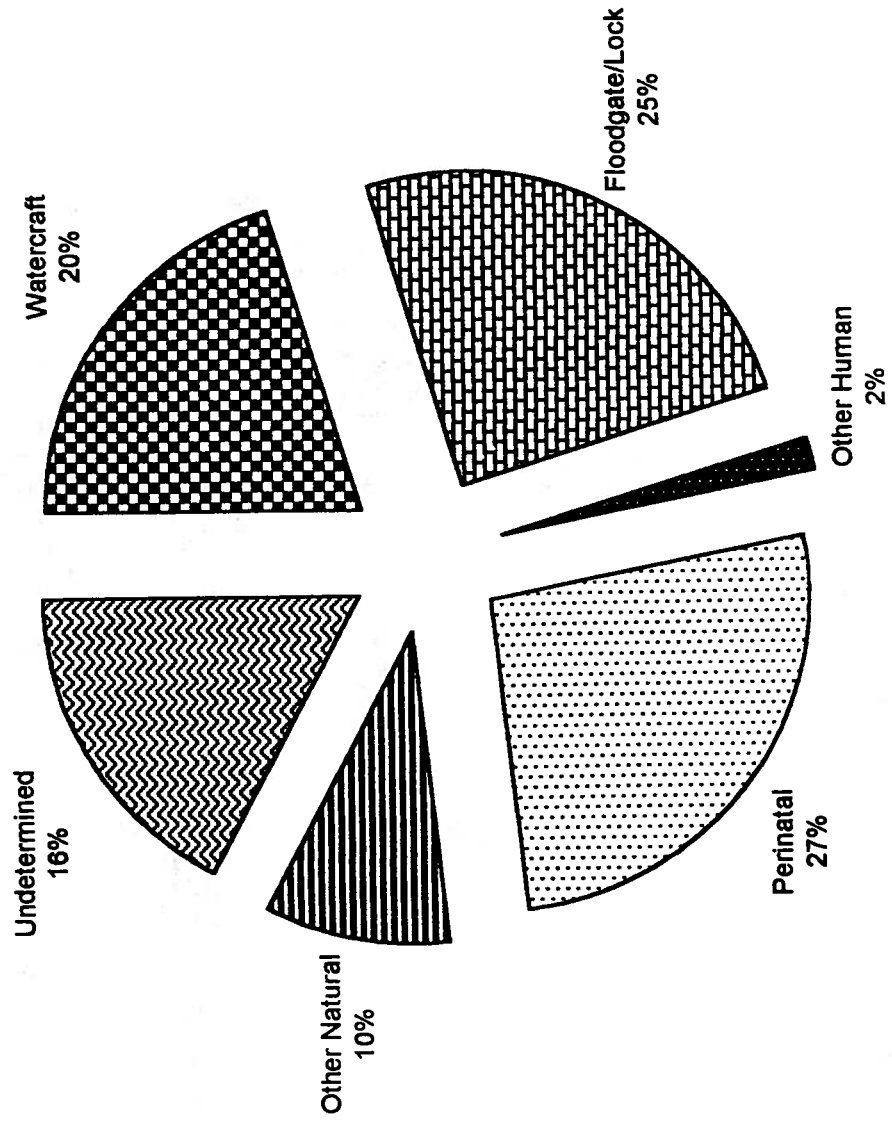
\*January 1983 through December 1991

\*\* January 1992 through December 2000

**Figure 12. Causes of Manatee Mortalities in Martin County (1983-1991; Prior to Speed Zones)**



**Figure 13. Causes of Manatee Mortalities in Martin County (1992-2000; After Speed Zones)**





approximately 0.22 in the Crossroads (Figure 2). The Crossroads are subject to high tidal velocities and any recovered carcasses in this area are subject to extensive tidal movement. Thus an animal hit there may not be collected there and an animal hit elsewhere may alternatively be collected there.

### *Water Control Structures*

Since FWC began maintaining records of manatee mortality in 1974, 20% of all mortality in Martin County has been attributed to the floodgates and locks used to control water levels in C-44 and on the eastern rim of Lake Okeechobee. Statewide, mortality associated with water control structures is only 4%. The majority of the floodgate/lock mortalities (20) in Martin County have occurred at the St. Lucie Lock (Figure 4), with the remaining seven being divided between the Port Mayaca Lock and the S-135 Water Control Structure (Figure 5). The St. Lucie and Port Mayaca Locks are owned, operated and maintained by the COE while the S-135 is a SFWMD structure. Since the implementation of speed zones (complete in December 1991), the percentage has increased to 25% and is now greater than watercraft mortality at 20%.

The number of manatee deaths related to the operation of floodgates and locks in Martin County has varied from zero to four, with an average of 1.6 per year during the 1990s (Figure 14), which is greater than boat mortality at 1.33 per year. In an effort to prevent manatee mortality at water control structures, the SFWMD, ACOE, and Harbor Branch Oceanographic Institution (HBOI) have been working cooperatively to develop and install sensor systems that will protect manatees from injury and death. The gates at St. Lucie Lock open horizontally, and historically manatees have been injured or killed when they have become trapped or crushed by closing gates. According to the COE, a prototype sensor system was installed at the St. Lucie Lock in October 1998. Monitoring of the effectiveness of this system has been ongoing subsequent to its installation, and in March 2001, HBOI installed an updated array of sensors at the St. Lucie Lock. The new sensors use sound waves that are transmitted and received by structures affixed to the lock gates. When a manatee or other large object breaks the plane of the sensors, the closing of the gates is halted. Lock tenders are able to visually assess all such situations and take appropriate actions. Lock tenders intend to monitor the new system, and continue documenting the sightings of manatees at the locks. Additional refinements to the sensor system will be made in the future as conditions warrant.

It is important to note that each lock system is opened/closed thousands of times each year. Recognizing the limitations on interpretation of daily "sightings", ACOE has recently recruited a number of volunteers who record information about each manatee observed in the vicinity of the lock. Sketches are made and provided to FMRI, where they are compared with records from a scar catalogue that is used to identify individual manatees by their distinctive scar patterns. In the future, records of these observations may be helpful in preventing manatee injuries at the locks while also providing more information about the cross-Florida movement of manatees.

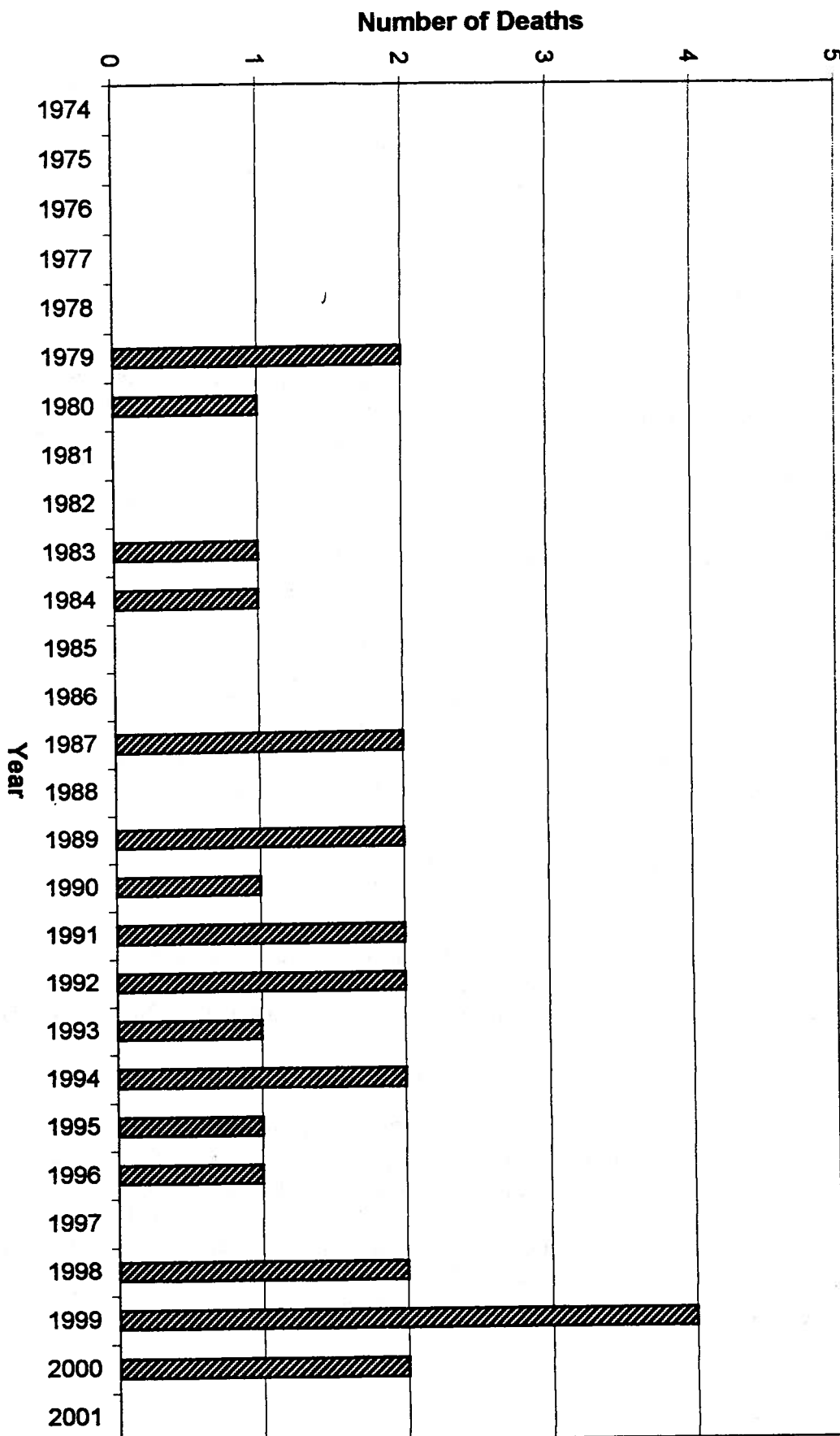


Figure 14. Martin County Floodgate/Lock-Related Manatee Mortality (1974-2001)

### *Aggregating Areas*

The potential for manatee/human interaction is relatively high in those areas where manatees tend to aggregate. Although there are no power plants or other major sources of warm water in Martin County, manatees do sometimes aggregate in certain areas. One example is the North Fork of the St. Lucie River in and around the spillway on C-23. Freshwater entering the estuary through this structure may be an attractant. Additionally, the mixing of fresh and saltwater may create a layering of water masses, one being warmer than the other. During the winter, manatees probably seek out areas that provide even slightly elevated water temperatures. Thermal stratification of the water column typically occurs in deeper areas of the estuary.

In addition to C-23, manatees are regularly observed in a boat basin (Anchor's Aweigh Marina) adjacent to Indian River Drive on the western shore of the IRL between the Jensen Beach and Stuart Causeways. The specific location of this marina is shown on Figure 16 in the marina/boat facilities section. This provides curious onlookers with an opportunity to view the marine mammals up close, and consequently, there is a relatively high potential for manatee/human interaction. The reason why manatees frequently aggregate in the marina is unknown, but may be related to thermal stratification of the water column or freshwater input.

### *Introduced Food and Water*

In estuarine areas, manatees are known to drink from introduced freshwater sources, and are sometimes attracted to hoses purposefully placed over the water. Other well-intentioned but ill-informed people may try to feed them. The extent to which either of these situations is a problem in Martin County is currently unknown.

### *3. Speed Zones and Sanctuary Locations*

Both the State of Florida and the federal government have the authority to designate specific areas where the protection of manatees requires special attention. This section describes existing speed zones, sanctuaries and refuges for manatees in Martin County.

#### *Speed Zones*

Florida Administrative Code Chapter 68C-22.024 identifies the vessel speed zones that have been adopted in Martin County. These speed zones are identified in Figures 2-5. The locations of the speed zones are also graphically illustrated in the Martin County BFSP (Martin County, 2001; updated 2002) and a 12-page pamphlet entitled Martin County Boating Safety and Manatee Protection Zones published in April 2000 and available from FIND and the Martin County Tax Collector. Speed zones currently provide protection for manatees within many local waterways of Martin County.

### *Idle Speed/No Wake*

For law enforcement purposes, a vessel that is operating at idle speed is proceeding at the minimum speed that will maintain the steerageway of the vessel. The only areas in Martin County that are designated as Idle Speed Zones are Manatee Pocket and Manatee Creek at the south end of the pocket.

### *Slow Speed*

For law enforcement purposes, a vessel that is operating at slow speed is completely off plane, has settled into the water and is proceeding without wake or with minimum wake. Slow speed also means no speed greater than that which is reasonable and prudent to avoid either intentional or negligently annoying, molesting, harassing, disturbing, colliding with, injuring or harming manatees and which comports with the duty of all persons to use due care under the circumstances. In general, slow speed zones have been established in Martin County where submerged aquatic vegetation and/or other important manatee habitat are present. For much of the IRL and St. Lucie River, slow speed zones extend 600 feet from shore.

### *25 MPH Maximum Speed*

For law enforcement purposes, a vessel that is operating at a maximum speed of 25 mph and is not operating at an unsafe speed for the specific waterway conditions, does not have an elevated bow which restricts visibility and is not producing an excessive wake which unreasonably or unnecessarily endangers their vessels or natural resources of the state. In Martin County, the 25 mph maximum speed is applicable to portions of the South Fork of the St. Lucie River and the IRL/ICW between the St. Lucie and Jupiter Inlets. This includes the Crossroads area

### *Sanctuaries and Refuges*

The Florida Manatee Sanctuary Act (Chapter 370.12(2)(b), FS) declares Florida as a refuge and sanctuary for the manatee. In addition to this general declaration, both the federal and state governments have the authority to designate specific areas as refuges and sanctuaries. Criteria used to consider such designations include the extent to which a candidate site provides significant habitat for foraging, refuge during winter cold periods, seclusion for calving, nursing, mating and resting, and/or safe travel corridors to or from these areas.

As defined by the USFWS, a manatee sanctuary is an area where all waterborne activities are prohibited, whereas the state's designation does not preclude entry by swimmers or non-motorized vessels. Often these are areas where manatees aggregate, such as warm water discharges from power plants. The USFWS defines a manatee refuge as an area where some waterborne activities may be allowed, subject to site-specific restrictions as are necessary to protect manatees.

There are currently no designated manatee sanctuaries, refuges, vessel prohibited areas or winter aggregation sites in Martin County. However, the State of Florida is considering sites in Florida that have been suggested as potential new sanctuaries or refuges. Sites that may be added include locations that serve as secondary or temporary thermal refuges, where manatees are harassed, and locations where bathymetric conditions (i.e., deep-water areas) keep water temperatures slightly warmer than shallow exposed areas during cold periods. These areas may include dredged marina basins, canals and spillway structures. No new manatee sanctuaries in Martin County have been proposed by USFWS or FWC at this time.

#### ***4. Law Enforcement Activities***

Six local, state and federal law enforcement entities provide enforcement personnel for manatee-related regulations in Martin County. These entities include:

- Martin County Sheriff's Department;
- Town of Jupiter Island Police Department;
- City of Stuart Police Department;
- FWC Division of Law Enforcement (formerly Florida Marine Patrol);
- US Fish and Wildlife Service, and
- US Coast Guard.

A questionnaire was developed and sent to each law enforcement agency with water-related responsibilities in Martin County. Each agency was asked to describe the number of officers assigned to manatee duty, the areas patrolled, the number of hours spent on the water each week, and the relative amount of time spent enforcing speed zone regulations. The information provided below is derived from responses to those questionnaires.

The Martin County Sheriff's Office (MCSO) has the most visible presence on Martin County's waterways. Four or five full-time officers are responsible for patrolling the county's waterways from Lake Okeechobee to three miles offshore in the Atlantic Ocean. Among other things, MCSO responsibilities include responding to boating accidents, surveillance for drug smuggling, and enforcement of vessel speed zone restrictions. Usually only one boat is on the water at any given time, but collectively MCSO officers spend in excess of 40 hours per week patrolling all Martin County waterways. Officers are generally on the water from 8:00 AM to midnight.

The only municipal police force that has a regular presence on the water is the Town of Jupiter Island. The Town has one full-time marine officer that patrols the Atlantic Ocean and the IRL from St. Lucie Inlet to Jupiter Inlet 24 to 40 hours per week. The City of Stuart recently acquired a patrol vessel and is in the process of training officers for boating duty. However, their on-the-water presence is currently limited to responding to emergencies.

The FWC Division of Law Enforcement personnel that are based in Northern Palm Beach County are responsible for patrolling several southeast Florida counties. The two officers currently assigned to Martin County, collectively spend 24-40 hours on the water each week. Although they patrol all county waterways, the majority of their effort is focused on the IRL and Atlantic Ocean. In mid-2001, several additional enforcement positions were approved for the portion of southeast Florida that includes Martin County. As the FWC Division of Law Enforcement is undergoing an internal re-organization, the number of officers that will patrol Martin County waters and the time they will spend on the water in Martin County is currently unknown.

The US Coast Guard (USCG) is responsible for enforcing federal laws on the ICW and Atlantic Ocean along the eastern seaboard of the United States. Martin County waters lie within the jurisdictions of two different regional offices, with the St. Lucie Inlet being the dividing boundary. Five-to-ten full-time personnel based in Ft. Pierce, in neighboring St. Lucie County are responsible for the area from the St. Lucie Inlet north. They also regularly patrol the Okeechobee Waterway. Three personnel based at Lake Worth in Palm Beach County are responsible for the Atlantic Ocean and the ICW from the St. Lucie Inlet south. Patrol craft from each of the USCG regional offices typically spend 1 to 8 hours per week on Martin County waterways.

USFWS enforcement personnel are based in Miami-Dade County and are responsible for enforcement of federal marine laws from Miami north to Merritt Island in Brevard County. Their presence in Martin County waters is limited, on average spending less than 8 hours per week on local waterways.

Although the cumulative effort of the six different agencies identified above provides law enforcement presence on all Martin County waterways, the majority of enforcement effort is focused on the waterways that are used most heavily by boaters, including the IRL, ICW and Okeechobee Waterway. With respect to manatee regulations, both the USCG and USFWS spend in excess of 50% of their time on the water in Martin County enforcing speed zone restrictions. Typically, both of these federal agencies issue fines of \$500.00 for observed violations. However, the maximum penalty is six months in jail and/or \$5,000. During the last four months of 2000, the USFWS issued 17 citations for speed zone infractions.

The FWC usually dedicates 10 to 25% of their time on Martin County waterways to enforcement of speed zone restrictions. In 2000, they issued 58 citations, all of which carry a maximum penalty of \$50.

The MCSO spends the most time of any agency on county waterways, but because of other enforcement responsibilities, a much smaller percentage of their time (10 to 25%) is spent enforcing speed zone regulations. As for state officers, the maximum penalty that can be levied for a speed zone infraction is \$50.

Enforcement of vessel speed restrictions is a medium priority for the Town of Jupiter Island. During 2000, 52 citations and 39 warnings were issued for speed zone violations. The maximum penalty for a speed zone violation is \$50.

Although some of the agencies patrolling Martin County waterways have unmarked patrol craft, they rarely use them when enforcing speed zone regulations. However, enforcement personnel have reported that there is typically increased compliance when marked patrol vessels are in the area, indicating that unmarked patrol craft might provide a better means of apprehending violators. Enforcement personnel recommend that compliance with manatee protection regulations by the public could be enhanced through a combination of several initiatives, the most important of which are:

- increasing the number of patrol units on the water and increasing the number of hours dedicated to enforcing speed zone regulations;
- increasing public awareness of manatees and vessel speed zone regulations;
- developing better methods for marking speed zones;
- developing and implementing a method to identify repeat violators and creating procedures to decrease repetitive noncompliance ; and
- removing the 21 year age cap on mandatory boating education.

### **C. Local Land Development**

This section identifies the local Land Development Regulations (LDRs) and elements of the Martin County CGMP that affect the protection of manatees and/or their habitat in Martin County. While the municipalities located in Martin County all have Comprehensive Plans, the coordination between the county and municipalities needed to ensure consistency in implementation of the MPP is addressed elsewhere in this document (see Appendix D).

#### ***1. Development Standards***

Activities that affect the shoreline, submerged lands, and open-water manatee habitat have the potential to impact manatees. Dredge/fill and shoreline stabilization activities may directly or indirectly affect the abundance, distribution, quantity and quality of food resources available for manatees and may lead to an overall degradation of habitat. Alteration of the shoreline and adjacent upland areas often destroys or reduces the natural function of wetlands and adjacent buffer areas. Replacement of mangroves and herbaceous shoreline vegetation with vertical bulkheads, shoreline armoring and/or piers, docks and marina facilities may affect a variety of natural coastal processes and may result in the loss of seagrasses and other submerged aquatic vegetation that provide foraging habitat for manatees.

Several federal, state and/or local regulatory/permitting programs currently provide protection for these sensitive natural resources. For example, property owners must obtain approvals from the ACOE for projects within Waters of the United States, which include all areas of manatee habitat in Martin County. Additionally, the State of Florida requires that approvals be obtained from the FDEP or SFWMD for projects that affect Waters of the State, which includes all areas of manatee habitat in Martin County.

Additionally, most of the IRL in Martin County, the North and Northwest Forks of the Loxahatchee River, and the North Fork of the St. Lucie River are all within state-designated boundaries of Aquatic Preserves. This designation provides an additional level of protection for these areas, often requiring approval from the governor and Cabinet prior to conducting dredge/fill projects.

At the local level, Martin County has developed and adopted a number of Land Development Regulations that relate in whole or part to the protection of manatees and/or their habitat. These include:

- Article 4.1 Wetlands Protection;
- Article 4.3 Mangrove Protection,
- Article 4.4 Barrier Islands and Sea Turtle Protection; and
- Article 4.9 Stormwater and Flood Control.

## ***2. Comprehensive Growth Management Plan***

Martin County's CGMP has been amended and modified on numerous occasions since its initial development and adoption in 1982. Two elements of the CGMP include information pertinent to the protection of manatees and their habitat:

- Chapter 8 - Coastal Management Element;
- Chapter 9 - Conservation and Open Space Element.

### *Chapter 8 – Coastal Management Element*

The Coastal Management Element of Martin County's CGMP was initially adopted on February 20, 1990. It has been amended on several occasions, most recently on December 5, 2000. The information that follows is based on a review of the current version of Chapter 8.

Section 8.4 of the Coastal Element describes the different coastal areas of Martin County, suggests future coastal needs and identifies pertinent goals, objectives and policies. Goal A of this Section describes coastal natural resources. Specific objectives and policies related to manatee protection include

Objective 2: Wildlife, Fish and Habitat:

- § Policy h: Manatee Protection Measures; and
- § Policy i: Other Manatee Protective Measures

Pursuant to Goal A, Objective 2, Policy h, Manatee Protection Measures, existing and new marina and boat ramp operators (public and private) are required to undertake the following manatee protection measures in areas where manatees occur:



- coordinate with FWC to implement and maintain a manatee public awareness program that includes the posting of signs to advise boat users that manatees are an endangered species that frequently use the waters of the IRL; additionally, manatee literature must be provided at conspicuous locations;
- declare the waters in and around the marina and/or boat ramp as a no wake or idle speed zone; and
- ensure that prospective renters, lessees or owners of slips are aware that if they are found in violation of marine laws which are intended to protect manatees, they may be prohibited from using the facility thereafter.

Pursuant to Goal A, Objective 2, Policy i, Other Manatee Protective Measures, the county will continue to investigate with the FWC provisions relating to vessel control and water safety programs that provide protection for manatees.

Other Goals, Objectives and Policies in Martin County's CGMP Chapter 8 that relate to the protection of manatees and/or their habitat are identified in Appendix C. These include habitat protection, which is an important component of the USFWS Manatee Recovery Plan.

### *Chapter 9 – Conservation and Open Space Element*

The Conservation and Open Space Element of Martin County's CGMP was initially adopted on February 20, 1990. It has been amended on several occasions, most recently on December 5, 2000. The information that follows is based on a review of the current version of Chapter 9.

Chapter 9 of Martin County's CGMP includes an inventory of publicly owned lands in Martin County, including those owned by the county, SFWMD, the State of Florida, and the federal government. Figure 15 shows the locations of lands that are currently in public ownership and those that have been proposed for acquisition. Many of these tracts have been purchased with funds generated by one or more voter-approved referenda specifically dedicated to the acquisition of lands for conservation and/or recreation purposes. It also includes major privately-owned parcels that are in permanent preservation. A number of these tracts are waterfront properties where shoreline features are substantially natural.

Section 9.4 of the Conservation and Open Space Element identifies a variety of goals, objectives and policies related to open space. Specific objectives and policies relating to protection of manatees include:

#### Objective 9 – Wildlife, Fish and Habitat:

- § Policy h: Manatee Protection Measures,
- § Policy i: Other Manatee Protective Measures.

# FIGURE 15

Pursuant to Objective 9, Policies h, Manatee Protection Measures, and i, Other Manatee Protective Measures, existing and new marina and boat ramp operators are required to implement the same protective measures for manatees as identified under Objective 2, Policies h and i under the Coastal Management Element of the CGMP.

Other Goals, Objectives and Policies in Martin County's CGMP Chapter 9 that relate to the protection of manatees and/or their habitat (e.g., water quality) are identified in Appendix C. These include habitat protection, which is an important component of the USFWS Manatee Recovery Plan.

### ***3. Marina/Boat Facilities***

The TCRPC conducted an inventory of existing boating facilities during preparation of Martin County's BFSP (Martin County, 2001, updated March, 2002). Four sources were used to develop the inventory:

- the Martin County CGMP (1990),
- A Boater's Guide prepared by the IRL National Estuary Program (IRLNEP, 1994),
- The Boating Activity Study (BAS) prepared by Schultz (1996); and
- a cursory field survey conducted in July 2000 by TCRPC.

The inventory identified 58 boat facilities, including 49 commercial and private marinas and facilities offering boat services and 9 public boat ramps (Figures 16-19). Most of the boat facilities in Martin County are concentrated in the following general locations:

- along the west shore of the IRL near Jensen Beach;
- on the St. Lucie River near downtown Stuart and the Roosevelt Bridge;
- along Manatee Pocket in Port Salerno; and
- along the west shore of the IRL in southern Martin County, just north of the Martin/Palm Beach County Line.

The concentrations of boat facilities in Jensen Beach, Port Salerno and the City of Stuart are in areas where commercial fishing villages were historically based. There is only one commercial marina on C-44, a ± 45-wet-slip facility located on the north side of the canal approximately nine miles east of Lake Okeechobee.

The most detailed information about the capacity of marinas is contained in the BAS by Schultz (1996). Based on an analysis of 28 marinas, the total capacity of wet berths in Martin County was estimated at 1,018 slips, and the total capacity of dry storage spaces was 1,515. However, these numbers represent only a sampling of the facilities in the county. Information on the county-wide capacity is incomplete because not all boat facilities cooperated with the survey. In addition, these numbers do not provide the number of boats stored at private residences, either on a trailer or at a dock.

#### ***4. Boat Ramps***

The BAS identified 9 public and one private boat ramps in Martin County (Figures 16-19), however there is recognition that this is not a complete listing of all private ramps. The ramps at Sandspruit Park, Jensen Beach Causeway Park, and Stuart Causeway Park (formerly Jaycee Park) were the busiest ramps in the county. The ramp identified as the Hobe Sound Public Ramp in the BAS has been replaced by a new facility several miles to the north. The new boat ramp is located at Jimmy Graham Park on the west side of the ICW along Gomez Road in Hobe Sound. Many of the boat ramps and associated parking have been improved since the BAS was prepared in 1996.

A high proportion of the boat trips originating in Martin County are from its boat ramps. The boating activity study found that the majority of boats using the boat ramps were powerboats, which have the greatest potential for impacting manatees. Martin County has public boat ramps located throughout the study area (Figures 16-19) that provide reasonable access to all of the major water bodies. Most of the boat ramps have been improved recently and are in good repair. The main problem with using the ramps is the lack of adequate parking at some locations on weekends and holidays.

#### ***5. Residential Dock Facilities***

The most comprehensive inventory of docks present in Martin County was conducted as part of the BAS. The BAS reported that surveys conducted between October 1995 and May 1996 documented the presence of 3,268 docks exclusive of marinas. Because the inventory included docks in the ICW in Palm Beach County between the Jupiter Inlet and the Martin County/Palm Beach County line, the actual number of docks in Martin County would have been slightly lower than the 3,268 recorded. Approximately 2,000 boats were moored at these docks at the time of the surveys.

Current land development regulations for unincorporated areas of the county allow one dock per single-family residential lot with existing water frontage. State and federal permitting agencies also have criteria for authorizing docks constructed over navigable waters. These permits set standards for dock design (e.g., length, width, height above the water, etc.) based on the water depths, water body classification, and the presence or absence of sensitive submerged resources at the site. The number of slips allowed at multifamily residential sites under current permitting rules is based upon the amount of water frontage, physical space limitation, water depths, and environmental resources at the site.

# FIGURE 16

# FIGURE 17

# FIGURE 18

# FIGURE 19



## **D. Education and Awareness**

Educational information on manatees is available from a variety of public and private sources. Existing sources of information, materials and public awareness programs are presented in this section.

### ***1. Florida Department of Environmental Protection***

The FDEP is one of two state agencies primarily responsible for dissemination of environmental information. Within FDEP, the state park system provides a variety of materials describing the state's flora and fauna. Additionally, in coordination with the state's five Water Management Districts, FDEP administers the Environmental Resources Permitting Program. This program incorporates site-specific environmental resource information, including manatee data, into its permitting decisions regarding activities potentially affecting Waters of the State.

Prior to a major reorganization of state agencies in July 1999, the majority of regulatory and public awareness activities regarding manatees in Florida were conducted by FDEP. However, the reorganization involved the transfer of most manatee-related activities to FWC.

In 2000, the FDEP Southeast District, which includes Martin County, was awarded a grant by FWC's Advisory Council on Environmental Education. The grant was used in 2001 to educate resident and visiting boaters and anglers about the importance of coastal estuarine systems. The program focused on seagrass habitats as they relate to the survival of manatees and encouraged responsible watercraft operation thereby reducing the potential for watercraft-related manatee mortality. Additional information can be obtained by calling (561) 681-6600.

In 1999, the FDEP began the "Clean Marina" program to educate marinas about keeping Florida waters clean. To qualify as a "Clean Marina," the facility must not only meet all environmental regulations, but take extra steps that demonstrate additional compliance. Each year the marina is asked to conduct a self audit to insure compliance. Several marinas in Martin County are being considered for the program.

### ***2. Florida Fish and Wildlife Conservation Commission***

Upon reorganization of the State of Florida's environmental agencies in 1999, activities concerning manatees were transferred from FDEP to FWC. The primary FWC agencies involved with manatees are the FMRI and the Bureau of Protected Species Management (BPSM). Although scientific information (e.g., mortality statistics) is compiled by FMRI, the majority of FWC's educational materials are made available through BPSM. These materials include a variety of posters, brochures, booklets and videos (Table 8). BPSM staff also participate in a variety of outreach events and train boater and citizen volunteer auxiliary patrols throughout the state. They are also involved in many manatee

protection plan education activities and are partners on several manatee-related grant projects, such as the development of this MPP. Additional information can be obtained by calling (850) 922-4330.

### ***3. Florida Power & Light Company***

Florida Power & Light Company is the state's largest electric utility, and five of FPL's power plants provide important winter refuges for manatees. FPL contributes to manatee research and public awareness by funding aerial surveys for manatees, producing and distributing educational materials and supporting research projects. In 1989, FPL produced an informative educational booklet entitled "The West Indian Manatee in Florida." This publication is available through FPL's Environmental Services Department, P.O. Box 14000, Juno Beach, Florida 33408. Additional information can be obtained by calling (561) 691-7000 or at their web site ([www.fpl.com](http://www.fpl.com))

FPL operates a Manatee Observation Center at its Riviera Power Plant located in Palm Beach County where visitors can observe manatees up close in an unobtrusive manner. This facility is open to the public free of charge from 8 AM to 3 PM from January 2 through February 28. A brochure which describes manatee presence at the power plant, and which includes directions and a map to the facility, can be obtained in advance of a site visit by calling the number identified above.

### ***4. Save the Manatee Club***

The Save the Manatee Club (SMC) is a non-profit organization based in Maitland, Florida, and is the single largest organization in the United States dedicated solely to the protection of manatees. SMC has developed a variety of public educational materials, and provides a variety of information on its website. Materials available through SMC include.

- Manatees – An Educator's Guide (5th Edition);
- Manatees: A Coloring and Activity Book;
- Adopt a Manatee Program;
- Manatee Messages: What You Can Do (video);
- The Best of Manatees (video);
- The Manatee (book);
- Manatees and Dugongs (book);
- Sam the Sea Cow (book for young readers);
- J. Rooker Manatee (book for youths age 3-12);
- Mary Manatee: A Tale of Sea Cows.

SMC also offers speakers for community and organization presentations and display booths for community events. Additional information can be obtained by calling (800) 432-5646.

**Table 8**

**Partial List of Manatee Information Available Through FWC's  
Bureau of Protected Species Management**

Videos	Swamp Surgeons – National Geographic TV	
	Exploring Florida: Tracking Manatee	
	General Rescue Guidance for Small Manatees	
	Manatee Awareness, Airship Science Flight, and Animal Rescue Feature	
	Manatee Messages: What You Can Do!	
	Manatees: Preserving the Legacy	
	Gentle Giants of the Waterways	
	Roll on Manatee	
	Silent Sirens	
	The Best of Manatees	
	What in the World is a Manatee?	
	Posters	Manatee Behavior
		Mini-Poster: The Florida Manatee
Miss Her Now, Miss Her Forever		
Sirenians of the World		
Brochures	Manatee Decal Collection	
	Miss Her Now, Miss Her Forever	
	The West Indian Manatee in Florida	
	Tips for Protecting Manatees in Florida	
	Where are the Manatees?	
Fact Sheets	Attention: Swimmers, Boaters and Divers	
	Commonly asked Questions about Manatees	
	Manatee Antillano Fact sheet	
	Manatee Fact Sheet	
	Manatee License Plate Fact Sheet	
	Marine Mammal Regulations	
	Mind Your Waterway Signs	
	Manatee Sea Stats	
Coloring/Activity Books	Manatees Florida's Gentle Giant (Elementary Level)	
	The Florida Manatee (Middle School/High School Workbook)	
Educational Guides	Ecoventures - Learning in Florida's Environment	
	Manatees: A Guide for Boating, Diving & Snorkeling	
	Manatees An Educator's Guide	
	Information on the Advisory Committee on Environmental Education	
	The Manatee, Florida's Endangered Marine Mammal; Student Activity Workbook for Middle and High School Students	
	Propeller Guard Issues	
	Recommendations to Improve Boating Safety & Manatee Protection for Florida's Waterways	
	Why Manatees are Important: A Scientist's Perspective	
Newsletter	Manatee News Quarterly	

## ***5. Local Conservation Organizations and Educational Initiatives***

### *Martin County School System*

Educational information concerning manatees is provided at varying levels in the Martin County School System. Although there is no established curriculum, individual educators at the elementary, middle school and high school levels have acquired materials to assist them in offering their students information about manatees

During their elementary school years, all students enrolled in Martin County schools attend programs at the Environmental Studies Center (ESC) in Jensen Beach. Depending on their age/class, students typically spend at least one week each year at ESC, where they become involved with hands-on marine science activities. Educational materials concerning manatees are provided specifically to first graders during their time at ESC. Older children are taken on excursions in the IRL, where information on manatees is provided as the opportunity arises. Additional information can be obtained by calling (561) 219-1887.

### *Florida Oceanographic Society*

The Florida Oceanographic Society (FOS) is a non-profit organization based in Martin County dedicated to the protection of marine and coastal resources. FOS operates the Coastal Science Center on Hutchinson Island, a facility that includes marine life touch tanks, interactive displays, and educational exhibits. Tours of the facility and surrounding natural plant communities are available to the public.

FOS features manatees in some of their educational materials and programs. These materials are provided to interested individuals and tour groups. FOS also holds a winter-season program series for adults. Guest speakers provide presentations on various pertinent topics, including manatees. Additional information can be obtained by calling (561) 225-0505.

### *Hobe Sound Nature Center*

The Hobe Sound Nature Center (HSNC) is a non-profit organization located at the Hobe Sound National Wildlife Refuge on US Highway 1 in southern Martin County. HSNC offers a winter-season program series for adults, where guest speakers provide presentations on various environmental topics, including manatees. HSNC also provides a series of youth summer camps. Individuals attending the camps are provided information on manatees and other relevant topics. HSNC also has a small museum that includes manatee artifacts. Additional information can be obtained by calling (561) 546-2067.

### *Martin County Tax Collector's Office*

All motorized watercraft owned by Martin County residents must be registered annually with the Martin County Tax Collector's Office. Information concerning manatees and manatee habitat, including booklets that describe vessel speed restriction zones in Martin County are available at the Tax Collector's Office.

Florida law requires that individuals born after September 30, 1980 must complete a boater education course or competency exam prior to operating a vessel powered by a motor of 10 horsepower or more. The course and exam are approved by the National Association of State Boating Law Administrators. A booklet entitled "How to Boat Smart," sponsored by FWC, provides information concerning manatees and includes the information needed to successfully complete the required exam. Information concerning this program is available at the Martin County Tax Collector's Office. Additional information can be obtained by calling (561) 288-5595.

### *Marine Industries Association of the Treasure Coast*

The Marina Industries Association (MIA) of the Treasure Coast, Inc., an association of retailers selling marine products, is involved in marine issues in Martin County. The MIA provides a legislative and lobbying voice on manatee issues. They can be reached at (561) 283-3999.

### *Safe Boating Courses*

Safe boating courses are available through several organizations in Martin County, including:

- United States Power Squadron, Martin County Chapter – classes are given twice per year and are open to individuals of all ages;
- United States Coast Guard Auxiliary, Martin County Chapter; and
- Chapman School of Seamanship – classes are given throughout the year and are open to individuals of all ages.

The degree of information about manatees that is presented in these classes varies. Additional information can be obtained by calling: US Power Squadron (888) 367-8777; US Coast Guard Auxiliary (800) 336-BOAT; Chapman School of Seamanship (561) 283-8130.

## ***6. Regional, State and Federal Organizations***

Information concerning manatees is also available from a variety of other sources. Some of these entities have interactive and static exhibits and/or educational programs that could be incorporated into curricula used by environmental educators in Martin County.

### *United States Fish and Wildlife Service (USFWS)*

USFWS is the primary federal agency involved in the conservation of the nation's wildlife. The Service operates the National Wildlife Refuge System, which includes the Hobe Sound National Wildlife Refuge in Martin County. USFWS is also responsible for enforcing the Endangered Species Act, which covers the manatee. Additional information can be obtained by calling (561) 546-1641.

### *US Geological Survey (USGS)*

The USGS Sirenia Project is based in Gainesville, Florida and conducts field research on manatees. Additional information can be obtained by calling (352) 372-2571.

### *US Army Corps of Engineers (ACOE)*

The ACOE is the federal agency responsible for reviewing and issuing permits for projects in the nation's rivers, lakes, harbors, navigation channels and wetlands. Although their primary responsibility is permitting, information about manatees is available through the ACOE's Public Affairs Office, P.O. Box 4970, Jacksonville, Florida 32232, (904) 232-1650.

### *South Florida Water Management District (SFWMD)*

SFWMD is one of five water management districts in Florida. Together with the FDEP, the water management districts share in the responsibility for reviewing and issuing permits for projects in waters and wetlands of the state. They are also responsible for implementing the state's SWIM Program. In south Florida, the SFWMD maps seagrasses in the IRL and owns and manages a number of water control structures that affect water quality in Martin County waterways. SFWMD publishes and distributes a variety of brochures and environmental education information from their District headquarters located at 3301 Gun Club Road, West Palm Beach, Florida 33416-4680, (561) 686-8800.

### *Florida Inland Navigation District (FIND)*

FIND is responsible for maintaining the east coast ICW and Okeechobee Waterway for navigation. Additionally, FIND installs and maintains the signs that identify the boundaries of manatee-related vessel speed restriction zones. FIND, which is based in Jupiter, Florida, publishes a brochure concerning manatee protection when using navigation locks, and also prints and distributes the pamphlets that identify speed zones in Martin County and other counties on the east coast of Florida. These brochures are available by contacting FIND, 1314 Marcinski Road, Jupiter, Florida 33477, (561) 627-3386.

### *Homosassa Springs State Wildlife Park*

This FDEP facility located north of Tampa near Florida's west coast houses a captive manatee maintenance and research facility. The public may view manatees from an

underwater viewing area and obtain a variety of information about manatees. Further information can be obtained from Homosassa Springs State Wildlife Park, 9925 W Fishbowl Dr., Homosassa Springs, Florida 33408, (850) 628-5343

#### *Sea World of Florida*

Sea World of Florida is one of several state-approved facilities that provides care and rehabilitation of sick and injured manatees in Florida. They maintain a large exhibit, where manatees can be observed. The exhibit includes informational videos and signs. Manatee education information is available from Sea World of Florida, 7007 Sea World Drive, Orlando, Florida 32809, (407) 351-3600.

#### *Audubon of Florida*

Audubon of Florida is a statewide alliance of over 40 local Audubon chapters and the National Audubon Society. Audubon is a recognized leader in natural resource protection and provides information on a variety of conservation issues. Additional information is available from Audubon of Florida, 1331 Palmetto Ave., Winter Park, Florida 32789, (407) 539-5700

#### *Miami Seaquarium*

The Miami Seaquarium is another state-approved manatee care and rehabilitation facility and has a variety of on-going manatee education and research programs. Captive manatees can be viewed by visitors, and educational materials and presentations are given about manatees. Additional information is available from Miami Seaquarium, 4400 Rickenbacker Causeway, Miami, Florida 33149, (305) 361-5705.

#### *Harbor Branch Oceanographic Institution (HBOI)*

Based on the IRL near Fort Pierce, HBOI is a marine research facility where scientists provide important information on marine mammals through research and public information. HBOI is open to visitors and offers a lecture series during which featured speakers present information on their various research projects. Additional information can be obtained from Harbor Branch Oceanographic Institution, RRI Box 196, Ft. Pierce, Florida 33450, (561) 465-2400

#### *Ft. Pierce Manatee Observation and Education Center*

Located at Moore's Creek on Indian River Drive near the Fort Pierce Utilities Authority power plant, this facility provides information about manatees through a cooperative effort of a variety of governmental agencies, local businesses and concerned citizens. It is open to the public Tuesday through Sunday from October 3 through June 30 every year. Manatees are often observed in the warm-water discharges from the power plant. Additional information can be obtained from the Ft. Pierce Manatee Observation and Education Center, 480 North Indian River Drive, Fort Pierce, Florida 34954, (561) 466-1600, Extension 3333.

### *Lowry Park Zoo*

Located in Tampa in Hillsborough County, Lowry Park Zoo is another state-approved manatee rehabilitation facility offering year-round care and public viewing of manatees. Additional information can be obtained from Lowry Park Zoo, 7530 N. Blvd., Tampa, Florida 33604, (813) 935-8552.

## **E. Governmental Coordination**

Governmental coordination concerning manatees consists of two inter-related components: coordination during the review of applications for proposed boating facilities and long-range planning that will allow future development to take place in a manner that ensures adequate protection for manatees. Both of these topics are discussed in this section.

There are four municipal governments within Martin County: The City of Stuart, the Town of Sewall's Point, The Town of Jupiter Island, and the Town of Ocean Breeze Park (Figure 1). There has been no attempt to obtain, review and analyze mechanisms by which those municipalities regulate activities potentially affecting manatees. However, all boat docks, marinas and similar facilities must be permitted through the state and federal agencies identified elsewhere in this document. Those agencies will recommend approval or denial of municipal permit applications, in part, on their consistency with manatee protection standards contained in this MPP and the BFSP.

### ***1. Permit Procedures and Development Review***

Currently, waterfront projects that involve new construction or renovation of existing facilities are regulated through a myriad of federal, state, regional and local regulations. While each level of government has adopted its own review criteria and permitting standards, prior to construction (unless otherwise meeting exemption criteria) a proposed project typically must receive multiple approvals and meet the most stringent of all applicable review criteria.

At the federal level, the ACOE is the lead agency in reviewing and permitting most waterfront development/construction projects. Depending on various project thresholds (e.g., number of slips, shoreline frontage, surface area over water, presence/absence of submerged resources, etc.), projects may also undergo review by the USFWS for potential impacts to federally-designated endangered and threatened species, including manatees. Depending on project thresholds, copies of permit applications and/or Public Notice summaries of projects may be transmitted to Martin County for review and comment.

At the regional and state level, FDEP and SFWMD share responsibilities in reviewing and permitting waterfront development/construction projects. Depending on various project thresholds, projects may also undergo review by the FWC for potential impacts to



state-designated endangered and threatened species, including manatees. Depending on project thresholds, copies of permit applications and/or Public Notice summaries of projects may be transmitted to Martin County for review and comment.

In addition to these federal and state permitting processes, most waterfront development/construction projects also require that Martin County (or the applicable municipality) review the proposed development and issue the necessary permits/approvals prior to construction. Review within Martin County may involve staff from a variety of Departments, including the Growth Management Department, which is responsible for determining if the project complies with Martin County's CGMP and applicable LDRs and Ordinances. Depending on the magnitude of the proposed project, approvals may be required at one or more of the following levels: Development Review Committee, Local Planning and Zoning Committee, and BCC. If Martin County determines that a proposed project does not meet the applicable CGMP elements or LDRs, the project may be denied or returned to the applicant for revisions.

## ***2. Programs and Future Planned Boat Ramps Projects***

In June 2001, Martin County adopted a BFSP (Martin County, 2001; updated March 2002). The BFSP establishes policies for the construction of new and expansion of existing boating facilities, including those at multi-family residences, marinas and boat ramps, to reduce boating-related interactions with manatees. It also designates preferred, conditional, and non-preferred locations for these facilities.

## MANATEE PROTECTION PLAN IMPLEMENTATION

In this section, the results of analyses of existing conditions are used to develop and describe a comprehensive program to protect manatees and their habitat in Martin County. The goal of this MPP is to protect manatees and their habitat and to reduce manatee mortalities in Martin County to a level that will allow the USFWS to reclassify the county's manatee designation from high risk to medium or low risk. An integral component of the MPP will be the establishment of a Manatee Protection Advisory Committee (MPAC). The MPAC will be led by county staff and consist of an advisory group with nine members. The make up of the committee will be: two citizens, a boat owner, a coastal land owner, a marine business owner, a representative from each of the following: the MIA, SMC, FWC, and an environmental consulting firm. The goal of MPAC will be to ensure the long-term protection of manatees and their habitat in Martin County. The committee's primary responsibilities will be to review the county's progress in implementing the policies of this plan and the BFSP, determine the effectiveness of those policies, evaluate new information as it becomes available, and make recommendations for amending the plan as conditions warrant.

### A. Habitat Protection

This Section identifies and describes recommendations for initiatives that will maintain, enhance, and restore manatee habitat in Martin County.

#### 1. Foraging Habitat

Analyses of manatee sighting records indicate that manatees occur throughout Martin County's non-landlocked waterways. Extensive seagrass beds are found in the IRL. Although not documented, it is suspected that valuable foraging resources also occur within the St. Lucie and Loxahatchee Estuaries, Lake Okeechobee, and the freshwater canals and tributaries that feed these systems.

##### *The Indian River Lagoon*

Submerged aquatic vegetation (SAV) in the IRL is likely the most important foraging habitat for manatees in Martin County. However, grassbed mapping efforts between 1986 and 1999 have revealed a significant reduction in this resource. Although some of this decline may be attributed to direct physical impacts associated with dredge/fill projects, dock construction, and boat scarring, the major contributing factor is deteriorating water quality (IRLNEP, 1996). Designation of the IRL as an Estuary of National Significance, and the establishment of IRLNEP resulted in the development of the Comprehensive Conservation Master Plan (CCMP). That plan recommends that a number of projects be designed and implemented by various federal, state and local governments to improve water quality in the IRL. However, implementation of plan recommendations is not mandatory.

In August 2000, five years after the development of the CCMP, an analysis was performed by Audubon of Florida under contract to IRLNEP to determine the extent to which progress had been made in implementing the plan. That analysis concluded that Martin County and the local municipalities that front the IRL in Martin County have made some progress in implementing CCMP recommendations. However, in order to reverse the continuing trend of decreasing SAV cover, additional aggressive steps are necessary. Toward this end, Martin County will utilize seagrass cover as an indicator of the ecological health of the IRL, and will continue to implement water quality improvement projects identified in the CCMP.

In addition to seagrasses, manatees are also known to forage on overhanging and emergent shoreline vegetation, and in the IRL, mangroves and other wetland plants may be an important food resource. Although the State of Florida and Martin County have existing regulations that protect mangroves and wetland vegetation, waterfront development continues to reduce the extent of these resources, and by extension, the foraging potential for manatees. For example, shoreline armoring is allowed under existing federal, state and local regulations, and although replacement of natural shoreline vegetation with armoring (i.e., seawalls, bulkheads) at individual project sites is likely minimal, cumulative effects could be substantial. However, in the absence of baseline data, the extent to which foraging opportunities are being degraded is not known.

In an attempt to minimize the loss of shoreline foraging habitat, Martin County will take the following actions:

- a. continue to enforce existing regulations concerning shoreline development, shoreline armoring, and wetlands protection;
- b. work with State agencies and Martin County Parks and Recreation Department to ensure integrity and protection of conservation lands and its shoreline vegetation;
- c. work with SFWMD and the ACOE through CERP projects to maintain a correct salinity envelope for estuarine areas; and
- d. work with state agencies to minimize cumulative effects on manatee habitat.

#### *St. Lucie and Loxahatchee Estuaries*

Seagrasses are found in the lower reaches of both the St. Lucie and Loxahatchee Estuaries. However, throughout the vast majority of these estuaries, SAV is largely lacking. In its place, mangroves and other emergent shoreline vegetation probably provide considerable foraging opportunities for manatees. Martin County will take the same actions as those identified in The IRL Section (actions a, b, c, and d) to protect foraging habitat in the St. Lucie and Loxahatchee Estuaries.

#### *Inland Areas including Lake Okeechobee and Freshwater Rivers*

Both SAV and emergent shoreline vegetation are present in Lake Okeechobee, but the extent to which these resources are used for foraging by manatees is not known. There is no known SAV in freshwater rivers inhabited by manatees in Martin County. In these areas, it is likely that manatees forage on floating (e.g., water hyacinth) and shoreline vegetation. Martin County will take the same actions as those identified in The IRL

Section (actions a, b, and d) to protect foraging habitat in Lake Okeechobee and freshwater rivers.

## ***2. Freshwater Sources***

Although, in many areas of Florida, freshwater sources (e.g., springs) provide considerable benefit for manatees, there are no such sources in Martin County. However, manatees have been documented to aggregate in the North Fork of the St. Lucie River where discharges from C-23, Bessey Creek and Hidden River all join the North Fork. Additionally, manatees are frequently sighted in the Okeechobee Waterway and Lake Okeechobee, but the extent to which the freshwater in these areas is an attractant is unknown.

Discharges of excess amounts of freshwater from canals and tributaries into the St. Lucie and Loxahatchee Estuaries and IRL have had detrimental effects on water quality, and projects are being designed to reduce the effects of these discharges. Restoring natural hydroperiods by reducing freshwater discharges into the estuaries could potentially reduce the attractiveness of the area to manatees. However, the overall benefits to foraging habitat associated with improved water quality will undoubtedly outweigh any negative effects associated with a reduction in freshwater input.

## ***3. Water Quality and Vegetation***

The most significant water quality problems in manatee habitat in Martin county are the effects associated with discharges of large volumes of freshwater from storm water control projects through man-made conveyances, including the St. Lucie Canal (C-44) and several agricultural canals, including C-23. Section A.2 in the Inventory of Existing Conditions described the widespread effects that alterations to the drainage basins have had on the quality, quantity, timing and delivery of freshwater into the estuaries and the resultant degradation of manatee habitat.

Along with freshwater, a variety of suspended materials and pollutants are transported into Martin County waterways. Section A.2 also identified those waterways that have been classified by the state and federal government as impaired due to poor water quality. Several mechanisms (e.g., CERP, TMDLs, PLRGs) have been developed to reduce pollutant loads to the estuary. It is recognized that it is impossible or infeasible to reverse many of the alterations caused by freshwater imbalances, but there is the potential to reduce the impact of other types of pollutants. Martin County will continue to cooperate with the State of Florida and EPA to comply with Section 303(d) of the CWA to improve the status of impaired waterways and to prevent other waterways from becoming impaired.

Martin County will continue to work with and coordinate with the Indian River Feasibility Task Force, the St. Lucie River Initiative and the Loxahatchee River Management Coordinating Council to improve water quality in Martin County's waterways.

Implementation of the TMDLs, PLRGs and other programs identified elsewhere in this MPP will improve the quality of water in manatee habitat in Martin County. As a result of these programs, SAV should increase, and therefore the foraging habitat for manatees should be enhanced

In addition to its manatee sighting and mapping program, FOS systematically documents and reports on the relative health of Martin County's coastal waterways. Analytical results of several leading water quality indicators are available from FOS for strategic locations in the St. Lucie Estuary and IRL (Appendix A) These data can be used for monitoring changes to the system as new water quality improvement programs are implemented. The FOS volunteer program also serves to increase public awareness of local water quality issues.

Martin County will continue to work cooperatively with the regulatory agencies and community-based groups identified above to implement programs to restore water quality in local waterways. Although it may take time to achieve the desired results, implementation of these initiatives should ultimately result in increases in the spatial distribution, vitality and abundance of SAV. Increases in foraging resources will, in turn, improve the quality of manatee habitat.

#### ***4. Habitat Acquisition Areas – Environmentally Sensitive Lands***

Martin County's current public land acquisition initiatives are focused on projects that will assist in improving water quality in the St. Lucie River and IRL, and these projects will therefore have only secondary effects on manatees. However, one particular project within the Florida Forever program that will directly benefit manatees by protecting valuable shoreline areas is the IRL Blueway Project. This project would use state and local funds to purchase undeveloped waterfront tracts along the IRL for conservation purposes. Martin County will support acquisition of lands included in the Blueway proposal, as appropriate. Additionally, the county will strive to see that land management plans are adopted and implemented in a manner that preserves, protects and enhances the value of these parcels for manatees.

In the recent past, Martin County's existing public land acquisition initiatives have generally been seller-driven (i.e., the property owner or agent has generally offered his/her property to the county for acquisition). Martin County will work with land owners and concerned citizens to identify and prioritize waterfront parcels where public ownership would benefit manatees.

#### ***5. Contaminant and Pollution Exposure***

Through Martin County's compliance with Section 303(d) of the CWA, waterways that are considered impaired or likely to become impaired have been identified, and steps are being developed or implemented to rectify these situations. In these impaired water bodies, poor water quality is a chronic problem. However, throughout the county's

waterways there is also the potential for acute water pollution resulting from catastrophic events (e.g., hurricanes, oil or fuel spills). Through its Sustainable Communities Demonstration program, Martin County has developed and implemented a Hazard Abatement program. As a result of this initiative, the county has developed protective measures to minimize the potentially devastating effects of hurricanes and other disasters.

To reduce the impact to manatees and their habitat from accidental contamination, Martin County will work with FDEP and USCG to ensure that permit applications for the construction of new or expansion of existing marinas where fuel will be stored or sold on site include a Fuel Spill Contingency Plan. Such a plan is currently required as part of the state's Environmental Resources Permitting process. County staff with appropriate qualifications will review these plans as part of the development review process and applicants encouraged to join the "Clean Marina" Program. Approvals will be contingent upon the adequacy of plans in protecting manatees and their habitat.

Martin County shall work with FDEP, the University of Florida's Institute of Food and Agricultural Sciences and other concerned agencies to limit the application of pesticides and herbicides in areas that could potentially impact manatee habitat. These materials shall be used only as recommended on the container. Floating plants that are treated with herbicide may be carried into manatee habitat, may be ingested by manatees and/or their decomposition by-products may result in unacceptable accumulations of organic sediments in local waterways. Consequently, Martin County will work with the SFWMD to explore methods for removing floating vegetation from its waterways rather than treating it with herbicide.

## ***6. Resting, Loafing and Calving Areas***

In general, data suggest that narrow, quiet upstream waters of tidal creeks provide important refuges for manatees, particularly during calving. Section A.3 in the Inventory of Existing Conditions provided the results of manatee mortality and sighting data that have been collected in Martin County over the last several decades. Although manatees have been documented to utilize various canals, creeks and freshwater tributaries in Martin County, there is no indication that any individual sites provide habitat that is particularly significant for resting, loafing or calving. Many of these waterways currently have vessel speed restrictions, and watercraft-related mortalities there have been comparatively low. Furthermore, there is no evidence of significant human/manatee interactions in these areas. Therefore, additional restrictions for the county's tidal creeks do not appear to be warranted at this time.

## **B. Manatee/ Human Interaction**

### ***1. Manatee Protection Advisory Committee***

One of the keys to successfully protecting manatees and their habitat in Martin County will be to establish a dialogue among the various stakeholders affected by the MPP. Heretofore, there has been comparatively little opportunity for thoughtful interaction

among these stakeholders. To address this obstacle, Martin County will establish a program through which human-related manatee mortality will be reviewed and analyzed by an advisory group, or MPAC. The BCC will appoint a MPAC, which will be chaired by a county staff member and will consist of nine members. The make up of the committee will be: two citizens, a boat owner, a coastal land owner, a marine business owner, a representative from each of the following: the MIA, SMC, FWC, and an environmental consulting firm. MPAC will meet on a periodic cycle that begins six months prior to each CGMP Evaluation and Appraisal Report Cycle. MPAC may be convened more frequently if instances of watercraft-related manatee mortality approach threshold limits that would negatively affect the permitting of boat facilities as described in the BFSP. MPAC's primary responsibility will be to assess the progress and success of implementation of this MPP and the BFSP by reviewing and analyzing new manatee and boating data, discussing manatee protection issues, and making recommendations to the county for improving manatee protection in local waterways. MPAC will not be involved in day-to-day marina siting issues.

## ***2. Floodgates/Locks and Manatee Barriers***

Martin County does not own or operate any floodgates or locks. Of the three facilities in Martin County, two (i.e., St. Lucie and Port Mayaca Locks) are owned, operated and maintained by the federal government (i.e., ACOE). The other (S-135) is owned by ACOE, but managed by SFWMD.

Manatee deaths have occurred at all three of the floodgate/lock structures in Martin County. The ACOE-operated structures, which open and close 1,000 to 2,000 times each year, have accounted for 23 deaths. As described in Section B.2 in the Inventory of Existing Conditions, the ACOE is actively working with HBOI to refine and improve a sensor array that will reduce the potential for manatees being killed or injured in its locks. In March 2001, HBOI installed one of these improved array systems at the St. Lucie Lock, where manatee deaths have been most numerous. Monitoring by ACOE personnel will continue and additional refinements made if manatee injuries and mortalities continue at this facility. ACOE anticipates installing an array system at the Port Mayaca Lock, once the prototype (or one of its successors) proves to be effective.

Four manatees have been killed at the S-135 Structure during the 27 years that records of manatee mortalities have been maintained by FWC. At flood control structures throughout their territory, SFWMD is working to minimize impacts on manatees and manatee protection sensors are scheduled to be installed at the S-135 Structure in FY2002-03.

Martin County has little or no control over the design, operation and management of floodgate and locks within the county. Nevertheless, the county will coordinate with regional, state and federal agencies to address manatee mortality issues related to the operation of floodgate and locks and will assist where possible with the development and/or implementation of new protective measures. It is notable that since the implementation of speed zones in Martin County, fully effective in January 1992,

floodgates and lock structures are now the major cause of manatee deaths by humans (Figure 13).

Both Martin County and SFWMD have installed weir-type water management structures across local waterways. In some instances, these structures have had the unanticipated consequence of serving as barriers to manatees, preventing them from reaching otherwise suitable foraging and/or resting habitat. In general, water control structures are designed to reduce the discharge of silts, suspended solids and other materials that could deteriorate downstream water quality and/or to prevent salt-water intrusion. The improved water quality that results from their presence likely benefits manatees and may compensate for limiting their access to upstream resources. Consequently, changes do not appear to be warranted for any of the weirs currently in place. However, the county will consider the potential loss of manatee habitat during the design of future weir and/or stormwater control structures

In other areas of the state, manatees have become trapped in storm drains and culverts, and FWC has recommended that counties consider retrofitting these structures with grates to prevent manatee entrapment. To date, this problem has not been documented in Martin County, and so no retrofitting has been performed. Martin County will consider retrofitting existing structures on a case-by-case basis if problems occur.

### ***3. Site Specific Vessel Speed Restrictions***

Review and analysis of data concerning human-related manatee mortality indicates that the development and implementation of site-specific vessel speed restriction zones has been effective in keeping watercraft-related mortality low in most, but not all, of Martin County's waterways. Successes were noted in the IRL and ICW between the St. Lucie Inlet and the Martin/Palm Beach County line and in the Manatee Pocket. However, in the Crossroads area, at the intersection of the St. Lucie River, IRL, ICW and St. Lucie Inlet, watercraft-related manatee mortalities has continued. The existing vessel speed designation in this area is 25 mph maximum. Martin County will work with FWC to review vessel speed restrictions for this area. Reducing vessel speeds in the congested Crossroads area may also improve boater safety. However, any increased law enforcement activity should not be continually focused on one particular area, but should be focused equally throughout the county where speed zones apply.

Additionally, because the MCSO is the primary law enforcement agency providing on-the-water enforcement of speed zones in Martin County, the county will adopt by ordinance all state-adopted manatee speed zone restrictions that are applicable to its local waterways. By so doing, the MCSO will be able to enforce both state and local protection measures

### ***4. Speed Zone Signage***

Throughout Florida, there is an inherent conflict between the need to post an adequate number of speed zone signs to make zone boundaries clear and understandable, while



recognizing that too many signs could pose a hazard to navigation. Feedback on the adequacy and effectiveness of current speed zone signage has been received through two mechanisms: response to a boater survey that was conducted during the spring of 2001 under a FWC grant to FDEP; and through comments from the enforcement entities who stop, warn and/or ticket speed zone violators. These responses revealed the need to more effectively educate the boating public about manatee protection issues and vessel speed restrictions. In addition to the initiatives that are described in the Education and Awareness component (Section D), the most effective way to improve recognition of manatee speed zones is through the posting of additional signs.

FIND is responsible for installing and maintaining manatee-related speed zone signage. The installation of such signs requires permits from the state and federal governments. In order to minimize the number of potential hazards to navigation, FIND positions the manatee protection signs on currently existing Aid to Navigation markers, wherever possible. In some instances the effectiveness of these signs is diminished because of restrictions on their position and placement. For example, on much of the west side of the IRL, the vessel speed limit is "Slow" within 600 feet of shore, but there are few in-water signs that alert boaters to this zone. In other instances, signs may face one direction only and are thus not visible to boats approaching from other directions.

Concerning maintenance of manatee-related speed zone signs, FIND has established a mechanism for coordination and communication with law enforcement personnel to ensure that problems with existing signs are brought to their attention. This program involves distribution of manatee sign report forms to law enforcement agencies. The form is completed and returned to FIND when/if sign repair or maintenance is necessary. FIND also conducts its own annual county-wide sign inspection. To assist FIND in its speed zone sign maintenance program, Martin County will work with the Sheriff's Office to ensure that all on-the-water personnel have the information needed to evaluate sign condition, understand the need for timely reporting of missing and damaged signs, and are provided with the forms they need to report maintenance problems.

In addition to manatee-related waterway signs, FIND has established interlocal agreements through which they agree to install and maintain waterway signs for boater safety. Watercraft safety zones have been designated in Martin County in the vicinity of bridges, but to date, signs marking these zones have not been installed. Although the primary purpose of these signs is not manatee protection, they would likely have the same effect by slowing vessel speeds and thereby reducing the risk of collisions with manatees. Having FIND post and maintain these signs (rather than each individual waterfront county) would allow the signs to be placed and maintained in a more cost-effective and consistent manner than would otherwise be possible. If situations arise in which a manatee-related speed zone overlaps with a non-manatee related watercraft safety zone, signs identifying the most restrictive limit will be installed and maintained. Therefore, Martin County will work cooperatively with FIND to develop an interlocal agreement through which FIND will be responsible for installing and maintaining non-manatee related vessel warning signs in county waterways.

It is believed that by conducting these activities, together with implementing the public awareness program described in the Education and Awareness component, and increasing

law enforcement as described elsewhere, there will be no need for additional manatee-related signage in county waterways at this time. However, one of the issues that should be addressed by the MPAC when it meets is the adequacy of speed zone signage. Additional site-specific signage should be considered if law enforcement personnel report consistent lack of awareness of speed zones as the cause for speed zone violations. During the periodic reviews of the MPP, and based on input from law enforcement personnel serving on the MPAC, it may be determined that additional signage is warranted at locations where violations are most prevalent

### ***5. Increased Law Enforcement Presence***

Section B.4 in the Inventory of Existing Conditions identified and described the federal, state and local law enforcement agencies that contribute to enforcement of marine laws in Martin County. Although these agencies collectively provide a significant enforcement presence on Martin County's waters, they all consistently report a need for additional time dedicated to enforcement of manatee speed zones. Because fiscal constraints often limit the amount of on-the-water enforcement, Martin County will endeavor to replicate at a local level the federal program through which marinas provide slip space for enforcement vessels at no charge. In some instances, marina owners/managers have been willing to provide free slip space for enforcement personnel. If Martin County has such a need at the time when a new or expanding marina goes through the development review process, Martin County will consider requesting that such slip space be voluntarily provided.

The BCC is committed to the appropriate funding level for effective enforcement of existing manatee speed zones by the MCSO. This funding consideration will be evaluated in the budgeting process each year based on input from interest groups, including MPAC.

Increasing the presence of law enforcement personnel on Martin County's waters is only one component of affecting increased compliance. The county will also routinely assess the effectiveness of law enforcement practices. There are several criteria that should be evaluated by MPAC.

- the ratio of warnings to citations (if available);
- the extent to which violations of vessel speed restrictions are by repeat offenders;
- the need for increased public awareness of manatee and vessel speed zone regulations; and
- the needs for increasing the number of patrol units on the water and the need for increasing the number of hours dedicated to enforcing speed zone regulations.

If analyses of these data indicate that, despite increased awareness of speed restrictions, the penalties do not provide an adequate deterrence for violation, the county will adopt stiffer penalties. This can/will be done only after Martin County adopts the speed zones by ordinance.

The State of Florida currently has adopted an LOS of 2.2 police officers per 1000 residents. MPAC will consider evaluating data pertaining to on-the-water law enforcement, boater registrations, boating activity and other appropriate information including enforcement activities of other agencies to develop a comparable LOS for on-the-water enforcement in Martin County. If an LOS is adopted, it will be reviewed periodically to determine if it is being maintained. If watercraft-related manatee mortality in speed restriction zones continues, Martin County may adjust the LOS to increase compliance.

In lieu of maintaining the desired LOS of enforcement personnel, Martin County, in coordination with FWC, may conduct periodic compliance audits to determine the extent to which boaters are complying with vessel speed restrictions.

#### ***6. Sanctuary Designation by USFWS or FWC***

Designation of manatee sanctuaries can be made at the federal (USFWS), state (FWC) and/or local (county or municipal) levels. There are currently no manatee sanctuaries or refuges in Martin County, although USFWS and FWC are currently evaluating locations that have been recommended as candidate sites. Analysis of existing data concerning the presence, abundance and distribution of manatees in Martin County does not suggest that the designation of any sanctuaries, refuges or motorboat prohibited areas are warranted at this time.

Areas in Martin County that may be important for calving, resting or thermal refugia but for which current data are insufficient to determine if additional protection is warranted are:

- South Fork Creek (i.e., those areas of the South Fork of the St. Lucie River located upstream (south) of the SR 76 bridge) (Figure 4),
- areas of the North Fork of the St. Lucie River near the mouth of C-23, Hidden Bay and Bessey Creek (Figure 2);
- Anchors Aweigh Marina (a dredged marina basin located on the west side of the IRL in Jensen Beach (Figure 16); and
- Okeechobee Waterway west of the St. Lucie Lock, Lake Okeechobee, and adjoining canals and tributaries (Figures 4 and 5).

The features that appear to make these sites attractive to manatees are as varied and diverse as their locations. Martin County will work with FWC to develop and implement programs to document the seasonal abundance, movements, water temperature (for wintering sites) and foraging activities of manatees at each site. Additionally, FWC has suggested that some foraging sites may be worthy of increased protection. Any new data that may become available will be reviewed by the county and/or MPAC to determine if additional protective measures are warranted.

## **C. Land Development**

Section C of the Inventory of Existing Conditions summarized the existing manatee protection mechanisms provided by Martin County. Although Martin County's environmental protection regulations are considered some of the most restrictive in the state, continued grassbed and wetland vegetation losses and degradation of manatee habitat are indicative of the need for continued attention. This section provides descriptions of mechanisms through which Martin County will make improvements to applicable development standards to reduce the potential for impacts to manatees.

### ***1. Shoreline Development Standards***

Pertinent LDR's affecting shoreline development include protection of mangroves, restrictions on the construction of vertical bulkheads, setbacks from wetlands, provisions for management of stormwater, and the requirement for habitat preservation areas. Despite these protective mechanisms, a substantial amount of the county's natural waterfront shoreline has been significantly altered. However, much of this decline occurred prior to enactment of current regulations. The MPAC will recommend that the BCC amend shoreline development regulations as the need arises.

### ***2. Development Standards for Submerged Lands***

The majority of the submerged lands in Martin County that are accessible to manatees are lands that are owned or controlled by the State of Florida. The designation of the entire IRL in Martin County as Aquatic Preserve provides the State of Florida with additional control over activities affecting state-owned lands. Projects on/over submerged lands (e.g., marinas, utility installations) are reviewed by the FDEP Bureau of State Lands for compliance with various environmental and public interest criteria and in many instances must be approved by the Governor and Cabinet sitting as the Board of Trustees of the Internal Improvement Trust Fund. Additionally, dredge/fill activities proposed on submerged lands are independently reviewed by federal agencies, including ACOE, EPA, USFWS, NMFS and USCG.

In addition to these state and federal reviews, Martin County has developed and implemented a process through which proposed projects must be reviewed and approved by the county prior to construction.

#### ***a. Marina Facility Siting Criteria***

Information concerning boat facility siting can be found in Martin County's BFSP, which was approved by the BCC on June 12, 2001, with subsequent revisions in March 2002.

### ***b. Performance Criteria***

As described above, the county shall appoint the MPAC. The MPAC shall meet as necessary, to review and analyze the following: the status of MPP and BFSP implementation; individual and overall cases of manatee mortality; the three-year manatee mortality average, vessel registration and boating activity data; speed zone compliance information; manatee habitat usage; and other relevant data and information as may be necessary to assess the effectiveness of MPP programs and policies

The goal of the MPAC shall be to use new information (e.g., changes in the population of manatees, increases and/or changes in boating activities, manatee mortality and injury statistics, documentation of secondary aggregating sites) as the basis for amending the MPP as necessary to better protect manatees and their habitat in Martin County. The findings of the MPAC shall be discussed in progress reports that will be presented to the BCC, other appropriate state and federal officials.

The ultimate goal of the MPP is to protect manatees and their habitat and to redesignate Martin County's classification from a high-risk county to a medium risk or low risk county due to watercraft-related manatee mortality.

### ***c. Residential No Entry Areas***

Although governmental agencies have the authority to designate areas as "No Entry," there are no areas designated as such in Martin County. The results of aerial surveys, radio/satellite telemetry and visual observations and the lack of significant aggregating sites suggest that no such designations in Martin County are warranted at this time.

### ***d. Restriction of Coastal Construction***

Martin County's BFSP addresses potential restrictions on coastal construction as related to marina facilities. Future coastal construction projects will be unaffected, provided the standards set forth in the BFSP are adhered to and average annual manatee mortalities remain below specified levels.

## **D. Education and Awareness**

Section D in the Inventory of Existing Conditions identified and described existing public education and awareness programs in Martin County. This Section uses this information to make recommendations for opportunities and initiatives to further improve this important aspect of manatee protection. The costs to implement this program are unknown at this time

### ***1. Educational Programs in Schools***

Although there are a variety of education and awareness materials concerning manatees that are available for use in public education and awareness programs (Table 8), they are not widely known or distributed in Martin County. To address this improvement

opportunity, Martin County will work with the appropriate organizations to develop and distribute educational materials about manatees. Key components of this initiative will include:

- establishing and maintaining a reference library of educational materials concerning manatees;
- using existing educational materials that are available from other organizations throughout the state to develop age-specific materials for life-long learning about manatees;
- establishing a system for distributing educational materials to interested educators and individuals;
- establishing and maintaining a speaker's bureau through which audience-specific programs are developed and offered to interested organizations; and
- developing and/or distributing Public Service Announcements (PSAs) to local media (i.e., television, radio, newspaper) to promote coverage of critical manatee protection issues including speed zones, seasonal restrictions, locations of interest, and locations where manatees can be observed through non-obtrusive means. The existing PSAs developed by SMC should be considered as an initial inventory of potential materials.

Potential groups that are qualified to develop and implement this program are the staffs of the ESC and the FOS. The county will consult with these and possibly other entities to establish a manatee public education program provided grant monies can be obtained. Potentially, a combination of groups may be involved.

Regardless of which entity is designated to be responsible for managing the program, it is acknowledged that providing adequate new financial resources is the only mechanism through which this initiative can be successfully implemented. Martin County will seek funding through the state's Advisory Committee on Environmental Education (ACEE) and/or provide funding for manatee public education through Martin County's portion of the boat registration fees or other sources.

## ***2. Awareness Programs – Boat and Personal Watercraft***

In addition to the lifelong learning materials identified elsewhere, there is the need to develop and/or distribute public awareness materials. These materials (e.g., pamphlet identifying speed zones) must be accessible, free or low cost, easy to use and easy to understand by the general public. Although the boat speed zone pamphlet is available at the county's vessel registration office and maps showing each of the speed zones are posted at public boat ramps, the varying speed zone widths, designations and seasonal limitations are at times confusing. Without the benefit of these reference materials on board, boaters may find it difficult to remember applicable regulations. Improved public awareness will be achieved through the development, distribution and implementation of the following:

- production and distribution of a single, two-sided laminated reference card showing vessel speed restriction zones in Martin County;
- distribution of "Mind Your Waterway" laminated cards that have already been developed by the State of Florida;
- posting and maintenance of manatee awareness and up-to-date speed zone signs at all public boat ramps and at the exists of all marina harbor entrances;
- developing a program to ensure that public awareness materials are made available to all individuals who own, rent or otherwise use personal watercraft;
- distribution of speed zone maps with boat registrations and having zone maps available at all license outlets and marine rental sites;
- add a manatee section to the Martin fl us web site with zone maps and rules; and
- utilize the resource of Martin County TV

Martin County will produce and distribute these public awareness materials using staff or volunteers. ACEE is also a possible funding source for this initiative.

Martin County will make speed zone restriction and "Mind Your Waterway" cards available at the county Tax Collector's Office, where boat-owners must annually register their watercraft and where individuals born after September 30, 1980 obtain their watercraft operator's certificate. Information from enforcement personnel have indicated that many boat operators who are stopped for violating vessel speed restrictions claim they were unaware of the applicable regulations in the vicinity of the violation. Through this initiative, cases of ignorance of the law should be considerably reduced

Although there are manatee-related materials at public boat ramps, educational institutions and some marinas, there are currently no manatee-related educational and interpretive kiosks at other waterfront facilities in the county. Martin County will consider developing such displays at two county-owned locations that offer opportunities for manatee interpretation. One of these locations, Indian Riverside Park, is located on the west bank of the Indian River between the Stuart and Jensen Beach Causeways. Martin County is in the initial stages of designing interactive displays at the Sustainable Resource Center at Indian Riverside Park, and will consider providing information concerning manatees at this facility.

The other location, Twin Rivers Park, is a tract of land that Martin County has recently purchased, but for which no site plan has been developed. It is a waterfront property located at the northeast tip of Rocky Point. Referred to as Twin Rivers Park because of it's strategic location overlooking the Indian and St Lucie Rivers, the park is immediately adjacent to the Crossroads, an area that is heavily used by boaters and manatees. The site has no infrastructure improvements and currently has relatively little public use. As park plans are developed, Martin County will consider opportunities to provide educational and/or interpretive information about manatees at this facility

### ***3. Coordination of Education and Awareness***

As described in the Education and Awareness component (Section D.1), Martin County will designate a staff person who will be responsible for developing and managing public education and awareness initiatives. This person will be encouraged to work with colleagues at the Manatee Observation and Education Center in Ft. Pierce and other educational institutions to obtain existing materials and/or compile new documents.

### ***4. Existing Grant Programs***

Implementing this MPP will be challenging from both a human and financial resource perspective. Potential sources of funding include:

- a portion of (or surcharge on) boat registration fees;
- a portion of the income derived from enforcement-related penalties;
- assessment of an additional impact fee on waterfront development; and
- federal, state, regional, and local grant programs and foundations.

A professional grant-writer assisting in preparation of the MPP has identified a variety of potential governmental and non-governmental sources of financial support. Sources of manatee information available over the internet and approximately 50 potential grant programs and foundations have been identified and compiled into a document entitled "Manatee Protection Plan – Funding Opportunities, Subsidies, Public Information, Networks and Related Information" (S.A. Simmons, Inc., 2001). Information concerning the most likely sources for funding is presented in Table 9. Martin County's GMD will review this document and use it as appropriate to solicit financial support to assist in implementing this MPP.

## **E. Governmental Coordination**

Many issues associated with protection of manatees and their habitat in Martin County are beyond the control of Martin County. This section therefore identifies and describes mechanisms and processes through which Martin County can facilitate communication and coordination with other governmental entities to enhance rather than duplicate protection of manatees and their habitat.

### ***1. Land Development Regulations***

Although existing and proposed broad goals, objectives and policies are identified in the Martin County CGMP, the mechanism for implementing these initiatives is through the adoption of specific LDRs. In Section C. in the Inventory of Existing Conditions, existing LDRs that relate to the protection of manatees and/or their habitat are identified. Although there are ordinances that specifically describe protection for wetlands,



mangroves, barrier islands and sea turtles, stormwater, and flood control, there is no ordinance that specifically focuses on the protection of manatees. It is therefore suggested that a new ordinance be adopted within Article 4 of the Martin County Land Development Regulations. The ordinance shall be entitled Manatee Protection and shall include, but not be limited to, the following.

- establishment of a Manatee Protection Advisory Committee;
- establishment of a dedicated funding source for the program;
- identification of the entity that will be responsible for coordinating the public information and awareness program;
- implementation of a program to collect additional information that will serve as the scientific basis for future amendments to the MPP; and
- identification of the process through which the county-wide MPP will be revised.

## ***2. Boat Traffic/Manatee Area Usage Study***

It is acknowledged that as time passes, there will be changes both in boating activity patterns in Martin County and in manatee use of Martin County's waters. The number of registered boaters will undoubtedly increase and patterns of boat use may change. Likewise, as various programs are implemented to improve water quality, the spatial distribution, abundance and vitality of SAV will also change. Thus, there will be a need to reassess the effectiveness of this MPP and the BFSP in response to these changes.

The MPAC will be responsible for monitoring the progress of MPP implementation. One of the tools needed to evaluate program effectiveness and adapt policies to better protect manatees will be the Boating Activity Study. The BAS, designed in cooperation with FWC, will be conducted at least once every seven years, provided financial assistance can be obtained from FWC and/or other sources, with the next study scheduled to be completed no later than 2006. The study will be managed by Martin County and fashioned after those previously conducted in the county. It will include sampling to determine levels of speed zone compliance at several key areas and be designed to document seasonal variability. Results of the BAS will be provided to MPAC and FWC, and adjustments will be made to the MPP as appropriate.

**Table 9**  
**Potential Funding Sources for Implementing the Martin County Manatee Protection Plan**

<b>Source</b>	<b>Name or Type of Program</b>	<b>Comments</b>
US EPA Office of Environmental Education	Environmental Education and Training program	Requires 25% match, next award cycle 2003
US EPA Office of Environmental Education	Environmental Education Grants	For design & dissemination of environmental curricula
US Department of Education	Eisenhower Professional Development Grant	To collect and disseminate exemplary science education instructional materials
US Fish and Wildlife Service	Cooperative Endangered Species Conservation Fund	Grantee must be the State agency
National Oceanographic & Atmospheric Administration (NOAA)	Financial Assistance for National Centers for Coastal Ocean Science	To minimize adverse consequences of human use of the coastal and marine environments
NOAA	Sea Grant Support	To support marine resource research, education and training
US EPA Office of Environmental Education	National Estuary Program	Activities associated with restoration of Estuaries of National Significance
NOAA/National Marine Fisheries Service	Habitat Conservation	To conserve protected resources & restore depleted marine life
Florida Fish & Wildlife Conservation Commission	Advisory Council on Environmental Education	Enhance awareness of Florida resources
Community Foundation for Palm Beach and Martin Counties	Educational Grants	Local community oriented initiatives
Chevron Corporation Grants	Environmental conservation & habitat preservation	Focused on K-12 science education
National Fish and Wildlife Foundation	Conservation Education Initiative	Supports education projects concerning fish, wildlife, plants and their habitat
National Fish and Wildlife Foundation	Partnership grants	Funds partnerships for fish & wildlife habitat restoration & enhancement and education
Walmart Foundation	Education and Environmental Programs	Supports programs in communities near Walmarts
Fields Pond Foundation Inc	Conservation, stewardship, education & publications	Typical funding \$2,000 to \$10,000
Pew Charitable Trusts	Environment Program	To preserve healthy marine ecosystems
Captain Planet Foundation	Education	Promote understanding of environmental issues through hands-on involvement by youth
Barbara Delano Foundation	Conservation and habitat protection	Target species include marine mammals
Bechtel Foundation	Youth, educational programs and science education	Involvement in communities where facilities are located
First Union Foundation	Special programs for youth	Involvement in communities where facilities are located
Turner Foundation	Biodiversity	To support ecosystem-wide habitat protection

Additional information on these and other programs is available from various sources, including the Catalog of Federal Domestic Assistance, the Guide to Florida Foundations, 2001, and the Environmental Grantwriters Association

## OBJECTIVES AND POLICIES

The action plan for implementing this MPP consists of three separate tasks:

- proposing changes to the CGMP and associated LDRs;
- conducting the public hearings required prior to ordinance adoption; and
- conducting other initiatives, which do not involve amendments to Martin County's CGMP or the LDRs.

These separate, yet related, initiatives are described in Sections A, B and C below.

### **A. Modifications to Martin County's Comprehensive Growth Management Plan**

The first step in implementing this MPP will be proposed revisions to the Martin County CGMP. As described in Section C in the Inventory of Existing Conditions, the current CGMP includes provisions for manatee protection in both the Coastal Management Element (Chapter 8) and the Conservation and Open Space Element (Chapter 9). To implement this MPP, Martin County will initiate an amendment to the CGMP to replace Section 8-4, Goal A, Objective 2, Policies h and i and Section 9-4, Goal A, Objective 9, Policies h and i with the following (or words to a similar effect):

1. Martin County shall work with the FWC to review speed zones in the area of the Crossroads, at and in the vicinity of the confluence of the IRL, and the St. Lucie River. Martin County shall work with the FWC and FIND to ensure that there is adequate sign posting of existing speed zones throughout all applicable areas of the county. Martin County will work with the FWC Division of Law Enforcement, Martin County Sheriff's Office, and other enforcement agencies to ensure the availability of adequate resources and personnel to enforce the speed restrictions, present and future.
2. Martin County, through the MPAC, will work cooperatively with FWC to monitor manatee mortality caused by collisions with watercraft in county waterways. If the annual rate of mortality shows an increasing trend, speed zones will be reviewed for changes. The MPP shall be reviewed, not less than every seven years with the County's CGMP as part of the Evaluation and Appraisal Report cycle and updated and modified as necessary.
3. Martin County shall work with FDEP, ACOE, USFWS and SFWMD to enhance seagrass restoration. The purpose of the program is to enhance estuarine natural resources, improve water quality, and provide additional foraging habitat for manatees. Consideration will be given to creating a benthic substrate conducive to the natural recruitment of seagrasses. The county will also work with SFWMD and FDEP to establish an acceptable salinity envelope for estuarine areas.

4. Martin County will dedicate the level of funding and staff necessary to implement the goals and policies of the Manatee Protection Plan. Martin County will fund this initiative through competitive grants, grants from FWC, and/or other sources, as deemed appropriate
5. The BCC shall establish a MPAC. The Committee's primary responsibility will be to assess the progress and success of implementation of the MPP and the BFSP by reviewing and analyzing new manatee and boating data, discussing manatee protection issues, evaluating enforcement efforts and making recommendations to the county for improving manatee protection in local waterways.
6. Martin County will propose an Interlocal Agreement with FIND through which FIND would assume the responsibility for installing and maintaining all vessel speed zone signs in Martin County. Martin County will request that FIND install and maintain additional signs at locations where enforcement personnel report low levels of awareness by vessel operators.

## **B. Amending LDRs**

As identified in Section C 1 in the inventory of Existing Conditions, Article 4 of Martin County's LDRs contain several articles that provide protection to resources that are also valuable to manatees. Although continuing implementation of these existing articles will be helpful in protecting manatees and their habitat, implementation of this MPP will require that Martin County propose a new subsection within Article 4, Manatee Protection. As proposed, this new article would include the applicable policies identified in Section A and the following (or words to a similar effect):

1. To minimize impacts to manatees, marina owners/operators shall provide to the county a site-specific Manatee Protection Plan, as required by FDEP. The Plan will be required for all new marinas and for existing marinas that are undergoing renovations. Upon approval by county staff, permanent implementation of the plan shall be included as a condition for issuance of a development order.
2. To reduce the potential for water quality degradation in manatee habitat, new or expanded facilities that propose to store or dispense fuel on site shall provide to the county, a site-specific Fuel Spill Contingency Plan. The Plan shall meet FDEP requirements and shall be provided to the county prior to issuance of a development order.
3. For protection of marine resources, including manatees, and to minimize impacts during the preparation for, and subsequent to, major storm events, marina owners/operators shall provide to the county a site-specific Emergency Preparedness Plan as required by FDEP. The Plan will be required for all new marinas and for existing marinas that are undergoing renovations, and shall be

provided to the county and reviewed by county staff prior to the issuance of a development order.

4. Martin County shall review all applications for boating facilities and ensure that proposed development plans and activities are consistent with the MPP and the BFSP prior to their approval
5. The county shall encourage the use of navigable channels and open navigable waters. Said areas should be appropriately demarcated and maintained and the county will work with FIND to ensure proper and appropriate demarcation. By encouraging this action, the resulting potential impact to marine resources, including manatees, should be reduced. Furthermore, the county should encourage the removal of muck deposits in waters of the county to potentially improve water quality, foster seagrass recruitment, and improve manatee habitat
6. Development of all new and expansion of all existing boating facilities shall be reviewed under the criteria set forth in the BFSP and the MPP. Applicants who have filed a development order with Martin County for a new boat facility or expansion of an existing boating facility and whose application has been determined to be complete prior to the adoption of the LDR shall be reviewed under criteria previously established in the CGMP.
7. Prior to being issued a permit for a dock over seagrasses, a permit applicant shall provide to the county the results of a current seagrass survey performed along the water frontage of the applicant's property seaward a distance encompassing the proposed docking facility. The survey must be conducted between May 1 and September 30 by an experienced biologist with relevant qualifications. The survey shall identify the species of seagrasses present, document their relative abundance, and determine overall coverage of seagrasses within the surveyed area. A map shall be prepared showing the distribution and relative abundance of seagrasses in relation to the proposed alignment of the dock to document that impacts to seagrass beds have been avoided or minimized.
8. Martin County shall prohibit the construction of new point source discharges of water into manatee habitat areas in the vicinity of seagrasses, unless mechanisms for treatment are designed such that there will be no degradation of water quality in the receiving body.
9. Martin County shall analyze results of seagrass mapping by SFWMD after the completion of each mapping event. Locations where there is loss of seagrass cover shall be analyzed in an effort to identify causative factors, and where feasible, initiatives shall be undertaken to reverse the decline of this important manatee foraging resource
10. Martin County will require that the MPAC review watercraft mortality and manatee injury data, boating activity data, manatee habitat usage data and other appropriate sources of information to determine the extent to which modifications to existing speed zones and/or creation of special manatee habitat areas are

warranted As appropriate, Martin County will modify the applicable county ordinance and request that the State of Florida modify 68C-22.024 FAC, for consistency. MPAC will meet periodically, no less frequently than beginning six months before the onset of each CGMP Evaluation and Appraisal Report process. MPAC may be convened more frequently if instances of watercraft-related manatee mortality approach threshold limits that would affect the construction of boat facilities

11. Martin County will develop and implement a process through which GMD will review Public Notices for waterfront development projects within the unincorporated areas received from federal and state agencies and provide correspondence to the appropriate agencies if the proposed project is not consistent with the objectives and policies of the MPP and BFSP.
12. Martin County will develop and implement a comprehensive program for effective public awareness and education concerning manatees and their habitat. The county shall ensure adequate funding for these programs through outside sources.
13. Martin County will ensure that a laminated card with maps showing all vessel speed zones within Martin County is developed and distributed at the county Tax Collector Office. The card shall be provided to registered boat owners, and made available at other locations, as appropriate. Martin County will advise boat owners and operators of watercraft rental companies that the laminated card or other maps showing manatee-related speed zones shall be present on board their vessels for informational purposes only. Failure to have the card/maps on board when operating the vessel in compliance with speed zones shall not be cause for penalties. Operators of watercraft rental companies shall be advised of the need to provide instruction to clients concerning the presence of vessel speed zones and the need to comply with applicable speed limits.
14. Martin County will work with FWC, USGS Sirenia Project, and USFWS to conduct or fund additional research as may be necessary from time to time to obtain the scientific data needed to better understand manatee habitat usage in Martin County. This information will be provided to MPAC and will be used to determine if additional protective measures are necessary.
15. Through a collaborative effort with the FWC, MCSO and other interested parties, Martin County will develop and implement a program to monitor the extent of compliance with manatee-related vessel speed zone restrictions. As warranted, MCSO will adjust the level of law enforcement presence to ensure substantial compliance with the regulations.
16. Martin County shall limit its own application of pesticides and herbicides in areas that could potentially impact manatee habitat. These materials shall be used only as recommended on the container. Martin County will explore methods for removing floating vegetation from its waterways rather than treating it with herbicide when and if the need arises in county-maintained waterways

17. Martin County will establish a monofilament line recycling program. The program may be coordinated and operated through a volunteer-based organization, such as Keep Martin Beautiful, and funded by grants. The recycling of monofilament line will be facilitated through the placement of monofilament line collection receptacles paired with educational information at high use boat ramps and marinas.
18. Martin County will designate the GMD as the county entity responsible for coordinating local manatee-related programs. This Department will also coordinate manatee-related issues with other federal, state, regional and municipal agencies.
19. Martin County will adopt by ordinance the applicable manatee-related vessel speed zones enacted by the State of Florida (or more restrictive zones as the county determines are necessary) and amend the ordinance in the future as necessary.

**C. Action Plan Items Not Involving Amendments to Martin County's CGMP**

1. Martin County will support the State of Florida's initiative to review Chapter 68C-22.024, FAC, to consider a new, vessel speed zone in the area known as the Crossroads. The exact boundaries of the proposed zone and need have not yet been established by the State.
2. Martin County will assist FWC in a research effort to document the extent of manatee use along potential travel corridors and/or at potential secondary aggregating areas, including:
  - the portion of Lake Okeechobee and the Rim Canal that are located within Martin County;
  - the portion of the St. Lucie Canal (C-44) west of the St. Lucie Locks;
  - South Fork Creek, (i.e., that portion of the South Fork of the St. Lucie River upstream (south) of SR 76);
  - the vicinity of the confluence of C-23, Bessey Creek and Hidden River;
  - the boat basin on the west side of the IRL known as Anchors Aweigh Marina; and
  - other sites as may be recommended by the MPAC, other agencies, or the public
3. Martin County will request that the City of Stuart, the Town of Sewall's Point, the Town of Jupiter Island and the Town of Ocean Breeze Park adopt applicable portions of the MPP and BFSP into their respective Comprehensive Plans.
4. Martin County will continue to be an active participant on the Loxahatchee River Coordinating Council.

5. Martin County will continue to use locally-generated funds for public land acquisition projects that will benefit all natural resources. The county will work collaboratively with other governmental entities to manage these lands for conservation purposes.
6. Martin County will consider the secondary effects to manatees during the design and construction of water control structures that prevent manatees from accessing upstream foraging areas.
7. Martin County will endorse by resolution the proposal for public acquisition of the waterfront parcels in Martin County that are included in the State's Indian River Lagoon Blueway land acquisition proposal and, if feasible, will provide financial support toward the acquisition of these properties.



## IMPLEMENTATION SCHEDULE

Implementation of the Martin County MPP will be an on-going process. Although some of the recommendations can be implemented relatively easily (e.g., compiling existing public awareness materials), implementing the majority of the MPP recommendations will be challenging and time-consuming.

Although this Plan currently recommends review of only one new vessel speed zone designation, additional restrictions may be warranted once additional data are collected. In most cases, informed decisions concerning these additional designations cannot be made until a data-collection period of one year or more has been completed.

The primary mechanism for ensuring that the MPP is implemented will be the incorporation of guiding goals and policies into county governance documents. This will include changes to the county's CGMP and LDRs. This process is lengthy and includes a number of public hearings at which residents, property owners, businesses, conservation organizations and interested individuals are offered the opportunity to review and provide comments on the draft ordinances. In consideration of these processes, it is acknowledged that implementation of the MPP will be a protracted process. Design, permitting, construction and operation of various water quality improvement projects will take years, and it will likely be decades until the benefits of these projects become evident.

Additionally, it is recognized that as time passes, there will be significant increases in the number of boaters, and changes in boating patterns and activities. In order for Martin County to remain proactive, and to reduce the likelihood of contentious interactions based on a lack of detailed information, it is recommended that the Martin County convene MPAC on a periodic basis such that any resulting changes can be made coincident with the CGMP Evaluation and Appraisal Report cycle. Martin County may convene MPAC more frequently if the frequency of watercraft-related mortality approach threshold levels that would negatively affect the permitting of new boating facilities as described in the BFSP. MPAC will discuss and analyze these and other changes and make recommendations for incremental adjustments to the MPP and/or BFSP on an as-needed basis with ample opportunity for public input. Making modifications on this basis will avoid the need to take drastic measures that could have significant economic or property rights implications.

A recommended time line for implementation of the MPP is shown in Figure 20. This time line will be revised, as appropriate, to reflect new data, information and circumstances.

FIGURE 20 IMPLEMENTATION SCHEDULE

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**APPENDIX A**

**Example of Florida Oceanographic Society  
Weekly Water Quality Map**

## **FOS example**

## APPENDIX B

### Non-verified Reports of Manatee Sightings

The most extensive database of manatee sightings in Martin County resides with the Florida Oceanographic Society (FOS), a non-profit, environmental advocacy organization based in Stuart, Florida. Due to strong local interest in manatees, FOS initiated a call-in system through which residents could report sightings of manatees in local waterways. Since 1990, FOS has maintained records, including the date, approximate location, and number of manatees reported by observers. This information is compiled weekly and published in local newspapers (see example on following page). Although there is no quality control process, and at times the number of manatees sighted may be imprecise due to viewing challenges, it is thought that the majority of the reports come from reliable sources and are reasonably accurate, but the information must be considered anecdotal.

Since the program began, FOS has received an average of over 400 calls per year. The number of manatees reported per call has ranged from one to fourteen. Because an individual manatee may be reported on consecutive days at one location and/or on different days at different locations, it is impossible to infer from this data the numbers of manatees present in Martin County at any one time. However, the FOS data are valuable in documenting the general locations and times of the year when manatees are present.

Data compiled through the FOS weekly sighting reports indicates that during the period from 1998 through 2000, manatees were present in Martin County waterways during every month of the year (Table 3). In some areas such as the IRL, they have been observed every month, while in other areas, sightings have only been reported during certain months. The fewest sightings have been reported from the creeks that empty into the St. Lucie River (e.g., Frazier Creek, Poppleton Creek, Danforth Creek, and Britt Creek). The extent to which this may be due to inconsistent observation effort among areas is not known.

Because manatee sightings reported to FOS are not verified, and there is no way to screen out incorrect observations or to distinguish if any animal may have been reported multiple times, FWC will not use these data as a basis for rulemaking.

EXAMPLE OF MANATEE MAP FROM FOS



## APPENDIX C

### Components of Martin County's CGMP Affecting Manatee Habitat

#### Components of Martin County's CGMP Affecting Manatee Habitat

The Martin County Comprehensive Growth Management Plan (CGMP) has been amended and modified on numerous occasions since its initial development and adoption in 1982. Two elements of Martin County's CGMP include information pertinent to the protection of manatees and their habitat:

- Chapter 8 - Coastal Management Element
- Chapter 9 - Conservation and Open Space Element

#### Chapter 8 – Coastal Management Element

The Coastal Management Element of Martin County's CGMP was initially adopted on February 20, 1990. It has been amended on several occasions, most recently on December 5, 2000. The information that follows is based on the review of the current version of Chapter 8.

Section 8.4 of the Coastal Element describes the coastal areas of Martin County, suggests future coastal needs and identifies pertinent goals, objectives and policies. Specific objectives and policies that relate to the protection of manatees and/or their habitat include:

#### Goal A – Coastal Natural Resources

- Objective 1: Protection and preservation of the functions and values of coastal wetlands and barrier island natural systems
  - § Policy c: Special Wetlands
  - § Policy m: Wildlife Habitat Preservation
- Objective 2: Wildlife, Fish and Habitat
  - § Policy a: Land Use Decision Guidelines
  - § Policy b: Secondary Impacts
  - § Policy c: Site Plan Review Guidelines
  - § Policy e. Site Assessment for Endangered Plant and Animal Population
  - § Policy h: Manatee Protection Measures
  - § Policy i: Other Manatee Protective Measures
- Objective 3: Estuarine Environmental Quality
  - § Policy a: Drainage System Retrofit
  - § Policy b. Surface and Stormwater Management Regulations
  - § Policy c: Interagency Cooperation for Water Release

- § Policy d: Intergovernmental Cooperation for Water Quality
- § Policy e: Drainage Basin Plans
- § Policy f: Seagrass Beds
- Objective 4 – Marine Natural Systems
  - § Policy a: Enforce Shoreline Performance Standards
  - § Policy b: Location of Construction Activity Near Estuarine Systems and Enforce Appropriate Vegetation and Landscaping Requirements
  - § Policy c: Proposed Alterations to Natural Tidal Flushing Patterns and Circulation of Estuarine Waters
  - § Policy d: Prohibition of Canals
  - § Policy e: Coordination of Development Activities along the Estuarine Shoreline with Appropriate Public Entities
  - § Policy f: Information and Technical Assistance on Matters Related to the Estuary System
  - § Policy g: Use of Proven Cost Effective Innovative Techniques to Preserve Values and Functions of the Estuary System which also Equitably Balance Public and Private Property Rights
  - § Policy h: Marine Grassbed and Tidal Marsh Areas
  - § Policy i: Mangrove Protection
- Objective 5 – Priority of Water Dependent and Water Related Uses
  - § Policy a: Prioritization of Waterfront Land Use Activities
  - § Policy b: Shoreline Zoning
  - § Policy c: Estuarine Protection Zone
  - § Policy d: Commercial Marina and Large Multi-Slip Docking Facilities Siting Criteria
  - § Policy e: Public Access, Boat Ramp Siting Criteria
- Objective 6 – Beach and Dune and Offshore Systems
  - § Policy a: Barrier Island Restrictions
  - § Policy b: Coastal Construction Code
  - § Policy c: Enforcement of Existing Regulations
  - § Policy d: Cumulative Impacts on Beach/Dune Systems
  - § Policy e: Shoreline Preservation and Restoration
  - § Policy f: Erosion Control Structures
  - § Policy j: Flood-proofing of Sanitary Sewer Systems
  - § Policy k: Designation of the St. Lucie Near Shore Reef as a National Marine Sanctuary
- Objective 7 – Coastal Public Access
  - § Policy e: Acquisition of Waterfront Parcels

Goal B – Protection from Hurricanes and Natural Disasters

- Objective 1 - Hazard Mitigation and Coastal High Hazard Area
  - § Policy e. Expansion of Barrier Island Ordinance
- Objective 2 – Direct Population Away from Coast
  - § Policy b: Barrier Island Development Regulations

- Objective 5 – Coastal Infrastructure
  - § Policy h: Public Utility Hook-up Guidelines
  - § Policy i: Storm or Surface Water Runoff
- Objective 6 – Interjurisdictional Resource Management
  - § Policy a: Interjurisdictional Plans Coordination
  - § Policy b: Aquatic Preserve Feasibility Study
  - § Policy c: St. Lucie River Estuary
  - § Policy d: Coordination with State and Federal Level Facilities
  - § Policy e: Cooperate to Enhance Natural Systems
  - § Policy g: Protection of Local Estuaries
  - § Policy h: City/County Coordination

Pursuant to Goal A, Objective 2, Policy h, Manatee Protection Measures, existing and new marina and boat ramp operators (public and private) are required to undertake the following manatee protection measures in areas where manatees occur.

- coordinate with FWC to implement and maintain a manatee public awareness program that includes the posting of signs to advise boat users that manatees are an endangered species that frequently use the waters of the IRL; additionally, manatee literature must be provided at conspicuous locations;
- declare the waters in and around the marina and/or boat ramp as a no wake or idle speed zone;
- ensure that prospective renters, lessees or owners of slips are aware that if they are found in violation of marine laws which are intended to protect manatees, they may be prohibited from using the facility thereafter.

Pursuant to Goal A, Objective 2, Policy i, Other Manatee Protective Measures, the county will continue to investigate with the FWC provisions relating to vessel control and water safety programs that provide protection for manatees.

#### Chapter 9 – Conservation and Open Space Element

The Conservation and Open Space Element of Martin County's CGMP was initially adopted on February 20, 1990. It has been amended on several occasions, most recently on December 5, 2000. The information that follows is based on the review of the current version of Chapter 9

Chapter 9 includes an inventory of publicly owned lands in Martin County, including those owned by the county, SFWMD, the State of Florida, and the federal government. Many of these tracts have been purchased with funds generated by one or more voter-approved referenda specifically dedicated to the acquisition of lands for conservation and/or recreation purposes. It also includes major privately-owned parcels that are in permanent preservation. A number of these tracts are waterfront properties where shoreline features are substantially natural.

Section 9.4 of the Conservation and Open Space Element identifies a variety of goals, objectives and policies related to open space. Specific objectives and policies relating to protection of manatees and/or their habitat include:

- Objective 4 – To ensure that the quality of surface water within the county is maintained and, where unacceptable, is improved
  - § Policy c: Monitor and Minimize Impacts to the St. Lucie Estuary
  - § Policy d: Improve Water Quality in all Waters of the State, Including Creeks, Rivers, Canals and Sloughs Connected to Waters of the State
  - § Policy i: Floodplain /Natural Harbor Protection
- Objective 7 – Natural Systems
  - § Policy a: Protection of Wetlands
  - § Policy c: Wetlands, Special
- Objective 8 – Marine Natural Systems
  - § Policy a: Enforce Shoreline Performance Standards in review of estuarine development proposals, including docks
  - § Policy b: Location of Construction Activity Near Estuarine Systems and Appropriate Vegetation and Landscaping Requirements
  - § Policy c: Proposed Alterations to Natural Tidal Flushing Patterns and Circulation of Estuarine Waters
  - § Policy d: Prohibition of Canals
  - § Policy e: Coordination of Development Activities along the Estuarine Shoreline with appropriate Public Entities
  - § Policy f: Information and Technical Assistance on Matters Related to the Estuary System
  - § Policy g: Use of Proven Cost Effective Innovative Techniques to Preserve Values and Functions of the Estuary System which also Equitably Balance Public and Private Property Rights
  - § Policy h: Marine Grassbed and Tidal Marsh Areas
  - § Policy i: Mangrove Protection
- Objective 9 – Wildlife, Fish and Habitat
  - § Policy a: Land Use Decision Guidelines
  - § Policy b: Secondary Impacts
  - § Policy c: Site Plan Review Guidelines
  - § Policy e: Site Assessment for Endangered Plant and Animal Population
  - § Policy h: Manatee Protection Measures
  - § Policy i: Other Manatee Protective Measures
- Objective 11 – Open Space
  - § Policy b: Seek Acquisition of Designated Wetland Areas of Special Concern
  - § Policy d: Natural Areas Greenways and Wildlife Corridor
  - § Policy f: Linear Parks Along Waterways

- Objective 12 – Interjurisdictional Resource Management
  - § Policy a: Interagency Coordination
  - § Policy b: South Fork, St Lucie River, Aquatic Preserve
  - § Policy c: St. Lucie Estuary System
  - § Policy d: Protection and Management of federal wildlife refuges, state parks, waterways and beaches
  - § Policy e: Natural Systems Protection
  - § Policy f: Intensity and Density Transition Zones

Pursuant to Objective 9, Policies h, Manatee Protection Measures, and i, Other Manatee Protective Measures, existing and new marina and boat ramp operators are required to implement the same protective measures for manatees as identified under Objective 2, Policies h and i under the Coastal Management Element of Martin County's CGMP.

## **APPENDIX D**

Letter from City of Stuart agreeing to update its Comprehensive Plan in a manner consistent with the County's regulations

Attention 2-551010X



# City of Stuart

121 S W FLAGLER AVENUE • STUART, FLORIDA 34994 2172

DAVID COLLIER  
CITY MANAGER

TELEPHONE 561 288-5312

March 5, 2002

Mr Russ Blackburn, County Administrator  
Martin County Board of Commissioners  
2401 S E Monterey Road  
Stuart, Florida 34996

Re Proposed Boat Facility Siting and Manatee Protection Plans

Dear Russ

The City has had an opportunity to review the proposed *Manatee Protection and Boat Facility Siting* plans currently under consideration and very much appreciates the County's willingness to take the lead on these important matters. Based on our review of the documents and discussions with your Growth Management Department staff, it is our understanding that the plans, as currently drafted, apply only to the unincorporated areas of Martin County. Upon adoption by the County Commission, the documents will then be used as the basis for future amendments to the County's Land Development Regulations (LDR)

As called for by its comprehensive plan, the City of Stuart will "piggyback" on this effort by amending its LDR in a manner consistent with the County's regulations

Thank you again and please let me know if we've missed anything

Sincerely,

Dave Collier  
City Manager

Cc City Commission  
Carl Coffin, City Attorney  
Monica Graziani, City development Director  
Kim Delaney, City Planner