MANATEE PROTECTION PLAN

A Comprehensive Approach to Reducing Manatee Mortalities and Protecting Manatee Habitat in St. Lucie County, Florida

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March 1, 2002

ST. Lucie County BOCC Approved
February 26th, 2002

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LIST OF ACRONYMS

ACEE	Florida Advisory Committee on Environmental Education
ACOE	U.S. Army Corps of Engineers
BAS	Boating Activity Study
BFSC	Boat Facility Siting Component of the St. Lucie County Manatee Protecion Plan
BOCC	St. Lucie County Board of County Commissioners
BPSM	Bureau of Protected Species Management
CCMP	Indian River Lagoon Comprehensive Conservation & Management Plan
CERP	Comprehensive Everglades Restoration Program
Comp Plan	St. Lucie County Comprehensive Plan
CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FIND	Florida Inland Navigation District
FMRI	Florida Marine Research Institute
FOS	Florida Oceanographic Society
FPL	Florida Power and Light Company
FPUA	Fort Pierce Utilities Authority
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
HBOI	Harbor Branch Oceanographic Institution
HSNC	Hobe Sound Nature Center
ICW	Intracoastal Waterway
IRL	Indian River Lagoon
IRLNEP	Indian River Lagoon National Estuary Program
LDC	St. Lucie County Land Development Code
LDRs	Land Development Regulations
LOS	Level of Service
SLCSO	St. Lucie County Sheriff's Office
MPAC	St. Lucie 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 Distract
SMC	Save the Manatee Club
TCRPC	Treasure Coast Regional Planning Council
TMDLs	Total Maximum Daily Loads
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMD	Water Management District

MANATEE PROTECTION PLAN: A COMPREHENSIVE APPROACH TO REDUCING MANATEE MORTALITIES AND PROTECTING MANATEE HABITAT IN ST. LUCIE COUNTY, FLORIDA

EXECUTIVE SUMMARY

Located on Florida's southeast coast, St. Lucie 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, and the North Fork of the St. Lucie River. Residents and visitors share these waters with varying numbers of the Florida manatee (*Trichechus manatus latirostris*). St. Lucie County and the municipalities located within the County, have developed and adopted Comprehensive Plans and land development regulations that are intended to allow growth while providing protection for native flora and fauna.

St. Lucie County's protection of manatees began in 1990, with the adoption of the Comprehensive Plan, which included elements concerning coastal protection and conservation and open space. The County's efforts to protect manatees were enhanced with the adoption of vessel speed zones in July 1994 and the posting of these zones, which was completed in September 1995. These activities have been effective in reducing the proportion of watercraft-related manatee deaths in the county, despite a substantial increase in the number of registered boats. Manatee protection was further increased in June 2001 when the St. Lucie Board of County Commissioner conceptually approved the Boat Facility Siting component of this Manatee Protection Plan.

This Manatee Protection Plan (MPP or "Plan") identifies that the economic value of the marine industries is over $133.8 million annually in St. Lucie 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 Indian River Lagoon and St. Lucie River and their associated freshwater and tidal creeks, channels and tributaries. Although manatee abundance in St. Lucie County is difficult to estimate, manatees have been documented to be present in the county throughout the year. With the discharge from the Ft. Pierce Utilities Authority's (FPUA's) power plant in downtown Ft. Pierce as the only major warm-water attractant, the ambient water temperatures appear to be adequate for manatee presence even during winter months.

During the period since record-keeping began in 1974 through 2000, manatee mortality in St. Lucie County has varied from zero to five deaths per year. Although the State of Florida attempts to recover and determine the cause of death of all manatees, often the decayed condition prevents a definitive cause of death from being established. The causes of manatee death in St. Lucie County during this period include: undetermined (37%), watercraft (27%), perinatal (11%), other natural (16%), cold stress (5%) and other human-related (4%). The MPP identifies actions that are being taken and/or will be taken in order to protect manatee habitat and minimize human-related manatee injury and death.

An important component of this Plan is the establishment of a Manatee Protection Advisory Committee (MPAC), a balanced, multi-disciplinary committee comprised of various governmental agencies and representatives from local businesses and conservation organizations. MPAC will be convened to review and assess 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. Current speed zones appear to be adequate, and no new speed restriction zones are recommended at this time. Should watercraft-related threats or mortality increases, additional speed zones may be recommended.

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 through increased enforcement. Another important element of increasing compliance is elevating the knowledge and awareness of boat operators. In this regard, the Plan identifies that the County will work collaboratively with FPUA's Manatee Observation and Education Center to develop educational materials that will be distributed to the owners of all vessels that are registered in the County.

The Plan requests that the Florida Fish and Wildlife Conservation Commission 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 St. Lucie County to obtain additional information in these areas.

The MPP includes a projected schedule for Plan implementation, which includes the adoption of the MPP Goal, Objectives and Policies pursuant to Policy 7.1.3.2 of the County's Comprehensive Plan, and the development and adoption of new Land Development Regulations during 2003-2004. St. Lucie County will convene MPAC on an as-needed basis to review the effectiveness of the MPP. However, MPAC may also be convened if instances of watercraft-related manatee mortality threaten the County's designation by the U.S. Fish and Wildlife Service as medium risk to manatees.

It is St. Lucie County's goal through adoption and implementation of the MPP to reduce human-related manatee mortality, protect manatee habitat, promote boating safety, and increase public awareness of the need to protect manatees and their environment. Also, through adoption and implementation of this MPP, the County will maintain its designation by the U.S. Fish and Wildlife Service as medium-risk to manatees.

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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 percent 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 whiskered 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.

Although the precise number of manatees in Florida is not known, aerial censuses have documented the population to be at least 3,276 individuals (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 Percent of Florida Population);
- Southwest (37 Percent of Florida Population);
- Northwest (12 Percent of Florida Population); and
- St. Johns River (4 Percent of Florida Population).

St. Lucie County is part of the Atlantic Region, which includes the lower St. Johns River, the east coast of Florida and the Florida Keys. Analyses by manatee researchers suggest that the number of manatees in this region has remained fairly steady or decreased slightly during recent years (USFWS, 2000).

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 five years. The gestation period is approximately 11-14 months, and a calf remains dependent on its mother for approximately 1-2 years.

B. St. Lucie County

1. General Location

St. Lucie County is located on Florida's central east coast. It includes approximately 626 square miles of land and open water. It is abutted on the north by Indian River County and is separated from Martin County to the South by the C-23 Canal. It stretches approximately 22 miles from the Atlantic Ocean on the east to its boundary with Okeechobee County on the west (Figure 1).

The 2000 census reports St. Lucie County's population as 192,695. The majority of these residents live in the eastern portion of the county. In general, Interstate 95 and the Florida Turnpike separate urban areas to the east from agricultural areas to the west.

Approximately 21 miles of the Indian River Lagoon is present in St. Lucie County, extending the county's entire length along the eastern portion of the county. The Ft. Pierce Inlet is the one surface connection between the Atlantic Ocean and the Indian River Lagoon.

2. Economic Value of Local Marine Industries

Waterfront development and marine-related industries are extremely important components of the economy of St. Lucie County. In 2000, over 11,000 vessels were registered in St. Lucie County. From trailered jon boats to ocean-going cruisers, the ownership, maintenance and use of these vessels involves various businesses throughout the county, including but not

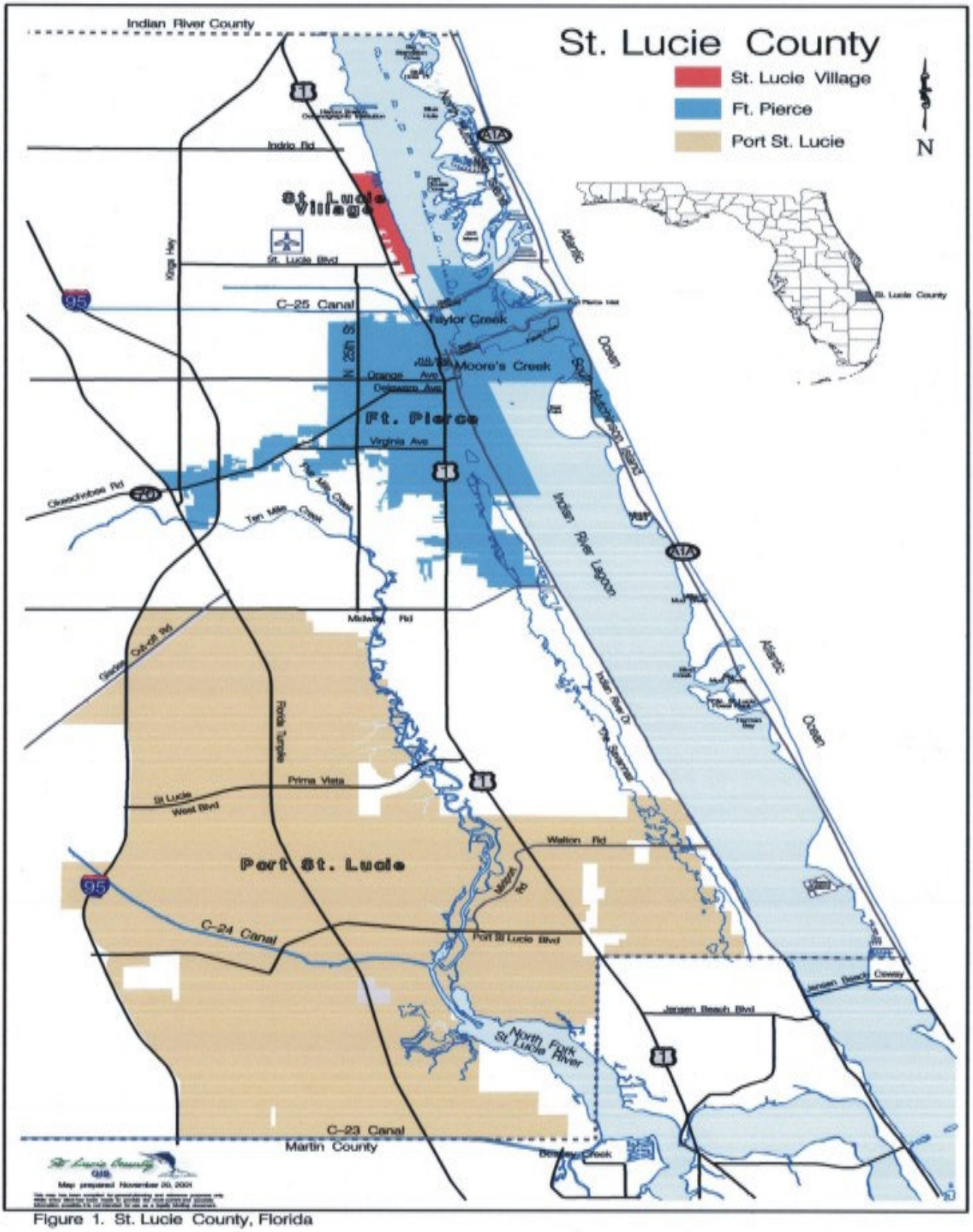


Figure 1. St. Lucie County, Florida

limited to sales of new and used boats, replacement parts, servicing, fueling and docking. It is impossible to place a value on the registered vessels themselves at this point, 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.

Boaters use their vessels for a variety of commercial and recreational purposes. Commercial fishing vessels are based in St. Lucie County, and their products are served at local restaurants and fish markets or exported outside the Treasure Coast. Charter vessels provide boating opportunities for a variety of people who are not boat-owners. Recreational uses include cruising, fishing, scuba diving and water skiing.

The waters off Ft. Pierce and St. Lucie County are widely recognized for the game fish that are caught not far off shore in the Atlantic. But the economic value of marine industries is not limited to the coastal waters. The North Fork of the St. Lucie River and the Indian River/Intracoastal Waterway provide a variety of boating opportunities for non-ocean going boaters. A few miles to the south in Martin County, there is easy access to the Okeechobee Waterway, the preferred travel corridor for many boaters to get to/from 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 (G.E.C., Inc., 2001), waterways have increased residential property values by up to $147 million in St. Lucie County. The impact of the waterways is estimated at $7.2 million on condominium values and $33.6 million on manufactured housing development. Without these waterways, property values in St. Lucie County would be $155.9 million to $182 million less than current values.

In a recent study for Marine Industries Association of Florida, Inc. (Thomas J. Murray & Associates, 2001), it has been estimated that marine industries have a $133.8 million annual effect on the economy of St. Lucie County. Local marine-related industries employ approximately 1,000 people and special events, including the annual St. Lucie County Boat Show, bring 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 our 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, 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 U.S. Fish and Wildlife Service first approved this plan in 1980. It was updated in 1989 and 1996 and has again been revised during 2000-01. One of the recommendations in the plan is to "develop site-specific manatee 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. St. Lucie County was designated as one of those key counties.

During the early years after the Governor's 1989 directive, the focus by the 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 Florida Fish and Wildlife Conservation Commission (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 also provided 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.

The purpose of St. Lucie 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 have been undertaken:

1. Inventory data pertaining to manatee distribution, abundance, and mortality in local waterways, including reviewing and assessing 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 Objectives and Policies that will be adopted pursuant to Policy 7.1.3.2 of the County's Comprehensive Plan. These Objectives and Policies will be used to develop 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 above.

As discussed later in this plan, boating impacts are the largest source of human-related manatee mortality. Consequently, the siting of new and expansion of existing boating facilities is a critical component of manatee protection. Overlapping with the development of this MPP has been the development of the Boat Facility Siting Component (BFSC) of this Plan. The BFSC includes an analysis of boating patterns and boating related impacts and describes the policies the County will implement to minimize the impacts of new or expanded boating facilities on manatees. The Board of County Commissioners (BOCC) has conducted public workshops on the BFSC, and the resulting document has been incorporated into this MPP at the request of the Commission.

As part of its strategy to develop appropriate conservation measures for manatees, the U.S. Fish and Wildlife Service (USFWS) delineated areas throughout Florida based on the relative risk of watercraft-related manatee mortality in those areas (USFWS, 2001). USFWS 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 (e.g., inland counties and counties with little manatee usage) had no documented watercraft-related mortality.

St. Lucie County is currently designated by the USFWS as a medium risk county. It is the County's goal to implement this MPP in order to maintain the county's designation as medium risk, as well as, to reduce human-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 water bodies for food, shelter, migratory pathways, and/or warm water refugia. This section provides a description of the aquatic areas within St. Lucie County that are accessible to manatees.

1. Locations

Manatee habitat in St. Lucie County can be separated into three distinct areas:

- Nearshore Atlantic Ocean;
- The Indian River Lagoon, including creeks, man-made canals and the Intracoastal Waterway (ICW); and
- The North Fork of the St. Lucie River.

Nearshore Waters of the Atlantic Ocean off North and South Hutchinson Island

St. Lucie County is located on the southeast coast of Florida between Indian River County to the north and Martin County to the south (Figure 1). It has approximately 21 miles of frontage on the Atlantic Ocean, with the Ft. Pierce Inlet providing the only surface-water connection between the ocean and inland waterways. The barrier islands situated north and south of the Ft. Pierce Inlet are referred to as North and South Hutchinson Island, respectively. Although manatees are most frequently observed in the Indian River Lagoon and other inland waters, they have been observed along the coast in the shallow, nearshore waters of the Atlantic Ocean.

Much of the nearshore area in St. Lucie County consists of barren sandy substrate that provides little, if any food for manatees. However, nearshore reefs and/or exposed hardbottom extend intermittently along the County's Atlantic coastline. These features range in water depths from less than 3 feet to over 30 feet. Manatees consume a variety of plant material and may graze on algae that grow on these substrates.

Florida Power and Light Company (FPL) maintains an electric generating facility, the St. Lucie Power Plant, on South Hutchinson Island. Ocean water, which is used for cooling purposes, enters the power plant through three large-diameter intake pipes. Two of the pipes are 12 feet in diameter and the third and largest pipe has an inside diameter of 16 feet. These pipes pass shoreward beneath the sea floor, beach and dunes and terminate within a large, enclosed canal that transports water to the plant. Manatees are occasionally entrained with cooling water and become temporarily entrapped in the intake canal.

The Indian River Lagoon, Including Adjoining Creeks, Man-made Canals and the Intracoastal Waterway (ICW)

The Indian River Lagoon 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 St. Lucie 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 Indian River Lagoon is an estuary of extremely high biological productivity. Reportedly America's most diverse estuary, the Indian River Lagoon is home to over 4,000 plant and animal species, including a number that are designated as endangered or threatened by the State of Florida and/or the federal government. Not surprisingly, the Indian River Lagoon has been designated as an estuary of national significance.

Approximately 21 miles of the Indian River Lagoon are present in eastern St. Lucie County, stretching continuously from the Indian River/St. Lucie County Line to the St. Lucie/Martin County Line. The lagoon varies in width from about 1.0 to 1.8 miles. With the exception of that portion within the Ft. Pierce City limits, all of the Indian River Lagoon within St. Lucie County has been designated as an Aquatic Preserve by the State of Florida.

Seagrasses and other submerged aquatic vegetation, although diminishing in coverage, are still present throughout much of the Indian River Lagoon. 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.

Two man-made features separate the Indian River Lagoon into three interconnected yet geographically distinct components (Figure 1). These sections are located from:

- The Indian River/St. Lucie County Line to the North Causeway;
- The North Causeway to the South Causeway, including the Ft. Pierce Inlet; and
- The South Causeway to the St. Lucie/Martin County line.

In St. Lucie County, two major watercourses provide freshwater drainage from inland areas directly into the Indian River Lagoon. Taylor Creek is a now-channelized waterway that drains lands northwest of the City of Ft. Pierce (Figure 1). In its upstream reaches, the creek drains agricultural lands and is maintained by SFWMD as the C-25 Canal. Near its downstream terminus, Taylor Creek flows over a spillway-type control structure located a short distance west of U.S. 1 and then enters the Indian River Lagoon west of the Ft. Pierce Inlet.

Moore's Creek is located approximately 1.1 miles south of Taylor Creek (Figure 1). It provides drainage through a heavily urbanized area of Ft. Pierce and joins the Indian River Lagoon on its west shore approximately 0.4 miles south of the South Causeway. Two

features of Moore's Creek, both of which are described in greater detail in various portions of this report, are particularly notable:

1. A segment of Moore's Creek just west of its connection with the Indian River Lagoon, is channelized and receives thermally affected water from the Fort Pierce Utilities Authority (FPUA) H.D. King Power Plant.

2. On the north bank of the channelized creek just west of the Indian River Lagoon, the City, County and local non-profit groups have worked cooperatively to construct, operate and maintain the Manatee Observation and Education Center (MOEC).

Man-made canals and channels of varying sizes and depths have been constructed at various locations in and adjacent to the Indian River Lagoon in St. Lucie County. These include:

- Harbor Branch Navigation Channel;
- Canals in Residential Neighborhoods, including:
  - St. Lucie Village,
  - Queen's Cove,
  - Ft. Pierce Cut and Wildcat Cove, and
  - Jennings Cove;
- Port of Ft. Pierce/Ft. Pierce Inlet;
- The FPL Navigational Channel in Big Mud Creek; and
- The Intracoastal Waterway.

Harbor Branch Oceanographic Institution (HBOI) is a non-profit marine research facility located on the west shore of the Indian River Lagoon approximately 1.5 miles south of the Indian River/St. Lucie County line (Figure 1). In addition to a land-based campus, HBOI maintains a berthing area that has been dredged from uplands and a navigation channel to allow scientific research and other vessels to move to and from the deeper waters of the ICW.

A number of canals which connect to the Indian River Lagoon have been excavated in residential areas, several of which are within the greater Ft. Pierce area. These areas include:

- St. Lucie Village – west side of the Indian River Lagoon approximately three miles south of the Indian River/St. Lucie County line;

- Queen's Cove – North Hutchinson Island, east side of the Indian River Lagoon approximately 3.0 miles south of the Indian River/St. Lucie County line;

- Ft Pierce Cut and Wildcat Cove – North Hutchinson Island, east side of the Indian River Lagoon approximately1.0 to 2.0 miles north of the Ft. Pierce Inlet;

- Jennings Cove – South Hutchinson Island, east side of the Indian River Lagoon, approximately 1.25 miles south of the Ft. Pierce Inlet; and

- Nettles Island – South Hutchinson Island, east side of the Indian River Lagoon approximately 1.7 miles north of the St. Lucie/Martin County Line.

The Port of Ft. Pierce (Port) is a deep-water (28 feet) commercial shipping port situated on the west shore of the Indian River Lagoon between the North and South Causeways almost entirely within the limits of the City of Ft. Pierce (Figure 1). Ships move between the Atlantic Ocean and the Port through the Ft. Pierce Inlet. The County continues to oversee management of the Port with the Board of County Commissioners acting in the capacity of a port authority and the County Administrator serving in the capacity of interim-Port Director. Since the Port includes properties located in the City and unincorporated County, responsibilities are divided between the City of Fort Pierce and St. Lucie County. All port master planning issues are handled by the County. Land use and zoning issues will be addressed by the appropriate local government. St. Lucie County proposes to include in its Comprehensive Plan the Port Master Plan.

The primary operator at the Port specializes in the import and export of citrus and fruit juice products. Other cargo shipped through the Port of Ft. Pierce includes small volumes of Caribbean fruit and other products, aragonite, and building materials. No figures are available regarding the volume of cargo handled at the port, but it is relatively small in comparison to most other ports on the east coast of Florida. Approximately half of the property within the Port is undeveloped including 20 acres owned by St. Lucie County and 67 acres owned privately. There is strong local interest in using this area as a hub for ecotourism and mega yachts, and the County has discussed increasing public access to the waterfront along with developing areas for recreation. The private owner has discussed plans to import and export produce between Ft. Pierce and the Bahamas.

Big Mud Creek is a natural waterway located on the east side of the Indian River Lagoon near the center of South Hutchinson Island (Figure 1). Although the shoreline of Big Mud Creek remains mangrove-lined and in a natural condition, the submerged lands of the creek have been deepened and serve as a navigation pathway for equipment being transported by barge to and from FPL's St. Lucie Power Plant.

The ICW is situated near the center of the Indian River Lagoon. This channel, which is maintained to a depth of –10 feet to –12 feet by the Florida Inland Navigational District (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.

In addition to these various dredged areas, there are a number of naturally-occurring tidal creeks and embayments that connect to the Indian River Lagoon. Those for which there are commonly used names (e.g., Little Mud Creek, Blind Creek, Ft. Pierce Cut, Wildcat Cove) are identified on Figures 2 and 3. Some of these creeks and embayments are in substantially natural condition, being fringed with growth of red mangroves (*Rhizophora mangle*), black mangroves (*Avicennia germinans*) and white mangroves (*Languncularia racemosa*) while others include various degrees of residential development.

Almost all the acreage of salt marsh and mangrove swamp in St. Lucie County is impounded, or has been impounded, for control of the salt marsh mosquito (*Aedes solicitans*). To accomplish mosquito control source reduction, a thin layer of water is maintained over the wetland adjacent to the Indian River Lagoon, by encircling the target areas with dikes and pumping estuarine waters into the cell. There are 37 impoundments, which encompass more than 1900 acres of mangrove and marshlands within the county. Three of these impoundment areas have breaches in the dikes which allow ingress and egress of marine organisms and perhaps manatees. Eleven others have culverts which are left open at all times. The rest are managed by St. Lucie County Mosquito Control District.

The North Fork of the St. Lucie River

The North Fork of the St. Lucie River (North Fork) is a naturally-meandering inland watercourse that flows south-southeast throughout much of St. Lucie County (Figures 1 and 4). Its drainage basins are generally west of the City of Fort Pierce and within the City of Port St. Lucie. Drainage from suburban and agricultural lands via Ten-mile Creek and Five-mile Creek serve as the headwaters of the North Fork. As it flows south, the North Fork gradually transitions from a narrow, winding watercourse with dense, overhanging vegetation, to a wide, open-water estuary. Approximately 5.5 miles downstream (south) of the creeks that serve as its headwaters, the North Fork passes into Martin County, where it then flows over 7 miles to its junction with the Indian River Lagoon. All of the North Fork within St. Lucie County has been designated an Aquatic Preserve by the State of Florida.

Several creeks and waterways flow into the North Fork between the headwaters and the St. Lucie/Martin County Line. Some of these waterways, (e.g., Winters Creek) are substantially natural. Others (e.g., C-24, C-23) are man-made features that allow management of water for agricultural uses and/or drain the surrounding watershed.

The State of Florida owns and manages a vast tract of freshwater wetlands in eastern St. Lucie County knows as the Savannas State Preserve. Because these wetlands are land-locked, they are inaccessible to manatees.

2. Public Land Acquisition Initiatives

In November 1994, voters in St. Lucie County approved a $20 million bond referendum to acquire environmentally valuable uplands for conservation. To date, over 5,500 acres of land have been acquired through this Environmentally Significant Lands (ESL) program. Although County funds cannot be used to purchase wetland or open-water tracts, in many instances St. Lucie County has been successful in using ESL funds in matching-fund programs with other regional, state and/or federal governmental entities whose funds can be used for the wetland/aquatic component of these properties.

Several of these tracts include water frontage in manatee habitat areas. Waterfront parcels that have been purchased through the ESL program are located throughout the county. Fronting the IRL, public land purchases have included parcels on North Hutchinson Island

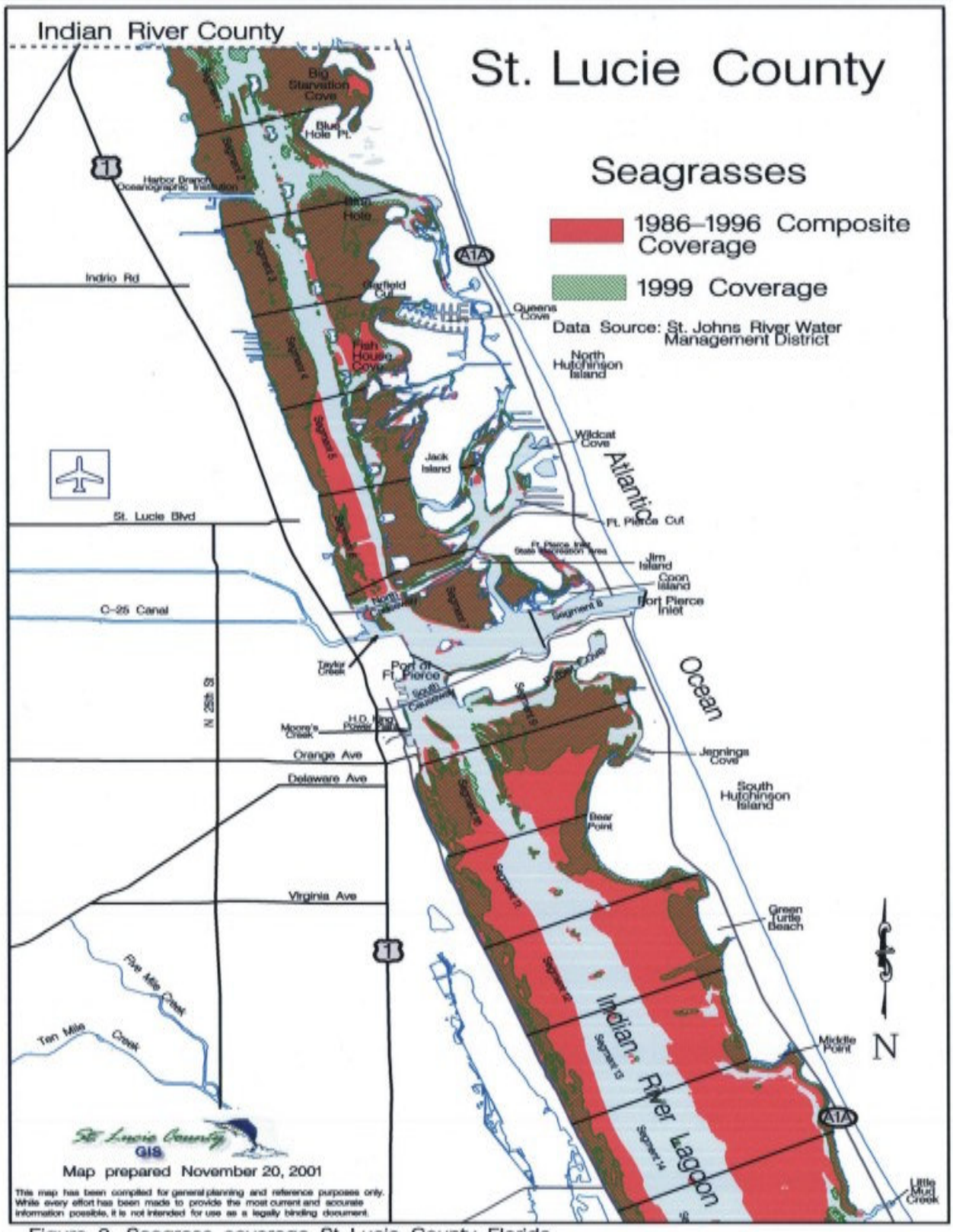


Figure 2. Seagrass coverage, St. Lucie County, Florida

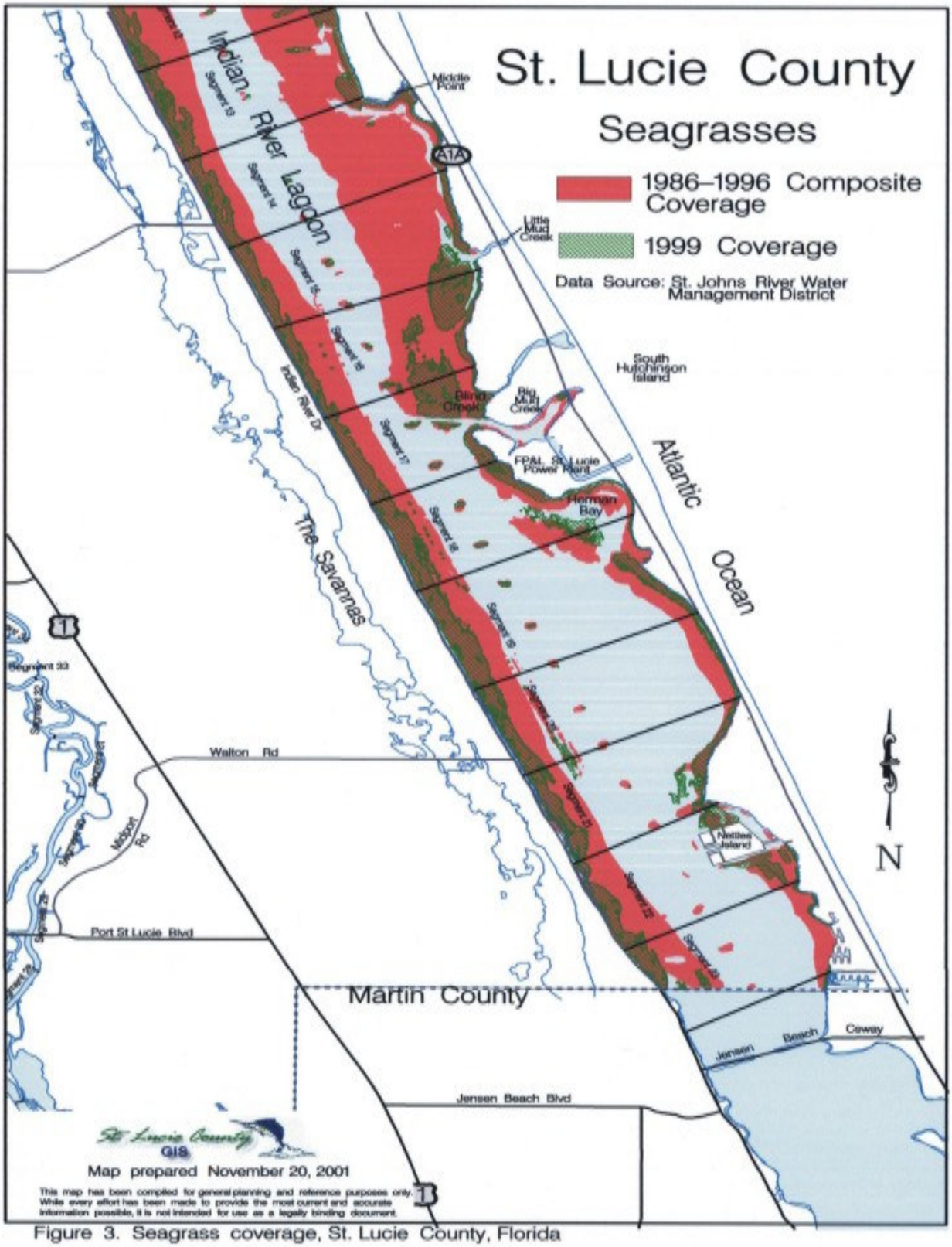


Figure 3. Seagrass coverage, St. Lucie County, Florida

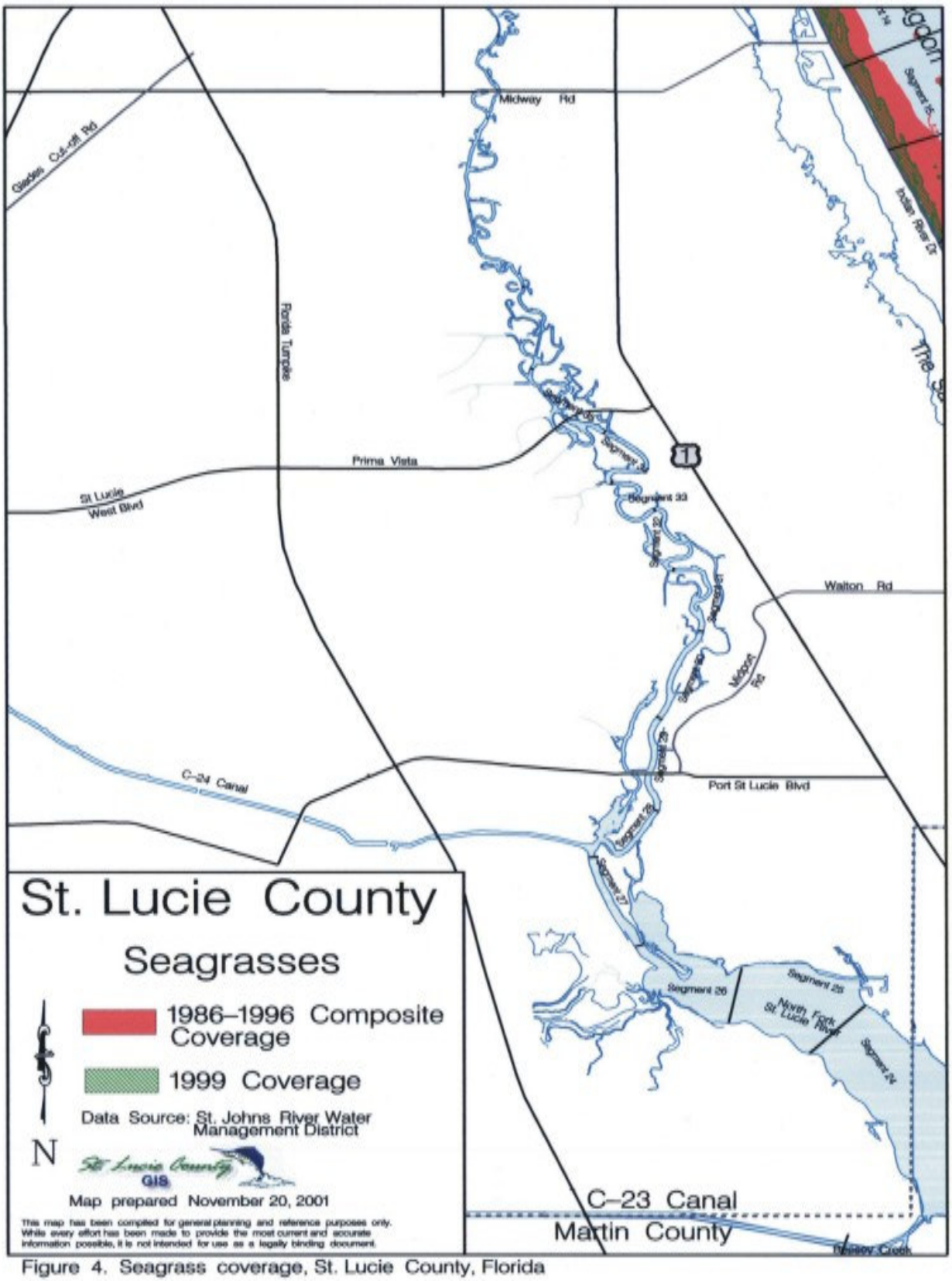


Figure 4. Seagrass coverage, St. Lucie County, Florida

(an addition to the Avalon State Recreation Area, King's Island and Queen's Island) and on South Hutchinson Island (Bear Point and Blind Creek). Several tracts that front the North Fork have also been brought into public ownership through the ESL program (Figure 5). In the future, it is anticipated that some ESL funds will be used as the local contribution toward joint land acquisition initiatives.

3. Water Quality and Vegetation

Estuaries are water bodies where saline ocean waters and fresh waters mix. The distribution and abundance of submerged 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 often find their way into estuaries via freshwater tributaries, canals, and upland run-off, including storm-water discharges.

Although water quality in the nearshore areas of the Atlantic Ocean is excellent, water quality in manatee habitat in inland St. Lucie County waterways is highly variable. Fluctuations occur daily, based primarily on tidal cycles, and seasonally, in response to southeast Florida's annual cycle of summertime wet season and wintertime dry season. Diurnal tides affect the IRL to the greatest extent near the Ft. Pierce Inlet, although exchange through the St. Lucie Inlet in neighboring Martin County also has some influence. Tidal effect is reduced as the distance from an inlet increases. Overall, water quality in St. Lucie County is better in the IRL than in the tributaries and canals that flow into the lagoon and the St. Lucie Estuary. Consequently, seagrasses are largely limited to the IRL.

Over the past several decades, water quality within the IRL and the St. Lucie Estuary has been significantly degraded by various drainage and development projects. Agricultural and urban drainage projects have changed the boundaries of the watershed/drainage basin and caused the loss of natural habitat. These changes have caused significant alterations in the timing, distribution, quality and quantity of fresh water that enters St. Lucie County waterways. Periodic freshwater discharges into the North Fork, primarily through the C-23, C-24 and other canals, have caused extreme salinity fluctuations. Many aquatic organisms such as oysters and seagrasses are unable to tolerate these fluctuations, which sometimes occur over relatively short time periods. Although similar discharges have occurred through the C-25 canal at Taylor Creek, the impacts there have been less severe, because the proximity of the creek to Ft. Pierce Inlet enhances mixing with ocean waters.

In addition to altering salinity regimes, freshwater discharges into the North Fork of the St. Lucie River and Indian River Lagoon 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 have fallen out of suspension, they have accumulated on the bottom sometimes forming a silty ooze over previously natural sediments. In some areas of the lower North Fork, this ooze is several inches thick. Thus,

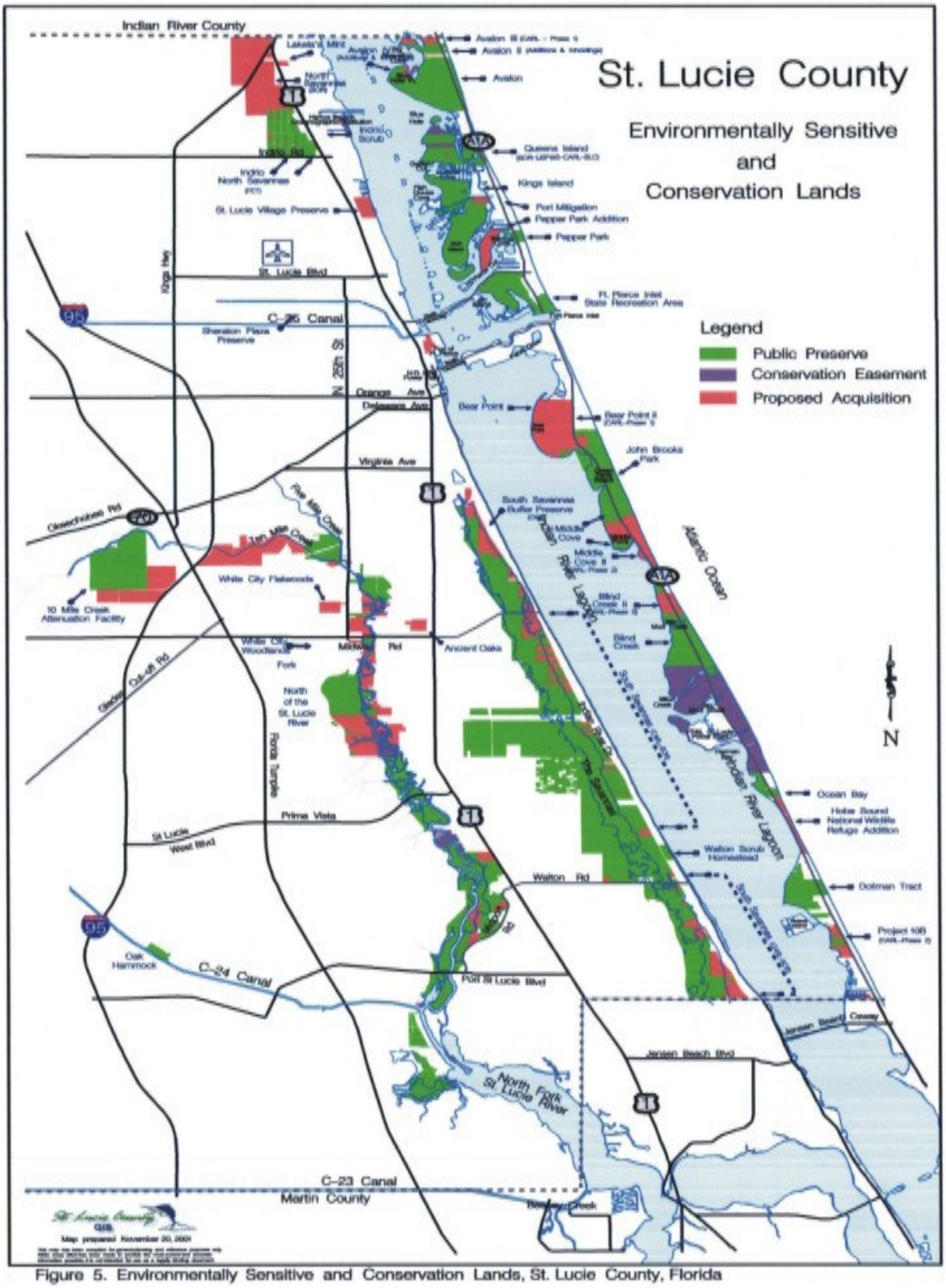


Figure 5. Environmentally Sensitive and Conservation Lands, St. Lucie County, Florida

changes in drainage basin characteristics within St. Lucie County have significantly impacted the estuarine ecosystem and caused the loss of oysters and submerged aquatic vegetation from large portions of their historic ranges.

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

Water Quality

In Chapter 17-3, Florida Statutes, 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 the acceptable levels of a variety of constituents (e.g., nutrients, suspended solids, turbidity, dissolved oxygen, etc.). All surface waters in St. Lucie County are classified as Class III waters except as noted below:

- Class II Indian River Lagoon from Middle Point south to St. Lucie/ Martin County Line, east of ICW centerline; and
  Indian River Lagoon from Indian River/St. Lucie County Line to an east-west line through the southern point of Fishhouse Cove.

Chapter 17-3 F.S. also identifies surface waters that, due to their ecological value and/or sensitivity are designated as “Outstanding Florida Waters” and “Outstanding National Resource Waters”. Although there are no Outstanding National Resource Waters in St. Lucie County, several areas have been designated as Outstanding Florida Waters, all of which are accessible to manatees. These include:

- Waters within the Ft. Pierce Inlet State Recreation Area;
- Waters within the state-owned Green Turtle Beach;
- Waters within the state-owned Surfside Additions;
- Waters within the boundaries of the Indian River Lagoon Aquatic Preserve; and
- Waters within the North Fork of the St. Lucie River Aquatic Preserve.

While, in general, many surface waters in St. Lucie County meet applicable water quality standards for their respective classifications, others currently do not. Section 303(d) of the federal Clean Water Act 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 Florida Department of Environmental Protection (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 St. Lucie County that are accessible to manatees and which did not meet applicable standards and are therefore considered impaired are identified in Table 1.

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 also identified in Table 1.

There are various programs that are currently in place or under review that, if implemented, would improve water quality in the St. Lucie County water bodies identified in Table 1. These programs include:

Surface Water Improvement and Management Plan (SWIM)

Adopted by the Florida legislature in 1987, the SWIM Act required that plans be prepared by the SFWMD 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 Comprehensive Evergaldes Restoration Project is a $7.8 billion project currently awaiting congressional authorization and state funding. The plan calls for creation of water storage areas and filtering marshes to manage surface water that is currently being discharged to the Atlantic Ocean and the Gulf of Mexico through an existing network of canals. Costs would 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 calls for surface water storage reservoirs, water storage areas, aquifer storage and recovery wells, water quality treatment areas, removal of more

Table 1

Surface Waters in St. Lucie County Identified by FDEP and EPA as Impaired or Nearly Impaired

Water Body	Major Causes of Failure to Meet Standards
Portions of the Indian River Lagoon [1]	Nutrients, dissolved oxygen, total suspended solids, biochemical oxygen demand, coliform bacteria, copper, and arsenic.
Portions of the North Fork of the St. Lucie River, including Ten-mile Creek [2]	Dissolved oxygen, nutrients, biochemical oxygen demand, coliform bacteria and pesticides.
C-23 [1]	Phosphorus, inorganic nitrogen, copper, lead, chromium, mercury, nickel, zinc, ethion.
C-24 [1]	Total phosphorus, inorganic nitrogen, copper, lead, chromium, mercury, nickel, zinc and ethion.
C-25 [1]	Nutrients and agricultural chemicals.
Henry Creek [2,3]	Dissolved oxygen, nutrients and coliforms.
Myrtle Slough [2,3]	Dissolved oxygen, nutrients and coliforms.

[1] Not impaired, but poor water quality
[2] Impaired
[3] Although these waters are not accessible to manatees, they drain into Lake Okeechobee, which is accessible to manatees.

than 500 miles of canals and levees which are barriers to natural sheetflow, 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, in the Indian River Lagoon for salinity, and in the St. Lucie Estuary for freshwater releases.

Total Maximum Daily Loads (TMDLs)

The federal Clean Water Act requires that Total Maximum Daily Loads (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 involved with supporting, developing and/or implementing non-regulatory programs to improve the health of local waterways. These include the Indian River Lagoon Restoration Feasibility Task Force and the St. Lucie River Initiative, both of which are 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.

Vegetation

Subsequent to the designation of the Indian River Lagoon as an Estuary of National Significance, SFWMD and SJRWMD have collaborated in the mapping of seagrasses in the IRL. This effort, which has been conducted intermittently since 1986, has involved analysis of aerial photography coupled with ground-truthing. Figures 2-4 show the results of the most recent grassbed mapping effort (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.

Although submerged freshwater vegetation (e.g., eelgrass, *Vallisneria americana*) may have occurred at one time in fresh water areas of St. Lucie County, no survey or mapping of this resource has been conducted recently. Emergent shoreline vegetation occurs along portions of the Indian River Lagoon and the North Fork of the St. Lucie River. However, there have been no efforts to map or categorize this vegetation.

Floating vegetation, including invasive, non-native water hyacinths (*Eichhornia crassipes*) is often present in the headwaters of the North Fork and is occasionally carried into estuarine waters through the C-23, C-24 and C-25 Canals during periods of heavy freshwater discharges. Although manatees consume water hyacinths, the introduction of this aquatic weed into the estuarine system is problematic. Because it cannot tolerate saline waters, the plant dies upon entering the estuary and sinks to the waterway bottom. As it decays, it adds to the detrital muck that smothers natural sediment biota.

Summary of Water Quality and Vegetation

Through the efforts of various federal, state and local governmental entities, a variety of data has been collected concerning water quality in those areas of St. Lucie County inhabited by manatees. In general, water quality in the nearshore areas of the Atlantic Ocean is excellent, and water quality in the Indian River Lagoon is adequate to support the submerged aquatic vegetation upon which manatees feed. Water quality is generally below standard in the water bodies that serve as headwaters of the North Fork of the St. Lucie River, and therefore is below standard in portions of the North Fork. This water body has been negatively affected by alterations within most of its constituent drainage basins. These changes have likely reduced the abundance and limited the distribution of submerged aquatic vegetation in the upper regions of the St. Lucie Estuary. 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.

4. Manatee Distribution

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

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

- Aerial surveys;
- Radio telemetry; and
- Visual observations, including data collected by the Florida Oceanographic Society and MOEC.

Aerial Surveys

The Florida Fish and Wildlife Conservation Commission (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 approximately 500 feet, and consist of annual state-wide synoptic surveys and local bimonthly surveys.

Synoptic flights are conducted each year to obtain a minimum statewide count of manatees. 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. In St. Lucie County, the focal point of the winter surveys is the thermally-enhanced water that is discharged from the FPUA's H.D. King Power Plant, although manatees are counted throughout the Indian River Lagoon.

Bi-monthly surveys, which are intended to document the relative abundance and distribution of manatees on a seasonal basis in local waterways, have been conducted at various times. Data from these surveys in St. Lucie County are somewhat difficult to interpret because some flight paths only covered the portion of the Indian River Lagoon between the Ft. Pierce Inlet and the St. Lucie/ Indian River County line, other surveys only covered the Indian River Lagoon south of the Ft. Pierce Inlet, and yet others only included the North Fork of the St. Lucie River.

The Treasure Coast Regional Planning Council (TCRPC) analyzed FWC's aerial survey data in developing the first draft of St. Lucie County's Boat Facility Siting Component. After eliminating surveys that were not completed due to inclement weather, a total of 111 aerial survey data sets recorded between June 1985 and June 1993 were available for the Indian River Lagoon in St. Lucie County. Additionally, there were 36 aerial surveys of the North Fork of the St. Lucie River between November 1990 and June 1993.

During the above referenced multi-year period of FWC overflights, a total of 1345 manatee sightings were documented in St. Lucie County. Manatees were approximately four times as abundant from December through April as during other times of the year. However, the number of manatees in the county during any given month can fluctuate greatly, especially during the winter.

Based on aerial survey data, manatees were most abundant in four general areas:

- Indian River Lagoon near Harbor Branch Oceanographic Institution;
- Eastern portion of the Indian River Lagoon in the Queen's Cove area;
- Indian River Lagoon near the mouth of Taylor Creek; and
- Indian River Lagoon near the mouth of Moore's Creek.

All of these areas are in the Indian River Lagoon and thus lie along the principal north-south corridor for manatees on the east coast of Florida, and all four offer certain attractants to manatees (e.g., proximity to extensive seagrass beds, sources of fresh water, etc.). In addition to these features, Moore's Creek also offers thermally enhanced waters. These locations also provide deeper water depths, which retain warmer water when winter cold fronts chill shallower Indian River waters. The dead-end canals at Queen's Cove may also provide quiet habitat that may be important for calving or nursing.

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 during development of St. Lucie County's BFSC. 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.

TCRPC reports that the results of the Sirenia Project indicate that 34 of the 63 manatees tracked by satellite included St. Lucie County in their range. By examining a summary of the general movement patterns for each of these manatees, 108 movements by 29 individuals traveling through or to St. Lucie County have been documented. Of these movements, 57 were to the north and 51 were to the south. All of the movements in October and November were toward the south. From December through March, 59 percent of the movements were to the south and 41 percent were toward the north. From April through June, the reverse was true, with the majority (75 percent) moving toward the north.

Manatees sometimes made several trips through St. Lucie County in relatively short periods of time within the same season. For example, one individual was tracked traveling south from Cocoa Beach (Brevard County) to the Port Everglades Power Plant (Broward County) in late October to mid-November 1989. This manatee then traveled to the Banana River (Brevard County) 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.

Although the results of the Sirenia Project are preliminary, 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 found traveling 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 Intracoastal Waterway, but some individuals travel in the Atlantic Ocean near the coast;

- The coastal waterway from the Indian River Lagoon to Biscayne Bay is considered to be a high-use area frequented by many manatees during the winter; and
- Manatees often travel in deep water channels which are also used by boats.

Visual Observations

The most long-term database of manatee sightings in St. Lucie County resides with the Florida Oceanographic Society (FOS), a non-profit, scientific 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. Because manatee sightings reported to FOS are not verified, and there is no way to screen out incorrect observations or to distinguish if an individual manatee 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 A.

Data compiled through the FOS sighting reports indicates that during the period from 1990 through 1992, (when the sighting reporting project included the entire county) manatees were present during every month of the year (Table 2). In some areas, such as the IRL and the North Fork, manatees were observed throughout the year. In other areas, manatees were reported less frequently.

When the FOS program was initiated, calls were received from throughout the Indian River Lagoon, as far north as Indian River County, and throughout the St. Lucie Estuary, including the North Fork of the St. Lucie River. However, the Ft. Pierce newspaper that published the weekly data decided to discontinue the service in 1993. Thus, FOS only compiled data for the northern portion of the Indian River Lagoon from 1990 through 1992. However, data collection for the southern portion of the lagoon as well for the North Fork has continued to date.

Collectively, data obtained through aerial surveys, radio telemetry and visual observations, make it apparent that manatees are found in most of St. Lucie County's non-land-locked 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. There are only two major sources of warm water in St. Lucie County, the Ft. Pierce Utility Authority's (FPUA's) H.D. King Power Plant and FPL's St. Lucie Plant on Hutchinson Island. Discharges from these plants and their effects on manatees are discussed in the following section.

Table 2

Months During Which Manatees Were Sighted in St. Lucie County Waterways, 1990-1992[1]

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Main Body of the North Fork to Kitching Cove			■	■	■	■	■	■	■	■	■	■
Kitching Cove							■		■	■	■	
Howard Creek								■				
Winter's Creek												
Blakeslee Creek											■	
Mid North Fork - Kitching Cove to Port St. Lucie Blvd.	■	■	■	■	■	■	■	■	■	■	■	■
Upper North Fork - North of Port St. Lucie Blvd.	■	■	■	■	■	■	■	■	■	■	■	■
IRL – Martin County Line to Herman Bay	■	■	■	■	■	■	■	■	■	■	■	■
IRL - Herman Bay to Bear Point		■			■	■	■	■	■	■	■	■
Big Mud Creek	■	■	■	■	■	■	■	■	■	■	■	■
Blind Creek												■
Little Mud Creek			■	■	■	■	■			■	■	■
IRL - Bear Point to South Causeway	■	■	■	■	■	■		■	■	■	■	■
IRL – South Causeway to North Causeway			■	■	■	■	■	■	■	■	■	■
Taylor Creek			■	■	■	■	■		■	■	■	■
IRL – North Causeway to Indian River County Line	■	■	■	■	■	■	■	■	■	■	■	■
Atlantic Ocean North of Ft. Pierce Inlet					■	■	■	■	■	■		■
Atlantic Ocean South of Ft. Pierce Inlet								■	■	■		■

[1] Source: Florida Oceanographic Society

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 Tequesta Field Station, respond to reports from St. Lucie 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. Based on many years of examining manatee carcasses, FWC defined the following nine categories of manatee mortality:

- Category 1 Watercraft-related;
- Category 2 Floodgate/canal lock;
- Category 3 Other Human;
- Category 4 Perinatal (Dependent Calf);
- Category 5 Cold Stress;
- Category 6 Other Natural;
- Category 7 Carcass Verified by Reliable Source but Not Recovered;
- Category 8 Undetermined, Too Decomposed; and
- Category 9 Other Undetermined.

From January 1974 through December 2000, there have been 56 manatee deaths recorded in St. Lucie County waterways (Table 3). For the purpose of analyzing manatee mortalities in St. Lucie County, these deaths were assigned to one of six categories: watercraft-related, other human related, perinatal, cold-stressed animals, other natural, and undetermined (FWC Categories 7, 8 and 9). FWC Categories 7, 8 and 9 have been combined because the distinctions among undetermined causes are not germane to this analysis. FWC also has a category for floodgate/lock related (FWC Category 2), but no mortalities in St. Lucie County have ever been assigned to this category. The location of dead manatees recovered by FWC from St. Lucie County waterways is shown by mortality code in Figures 6-8.

Manatees have died in St. Lucie County waterways almost every year since 1977, with total annual counts varying from none (1979 and 1983) to five (1990; Table 3). Since mortality statistics have been kept, approximately 30 percent of all mortalities in St. Lucie County have been firmly attributed to human-related causes (Figure 9). On an annual basis, the relative contribution of various causes of mortality to total mortality has varied considerably (Figure 10).

Table 3

Summary of Manatee Mortalities in St. Lucie County by Year and Type, 1974-2000

Year	Mortality Code[1]							
	1	2	3	4	5	6	7	Total
1974								0
1975								0
1976								0
1977							3	3
1978							1	1
1979								0
1980							1	1
1981	1						3	4
1982						1	1	2
1983								0
1984	2						1	3
1985	1						1	2
1986					3		1	4
1987	1							1
1988				1		1		2
1989	1			2		1		4
1990	4						1	5
1991	1							1
1992	1					2	1	4
1993	1			1			2	4
1994						2		2
1995			1				1	2
1996	1			1		2		4
1997			1				1	2
1998							1	1
1999				1			1	2
2000	1						1	2
TOTAL	**15**	**0**	**2**	**6**	**3**	**9**	**21**	**56**

[1]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)]

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

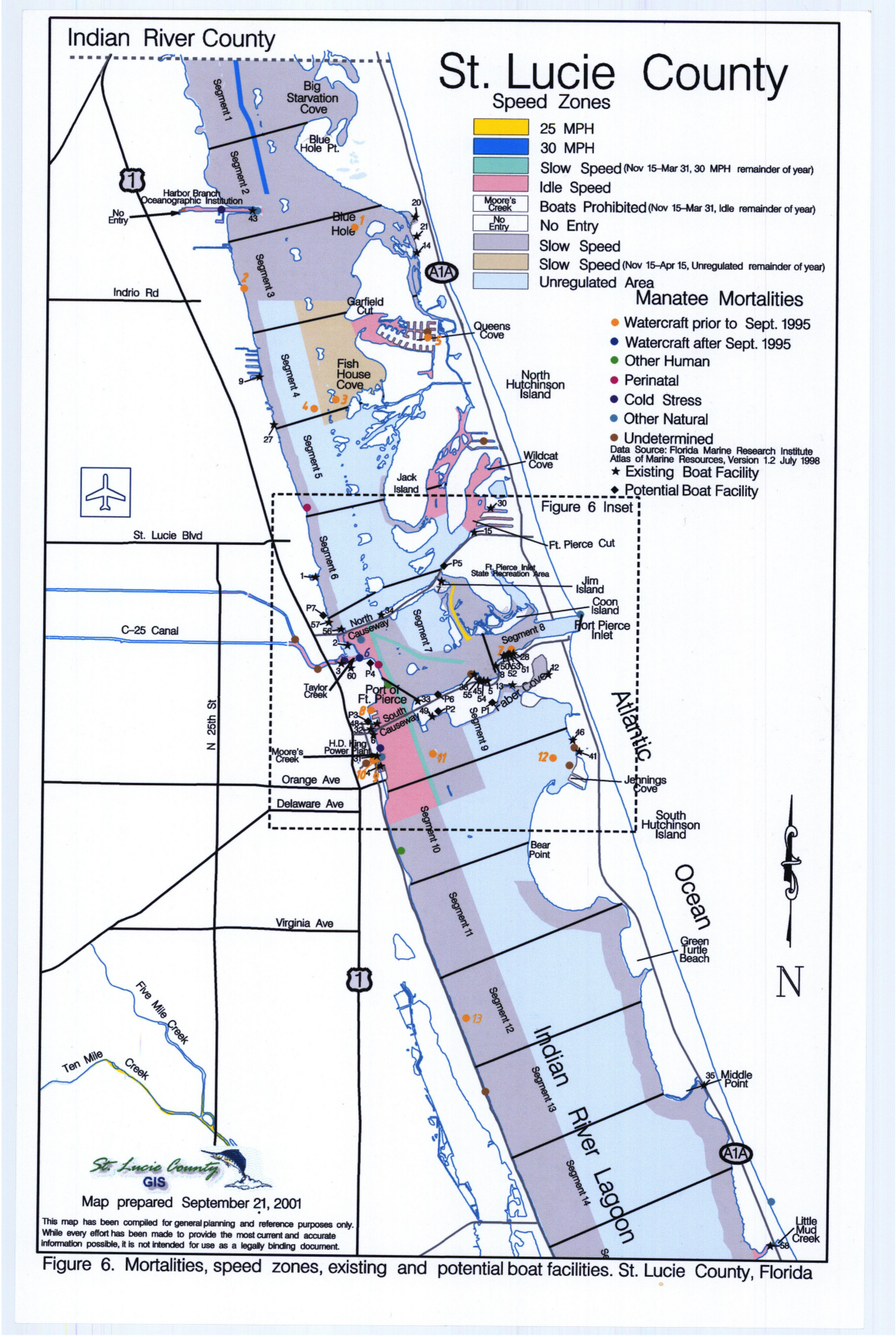


Figure 6. Mortalities, speed zones, existing and potential boat facilities. St. Lucie County, Florida

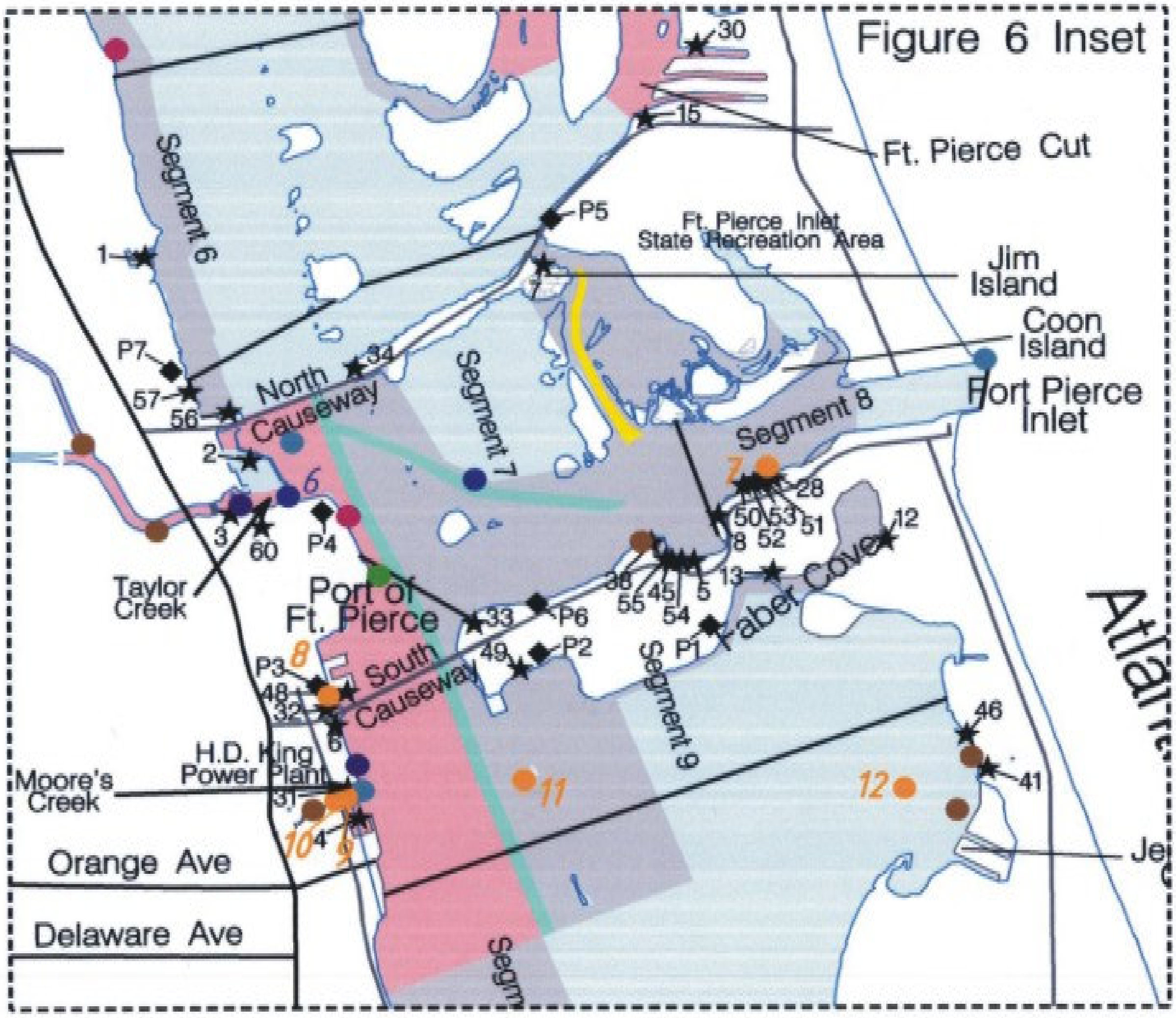


Figure 6 Inset
Ft. Pierce Cut
Ft. Pierce Inlet State Recreation Area
Jim Island
Coon Island
Fort Pierce Inlet
Segment 6
Segment 7
Segment 8
Segment 9
North Causeway
South Causeway
Port of Ft. Pierce
Taylor Creek
Moore's Creek
H.D. King Power Plant
Orange Ave
Delaware Ave
Faber Cove
P1
P2
P3
P4
P5
P6
P7

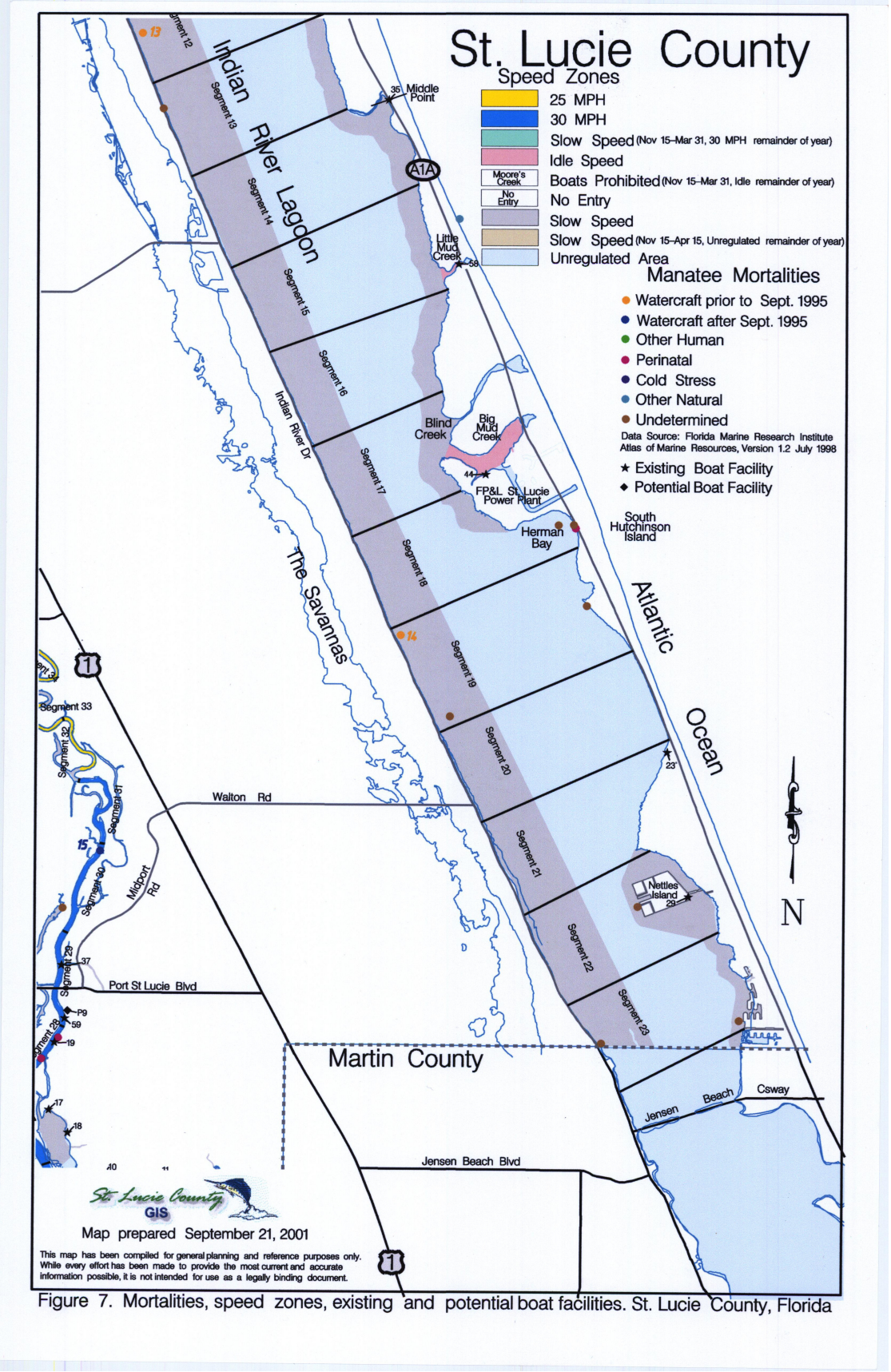


Figure 7. Mortalities, speed zones, existing and potential boat facilities. St. Lucie County, Florida

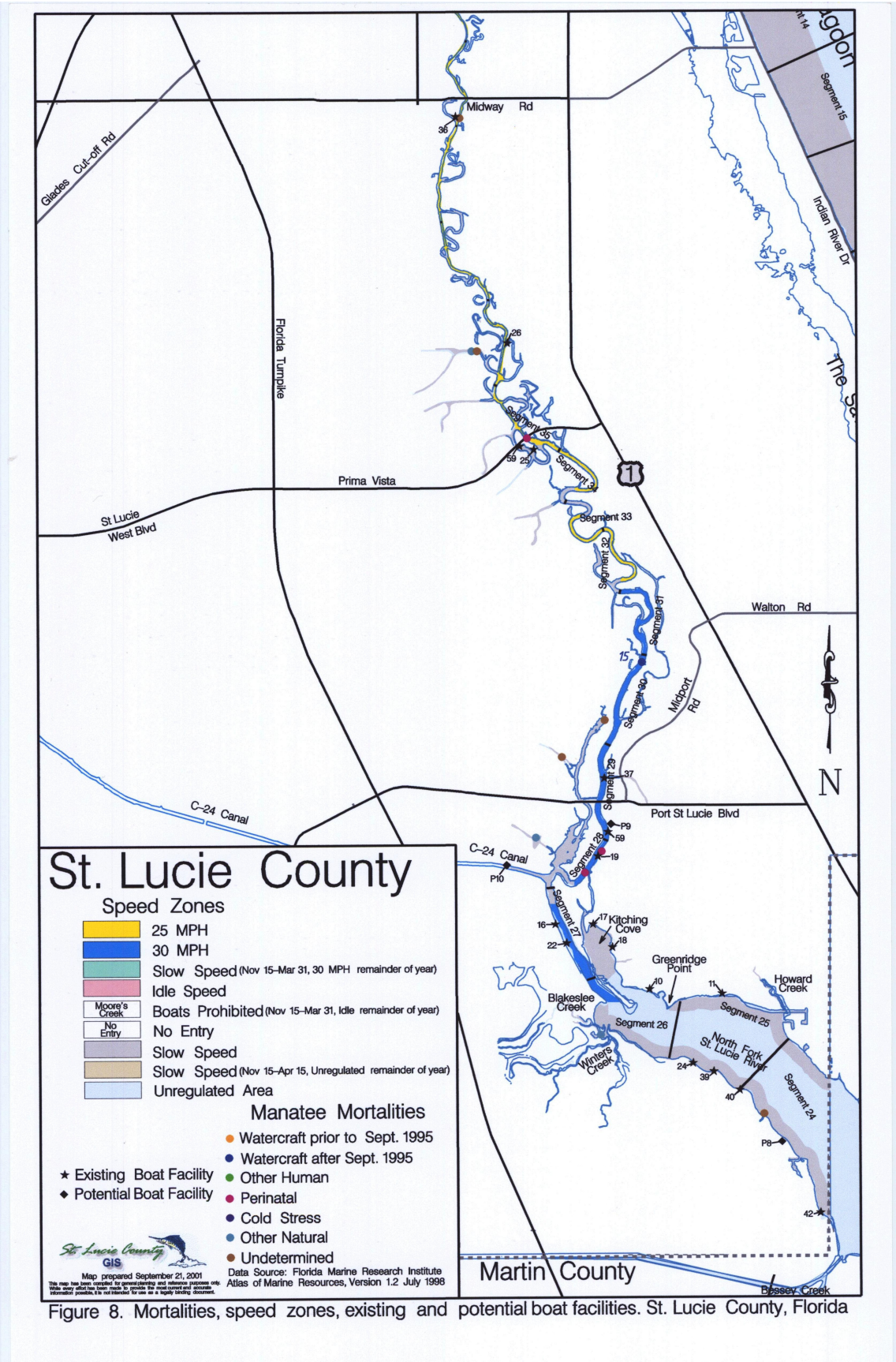


Figure 8. Mortalities, speed zones, existing and potential boat facilities. St. Lucie County, Florida

Perinatal mortality (the death of newborn and dependent calves) has accounted for 11 percent of the total manatee mortality (Figure 9). These mortalities occurred in equal numbers in the North Fork of the St. Lucie River and the Indian River Lagoon. The extent to which creeks and other sheltered areas of these two water bodies provide pregnant and nursing mothers with refuge from boat traffic or the extent to which they are used for birthing is unknown.

2. Analysis of Manatee/Human Interaction

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

- Watercraft;
- Power plants;
- Other congregating areas; and
- Introduced sources of water and food.

Watercraft

Shipping, commercial fishing, and recreational boating are extremely important components of St. Lucie County's culture and economy. The narrow, winding North Fork of the St. Lucie River, the wide Indian River Lagoon, and the open Atlantic Ocean, all areas where manatees may be present, are heavily traveled by a variety of watercraft ranging in size from small skiffs to ocean-going freighters. Areas where boats are present in large numbers, such as in and around marinas and in navigational channels, increase the risk of harm to manatees. In addition to these high use areas, boats are also concentrated during special events, such as the annual Ft. Pierce Christmas Boat Parade, 4th of July fireworks, fishing tournaments, and boat races. These events draw large numbers of watercraft into relatively confined spaces for short periods. Although powerboat races are not currently held in St. Lucie County, they pose a particularly serious threat to manatees. Consequently, whenever the U.S. Coast Guard permits one of these events, it must enter into a Section 7 Consultation with the USFWS, as required under the Endangered Species Act, to ensure that adequate safeguards are implemented.

Since data have been systematically collected, 15 manatees have died from boat collisions in St. Lucie County waterways (Table 3). Annual mortalities from watercraft have varied from zero to four.

Figure 9. Causes of Manatee Mortalities in St. Lucie County (1974 - 2000)

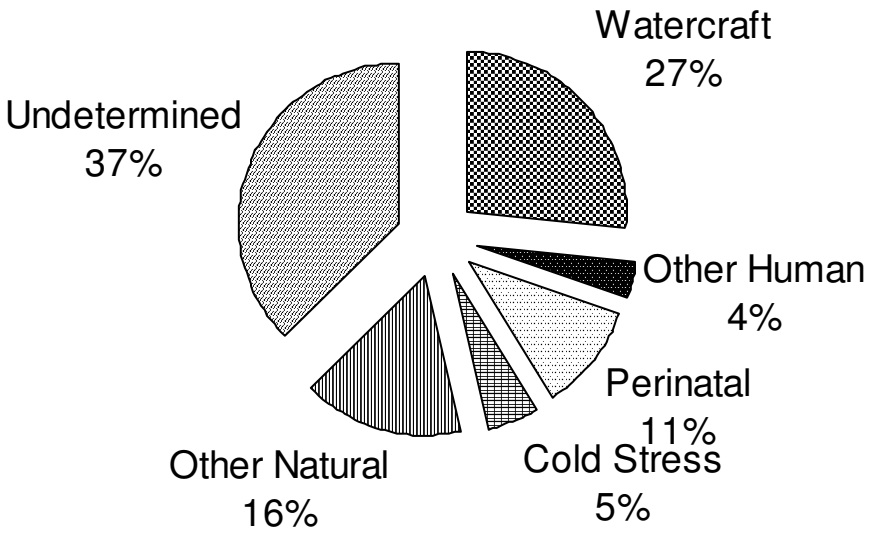
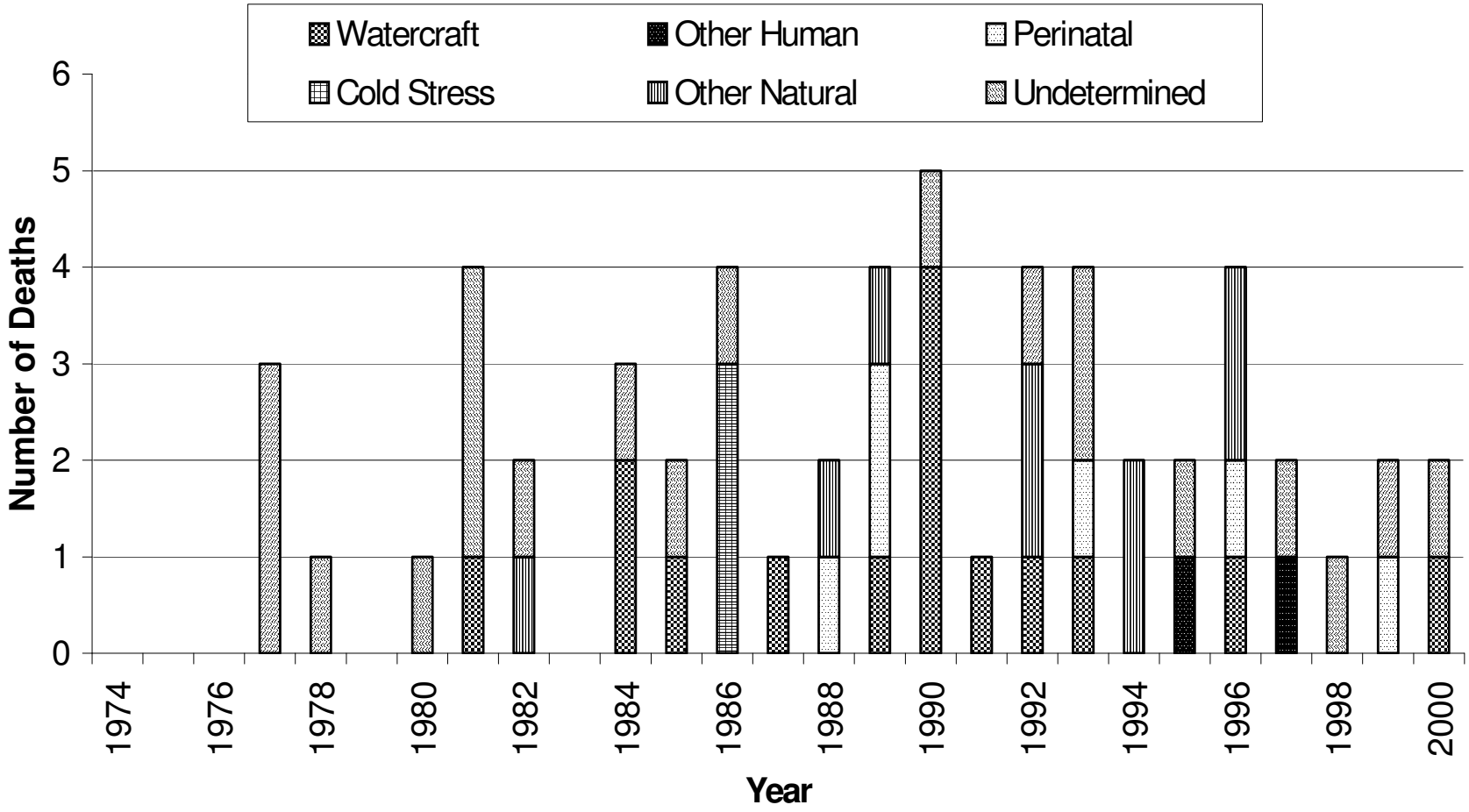


Figure 10. Manatee Deaths in St. Lucie County



The U.S. Fish and Wildlife Service assessed regional manatee populations, manatee ecology, and historic watercraft-related manatee losses throughout Florida, and delineated areas of relative mortality risk for manatees (USFWS, 2001). High risk areas were defined 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 mortalities per year and low risk areas had no documented watercraft-related mortality. Based on these USFWS criteria, St. Lucie County was designated a medium risk area.

In an attempt to reduce boat-related manatee mortalities, the state of Florida adopted boat speed restrictions for St. Lucie County in July 1994. The City of Ft. Pierce has also adopted ordinances that allow them to enforce these speed zones within their jurisdiction. Posting of signs identifying zones where speed is regulated was completed in September 1995. FIND was responsible for installing these signs and currently maintains them.

In determining the effectiveness of vessel speed restrictions in St. Lucie County, it is instructive to compare the number of watercraft-related manatee mortalities that occurred prior to the posting of speed zones to those that have occurred subsequent to these postings. Thirteen watercraft-related manatee mortalities were reported from January 1974 through August 1995 (average = 0.60/year; Figure 11). Two watercraft-related manatee mortalities were reported from September 1995 through December 2000 (average = 0.38/year). This comparison reveals a 37 percent reduction in watercraft mortalities during the period that speed restrictions have been in place. This reduction is even more dramatic when the increase in the number of boats using St. Lucie County's waterways is considered.

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 21.7-year interval before the restrictions went into effect, watercraft accounted for 29 percent of all manatee mortality (Figure 12). Since the restrictions went into effect the contribution of watercraft mortality declined to 18 percent (Figure 13).

Because watercraft-related manatee mortality is a cause of deaths over which St. Lucie County has some control, it is important to analyze the locations where these mortalities have occurred. It must be recognized, however, that 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 two areas of the Indian River Lagoon: a) north of the North Causeway, and b) within the City of Ft. Pierce (Table 4). All other areas had one or no watercraft-related mortalities for the entire 27-year period.

Power Plants

The potential for manatee/human interaction is relatively high in areas where manatees tend to congregate. Two types of site-specific features draw manatees together; sources of warm water that are attractive during the winter, and sources of fresh water that empty into otherwise saline areas. This section discusses the locations and relative attractiveness of warm water discharges in St. Lucie County.

Figure 11. St. Lucie County Watercraft-Related Manatee Mortalities

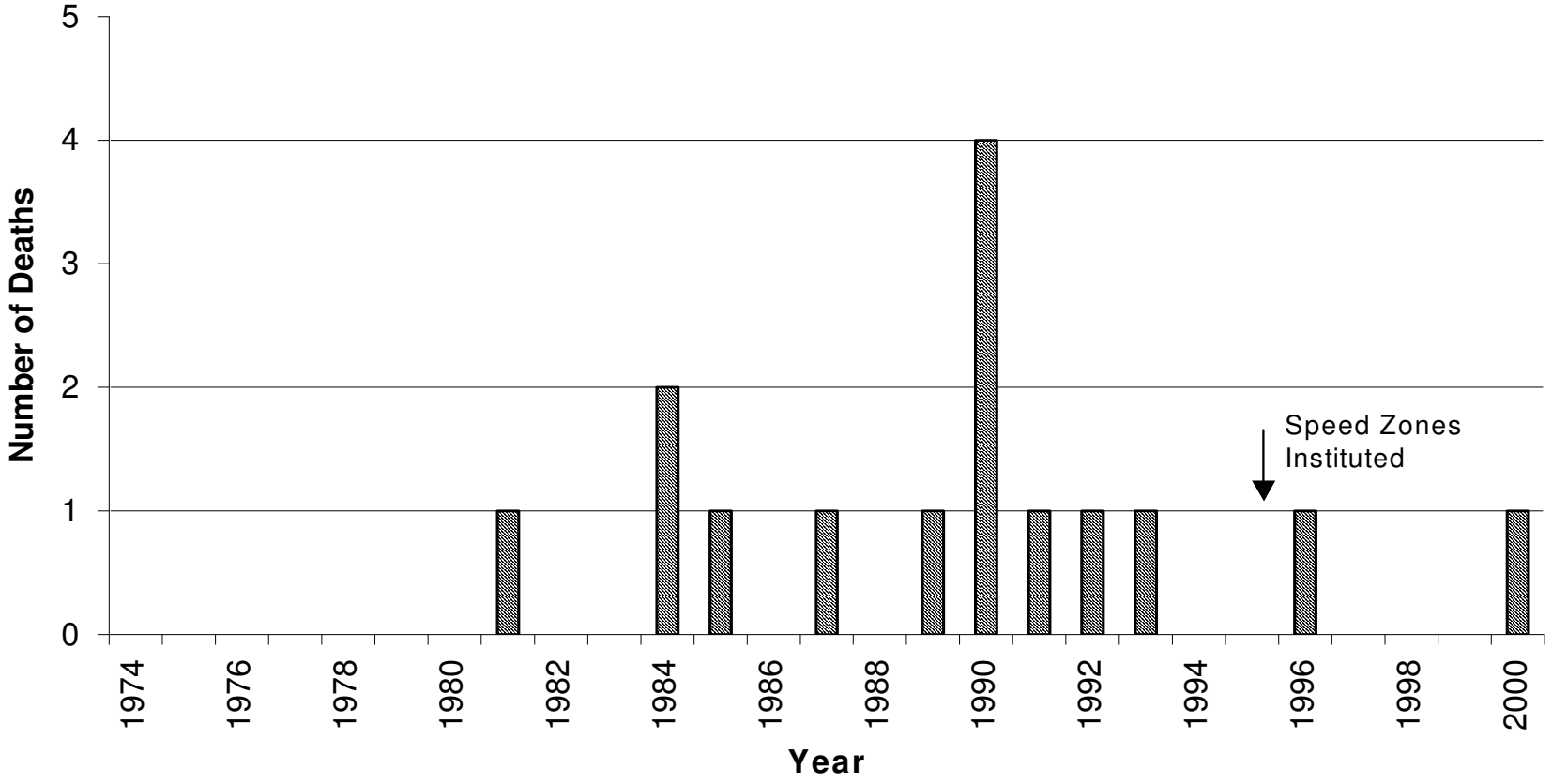


Figure 12. Causes of Manatee Mortalities in St. Lucie County (Prior to Speed Zones)

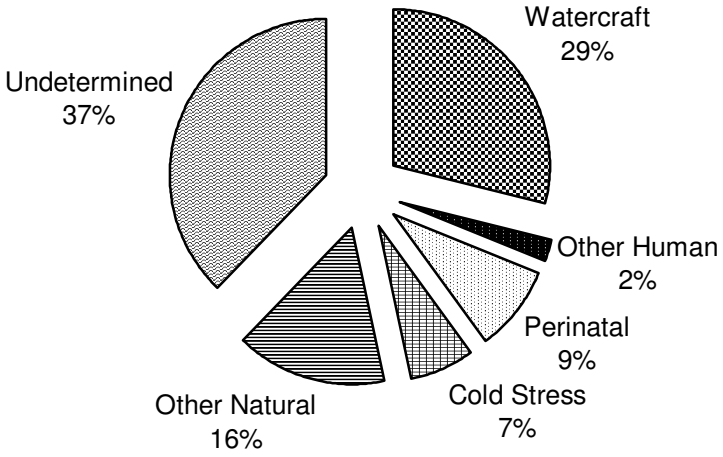


Figure 13. Causes of Manatee Mortalities in St. Lucie County (After Speed Zones)

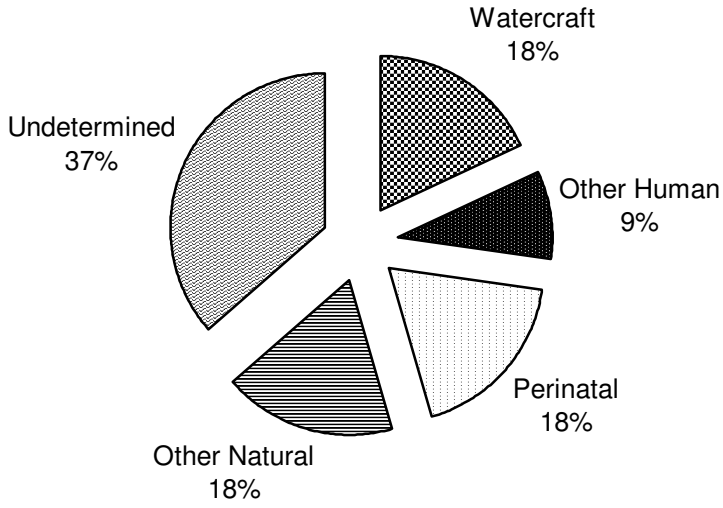


Table 4

Average Annual Number of Watercraft-Related Manatee Mortalities by General Location in St. Lucie County

General Location of Carcass Recovery	Number	
	Pre-Speed Zones[1]	Post-Speed Zones[2]
Atlantic Ocean	0.00	0.00
Indian River Lagoon North of North Causeway	0.23	0.00
Indian River Lagoon, City of Ft. Pierce (Includes Moore's Creek)	0.32	0.19
Indian River Lagoon South of Ft. Pierce	0.05	0.00
North Fork St. Lucie River	0.00	0.19
TOTAL	**0.60**	**0.38**

[1] January 1974 through August 1995.
[2] September 1995 through December 2000.

There are two power plants in St. Lucie County that discharge heated effluents into local waterways where manatees occur; FPUA's H.D. King Power Plant in Ft. Pierce and FPL's St. Lucie Plant on Hutchinson Island. The former, which discharges its thermal effluents into Moore's Creek (Figure 2), is the more important of the two for manatees. Although this facility previously served as the primary source of electricity for local residents, it currently operates primarily as a peaking unit, used only during periods of high electrical demand. During extremely cold periods (i.e., when water temperatures in Moore's Creek decrease to 61^0 F or below) the plant operates without regard to the demand for electricity. This is done to provide warm water for manatees that have become accustomed to, and perhaps dependent upon, Moore's Creek as a warm-water winter refuge. Shortly after the plant begins discharging heated effluents during a winter cold snap, manatees begin congregating in the creek.

The MOEC, located on Moore's Creek in Ft. Pierce, has maintained records of manatees within the creek since November 1996. On an hourly basis each day that the center is open, observers count and record the number of individual animals present. The largest number of sightings for any one hour (daily maximum) is then entered into a database. Although this data does not provide a total daily count of individual manatees present within the creek, it does provide an index of relative abundance. Counts are typically made between November and April of each year.

Manatees are present in greatest numbers in Moore's Creek during the period from December through February of each year (Table 5). The largest daily maximum number was recorded in December 1996 when 35 manatees were observed during one of the hourly counts.

The St. Lucie Plant discharges heated effluent into the Atlantic Ocean through a buried pipe. Water is jetted into the surrounding water in approximately 20 to 39 feet of water about 1510 to 3380 feet offshore through a series of diffusers that enhance mixing. Because of the

effectiveness of these diffusers, ocean temperature increases associated with plant operation are relatively small in terms of both absolute value and spatial scale. Furthermore, due to water depth, currents, and the moderating influence of the nearby Gulf Stream, seasonal fluctuations in ocean temperature are much less dramatic than those in the adjacent Indian River Lagoon, where shallow depths permit more rapid heat exchange between the air and water. Minimum ocean temperatures are typically recorded in January and only reach about 65°F. Due to a combination of the infrequent use of ocean waters by manatees, the relatively small spatial extent of warm water, and the lack of substantive food resources in the general area, it does not appear that discharges from the St. Lucie Plant act to any appreciable degree as an attractant for manatees. There are no known reports of manatees congregating near the plant discharges, even during the winter.

Table 5

Manatee Sighting Data[1] Collected by the MOEC, November 1996 – February 2001

	Nov	Dec	Jan	Feb	Mar	Apr
Years of Observation	5	5	5	5	4	4
Number of Days Counts Were Taken	123	121	128	120	101	59
Maximum Number of Manatees Present At Any One Time	8	35	23	26	9	4
Average of Highest Daily Manatee Counts	1.5	5.4	5.5	3.2	2.0	1.2
Year of Maximum Abundance	2000	1996	1999	1997	1998/99	1997

[1] Counts are taken each hour that the MOEC is open, and the largest hourly count of day is recorded.

Although discharges from the St. Lucie Plant exert little influence over manatees, the plant does occasionally entrain these animals into its enclosed intake cooling water system (EAI, 2001). Since the plant began operating in 1976, there have been five occasions when manatees have entered the offshore intake structures and become entrapped in the intake canal. The first event occurred in February 1991. FPL coordinated its capture with the USFWS and FWC (formerly FDEP). Because of the novelty of the event, a passive capture technique was attempted to capture and remove the animal from the canal. This involved luring the animal with food and water into a partially submerged cage. After considerable time passed without success, a more aggressive netting effort ensued. Ultimately the animal was captured after 32 days in the intake canal. After evaluation and rehabilitation it was released back to the wild.

During subsequent events FPL improved its capture techniques. During the last four events (August 1991, December 1995, September 1996, and December 1997), the animals have been removed within a day of their first sighting in the canal. Two of these animals were taken to marine mammal care and rehabilitation facilities prior to their release. One animal had to be treated for deep prop wounds that it incurred prior to entering the canal. The other appeared to be a small calf separated from its mother. Current procedures call for FPL to coordinate the capture and evaluation of entrapped manatees with FWC. As required, FPL assists FWC in

transporting ill or injured animals to approved rehab facilities and/or releasing entrapped animals back into the wild. No manatees have died as a result of their entrapment.

Other Congregating Areas

In south Florida, in addition to power plants, manatees also are known to congregate in areas where site-specific conditions may thermally stratify the water column during sudden cold weather events. This stratification typically occurs in deeper areas of the St. Lucie Estuary and Indian River Lagoon, particularly in areas where fresh and salt waters mix, such as at the mouth of canals. Although there are no temperature data to support these conjectures, the results of winter aerial surveys suggest that manatees may congregate in the area where the C-23 Canal spillway discharges into the North Fork of the St. Lucie River. This canal forms the boundary between St. Lucie and Martin Counties (Figure 1). Although the C-23 actually discharges into the North Fork in Martin County, it is nevertheless important to note here, because manatees attracted to the site may move further upstream in the North Fork into St. Lucie County. Furthermore, boaters from St. Lucie County pass through the area en route to the St. Lucie Inlet and Indian River Lagoon.

Other locations where manatees may be attracted due to thermal stratification are the comparatively deeper water canals at HBOI, Queen's Cove, and Big Mud Creek. Dredged basins, such as the Port of Fort Pierce and the Fort Pierce Yacht Club, may serve as similar attractants.

Freshwater entering otherwise saline areas may also attract manatees. The principal sources of fresh water in St. Lucie County are Moore's Creek (which also provides thermally enhanced waters), Taylor Creek and the North Fork of the St. Lucie River. The BFSC identifies the dredged channels at HBOI and Queen's Cove as perhaps lesser sources of freshwater input.

Introduced Food and Water

In addition to the natural sources of fresh water described above, manatees are also attracted to introduced freshwater sources such as hoses purposefully placed over the water. Well-intentioned but ill-informed people may also try to feed the animals. Prior to the establishment of the MOEC, dock hoses adjacent to boat slips in Moore's Creek were reportedly regularly left running so that manatees could drink from them. Additionally, on-lookers would often throw lettuce and other food items into the water. Since the MOEC has been in operation, these activities have ceased. The extent to which people currently provide food and/or water to manatees in St. Lucie County is 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 exiting speed zones, sanctuaries and refuges for manatees in St. Lucie County.

Speed Zones

Florida Administrative Code Section 68C-22.008 identifies the vessel speed zones that have been adopted in St. Lucie County (Figures 6-8). The locations of the speed zones are also graphically illustrated in a 15-page pamphlet entitled "St. Lucie County Manatee Protection Zones" (Appendix B) published in February 2000 and available from FIND. Various speed restriction zones and no entry areas currently provide protection for manatees within many local waterways of St. Lucie County. The following designations have been established:

- No Entry Zone (year round);
- Motorboats Prohibited (November 15 through March 31)/Idle Speed (remainder of the year);
- Idle Speed (year-round);
- Slow Speed (year-round);
- Slow Speed (November 15 through March 31)/Maximum 30 mph Speed Zone (remainder of year);
- Slow Speed Zone (November 15 through April 15);
- Maximum 25 mph Speed Zone (year-round); and
- Maximum 30 mph Speed Zone (year-round).

No Entry

Watercraft of all types are prohibited from entering these areas, unless an exemption is granted. In St. Lucie County, there is one No Entry zone, the west end of the HBOI Canal.

Motorboats Prohibited (November 15 through March 31)/Idle Speed (remainder of the year)

In St. Lucie County, there is one Motorboats Prohibited Zone; Moore's Creek. The only exception is that operators of sailboats under temporary motor propulsion who are leasing dock space within this designated area are allowed ingress and egress to/from their dock.

Idle Speed Zone (year-round)

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 areas in and around HBOI, Garfield Cut, Jack Island, Ft. Pierce Cut/Wildcat Cove, North Beach Causeway to Delaware Avenue, Little Mud Creek and Big Mud Creek all have this designation.

Slow Speed Zone (year-round)

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 St. Lucie County where

submerged aquatic vegetation and/or other important manatee habitat is present. The portions of the Indian River Lagoon west of the ICW and select areas along the eastern shoreline and much of the North Fork of the St. Lucie River are designated as Slow Speed, Year-round.

Slow Speed (November 15 through March 31)/Maximum 30 mph Speed Zone (remainder of year)

Portions of the ICW near the Ft. Pierce Inlet and Shark Cut are the two areas in St. Lucie County with this designation

Maximum 25 mph Speed Zone (year-round)

For law enforcement purposes this zone permits entry to "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 St. Lucie County, the 25 mph maximum speed is applicable to areas in and around Coon Island and Jim Island and portions of the North Fork of the St. Lucie River north of Port St. Lucie Blvd. in the City of Port St. Lucie.

Maximum 30 mph Speed Zone (Year-round)

The area in and around Blue Hole Point and portions of the North Fork of the St. Lucie River from Greenridge Point to Port St. Lucie Blvd. are the two areas in St. Lucie County with this designation.

Sanctuaries and Refuges

The Florida Manatee Sanctuary Act (Chapter 370.12(2)(b), Florida Statutes) 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 U.S. Fish and Wildlife Service, a manatee "sanctuary" is an area where "all waterborne activities are prohibited". In some instances these areas are also referred to as "motorboat prohibited zones". Often these are areas where manatees congregate, such as warm water discharges from power plants. A manatee "refuge" is an area where some "waterborne activities" may be allowed, subject to site-specific restrictions as are necessary to protect manatees.

In addition to the sites previously identified, the State of Florida (FWC) and the federal government occasionally consider designating sites in Florida that have been suggested as potential new sanctuaries or refuges. Sites that may be added typically include locations that serve as "secondary" or temporary thermal refuges, including 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. During 2001, FWC announced their intention to evaluate the need for designating additional levels of protection for manatees in Big and Little Mud Creeks. The extent to which these analyses will result in new manatee sanctuaries and/or refuges being designated in St. Lucie County is unknown.

4. Law Enforcement Activities

Six local, state and federal law enforcement entities have the authority to provide enforcement personnel for water-related regulations in St. Lucie County:

- FWC Division of Law Enforcement (formerly Florida Marine Patrol);
- St. Lucie County Sheriff's Office;
- City of Fort Pierce Police Department;
- City of Port St. Lucie Police Department;
- US Coast Guard; and
- U.S. Fish and Wildlife Service.

A questionnaire was developed and sent to each of these agencies. They were asked to describe the number of officers assigned to marine 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 FWC, Division of Law Enforcement, is based in Palm Beach County and is responsible for patrolling several counties. The two officers assigned to St. Lucie County typically spend in excess of 40 hours per week on the water, giving this agency the most visible presence on St. Lucie County's waterways. FWC patrols all county waterways including the North Fork of the St. Lucie River. In mid-2001, several additional enforcement positions were approved for the portion of southeast Florida that includes St. Lucie County. As the FWC Division of Law Enforcement is undergoing an internal reorganization, the number of officers that will patrol St. Lucie County waters, and the time they will spend on the water in St. Lucie County is currently unknown.

The St. Lucie County Sheriff's Office (SLCSO) dedicates the next highest number of hours to marine enforcement. Among other things, SLCSO responsibilities include responding to boating accidents, surveillance for drug smuggling, and enforcement of vessel speed zone restrictions. The two full-time officers responsible for patrolling the county's waterways spend between 24 and 40 hours per week on the water. Most of that time is spent in the Indian River Lagoon and nearshore waters of the Atlantic Ocean, but they occasionally patrol the North Fork. Usually only one boat is on the water at any given time.

Although both the City of Ft. Pierce and the City of Port St. Lucie have the authority to enforce waterway regulations, neither entity has a regular presence on the water. Both have patrol boats, but they are typically only placed in service during special events and emergencies. The City of

Ft. Pierce indicated that budget constraints are primarily responsible for its reduced presence on the water.

The U.S. Coast Guard (USCG) is responsible for enforcing federal laws on the Intracoastal Waterway and Atlantic Ocean along the eastern seaboard of the United States. USCG maintains an office and boats at their facility adjacent to the Ft. Pierce Inlet. Five-to-ten full-time officers based at this facility are responsible for enforcing federal regulations in St. Lucie County and surrounding areas.

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 St. Lucie 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 St. Lucie County waterways, the majority of enforcement effort is focused on the waterways that are used most heavily by boaters, primarily the Indian River Lagoon. With respect to manatee regulations, both the USCG and USFWS spend up to 50 percent of their time on the water enforcing speed zone restrictions in St. Lucie County. Typically, both of these federal agencies issue fines of $500.00 for observed violations. However, the maximum penalty is 6 months in jail and/or $5,000. Neither agency was able to provide an estimate of the number of citations issued for speed zone infractions during a typical year.

Although, the FWC spends the most time of any agency on the water, it typically dedicates only 10 to 25 percent of its time in St. Lucie County to enforcement of speed zone restrictions. FWC was unable to provide statistics on the number of citations issued each year. Those citations carry a maximum penalty of $50.

The SLCSO ranks enforcement of speed zone regulations as a medium priority, even though it dedicates from 25 to 50 percent of its time on the water to this activity. The maximum penalty that can be levied for an observed infraction is $67. The Sheriff's Office reported that it issued 61 written citations for speed zone infractions during 2000. However, 615 written and verbal warnings were also given to boaters not adhering to posted speed zone regulations.

Although some of the agencies patrolling St. Lucie 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;
- Increasing the number of hours spent enforcing speed zone regulations; and
- Increasing public awareness of manatees and vessel speed zone regulations.

C. Local Land Development

Development of land in St. Lucie County is regulated through various federal, state, county and municipal laws, rules, codes and ordinances. This section identifies the Land Development Regulations (LDRs) and elements of the St. Lucie County Comprehensive Plan (Comp Plan) that affect the protection of manatees and/or their habitat in St. Lucie County. After descriptions of the pertinent County regulations, information is presented concerning the local initiatives adopted and enforced by the Cities of Ft. Pierce and Port St. Lucie. It should be noted, however, that the percentage of waterways controlled by these municipalities is significantly less than the waterways controlled by the county.

St. Lucie County

1. Development Standards

Activities that affect the shoreline, submerged lands, and open-water manatee habitat have the potential to negatively 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 negatively 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 St. Lucie County. Additionally, the State of Florida requires that approvals be obtained from FDEP or SFWMD for projects that affect "Waters of the State", which includes all areas of manatee habitat in St. Lucie County. Additionally, much of the Indian River Lagoon and all of the North Fork in St. Lucie County are 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.

St. Lucie County has developed and adopted a Land Development Code (Ordinance 90-036) that relates in part to the protection of manatees and/or their habitat. It includes:

- Section 6.00 Vegetation Protection;
  - Section 6.01 Mangrove Protection;
  - Section 6.02 Environmentally Sensitive Lands;
  - Section 6.02.01 Coordination with FWC and USFWS Regarding Listed Species;
  - Section 6.02.02 Shoreline Protection;
  - Section 6.02.03 Wetland Protection;
  - Section 6.04 Habitat of Endangered and Threatened Species; and

- Section 6.04.03 Reserved for Manatee Protection.

Other Ordinances describe the decision-making process, development review procedures, enforcement proceedings and penalties associated with these ordinances.

2. Comprehensive Plan

St. Lucie County's Comprehensive Plan was initially developed and adopted in 1990. Two elements of the Comprehensive Plan include information pertinent to the protection of manatees and their habitat:

- Chapter 7 - Coastal Management Element; and
- Chapter 8 - Conservation Element.

Chapter 7 – Coastal Management Element

The Coastal Management Element of St. Lucie County's Comp Plan was initially adopted on January 9, 1990. Modifications to this element are currently undergoing development and will soon be available for public review and comment. The information that follows is based on the review of the current version of Chapter 7.

The Coastal Management Element begins with descriptive information concerning the county's coastal area, including its natural resources, existing land use, archeological and historical resources. It then describes estuarine pollution, the beach and dune system, natural disaster planning, public access, coastal access infrastructure and coastal planning efforts. After identification of significant issues, which include seagrasses and threatened and endangered species, the Plan then identifies various goals, objectives and policies concerning coastal resources. The specific objectives and policies that relate directly to manatees are in Objective 7.1.3 (Protection of Living Marine Resources). Specifically, Policy 7.1.3.2 identifies that St. Lucie County will "Enact Regulations to Protect Manatees".

Additionally, there are many objectives and policies related indirectly to the protection of manatees. These objectives and policies (e.g., protection of buffers adjacent to rivers, protection of seagrasses, water quality) are identified in Appendix C.

Chapter 8 – Conservation Element

The Conservation Element of St. Lucie County's Comprehensive Plan was initially adopted on May 1991. Modifications to this element are currently undergoing development and will soon be available for public review and comment. The information that follows is based on the review of the current version of Chapter 8.

The Conservation Element begins with descriptive information concerning natural resources present in St. County, including its surface waters and wetlands, air, soil minerals, fisheries upland vegetative communities. It then describes wildlife, birds and species listed as

endangered, threatened or of special concern. After identifying the potential for conservation, use or protection of natural resources, this Element then identifies various goals, objectives and policies concerning these resources. The specific objective and policy that relate to the protection of manatees is Objective 8.1.8 (Enact regulations which require the conservation and protection of ecological communities, wildlife and marine habitat), Policy 8.1.8.2, which states that St. Lucie County will "Develop criteria for the protection of endangered and threatened plant and animal populations and the conservation of native habitat".

This Element also includes other objectives and policies that relate indirectly to the protection of manatees. These objectives and policies (e.g., Designate environmentally sensitive areas for conservation) are identified in Appendix C.

City of Ft. Pierce

The City of Ft. Pierce first adopted a Comprehensive Plan in 1979. Major revisions were made in 1990, and the City intends on seeking public review and comment on additional revisions that are expected to be released during 2001. Information concerning the protection of manatees and their habitat is found in two elements:

- Chapter 5 - Coastal Management Element; and
- Chapter 6 - Conservation Element.

Chapter 5 – Coastal Management Element

The Coastal Management Element of the City's Comprehensive Plan begins with descriptive information concerning the city's coastal area, including its natural resources, existing land use, archeological and historical resources. It then describes estuarine pollution, the beach and dune system, natural disaster planning, public access, coastal access infrastructure and coastal planning efforts. After identification of significant issues, which include restoration of dune vegetation, addressing continued beach erosion and protection of threatened and endangered species, including manatees, the Plan then identifies various goals, objectives and policies concerning these coastal resources.

The single specific objective and policy that relates to the protection of manatees is Objective 5.1.2 (Revise regulations to provide protection for species with special status), Policy 5.1.2.2 in which the City commits to "Require that new marinas provide a manatee protection plan, establish boating speed limits, and post notices to advise and caution boaters in manatee congregating areas".

This Element also includes other objectives and policies that relate indirectly to the protection of manatees. These objectives and policies (e.g., Enforcing regulations to improve water quality in the Indian River Lagoon.) are identified in Appendix C.

Chapter 6 - Conservation Element

The Conservation Element of the City's Comprehensive Plan begins with descriptive information concerning the city's natural resource features, including its wetlands, soils, floodplains, drainage basins and mineral resources. It then describes air and water pollution, and provides information concerning water/wastewater mass balance and projected water demands. After identification of significant issues, which include the effects of sea level rise, pollution of surface waters and development of lands adjacent to preserves, this Element then identifies various goals, objectives and policies concerning these resources.

The specific objective that relates to the protection of manatees is Objective 6.1.5 (Identify all ecological communities and wildlife, especially endangered and rare species and develop programs to manage and protect them), Policy 6.1.5.1 which states that the City shall "Amend, adopt and implement regulations to require protection of endangered an threatened plants and animals and preserve their habitat…"

This Element also includes other objectives and policies that relate indirectly to the protection of manatees. These objectives and policies (e.g., participating in the acquisition of environmentally sensitive lands) are identified in Appendix C.

City of Port St. Lucie

The City of Port St. Lucie is currently operating under a Comprehensive Plan last revised in 1991. Information concerning the protection of manatees and their habitat is found in the Conservation and Coastal Management Element of the Comp Plan.

The Conservation and Coastal Management Element of the City's Comprehensive Plan begins with descriptive information concerning the city's environmental setting and coastal planning areas, including the Indian River Lagoon and the North Fork of the St. Lucie River. It then provides information on land use within these areas, describes hurricane evacuation and coastal high hazard areas and coastal planning area infrastructure. After identification of natural resources, hazardous waste and water use, the Plan then identifies and summarizes significant issues, after various goals, objectives and policies concerning these resources are identified.

The specific objective and policies that relate to the protection of manatees and/or their habitat are Objective 5.2.5 (Review and revise existing natural resource protection regulations regarding conservation, appropriate use and protection of fisheries wildlife, wildlife habitat, marine habitat and native vegetative communities, including forests and wetlands), Policy 5.2.5.4 which states that the City will "Prohibit the development of marinas in designated manatee critical habitat" and Policy 5.2.5.5, which states that the City will "Work with St. Lucie County and the Manatee Advisory Committee to designate special manatee habitats".

This Element also includes other objectives and policies that relate indirectly to the protection of manatees. These objectives and policies (e.g., Prohibition of alteration that would degrade existing estuarine productivity.) are identified in Appendix C.

3. Marina/Boat Facilities

During 2000, St. Lucie County contracted with the TCRPC to develop a draft Boat Facility Siting Plan (now the Boat Facility Siting Component of this MPP). As a part of this effort, TCRPC conducted an inventory of existing boating facilities. Five sources were used to develop the inventory:

- The St. Lucie County Community Development Department (1990);
- A Boater's Guide prepared by the Indian River Lagoon National Estuary Program (1995);
- A St. Lucie County model marina siting report (Applied Technology and Management, Inc, 1992);
- The Boating Activity Study (BAS) prepared by Morris et. al. (1995); and
- A cursory field survey conducted in July 2000 by TCRPC.

The inventory identified 42 boat facilities, including 30 commercial and private marinas and facilities offering boat services, 9 public boat ramps and three facilities operated by governments. Subsequent to this effort, a team of FWC and St. Lucie County staff conducted further fieldwork during February 2001. This effort resulted in several additional boating facilities being identified. Most of the boat facilities in St. Lucie County are located in the vicinity of the Fort Pierce Inlet (Figures 6-8).

According to information from FWC (2001), 11,002 vessels were registered in St. Lucie County in 2000. The BAS survey revealed that approximately 63 percent of the registered boats were stored at home (most presumably on trailers), 8 percent were stored in a marina wet slip, 4 percent in dry storage and 25 % stored at other locations (e.g., business parking lot, friends yard). These results emphasize the importance of boat ramps in providing many resident boaters with access to local waterways.

4. Boat Ramps

The TCRPC inventory identified nine public boat ramps in St. Lucie County. Five of these ramps (North Causeway, Black Pearl Ramp, Moore's Creek ramp, South Causeway Ramp, and Jaycee Park Ramp are located in relatively close proximity to the Fort Pierce Inlet. The BAS found that the Black Pearl and North Causeway ramps have the greatest number of boats launched in St. Lucie County. The Moore's Creek Ramp is closed every year from November 15 to March 15 to provide protection to manatees that congregate in the thermal effluent during winter.

<u>Residential Dock Facilities</u>

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.

A list of multifamily residential docks in St. Lucie County is included in Exhibit 6 of the Boat Facility Siting Component of this MPP. This information is not intended to be comprehensive since some boat facilities may have been omitted accidentally during inventory and/or some facilities may have been modified since the inventory was conducted. The number of slips allowed under current permitting rules is based upon the amount of water frontage, physical space limitation, water depths, and environmental resources at the site.

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 St. Lucie County, was awarded a grant by FWC's Advisory Council on Environmental Education. The grant is being used to educate resident and visiting boaters and anglers about the importance of coastal estuarine systems. The program focuses on seagrass habitats as they relate to the survival of manatees and encourages responsible watercraft operation thereby reducing the potential for watercraft-related manatee mortality.

2. Florida Fish and Wildlife Conservation Commission

Upon reorganization of the State of Florida's environmental agencies in 1999, activities concerning manatees were transferred to FWC. The primary FWC agencies involved with manatees are the Florida Marine Research Institute (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 6).

3. Manatee Observation & Education Center and St. Lucie County School System

The Manatee Observation and Education Center (MOEC) and initiatives within the St. Lucie County School System offer a variety of information about manatees to county residents and visitors of all ages. The Center consists of a strategically situated museum-type facility located east of Indian River Drive in the downstream reaches of Moore's Creek. As previously described, the combination of fresh water and thermally enhanced water from the H.D. King Power Plant make Moore's Creek extremely attractive to manatees, especially during the colder months of the year.

Through a collaborative partnership between the Ft. Pierce Utilities Authority (FPUA), the local business community and interested individuals and groups, MOEC offers visitors the only locally sanctioned opportunity to view manatees in the wild. The Center also contains salt-water aquaria and other exhibits that allow visitors to learn more about the aquatic and marine environment through interactive and static displays. An indoor classroom offers additional opportunities for visitors to learn more about manatees and the marine ecosystem by attending movies, slide presentations and lectures. The center is expanding its repertoire of programs to provide stimulating nature-based experiences even when manatees are not congregating in Moore's Creek.

The Center is open to visitors Tuesday through Sunday from October through June, and is managed under the auspices of FPUA. Full-time staff are assisted by an active team of volunteers, many of whom are members of the Center's non-profit support organization.

The Center is used extensively as a field trip destination by local schools. In general, there are two, one-hour visitations per school day. An annual average of approximately 3500 elementary school students and 600 chaperones are taught planned curricula that meet Florida Sunshine State Standards. MOEC has also begun a high school intern teaching program where 30 interns teach 5,000 people. Center staff also provide in-service workshops for teachers and off-site presentations to school groups and other community organizations (e.g., Rotary Club, Audubon Society). The Center also offers boating safety courses, kayaking excursions, and a Certified Naturalist Program for adults.

The Center is also available for non-school related visitation during all open hours. Even when the Center building is closed, visitors may still safely view manatees present in Moore's Creek in an un-obtrusive manner. Current estimates are that the center hosts approximately 85,000 visitors per year, including local residents and visitors from all over the world.

In addition to these "routine" offerings, the Center also interacts with thousands of individuals through its hosting or participation in a variety of special events (e.g., Earth Day, NatureFest Day, book signings, brown-bag lunch series). Additional information can be obtained from the Ft. Pierce Manatee Observation and Education Center, 480 North Indian River Drive, Fort Pierce, Florida, 34950 (Telephone: 772-466-1600, Extension 3333 or 3071).

Table 6

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

Videos	A Standing Snag
	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
	Nickelodeon Wildside (with Manatee Segment)
	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	Manatees: Florida's Gentle Giants
	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
	Save the Manatee Trust Fund
Coloring/Activity Books	Travel Activity Sheet
Educational Guides	The Manatee, Florida's Endangered Marine Mammal: Student Activity Workbook for Middle and High School Students
	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 (ACEE)
	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

Educational information concerning manatees is available to varying degrees at all levels in the St. Lucie County School System. Although there is no established curriculum specifically focusing on manatees, individual educators at the elementary, middle school and high school levels all have access to materials to assist them in offering their students information about manatees. Within the County school system, Lincoln Park Academy serves as the magnate school for science and technology. Because of this emphasis, students at this facility are more likely to be presented information about manatees than students at other County schools.

The County school system has established cooperative agreements with two local marine science based entities. Through an agreement with HBOI, high school juniors and senior can take classes and/or attend summer camps at HBOI. Through a dual enrollment agreement, select high school students can earn college credits for participating in college-level marine science courses taught by scientists based at the Smithsonian Institution's facility located on the Indian River Lagoon in Ft. Pierce.

4. Harbor Branch Oceanographic Institution (HBOI)

Based on the Indian River Lagoon north of 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, RR1 Box 196, Ft. Pierce, Florida 33450 (Telephone: 772-465-2400).

5. Florida Power and Light Company

Florida Power and Light Company (FPL) is the state's largest electric utility, and five of FPL's power plants (but not the facility in St. Lucie County) provide important winter refuges for manatees. FPL contributes to manatee research and pubic awareness by providing funding for aerial manatee surveys, and 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.

6. 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 but are not limited to:

- 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); and
- Mary Manatee: A Tale of Sea Cows.

SMC also offers speakers for community and organization presentations and display booths for community events.

7. Other Local Conservation Organizations and Educational Initiatives

Florida Oceanographic Society (FOS)

The Florida Oceanographic Society 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.

Safe Boating Courses

Safe boating courses are available through several organizations in St. Lucie County, including:

- United States Power Squadron, St. Lucie County Chapter – Classes are given twice per year and are open to individuals of all ages;
- United States Coast Guard Auxiliary, St. Lucie County Chapter; and
- FWC and MOEC.

Information concerning vessel speed zones is provided in all three courses. The degree of information about manatees that is presented in these classes varies, but is most extensive in the course provided by the FWC and MOEC. Additional information can be obtained by calling: U.S. Power Squadron (1-888-367-8777); U.S. Coast Guard Auxiliary (1-800-336-BOAT); MOEC (772-466-1600 x-3333).

8. Other 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 St. Lucie 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. Although the nearest National Wildlife Refuge is Hobe Sound Wildlife Refuge in adjacent Martin County, a land acquisition initiative is being negotiated through which lands in St. Lucie County could be added as a satellite property to the Hobe Sound Refuge (Telephone 772-546-1641).

Additionally, USFWS is responsible for enforcing the Endangered Species Act and the Marine Mammal Protection Act. USFWS issues concerning manatee protection, such as the Recovery Plan, are administered at the USFWS office in Jacksonville, Florida (904-232-2580). Manatee protection issues associated with the review and issuance of permits for federal dredge/fill projects in St. Lucie County is the responsibility of USFWS at the Vero Beach Field Office (772-562-3909).

U.S. Geological Survey (USGS)

The USGS Sirenia Project is based in Gainesville Florida and conducts field research on manatees (Telephone: 352-372-2571).

U.S. 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 (Telephone: 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 state permits for projects in waters and wetlands of the state. They are also responsible for implementing the state's Surface Water Improvement and Management (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 St. Lucie 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 (Telephone: 561-686-8800).

Florida Inland Navigation District (FIND)

FIND is responsible for maintaining the ICW for navigation. Additionally, FIND installs and maintains the signs, which identify the boundaries of manatee-related vessel speed restriction zones. FIND, which is based in Jupiter Florida also prints and distributes the pamphlets that identify speed zones in St. Lucie and other counties on the east coast of Florida. These brochures are available by contacting FIND at 1314 Marcinski Rd., Jupiter, FL 33477 (Telephone: 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 (Telephone: 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 (Telephone: 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 (Telephone: 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. Miami Seaquarium, 4400 Rickenbacker Causeway, Miami, Florida 33149 (Telephone: 305-361-5705).

Lowry Park

Located in Tampa in Hillsborough County, Lowry Park in 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 (Telephone: 813-935-8552).

E. Governmental Coordination

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

In addition to St. Lucie County, there are two municipal governments within St. Lucie County; the City of Ft. Pierce and the City of Port St. Lucie. Presently, there is little coordination and communication between the cities and the County regarding the protection of manatees and their habitat. However, all boat docks, marinas and similar facilities must be permitted through the state and federal agencies identified elsewhere in this document. It is assumed that those agencies will recommend approval or denial of municipal permit applications, in part, on their consistency with manatee protection standards contained in this MPP subsequent to its adoption.

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 it's 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 undergo review by the USFWS for potential impacts to federally-designated endangered and threatened species, including manatees. Also depending on project thresholds, copies of permit applications and/or Public Notice summaries of projects may be transmitted to St. Lucie County for review and comment.

At the regional and state level, FDEP and SFWMD share responsibilities for reviewing and permitting waterfront development/construction projects. Depending on various project thresholds, projects may undergo review by the FWC for potential impacts to state-designated endangered and threatened species. Also depending on project thresholds, copies of permit applications and/or Public Notice summaries of projects may be transmitted to St. Lucie County for review and comment.

In addition to these federal and state permitting processes, most waterfront development/construction projects also require that St. Lucie County (or the applicable municipality) review the proposed development and issue the necessary permits/approvals prior to construction. Review within St. Lucie County may involve staff from a variety of Departments to determine if the project is consistent with the Comp Plan and applicable Land Development Regulations 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 Board, and Board of County Commissioners. If the county determines that a proposed project does not meet the applicable Comprehensive Plan elements or Land Development Regulations, the project may be denied or returned to the applicant for revisions.

2. Programs and Future Planned Boat Ramp Projects

During 2000, St. Lucie County contracted with the TCRPC to develop a draft Boat Facility Siting Plan (now the Boat Facility Siting Component or BFSC of the Manatee Protection Plan). Upon completion of the draft, the St. Lucie County BOCC held two public workshops to solicit comments on the draft BFSC. In addition to marina siting, the BFSC also includes an inventory of existing boat ramps and presents information concerning the construction of new ramps and the expansion of existing public boat ramps. The BSFC, as revised by the BOCC after public workshops, follows hereafter.

BOAT FACILITY SITING COMPONENT

The goal of the boat facility siting plan is to locate boat facilities in a way that will reduce the number of manatees injured or killed by boats. Aerial survey data were analyzed to develop a relative index value allowing the comparison of manatee abundance in 52 segments of the coastal waterway. Four main areas stand out that had a relatively high abundance of manatees. These areas include portions of the Indian River Lagoon near: 1) Harbor Branch Oceanographic Institution, 2) Queen's Cove development, 3) Taylor Creek, and 4) Moore's Creek. Each of these areas appears to have a freshwater attractant for manatees. In addition, the Moore's Creek location has the warm-water discharge from the Fort Pierce Utilities Power Plant. In addition, extensive seagrass communities are located near each of these sites. Twelve (86%) of the fifteen manatee carcasses whose deaths were attributed to impact with watercraft in the county were recovered within or adjacent to these four areas.

Analysis of boating activity patterns in St. Lucie County indicated that boating activity is concentrated around the Fort Pierce Inlet. This is significant because manatees occur primarily in the coastal waterways. Boats traveling offshore have a reduced risk of hitting manatees once they clear the inlet. The analysis of boating activity patterns also found that the Intracoastal Waterway (ICW) was a popular destination for boaters in St. Lucie County. The ICW is an area having a high level of overlap in use by boats and manatees. The ICW is the main north-south travel route through the county for boats and manatees. This route runs south from the Indian River Lagoon in Indian River County through St. Lucie County to Martin County.

The amount of overlaps between boats and manatees in St. Lucie County increases with proximity to the Fort Pierce Inlet. The Fort Pierce Inlet attracts boats because it is the only inlet in the county. Manatees are attracted to this area because of the extensive seagrass beds in the lagoon near the inlet, and because of freshwater attractants at Taylor and Moore's Creeks, and warm-water discharge from the Fort Pierce Utilities Power Plant during the winter. Essentially all portions of the coastal waterway that exhibit a high level of boat use also have a high level of manatee use.

A screening methodology was used to identify desirable locations for the development of new boat facilities or the expansion of existing boat facilities. A scoring system was designed that provided an equal weighting to each of five categories, including: proximity to inlets, manatee abundance, manatee habitat, manatee mortality, and speed zones. A score for each of these categories was assigned to each of the coastal waterway segments that were defined during the analysis of manatee abundance. The procedure allows a score to be computed that characterizes the relative probability of impact to manatees if additional boat trips are generated from a given segment of the coastal waterway. A total score for each segment was calculated by adding the individual scores assigned to each of the five categories.

Results of the screening process revealed that only one of the 35 segments of the coastal waterway in St. Lucie County was classified as an area of low potential for impact to manatees. Segment 8, which corresponds with the Fort Pierce Inlet and entranceway into the Indian River Lagoon, is the area that had the most favorable score (Figure 6-Inset). Desirable features of this

area include proximity to the inlet, presence of slow speed zones in effect, low coverage of seagrasses, and no recent records of manatee mortality. Another major feature of this area is that it is east of the ICW. Boat trips originating from this area can reach the Atlantic Ocean without crossing the ICW.

The primary location for new boat facilities in St. Lucie County is defined as sites that are located in an area identified as the Fort Pierce Inlet Area. The geographic area identified as a primary location is depicted in Exhibit 8. The plan supports the expansion and redevelopment of marine industries in this area. The number of boats at each facility will be limited by site plan constraints, and local, state, and federal requirements to avoid and minimize impacts to natural resources.

Secondary locations for boat facilities in St. Lucie County are defined as sites, with appropriate zoning and land use that is consistent with the County's adopted Comprehensive Plan, located outside of the primary location. Expansion or development at these sites will be reviewed and approved on a case-by-case basis by the local government and state and federal permitting agencies. The number of boats at each facility may be limited by site plan constraints, and local, state, and federal requirements to avoid and minimize impacts to natural resources.

Currently, St. Lucie County has a very good record of protecting manatees. Since September 1995 when signs were first posted for the speed zones in St. Lucie County, watercraft related manatee deaths have declined to the annual mortality rate of 0.4 during the last five years. Therefore, this plan suggests that the focus of the continued protection of manatees from watercraft impacts in St. Lucie County should be on the enforcement of current speed zones and/or implementation of more appropriate speed zones.

The final section of the plan includes a number of policies dealing with manatee protection, habitat protection, and boat facility siting in St. Lucie County.

Please note, this plan is not intended to viewed as a "stand-alone" marina siting plan, since it does not completely address all issues relating to marina siting, i.e., safety, pollutants, sedimentation, traffic, etc. Some of the data included in this document could be utilized in the creation of a marina siting plan.

A. Introduction

In 1989 the Governor and Cabinet of Florida gave the directive that Manatee Protection Plans (MPP) be prepared for each of 13 counties known to have a high population of manatees. The Florida manatee is listed as an endangered species by the Florida Fish and Wildlife Conservation Commission (FWC) and U.S. Fish and Wildlife Service (USFWS). The MPP is to be adopted and implemented by a county, local government, or port authority and approved by the State. The purpose of the MPP is 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.

The MPP is to include the following components: 1) a boat facility siting plan that inventories existing boat facilities and natural resources; 2) an evaluation of boat use and traffic patterns; 3) criteria on which proposed sites will be evaluated; 4) lists and maps of locations ranked by degree of suitability; 5) dock densities; 6) policies for the expansion of existing boat facilities; 7) boating speed zones; 8) provisions to protect water quality and submerged aquatic vegetation; and 9) a local education and awareness element.

St. Lucie County is one of the key counties expected to develop a countywide MPP. To assist St. Lucie County, the FWC, which is formerly a division of the FDEP entered into contracts with Florida Institute of Technology and Florida Atlantic University to conduct boating activity studies for the county. These studies were complete in 1995 and 1996, respectively. In January 2000, the FWC agreed to provide funds to St. Lucie County to prepare a countywide boat facility siting plan. St. Lucie County then subcontracted with Treasure Coast Regional Planning Council (TCRPC) to prepare the boat facility siting plan. This component of the MPP is the result of TCRPC's contract with St. Lucie County with revisions based on input from the public and the BOCC.

St. Lucie County is located on the southeastern coast of Florida (Map 1). The study area for the boat facility siting component features the main coastal waterways, including portions of the Indian River Lagoon and St. Lucie River. The main navigation route through the county is the ICW. The ICW forms a north-south route that is located in the Indian River Lagoon. The ICW connects to the Atlantic Ocean through the Fort Pierce Inlet, which is located in the City of Fort Pierce. The Port of Fort Pierce is also located within the city. The North Fork of the St. Lucie River originates in St. Lucie County and flows south and joins the South Fork in Martin County.

The Boat Facility Siting Component is an important part of the MPP. The BFSC indicates desirable locations for the development of boat facilities based on an evaluation of natural resources, manatee protection needs, and recreation and economic demands. The main objective of this component is to minimize the amount of interaction between manatees and boats and to reduce the number of manatees injured or killed by boats. However, because recreational boating is important to the economic interests of St. Lucie County, this task must be performed in a balanced manner. To further accomplish this task, St. Lucie County will update the 1992 Marina Siting Plan to be adopted by the St. Lucie County Board of County Commissioners. Issues such as safety, pollutants, sedimentation, etc. will be addressed in the marina siting plan.

This boat facility siting component of the MPP is organized to present first a discussion of manatees and an analysis of manatee abundance in St. Lucie County. An evaluation of boating activity patterns, and the identification of existing and potential sites for the development or expansion of boat facilities follow this. Next, these sites are ranked and desirable locations are identified. Finally, thresholds and policies are presented to explain how the plan is to be used.

B. General Biology and Behavior of Manatees

Several aspects of the biology and behavior of manatees affect the distribution of the manatee population in coastal waterways. Much of the following general discussion is derived from

Reynolds and Odell (1991), which provides an excellent review of the information known about manatees. O'Shea et al. (1995) present a more technical treatment of manatee population biology. Only selected facts relevant to understanding the distribution of manatees in St. Lucie County are described below.

The Florida Manatee (*Trichechus manatus latirostris*) is a large aquatic mammal reaching an average adult length of about 11.5 feet and weight of about 2,200 pounds. The species may be found in any water over one meter deep connected to the coastal waterway system. Manatees live in both freshwater and saltwater. They sometimes move into the deep open waters of the ocean, but they are more frequently found in the coastal lagoons and estuaries. The primary range of the manatee along the Atlantic coast of Florida extends from the St. Johns River in northeastern Florida southward to the coastal waters near Miami.

Manatees are herbivorous, feeding on a wide variety of submerged, emergent, floating, and shoreline vegetation. In brackish or saltwater, they feed primarily on several species of seagrasses, including turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*). They may also eat certain species of algae, mangrove leaves, and seedlings. Freshwater or low salinity species that are commonly part of the diet of manatees also include native submerged aquatic vegetation, such as tapegrass (*Vallisneria americana)* and ruppia (*Ruppia maritima*). In freshwater, they also feed on exotic aquatic vegetation such as water hyacinth (*Eichhornia crassipes*) and hydrilla (*Hydrilla verticillata*). Manatees feed at all levels of the water column and may feed on vegetation overhanging the water and on the bank. They often spend 6-8 hours a day foraging. They may eat at any time of day or night. While foraging underwater, manatees can stay submerged for up to 20 minutes, but the average interval between coming to the surface for a breath is about 2-3 minutes.

Although not essential to survival, manatees are attracted to sources of freshwater. They will drink freshwater from sources that discharge into the coastal waterway. Manatees will often congregate at river mouths, floodgates, water treatment facilities, and other sources of freshwater.

Another important consideration is that manatees are sensitive to water temperature. Severe cold weather at or below freezing for several days may kill manatees. When the water temperature drops below 68°F, manatees seek warm-water sites. Seasonal changes may stimulate long-distance migrations by individual manatees. During the winter, individuals may make shorter movements to and from natural and artificial warm-water sites following the passing of periodic cold fronts. In St. Lucie County, the warm-water discharge at the Fort Pierce Utilities Power Plant is recognized as one of the best-known attractants to manatees. Many manatees spending the summer in northeastern Florida are known to spend part of the winter in the warm waters near this power plant. When the weather becomes warmer between cold fronts, manatees may leave temporarily and travel to feeding areas located many kilometers away.

C. Patterns of Movement by Manatees

The best source of information on the movement of individual manatees is available from the USGS Sirenia Project (National Biological Survey 1994). This study examined the results of tracking 63 manatees at various times between 1986 and 1993. Their results indicate that 34 of the 63 manatees tracked by satellite include St. Lucie County in their range. By examining a summary of the general movement patterns for each of these manatees, 108 movements by 29 individuals traveling to or through St. Lucie County have been documented with a good determination of the time of travel (Exhibit 1). Of the 108 movements, 57 were to the north and 51 were to the south. All of the movements in this sample were made between October and June. Seventy-nine percent of all of the movements were initiated in December through March, 12% were initiated in October through early November, and 9% were initiated in April through June. All of the movements in October and November were to the south. From December through March, 59% of the movements were to the south and 41% to the north. From April through June, 25% of the movements were to the south and 75% were to the north.

Manatees sometimes made several trips through St. Lucie County in a relatively short period of time within the same season. For example, TBC-09 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.

The results of the studies by the Sirenia Project are preliminary; however, the following generalizations concerning patterns of manatee movements are available:

1) Individual manatees often return to the same warm season site year after year;

2) Individual manatees may also return to a previously used warm-water site during the winter, but some manatees will travel during mid-winter to alternate sites;

3) There is considerable variation among individuals concerning the timing and extent of migration and the amount of time spent at warm-water sites;

4) The range of some manatees includes the entire eastern coast of Florida with seasonal movements of 525 miles;

5) Manatees have been found traveling at a rate of about 25 miles/day for several consecutive days when moving from one area to another;

6) Most long-range movements are seasonal, but some long-range movements and many short-range movements do not appear to be related to temperature;

7) Most manatees travel within the ICW, but some individuals travel in the Atlantic Ocean near the coast;

8) The coastal waterway from the Indian River Lagoon to Biscayne Bay is considered to be a high-use area frequented by many manatees during the winter; and

9) Manatees often travel in deep water channels used by boats and vessels.

D. Abundance of Manatees

Mapped satellite telemetry data from the USGS Sirenia Project (National Biological Survey 1994) were examined to gain an understanding of the manatee movement patterns in St. Lucie County. However, this data set is based on tracking a limited number of individuals. This is not considered the best source of information for analyzing manatee populations, and where manatees are most abundant in the coastal waterways of the county.

The most comprehensive source of information on the abundance of manatees in St. Lucie County is from data collected during aerial surveys. The FWC conducted aerial surveys from fixed-wing aircraft flying at an altitude of 500 feet. Specific details of the methodology are described in Chapter 3 of the Manatee GIS Reference Guide included in the Atlas of Marine Resources (FDEP, Florida Marine Research Institute 1998). In 1974, at the inception of the manatee counts using aerial surveys, 800 manatees were counted throughout Florida. The most recent aerial survey conducted by the Florida Marine Research Institute in January 2001 revealed a count of 3,276 for the entire state.

North of Fort Pierce Inlet the Indian River Lagoon was surveyed during 62 flights from June 1985 to December 1987. However, because three flights were incomplete (amii: 7/24/85, 5/9/86, and 10/20/86) and the flights prior to November 30, 1985 did not fly south into St. Lucie County, the data from 13 flights were eliminated from the analysis (amii: 6/4/85, 7/10/85, 7/24/85, 8/5/85, 8/19/85, 9/9/85, 9/27/85, 10/14/85, 10/30/85, 11/17/85, 11/30/85, 5/9/86, and 10/20/86). Therefore, 49 flights were analyzed in this analysis. South of the Fort Pierce Inlet the Indian River Lagoon was surveyed during 27 survey flights flown from January 1986 to January 1987, and 40 survey flights flown from November 1990 to June 1993. Data from five of the flights were incomplete because the survey had to be terminated prematurely due to bad weather. Data from these incomplete surveys were eliminated from the analysis (amemc: 6/18/86; amlc: 12/30/90, 9/24/91, 12/30/91, and 4/30/92). In another case, part the survey route was flown on one day, and the remainder of the survey was flown several days later. In this case the data from the two days were combined and counted as one survey (amlc: 6/24/91 and 6/27/91). Therefore, the Indian River Lagoon was analyzed using data from a total of 111 aerial surveys. The analysis of manatee populations in the North Fork of the St. Lucie River is based on the data collected during 36 flights from November 1990 to June 1993.

The aerial survey data yielded 1345 manatee sightings in the coastal waterways of St. Lucie County. A comparison of the mean number of manatee sightings per survey in each month indicates that manatees were most abundant from December through April (Exhibit 2). These data provide a good estimate of how the relative abundance of manatees changes seasonally. In general, St. Lucie County appears to have about four times more manatees from December

through April than it does throughout the rest of the year. However, the number of manatees in the county during any given month can fluctuate greatly, especially during the winter.

The aerial survey data are also useful in identifying areas frequented by manatees. For this evaluation the coastal waterway in St. Lucie County was divided into 35 segments, each approximately one mile in length. Some segments, primarily at the ends of canals and rivers were longer than one mile to accommodate the length of a well-defined section of the waterway.

Not all of the segments were sampled during each of the 111 aerial surveys. Therefore, in order to compare the number of manatees at different locations, a relative index of manatee abundance was developed by calculating the average number of manatees counted in each segment during each survey (Exhibit 3). These data show that manatees are most abundant in the Indian River Lagoon from the north county line, south to the portion of the lagoon adjacent to Big Mud Creek. Based on the overall averages, the following locations had the greatest relative abundance of manatees (Figures 14-16):

Segment 2. This area includes the portion of the Indian River Lagoon adjacent to the Harbor Branch Oceanographic Institution. Manatees were most abundant in this area from February through April. Manatees were concentrated in the deep channel of the Institution. It is possible that they were attracted by the availability of freshwater. Also, this area has extensive seagrass beds nearby, and is adjacent to the primary north-south travel corridor for manatees on the east coast of Florida.

Segment 4. This area includes the portion of the Indian River Lagoon adjacent to Queen's Cove. This is a residential development characterized by a large number of dead-end finger canals. Manatees were most abundant in this area from February through April. Manatees may be attracted to this area by the availability of freshwater. This area has extensive seagrass beds nearby, and is adjacent to the primary north-south travel corridor for manatees on the east coast of Florida.

Segment 7. This area includes the portion of the Indian River Lagoon adjacent to Taylor Creek. Manatees were abundant in this area throughout the year. Freshwater from Taylor Creek appears to be the main attractant for manatees. This area has extensive seagrass beds nearby, and is adjacent to the primary north-south travel corridor for manatees on the east coast of Florida.

Segment 9. This section of the Indian River Lagoon includes the warm-water discharge from the Fort Pierce Utilities Power Plant. In addition to the warm-water discharge, freshwater from Moore's Creek may also attract manatees to this area. Manatees were most abundant in this area from December through April. This area has extensive seagrass beds nearby, and is adjacent to the primary north-south travel corridor for manatees on the east coast of Florida. During the years of the aerial surveys, freshwater discharges from a sewage treatment facility also attracted manatees to this portion of the lagoon. However, this facility no longer discharges into the Indian River Lagoon.

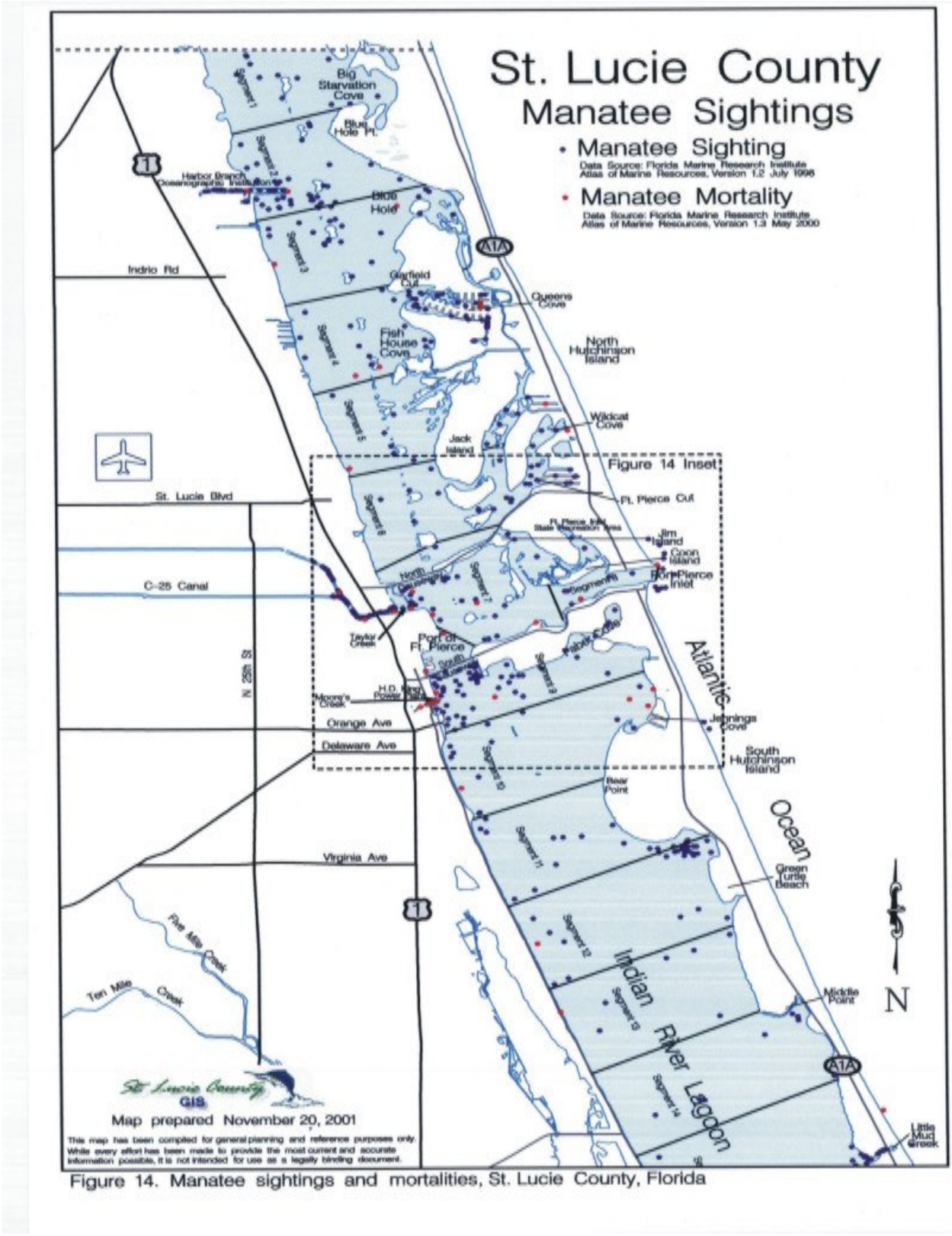


Figure 14. Manatee sightings and mortalities, St. Lucie County, Florida

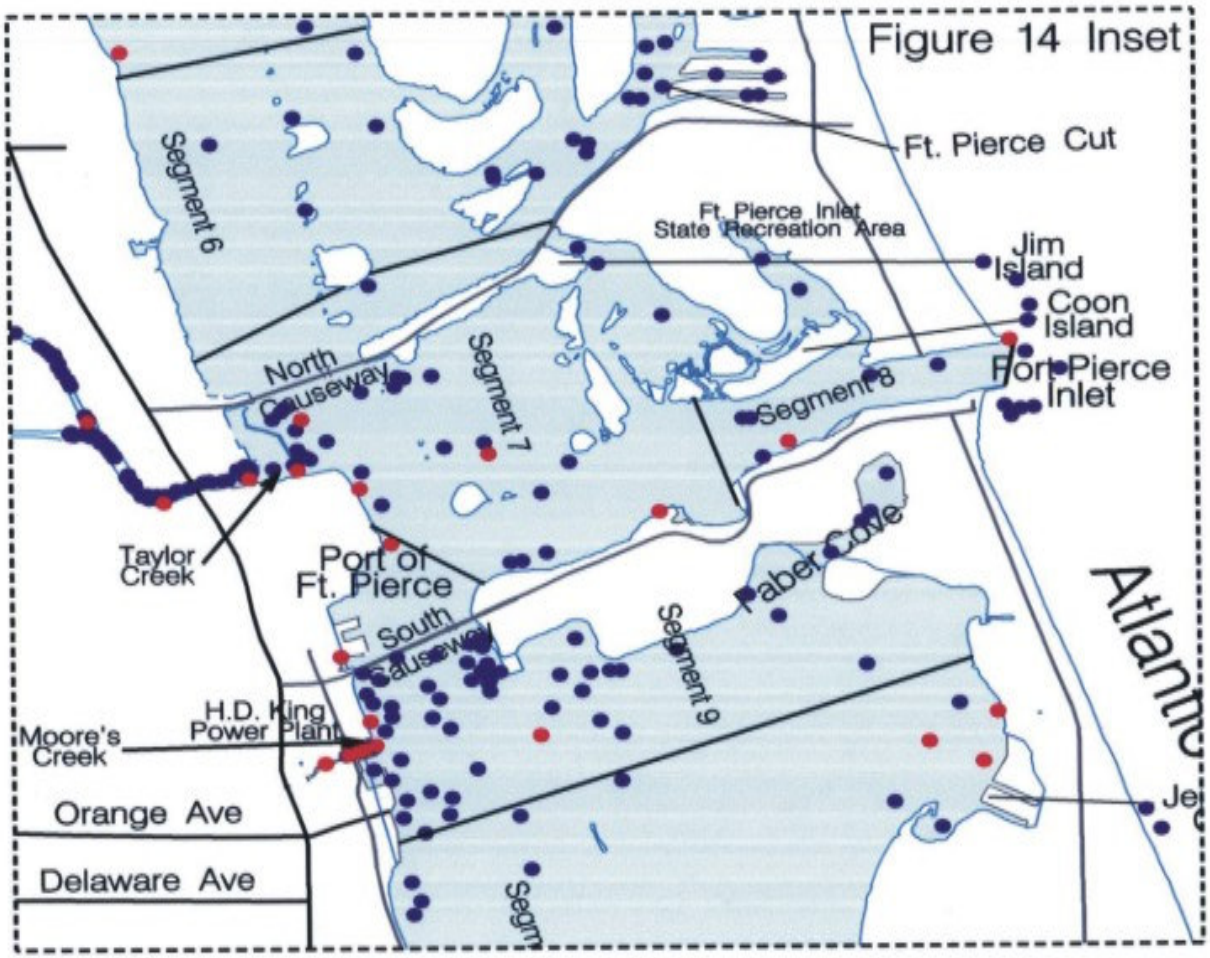


Figure 14 Inset
Ft. Pierce Cut
Ft. Pierce Inlet
State Recreation Area
Jim
Island
Coon
Island
Fort Pierce
Inlet
Segment 6
North
Causeway
Segment 7
Segment 8
Taylor
Creek
Port of
Ft. Pierce
South
Causeway
Paber Cove
Segment 9
Atlantic
H.D. King
Power Plant
Moore's
Creek
Orange Ave
Delaware Ave

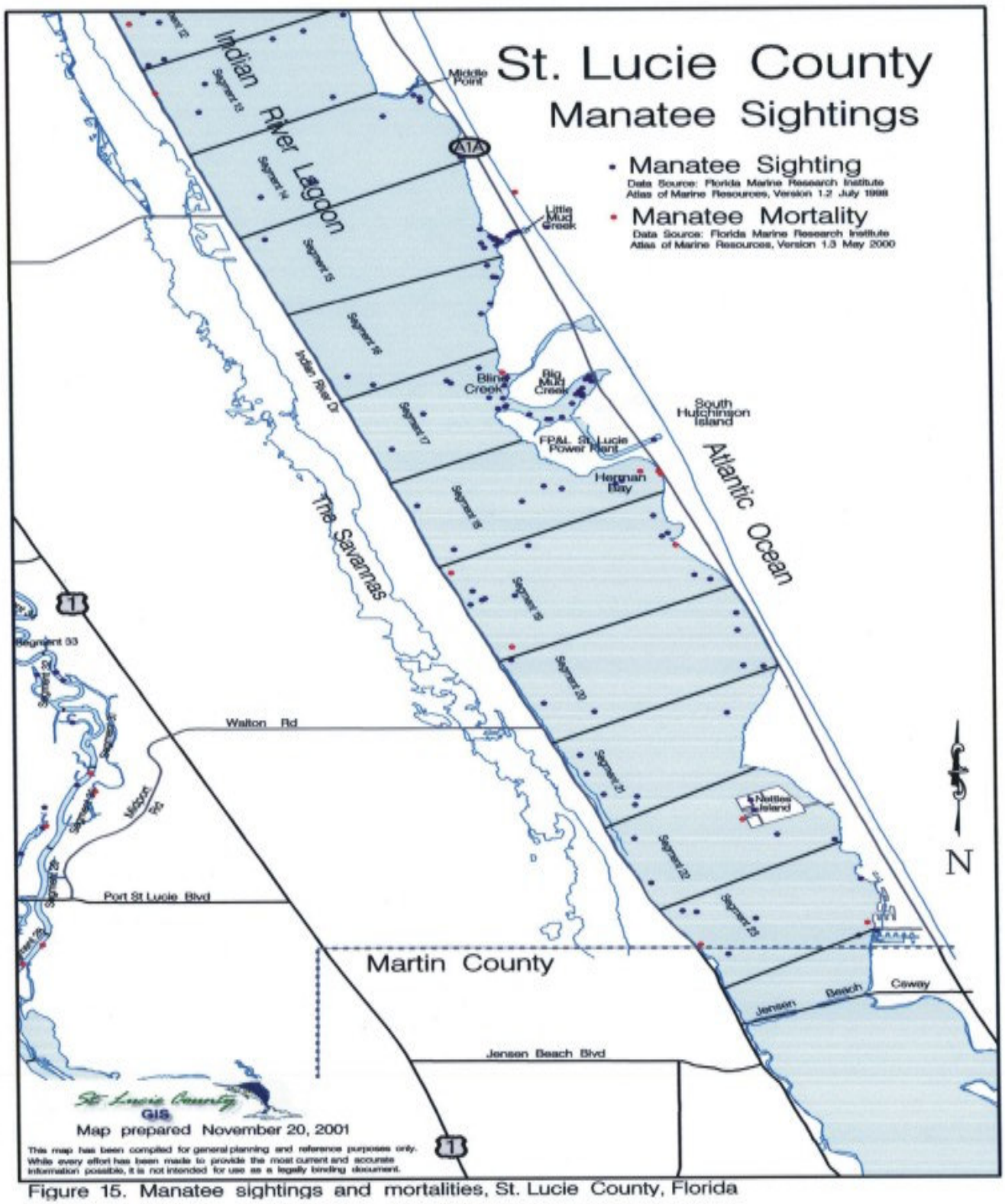


Figure 15. Manatee sightings and mortalities, St. Lucie County, Florida

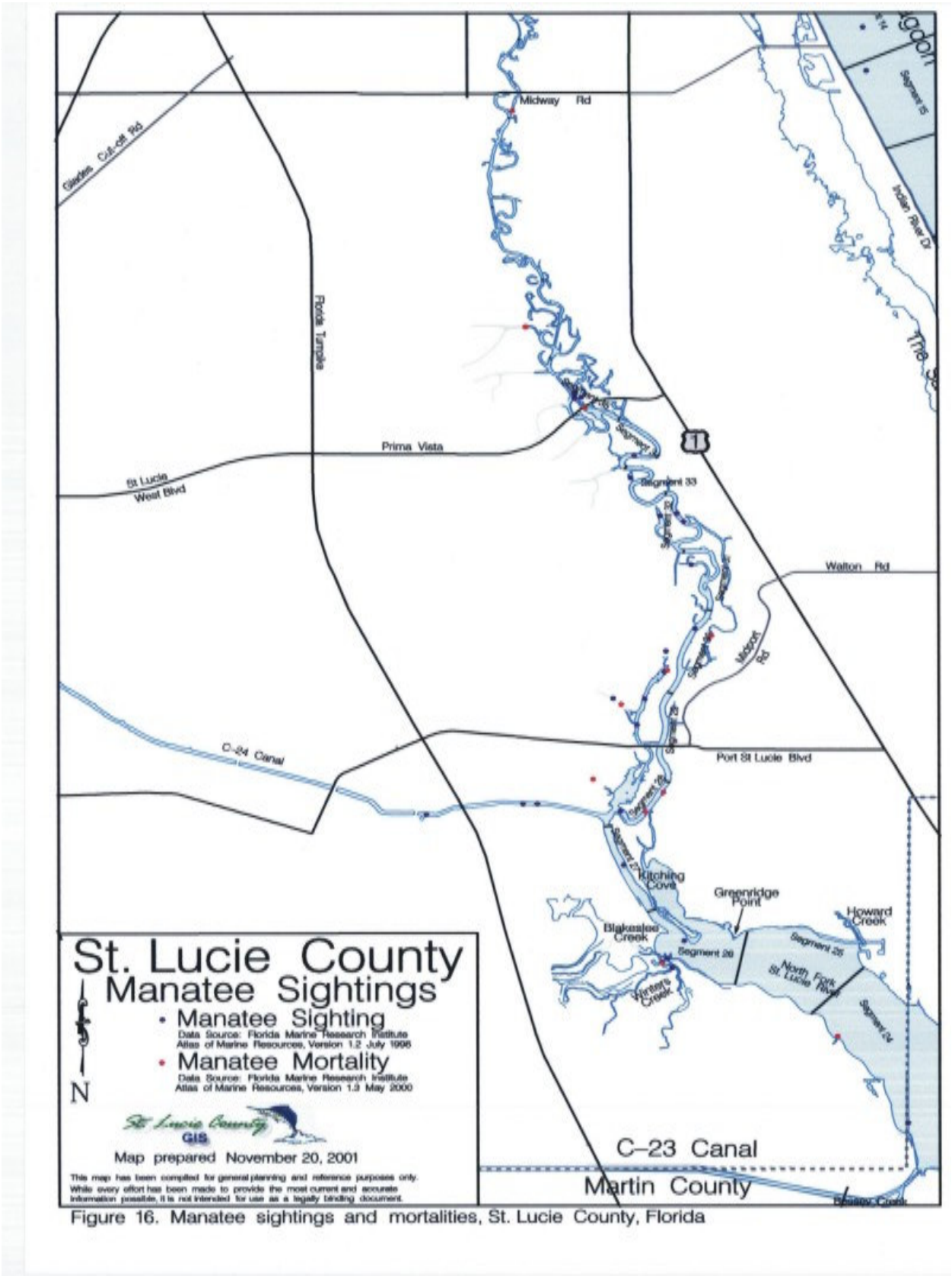


Figure 16. Manatee sightings and mortalities, St. Lucie County, Florida

E. Mortality of Manatees

The Florida Marine Research Institute has maintained records of manatee mortality since 1974. In the 27-year period through 2000, a total of 56 dead manatees have been recovered in St. Lucie County. The causes of death are for a variety of reasons, including watercraft related (27%), dependent calf (11%), cold stress (5%) and other (including natural) causes (16%). The cause of death of 34% of the manatees was undetermined. Examination of the mapped distribution of the manatee recovery locations available from the FWC did not reveal any patterns other than those discussed below concerning watercraft related mortality.

An increase in manatee mortality due to collision with watercraft in the late 1980s and early 1990s is a major reason why increased protection measures are important for manatees throughout the state. The primary concern with the manatee mortality data in St. Lucie County is that the cause of death of 15 (28%) manatees was attributed to collision with a watercraft. Since July 1994, speed zones have been in effect at some locations in St. Lucie County. Sign posting for the speed zones was completed in September 1995. Prior to this time the rate of manatee mortality caused by collision with watercraft was 0.60 deaths per year. After September 1995, the rate has been 0.40 deaths per year in St. Lucie County. These findings indicate that the speed zones have been partially effective in reducing manatee mortality.

Watercraft-related manatee mortality has occurred throughout the year in St. Lucie County (Exhibit 2). However, six (43%) of the manatee deaths resulting from impact with watercraft in St. Lucie County occurred from December through February (Exhibit 4). This coincides with the seasonal peak of manatee movements through the county.

The portions of the coastal waterway having the greatest level of watercraft-related manatee mortality are segments 3-4 and 7-10 (Figures 6-8, Exhibit 5). Twelve (86%) of the fifteen manatee carcasses were recovered in these two sections of the Indian River Lagoon. These areas are adjacent to the portions of the Indian River Lagoon that have the highest abundance of manatees in the county. The manatee carcass recovery locations are not necessarily the locations where manatees were hit by watercraft, because injured manatees may have swam to these locations and died at a later time. In addition, dead individuals may drift from the point of impact for some distance before they are recovered. Nevertheless, the mortality data are generally consistent with the aerial survey data in identifying the sections of the coastal waterway critical to manatees.

F. Manatee Habitat

Most locations in the coastal waterways of St. Lucie County can be classified as one or more types of habitat for manatees. Manatee habitat types available in the county include: feeding areas, traveling corridors, freshwater attractants, warm-water attractant, and resting/protected areas. Feeding areas, freshwater attractants, and the warm-water attractant are important because manatees congregate at these locations. The travel corridors are also very important during seasonal long-distance movements by manatees, which occur primarily from December through March.

Seagrasses are the most important food source for manatees in the county. Seagrass beds occurring in St. Lucie County are shown in Figures 2-4. These seagrass maps are based on the analysis of aerial photographs taken in 1994. The St. Johns River Water Management District provided the seagrass data.

The seagrasses are concentrated in beds that are located adjacent to the shoreline throughout the entire length of the Indian River Lagoon in St. Lucie County (Figures 2-4). The most extensive seagrass beds occur in the Indian River Lagoon between the north county line and the area of the lagoon near Big Mud Creek. This coincides with the portion of the lagoon that had the highest abundance of manatees in the county (Figures 14-16, Exhibit 5).

The main freshwater flows to the coastal waterways in St. Lucie County are Taylor Creek, Moore's Creek, and the North Fork of the St. Lucie River. The freshwater flows into the Indian River Lagoon from Taylor Creek and Moore's Creek and were associated with segments 7 and 9. These two segments had two of the three highest levels of manatee abundance in the County. Freshwater flows at the Harbor Branch Oceanographic Institution and at Queen's Cove development may also be responsible for attracting manatees to these areas. Freshwater flows from the North Fork of the St. Lucie River do not appear to function as a freshwater attractant for manatees.

The main warm-water discharge in St. Lucie County is from the Fort Pierce Utilities Authority (FPUA) power plant located in Segment 9 (Figure 14-Inset). The warm-water discharge for this facility is located in Moore's Creek, which also serves as a freshwater attractant for manatees. Historically, this area has attracted a large number of manatees from December through April. The Manatee Observation and Education Center located at this location has had volunteers count the number of manatees once an hour from Tuesday through Sunday from November to April. The records from 1996 to 2000 indicate that the number of manatees recorded during these hourly counts ranged from 0 to 35 manatees. The highest hourly counts were recorded in December 1996 (35 manatees); February 1997 (26 manatees); December 1997 (26 manatees); January 1999 (23 manatees); December 1999 (20 manatees); and February 2000 (20 manatees). Of course, these counts only represent only a sampling of the number of manatees present at the Moore's Creek location. It is likely that more manatees are present in this general area, but not all of the manatees can be viewed by the volunteers conducting the counts. These data suggest that the number of manatees visiting the warm-water discharge at any given time is highly variable.

In recent years the FPUA power plant has been run intermittently. Representatives from this facility have indicated that the operation of the plant depends on economic factors. The Florida Municipal Power Agency (FMPA) provides direction to the plant, determining when the power generators are operated. Currently, the power generators at the plant are run primarily during the summer and during relatively cold periods during the winter. The FPUA currently has a plan in effect that calls for operation of the plant during cold periods for purposes of providing warm-water discharge for manatees, even if operations are not directed by the FMPA. The plant operations are not being phased out, and the current intermittent operation schedule is expected to remain in effect in the future.

Big Mud Creek (Segment 17, Figure 15) and Little Mud Creek (Segment 15, Figure 15) are also areas where manatees tend to congregate. Although these areas do not have a thermal discharge, warm water in these secluded creeks may attract manatees. Big Mud and Little Mud Creeks are being considered under state review for some form of protective status.

The primary north-south travel route for manatees follows the ICW through St. Lucie County. The primary travel route traverses the Indian River Lagoon from the north to the south county line. Generally, segments located along this travel route had a higher relative abundance of manatees than the segments that were not located along this route. The travel route also connects to the Fort Pierce Inlet, which is used by manatees to access the Atlantic Ocean.

Most of the finger canals, small basins and waterways connected to the Indian River Lagoon, and North Fork of the St. Lucie River are designated as resting/protected habitat. Manatees use these areas because they are relatively free of heavy traffic by watercraft. Manatees will often give birth in quiet isolated waterways.

G. Conclusions Based on the Manatee Data

Manatees occur in all of the coastal waterways in St. Lucie County throughout the year. However, there are certain times of the year when manatees are more abundant and tend to congregate at specific locations. The aerial survey data indicate that there are about four times as many manatees in St. Lucie County in the winter than in other seasons. Telemetry data from the Sirenia Project indicate that most long-distance movements of manatees through St. Lucie County were initiated from October though March, with the peak occurring in the four-month period between December and March. Individual manatees may make several north-south trips through St. Lucie County within the same season. The highest levels of watercraft-related manatee mortality were detected in December through February, which coincides with the peak time of long-distance movements and abundance in the county.

The aerial survey data were most useful in identifying areas where manatees congregate. Four main areas stand out that had a relatively high abundance of manatees. These areas include portions of the Indian River Lagoon near: 1) Harbor Branch Oceanographic Institution, 2) Queen's Cove development, 3) Taylor Creek, and 4) Moore's Creek. Each of these areas appears to have a freshwater attractant for manatees. In addition, the Moore's Creek location has the warm-water discharge from the Fort Pierce Utilities Power Plant. In addition, extensive seagrass communities are located near each of these sites. Twelve (86%) of the fifteen manatee carcasses whose deaths were attributed to impact with watercraft in the county were recovered within or adjacent to these four areas.

Big Mud Creek and Little Mud Creek are also areas where manatees tend to congregate. Although these areas do not have a thermal discharge, warm water in these secluded areas may attract manatees.

The Fort Pierce Utilities Power Plant has a warm-water discharge that functions as an attractant to manatees during cold weather. However, some manatees travel through St. Lucie County to

reach warm-water refuges in other counties. The primary north-south travel route follows the ICW, which traverses the entire length of the Indian River Lagoon in St. Lucie County. This travel route is important because it is part of the primary travel corridor for the entire east coast population of manatees. Fourteen of the fifteen watercraft-related manatee mortalities in St. Lucie County occurred along sections of the Indian River Lagoon adjacent to this primary travel corridor.

H. Boating Activity Patterns

Morris (1995) prepared a Boating Activity Study (BAS) that included the area of the Indian River Lagoon from the Sebastian Inlet in Indian River County to the St. Lucie Inlet in Martin County. The purpose of this study was to provide information about boating activity patterns in the inter-inlet waters of Indian River County, St. Lucie County, and northern Martin County. The study was based on six different survey activities including, aerial and on-water surveys of boating activity; boat operator intercept interviews; and marina, shoreline, and mail surveys. The results of these surveys that are most relevant to manatee protection are discussed below.

Results of the aerial surveys indicated that the months of May through October had the greatest level of boating activity, while the on-water surveys showed that April through July had the most boating activity. The most frequent boating activities observed were traveling and recreational fishing. Powerboats accounted for most of the observations (83% in the aerial surveys and 90% in the on-water surveys), followed by sailboats (12% in the aerial surveys, 7% in the on-water surveys), and jet skis (6% in the aerial surveys, 3% in the on-water surveys). Powerboats in the 16-25 foot category accounted for 55.4% of all the aerial observations, and 59.2% of all on-water observations.

The BAS surveyed 5 boat ramps in St. Lucie County. The most heavily used ramps were the Black Pearl (33.6%) and North Causeway (33.1%) ramps, followed by the Moore's Creek ramp (20.9%), South Causeway ramp (8.0%), and Jaycee Park ramp (4.4%). The other boat ramps in the county were not surveyed. The majority of boats using the ramps were powerboats (92%), followed by jet skis (8%), and sailboats (1%). Powerboats less than 25 feet in length accounted for 85.4 % of all launchings from ramps. The ramp survey indicated that the primary activity on the water was recreational fishing (45.4%), followed by traveling (28.4%), and skiing (10.9%). Results of the ramp survey also indicated that the majority of the boaters using the ramps were from St. Lucie County (52%), followed by Indian River County (32%), Martin County (9%), Brevard County (3%), Palm Beach County (2%), and Orange County (1%).

The BAS by Morris (1995) did not determine the destination of boats launched from the ramps. However, the proximity of the busiest ramps to the inlet suggests that offshore was a primary destination of boaters using the ramps. In a similar study by Shultz (1996) conducted in Martin County, a general conclusion of the ramp survey was that the waterbodies nearest to each ramp location were the primary destinations of the boaters using the ramp. Ramp users have a strong tendency to stay in the general area in which they launch. Ramps closest to the ocean had the greatest proportion of their users go to the ocean.

Results of the mail survey indicated that most boaters operated powerboats (92%) and stored their boats at home (62.8%). The most common size of boat was 16 to 25 feet (50%), followed by the less than 16-foot category (35.2%). The majority of boats were powered by outboard motors (73.6%) with a horsepower equal to or less than 150 horsepower (70.4%). Recreational fishing and traveling were identified as the most popular boating activities. Recreational fishing was an activity for which 49.1% of the boaters indicated that they always used their vessels. The mail responses also indicated that 34.5% of the boaters launched their watercraft from the boat ramp closest to their residence, and 26% launched from a ramp closest to their destination. An average speed of 21-30 miles per hour was reported for 35.6% of the boats launched from trailers, and 32.1% of the boats coming from private docks. Boats docked at marinas had the highest percent (43.2%) of responses in the 11-20 mile per hour speed range. In the mail survey the respondents reported a greater use of their boats in the winter from October to March.

The BAS identified 15 marinas in St. Lucie County (Exhibit 6). During the survey period in the summer of 1993, the total wet slip capacity of the 15 marinas was 1240 slips and the dry storage capacity was 777 spaces. The wet slips were occupied by 838 boats (68%) and the dry storage spaces were occupied by 439 boats (56%). The marina survey indicated that 78% of the boats stored in wet slips in St. Lucie County were powerboats, and 22% were sailboats. Of the boats stored in dry storage, 60% were powerboats and 40% were sailboats. The facilities with the largest number of wet slips included the Harbortown Marina (340 wet slips), Fort Pierce Yachting Center (240 wet slips), and the Pelican Yacht Center (120 wet slips). The main facilities with dry storage were the Taylor Creek Marina (600 dry spaces), Riverside Marina (87 dry spaces), and Harbortown Marina (85 dry spaces).

The BAS by Morris et al. (1995) did not provide survey results characterizing the destination of boaters similar to the Martin County (Shultz 1996) and Palm Beach County (Baker and Villanueva 1994) boating activity studies. The Martin and Palm Beach County studies found that traveling offshore was the most popular destination among boaters. Although Morris (1995) did not identify destinations, a major conclusion of the inter-inlet study is that the greatest amount of boating activity occurred in the sections of the study area that contained an inlet. It is likely that an offshore destination contributed to this phenomenon.

The dominant boat type identified in St. Lucie County during the on-water surveys was a 16-25 foot powerboat. Small powerboats have a great potential for impacting manatees because they can traverse relatively shallow waters frequented by manatees. Manatees are particularly vulnerable in shallow water because they lack adequate clearance to avoid impact by watercraft hulls, lower units, and propellers. Shallow waters could not otherwise be used by larger boats, which are restricted to deeper water in the channels. Since manatees also travel through deep water in channels, fast moving boats of all sizes have potential for striking and killing manatees.

Even though the boating activity and manatee data do not enable a quantitative analysis of the degree of overlap of patterns of use, the extent of overlap can be described in general terms. The ICW is an area having a high level of overlap in use by boats and manatees. The ICW is the main north-south travel route through the county for boats and manatees. This route runs south from the Indian River Lagoon in Indian River County through St. Lucie County to Martin County.

The amount of overlaps between boats and manatees in St. Lucie County increases with proximity to the Fort Pierce Inlet. The Fort Pierce Inlet attracts boats because it is the only inlet in the county. Manatees are attracted to this area because of the extensive seagrass beds in the lagoon near the inlet, and because of freshwater attractants at Taylor and Moore's Creeks, and warm-water discharge from the Fort Pierce Utilities Power Plant during the winter. Essentially all portions of the coastal waterway that exhibit a high level of boat use also have a high level of manatee use.

I. Inventory of Boat Facilities

Five sources were used to develop an inventory of boat facilities in St. Lucie County. The inventory is based on information obtained from: 1) the St. Lucie County Community Development Department (St. Lucie County 1990); 2) A Boater's Guide prepared by the Indian River Lagoon National Estuary Program (1995); 3) a St. Lucie County model marina siting report (Applied Technology and Management Inc. 1992); 4) the BAS prepared by Morris et al. (1995); and 5) drive-by field surveys conducted in July 2000 and February 2001. This information is not intended to be comprehensive since some boat facilities may have been omitted accidentally during inventorying and/or some facilities may have since expanded or downsized their operating capacity.

The inventory identified 60 boat facilities, including 48 commercial and private marinas and facilities offering boat services; 9 public boat ramps; and 3 operated by governments (Exhibit 6; Figures 6-8). Most of the boat facilities in St. Lucie County are concentrated near the Fort Pierce Inlet (Figure 6-Inset).

The most detailed information about the capacity of marinas is contained in the BAS by Morris (1995). Based on the analysis of 15 marinas, the total capacity of wet berths was 1240 slips, and the total capacity of dry storage spaces was 777. These numbers represent only a sampling of the facilities in the county. The inventory did not provide the number of boats stored at private docks.

According to the latest information available from the Florida Department of Highway Safety and Motor Vehicles, 11,002 vessels were registered in St. Lucie County in 1999-2000. The mail survey conducted as part of the BAS revealed that about 63% of the registered boats were stored at home; 8% in a marina wet slip; 4% in dry storage at a marina; and 25% at other locations such as a business parking lot, garage, boat shed, or a friend's yard. These results emphasize the importance of boat ramps for boats stored at home.

The inventory identified 9 public boat ramps in St. Lucie County (Exhibit 6, Figures 6-8). Five of these ramps, the North Causeway ramp, Black Pearl ramp, Moore's Creek ramp, South Causeway ramp, and Jaycee Park ramp are all located relatively close to the Fort Pierce Inlet (Figure 6-Inset). The BAS found that the Black Pearl and North Causeway ramps had the greatest number of boats launched in St. Lucie County.

J. Identification of Potential Sites

All of the existing boat facility sites identified in Exhibit 6 are considered to have potential for expansion or redevelopment of boat facilities. Even though an existing boat facility may appear to be built-out, the facility could possibly expand by purchasing and redeveloping adjacent property. For this reason it is impossible to rule out the potential for expansion and redevelopment at any existing facility.

A search was conducted to identify undeveloped sites and sites with a potential for redevelopment that could accommodate the development of new boat facilities. The search for undeveloped parcels was carried out by inspecting aerial photographs and maps (Experian 1998 Aerial & Map Atlas). Undeveloped parcels adjacent to the coastal waterway were mapped. These parcels were investigated by discussing the sites with representatives from local governments and by referring to local government comprehensive plans. Research on these parcels attempted to identify the zoning classification, plans for development, and environmental constraints. In addition, sites with a potential for redevelopment were identified through discussions with representatives from local governments.

Ten sites that are currently undeveloped or have redevelopment potential were identified as potential sites for new boat facilities (Exhibit 6, Figures 6-8). Five of the potential sites are located within the jurisdictional boundaries of the City of Fort Pierce, three are located in unincorporated St. Lucie County, and two are located in the City of Port St. Lucie.

Potential sites P1-P4 and P6 occur within the City of Fort Pierce. Site P1 is on the south side of Seaway Drive on Causeway Island (Figure 6-Inset). Watermark Communities, Inc. (WCI) owns this undeveloped property. The property owners have discussed plans with the City of Fort Pierce concerning a mixed-use development, but specific site plans have not been submitted for review.

Potential site P2 is located on Causeway Island west of site P1 (Figure 6-Inset). Causeway Mobile Home Park is currently developed on this site. City and county planners have identified this property as having potential for redevelopment. There are no plans to redevelop this site at the present time.

Potential site P3 is located in the City of Fort Pierce and includes the upland areas adjacent to the commercial fishing operations at Fisherman's Wharf (Figure 6-Inset). This area was identified by City planners as having potential for redevelopment. There are no plans to redevelop this site at the present time.

Potential site P4 is part of the Port of Fort Pierce property (Figure 6-Inset). This site includes about 20 acres owned by St. Lucie County. Specific plans have not been developed for this parcel.

Potential site P5 is located in unincorporated St. Lucie County east of Little Jim Bridge (Figure 6-Inset). St. Lucie County has plans to install a new boat ramp at this location. The project plans include new parking spaces, road improvements, and exotic species removal.

Potential site P6 is the site of the existing South Causeway ramp in the City of Fort Pierce (Figure 6-Inset). This area was identified by City planners as having potential for redevelopment. There are no plans to redevelop this site at the present time.

Potential site P7 is located in unincorporated St. Lucie County on the west shore of the Indian River Lagoon (Figure 6-Inset). This undeveloped parcel has limited access to the water. However, if redevelopment occurs in the area of the commercial fishing operations adjacent to the south, this site could have potential for upland storage of boat facilities. There are no current plans for the development of boat facilities at this location.

Potential site P8 is located in unincorporated St. Lucie County on the North Fork of the St. Lucie River (Figure 8). This parcel is one of the last remaining undeveloped parcels south of the Harbor Ridge development. The surrounding area is comprised of residential and golf course development. There are no current plans for the development of boat facilities at this location.

Potential sites P9 and P10 are located in the City of Port St. Lucie (Figure 8). Site P9 is partially cleared and located on the North Fork of the St. Lucie River. There are no current plans for the development of boat facilities at this location. Potential site P10 is located on the north shore of the C-24 canal. The Southbend Neighborhood Association has discussed the development of a boat ramp at this site. No specific plans have been submitted for review.

K. Criteria for Screening Sites

The FWC has identified a number of factors to be considered in determining the suitability of sites for boat facilities. These factors include: 1) proximity to inlets; 2) proximity to the ICW; 3) proximity to popular boating destinations; 4) proximity to manatee aggregation sites; 5) water depth; 6) presence of seagrass beds; 7) extent of manatee use; and 8) amount of overlap in patterns of use by manatees and boats. In addition to these factors, other characteristics could be considered, including: 9) size of the parcel; 10) existing land use; 11) potential for redevelopment; 12) land use and zoning classification; 13) recreational needs; and 14) the importance of an area to the economic development of a community.

Some of the factors noted above, such as proximity to inlets, are a function of the general location of a given site. These factors are most appropriate to use in a general screening process to identify desirable locations for boat facilities. Other factors, such as zoning classification, depend on site-specific characteristics and specific plans for development. Whether or not dredging is required may depend on the number of slips proposed and where the slips are to be located. Similarly, impacts to seagrasses or mangroves may depend on whether wet slips or dry storage are proposed and their exact location. Technical evaluations based on specific site plan proposals are necessary in order to consider these factors. Issues related to factors that depend on a specific plan for development are better dealt with in policies governing the development of boat facilities, rather than a general screening process. These issues are dealt within the policy section of this plan.

The following discussion explains the rationale for using five main factors in a general screening process to compute a score that characterizes the relative probability of impact to manatees if additional boat trips are generated from a given location. These factors include proximity to inlets, manatee abundance, manatee habitat, manatee mortality, and speed zones. These factors are useful because they can be applied to the entire coastal waterway and a clear connection can be made concerning potential impacts to manatees. However, this system of ranking sites is only appropriate for a general screening process. This process should be considered distinct from the permit review process administered by state agencies. The Bureau of Protected Species Management in the Office of Environmental Services of the FWC uses a different evaluation process when providing comments to the FDEP and the Water Management Districts concerning impacts to listed species expected with regulated activities under the Environmental Resource Permit, sovereign submerged lands, and Florida Coastal Management authorities. Activities in surface waters and wetlands is regulated by Water Resources, Part IV, Chapter 373.414(a)2, Florida Statutes, implemented by FDEP and the Water Management Districts.

Proximity to Inlets. The analysis of boating activity patterns revealed that the Fort Pierce Inlet area had the greatest amount of boating activity in St. Lucie County. This is important because manatees occur primarily in the coastal waterways. Boats traveling offshore have a reduced risk of hitting manatees once they clear the inlet. However, the farther a boat travels through the coastal waterway to reach the inlet, the greater the chances of it striking a manatee. For this reason, proximity to inlets should be used in a general screening process to select desirable locations for boat facilities. Sites located closer to inlets are more desirable for siting boat facilities than sites located farther away. The segments identified in the section dealing with the evaluation of manatee abundance are appropriate to use in this analysis, because they provide an approximate measure of distance to the closest inlet. Although the segments differ in the area of coastal waterway that they cover, their standard length of about one mile makes them convenient to use in this analysis. Proximity to inlets should be used in association with other factors to rank the desirability of individual sites for the development or expansion of boat facilities.

Manatee Abundance. The best source of information on the abundance of manatees in St. Lucie County is from aerial surveys conducted between 1985 and 1993 by the FWC (FDEP 1998). Analyses of these data indicate that manatees are most abundant at specific locations in the coastal waterway. Manatee abundance should be incorporated into the screening process because boats traveling through or adjacent to areas of greater abundance have an increased risk of striking a manatee.

Manatee Habitat. Seagrass beds are one of the most important estuarine habitats for manatees. Seagrasses are a major source food for manatees. Freshwater vegetation in rivers and canals may also provide extensive forage for manatees. The seagrass maps used in this report are based on data provided by the St. Johns River Water Management District. The seagrasses were mapped by analyzing aerial photographs taken in 1994. The maps indicate that seagrasses occur at various locations throughout the Indian River Lagoon (Figures 2-4). Areas with seagrasses have a greater potential to attract manatees than areas with little or no seagrasses. In addition, the presence of seagrasses can limit design options for the siting of new boat facilities, because seagrasses are protected by state and federal agencies. The presence of seagrass beds should be

used in association with other factors to rank the desirability of an area for the development or expansion of boat facilities.

Manatee Mortality. In the period of 1974-2000, 15 manatee deaths in St. Lucie County were caused by collision with watercraft. The locations where these manatees were recovered are areas of concern. Since July 1994, speed zones have been in effect at some locations in St. Lucie County. Sign posting for the speed zones was completed in September 1995. Prior to this time the rate of manatee mortality caused by collision with watercraft was 0.60 deaths per year. After September 1995, the rate has been 0.40 deaths per year in St. Lucie County. These findings indicate that the speed zones have been partially effective in reducing manatee mortality. Although a manatee struck by a watercraft may drift or swim before being recovered, the recovery locations provided by the FWC are the best data available for estimating where manatees have an increased risk of being struck by a boat. Manatee mortality should be considered in the screening process, because boats traveling through areas with a history of manatee mortality have an increased risk of striking a manatee.

Speed Zones. The speed zone restrictions include idle speed/no wake (the minimum speed that will maintain steerageway of the vessel), slow speed/minimum wake (approximately 5-7 miles per hour), and 25 or 30 mph depending on location and season. These speed restrictions apply to various locations throughout the coastal waterway (Figures 6-8). In some areas, the channel is exempt from the speed restriction. Speed zones are only partially effective in reducing impacts to manatees. This is primarily for two reasons. First, not all boaters obey the speed zones. Given the ideal situation of 100% compliance with the law, manatees would receive a higher level of protection. Speed zone enforcement by law officers can help to protect manatees in this situation. The second reason speed zones are only partially effective is because at certain times manatees travel across or within the channels. Many of the channels have a 25 or 30 mph speed limit, which places manatees at higher risk of being struck by boats. An increased level of enforcement will not eliminate impacts to manatees in this situation. Existing speed zones should be incorporated into the screening process. Areas in which the entire width of the waterway is idle or slow speed, channel included, should be counted as having a reduced risk of impact to manatees.

L. Screening Methodology

The methodology used to identify desirable locations for the development of new boat facilities or the expansion of existing boat facilities is based on the five main criteria for the general screening process described in the previous section. A scoring system was designed that provided an equal weighting to each of the five categories. A score for each of these categories consisting of a 1, 2, or 3 was assigned to each of the coastal waterway segments that were defined during the analysis of manatee abundance in the previous section of the report (Figures 14-16). A score of 1 indicates relatively lower potential for impact to manatees, a 2 indicates intermediate potential for impact to manatees, and a 3 indicates relatively higher potential for manatees. The procedure allows a score to be computed that characterizes the relative probability of impact to manatees if additional boat trips are generated from a given segment of the coastal waterway. A total score for each segment was calculated by adding the individual scores

assigned to each of the five categories (Exhibit 7). The scores for each category were computed as follows:

Proximity to Inlets. The closest inlets to the coastal waterways in St. Lucie County are the Ft. Pierce and St. Lucie Inlets. Since each segment in the study area is about one mile in length, the distance to each inlet can be approximated by counting the number of segments from the inlets. For example, Segment 1 is located at the St. Lucie and Indian River County line. By counting the number of segments to the closest inlet, the St. Lucie Inlet, it can be determined that this segment is about 8 miles from the inlet. The maximum distance from either inlet measuring along the Indian River Lagoon is about 13 miles. Segments in the North Fork of the St. Lucie River ranged from 11 to 22 miles from the St. Lucie Inlet. In order to characterize relative distance to the inlet, segments within five miles of the inlet were classified as close to the inlet and received a score of 1. Segments ranging from six to 10 miles from the inlet were classified as intermediate and received a score of 2. Segments greater that 10 miles from the inlet were considered far from the inlet and received a score of 3.

Manatee Abundance. Analysis of aerial survey data provided by the FWC resulted in the calculation of relative index of manatee abundance values ranging from 0 to 5.6 for all the segments of the coastal waterway in St. Lucie County. Segments with relative index of manatee abundance values ranging from 0 to 0.5 were classified as relatively low abundance and assigned a score of 1. Segments with relative index of manatee abundance values ranging from 0.6 to 1.0 were classified as intermediate and assigned a score of 2. Segments with relative index of manatee abundance values greater than 1.0 were classified as relatively high abundance and assigned a score of 3.

Manatee Habitat. The seagrass maps (Figures 2-4) were visually inspected and the percent of each segment covered with seagrasses was estimated. Segments with 0 to 25 percent coverage of seagrasses were classified as low coverage areas and assigned a score of 1. Segments with 25 to 75 percent seagrass coverage were classified as intermediate and assigned a score of 2. Segments with greater than 75 percent seagrass coverage were classified as high coverage areas and assigned a score of 3. This method of scoring seagrasses only assesses the importance of seagrasses within the general area of the segment analyzed. The FWC and FDEP typically apply a more detailed method of determining seagrass habitat value when evaluating the seagrass coverage at a specific location during the permit review process. Also, freshwater vegetation should be considered in a similar manner for the riverine and canal segments. However, maps of freshwater vegetation were not available for this analysis.

Manatee Mortality. Two manatees have died from impact with watercraft in St. Lucie County since the speed zone signs were posted in September 1995. Using these two records, segments with no manatee mortality within them were classified as low mortality areas and assigned a score of 1. Segments with one record of manatee mortality were classified as intermediate and assigned a score of 2. Segments with two or more records of manatee mortality were classified as high mortality areas and assigned a score of 3.

Speed Zones. Various types of boating speed zones are present throughout the coastal waterway in St. Lucie County (Figures 6-8). Segments with 50-100 percent of their area having the entire

width of the waterway designated as idle or slow speed were classified as low speed areas and assigned a score of 1. Segments with a portion less than 50 percent of their area designated as idle or slow speed were classified as intermediate and assigned a score of 2. Segments without any portion of their area designated as idle or slow speed were classified as high-speed areas and assigned a score of 3.

M. Results of the Screening Process

Applying the screening methodology to each of the 35 segments (Figures 14-16) in the St. Lucie County coastal waterway resulted in total scores ranging from 5 to 10. The number of segments associated with each score was distributed as follows:

Score	Number of Segments	Impact to Manatees
5	1	Low
6	0	Low
7	5	Medium
8	19	Medium
9	9	High
10	1	High

For purposes of characterizing potential impact to manatees if additional boat trips are generated from a given area, segments with scores ranging from 5 to 6 were classified as areas of low potential for impact to manatees. Segments with scores ranging from 7 to 8 were classified as areas of medium potential for impact to manatees. Segments with scores ranging from 9 to 10 were classified as areas of high potential for impact.

Segment 8 was the only segment with a score in the category of low potential for impact to manatees. This segment corresponds with the Fort Pierce Inlet and entranceway into the Indian River Lagoon. Boat facilities located in this segment include the La Entrada Del Mar docks and the Pelican Yacht Club (Figure 6-Inset). In addition, there are a number of existing boat facilities and potential sites that are located only a short distance from this segment that could access the inlet without traveling through the ICW. These include the following facilities and sites:

Map Code	Boat Facility/Potential Site
5	Fort Pierce Inlet Marina;
7	Little Jim's Marine;
38	US Coast Guard;
33	South Causeway ramp;
45	Lavern Quandt;
P5	Potential Site; and
P6	Potential Site.

Also, there are several other sites nearby that could allow boats to reach the inlet with minimal or no travel through the ICW. These include the North Causeway ramp (Map code 34) and potential sites P1 and P2.

The remainder of the boat facilities and potential sites identified in St. Lucie County (Exhibit 6) occur in areas classified as medium or high potential for impact to manatees.

N. Discussion

The identification of primary locations for the development of future boat facilities is an important function of this plan. The screening process applied to St. Lucie County is useful for identifying desirable locations for the development or expansion of boat facilities based on probability of impact to manatees. Results of the screening process revealed that only one of the 35 segments of the coastal waterway in St. Lucie County was classified as an area of low potential for impact to manatees. Segment 8, which corresponds with the Fort Pierce Inlet and entranceway into the Indian River Lagoon, is the area that had the most favorable score. Desirable features of this area include proximity to the inlet, presence of slow speed zones in effect, low coverage of seagrasses, and no recent records of manatee mortality.

Another major feature of the inlet area is that it is east of the ICW, which is a major north-south travel route for manatees through St. Lucie County. Boat trips originating from this area can reach the Atlantic Ocean without crossing the ICW. This is especially important because major manatee aggregation areas occur nearby to the west at the entrances to Moore's Creek and Taylor Creek. The same features that make segment 8 a desirable location for boat facilities also apply to a broader area identified as the Fort Pierce Inlet Area in Exhibit 8. This area includes a number of existing boat facilities, and potential sites for future development of boat facilities.

A consideration of land use and zoning issues revealed that there are a limited number of sites available for new facilities in St. Lucie County. Therefore, consideration should be given to the expansion of existing facilities and redevelopment to accommodate future growth in St. Lucie County.

Primary Locations. The area that appears to be most suitable for boat facilities is the Fort Pierce Inlet Area. This area should be identified as the primary location for future boat facilities. The geographic area identified as the primary location is depicted in Exhibit 8. The number of boats at each facility will be limited by the site plan constraints and local, state, and federal permit requirements to avoid and minimize impacts to natural resources. The City and the county should promote the expansion and redevelopment of marine industries within the Fort Pierce Inlet Area. One benefit of redevelopment is that there will be opportunities for reconfiguring storm water management systems, and this will ultimately improve water quality in this area. Another benefit of concentrating new boat facilities in this area is that the enforcement of speed zones can be more effective than if new facilities are spread throughout the county.

Secondary Locations. All other locations that have not been identified as a primary location must be designed to avoid and minimize impacts to natural resources to the maximum extent

feasible. Any impacts to seagrasses, tidal marshes, or mangrove communities must be avoided or minimized. Expansion or development of boat facilities at secondary locations with appropriate land use and zoning designations will be reviewed and approved on a case-by-case basis by the local government and state and federal permitting agencies. Permit conditions or restrictions on a site may include, but are not limited to: a limit on the total number of boat slips allowed, the use of more upland storage instead of wetland storage, a restriction of the maximum size of boats that use the facility, a restriction on the number of powerboats that use the facility (powerboat to sailboat ratio), redesign of the facility to avoid seagrasses or other natural resources, or a reduction of the size of the facility.

Density Thresholds. Along with the location of a facility, the number of slips or dry racks that are maintained at a particular site is an important consideration. The number of trips generated from a facility is a function of the number of boats docked or stored at the location. Each facility will be limited by site plan constraints, including local, state, and federal requirements to avoid and minimize impacts to natural resources.

For single-family residential lots with existing water frontage, a limit of one dock per lot is the recommended threshold. This applies to the entire coastal waterway, regardless of the location of the site. Whether or not a dock may actually be constructed is to be determined by the rules and regulations of the local government and state and federal permitting agencies.

In the case of private multifamily residential docks designed to accommodate the boats of more than one residence, the total number of slips shall be determined by the site plan design, physical space limitation, environmental permitting criteria, and approval by the local government and permitting agencies.

Boat Ramps. A high proportion of the boat trips originating in St. Lucie County is from boat ramps. The boating activity study found that the majority of boats using the boat ramps were powerboats, which have a great potential for impacting manatees. St. Lucie County has a good distribution of public boat ramps located throughout the study area (Figures 6-8), which 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 need for additional parking at some locations on weekends and holidays.

As the population of St. Lucie County grows, there will be a need to increase public access at the boat ramps. When a need has been demonstrated in order to meet an acceptable level of service, additional public access should be provided by increasing the ramp lanes and increasing the parking spaces at existing ramps where possible. Expansion of existing ramp facilities is desirable because the potential impact on manatees can be monitored more easily with a fewer number of ramp locations. Speed zones and enforcement can be used more effectively if necessary to protect manatees when the facilities are concentrated.

St. Lucie County has identified the need to provide additional ramps and related facilities at potential site P5, located in unincorporated St. Lucie County east of Little Jim Bridge (Figure 6-Inset). St. Lucie County has plans to install a new boat ramp at this location. The project plans include new parking spaces, road improvements, and exotic species removal. This is an excellent

location for a new boat ramp because it is located in a preferred location, and has access to the inlet through a channel without the need to travel through the ICW.

When the county identifies a need to provide additional parking for boat ramps, the challenge is to be creative in improving the parking at existing facilities. Two alternatives for increasing the parking should be evaluated. First, the land uses at the existing ramp properties should be evaluated to determine if additional parking can be provided. Second, the concept of providing an auxiliary parking location with a shuttle service should be examined. These alternatives would allow greater access to existing facilities, and reduce the need to develop facilities at new locations. The expanded use of existing ramps facilitates the efficient placement and enforcement of speed zones.

Speed Zones and Enforcement. St. Lucie County currently has a very good record of protecting manatees. Since September 1995 when signs were first posted for the speed zones in St. Lucie County, there have been only two manatees whose death was attributed to watercraft. During the last five years the annual mortality rate has been 0.4 manatee deaths attributed to watercraft. This is a relatively low rate and it suggests that the current speed zones and levels of enforcement are adequate in the county. However, the main concern is if additional boat traffic is generated from new facilities. One concern is the speed in the channel adjacent to the new ramp proposed east of the Little Jim Bridge. There is no speed zone north of the bridge, but it is designated slow speed at the bridge and 300 feet south of the bridge. The channel leads to the inlet south of this point. The current speed limit in the channel is 25 miles per hour (mph). The appropriateness of this speed limit should be evaluated prior to operation of new boat ramps at this location.

If the annual rate of mortality shows an increasing trend in areas where the entire width of the waterway is idle or slow speed, channel included, then additional law enforcement of the speed zones shall be provided in the appropriate areas. If the annual rate of watercraft -related mortality shows an increasing trend in areas without full speed zones, then additional speed zones shall be adopted. If the annual rate of watercraft-related mortality shows an increasing trend in areas with full speed zone protection, then the County will evaluate additional appropriate actions that may be taken, including public education programs.

New speed zones may be accomplished by local ordinance or state rule; however, local governments cannot regulate speeds within the ICW. Speed zone promulgation by the state is a separate process prescribed by law with specific requirements that must be followed. The FWC Bureau of Marine Enforcement, Sheriff's Department, and other enforcement agencies should provide adequate resources and personnel to enforce the speed restrictions.

Seagrasses. Implementation of this plan will be effective in minimizing impacts to seagrasses, a prime food source and habitat for manatees. However there may be future projects in the county that could have an impact on seagrasses. Such projects could be related to bridge construction, placement of utility lines or pipelines, channel enlargement, etc. It would be desirable for the county to be proactive in providing restoration of seagrasses.

O. Port of Fort Pierce

The Port of Fort Pierce is a deepwater port located almost entirely within the City of Fort Pierce. The county currently oversees management of the port. In 1998, the Florida Legislature abolished the St. Lucie County Port and Airport Authority. The Board of County Commissioners now serves in the capacity of the Port Authority and the County Administrator in the acting role of interim-Port Director.

The planning responsibilities are divided between the City of Fort Pierce and St. Lucie County, with the County responsible for all master planning for the Port. Therefore, St. Lucie County proposes to include the Port Master Plan in its Comprehensive Plan.

The most recent master plan for the port was prepared by Post, Buckley, Schuh & Jernigan, Inc. (1989). The master plan describes the future growth potential of the 163-acre port. The goals of the master plan are to expand cargo operations, initiate cruise operations, and seek other port related recreational, commercial, and industrial opportunities. However, this master plan is not currently being implemented. In May 2001, the County contracted with FAU Joint Center for Environmental and Urban Problems to have a new master plan prepared for the port. Indian River Terminal Company is the primary operator at the port. This company specializes in the import and export of citrus and fruit juice products. Other cargo shipped through the Port includes small volumes of Caribbean fruit and other produce, aragonite, and building materials.

The Port has great potential for future development, because approximately half of the property within the Port areas is undeveloped. The undeveloped property is identified as Potential site P4 on Figure 6-Inset. The undeveloped property includes about 20 acres owned by St. Lucie County and 67 acres owned privately by Lloyd Bell. The county has discussed increased public access to the waterfront along with developing areas for recreation. Lloyd Bell has discussed plans to open a cargo facility to import and export produce between Fort Pierce and the Bahamas. The future development of these properties will be addressed in the new master plan for the port.

Discussions with a representative from Indian River Terminal Company indicate that the current 28-foot depth of the port limits the ability of many large vessels from entering the port. Their company is responsible for docking about one large vessel per month on average. Great amounts of citrus that are grown in this area are being shipped by trucks to other deepwater ports for transport overseas, because the large vessels cannot enter the Port of Fort Pierce. Therefore, it will be difficult for their current business operations to expand without increasing the depth of the port. There are no plans at this time to deepen the port.

There is no entity currently monitoring activities at the port. The Port does not have harbormaster, and there is no inventory of the number of vessel calls to the port. Further more, the port does not have a formal protection plan or set of procedures specifically designed for the protection of manatees. Given the limited operations that take place at the port, there has been little need for the monitoring vessels and special protection procedures for manatees. However, development standards and procedures that are specifically designed to help protect manatees

should be adopted as part of any expansion plans at the port (for example, standoff at docks and fenders between ships that provide a minimum of 4' at maximum compression).

It is important that any plans to expand the port also consider manatee protection, because of the port's proximity to major manatee aggregation sites located at Taylor Creek and Moore's Creek (Figure 14-Inset). The new master plan to be developed for the port shall include a section specifically dealing with manatee protection. This section shall discuss manatee protection procedures related to: dock design and construction; maintenance dredging; expansion of ship berths and channels; the use of explosives; sediment disposal; impacts to seagrasses and submerged aquatic vegetation; and crew procedures for observing and avoiding manatees when arriving and departing from docks.

P. Policies for Siting Boat Facilities

In order for a site to be found acceptable for the development or expansion of boat facilities, it is necessary for a specific proposal to be reviewed by the local government, FDEP, ACOE, USFWS, and SFWMD. The local government needs to make a determination if the development proposal is consistent with the local government's comprehensive plan, land development regulations, and this boat facility siting plan. The state and federal agencies also need to determine if the development proposal is consistent with permitting criteria. An acceptable site for the development or expansion of boat facilities is one for which the specific proposal for the boat facility has been reviewed and found to be consistent with the boat facility siting plan, approved by the local government, and approved by the state and federal permitting agencies.

Exhibit 1. Timing of long-distance manatee movements through St. Lucie County based on satellite telemetry data (National Biological Survey 1994). RPP = Riviera Power Plant; PEPP = Port Everglades Power Plant.

Manatee Number	Origin	Destination	Direction	Time of Movement
TBC-01	RPP	Brevard County	North	March 87
TBC-03	PEPP	Sebastian River	North	Dec 88 to Early Jan 89
	Indian River	PEPP	South	Mid-Nov 89 to Mid-Dec 89
	Sebastian	Lantana	South	Early Feb 91 to Mid-Feb 91
	Boca Raton	Vero Beach	North	Mid-Feb 91 to Late Feb 91
	Sebastian River	PEPP	South	Mid-Dec 91 to Mid-Jan 92
	PEPP	Cocoa Beach	North	Mid-Feb 92 to Early Mar 92
	Indian River	PEPP	South	Jan 93 to Mid-Feb 93
TBC-04	Cocoa Beach	PEPP	South	Late Dec 86 to Early Jan 87
	PEPP	Sebastian River	North	Late Mar 87 to Early Apr 87
TBC-09	Broward Co.	Cocoa Beach	North	Early Feb 89
	Cocoa Beach	PEPP	South	Late Feb 89 to Early Mar 89
	PEPP	Banana River	North	Mid-Mar 89 to Late Mar 89
	Cocoa Beach	PEPP	South	Late Oct 89 to Mid-Nov 89
	PEPP	Banana River	North	Early Feb 90 to Mid-Feb 90
	Banana River	PEPP	South	Late Feb 90 to Mid-Mar 90
	Vero Beach	Ft. Lauderdale	South	Early Oct 90
	PEPP	Vero Beach	North	Mid-Dec 90 to Early Jan 91
	Sebastian	PEPP	South	Mid-Jan 91 to Mid-Feb 91
	Lake Worth	Vero Beach	North	Late Feb 91
	Vero Beach	Pompano Beach	South	Early to Mid-Mar 91
	Brevard County	PEPP	South	Late Oct 91
	PEPP	Brevard County	North	Mid-Feb 92 to Late Feb 92
	PEPP	Brevard County	North	Mid-Dec 92
	Brevard County	PEPP	South	Late Dec 92
	PEPP	RPP	North	Early Jan 93
	PEPP	Indian River Co.	North	Early Mar 93 to Mid-Mar 93
TBC-10	Brevard County	Lake Worth	South	Jan 88
TBC-13	Brevard County	RPP	South	Jan 88 to Early Feb 88
	Boca Raton	Brevard County	North	Early Mar 88 to Mid-Mar 88
TBC-14	Brevard County	PEPP	South	Mid-Jan 87
	PEPP	Ft. Pierce	North	Mid-Feb 87
TBC-17	Banana Creek	Peck Lake	South	Nov 87 to Dec 87
TBC-20	Cape Canaveral	PEPP	South	Early Dec 87
	PEPP	Sebastian River	North	Mid-Jan 88
	Port Canaveral	PEPP	South	Mid-Nov 89 to Early Dec 89
TBC-21	Ft. Pierce	Banana River	North	Mid-Feb 90 to Early Mar 90
TBC-24	Brevard County	PEPP	South	Mid-Nov 89 to Mid-Dec 89
	PEPP	Banana River	North	Mid-Feb 90
	Banana River	Broward County	South	Mid-Dec 90
	PEPP	Sebastian	North	Mid-March 91
	Banana River	PEPP	South	Early Nov 91 to Mid-Nov 91
	PEPP	Cocoa Beach	North	Mid-Feb 92 to Early Mar 92
	Banana River	PEPP	South	Early Dec 92
	PEPP	Banana River	North	Mid-Mar 93

Exhibit 1. Continued.

Manatee Number	Origin	Destination	Direction	Time of Movement
TBC-25	Cape Canaveral	PEPP	South	Mid-Dec 89
	PEPP	Banana River	North	Mid-Feb 90
TBC-26	Cape Canaveral	Dade County	South	Early Dec 89
	Dade County	Banana River	North	Mid-Feb 90
	Banana River	Dade County	South	Mid-Dec 90
	PEPP	Vero Beach	North	Mid-Feb 91
	Cape Canaveral	Ft. Pierce	South	Late Nov 91 to Late Dec 91
	Ft. Pierce	Ft. Lauderdale	South	Early Jan 92
	Dade County	Cape Canaveral	North	Late Feb 92 to Early Mar 92
TBC-35	Sebastian	Ft. Pierce	South	Early Dec 92
TBC-36	Cape Canaveral	Taylor Creek	South	Early Jun 92
	St. Lucie Co.	Banana River	North	Mid-Jun 92
	Brevard County	Willoughby Creek	South	Mid-Dec 92
	Indian River Co.	St. Lucie Co.	South	Mid-Mar 93
	St. Lucie Co.	Brevard Co.	North	Late-Mar to Mid-Apr 93
TBC-37	Ft. Pierce	Lake Worth	South	Early Dec 92
	Lake Worth	Ft. Pierce	North	Late Dec 92
	Vero Beach	Lake Worth	South	Late Jan 93
TBC-38	Brevard County	PEPP	South	Late Nov 92 to Mid-Dec 92
TFP-02	RPP	Banana River	North	Late Mar 90
	Banana River	Jupiter Inlet	South	Mid-Apr 90
	RPP	Sebastian River	North	Mid-Apr 93
TFP-03	Lake Worth	Vero Beach	North	Early Feb 92 to Early Mar 92
	Fort Pierce	Hobe Sound	South	Early Dec 92 to Mid-Dec 92
TFP-04	Lake Worth	Ft. Pierce	North	Early Mar 92
	Ft. Pierce	Lake Worth	South	Mid-Mar 92
TFP-05	Ft. Pierce	Miami	South	Late Dec 91
TFP-06	St. Lucie Co.	Sebastian River	North	Mid-Jun 92
	Banana River	Ft. Pierce	South	Late Oct 92 to Early Nov 92
	Ft. Pierce	PEPP	South	Early to Mid-Feb 93
	PEPP	St. Lucie County	North	Mid-Mar 93
	St. Lucie Co.	Sebastian River	North	Early Jun 93
TJX-01	Ft. Pierce	PEPP	South	Mid-Dec 90
	PEPP	Vero Beach	North	Late Dec 90 to Early Jan 91
	PEPP	Titusville	North	Mid-Feb 92
TMI-01	Sebastian River	RPP	South	Late Feb 91 to Early Mar 91
	PEPP	Fort Pierce	North	Late Mar 93
	Ft. Pierce	Jupiter	South	Early Apr 93
	Jupiter	Indrio	North	Mid-Apr 93
TMI-02	Dade County	Brevard County	North	Mid-Apr 93 to Early May 93
TNC-01	Banana River	Dade County	South	Late Jan 88
	Dade County	Banana River	North	Early Feb 88
	PEPP	Banana River	North	Mid-Jan 90
	St. Lucie Inlet	Banana River	North	Late Feb 91 to Mid-Mar 91

Exhibit 1. Continued.

Manatee Number	Origin	Destination	Direction	Time of Movement
TPE-01	PEPP	Banana River	North	Early Feb 89
	PEPP	Banana River	North	Early to Mid-Jan 90
	Banana River	PEPP	South	Early to Mid-Nov 90
	PEPP	Wabasso	North	Early Feb 91
	Wabasso	PEPP	South	Mid-Feb 91
	PEPP	Wabasso	North	Late Feb 91
	PEPP	Boynton Beach	North	Late Jan 92
	PEPP	Banana River	North	Mid-Feb 92
	Brevard County	PEPP	South	Late Nov 92 to Early Dec 92
	PEPP	Brevard County	North	April 93
TPE-03	PEPP	Banana River	North	Early Jan 90 to Early Feb 90
	Ft. Pierce	PEPP	South	Mid-Feb 91
	PEPP	Banana River	North	Mid-Feb 91 to Mid-Mar 91
	Broward Co.	Sebastian River	North	Mid-Jan 93
	Sebastian River	PEPP	South	Late Jan 93
	PEPP	Brevard County	North	Mid-Mar 93 to Mid-Apr 93
TRB-01	RPP	Banana River	North	Mid to Late Feb 92
	Banana River	Jupiter Inlet	South	Early Feb 93
	Lake Worth	Banana River	North	Early Mar 93

Exhibit 2. Seasonal abundance of manatees in St. Lucie County based on analysis of aerial survey data (1985-1987, 1986-1987, 1990-1993) collected by FWC. Manatee mortality attributed to the collision with watercraft (1974-2000) in St. Lucie County based on data provided by the FWC. Refer to Exhibit 5 for information on manatee mortality.

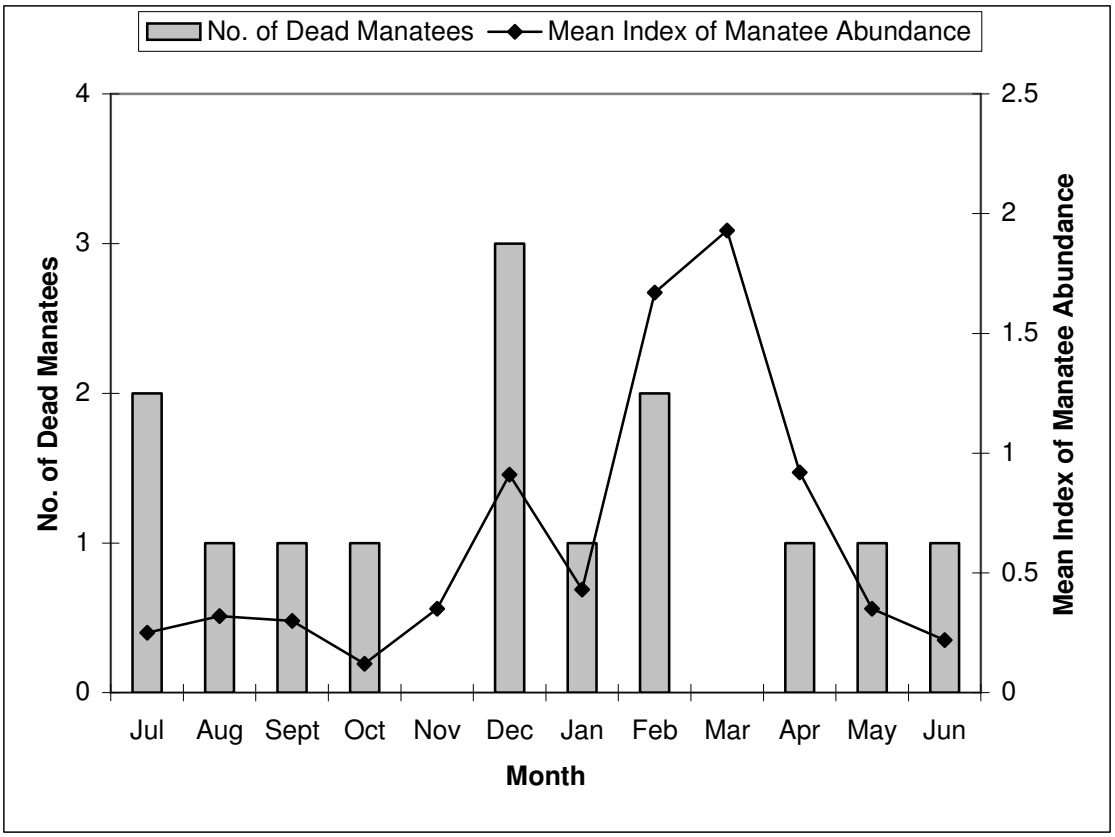


Exhibit 3. Relative index of manatee abundance. The values represent the average number of manatees counted during each aerial survey conducted by the FWC. The analysis is based on the data from 111 aerial surveys conducted form 1985 to 1993. The segments correspond to the locations identified on Figures 14-16.

Segment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall Average
1	0	1.5	5.2	0.7	0	0	0	0	0.2	0	0	0	0.6
2	0	16.0	19.2	8.5	2.3	0	0.5	0	0.2	0	0.5	1.5	4.1
3	0	2.5	6.2	0.2	0	0.5	0	0.2	0	0.7	0	0.8	0.9
4	0	10.0	6.5	2.0	0	0.2	0.7	1.4	0.5	0	0.2	1.3	1.9
5	0.2	1.0	0.7	0	0	0	0.7	0.4	0.5	0	0	0.3	0.3
6	0.2	0.5	2.0	1.0	1.3	0.7	1.0	1.4	1.0	0.3	0.5	0.3	0.8
7	2.0	13.2	15.0	9.5	4.3	5.0	3.5	4.4	1.7	1.3	1.5	5.8	5.6
8	0.1	0	0	1.4	0	0.2	0.2	0.1	0	0.2	0	0	0.2
9	5.7	4.9	5.0	2.4	1.3	1.2	0.8	0	0.7	0.2	0.5	16.6	3.3
10	0.3	0.6	0.4	0.1	0.1	0	0.3	0.2	0	0	0	0.5	0.2
11	0.1	0	0	0.9	0	0.1	0.2	0	0.3	0	0	0.4	0.2
12	0.3	2.4	0.5	0.4	0	1.7	0.6	0.2	0.7	1.0	2.2	0.4	0.9
13	0	0	1.2	0	0.1	0	0	0	0	0	1.0	0	0.2
14	0	0.4	0.3	0	0	0	0	0.2	0	0	0.2	0.2	0.1
15	1.5	2.0	2.2	1.4	0.4	0	0.6	0.6	1.0	0.3	0.5	0.2	0.9
16	0	0.6	0.2	0	0	0	0	0	0.7	0	0.2	0.2	0.2
17	2.3	1.6	0.5	0.8	0.9	0.3	0	0.4	0.7	0	1.2	1.4	0.8
18	0	0.6	0	0.6	0	0	0	0	0	0	0.5	0.4	0.2
19	0.3	0.2	0.7	1.0	0	0	0	0.2	0.5	0	0.5	0.2	0.3
20	0	0	0.7	0.6	0	0	0.2	0	0	0.3	0.2	0	0.2
21	0.2	0.2	0	0	0.1	0	0	0	0.7	0	0.5	0.4	0.2
22	0	0	0	0.4	0	0	0	0.2	0	0	0.2	0.6	0.1
23	0	0	0	0.2	0	0.2	0	0	1.0	0	0.5	0.2	0.2
24	0.3	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0.2	0.4	0	0	0	0	0	0	0

Exhibit 3. Continued.

Segment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall Average
27	0	0	0	0	0	0.6	0	0	0	0	0	0	0
28	0.7	0.3	0.5	0	0.5	0.6	0.5	0	0	0	0.5	0	0.3
29	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0.3	0	0	0	0	0
31	0	0	0	0	0	0	0	0.3	0	0	0	0	0
32	0.7	0	0	0	0.7	0	0	0	0	0	0	0	0.1
33	0	0	0.2	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	1.0	0	0.1
35	0	0	0.5	0	0.2	0.4	0	0.7	0	0	0	0	0.1
Overall Average	0.43	1.67	1.93	0.92	0.35	0.22	0.25	0.32	0.30	0.12	0.35	0.91	0.65

Exhibit 4. Manatee mortality attributed to collision with watercraft. Information from 1974 to 2000 provided by the FWC. The locations of segments and manatee carcass recoveries are shown in Figures 6-8.

Manatee Number	Year	Month	Segment	Location
1	1990	JAN	3	Indian River Lagoon; St. Lucie Co., one mile E of Harbor Branch
2	1993	JUL	3	Indian River Lagoon; Indrio, 0.5 miles S of Harbor Branch
3	1990	JUL	4	Indian River Lagoon; St. Lucie Village, E of ICW
4	1990	FEB	4	Indian River Lagoon; St. Lucie Village, near ICW
5	1987	AUG	4	Indian River Lagoon; St. Lucie Co., in waterway at Queen's Cove
6	1996	OCT	7	Indian River Lagoon; Ft. Pierce, at mouth of Taylor Creek
7	1984	MAY	8	Ft. Pierce Inlet; Ft. Pierce, S side of inlet
8	1985	FEB	9	Indian River Lagoon; Ft. Pierce, at public boat ramp on Seaway Dr.
9	1989	DEC	9	Indian River Lagoon; Ft. Pierce, at warm-water discharge canal at Ft. Pierce Power Plant
10	1990	DEC	9	Moore's Creek; Ft. Pierce, just W of the Indian River Lagoon
11	1991	JUN	9	Indian River Lagoon; Ft. Pierce, E of ICW, 0.5 miles S of South Bridge Causeway
12	1992	SEP	10	Indian River Lagoon; Ft. Pierce, W shoreline near Hook Point
13	1981	APR	12	Indian River Lagoon; Ft. Pierce, near W shoreline, 3.0 miles S of South Bridge Causeway
14	1984	DEC	19	Indian River Lagoon; St. Lucie Co., near W shoreline, across from Herman Bay
15	2000	MAR	30	Evans Creek on western shoreline, North Fork St. Lucie River; Port St. Lucie

Exhibit 5. Summary of manatee habitat, relative abundance, and mortality. The segments correspond to the locations identified on the maps in Figures 14-16. A "T" under travel route indicates the segments located along the primary north-south travel route through the county. An "f" under feeding habitat signifies that the segment has only a small amount of feeding habitat (i.e., seagrasses); an "F" indicates a significant amount of feeding habitat. An "FW" indicates a freshwater attractant is present. A "WW" indicates that a warm-water attractant is present. The relative index of manatee abundance values are based on the overall averages provided in Exhibit 3. Refer to Exhibit 4 for details concerning mortality.

Segment	Location	Travel Route	Feeding Habitat	Freshwater	Warm Water	Relative Index of Manatee Abundance							No. of Dead Manatees
						0.0	1.0	2.0	3.0	4.0	5.0	6.0	
1	INDIAN RIVER LAGOON	T	F			-------							
2	INDIAN RIVER LAGOON	T	F	FW		----------							
3	INDIAN RIVER LAGOON	T	F			----------							XX
4	INDIAN RIVER LAGOON	T	F	FW		----------							XXX
5	INDIAN RIVER LAGOON	T	F			----							
6	INDIAN RIVER LAGOON	T	F			----------							
7	INDIAN RIVER LAGOON	T	F	FW		----------							X
8	FORT PIERCE INLET	T	F			---							X
9	INDIAN RIVER LAGOON	T	F	FW	WW	----------							XXXX
10	INDIAN RIVER LAGOON	T	F			---							X
11	INDIAN RIVER LAGOON	T	F			---							
12	INDIAN RIVER LAGOON	T	F			----------							X
13	INDIAN RIVER LAGOON	T	F			---							
14	INDIAN RIVER LAGOON	T	F			--							
15	INDIAN RIVER LAGOON	T	F			----------							
16	INDIAN RIVER LAGOON	T	F			---							
17	INDIAN RIVER LAGOON	T	F			----------							
18	INDIAN RIVER LAGOON	T	F			---							
19	INDIAN RIVER LAGOON	T	F			----							X
20	INDIAN RIVER LAGOON	T	F			---							
21	INDIAN RIVER LAGOON	T	F			---							
22	INDIAN RIVER LAGOON	T	F			--							
23	INDIAN RIVER LAGOON	T	F			---							
24	ST. LUCIE RIVER, N FORK					-							
25	ST. LUCIE RIVER, N FORK					-							
26	ST. LUCIE RIVER, N FORK					-							
27	ST. LUCIE RIVER, N FORK					-							
28	ST. LUCIE RIVER, N FORK					----							

Exhibit 5. Continued.

Segment	Location	Travel Route	Feeding Habitat	Freshwater	Warm Water	Relative Index of Manatee Abundance							No. of Dead Manatees
						0.0	1.0	2.0	3.0	4.0	5.0	6.0	
29	ST. LUCIE RIVER, N FORK					-							
30	ST. LUCIE RIVER, N FORK					-							X
31	ST. LUCIE RIVER, N FORK					-							
32	ST. LUCIE RIVER, N FORK					--							
33	ST. LUCIE RIVER, N FORK					-							
34	ST. LUCIE RIVER, N FORK					--							
35	ST. LUCIE RIVER, N FORK					--							

Exhibit 6. Existing and potential boat facility sites. The information is based on the inventories by St. Lucie County, Indian River Lagoon National Estuary Program (1995), Morris et al. (1995), and field surveys. Slip capacity is based on information provided by Morris (1995). Under type of facility, marinas and dry storage facilities are designated as: Public, if owned by a municipality, county, state or federal government; Private, if privately owned and not open to the public; or Commercial, if privately owned and open to the public or other businesses. Map codes correspond with the index in Figures 6-8. Facilities identified with an asterisk (*) are located in primary locations for development or expansion of boat facilities. All other facilities are considered secondary locations. See the Discussion and Policy sections of this plan for description of primary and secondary locations.

Map Code	Boat Facility or Property Description	Type of Facility	Comments
	Existing Boat Facilities		
19	Anchorage	*Private*	
52	Angler Apartment Dock*	*Private*	
46	Bahama Breeze Yacht Club (Application withdrawn)	*Private*	Formerly The Hutchinson Club and Ocean Island Club; has applied for a permit to develop 38 boat slips.
11	Ballantrae Marina	*Private*	
14	Bryn Mawr	*Private*	
54	Captain Jim's Bait Tackle Shop*	*Private*	
49	Causeway Mobile Home Park*	*Private*	
10	Club Med Marina	*Private*	
13	Collanades Condo Docks	*Private*	51 wet slips
57	Commercial Longliner	Private	
60	Cracker Boy	Private	
50	Dockside Harbor Light Resort*	Private	
55	Elizer, James and Cameron*	Private	
4	Fort Pierce City Marina	Public	
5	Fort Pierce Inlet Marina*	*Commercial*	40 wet slips; submitted an application to FDEP to reconfigure the existing permitted west dock from 13 to 19 slips
6	Fort Pierce Yacht Club	*Commercial*	240 wet slips
43	Harbor Branch Oceanographic Institute	*Private*	
15	Harbor Cove	*Private*	
24	Harbor Ridge	*Private*	
39	Harbor Ridge	*Private*	

Exhibit 6. Continued.

Map Code	Boat Facility or Property Description	Type of Facility	Comments
	Existing Boat Facilities Continued		
40	Harbor Ridge	*Private*	
2	Harbortown Marina	*Commercial*	340 wet slips; 85 dry spaces
53	Holiday Inn Express*	*Private*	
56	Inlet Fisheries	*Private*	
12	Island Cove Marina	*Private*	
23	Island Dunes Yacht Club	*Private*	
17	Kitching Cove	*Private*	
51	Kiwi Motel and Apartments*	*Private*	
28	La Entrada del Mar*	*Private*	
45	Lavern Quandt*	Commercial	13 wet slips; has pending permit application to reconstruct the existing dock and expand with the addition of 14 slips
7	Little Jim's Marine*	Public	28 wet slips; 5 dry spaces
29	Nettles Island Marina	*Private*	
16	Norseman's Marina	*Private*	12 wet slips
20	Ocean Harbor	*Private*	98 wet slips
21	Ocean Resorts	*Private*	42 wet slips
8	Pelican Yacht Club*	Commercial	120 wet slips
26	Rivers Edge	*Private*	
1	Riverside Marina	Commercial	60 wet slips; 87 dry spaces
27	River Woods	*Private*	
22	Sorrento Court	*Private*	
18	Tarpon Bay Yacht Club	*Private*	
3	Taylor Creek Marina	Commercial	18 wet slips; 600 dry spaces
42	The Floridian	*Private*	
30	The Sands Lakeview	*Private*	70 wet slips
48	Toucans Fisherman's Warf	Commercial	
38	US Coast Guard*	Public	
9	Village Marina	*Private*	42 wet slips

Exhibit 6. Continued.

Map Code	Boat Facility or Property Description	Type of Facility	Comments
	Boat Ramps		
32	Black Pearl Ramp	Public	one ramp with two single lanes; paved parking; referred to as the Seaway ramp in the BAS (Morris et al. 1995)
44	FPL Ramp	Private	
41	Jaycee Park Ramp	Public	one ramp with two double lanes; paved parking
58	Little Mud Creek Access Ramp	Public	one unpaved ramp; unpaved parking
35	Middle Cove Access Ramp	Public	one unpaved ramp; unpaved parking
31	Moore's Creek Ramp	Public	one ramp with six lanes comprised of two double lanes and two single lanes; ramp closed from November 15 to April 1 for manatee protection; referred to as the Indian River Memorial Amphitheater in the BAS (Morris et al. 1995)
47	North Port Marina Ramp	Private	
34	North Causeway Ramp	Public	one ramp with two single and one double lanes; paved parking
37	Rivergate Park Ramp	Public	one ramp with 3 single lanes; paved parking
59	Westmoreland	Private	one small paved ramp
33	South Causeway Ramp*	Public	one large ramp with approximately 3 lanes; paved parking
25	St. Lucie River Marina Ramp	Public	one 2-lane ramp; paved parking
36	White City Park Ramp	Public	one unpaved ramp with two lanes; unpaved parking
	Potential Sites		
P1	Potential Site*		zoned Single Family Moderate Density Zone; within the City of Fort Pierce; owned by Watermark Communities, Inc.
P2	Potential Site*		zoned Single Family Moderate Density Zone; within the City of Fort Pierce; currently developed with a mobile home park; has potential for redevelopment
P3	Potential Site		zoned Marine Commercial Zone; within the City of Fort Pierce; currently developed with commercial fishing facilities; has potential for redevelopment
P4	Potential Site		zoned Marine Industrial Zone; within the City of Fort Pierce; currently undeveloped; a portion of the Port of Fort Pierce; owned by St. Lucie County

Exhibit 6. Continued.

Map Code	Boat Facility or Property Description	Type of Facility	Comments
	Potential Sites Continued		
P5	Potential Site*		zoned Institutional; unincorporated St. Lucie County; identified as a area where St. Lucie County is planning to develop a new boat ramp; county has applied for a permit from the FDEP to construct four ramp lanes with a staging area, floating docks, associated parking areas, restrooms, and boat washing station
P6	Potential Site*		zoned General and Recreational Open Space Zone; within the City of Fort Pierce; park is currently developed with south causeway ramps and a museum
P7	Potential Site		zoned Light Industrial and General Commercial; unincorporated St. Lucie County; currently undeveloped; limited access to the water except if associated with redevelopment of commercial fishing operations directly to the south
P8	Potential Site		zoned Agricultural, Residential 1; unincorporated St. Lucie County; currently undeveloped
P9	Potential Site		zoned Planned Unit Development Zoning District; City of Port St. Lucie; owned by Westmoreland; primarily undeveloped
P10	Potential Site		zoned Single Family Residential Zoning District; City of Port St. Lucie; Southbend Neighborhood Association has discussed development of a boat ramp at this site

Exhibit 7. Scoring of segments for potential impact to manatees. The segments are designated on Figures 14-16. Closest inlet codes are F = Fort Pierce Inlet, S = St. Lucie Inlet. See the text for an explanation of the scoring procedures. The total score for each site is determined by adding the values in each column. Higher scores indicate a higher potential for impact to manatees.

Segment	General Location	Closest Inlet	Proximity to Inlets	Manatee Abundance	Manatee Habitat	Manatee Mortality	Speed Zone	Total Score
1	INDIAN RIVER LAGOON	F	2	2	2	1	1	8
2	INDIAN RIVER LAGOON	F	2	3	2	1	1	9
3	INDIAN RIVER LAGOON	F	2	2	2	1	1	8
4	INDIAN RIVER LAGOON	F	1	3	2	1	1	8
5	INDIAN RIVER LAGOON	F	1	1	2	1	2	7
6	INDIAN RIVER LAGOON	F	1	2	2	1	2	8
7	INDIAN RIVER LAGOON	F	1	3	2	2	1	9
8	FORT PIERCE INLET	F	1	1	1	1	1	5
9	INDIAN RIVER LAGOON	F	1	3	2	1	1	8
10	INDIAN RIVER LAGOON	F	1	1	2	1	2	7
11	INDIAN RIVER LAGOON	F	1	1	2	1	2	7
12	INDIAN RIVER LAGOON	F	2	2	2	1	2	9
13	INDIAN RIVER LAGOON	F	2	1	2	1	2	8
14	INDIAN RIVER LAGOON	F	2	1	2	1	2	8
15	INDIAN RIVER LAGOON	F	2	2	2	1	2	9
16	INDIAN RIVER LAGOON	F	2	1	2	1	2	8
17	INDIAN RIVER LAGOON	F	3	2	2	1	2	10
18	INDIAN RIVER LAGOON	F	3	1	2	1	2	9
19	INDIAN RIVER LAGOON	F, S	3	1	1	1	2	8
20	INDIAN RIVER LAGOON	S	3	1	1	1	2	8
21	INDIAN RIVER LAGOON	S	3	1	1	1	2	8
22	INDIAN RIVER LAGOON	S	2	1	2	1	1	7
23	INDIAN RIVER LAGOON	S	2	1	1	1	2	7
24	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8
25	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8
26	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8

Exhibit 7. Continued.

Segment	General Location	Closest Inlet	Proximity to Inlets	Manatee Abundance	Manatee Habitat	Manatee Mortality	Speed Zone	Total Score
27	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8
28	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8
29	ST. LUCIE RIVER, N FORK	S	3	1	1	1	3	9
30	ST. LUCIE RIVER, N FORK	S	3	1	1	1	3	9
31	ST. LUCIE RIVER, N FORK	S	3	1	1	1	3	9
32	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8
33	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8
34	ST. LUCIE RIVER, N FORK	S	3	1	1	1	2	8
35	ST. LUCIE RIVER, N FORK	S	3	1	1	1	3	9

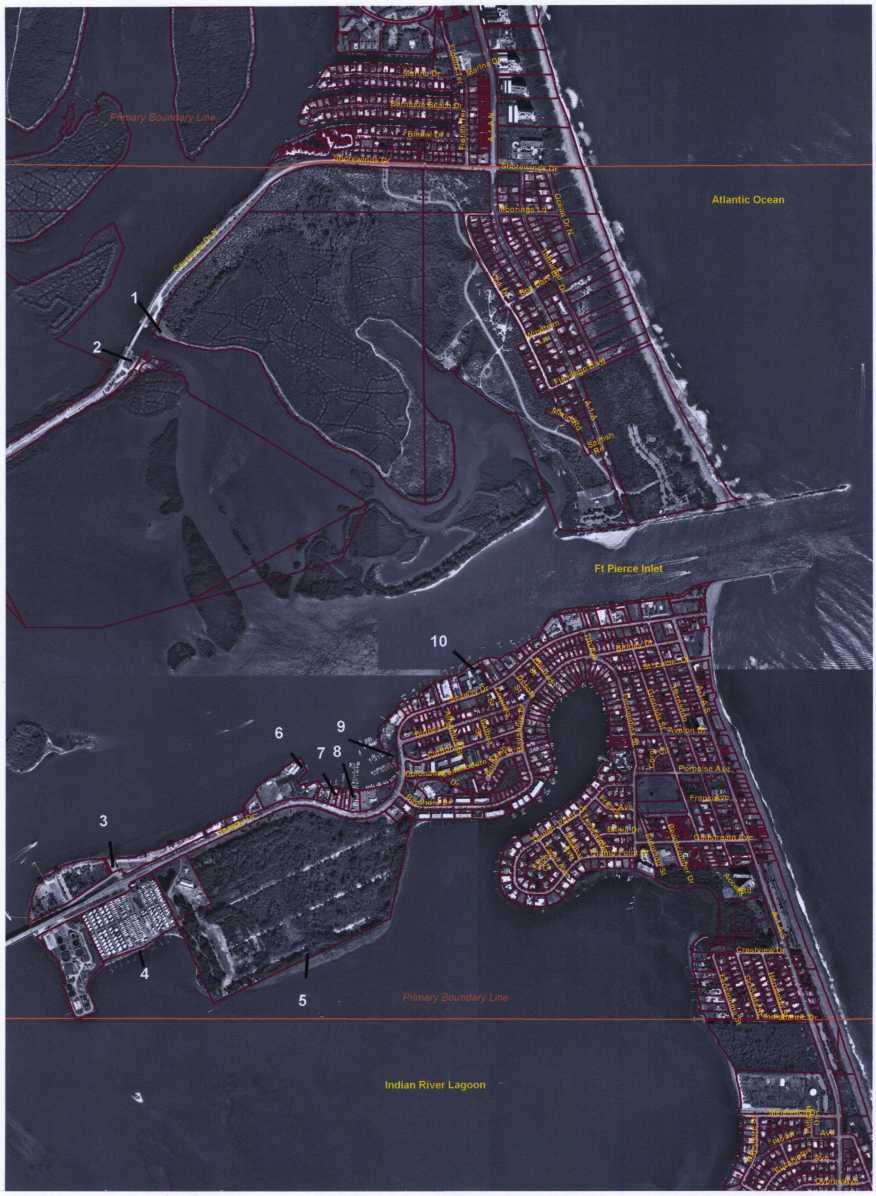


Exhibit 8. Fort Pierce Inlet Area. Aerial photograph showing the primary location for boat facilities in St. Lucie County. Data source: St. Lucie County Property Appraiser, February 2000.

Sites

1 - Potential Site P5
2 - Little Jim's Marine
3 - Potential Site P6
South Causeway Ramp & Park
4 - Potential Site P2
Causeway Mobile Home Park
5 - Potential Site P1
6 - U.S. Coast Guard
7 - Kennedy/Gilbert
(Lavern Quandt parcel)
8 - Ft. Pierce Inlet Marina
9 - Pelican Yacht Club
10 - La Entrada Del Mar

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 St. Lucie County while minimizing the impacts to boaters and owners of waterfront property. The goal of this MPP is to maintain or decrease the low level of watercraft-related manatee mortalities in St. Lucie County in order to keep the USFWS designation of St. Lucie County as medium risk for manatees. It is further the goal of this MPP to reduce human-related manatee mortality, protect manatee habitat, promote boating safety, and increase public awareness of the need to protect manatees and their environment.

An integral component of the MPP that will help ensure the long-term protection of manatees in the county is the development of a St. Lucie County Manatee Protection Advisory Committee (MPAC). The MPAC will be a multi-disciplinary team that will include stakeholders from the County, state and federal governmental wildlife agencies, local boating, business and conservation organizations, law enforcement personnel, and environmental educators. St. Lucie County will convene MPAC on an as-needed basis to review the effectiveness of the MPP. However, MPAC may also be convened if instances of watercraft-related manatee mortality threaten the County's designation by the U.S. Fish and Wildlife Service as medium risk to manatees. St. Lucie County will provide support for implementation of the MPP, including MPAC, through a variety of sources, which may include but are not limited to a combination of a portion of penalties received from violations of speed zone restrictions, vessel registration fees, the assessment of an additional impact fee on waterfront development, grants, and/or other sources. The committee's primary responsibilities will be to review the progress in implementing this plan, determine the effectiveness of those policies, evaluate new information as it becomes available, and make recommendations for amending the plan as conditions warrant.

Because watercraft-related manatee mortality in St. Lucie County has been minimal (i.e., two in five years) subsequent to the adoption and posting of vessel speed restriction zones, no new zones are proposed and no changes are recommended to the current speed restriction zones at this time. Recommendations are made, however, for increasing enforcement of existing vessel speed limits.

Opportunities are identified and suggested for initiatives that will enhance public education and awareness about manatees and their habitat. Potential funding sources, including federal and state governmental entities and non-governmental organizations (i.e., foundations, trusts) that may provide financial assistance toward implementing components of this plan are also identified.

Because a significant proportion of manatee-related activities are beyond the sole control of St. Lucie County, this Section also describes a process for enhancing inter-governmental communication and coordination.

A. Habitat Protection

This Section identifies and describes recommendations for initiatives that will maintain and enhance manatee habitat in St. Lucie County.

1. Foraging Habitat

Analysis of manatee sighting records and the results of vegetation mapping suggest that the primary habitat that provides valuable resources for foraging by manatees in St. Lucie County is the Indian River Lagoon (IRL) and its adjoining creeks, man-made canals and channels. Although the specific food resources are less well known, the presence of manatees in freshwater areas of the County (e.g., primarily the North Fork of the St. Lucie River) suggest that food is also present in these areas.

The Indian River Lagoon and Its Adjoining Creeks, Man-made Canals and Channels

Submerged aquatic vegetation in the IRL is likely the most important foraging habitat for manatees in St. Lucie County. Grassbed mapping efforts between 1986 and 1999 have documented a significant reduction in seagrasses in St. Lucie County. Although a small portion of this reduction in cover may be attributed to direct impacts associated with dredge/fill projects and boat scarring, the vast majority of this decline is the result of deteriorating water quality (IRLNEP, 1996). Designation of the IRL as an Estuary of National Significance, and attention by the Indian River Lagoon National Estuary Program (IRLNEP) have resulted in the development of the Indian River Lagoon's Comprehensive Conservation Master Plan (CCMP). That plan recommends that a number of projects be designed and implemented by various federal, state and local governmental entities to improve water quality in the IRL. However, implementation of these 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 by governmental entities in implementing the plan. The analysis identified that St. Lucie County and the municipalities that front the IRL in the County have made some progress in implementing these recommendations. However, in order to reverse the continuing trend of decreasing submerged aquatic vegetation (SAV) cover, aggressive steps are necessary to implement the recommendations in the IRL CCMP. Toward this end, St. Lucie County will utilize seagrass cover as an indicator of ecological health in the IRL and continue to work with other governmental agencies to implement projects identified in the CCMP to improve water quality.

Ft. Pierce Inlet is the only surface-water connection between the IRL and the Atlantic Ocean in St. Lucie County. Maintaining the inlet by routine maintenance dredging allows tidal exchange, which is critical to maintaining water quality that is suitable for the continued existence of seagrasses. The effects of this daily tidal exchange are most evident in close proximity to the Fort Pierce Inlet. Effects decrease as distance from the inlet increases.

In addition to seagrasses, manatees are also known to forage on overhanging and emergent shoreline vegetation. Thus, mangroves and other emergent vegetation in the IRL and its associated tidal creeks may be an important food resource. The State of Florida and ACOE have existing regulations that protect mangroves and wetland vegetation, and in most cases, losses of wetlands are mitigated by the enhancement, creation or preservation of wetlands. Permitting agencies generally prefer wetland mitigation projects in which the same type of habitat that is impacted is also enhanced (i.e., replanting of mangroves if mangroves are destroyed). This should help minimize the loss of manatee foraging resources in St. Lucie County.

Freshwater Areas

The primary fresh water area that provides foraging habitat for manatees in St. Lucie County is the North Fork of the St. Lucie River (North Fork), most of which is within the City of Port St. Lucie. There is no mapped SAV in the North Fork. Due to water quality and sediment conditions which likely prevent seagrasses from existing in this area, it is likely that manatees forage primarily on floating and overhanging vegetation. Shoreline armoring is allowed under existing federal, state and local requirements. Although replacement of natural shoreline vegetation with armoring (i.e., seawalls, bulkheads) at individual project sites is likely minimal, cumulative effects could result in undesirable impacts on manatees. However, because much of the waterfront in the North Fork has been acquired for preservation purposes, the extent to which future shoreline stabilization projects will eliminate manatee foraging habitat is minimal. Additionally, federal, state and municipal governmental entities regulate shoreline armoring, and permitting processes consider site-specific conditions and their potential effect on manatees and other protected species.

Despite most freshwater foraging areas being within municipal boundaries where St. Lucie County has little or no authority, the County may work with the respective municipalities to improve water quality in these areas.

2. Fresh Water Sources

Although in many areas of Florida, sources of fresh water (e.g., springs) provide considerable benefit for manatees, there are no springs in St. Lucie County. The Boat Facility Siting component of this Plan describes five areas that may serve to varying extents as fresh water attractants for manatees. These five sites (listed in descending order based on the extent to which they serve as freshwater attractants) are:

1. Taylor Creek;
2. Moore's Creek;
3. Harbor Branch Oceanographic Institution (HBOI);
4. Queen's Cove; and
5. North Fork of the St. Lucie River.

Taylor Creek

Taylor Creek, a natural waterway that has been channelized, provides drainage to residential areas north of the City of Fort Pierce and receives inflow from agricultural lands to the north and west through the C-1 and C-25 Canals. Drainage through this waterway is primarily rainwater runoff, and because there is little water storage in this system, flows vary widely, and peak during the rainy-season months of June-October. Water quality in Taylor Creek varies, and preliminary planning efforts are underway by the County to dredge this waterway to remove debris and accumulated sediments. Taylor Creek likely provides substantially greater value for manatees as a fresh water sources than any of the remaining sites.

Moore's Creek

As described in Section B.2 of the Inventory of Existing Conditions, Moore's Creek serves as the conduit for the discharge of thermally enhanced water that is produced as a by-product of the generation of electricity at the FPUA's H.D. King Power Plant. Saline water withdrawn from the IRL is used for cooling purposes, and the thermally enhanced waters are discharged into Moore's Creek, where they mix with fresh water before flowing into the IRL. Flow rates and water temperatures vary considerably throughout the year.

Reports (MOEC, unpublished data) suggest that manatees are attracted to this area primarily as a warm-water refuge during the wintertime. The presence of fresh water appears to be a less-important attractant, although there are no data available concerning the volume of fresh water that enters the Indian River through this waterway. Control of the volume, discharge and thermal effects of discharges are determined and regulated by the City of Fort Pierce and the state and federal permitting agencies, and are beyond the authority of St. Lucie County.

Although it may not affect the volume of fresh water being discharged, FPUA has conceptual plans to remove discarded debris and other materials that have accumulated in Moore's Creek.

Harbor Branch Oceanographic Institution (HBOI)

As described in Section A.1 of the Inventory of Existing Conditions, HBOI maintains a canal and navigation channel at its facility in northern St. Lucie County. The canal, which has been excavated from uplands, receives freshwater input at two locations; surface water runoff that enters the canal at the small boat marina located near the Indian River, and a lesser amount of groundwater that enters the canal near its westernmost terminus. Sightings of manatees at HBOI suggest that these areas are important for manatees, although there are no data on the volume or temperature of discharges at either point of discharge. Aerial telemetry suggests that manatees that are attracted to the HBOI canal forage in the IRL. These areas are subject to vessel restrictions (including a "no entry" zone), and St. Lucie County will continue to enforce these restrictions to protect manatees that use these waters.

Queen's Cove

Queen's Cove is a residential subdivision located on North Hutchinson Island on the east side of the IRL. Although the volume and sources of freshwater at this site have not been identified, it is likely that culverts provide drainage from upland areas into the tidal creeks of the IRL. This discharge of freshwater, and the possible discharge from hoses at residential docks may serve as human-created attractants for manatees. St. Lucie County will request that FWC include this as an area that requires further investigation.

North Fork of the St. Lucie River

The St. Lucie River is an extensive estuary in which fresh water from inland creeks and canals mixes with the more-saline waters of the Indian River. Although the North Fork of the St. Lucie River is the largest body of fresh water in the County, and manatees are frequently present in it, there are no individual creeks or canals to which manatees appear to be particularly attracted. Much of the land adjoining the North Fork has been purchased for preservation purposes. Funding is being sought to implement a project that was recently designed to improve the quality of water entering the North Fork through 10-Mile Creek

Throughout Florida, the water management districts have recently begun focusing on the detrimental effects on rivers that have resulted from alterations to the natural deliveries (e.g., quantities, quality, timing of discharges) of surface water. In some rivers (e.g., Loxahatchee River) competing uses for limited water have resulted in negative effects on the riverine ecosystem. Other rivers (e.g., South Fork of the St. Lucie River) have been negatively affected by the delivery of too much water entering the river through the existing system of drainage canals. The extent to which the North Fork has been degraded due to alterations of freshwater delivery is not known. St. Lucie County will consider working with the City of Port St. Lucie and SFWMD to determine if there is a need to more closely monitor or regulate the discharges into the North Fork. If such an investigation reveals the need, the County may request that the North Fork be added to the list of waterbodies for which the SFWMD will establish a rule for "minimum flows and levels".

3. Water Quality and Vegetation

In the vicinity of the Ft. Pierce Inlet, water quality in the IRL in St. Lucie County is excellent. Maintenance dredging of the Fort Pierce Inlet for navigation purposes has the additional benefit of maintaining significant tidal exchange between the Atlantic Ocean and the IRL. This diurnal tide allows pollutants that are generated or introduced at inland locations to be discharged to sea, and generally keeps water quality in the IRL suitable for the existence of seagrasses and other SAV.

More distant from the inlet, however water quality in the IRL is negatively affected by untreated stormwater runoff. St. Lucie County and the municipalities in the county are making progress in retrofitting stormwater structures to reduce these impacts, and will continue these efforts.

Many of the tidal creeks, man-made canals and channels that adjoin the IRL in St. Lucie County provide habitat for manatees. Water quality in these canals and channels varies, however, many canals and channels are typically too deep to provide conditions suitable for the existence of seagrasses. Because the main threats to manatees in these canals and channels are related to encounters with watercraft rather than poor water quality, discussion of these features is presented later in the Site Specific Vessel Speed Restrictions section of this component.

The most significant factors that affect the quality of surface waters in manatee habitat in St. Lucie County are the negative effects associated with point-source and non-point-source discharges of surface water into manatee habitat areas. These discharges include man-made conveyances, including the C-23 Canal (which actually discharges into the North Fork in Martin County just south of the St. Lucie/Martin County line), the C-24 Canal, he C-25 Canal and various agricultural canals and ditches from residential and urbanized lands. Section A.3 (Water Quality and Vegetation) of the Inventory of Existing Conditions described the widespread negative effects that alterations to the drainage basins have had on the quality, quantity, timing and delivery of freshwater into the estuaries. This has resulted in the degradation of manatee habitat.

Section A.3 in the Inventory of Existing Conditions also indicated that several waterways in St. Lucie County have been classified by the state and federal government as "impaired" due to elevated levels of nutrients and suspended materials. Several mechanisms (e.g., CERP, TMDLs, PLRGs) have been developed to address the unacceptable results of these discharges. Reversing many of the alterations caused by freshwater imbalances may be infeasible, but reducing the impact of other pollutants is possible.

In addition to the regulatory programs that are addressing these water quality issues, local river advocates have been successful in obtaining legislatively-approved funding for projects that improve water quality in the IRL and St. Lucie Estuary. Information concerning these programs was presented in Section A.3 of the Inventory of Existing Conditions. St. Lucie County will continue to work with and coordinate with the Indian River Restoration Feasibility Task Force and the St. Lucie River Initiative to improve water quality in these water bodies.

Implementation of the regulatory and non-regulatory programs identified above will improve the quality of water in manatee habitat in St. Lucie County. As these programs improve water quality in the target waterways, submerged aquatic vegetation should increase and therefore the foraging habitat for manatees should be enhanced. St. Lucie County will continue to work cooperatively with the agencies and community groups to assist with implementation of these programs. St. Lucie County will also continue to coordinate with the State of Florida and EPA to comply with Section 303d of the Clean Water Act, and will continue or expand its program to identify waterways that may likely become "impaired" if restorative projects are not undertaken.

4. Habitat Acquisition Areas – Environmentally Sensitive Lands

As described in Section A.2 (Public Land Acquisition Initiatives) of the Inventory of Existing Conditions, in November 1994, voters in St. Lucie County approved a $20 million bond referendum to acquire environmentally valuable uplands for conservation. In combination with

state and federal land acquisition programs, to date over 5,500 acres of land in St. Lucie County have been acquired through this Environmentally Significant Lands (ESL) program.

One particular project that will directly benefit manatees by protecting valuable shoreline habitat is a proposal to acquire lands fronting the IRL through the state's Conservation and Recreational Lands (CARL) program. The project, referred to as the Indian River Lagoon Blueway, would use state and local funds to purchase undeveloped waterfront tracts for conservation purposes. The Blueway proposal includes over 35 tracts that front the IRL from Volusia County through Martin County. Six of these tracts (i.e., Avalon, Queen's Island, Bear Point, Middle Cove, Blind Creek and Project 10B) are in St. Lucie County (Figure 5). The County has endorsed this proposal by providing financial support toward acquisition of lands included in the Blueway proposal. Additionally, the County will ensure that land management plans are adopted and implemented in a manner that preserves, protects and enhances the value of these parcels for manatees.

5. Contaminant and Pollution Exposure

Through St. Lucie County's compliance with Section 303(d) of the Clean Water Act, waterways that are considered impaired or likely to become impaired have been identified (see Table 1), and steps are being developed or implemented to address these situations.

In addition to these impaired waterways where water quality problems are chronic, there is the potential for acute water pollution though catastrophic events (e.g., hurricanes, oil or fuel spills). To reduce the potential for negative impacts, the State of Florida (FDEP or WMD) currently requires that permit applicants who wish to construct a new or expand an existing marina develop a Fuel Spill Contingency Plan as part of the Environmental Resources Permitting process. St. Lucie County will require that applicants for construction of facilities that store or sell fuel on site in unincorporated areas of the County provide a copy of this plan as part of the County's development review or building permit process. The County will review these plans, and approvals will be contingent upon the adequacy of plans to protect manatees and their habitat.

Through its Mosquito Control District and Public Works Department, St. Lucie County will work with FDEP, the University of Florida's Institute of Food and Agricultural Sciences, SFWMD and other concerned agencies to limit the application of pesticides and herbicides that could potentially impact manatee habitat. These materials will 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 on the bottom of local waterways. Consequently, St. Lucie County will work with SFWMD and others to explore methods (e.g., mechanical harvesting, biological controls) for removing floating vegetation from its waterways.

Although there are presently no known situations of contamination of manatee habitat in St. Lucie County by hazardous or toxic materials (e.g., Superfund Sites), the existence of industrial (e.g., fuel storage) and agricultural facilities adjacent to manatee habitat areas could result in such contamination. Should such a situation occur in unincorporated areas of the County, St.

Lucie County will work with the federal government (i.e., EPA) and the responsible entity to decontaminate any sites that are determined to be contaminating manatee habitat areas.

6. Resting, Loafing and Calving Areas

Section A.4 (Manatee Distribution) of the Inventory of Existing Conditions provided the results of the various manatee surveys that have been conducted in St. Lucie County over the last several decades. Although manatees have been documented to be present in various canals creeks and waterways, there is no indication that any individual sites (other than Moore's Creek where there is a warm-water attractant) provide habitat that is particularly significant for resting, loafing or calving. In general, however, data suggest that the narrow, comparatively quiet upstream waters of tidal and freshwater creeks provide important refuges for manatees, particularly during calving. Many of these waterways, particularly in the North Fork currently have vessel speed restrictions. Because watercraft-related manatee mortality has been extremely low in these areas, additional restrictions 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 St. Lucie 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, St. Lucie County will establish a program through which human-related manatee mortality and other manatee issues will be reviewed and analyzed. The Board of County Commissioners will appoint a St. Lucie County Manatee Protection Advisory Committee. MPAC will be a citizen-based committee, members of which will be appointed by the BOCC. The committee will consist of affected stakeholders, including but not limited to a representative from each of the following groups: the Marine Industries, conservation organizations, municipalities, a County elected official, MOEC and law enforcement personnel. County staff, State and Federal wildlife agency staff and a representative from the scientific community may serve as technical resources for MPAC.

St. Lucie County will convene MPAC on an as-needed basis to review the effectiveness of the MPP. However, MPAC may also be convened if instances of watercraft-related manatee mortality threaten the County's designation by the U.S. Fish and Wildlife Service as medium risk to manatees. MPAC's primary responsibility will be to assess the progress and success of implementation of this MPP (including its Boat Facility Siting component) 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.

2. Flood Gates/Locks and Manatee Barriers

In St. Lucie County, there are no floodgates or locks that are accessible to manatees, although manatees can access the downstream side of the Fort Pierce Farms Water Control District's structure on the C-1 Canal. The spillway-type design of this structure prevents manatees from becoming trapped, and there have been no manatee injuries or deaths documented at this structure.

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. Currently, stormwater or other outfall pipes, as well as, impoundment culverts in St. Lucie County are not documented for trapping manatees. However, in the event manatees are found to be trapped at individual locations, those specific locations will be retrofitted with FWC-approved devices that will preclude manatees.

3. Port Facilities and Power Plants

In St. Lucie County there is one port and two power plants that have the potential to affect manatees. Descriptive information about these facilities was provided in Section A.1 and B.2 of the Inventory of Existing Conditions. Information concerning the potential needs to enhance manatee protection at these facilities is described in this section.

Port of Fort Pierce

Activities at the Port of Fort Pierce have the potential to affect manatees. At other port facilities in Florida, manatees have been crushed between ships and bulkheads. Typically in such cases, the carcass shows signs of blunt trauma (e.g., numerous broken bones) without accompanying fresh propeller wounds). Although to date there have been no manatee carcasses recovered at the Port of Fort Pierce, four carcasses (M8144, M8423, M8508, MSW116) with injuries consistent with crushing as a cause of death have been recovered within several miles of the Port (FWC, 2000). Because the Port of Fort Pierce presently has no formal plan for manatee protection, St. Lucie County encourage the development of a site-specific manatee protection plan as a section of the master plan for the Port. Such a plan should address construction and operational procedures, fendering systems, manatee observers, vessel speed limits in Port waters, educational materials and signage, and training of staff on manatee protection issues. The plan should also address the potential impacts of stormwater outfalls on manatees. Specifically, such outfalls should be designed to preclude manatee injuries and prevent pollutants from entering manatee habitat.

St. Lucie Power Plant

Located on South Hutchinson Island, Florida Power and Light Company's St. Lucie Power Plant uses ocean water for power plant cooling purposes. Water is drawn into the plant from the Atlantic Ocean through large-diameter intake pipes. After it is used for cooling, it is discharged into the Atlantic Ocean through a multi-port diffuser system. This system distributes the heated

water over a broad area, varying from 1510 to 3380 feet offshore. Although manatees are infrequently present in the Atlantic Ocean, the operation of this facility presents two potential effects on manatees; 1) manatees could be entrained through the intake pipes, and 2) the heated effluent could serve as an attractant, especially during the winter months.

As described in Section B.2 of the Inventory of Existing Conditions, five manatees have been entrained in the power plant intake canal during the ± 25 years of plant operation. There have been no manatee fatalities at the facility, and in each instance, the manatee has been caught and released. FPL has evaluated engineering modifications that would preclude manatees from entering the system, and has worked with USFWS and FWC to establish a protocol to follow when/if such situations arise in the future. No alterations to this protocol appear warranted at this time.

The multi-port diffuser system appears to adequately disperse the heated effluent such that, to date, there has been no evidence that the thermal effects are substantial enough to attract manatees.

H.D. King Power Plant

Located on the west side of the IRL within the City of Fort Pierce, the Fort Pierce Utility Authority's H.D. King Power Plant uses IRL water for power plant cooling purposes. Water is drawn into the plant through intake pipes located at the west bulkhead of the City Marina. After it is used for cooling, heated effluent is discharged into the lower reaches of Moore's Creek, which empties into the IRL adjacent to the Manatee Observation and Education Center. The City Marina leases several docks along the south side of Moore's Creek, and public boat ramps are located on the north (MOEC) side of the Creek near its downstream mouth. The operation of this power plant has the potential to affect manatees in two ways: 1) potential entrainment at the location where water for cooling purposes enters the power plant system from the IRL; and 2) impacts that may result from manatees being attracted to the warm-water discharge.

The intake structure has been fitted with a 5 inch x 5 inch grating to prevent manatees and/or other large objects from being drawn into the power plant. Additionally, the flow rate through this intake system is so minimal that manatees would not be expected to be impinged against the intake gratings. Manatees are not drawn to this area, and there is no documentation or indication that manatees have been affected by the presence or operation of the intake from the H.D. King Power Plant.

Manatee censuses have documented that manatees are attracted to Moore's Creek. Although the presence of fresh water in an otherwise saline area may serve as a secondary attractant, the presence of manatees during the coldest times of the winter suggests that heated water is the primary attractant. Several steps have been undertaken to protect manatees while they are congregating during the winter months. The public boat ramps at the mouth of Moore's Creek are closed during the manatee season. Additionally, several of the City Marina's slips that are in Moore's Creek have been removed are others have been restricted to sailboat use only. The MOEC offers the public an opportunity to observe manatees in an unobtrusive manner, and learn them. Together, these provisions appear to be successful in protecting manatees at this location.

The H.D. King Power Plant has been used with varying frequency during the last several years, and its long-term use is somewhat uncertain. To address this potentially inconsistent source of warm water, FPUA coordinates with USFWS and FWC, and during specific circumstances, portions of the plant are operated during the winter solely to provide heated water to manatees. Although this agreement is resulting in manatees being drawn unnaturally to a man-made source of water, and may therefore be detrimental, the arrangement does provide a thermal refuge that would not otherwise be present.

4. Site Specific Vessel Speed Restrictions

Compilation, 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 reducing watercraft mortality in St. Lucie County waterways. Only two watercraft-related manatee mortalities have been recorded since the posting of vessel speed zones in 1995. One of these was in the IRL east of Moore's Creek, where there are idle and slow speed zones. The carcass was recovered east of the ICW channel, during the month of April when a maximum 30 mph speed designation is in effect. The second watercraft-related mortality was in Evin's Creek, a tributary of the North Fork in Port St. Lucie where the speed zone is slow. Because law enforcement personnel and residents have indicated that compliance with existing speed restrictions is more important than establishing new zones, this topic is addressed in greater detail in the Increased Law Enforcement Presence component below.

As described in Section A.1 of the Inventory of Existing Conditions, HBOI maintains a canal and navigation channel at its facility in northern St. Lucie County. Manatee censuses have revealed that this area is important for manatees. Vessel speed restrictions and a "No Entry" zone are currently in effect for various portions of this tidal navigation system. As there have been no watercraft-related manatee mortality recoveries in the HBOI canal and channel since the posting of vessel speed zones in 1995, it does not appear that changes to these designations are warranted.

Based on this low watercraft-related mortality, and few rescues of injured manatees from local waterways, no additional speed restrictions appear warranted at this time. St. Lucie County will request that municipalities within the County adopt by ordinance the state-approved manatee speed zones and enforce these designations within their municipal boundaries. Because a violation of speed zone restrictions would therefore be a violation of City regulations, City enforcement personnel would be more likely to enforce the regulation than if no such local ordinance were in effect.

5. 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: responses 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) below, one potential mechanism to improve recognition of manatee speed zones is through the posting of additional signs. However, because each additional sign presents a potential hazard to navigation, new signs should generally be installed only if other alternatives are not effective in protecting manatees.

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, St. Lucie County will work with the Sheriff's Office to ensure that all on-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 vessel speed zones, some counties and municipalities have also established water safety zones at locations (e.g., near bridges) where reduced vessel speed would enhance human safety. FIND has established interlocal agreements through which they agree to install and maintain these waterway signs, even if the signs are not on waterways where FIND has other responsibilities. Although the primary purpose of posting these signs is not for manatee protection, the signs would likely have this 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 or municipality) would allow the signs to be placed and maintained in a more cost-effective and consistent manner than would otherwise be possible. Therefore, if such zones are adopted, St. Lucie 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. If situations arise in which a manatee-related speed zone overlaps with a non-manatee related speed zone, signs identifying the most restrictive limit will be installed and maintained.

With improved sign maintenance, implementation of the public awareness program and increased law enforcement, there should be no need for additional manatee-related signage in County waterways in the near future. However, MPAC shall consider additional site-specific signage in the future if law enforcement personnel report a consistent lack of awareness of speed zones as the cause for speed zone violations. During the periodic reviews of the MPP it may be determined that additional signage is warranted at locations where speed zone violations are most prevalent. The County and/or MPAC will also analyze the location of each watercraft-related manatee mortality in relation to speed zone signage, and take appropriate corrective action.

6. 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 St. Lucie County. Although these agencies collectively provide a significant enforcement presence on County 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, St. Lucie County will endeavor to replicate at the local level the federal program through which marinas provide slip space for enforcement vessels at no charge. Slip space is currently provided voluntarily at some existing marinas. Through the development review and approval process, St. Lucie County will consider requesting or requiring that such slip space be provided at new or expanding marina(s) if there is a need for such space. If adequate docking has been dedicated for marine law enforcement watercraft, the County may consider funding offers that would provide additional enforcement on County waterways as mitigation for marina projects. The County will coordinate with state law enforcement agencies in this regard. Implementation of this program may involve amendments or additions to the County land Development Code.

Increasing the presence of law enforcement personnel on St. Lucie County's waters is only one component of affecting increased compliance. In cooperation with the Sheriff's Office and FWC enforcement personnel, the County will coordinate with the state on the assessment of the effectiveness of law enforcement practices. The two primary mechanisms that should be evaluated on a routine basis are:

- The ratio of warnings to citations (if available); and
- The extent to which violations of vessel speed restrictions are by repeat offenders.

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.

To reduce the potential for watercraft-related impacts to manatees, St. Lucie County will therefore establish and adopt by ordinance county-specific speed zone restrictions and amend, as necessary from time to time, the penalties for violation of applicable speed zones. This ordinance will include provisions for higher penalties for repeat offenders.

In coordination with FWC, St. Lucie County will conduct periodic compliance audits to determine the extent to which boaters are complying with vessel speed restrictions. If conducted, details of the audit will be developed by the County Sheriff's Office and FWC. Resulting data will be furnished to the MPAC not less than once every five years. This information may be used by the MPAC to develop recommendations for changes to enforcement programs.

7. 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. Although there are currently no federal or state designated manatee sanctuaries or refuges in St. Lucie County, the west end of HBOI Canal is designated as a No Entry zone and Moore's Creek is designated as Motorboats Prohibited from November 15 – March 31. USFWS and FWC are currently evaluating additional locations throughout Florida as candidate sites for manatee sanctuaries or refuges. Past analysis of existing data concerning the presence, abundance and distribution of manatees in St. Lucie County did not support that the designation of additional sanctuaries, refuges or motorboat prohibited areas were warranted at that time.

Areas in St. Lucie County that may be important for calving, resting or thermal refugia are:

- Big Mud Creek;
- Little Mud Creek;
- Taylor Creek; and
- Queen's Cove.

The features that appear to make these sites attractive to manatees are as varied and diverse as their locations. St. Lucie County will work with FWC to develop and implement programs to document the seasonal abundance, movements and foraging activities of manatees, freshwater discharge volumes, and water temperatures (as applicable) at each site. Currently, Big Mud and Little Mud Creeks are being considered under FWC review for possible increased protection for manatees. Any new data that may become available will be analyzed by the County and/or MPAC to determine if additional protective measures are warranted.

C. Land Development

Section C in the Inventory of Existing Conditions summarized the existing manatee protection mechanisms provided by St. Lucie County. The water quality of the IRL in the vicinity of the Ft. Pierce Inlet is generally good, although grassbed losses in much of the IRL suggest that there may be a need for additional protective measures over and above those required by the state and federal government. This section provides descriptions of mechanisms through which St. Lucie County will make improvements to local development standards to reduce the potential for negative impacts on manatees.

1. Shoreline Development Standards

In general, St. Lucie County and the municipalities in the County rely on state and federal regulations and permitting criteria to protect the natural resources of the shoreline. State and/or federal regulations provide protection for mangroves, seagrasses and other shoreline vegetation, and permits must be obtained for projects that involve water management systems and/or discharges from these systems into jurisdictional waters. Regulations also dictate conditions concerning the construction of vertical bulkheads and other erosion control structures that could affect shoreline vegetation. In addition to these state and federal requirements, St. Lucie County's LDRs require a minimum 50-ft buffer adjacent to rivers, creeks and estuaries.

St. Lucie County will continue to implement existing LDRs and coordinate with state and federal agencies to provide comments on projects that are inconsistent with County regulations.

2. Development Standards for Submerged Lands

The majority of the submerged lands in St. Lucie County that are accessible to manatees are lands that are owned or controlled by the State of Florida. The designation of most of the IRL in St. Lucie County and the North Fork as Aquatic Preserves provide 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 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, St. Lucie County has developed and implemented an approval process through which proposed projects must be reviewed and approved by the County prior to construction.

St. Lucie County will continue to implement existing LDRs and coordinate with State and federal agencies to provide comments on projects in unincorporated areas of the county that affect submerged lands and which are inconsistent with County regulations.

a. Marina Facility Siting Criteria

Marina facility siting criteria for the protection of manatees were developed in the Boat Facility Siting Component of this MPP. The screening methodology which was used included criteria such as manatee abundance, manatee habitat, manatee mortality, presence/absence of vessel speed restrictions and proximity to inlets to identify desirable locations for the development of new boat facilities or the expansion of existing boat facilities. Results of the screening process revealed that only one of the 35 segments of the waterways in St. Lucie County was classified as an area of low potential for impact to manatees. This one location, which is identified as the "primary" area for the construction of new boat facilities and/or the expansion of existing facilities is the "Fort Pierce Inlet Area" (see Exhibit 8 of the Boat Facility Siting Component).

Desirable features of this area include proximity to the inlet, presence of slow speed zones from November 15 through March 30, low coverage of seagrasses, and no recent records of watercraft-related manatee mortality. Another significant feature of this area is that it is east of the ICW. The majority of boat trips originating from this area can access the Atlantic Ocean without crossing the ICW or IRL, which are frequently used by manatees.

Secondary locations for boat facilities in St. Lucie County are defined as all areas with appropriate land-use and zoning designations for waterfront development that are located outside the primary area. Expansion of existing boating facilities or development of new boating facilities at these sites will be based on the ability to minimize impacts to natural resources and approval by the local government, state and federal permitting agencies. The number of boats at each facility will be limited by site plan constraints and local, state and federal requirements to avoid and minimize impacts to natural resources.

b. Performance Criteria

The USFWS has developed a ranking system that describes the relative threat to manatees on a county-by-county basis (USFWS, 2001). Counties that have had no watercraft related manatee mortalites are classified as low risk. Counties that where there have been some watercraft related manatee deaths, but less than one per year averaged over the last ten years are considered medium risk. Counties that have averaged more than one watercraft-related manatee death per year during the last ten years are considered high risk. Permits for waterfront construction are most difficult to obtain in high risk counties. St. Lucie County's present designation by USFWS is medium risk.

Because the County does not want to have waterfront construction restricted based on the manatee mortality criteria, it will implement measures necessary to maintain the medium risk designation. Watercraft-related manatee mortality has decreased subsequent to the adoption and posting of vessel speed restriction zones in the mid-1990s. Due to this decrease it is recommended that 1995 be adopted as the base year for the calculation of watercraft-related manatee mortalities. Through the adoption of this MPP, St. Lucie County will adopt as a performance criterion an average of less than one watercraft-related manatee mortality per year for any five-year period subsequent to the posting of vessel speed limit signs. The average annual county-wide incidence of watercraft related manatee mortality for the five years since speed zones were adopted and posted is 0.4. Provided there are no dramatic changes in boating patterns or manatee abundance and the enforcement, public awareness and educational initiatives are undertaken, staying below the target threshold should not be difficult.

St. Lucie County will analyze watercraft-related manatee mortality on an annual basis and take corrective actions, if necessary, as shown in Figure 17. As described above, the county shall appoint a Manatee Protection Advisory Committee. MPAC shall meet periodically to review and analyze the following: the status of MPP implementation; individual and overall cases of manatee mortality; increases in vessel registrations 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 congregating sites) as the basis for amending the MPP as necessary to protect manatees and their habitat in St. Lucie County. The findings of MPAC shall be presented in progress reports that will be presented to the BOCC, other appropriate state and federal officials and all committee participants.

St. Lucie County will convene MPAC on an as-needed basis to review the effectiveness of the MPP. However, MPAC may also be convened if instances of watercraft-related manatee mortality threaten the County's designation by USFWS as medium risk to manatees.

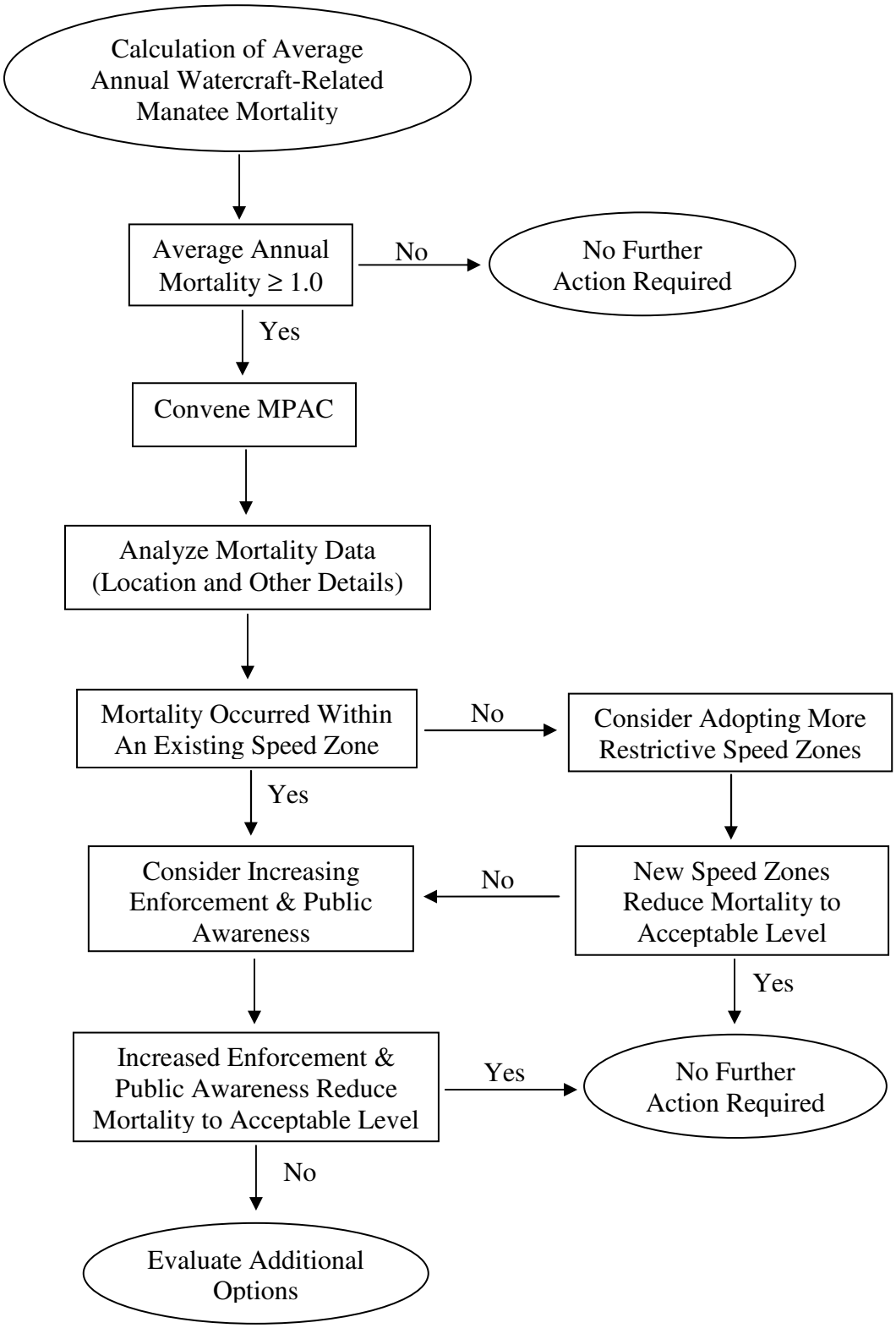
c. Residential "No Entry" Areas

In St. Lucie County, the two areas that are currently designated as "No Entry" are the west reach of the HBOI canal and portions of Moore's Creek. The results of aerial surveys, radio/satellite telemetry and visual observations and the lack of additional significant congregating sites suggest that no new "No Entry" designations in St. Lucie County are warranted at this time.

d. Restriction of Coastal Construction

As noted in Section C (Local Land Development) of the Inventory of Existing Conditions, St. Lucie County has adopted environmental protection regulations that in some cases exceed state and/or federal requirements (e.g., setbacks from open water). Through review of proposed projects by the State of Florida, permitting of waterfront development is linked to the protection of manatees. Upon adoption of this MPP by St. Lucie County and the State of Florida, the boat facility siting and enforcement provisions will be used to develop Land Development Regulations. Future coastal construction projects will be unaffected, provided the standards set forth in this plan for manatee protection are adhered to and annual watercraft-related manatee mortalities remain below specified levels.

Figure 17. Actions to be taken based on analysis of average annual watercraft-related manatee mortality.



D. Education and Awareness

Section D (Education and Awareness) in the Inventory of Existing Conditions identified and described existing public education and awareness programs in St. Lucie County. This Section uses that information to make recommendations for opportunities and initiatives to further improve this important aspect of manatee protection.

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 6), they are only moderately known and distributed to St. Lucie County residents and visitors. To address this improvement opportunity, St. Lucie County will designate and assist with financial resources or seek grant funds to develop and distribute educational materials about manatees. Key components of this initiative include:

- Establishing and maintaining a publicly-accessible 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 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.

St. Lucie County will explore partnership opportunities with FPUA's Manatee Observation and Education Center (MOEC) with hopes that MOEC will accept responsibility for the development and implementation of this education program. It is acknowledged that providing adequate *new* financial resources is the only mechanism through which this initiative can be successfully implemented. St. Lucie County will provide these resources which may include but are not limited to a combination of: grants; a portion of penalties received from violations of speed zone restrictions; vessel registration fees; the assessment of an additional impact fee on all waterfront development; and other sources. The County will also seek financial support through FWC's Advisory Committee on Environmental Education (ACEE) or other programs as described in Section D.4 (Existing Grant Programs and Other Funding Sources), below.

2. Awareness Programs – Boat and Personal Watercraft

In addition to the lifelong learning materials identified above, 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 a boat speed zone pamphlet with maps showing the speed zones has been developed and signs are posted at public boat ramps, the varying speed zone widths, designations and seasonal limitations are at times confusing. Without the benefit of having 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 St. Lucie County;
- Distribution of "Mind Your Waterway Signs" laminated cards that have 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;
- Developing a program to ensure that public awareness materials are made available to all individuals who own, rent or otherwise use personal watercraft; and
- Distributing these materials at the County vessel registration office and providing them to Martin County and Indian River County for distribution at their tax collector's offices.

St. Lucie County will either produce and distribute these materials directly, or will designate the responsibility for this program to the MOEC, in which case funding will also be provided.

St. Lucie County will make these materials available at the County Tax Collector's Office, where boat-owners must annually register their watercraft and where individuals born after September 30, 1980 can obtain their watercraft operator's certificate. Information from enforcement personnel have indicated that many boat operators who are stopped for violating vessel speed restriction zones claim they were unaware of the applicable restriction at the location of the violation. Failure to be cognizant of applicable vessel speed zones shall not be cause for waiver of penalties by law enforcement personnel.

3. Coordination of Education and Awareness

As described in Section D.1 (Educational Programs in Schools) above, St. Lucie County will work with FPUA in an attempt to have MOEC accept responsibility for coordinating education initiatives. MOEC will be encouraged to work with its colleagues in the surrounding counties and other educational institutions to obtain existing materials and/or compile new documents.

4. Existing Grant Programs and Other Funding Sources

Implementing this MPP will be challenging from both human resources and financial resources perspectives. 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 development of the MPP has identified a variety of potential governmental and non-governmental sources of financial support for implementation of this MPP. 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 "St. Lucie County Manatee Protection Plan – Funding Opportunities, Subsidies, Public Information, Networks and Related Information". Information concerning the most likely sources for funding is identified in Table 7. The County administrator (or designee) will review this document and use it as appropriate to solicit financial support to assist in implementing this MPP. The County will also seek financial support through FWC's Advisory Committee on Environmental Education (ACEE).

E. Governmental Coordination

Many issues associated with protection of manatees and their habitat in St. Lucie County are beyond the control of the County. This section therefore identifies and describes mechanisms and processes through which St. Lucie 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 St. Lucie County Comprehensive Plan, the mechanism for implementing these initiatives is through the adoption of specific Land Development Regulations (LDRs). In Section C.1 (Development Standards) of 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 environmentally sensitive lands, shoreline protection, and wetlands, there is no ordinance that specifically focuses on the protection of manatees, although Section 6.04.03 of the County's Land Development Code has been reserved for this purpose. It is suggested that new ordinances related to manatee protection be adopted within this section of the St. Lucie County LDC. Section 6.04.03 of the LDC shall be entitled "Manatee Protection" and shall include but not be limited to the following:

Table 7
Potential Funding Sources for Implementing the St. Lucie County MPP

Source	Name or Type of Program	Comments
U.S. EPA Office of Environmental Education	Environmental Education and Training Program	Requires 25% match, next award cycle 2003
U.S. EPA Office of Environmental Education	Environmental Education Grants	For design & dissemination of environmental curricula
U.S. Department of Education	Eisenhower Professional Development Grant	To collect and disseminate exemplary science education instructional materials
U.S. Fish and Wildlife Service	Cooperative Endangered Species Conservation Fund	Grantee must be the State agency
National Oceanographic & Atmospheric Administration (NOAA)	Financial Assistance for Nat'l 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
U.S. 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 Fl. resources
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 Walmart stores
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-side 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.

- Establishment of a St. Lucie County Manatee Protection Advisory Committee;
- Establishment of a dedicated funding source for implementation of the MPP;
- Adoption of a Level of Service or requirement for compliance audits for enforcement of manatee-related regulations;
- Designation of the Manatee Observation and Education Center as the entity that will be responsible for coordinating the public information and awareness program, and appropriation of adequate funds for program implementation;
- Implementation of a program to collect additional information that will serve as the scientific basis for future amendments to the MPP;
- Identification of the process through which the County-wide MPP will be revised;
- Identification of primary and secondary sites for the construction or expansion of marina facilities, docks and boat ramps; and
- Identification of the criteria which would allow construction at primary and secondary sites.

Additionally, St. Lucie County will request that the City of Fort Pierce, the City of Port St. Lucie and St. Lucie Village adopt manatee protection and boat facility siting ordinances, and will recommend the use of the County's ordinances as models.

2. Boat Traffic/Manatee Area Usage Study

It is acknowledged that as time passes, there will be changes in the number of boat registrations, the frequency of use of these boats and patterns of boat use in St. Lucie County. Likewise, as various programs that are implemented to improve water quality, the spatial distribution, abundance and vitality of SAV may also change. Thus, there will be a need to reassess the effectiveness of this MPP 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 more effectively protect manatees will be the Boating Activity Study (BAS). St. Lucie County and the FWC will cooperate in the design and assessment of the BAS, which will be conducted at least once every five years. The study will also include sampling to determine levels of compliance with boat speed restriction zones at several key areas, and be devised to include seasonal variability. Results of the BAS will be provided to MPAC and FWC, and adjustments will be made to the MPP as appropriate.

3. Review and Adoption of MPP

St. Lucie County will request that the MPP be reviewed and approved by FWC and USFWS.

OBJECTIVES AND POLICIES

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

1. Adopting the Goal, Objectives and Policies of this MPP pursuant to Policy 7.1.3.2 of the St. Lucie County Comprehensive Plan;
2. Amending or creating new Ordinances and associated LDRs; and
3. Conducting other initiatives, which do not involve the MPP Goal, Objectives or Policies or St. Lucie County's LDRs.

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

A. Goal, Objectives and Policies

The first step in implementing this MPP will be the adoption of its Goal, Objectives and Policies pursuant to Policy 7.1.3.2 of the St. Lucie County Comp Plan. As described in Section C of the Inventory of Existing Conditions, the Comp Plan includes provisions for environmental protection in both the Coastal Management Element (Chapter 7) and the Conservation Element (Chapter 8). Although there are no existing policies that specifically identify manatee protection, there are a number of policies that describe natural resource protection and boat facility siting. Implementation of this MPP will involve the adoption of the Goal, Objectives and Policies, as described below, pursuant to Policy 7.1.3.2 of the County's Comp Plan.

Effective on the date of adoption of the MPP by the BOCC, all new boating facilities and all existing boating facilities that propose expansion (in spatial extent or numbers of vessel slips) shall be reviewed based on the following criteria.

GOAL: Protect Manatees and their Habitat.

Objective I: Site new boating facilities and allow expansion of existing boating facilities at locations in a manner that will minimize the potential for watercraft-related manatee mortality and adverse impacts to manatee habitat including seagrass.

Policy 1. The siting of all boat facilities in any local government jurisdiction in St. Lucie County shall be consistent with the guidelines, methodologies, procedures, and policies established in this plan. This applies to the expansion of existing facilities or the development of new facilities.

Policy 2. A specific site plan proposal shall be reviewed to determine if the site is located in an area designated as primary or secondary location as defined in the following policies. Limitations as described in this plan shall apply to sites in these locations.

Policy 3. The primary location for new boat facilities in St. Lucie County is defined as sites that are located in the Fort Pierce Inlet Area. The geographic areas identified as the primary

locations are depicted in Exhibit 8. The county supports the expansion and redevelopment of marine industries in this area. The number of boats at each facility will be limited by site plan constraints, and local, state, and federal requirements to avoid and minimize impacts to natural resources.

Policy 4. St. Lucie County will encourage land uses and site plans in the Fort Pierce Inlet Area that enhance access to the coastal waterway and maximize the number of wet slips and dry storage racks at a given facility.

Policy 5. St. Lucie County will encourage the FDEP and SFWMD to develop an ecosystem-planning initiative for the Fort Pierce Inlet Area. A prime focus of this initiative is to develop a coordinated and comprehensive approach to increasing the number of boat facilities, enhancing natural resources, and protecting manatees. Special attention should be give to enhancing stormwater management systems, determining adequate levels of enforcement for speed zones, and considering parking alternatives for boat ramps.

Policy 6. Secondary locations for boat facilities in St. Lucie County are defined as sites located outside of the primary location. Expansion or development at these sites will be based on impacts to natural resources. Any impacts to seagrasses, tidal marshes, or mangrove communities must be avoided or minimized. Expansion or development of boat facilities at secondary locations will be based on the review and approval by the local government and state and federal permitting agencies. The number of boats at each facility will be limited by site plan constraints, and local, state, and federal requirements to avoid and minimize impacts to natural resources.

Policy 7. Single-family residential lots with existing water frontage are allowed limit of one dock per lot. This applies to the entire coastal waterway, regardless of the location of the site. The permitting requirements apply from the local government, FDEP, ACOE, USFWS, and SFWMD.

Policy 8. Private multifamily residential docks designed to accommodate the boats of more than one residence shall be allowed at primary and secondary locations. The total number of slips shall be determined by the site plan design, physical space limitation, environmental permitting criteria, and approval by the local government and permitting agencies.

Policy 9. As the need arises to increase public access at existing or future boat ramps, St. Lucie County shall strive to meet an acceptable level of service by increasing the ramp lanes and increasing the parking spaces at existing ramps. In order to increase parking at a particular ramp, St. Lucie County will evaluate if additional parking can be made available at the site. When this approach is not feasible, the concept of providing an auxiliary parking location with a shuttle service will be examined. Expansion of existing ramp facilities is more desirable because the potential impact on manatees can be monitored more easily with a fewer number of ramp locations.

Policy 10. St. Lucie County shall work with the FWC to evaluate speed zones in any area where increased boat traffic is expected due to the development or expansion of boat facilities. St.

Lucie County shall also work with the FWC Division of Law Enforcement, Sheriff's Department, and other enforcement agencies to ensure the availability of adequate resources and personnel to enforce the speed restrictions.

Policy 11. The master plan for the Port of Fort Pierce shall include a section specifically dealing with manatee protection. This section will discuss manatee protection procedures related to: dock design and construction; maintenance dredging; expansion of ship berths and channels; the use of explosives; sediment disposal; impacts to seagrasses and submerged aquatic vegetation; and crew procedures for observing and avoiding manatees especially when arriving and departing from docks.

Policy 12. St. Lucie County will partner with the USFWS, FWC, and others to provide educational programs, brochures, etc. for the general public on related watercraft issues including boater safety, manatees and their habitat, seagrasses, etc.

Objective II: Increase education, awareness and protection of manatees and their habitat.

Policy 13. The Board of County Commissioners will appoint a St. Lucie County Manatee Protection Advisory Committee. MPAC will be a citizen-based committee, members of which will be appointed by the BOCC. The committee will consist of affected stakeholders, including but not limited to a representative from each of the following groups: the Marine Industries, conservation organizations, municipalities, a County elected official, MOEC and law enforcement personnel. County staff, State and Federal wildlife agency staff and a representative from the scientific community may serve as technical resources for MPAC.

St. Lucie County will convene MPAC on an as-needed basis to review the effectiveness of the MPP. However, MPAC may also be convened if instances of watercraft-related manatee mortality threaten the County's designation by the U.S. Fish and Wildlife Service as medium risk to manatees. MPAC's primary responsibility will be to assess the progress and success of implementation of this MPP 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.

Policy 14. St. Lucie County and FWC shall calculate and monitor manatee mortality caused by collision with watercraft in the County waterways, as well as provide enforcement of speed zones. If the average annual rate of watercraft-related mortality is greater than or equal to 1.0 for the most recent five-year period in areas where the entire width of the waterway is idle or slow speed, channel included, then additional law enforcement of the speed zones shall be provided in the appropriate areas. If the average annual rate of watercraft -related mortality is greater than or equal to 1.0 for the most recent five-year period in areas without full speed zones, then additional speed zones shall be considered. As appropriate, St. Lucie County may modify the applicable County ordinance and request that the State of Florida also modify 68C-22.008 F.A.C. If the average annual rate of watercraft-related mortality is greater than or equal to 1.0 during the most recent five-year period in areas with full speed zone protection, then the County will evaluate additional appropriate actions that may be taken, including public education programs. The plan should be updated and modified as needed.

Policy 15. The St. Lucie County Board of County Commissioners will determine and seek the level of funding necessary to implement the goals and policies of the MPP. The County will fund this initiative through a variety of sources, which may include but is not limited to grants, funds from FWC, a portion of penalties received from speed zone violations, vessel registration fees, impact fees on waterfront development, and/or other sources, as deemed appropriate.

Policy 16. Seagrass beds shall be protected from dredge and fill projects, except for maintenance dredging projects and as described in Policy 17 below.

Policy 17. Prior to being issued a permit for a dock over seagrasses, a permit applicant shall provide to the County the results of a 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 will 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.

Policy 18. St. Lucie County will prohibit the construction of new point source discharges of water into manatee habitat areas in the vicinity of seagrasses, unless the applicant provides the required stormwater treatment to demonstrate compliance with applicable water quality standards.

Policy 19. St. Lucie County will analyze results of seagrass mapping by SFWMD after the completion of each mapping event. If there are declines in seagrass coverage, the County will work with SFWMD to identify causes for these declines and will assist in implementation of programs to improve conditions.

Policy 20. St. Lucie County shall work with the FDEP, ACOE, USFWS and SFWMD to establish a seagrass restoration program. The purpose of the program is to enhance estuarine natural resources, improve water quality, and provide habitat for manatees. Consideration should be given to lowering spoil islands, filling deep areas of the coastal waterway, and creating a benthic substrate conducive to the natural recruitment of seagrasses.

Policy 21. To reduce the potential for watercraft-related impacts to manatees, St. Lucie County will adopt by Ordinance the applicable manatee-related vessel speed zones enacted by the State of Florida (or more restrictive zones if the County determines they are necessary). The ordinance will include provisions for increased penalties for repeat offenders and will be amended in the future as necessary.

Policy 22. St. Lucie County will ensure that a laminated card with maps showing all vessel speed zones within the 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. 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. Failure to be cognizant of applicable vessel speed zones shall not be cause for waiver of penalties by law enforcement personnel.

Policy 23. The St. Lucie County Board of County Commissioners will determine and seek the appropriate levels of funding necessary to implement the MPP and increase the extent of on-the-water enforcement personnel by Sheriff's Office staff. Such fiscal responsibility may involve the establishment of a Manatee Protection Trust Fund or involve seeking funding from other sources (i.e., grants, federal, state, and/or foundations).

Policy 24. Through the Sheriff's Office, St. Lucie County will develop and implement a program to routinely monitor the extent of compliance with manatee-related boat speed restrictions. The compliance audit will be performed at least once every seven years, and the results will be provided to the MPAC for review and analysis. As warranted, St. Lucie County will adjust the level of law enforcement presence to ensure substantial compliance with the regulations.

Policy 25. St. Lucie County will coordinate with the Florida Inland Navigation District to ensure that FIND continues to be responsible for installing and maintaining all vessel speed zone signs in the County. St. Lucie County will also request that FIND install and maintain additional signs at locations where enforcement personnel report low levels of awareness by vessel operators.

Policy 26. St. Lucie County will establish and maintain a process for coordinating manatee-related issues with other federal, state, regional and municipal agencies. This coordination will include developing and implementing a process through which the County will review "Public Notices" for waterfront development projects received from federal and state agencies and provide correspondence to the appropriate agencies if the proposed project is not consistent with county regulations.

Policy 27. St. Lucie County will develop and implement a far-reaching program for effective public awareness and education concerning manatees and their habitat. The BOCC shall request that the MOEC accept responsibility for the development and implementation of a program to provide opportunities for life-long learning about manatees for county residents and visitors, and dedicate appropriate funding to allow MOEC to compile a library of existing manatee information and develop and distribute additional materials as necessary.

Policy 28. St. Lucie County will work with FWC or other agencies or organizations to conduct additional research as necessary to obtain scientific data that will support the need to modify manatee protection zones and measures.

Policy 29. St. Lucie County will explore methods of aquatic weed removal to minimize the unintentional negative side effects that may accompany the use of herbicides and/or pesticides. The intent will be to prevent floating plants that have been treated with chemicals from being carried by currents into manatee habitat areas, where they may be ingested by manatees and/or their decomposition by-products may result in unacceptable accumulations of organic sediments.

Policy 30. St. Lucie County will establish a monofilament line recycling program. The program could be coordinated and operated through a volunteer-based organization such as Keep St. Lucie Beautiful and funded by grants. The recycling of monofilament line could be facilitated through the placement of monofilament line collection receptacles paired with educational information at high use boat ramps and marinas.

B. Amending LDRs by Changing or Creating New Ordinances

As identified in the Inventory of Existing Conditions (see Development Standards), Section 6.0 of St. Lucie County's Land Development Code contains several sections that provide protection to resources that are valuable to manatees. Continuing implementation of these existing ordinances will be helpful in protecting manatees and their habitat. However, implementation of this MPP will require that St. Lucie County incorporate the numbered items identified in Section A above into Section 6.04.03 of the County's LDC.

C. Action Plan Items Not Involving Amendments to LDRs

1. St. Lucie County will coordinate with FWC during the investigation of manatee use in areas that are being considered for potential additional manatee protection (i.e., Little Mud Creek and Big Mud Creek).

2. St. Lucie County will request that the City of Fort Pierce, the City of Port St. Lucie and St. Lucie Village adopt applicable portions of the MPP and require that the siting of all boat facilities within any local government jurisdiction in St. Lucie County be consistent with the guidelines, methodologies, procedures, and policies established in the MPP. This applies to the expansion of existing facilities and the development of new facilities.

3. St. Lucie County will request that municipalities within the county adopt by ordinance the state-approved manatee speed zones and enforce these designations within their municipal boundaries.

4. St. Lucie County will encourage FDEP, SFWMD and the City of Fort Pierce to develop an ecosystem planning initiative for the Fort Pierce Inlet Area. A prime focus of this initiative is to develop a coordinated and comprehensive approach to increasing the number of boat facilities, enhancing natural resources, and protecting manatees. Special attention should be given to enhancing stormwater management systems, determining adequate levels of enforcement of speed zones, and considering parking alternatives at boat ramps.

5. St. Lucie County will continue to use locally-generated funds in public land acquisition projects, and to the extent possible, work collaboratively with other governmental entities to acquire and manage lands for conservation purposes.

6. St. Lucie County will endorse by resolution the proposal for public acquisition of the waterfront parcels in the County that are included in the Indian River Lagoon Blueway land acquisition proposal and, if feasible, provide financial support toward their acquisition.

7. St. Lucie County will continue to seek partners to implement projects to improve water quality conditions in Taylor Creek.

8. St. Lucie County will request that the MPP be reviewed and approved by FWC and USFWS.

IMPLEMENTATION SCHEDULE

Implementation of the St. Lucie 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 does not recommend any new vessel speed zones, additional restrictions may be warranted once additional data are collected in areas where manatees have been reported to congregate. 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.

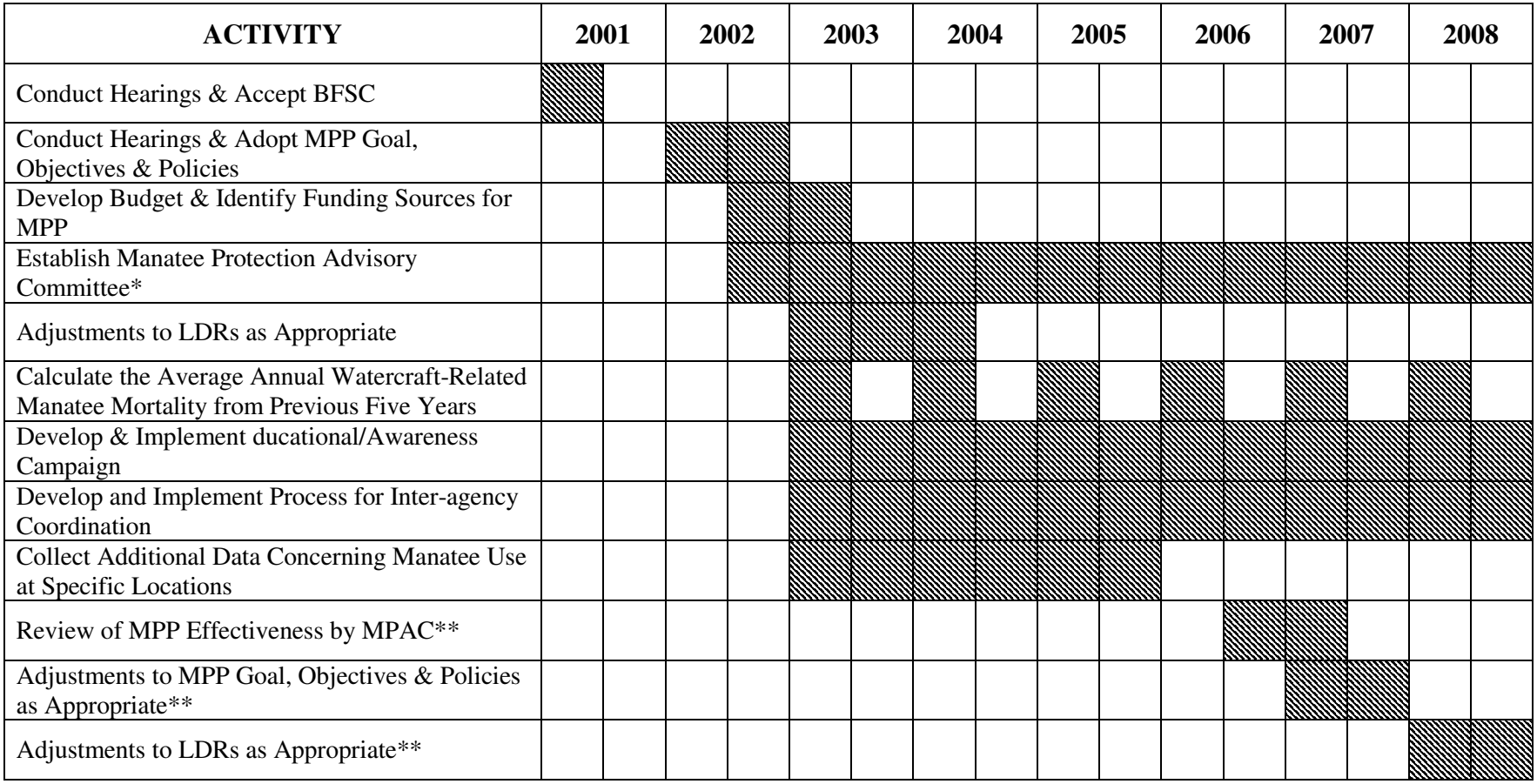
The primary mechanism for ensuring that the MPP is implemented is the adoption of the MPP Goal, Objectives and Policies into county governance documents. This will include adoption of the MPP Goal, Objectives and Policies pursuant to Policy 7.1.3.2 of the County's Comprehensive Plan and subsequent development of related ordinances. The process for such adoptions is lengthy (60 days – 1 year) 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 plan. 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 St. Lucie County to remain proactive, and to reduce the likelihood of contentious interactions based on a lack of detailed information, it is recommended that the County convene MPAC on an as-needed basis to review the effectiveness of the MPP. The County may also convene MPAC if watercraft-related manatee mortalities approach the threshold value that would threaten the County's designation as medium risk by USFWS. MPAC will discuss and analyze these and other changes and make recommendations for incremental adjustments to the MPP on an as-needed basis with ample opportunity for public input. Making modifications on this basis is proactive and 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 18. This time line will be revised, as appropriate, to reflect new data, information and circumstances.

FIGURE 18

PROPOSED SCHEDULE FOR IMPLEMENTATION OF ST. LUCIE COUNTY MANATEE PROTECTION PLAN



*Will meet on an as-needed basis.

**May occur earlier if watercraft-related manatee mortality approaches threshold.

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APPENDIX A

Non-verified Reports of Manatee Sightings

Non-verified Reports of Manatee Sightings

The most long-term database of manatee sightings in St. Lucie County resides with the Florida Oceanographic Society (FOS), a non-profit, scientific 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. Because manatee sightings reported to FOS are not verified, and there is no way to screen out incorrect observations or to distinguish if an individual manatee may have been reported multiple times, FWC considers these data to be anecdotal, and they are not used as a basis for rulemaking.

Data compiled through the FOS sighting reports indicates that during the period from 1990 through 1992, (when the sighting reporting project included the entire county) manatees were present during every month of the year. In some areas, such as the IRL and the North Fork, manatees were observed throughout the year. In other areas, manatees were reported less frequently.

This information is compiled weekly and published in local newspapers. 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.

When the FOS program was initiated, calls were received from throughout the Indian River Lagoon, as far north as Indian River County, and throughout the St. Lucie Estuary, including the North Fork of the St. Lucie River. However, the Ft. Pierce newspaper that published the weekly data decided to discontinue the service in 1993. Thus, FOS only compiled data for the northern portion of the Indian River Lagoon from 1990 through 1992. However, data collection for the southern portion of the lagoon as well for the North Fork has continued to date.

Manatees were less regularly observed in the tributaries flowing into the North Fork. A comparison of more recent data for the North Fork (1998-2000) similarly shows a relatively low occurrence of manatees in the adjacent creeks. This could indicate that they do not regularly use these areas or that when they are present, they are not observed or reported. The only major departure between the two data sets is that during recent years, manatees have been observed in Kitching Cove throughout the year, whereas previously, FOS only received sighting reports during the summer and fall.

During the period from 1990 through 1992, FOS received up to approximately 300 calls per year reporting manatee sightings in St. Lucie County. The maximum number of manatees reported by a single caller was 40. That sighting occurred in the Fort Pierce Yacht Basin in January 1991.

Collectively, data obtained through aerial surveys, radio telemetry and visual observations, make it apparent that manatees are found in most of St. Lucie County's non-land-locked 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. There are only two major sources of warm water in St. Lucie County, the Ft. Pierce Utility Authority's (FPUA's) H.D. King Power Plant and FPL's St. Lucie Plant on Hutchinson Island. Discharges from these plants and their effects on manatees are discussed in the following section.

APPENDIX B

St. Lucie County Manatee Protection Zones

ST. LUCIE COUNTY
MANATEE PROTECTION ZONES

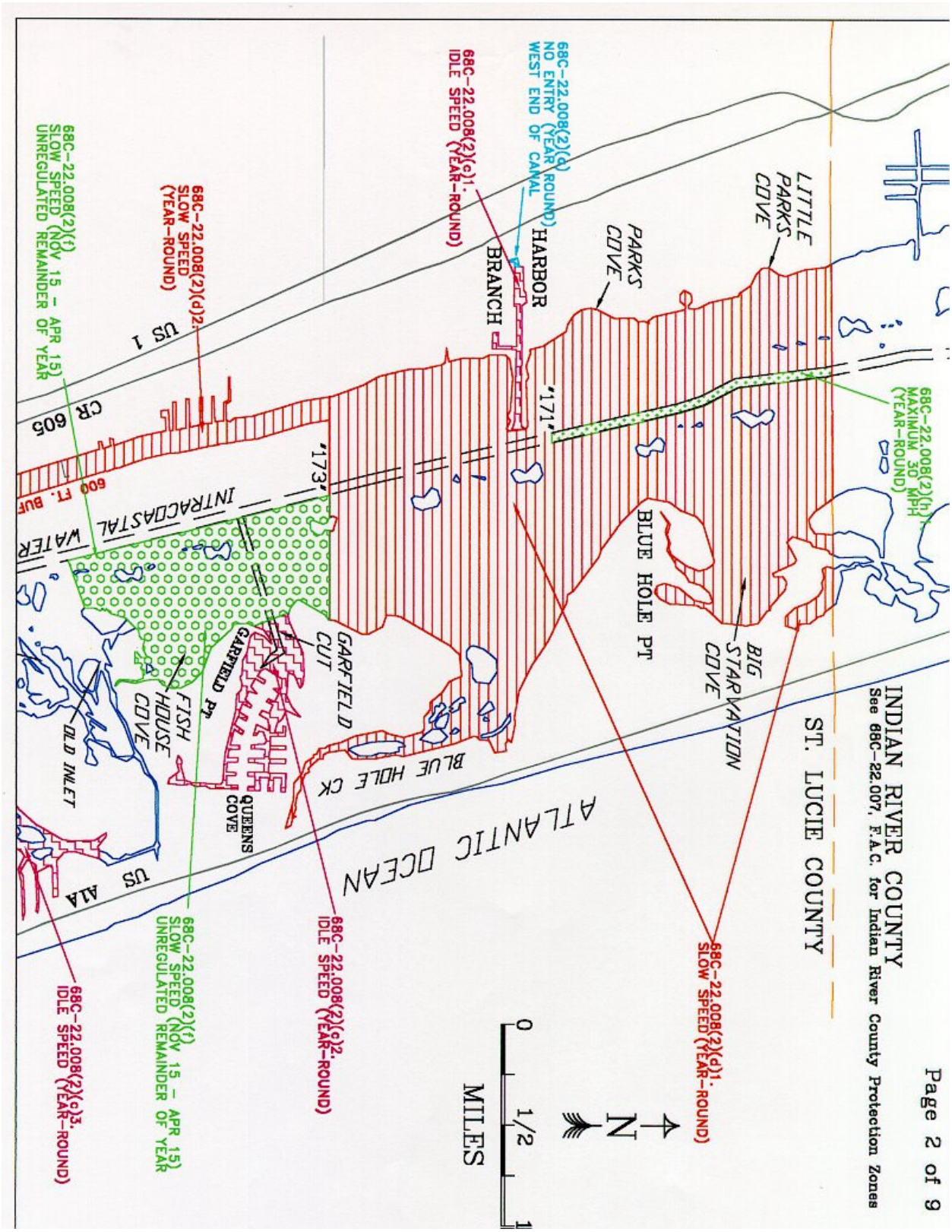
Manatees

68C-22.008,F.A.C. Florida Administrative Code (F.A.C.)

For information please call or write to:
Fish and Wildlife Conservation Commission
Office of Environmental Services
Bureau of Protected Species Management
620 South Meridian Street, OES-BPS
Tallahassee FL 32399-1600
TEL:(850) 922-4330 FAX:(850) 922-4338 SUNCOM: 292-4330

LEGEND

- NO ENTRY (YEAR ROUND)
- MOTORBOATS PROHIBITED (NOV. 15 – MAR. 31)
  IDLE SPEED (REMAINDER OF YEAR)
- IDLE SPEED (YEAR ROUND)
- SLOW SPEED (YEAR ROUND)
- SLOW SPEED (NOV. 15 – APR. 30)
  MAXIMUM 30 MPH (REMAINDER OF YEAR)
- SLOW SPEED (NOV 15 – APR. 15)
  UNREGULATED (REMAINDER OF YEAR)
- MAXIMUM 25 MPH (YEAR ROUND)
- MAXIMUM 30 MPH (YEAR ROUND)


INDIAN RIVER COUNTY
See 68C-22.007, F.A.C. for Indian River County Protection Zones
ST. LUCIE COUNTY
Page 2 of 9
LITTLE PARKS COVE
PARKS COVE
HARBOR BRANCH
BLUE HOLE PT
BIG STAR VATION COVE
68C-22.008(2)(h) MAXIMUM 30 MPH (YEAR-ROUND)
68C-22.008(2)(a) NO ENTRY (YEAR ROUND) WEST END OF CANAL
68C-22.008(2)(c)1. IDLE SPEED (YEAR-ROUND)
68C-22.008(2)(c)1. SLOW SPEED (YEAR-ROUND)
'171'
'173'
INTRACOASTAL WATER
600 FT. BUF
US 1
CR 605
68C-22.008(2)(d)2. SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(f) SLOW SPEED (NOV 15 - APR 15) UNREGULATED REMAINDER OF YEAR
GARFIELD CUT
GARFIELD PT
FISH HOUSE COVE
QUEENS COVE
BLUE HOLE CK
OLD INLET
US A1A
ATLANTIC OCEAN
68C-22.008(2)(c)2. IDLE SPEED (YEAR-ROUND)
68C-22.008(2)(f) SLOW SPEED (NOV 15 - APR 15) UNREGULATED REMAINDER OF YEAR
68C-22.008(2)(c)3. IDLE SPEED (YEAR-ROUND)
68C-22.008(2)(c)1. SLOW SPEED (YEAR-ROUND)
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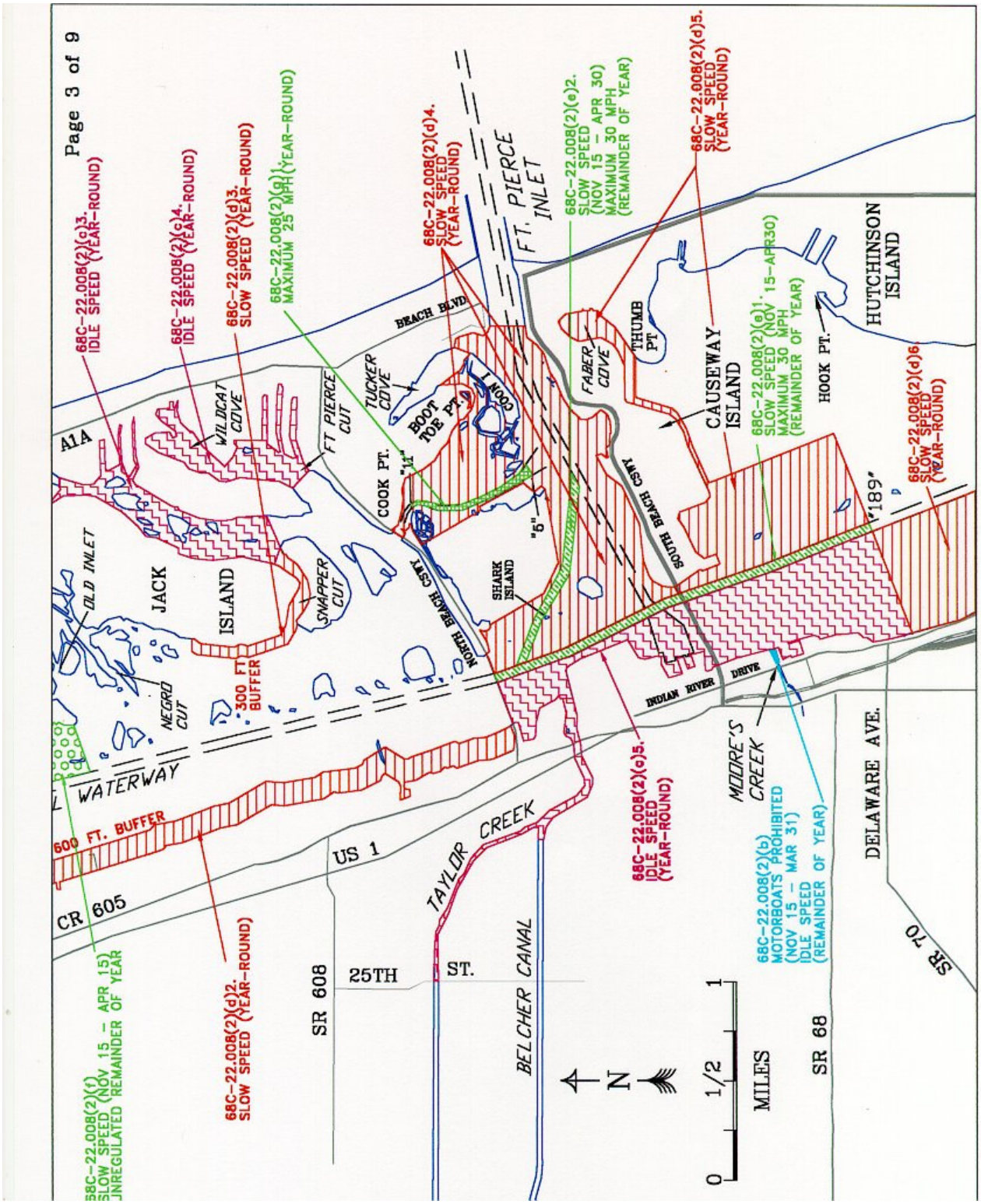
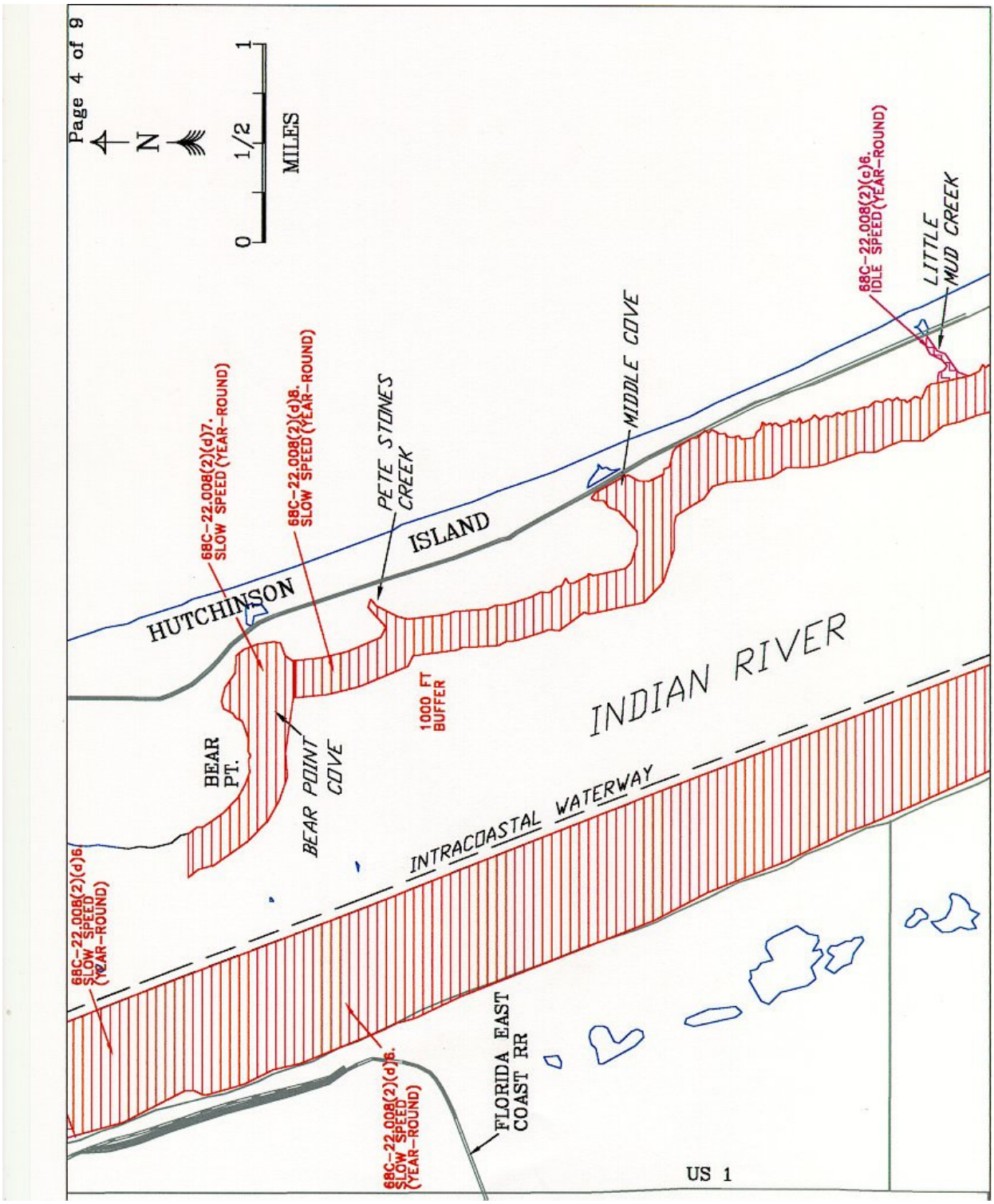
1/2
1
MILES


Page 3 of 9
68C-22.008(2)(c)3. IDLE SPEED (YEAR-ROUND)
68C-22.008(2)(c)4. IDLE SPEED (YEAR-ROUND)
68C-22.008(2)(d)3. SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(g)1. MAXIMUM 25 MPH (YEAR-ROUND)
68C-22.008(2)(d)4. SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(e)2. SLOW SPEED (NOV 15 - APR 30) MAXIMUM 30 MPH (REMAINDER OF YEAR)
68C-22.008(2)(d)5. SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(e)1. SLOW SPEED (NOV 15-APR30) MAXIMUM 30 MPH (REMAINDER OF YEAR)
68C-22.008(2)(d)6 SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(f) SLOW SPEED (NOV 15 - APR 15) UNREGULATED REMAINDER OF YEAR
68C-22.008(2)(d)2. SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(c)5. IDLE SPEED (YEAR-ROUND)
68C-22.008(2)(b) MOTORBOATS PROHIBITED (NOV 15 - MAR 31) IDLE SPEED (REMAINDER OF YEAR)
A1A
BEACH BLVD
OLD INLET
JACK ISLAND
NEGRO CUT
SNAPPER CUT
WILDCAT COVE
FT PIERCE CUT
TUCKER COVE
COOK PT.
"11"
BOOT TOE PT.
"5"
SHARK ISLAND
NORTH BEACH CSWY
SOUTH BEACH CSWY
FABER COVE
THUMB PT
CAUSEWAY ISLAND
HOOK PT.
HUTCHINSON ISLAND
"189"
FT. PIERCE INLET
INDIAN RIVER DRIVE
MOORE'S CREEK
DELAWARE AVE.
SR 70
SR 68
WATERWAY
300 FT BUFFER
600 FT. BUFFER
US 1
CR 605
SR 608
25TH ST.
TAYLOR CREEK
BELCHER CANAL
N
0 1/2 1
MILES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1
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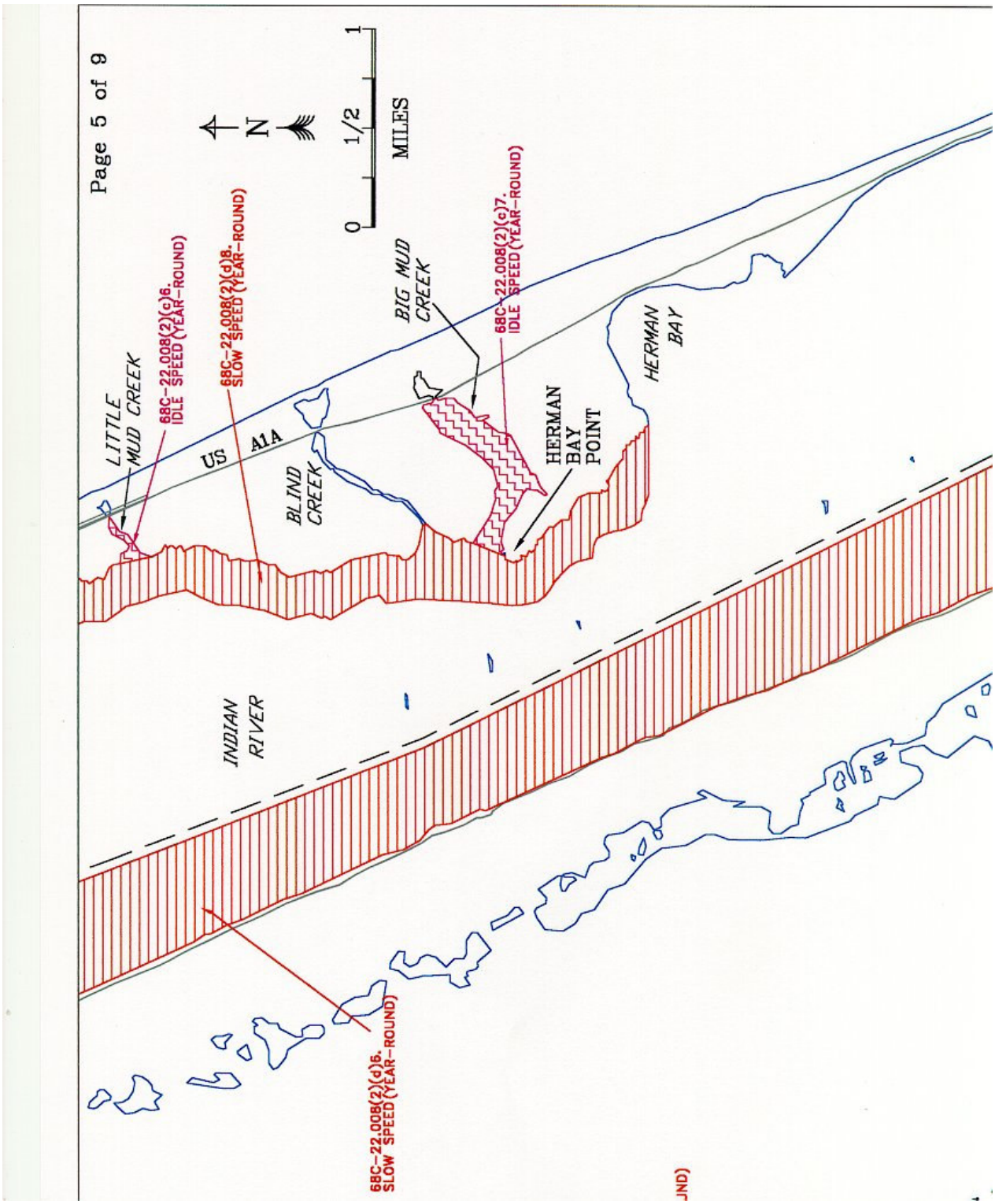
SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(d)8.
SLOW SPEED (YEAR-ROUND)
PETE STONES
CREEK
MIDDLE COVE
68C-22.008(2)(c)6.
IDLE SPEED (YEAR-ROUND)
LITTLE
MUD CREEK
HUTCHINSON
ISLAND
INDIAN RIVER
1000 FT
BUFFER
BEAR
PT.
BEAR POINT
COVE
INTRACOASTAL WATERWAY
68C-22.008(2)(d)6.
SLOW SPEED
(YEAR-ROUND)
68C-22.008(2)(d)6.
SLOW SPEED
(YEAR-ROUND)
FLORIDA EAST
COAST RR
US 1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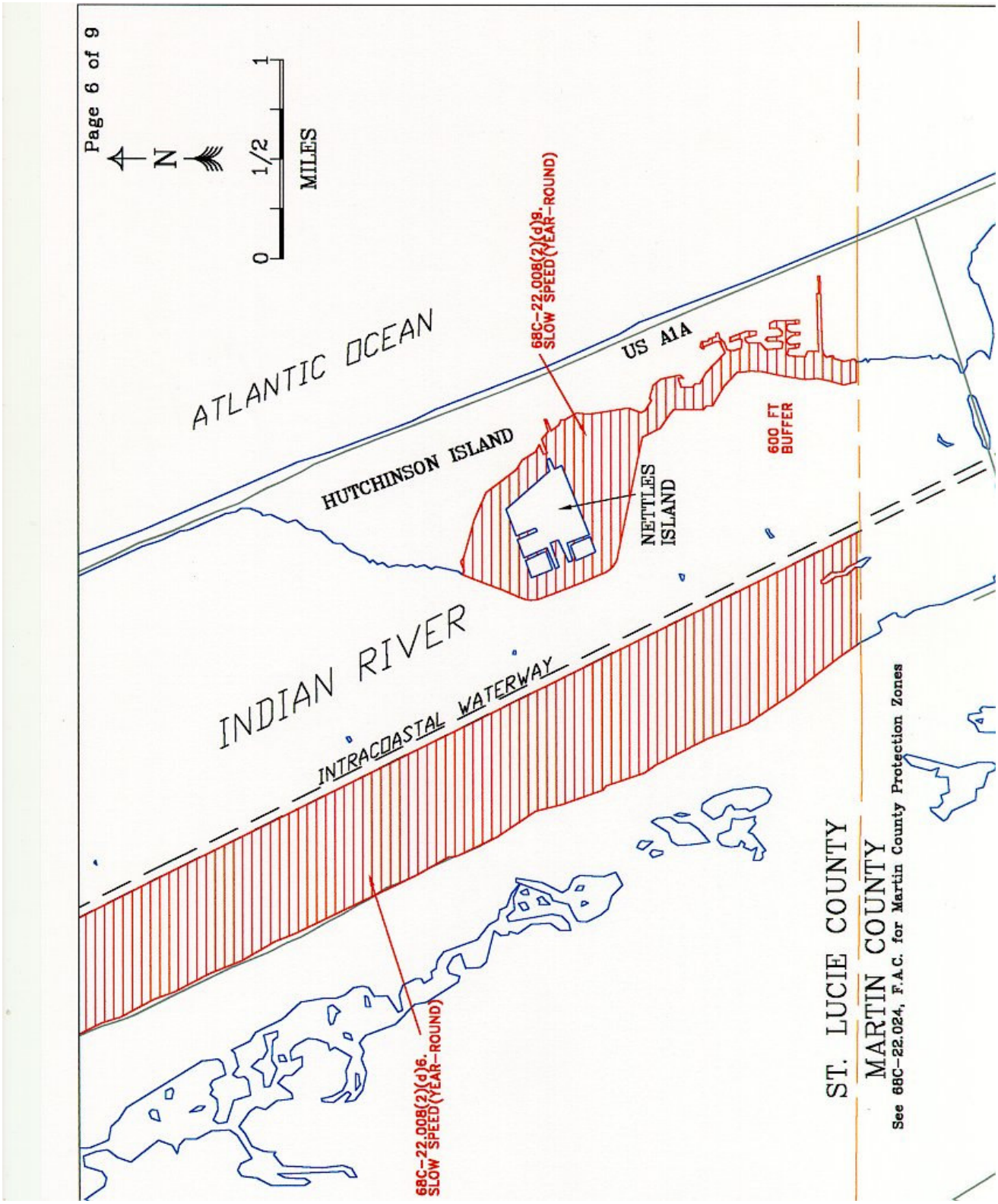
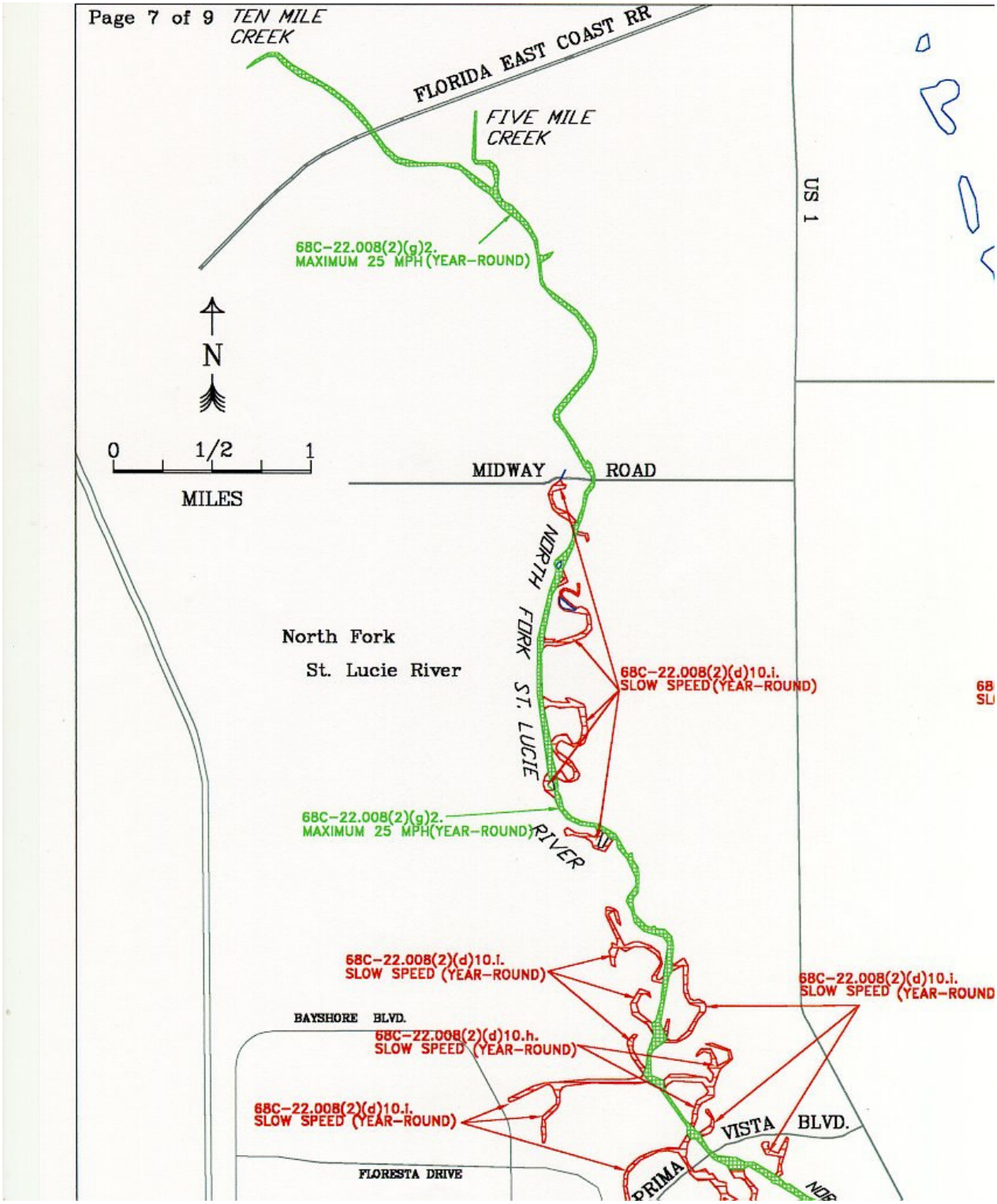
1/2
1
MILES
LITTLE MUD CREEK
68C-22.008(2)(c)6. IDLE SPEED (YEAR-ROUND)
68C-22.008(2)(d)8. SLOW SPEED (YEAR-ROUND)
US A1A
BLIND CREEK
BIG MUD CREEK
68C-22.008(2)(c)7. IDLE SPEED (YEAR-ROUND)
HERMAN BAY POINT
HERMAN BAY
INDIAN RIVER
68C-22.008(2)(d)6. SLOW SPEED (YEAR-ROUND)


Page 6 of 9
N
0
1/2
1
MILES
ATLANTIC OCEAN
US A1A
68C-22.008(2)(d)9.
SLOW SPEED(YEAR-ROUND)
600 FT
BUFFER
HUTCHINSON ISLAND
NETTLES
ISLAND
INDIAN RIVER
INTRACOASTAL WATERWAY
68C-22.008(2)(d)6.
SLOW SPEED(YEAR-ROUND)
ST. LUCIE COUNTY
MARTIN COUNTY
See 68C-22.024, F.A.C. for Martin County Protection Zones


Page 7 of 9
TEN MILE CREEK
FLORIDA EAST COAST RR
FIVE MILE CREEK
US 1
68C-22.008(2)(g)2.
MAXIMUM 25 MPH (YEAR-ROUND)
N
0
1/2
1
MILES
MIDWAY ROAD
NORTH FORK ST. LUCIE RIVER
North Fork
St. Lucie River
68C-22.008(2)(d)10.i.
SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(g)2.
MAXIMUM 25 MPH(YEAR-ROUND)
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SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(d)10.i.
SLOW SPEED (YEAR-ROUND
BAYSHORE BLVD.
68C-22.008(2)(d)10.h.
SLOW SPEED (YEAR-ROUND)
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SLOW SPEED (YEAR-ROUND)
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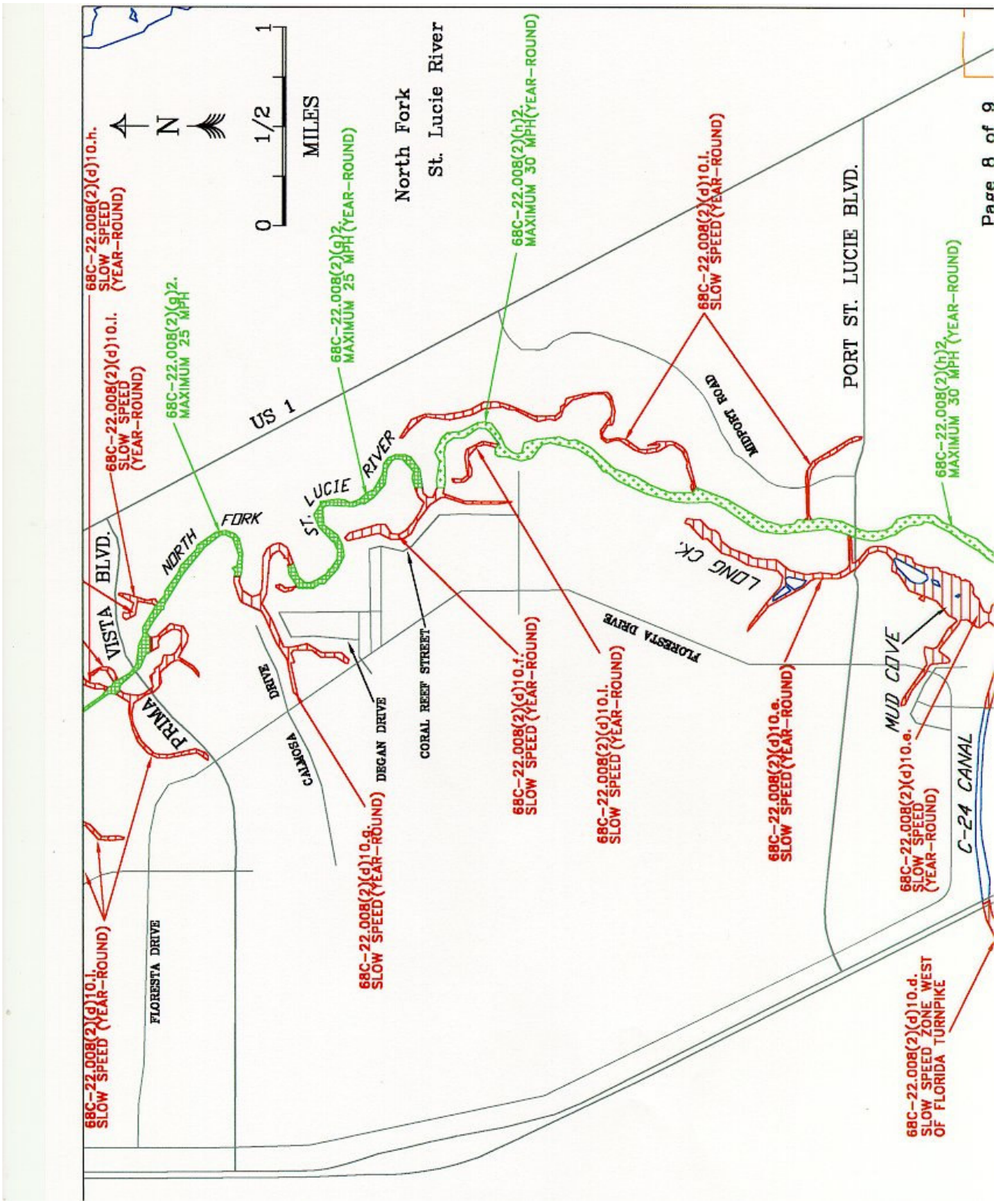
FLORESTA DRIVE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(YEAR-ROUND)
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SLOW SPEED
(YEAR-ROUND)
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MAXIMUM 25 MPH
68C-22.008(2)(g)2.
MAXIMUM 25 MPH (YEAR-ROUND)
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MAXIMUM 30 MPH (YEAR-ROUND)
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SLOW SPEED (YEAR-ROUND)
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MAXIMUM 30 MPH (YEAR-ROUND)
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SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(d)10.g.
SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(d)10.i.
SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(d)10.i.
SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(d)10.e.
SLOW SPEED (YEAR-ROUND)
68C-22.008(2)(d)10.e.
SLOW SPEED
(YEAR-ROUND)
68C-22.008(2)(d)10.d.
SLOW SPEED ZONE WEST
OF FLORIDA TURNPIKE
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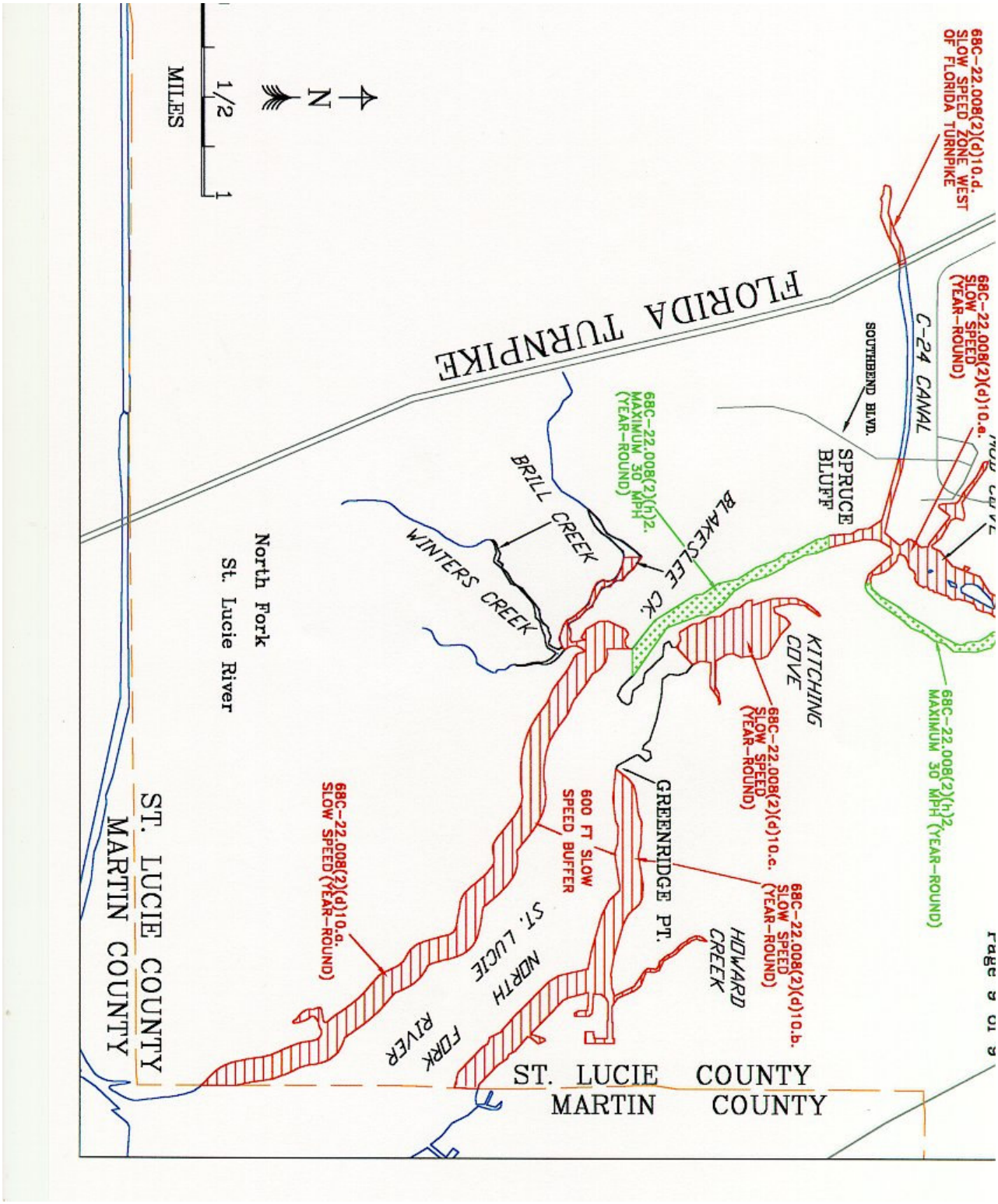
MILES
North Fork
St. Lucie River
US 1
ST. LUCIE RIVER
NORTH FORK
VISTA BLVD.
PRIMA VISTA BLVD.
FLORESTA DRIVE
CALMOSA DRIVE
DEGAN DRIVE
CORAL REEF STREET
FLORESTA DRIVE
LONG CK.
MUDPORT ROAD
PORT ST. LUCIE BLVD.
MUD COVE
C-24 CANAL
Page 8 of 9


68C-22.008(2)(d)10.d.
SLOW SPEED ZONE WEST
OF FLORIDA TURNPIKE
68C-22.008(2)(d)10.e.
SLOW SPEED
(YEAR-ROUND)
FLORIDA TURNPIKE
C-24 CANAL
SOUTHBEND BLVD.
SPRUCE
BLUFF
68C-22.008(2)(h)2.
MAXIMUM 30 MPH
(YEAR-ROUND)
BRILL CREEK
WINTERS CREEK
BLAKESLEE CK.
KITCHING
COVE
68C-22.008(2)(h)2.
MAXIMUM 30 MPH (YEAR-ROUND)
68C-22.008(2)(d)10.c.
SLOW SPEED
(YEAR-ROUND)
68C-22.008(2)(d)10.b.
SLOW SPEED
(YEAR-ROUND)
GREENRIDGE PT.
600 FT SLOW
SPEED BUFFER
HOWARD
CREEK
68C-22.008(2)(d)10.c.
SLOW SPEED (YEAR-ROUND)
NORTH FORK
ST. LUCIE
RIVER
North Fork
St. Lucie River
ST. LUCIE COUNTY
MARTIN COUNTY
ST. LUCIE COUNTY
MARTIN COUNTY
N
1/2
1
MILES

APPENDIX C

Components of County and Municipal Government Comprehensive Plans Affecting Manatee Habitat

Components of County and Municipal Government Comprehensive Plans Affecting Manatee Habitat

St. Lucie County's Comprehensive Plan was initially developed and adopted in 1990. Two elements of the Comp Plan include information pertinent to the protection of manatees and their habitat:

- Chapter 7 - Coastal Management Element
- Chapter 8 - Conservation Element

Chapter 7 – Coastal Management Element

The Coastal Management Element of St. Lucie County's Comp Plan was initially adopted on January 9, 1990. Modifications to this element are currently undergoing development and will soon be available for public review and comment. The information that follows is based on the review of the current version of Chapter 7.

The Coastal Management Element begins with descriptive information concerning the county's coastal area, including its natural resources, existing land use, archeological and historical resources. It then describes estuarine pollution, the beach and dune system, natural disaster planning, public access, coastal access infrastructure and coastal planning efforts. After identification of significant issues, which include seagrasses and threatened and endangered species, the Plan then identifies various goals, objectives and policies concerning coastal resources. Specific goals, objectives and policies that relate to the protection of manatees and/or their habitat include:

Goal 7.1 Balancing Growth and Coastal Resources

- Objective 7.1.1 Future Development in the Coastal Area
  - Policy 7.1.1.1 Development limited to uses compatible with the environmental characteristics
  - Policy 7.1.1.2 Consistency with other Ordinances (e.g., Mangrove Protection)
  - Policy 7.1.1.3 Erosion Control cannot interfere with natural resources
  - Policy 7.1.1.4 Implementation of the Hutchinson Island Plan
  - Policy 7.1.1.5 Future development and re-development shall be consistent with coastal resource protection
  - Policy 7.1.1.6 Coordination with state agencies concerning Aquatic Preserves
- Objective 7.1.2 Protecting Wetlands and Wildlife Habitat
  - Policy 7.1.2.3 Develop Land Development Regulations requiring a minimum 50 foot buffer zone adjacent to rivers, creeks and estuaries
  - Policy 7.1.2.4 Establishes boundaries of buffers zone based on water frontage
  - Policy 7.1.2.5 Assess mosquito impoundments to enhance environmental value
  - Policy 7.1.2.6 Prevent degradation of wetlands due to changes in quality and quantity of water inflow
  - Policy 7.1.2.7 Develop Land Development Regulations concerning wetland mitigation

    - Policy 7.1.2.8 Evaluate remedies for riverfront erosion
- Objective 7.1.3 Protection of Living Marine Resources
    - Policy 7.1.3.2 Enact regulations to protect manatees
    - Policy 7.1.3.3 Consider cumulative impacts of development on wetlands
    - Policy 7.1.3.4. Evaluate the need to monitor seagrasses
    - Policy 7.1.3.5 Coordinate with State of Florida to protect reefs and seagrass beds
    - Policy 7.1.3.6 Map and protect nearshore reefs
    - Policy 7.1.3.7 Management of spoil islands
    - Policy 7.1.3.8 Seek designation of nearshore reefs as federal marine sanctuaries
    - Policy 7.1.3.9 Identify coastal areas that provide habitat for endangered and threatened species
    - Policy 7.1.3.10 Evaluate alternative sand sources to minimize impacts on natural reefs
- Objective 7.1.4 Estuarine Water Quality
    - Policy 7.1.4.1 Enact regulations to control stormwater discharges
    - Policy 7.1.4.2 Modify sewage treatment policies to protect water quality
    - Policy 7.1.4.3 Prohibit new causeways across the Indian River Lagoon
    - Policy 7.1.4.4 Prohibit discharges to surface waters
    - Policy 7.1.4.5 Place dredged material on uplands
    - Policy 7.1.4.6 Develop a plan to collect, treat and dispose effluent from developments on barrier islands
    - Policy 7.1.4.7 Coordinate with watershed committees to establish an Indian River Lagoon Planning Task Force to protect resources and identify areas for development
    - Policy 7.1.4.8 Enact regulations to prohibit shoreline alteration that degrades estuarine productivity
    - Policy 7.1.4.9 Prioritize sources of water pollution not being addressed by others
    - Policy 7.1.4.10 Address other pollution problems
- Objective 7.1.7 Enact regulations concerning water-dependent shoreline development
    - Policy 7.1.7.1 Adopt criteria for marina siting and land use
    - Policy 7.1.7.3 Develop a marina siting element
    - Policy 7.1.7.4 Enact regulations to protect citizens and natural resources

Goal 7.3 Providing Public Access to oceanic, estuarine and riverine coastal resources

- Objective 7.3.1 Implement a public access program to prevent a net loss of access to public beaches, lagoon and rivers
    - Policy 7.3.1.1 Enact regulations to maintain existing public access
    - Policy 7.3.1.2 Enact regulations to require fishing catwalks on all new or replacement bridges over the Indian River Lagoon
    - Policy 7.3.1.3 Enact regulations requiring parking and access to state and county roads
    - Policy 7.3.1.4 Enact regulations establishing criteria for acceptance of shoreline lands suitable for use as public access facilities
    - Policy 7.3.1.5 Conduct a study to determine areas along State Road A1A suitable for parking or access to water

- Policy 7.3.1.6 Conduct a study to determine preferred locations for additional boat ramps
- Policy 7.3.1.7 Identify locations for new marinas and expansion of existing marinas

Goal 7.4 Provide Adequate and Available Public Facilities to residents and visitors to the County's Coastal Area

- Objective 7.4.1. Ensure appropriate Level of Service standards are considered during the review process for proposed development
  - Policy 7.4.1.1 Enact regulations that prohibit use of public funds for development in coastal high hazard areas, (with conditions)
  - Policy 7.4.1.5 Enact regulations which limit future development based on the capacity of sewer service
  - Policy 7.4.1.7 Identify drainage systems operating below the established Level of Service and then identify and implement a plan to address these inadequacies

Chapter 8 – Conservation Element

The Conservation Element of St. Lucie County's Comprehensive Plan was initially adopted on May 1991. Modifications to this element are currently undergoing development and will soon be available for public review and comment. The information that follows is based on the review of the current version of Chapter 8.

The Conservation Element begins with descriptive information concerning natural resources present in St. County, including its surface waters and wetlands, air, soil minerals, fisheries upland vegetative communities. It then describes wildlife, birds and species listed as endangered, threatened or of special concern. After identifying the potential for conservation, use or protection of natural resources, the Plan then identifies various goals, objectives and policies concerning these resources. Specific goals, objectives and policies that relate to the protection of manatees and/or their habitat include:

Goal 8.1 Protection, Appropriate use and conservation of natural resources

- Objective 8.1.2 Enact regulations which require the conservation and appropriate use, and protection of surface waters
  - Policy 8.1.2.1 Develop regulations to address stormwater management
  - Policy 8.1.2.2 Use SFWMD stormwater ordinance as a model for county regulations
  - Policy 8.1.2.3 Evaluate effectiveness of using innovative techniques to control mosquitoes
  - Policy 8.1.2.4 Request assistance from SFWMD in evaluating the feasibility of a reservoir to control inputs of fresh water and stormwater and conservation of water resources
  - Policy 8.1.2.5 Request review and comments from existing watershed committees on appropriate stormwater management initiatives
- Objective 8.1.3 Enact regulations which require the protection and maintenance of the 100-year floodplain
- Policy 8.1.3.1 Develop innovative programs to protect and maintain floodplains

- Policy 8.1.3.2 Develop a floodplain management handbook to improve implementation, monitoring and enforcement
- Policy 8.1.3.3 Conduct a study of floodplains to identify the most appropriate areas for acquisition
    - Policy 8.1.3.4 Request review and comments from existing watershed committees on appropriate floodplain management initiatives for unincorporated areas
    - Objective 8.1.4 Enact regulations which require the conservation and protection of wetlands
        - Policy 8.1.4.1 Require wetland and water budgets be provided with plans for development
        - Policy 8.1.4.2 Develop criteria for evaluation of proposed wetland alteration and mitigation
        - Policy 8.1.4.3 Require a minimum 50 foot setback along rivers, creeks and estuaries
        - Policy 8.1.4.4 Require a buffer zone of native upland vegetation around preserved wetlands
        - Policy 8.1.4.5 Coordinate with state, regional and federal governmental agencies concerning dredge and fill permitting
        - Policy 8.1.4.6 Include innovative techniques to protect and maintain wetlands
        - Policy 8.1.4.9 Identify and analyze wetland areas considered environmentally sensitive
    - Objective 8.1.8 Enact regulations which require the conservation and protection of ecological communities, wildlife and marine habitat
- Policy 8.1.8.2 Develop criteria for the protection of endangered and threatened plant and animal populations and the conservation of native habitat
- Policy 8.1.8.3 Allow transfer of development rights to direct development away from unsuitable lands
    - Objective 8.1.10 Enact land development regulations which address the conservation, appropriate use and protection of current and projected water sources
        - Policy 8.1.10.5 Request assistance from SFWMD in evaluating the feasibility of a reservoir to control inputs of fresh water and stormwater and conservation of water resources
    - Objective 8.1.11 Promote protection of managed conservation areas
        - Policy 8.1.11.1 Cooperate with the State of Florida in the management of their lands
        - Policy 8.1.11.2 Include the protection of natural reservations in land development regulations
    - Objective 8.1.12 Designate environmentally sensitive areas for conservation
        - Policy 8.1.12.1 Identify suitable sites in coordination with other state and federal governmental entities
        - Policy 8.1.12.2 Include protection of environmentally sensitive areas into all appropriate land development regulations
        - Policy 8.1.12.3 Cooperate with adjacent local governments to conserve, appropriately use or protect unique communities within more than one jurisdiction.

City of Ft. Pierce

The City of Ft. Pierce first adopted a Comprehensive Plan in 1979. Major revisions were made in 1990, and the City intends on seeking public review and comment on additional revisions that are expected to be released during 2001. Information concerning the protection of manatees and their habitat is found in two elements:

- Chapter 5 - Coastal Management Element
- Chapter 6 - Conservation Element

Chapter 5 – Coastal Management Element

The Coastal Management Element of the City's Comprehensive Plan begins with descriptive information concerning the city's coastal area, including its natural resources, existing land use, archeological and historical resources. It then describes estuarine pollution, the beach and dune system, natural disaster planning, public access, coastal access infrastructure and coastal planning efforts. After identification of significant issues, which include restoration of dune vegetation, addressing continued beach erosion and protection of threatened and endangered species, including manatees, the Plan then identifies various goals, objectives and policies concerning these coastal resources. Specific goals, objectives and policies that relate to the protection of manatees and/or their habitat include:

Goal 5.1 Increase the economic and social benefits associated with the Ft. Pierce Inlet and the Port Area while protecting and maintaining the coastal area natural resources.

- Objective 5.1.1 All future development shall preserve, protect or enhance natural resources
  - Policy 5.1.1.8 Shoreline alteration and construction which degrade existing estuarine productivity shall be prohibited.
  - Policy 5.1.1.9 Adopt regulations requiring appropriate natural vegetated buffers adjacent to the Indian River Lagoon system and its major tributaries
  - Policy 5.1.1.11 Develop environmentally conscious criteria for marina siting
  - Policy 5.1.1.13 Manage and preserve spoil islands as green areas
  - Policy 5.1.1.14 Coordinate with local interest groups to designate nearshore reefs in accordance with the Federal Marine Sanctuary Program.
  - Policy 5.1.1.15 Enact ordinances requiring marinas to develop hurricane evacuation plans.
  - Policy 5.1.1.16 Require mitigation for unavoidable wetland impacts
- Objective 5.1.2 Revise regulations to provide protection for species with special status
  - Policy 5.1.2.2 Require that new marinas provide a manatee protection plan. Establish boating speed limits, and post notices to advise and caution boaters in manatee congregating areas.
  - Policy 5.1.2.4 Protect sabellarid worm reefs
- Objective 5.1.3 Revise regulations to provide for maintenance or enhancement of water quality in the Indian River Lagoon

- Policy 5.1.3.1 Adopt or amend drainage regulations consistent with SFWMD and the State and prohibit new point sources of run-off for less than the 25-year storm event
- Policy 5.1.3.2 Continue toxicity testing on treated effluent from the FPUA sewage treatment plant
- Policy 5.1.3.3 Prohibit structures that constrict water circulation in the Indian River Lagoon.
- Policy 5.1.3.4 Prohibit unacceptable dumpings into ditches, stormwater conveyances and the Indian River Lagoon

- Objective 5.1.10 Maintain current levels and continue to develop programs to increase public beach, lagoon and river access.
  - Policy 5.1.10.1 Develop regulations which encourage the dedication of public access facilities
  - Policy 5.1.10.2 Accept donation of shoreline land suitable for use as public access facilities
  - Policy 5.1.10.3 Investigate governmental, public and private programs for the purchase of public lands
  - Policy 5.1.10.4 Ensure that all publicly-funded projects within the City provide access to the shoreline
- Objective 5.1.12 Assist in enforcing federal, state and regional governmental regulations to improve water quality in the Indian River Lagoon.
  - Policy 5.1.12.1 Report all identified point-source polluters to the appropriate governmental entity
  - Policy 5.1.12.2 Ensure that federal, state and City approvals are issued prior to the construction of all residential docks
  - Policy 5.1.12.3 Adopt appropriate drainage regulations
  - Policy 5.1.12.4 Request that TCRPC convene an Indian River Lagoon Planning Task Force which shall include representatives from the state, RPC, counties and municipalities
  - Policy 5.1.12.5 Condition development permits to require compliance with applicable state, federal and local drainage system requirements
  - Policy 5.1.12.6 Become an active participant in a county-wide drainage advisory board
  - Policy 5.1.12.7 Meet with the Mosquito Control District (MCD) routinely to discuss improvements to the canal system
  - Policy 5.1.12.8 Condition projects that may affect MCD to obtain MCD approval
  - Policy 5.1.12.9 Condition building permits to require compliance with applicable local, state and federal requirements for on-site wastewater treatment systems
  - Policy 5.1.12.10 Cooperate with the Port of Ft. Pierce to implement the City's Future Land Use Element and the Port's Master Plan

Chapter 6 - Conservation Element

The Conservation Element of the City's Comprehensive Plan begins with descriptive information concerning the city's natural resource features, including its wetlands, soils,

floodplains, drainage basins and mineral resources. It then describes air and water pollution, and provides information concerning water/wastewater mass balance and projected water demands. After identification of significant issues, which include the effects of sea level rise, pollution of surface waters and development of lands adjacent to preserves, the Plan then identifies various goals, objectives and policies concerning these resources. Specific goals, objectives and policies that relate to the protection of manatees and/or their habitat include:

Goal 6.1 Preserve or manage natural resources to ensure their protection and maximize their functions and values.

- Objective 6.1.2 Manage surface and sub-surface water resources to ensure their viability as natural habitats and utility for recreation and potable water uses.
  - Policy 6.1.2.1 Review and revise drainage regulations to ensure Best Management Practices are required
  - Policy 6.1.2.2 Amend, adopt and implement regulations that regulate activities in wetlands and require mitigation for wetlands impacted
  - Policy 6.1.2.3 Cooperate with federal, state and regional governmental entities to ensure compliance with dredge and fill permitting processes
  - Policy 6.1.2.4 Require buffer zones of native vegetation be preserved or constructed in and around wetlands, retention areas and deepwater habitats
  - Policy 6.1.2.5 Ensure adequate provision of potable water and sanitary sewer services for residents and businesses within planned urban service areas
  - Policy 6.1.2.6 Require that all new developments meet surface water and storm water management criteria as established by the State and WMD
  - Policy 6.1.2.7 Implement a water quality monitoring program for drainage canals
- Objective 6.1.4 Adopt provisions to control soil erosion
  - Policy 6.1.4.1 Use Soil and Water Conservation District guidelines to minimize soil erosion
  - Policy 6.1.4.2 Amend, adopt and implement regulations that incorporate topographic, hydrologic and vegetative cover factors in the site plan review process
- Objective 6.1.5 Identify all ecological communities and wildlife, especially endangered and rare species and develop programs to manage and protect them
  - Policy 6.1.5.1 Amend, adopt and implement regulations to require protection of endangered an threatened plants and animals and preserve their habitat; require removal of invasive exotic vegetation and require that woody vegetation of a significant size is preserved or replaced
  - Policy 6.1.5.2 Investigate innovative techniques such as transfer of development rights to direct development away from unsuitable lands
  - Policy 6.1.5.3 Require that development orders be issued only if the conservation of wildlife and natural systems is compatible with the Comp Plan
  - Policy 6.1.5.4 Coordinate with adjacent governmental entities to protect environmentally sensitive areas that cross jurisdictional boundaries
  - Policy 6.1.5.5 Continue participation in the Conservation and Recreational Lands Program and others to ensure designation and protection of environmentally sensitive lands

City of Port St. Lucie

The City of Port St. Lucie is currently operating under a Comprehensive Plan last revised in 1991. Information concerning the protection of manatees and their habitat is found in the Conservation and Coastal Management Element of the Comp Plan.

The Conservation and Coastal Management Element of the City's Comprehensive Plan begins with descriptive information concerning the city's environmental setting and coastal planning areas, including the Indian River Lagoon and the North Fork of the St. Lucie River. It then provides information on land use within these areas, describes hurricane evacuation and coastal high hazard areas and coastal planning area infrastructure. After identification of natural resources, hazardous waste and water use, the Plan then identifies and summarizes significant issues, after various goals, objectives and policies concerning these resources are identified. Specific goals, objectives and policies that relate to the protection of manatees and/or their habitat include:

Goal 5.1 Maintain and enhance social and economic resources through regulation of development activities that would damage or destroy such resources

- Objective 5.1.1 Review and revise regulations which pertain to shoreline use, giving priority to water-dependent uses
  - Policy 5.1.1.1 Review and revise the criteria for the prioritization of shoreline uses
- Objective 5.1.2 Continue to protect estuarine beaches and shoreline vegetation
  - Policy 5.1.2.1 Continue to enforce regulations which prohibit the alteration of estuarine beaches and require restoration of degraded beaches
- Objective 5.1.6 Increase access where possible and prevent the loss of the amount of public access to lagoon or river shorelines and coastal resources consistent with estimated public needs
  - Policy 5.1.6.1 New development shall maintain existing public access to the Indian River Lagoon or North Fork
- Objective 5.1.6 .2 The City, with St. Lucie County shall prioritize new park purchases and park development with emphasis on parks that provide access to coastal waters
  - Policy 5.1.6.3 Complete a study to identify the most appropriate locations for additional boat ramps, marinas and other water-dependent uses and revise regulations as necessary

Goal 5.2 Conserve, protect and manage natural resources in a manner which maximizes their functions and purposes

- Objective 5.2.2 Complete an analysis to conserve, appropriately use and protect the quality and quantity of current and projected water sources and waters that flow into estuarine waters or oceanic waters to maintain or improve water quality
  - Policy 5.2.2.1 Examine measures to monitor and reduce water consumption by 10 percent within 10 years
- Objective 5.2.3 Review and revise regulations as needed to conserve, appropriately use and prot4ect the environmental quality and living marine resources of estuarine waters
  - Policy 5.2.3.1 Consider revisions to the public interest test when development results in alteration to the natural resource

- Policy 5.2.3.2 Prohibit alteration and construction which degrades existing estuarine productivity unless such alteration is in the public interest.
- Policy 5.2.3.3 Consider revisions to existing marina siting criteria to better address regional and state resource protection standards
- Policy 5.2.3.4 Retain river islands to serve as green areas, bird roosting, nesting, and feeding areas and, when appropriate, water-oriented recreation areas
- Policy 5.2.3.5 Review, revise and continue to enforce regulations which prohibit new point sources of run-off from discharging into the Indian River Lagoon and North Fork for less than the 25-year storm event and prohibit structures which constrict water circulation
- Policy 5.2.3.7 Update master drainage plans and programs that examine quality and quantity of stormwater and prioritize improvements

- Objective 5.2.5 Review and Revise existing natural resource protection regulations regarding conservation, appropriate use and protection of fisheries wildlife, wildlife habitat, marine habitat and native vegetative communities, including forests and wetlands
  - Policy 5.2.5.2 Implement guidelines to allow for purchase and management of preservation areas
  - Policy 5.2.5.3 Review existing measures for species identification and protection to ensure requirements exist for site surveys prior to development and management plans for identified species
  - Policy 5.2.5.4 Prohibit the development of marinas in designated manatee critical habitat
  - Policy 5.2.5.5 Work with St. Lucie County and the Manatee Advisory Committee to designate special manatee habitats
  - Policy 5.2.5.6 Review, revise and continue to enforce regulations that protect native vegetative communities
  - Policy 5.2.5.8 Examine the ability of the site plan review process to implement the requirements of existing natural resource protection standards
  - Policy 5.2.5.9 Review, revise and continue to enforce regulations which require a buffer zone of native upland vegetation around wetland and deepwater habitats
  - Policy 5.2.5.10 Require submission of comments from appropriate agencies to the City prior to dredge and fill permit issuance

Policy 5.2.5.11 Continue to coordinate with adjacent local governments to conserve, appropriately use, or protect unique vegetative communities located in more than one jurisdiction