

**EXHIBIT 3**

PROPOSED AMENDMENT TO THE BROWARD COUNTY COMPREHENSIVE  
PLAN (SUPPORT DOCUMENT)

CONSERVATION ELEMENT

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**(MPPC)**

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### **LIST OF DEFINITIONS**

**1:100** – ratio between boat slip count and shoreline length. This ratio represents typical single-family density, or one slip for every one hundred feet of shoreline owned or controlled by the applicant. This ratio is frequently applied to permitting of dock construction by the State of Florida in key counties without a Manatee Protection Plan.

**Anchorage** – in-water vessel storage activity either by anchor or fixed mooring device without an associated dock or physical boat slip. (Source: Sarasota MPP, Sept. 2003)

**Application Fee** <sup>(tpq1)</sup> – the non-refundable, partial payment of the new slip fee which is due at time of application for an Environmental Resource License to construct, reconfigure, or modify the number of existing slips at a marine facility if the post-construction number of slips will be greater than five.

**Area of Special Concern** – areas of particular importance to manatees, including those areas with documented high use, high death, or represents an important travel corridor between warm water refuges. These areas are depicted in Figure 3, and are known as Port Everglades, South Fork New River, Dania Cutoff Canal Middle/C-10, and Dania Cutoff Canal West.

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**As-built drawing** [tpq2] – post construction drawings which document how the facility was built in relation to the license and must be signed and sealed by a professional engineer or professional land surveyor registered in the State of Florida.

**Boat** – a watercraft propelled by sails or one or more electric or internal combustion engine(s). A boat may refer to any size vessel ranging from a personal watercraft to freighters or cruise ships. A boat shall not be considered a recreational vehicle even though it has facilities for temporary living quarters. For purposes of this plan, the word “boat” does not include canoes or kayaks. (Source: Sarasota MPP)

**Boat or Marine Facility** – a public or private structure or operation where boats are moored and/or launched, including commercial, recreational, private, governmental, residential marinas, and boat ramps. A dry storage facility is considered a boat facility if the dry storage facility has the capability of launching vessels into adjacent waters or water access is provided adjacent to the project. Facilities such as long-term boat storage lots, boat yards, or boat dealership lots that do not have direct water access will not be considered boat facilities. For the purposes of this plan, coastal waterfront single-family residence and coastal waterfront multi-slip facilities with less than five (5) slips are not considered a marine facility.

**Boat/Manatee Overlap** – the use of a particular waterway by both manatees and boats. The amount of overlap refers to the probability or likelihood of adverse boat and manatee interactions (such as collisions, crushing, injury or harassment) in a waterway, as a result of boat and manatee use of the same waterways. (Source: FWC)

**Boat Ramp** – a fixed, structural, man-made or altered natural feature that facilitates the launching and landing of boats from land into a water body. (Source: FWC)

**Class III Waters** – those surface waters of the State of Florida that have been classified as recreation, propagation, and maintenance of a healthy well-balanced population of fish and wildlife. (Source: Broward County 1997 Comprehensive Plan and FWC)

**Coastal Waters** – portion of Broward County’s tidally influenced waterways which have navigable access to oceanic waters and which lie east of the salinity control structures.

**Commercial Marina** [tpq3] – a boat facility constructed and used for the purpose of sale, lease, or rent of boat dockage (dry storage or wet slips) for profit. This type of marina may be owned by private or governmental entities. (Source: Broward County 1997 Comprehensive Plan and FWC)

**Critical Habitats** – any federally designated areas which, pursuant to the Endangered Species Act of 1973, have been determined by the federal government to include physical and/or biological features that are essential to the survival of an endangered species (such as the

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manatee), which may require special management considerations or protection. (Source: Broward County 1997 Comprehensive Plan and FWC<sup>[tpq4]</sup>)

**Dock**<sup>[tpq5]</sup> – a facility, such as, but not limited to, piers, walkways or other structures, that are constructed within a waterward area and is for the purpose of mooring a vessel. (Chapter 27, Article I, Section 27.332)

**Dry Storage Facility** – an upland structure, upland parking or space used for storing watercraft. A dry storage facility is considered a boat facility if the dry storage facility has an associated capability of launching vessels into water, even if that launching point is offsite. Facilities that do not represent daily in/out facilities, however, such as boat storage for boat dealerships or long term, non-use storage (at least six months), are not considered to contribute significantly to boat traffic and therefore are not subject to the Manatee Protection Plan. (Source: Sarasota MPP and FWC)

**Environmental Resource License (ERL)** – <sup>[tpq6]</sup>an approval issued by EPGMD for activities involving dredging and filling an aquatic resource, wetland alteration, mangrove alteration or mitigation banking.

**Essential Habitat** – any land or water area constituting elements necessary to the survival and recovery of the manatee population from endangered status, which may require special management considerations and protective measures. The constituent elements include, but are not limited to: space for individual and population growth and for normal behavior; available food sources with adequate water depth and quality; warm and fresh water sources; sites for breeding and rearing of offspring; and habitats protected from disturbances that are representative of the geographical and seasonal distribution of the species. Essential Habitat is a criterion for determining areas where marine-related facilities should be limited. (Source: Broward County 1997 Comprehensive Plan)

**Existing Boat/Marine Facility** <sup>[tpq7]</sup>– a boat facility that is permitted and/or authorized, or legally in operation as of the effective date of this plan. Only property owned or controlled by the facility and licensed or developed as of the effective date of this plan will be considered “existing”.

**Good Faith Application** – When an Environmental Resource License application has reached a point in the process wherein County staff has determined that the applicant has provided sufficient proof of ownership in addition to satisfactorily providing any water quality analysis, sediment and soil analysis, natural resource survey to accurately characterize the project site conditions, and appropriate application fee has been paid<sup>[tpq8]</sup>.

**Idle Speed Zone** – a speed-regulated area in which vessels create no wake and are not permitted to proceed at a speed greater than that necessary to maintain steerageway of the vessel. [While

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operating in an idle speed zone, all vessel operators shall exercise a high degree of care for manatee presence.] (Source: FWC)

**Linear Shoreline** – the mean high water line in tidally influenced areas and the ordinary high water line along waterways that are not tidally influenced. This definition shall not apply to shorelines artificially created through dredge and fill activities (such as boat basins or canals) after the effective date of the plan. Such artificially created shorelines must have received all the proper permitting authorization required at that time. Shoreline along man-made ditches (such as mosquito control, flood control ditches, etc.) shall not qualify as linear shoreline, regardless of their date of construction unless there is documentation of regular navigation use existing prior to July 1, 2004. Linear shoreline shall be calculated (with a precision of at least to the hundreds of feet) using survey quality aerial photographs or by accurate field survey. The calculation of linear shoreline is based upon shoreline that is owned or legally controlled by the applicant. (Source: FWC)

**Long Term Boat Storage Facility** – facility that only provides storage for vessels that will not be used for long periods of time (at least six months). Boats are typically stored in these facilities seasonally and are not used when they are in storage. The vessels are typically “winterized” and are moved to other facilities when brought out of storage to be used. These facilities were not counted in this plan. (Source: FWC)

**Manatee Mitigation Fee** <sup>[tpq9]</sup> – the annual fee required from all facilities with five or more slips. A Marine Facility Operating License will be issued upon payment of this fee.

**Mega-Yacht** – any motor vessel greater than eighty (80) feet in length.

**Mooring** – a location where one vessel is typically stored or accommodated when not in use. Types of moorings include anchorages, beached or blocked, dry stack, hoist, ramp, seawall, trailer, floating platforms, davits, boat lifts, or wet slip. (Source: Sarasota MPP)

**Multi-family Residence** <sup>[tpq10]</sup> – a building having a roof and outer walls not entirely separated from any other structure by space, and occupied by multiple families on a single lot.

**Multi-slip Docking Facility** <sup>[tpq11]</sup> – any dock which includes more than one boat slip.

**New Slip Fee** – the <sup>[tpq12]</sup>payment required for each new proposed slip above the historical number of slips at a marine facility.

**Permanent Use** – commercial, residential or private boat facilities that include wet or dry slips, moorings or spaces for the storage of vessels. (Source: FWC)

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**Port Uses** – freight terminals or berthing for large vessels (>100’), including ancillary vessels required for Port operations. (Source: FWC)

**Powerboat** – a vehicle designed for operation as a watercraft propelled primarily by motor, (one or more electric or internal combustion engine(s)). Vessels that have two main propulsion systems (power and sail) shall be defined as powerboats. (Source: FWC)

**Refuge** – a manatee protection area in which the U.S. Fish and Wildlife Service has determined that certain waterborne activities would result in the taking of one or more manatees, and that certain waterborne activities must be restricted to prevent the taking of one or more manatees, including but not limited to taking by harassment. (Source: Broward County 1997 Comprehensive Plan and FWS)

**Residential Docking Facilities** – docks and wet slips provided for the sole use of the residents of a residential land use/development adjacent to a coastal water body. These facilities may be for single family or multi family use. (Source: Broward County 1997 Comprehensive Plan)

**Roll-On/Roll-Off (Ro/Ro)** – containers and cargo rolled or driven on and off transport ships. (Source: Broward County 1997 Comprehensive Plan)

**Sanctuary** – a manatee protection area in which the U.S. Fish and Wildlife Service has determined that any waterborne activity would result in the taking of one or more manatees, including but not limited to taking by harassment. Sanctuaries are areas reserved exclusively for manatees, where they may conduct activities such as breeding, nursing, and resting, free from any harassment by humans. (Source: Broward County 1997 Comprehensive Plan and FWS)

**Single-family Dock** – a fixed or floating structure, including moorings, used for berthing buoyant vessels, accessory to a detached single family residence. (Sarasota MPP)

**Single-family Residence** – a building having a roof and outer walls entirely separated from any other structure by space, and occupied by members of a single family on a single lot. (Source: Broward County 1997 Comprehensive Plan and FWC)

**Slip** – a space designed for the mooring or storage of a single watercraft, which includes wet or dry slips, anchorage, beached or blocked, hoist, seawall, floating platforms, davits, boat lifts, or the number of parking spaces for boat ramps. Piers authorized only for fishing or observation are not considered wet slips. (Source: FWC)

**Slow Speed Zone** – a speed regulated area in which vessels are settled in the water, not plowing, with minimum wake. Slow speed also means no speed greater than that which is reasonable and prudent to avoid either intentionally or negligently annoying, molesting, harassing, disturbing, colliding with, injuring, or harming manatees. (Source: FWC)

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**Submerged Aquatic Vegetation (SAV)** – fresh, brackish or saltwater (seagrass) submerged vegetation that may be used by manatees for food. (Source: FWC)

**Transitory Uses** <sup>[tpq13]</sup> – boat facilities with docking for temporary uses (generally less than one day), including water-dependent public transportation, boat rental, restaurant and hotel docks.

**Travel Corridor** – a waterway through which manatees travel, either daily or seasonally, in order to reach feeding areas, sources of fresh or warm water, or other Essential Habitat areas. (Source: Broward County 1997 Comprehensive Plan and FWC)

**Warm Water Refuge** – a natural or man-made warm water habitat, which maintains a temperature equal to or greater than the minimum for manatees' survival (approximately 20° C or 68° F). (Source: Broward County 1997 Comprehensive Plan)

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### LIST OF ABBREVIATIONS

|               |  |
|---------------|--|
| <u>ACOE</u>   | <u>U.S. Army Corps of Engineers</u>  |
| <u>ASC</u>    | <u>Area of Special Concern</u>   |
| <u>BOCC</u>   | <u>Broward County Board of County Commissioners</u>  |
| <u>BFSP</u>   | <u>Boat Facility Siting Plan</u>   |
| <u>DCA</u>    | <u>Florida Department of Community Affairs</u>   |
| <u>EMLEG</u>  | <u>Enhanced Marine Law Enforcement Grant</u>   |
| <u>EPGMD</u>  | <u>Broward County Environmental Protection and Growth Management Department<br/>(formerly EPD)</u> |
| <u>ERL</u>    | <u>Environmental Resource License</u>  |
| <u>ERP</u>    | <u>Environmental Resource Permit</u>   |
| <u>FAC</u>    | <u>Florida Administrative Code</u>   |
| <u>FDEP</u>   | <u>Florida Department of Environmental Protection</u>  |
| <u>FDHSMV</u> | <u>Florida Department of Highway Safety and Motor Vehicles</u>                                     |
| <u>FIND</u>   | <u>Florida Inland Navigation District</u>  |
| <u>FPL</u>    | <u>Florida Power and Light Company</u>   |
| <u>FWC</u>    | <u>Florida Fish and Wildlife Conservation Commission</u>   |
| <u>FWRI</u>   | <u>Florida Fish and Wildlife Research Institute</u>  |
| <u>FWS</u>    | <u>U.S. Fish and Wildlife Service</u>  |
| <u>GIS</u>    | <u>Geographic Information System</u>   |
| <u>ICW</u>    | <u>Atlantic Intracoastal Waterway</u>  |
| <u>MAC</u>    | <u>Broward County Marine Advisory Committee</u>  |
| <u>MIASF</u>  | <u>Marine Industries Association of South Florida</u>  |
| <u>MPP</u>    | <u>Manatee Protection Plan</u>   |
| <u>NOAA</u>   | <u>National Oceanic and Atmospheric Administration</u>   |



## CONSERVATION ELEMENT

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### I. INTRODUCTION

A. General. The purpose of the Conservation Element is to promote the conservation, wise use, and protection of Broward County's natural resources. The Conservation Element is a required element of the comprehensive plan as per Subsection 163.3177, Florida Statutes. The data and analysis presented in this element satisfy the requirements of Rule 9J[5.013, Florida Administrative Code. The goals, objectives, and policies of this element fulfill the requirements of Rule 9J[5.013(2), F.A.C. and Rule 9J[5.013(3), F.A.C..

Issues concerning conservation of natural resources are also addressed throughout this comprehensive plan. The Future Land Use Element provides implementation tools to preserve lands for conservation and promote appropriate land uses to minimize the impacts of development on the environment. The Transportation Element promotes strategies to improve air quality and protection of the port's coastal environment. The Infrastructure Element strives to ensure the provision of clean water, preservation of the sources of that water, and the safe efficient handling of wastewater and solid waste while protecting the County's air, water, and soil resources.

B. Service Area. The planning area for air resources is the South Florida Airshed which is comprised of the developed areas of Palm Beach, Dade, and Broward Counties as defined by the U.S. EPA. The planning area for water resources is the Lower East Coast Area of the Central and Southern Florida Flood Control System (C&SF) as defined by the South Florida Water Management District (SFWMD). For biological resources the planning area is the County.

Broward County Charter, Section 8.04, gives the Broward County Commission the authority to protect the County's environment by prohibiting or regulating air and water pollution and the destruction of natural resources. Therefore, the regulatory service area for this Element is considered to be the entire County to the extent that it addresses air quality, water quality, water quantity, and the protection of natural resources. Due to the fact that some state and federal agencies also have jurisdictional and operational responsibilities concerning the conservation and protection of natural resources in the County, efforts have been made to achieve consistency with the plans of those outside agencies.

C. Planning Horizon. The short term planning horizon is five years or 2012. The long-term planning is 10 years or 2018, ~~are the years 2005 through 2015~~. The planning horizon for the assessment of water needs and sources is the year 203015, ~~in accordance with the 2002 Growth Management Act~~.

D. Definitions. The following definitions are provided to assist in the reading of this Element. Sources of the definitions are provided in parentheses.

**Airshed** - an area of varying size that is dependent on a single air mass and that is uniformly

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affected by the same sources of air pollution. (Webster's New World Dictionary)

**Aquifer** - a stratum or formation of permeable material that will yield groundwater in useful quantities. (U. S. EPA)

**Aquifer Recharge** - the addition of water to the groundwater system by natural or artificial processes. (U. S. EPA)

**Channelization** - to straighten and deepen streams so water will move faster. (U. S. EPA)

**Community** - an assemblage of plants and animals living in a particular area or habitat. (Everglades Wildguide)

**Desalinization** - removing the salt from saline waters to produce potable water. (South Florida Regional Planning Council)

**Dissolved Oxygen** - a measure of the amount of oxygen available for biochemical activity in water. (U. S. EPA)

**Ecosystem** - the living and non-living components of the environment which interact or function together, including plant and animal organisms, the physical environment, and the energy systems in which they exist. All the components of an ecosystem are interrelated. (Florida Coastal Management Program)

**Endangered Species** - species whose numbers have declined to such a critically low level or whose habitats have been so seriously reduced or degraded that without active assistance their survival in Florida is questionable. (Rare and Endangered Biota of Florida)

**Estuary** - a semi-enclosed, naturally existing coastal body of water in which saltwater is naturally diluted by fresh water and which has a connection with oceanic waters, including bays, embayments, lagoons, sounds, and tidal streams. (Rule 9J-5, F.A.C.)

**Evapo-transpiration** - the transfer of water to the atmosphere by the combined processes of evaporation and plant transpiration. (U. S. EPA)

**Exotic Species or Exotics** - species not native to the region. (Fundamentals of Ecology)

**Groundwater** - subsurface water in the zone of saturation. (U. S. EPA)

**Hazardous Substance** - a substance that has one or more of the following characteristics: ignitable; corrosive; reactive; toxic. (Broward County Wellfield Protection Ordinance)

**Listed Animal Species** - means animal species listed as endangered, threatened, or of special

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concern by the Florida Fish and Wildlife Conservation Commission in Rule Chapter 68A-27, Florida Administrative Code.

**Natural Communities** - Natural Community means a community that is dominated by native plant species as described in the Florida Natural Areas Inventory publication, "Guide to the Natural Communities of Florida." A Natural Community generally possesses the following characteristics: the plant species composition includes most of the more common species typical of that natural community type; the community may contain small areas of exotic or invasive plants that could be easily controlled by prescribed burning or other forms of management; evidence of historical disturbance may be present but disturbance has not destroyed or prevented the re-establishment of a mature natural community type; and, the community is not substantially disturbed by recent human activities, except for such disturbance as low intensity forestry activities that allow the natural community to recover to previous conditions.

**Preserve** - to save from change or loss other than those caused by natural geological and evolutionary processes, and reserve for a special purpose. (Florida Coastal Management Program)

**Protect** - to save or shield from loss, destruction, or injury or for future intended use. (Florida Coastal Management Program)

**Rare Species** - species which, although not presently endangered or threatened are potentially at risk because they are found only within a restricted geographic area or habitat in the state or are sparsely distributed over a more extensive range. (Rare and Endangered Biota of Florida)

**Raw Water** - untreated potential drinking water. (U.S. EPA)

**Sheetflow** - large volumes of shallow water moving very slowly. (South Florida Regional Planning Council)

**Sole Source Aquifer** - the sole or principal drinking water source for an area which, if contaminated, would create a significant hazard to public health. (Safe Drinking Water Act of 1974)

**Species of Special Concern** - a species that does not clearly fit into the endangered, threatened, or rare categories yet which, for certain reasons, warrants special concern. (Rare and Endangered Biota of Florida)

**Storm Surge** - the increase in normal water levels, driven by high winds, near the area where the storm center makes landfall. (South Florida Region Hurricane Loss Study)

**Threatened Species** - species that are likely to become endangered within Florida in the

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foreseeable future if current trends continue. Includes species which may still be abundant, but are being subjected to serious adverse pressure throughout their range. (Rare and Endangered Biota of Florida)

**Toxic Substance** - a chemical or mixture that presents an unreasonable risk of injury to health or the environment. (Broward County Wellfield Protection Ordinance)

**Unconfined Aquifer** - an aquifer in which the water table defines the upper surface of the zone of saturation. (U. S. EPA)

**Understory** - assemblages of natural low-level woody, herbaceous, and groundcover species which exist in the area below the canopy of the trees. (South Florida Water Management District)

**Wetlands** - those areas that are inundated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce, or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps, and other similar areas. (Rule 9J-5, F.A.C.)

**Zone of Saturation** - the zone in which interconnected interstices are saturated with water under pressure equal to or greater than atmospheric. (U.S. EPA)

**Zones of Influence** - zones delineated by iso-travel contours around wellfields, within which toxic substances will be regulated to protect the quality of the groundwater. (Broward County Wellfield Protection Ordinance)

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### II. DATA REQUIREMENTS

#### A. Water Resources and Water Quality.

1. **Wetlands.** The Water Conservation Areas (WCA), 790 square miles in size, are part of the surviving remnants of the historical Everglades, which originally spread from Lake Okeechobee south to Florida Bay. The WCAs are located west of Route 27 and the Sawgrass Expressway outside the developable area of the county. The WCAs 2 and 3 were created as a result of the construction of levees as part of the Central and Southern Florida Flood Control Project (C&SF) and are a major wetland of great importance. The WCAs serve a variety of purposes, including providing fish and wildlife habitat; supporting fish & wildlife propagation, including nesting grounds for waterfowl; storing regulatory releases of water from WCA 1 in Palm Beach County; conveying controlled water supply releases from Lake Okeechobee to eastern Broward County, Miami-Dade County, and Everglades National Park; detaining and storing water during the wet season for water supply purposes during the dry season; preventing water from flooding eastern Broward County; recharging ground water; and filtrating and purifying water as it percolates into the aquifer or flows towards Florida Bay. (See Drainage/Natural Groundwater Aquifer Recharge Sub-Element).

In 1996, there were approximately 5,300 acres of wetlands existing in the area of Broward County east of the WCAs. Approximately 4,300 acres comprise the 3A/3B Seepage Management Area located between WCA 3 and U.S. Highway 27. Most of the remaining 1,300 acres of wetlands have been severely degraded as a result of growth and development activities. A minimal amount of acreage exists which is considered to be in pristine condition. Major types of wetlands found in the county are melaleuca, cypress, mangrove, and sawgrass. Appendix 13-D categorizes wetland types and acreage and Figure E of the Natural Resource Map Series depicts wetland boundaries. Additional planning efforts are under way to enhance the protection of the WCAs.

~~As part of the Comprehensive Everglades Restoration Plan, the SFWMD and the U.S. Army Corps of Engineers are in process of developing the Broward Water Preserve Area (WPA)~~ As part of the Comprehensive Everglades Restoration Plan, the SFWMD and the U.S. Army Corps of Engineers are in process of developing the Broward Water Preserve Area (WPA) which will consist of two surface water reservoirs (the C-9 and C-11 Impoundments) and the 3A/3B Seepage Management Area. The purpose of the Broward WPA is to increase the spatial extent of functional wildlife habitat in the project area, help re-establish the natural timing of water deliveries and hydropatterns to the Everglades while maintaining flood protection, and increase aquifer recharge for urban areas. Water stored in these wetlands and reservoirs should also reduce seepage through and under existing levees, thereby reducing loss of water from the WCAs.

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Broward County reaps many economic benefits from the protection of wetlands, particularly through the Water Conservation Areas. The continual processes of water filtration and purification as water percolates into the groundwater, especially the Biscayne Aquifer, translate into cost savings in terms of treatment levels required for potable water. Groundwater recharge is also valuable in terms of stemming the tide of saline intrusion, which results from the withdrawal of groundwater more quickly than it can be replaced. Saline intrusion can lead to expensive desalinization of potable water through processes such as reverse osmosis. Map 13-4 delineates areas of saline intrusion.

The natural ability of wetlands to absorb excess water during a flood provides an enormous financial value by protecting property and possessions, as well as unquantifiable benefits of protecting human life and societal well being. The abundance and diversity of wildlife and aquatic life found in wetlands attracts tourists in pursuit of recreational opportunities for fishing, birding, and boating, among others. Tourism can significantly bolster the economy through the influx of new dollars from outside the community. The wetlands of Broward County also have a broader economic impact in terms of contributions to the region as a whole. Maintenance of the Water Conservation Areas provides flood protection in Miami Dade County. The protection of the remaining Everglades assures a flow of water into Florida Bay, which, if the wetlands are performing the ecological functions they are supposed to will help ensure the biological productivity and diversity of the bay.

Alterations of existing wetlands may have an adverse environmental impact on the waters of Broward County and on the ecological functional values wetlands provide. The Environmental Protection and Growth Management Department (EPGMD) has administered a program to protect and preserve wetlands since 1993. Its purpose is to maintain the functions and values provided by aquatic and wetland resources so there will be no overall net loss and to strive for a net resource gain over present conditions. Adverse impacts must be regulated by avoidance as the first priority, minimization as a second priority, or mitigation as a third priority. Wetland resource alteration includes the dredging, filling, drainage, or flooding of jurisdictional wetland areas. A license must be issued by EPGMD prior to the alteration of wetlands. Decisions to issue licenses are made by evaluating the quality and condition of the wetland and deriving a numerical ranking of the wetlands importance.

There are many techniques for assessing wetland values. The best known are the U.S. Fish and Wildlife Service's Habitat Evaluation Procedure (HEP) and the U.S Army Corps of Engineer's Wetland Evaluation Technique (WET). Due to the limitations of these techniques, however, Broward County has established its wetland evaluation method. The Wetlands Benefit Index (WBI), codified in Chapter 27, Article XI. of the Broward County Code of Ordinances, is based upon 10 factors which include fish and wildlife values, hydrophyte dominance, intactness of wetland community, connectedness

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of surface water hydrology, connectedness of the location in the landscape, hydroperiod, soils, and habitat diversity. These 10 factors are used to develop a numerical ranking of wetlands, which range from 0.25 to 1.0. Conservation Element Policy 13.9.7. summarizes the key components of Broward County's Wetland Protection Ordinance and the WBI. It provides that property should be developed so that it avoids or minimizes, to the greatest degree practicable, wetlands. It provides that for wetlands with a WBI ranking of 0.80 or higher, there is a rebuttable presumption against development. This presumption could be overcome, for example, if application of the ordinance resulted in a taking of private property. If a wetland has a WBI below 0.80, then development can occur but the developer must mitigate or enhance, or both, wetlands to compensate for the loss of wetland functions.

2. **Rivers and Canals.** There are approximately 1,800 miles of ~~natural~~-waterways in the County. All the surface waters of the County are designated by the Florida Department of Environmental Protection as Class III waters. Class III waters have recreation and fish and wildlife propagation as the designated use. Class I waters have public water supply as the designated use. The Figure C of the Natural Resource Map Series shows all water features of Broward County.

Primary canals, maintained by the South Florida Water Management District, were originally constructed to provide drainage and flood protection in the low-lying areas of the Lower East Coast. Today, the operation of the primary canals has been expanded to aid in providing water supply, wetland rehydration, and mitigation of saltwater intrusion. These canals provide opportunities in some areas for recreational boating, canoeing, freshwater fishing, and water skiing. Water in the canals is replenished by rainfall, surface water runoff, and surface water discharges and groundwater seepages from Water Conservation Areas 3A and 3B. In drought conditions, local supplies can be supplemented by deliveries of water stored in Lake Okeechobee and transported via the canal system. However, during periods of water shortage, Lake Okeechobee may be unable to provide the necessary water deliveries, these deliveries may be able to meet the demand as was experienced during the drought conditions of the late 1980's and again in 2007. Water management operations and policies will limit future use of regional water deliveries for the purpose of providing recharge of urban canal systems. Water levels in Lake Okeechobee have been lowered by one foot due to concerns about the integrity of the 140-mile long Herbert Hoover Dike which surrounds the lake. This loss of storage capacity may reduce the amount of water that would otherwise be available for dry season deliveries, a condition likely to persist until rehabilitation of the Dike is completed in 2030. Furthermore, the Governing Board of the South Florida Water Management District adopted the Regional System Water Availability Rule in February 2007. This rule is designed to prevent increased urban reliance upon regional water resources, including the Everglades Water Conservation Areas, beyond levels measured prior to April 2006. Thus, alternative water sources will have to be developed to provide

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any recharge to urban areas in excess of this threshold. Primary canals are listed in Appendix 13 I.

The natural rivers of Broward County, listed in Table 13 I, formed the natural drainage system for the Eastern part of Broward County. These rivers originally handled any eastward flow from the Everglades and drainage from low ridges, flatwood areas, and the Coastal Ridge. With the exception of Whiskey Creek, the Tarpon River, and the Stranahan River, the natural rivers of the county have been incorporated in the primary canal system providing conveyance to tidewaters in the Intracoastal Waterway (ICW).

**TABLE 13-1  
NATURAL RIVERS**

| Rivers                         |                             |
|--------------------------------|-----------------------------|
| Middle River                   | South Fork of the New River |
| North Fork of the Middle River | Tarpon River                |
| South Fork of the Middle River | Stranahan River             |
| New River                      | Whiskey Creek               |
| North Fork of the New River    |                             |

3. **Bays and Lakes.** There are no water bodies classified as bays in Broward County. Lakes, the largest of which are West Lake, North Lake, and South Lake, are all located along or immediately west of the Intracoastal Waterway in the incorporated area. Most of the county's existing lakes are manmade, usually formed as a by-product of excavation or mining activity. There is, however, a natural fresh water lake called Bonnet Slough a portion of which lies within Hugh Taylor Birch State Recreation Area in Fort Lauderdale. There is also a small freshwater lake on the Bartlett Estate, a privately owned property along Fort Lauderdale's beachfront.

4. **Groundwater.** Two major aquifer systems underlie the eastern part of the county: the deep Floridan Aquifer System and the shallow Surficial Aquifer System. These aquifers are separated by the low permeability sediments of the Intermediate Aquifer System. The principal water bearing unit of the Surficial Aquifer System is the Biscayne Aquifer. The Biscayne Aquifer is a high quality aquifer, producing large quantities of water in eastern Broward. The Intermediate Aquifer System serves to restrict the flow of water between the Surficial Aquifer and the Floridan Aquifer Systems. This system does not yield significant quantities of water. The Floridan Aquifer System is present throughout the state and is the deepest part of the active ground water flow system on mainland Florida. The Floridan contains brackish water in Broward County which

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requires desalination in order to be used for either irrigation or potable uses. The City of Hollywood is currently the only Broward County municipality with a permitted Floridian well, with withdrawals approximating 1 million gallons per day. The Regional System Water Availability Rule adopted by the South Florida Water Management District in February 2007 restricts future withdrawals from the Biscayne Aquifer, currently the primary source of drinking water for Broward County and the entire Lower East Coast of the South Florida Water Management District's service area. As a result, local governments and other water providers will be required to develop alternative water supplies to satisfy water demands that exceed groundwater withdrawals measured prior to April 2006.

B. A. — Air Resources Quality. The air quality in Broward County is generally in the "good" range over 90% of the time and in the "moderate" range 10% of the time.

BC. Floodplain. Coastal and inland flooding continue to be integral aspects of Broward County's environment. Figure D of the Natural Resource Map Series shows existing floodplains and flood prone areas in the County. Appendix 13 I, is a list of flood zone designations in the county. "A" zones are areas expected to flood during a 100-year storm event. Approximately 85-90 percent of Broward County lies within an "A" zone. EPD, through its review and permit authority, requires floor area elevations to meet three-day, one hundred year design storm criteria. The EPGMD review also requires road crown elevations to be at or above the 10-year, 1-day design storm stage for local roads in the Unincorporated Area and County roads on the Functional Classification Map.

D. Commercially valuable minerals. Mining is a relatively minor commercial activity in Broward County accounting for only about 0.1 percent of the County's economy. Non-metallic minerals, mostly crushed limestone and gravel used in construction, account for the majority of the mining activity. This activity is declining as urban uses encroach into the areas previously limited to mining operations.

E. Soil associations and areas with soil erosion problems. Ten different soil associations are shown on Figure G of the Natural Resource Map Series. The western portion of the developable area is represented by the Hallandale-Margate and Lauderhill-Dania soil associations. These two (2) soil associations are characterized by nearly level, generally sawgrass marsh and are considered to be unsuitable for septic tank and drainfield use. The soils are organic and overlie limestone. In many places, the soils are shallow (between 40-60 inches). As areas are developed, organic soils are removed (demucking process) and fill, consisting of rock or sand, is deposited.

The central portion of the developable area consists of nearly level, grassy areas, interspersed with small ponds. The Immokalee, Immokalee-Pompano, and Duette

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Pomello soil associations are wet and sandy, underlain by limestone. This area is undergoing rapid urban development which requires the use of fill to raise surface elevations.

The eastern portion of the developable area is made up of sandy soils, some of which are poorly drained while other parts are excessively or well drained. Sandy soils include the Paola, St. Lucie, Palm Beach Beaches, and Dade soils associations. Since the installation of drainage structures, the area has been almost entirely developed for urban use.

The U.S. Department of Agriculture, Natural Resource Conservation Service, indicates that inland soil erosion is minimal except at construction sites. With 24 miles of ocean shoreline, coastal erosion whether caused by the natural flow of sand, storm/wave action or man made construction will always be a major concern for Broward County. (See Coastal Management Element for details on coastal erosion.)

### F. Natural Resource Areas.

1. **Recreationally important fish or shellfish.** Recreational fishing is one of the most important activities off the County coast. It is also important in the freshwater areas of the county inland, with fishing activities primarily ~~occurring~~ occurring in the Water Conservation Areas. Charter boats, drift boats, pleasure craft, tackle and bait businesses constitute a major part of the recreational fishing industry. A large variety of aquatic life is supported in the County's inland and offshore waters. Salt and freshwater catches include bass, sailfish, dolphin, mackerel, bluefish, amberjack, blackfin, tuna, and swordfish. The Florida Freshwater Fish and Game Commission regulates freshwater fishing in unincorporated Broward.

The aquatic environment also supports threatened and endangered species such as the West Indian Manatee which is an endangered mammal with an estimated total population of 750-850; 400-500 are estimated to live in waters on the Atlantic Coast.

Three endangered or threatened species of sea turtle nest in Broward County: Loggerheads (*Caretta caretta*), Atlantic Green Turtles (*Chelonia mydas*), and Atlantic Leatherbacks (*Dermochelys coriacea*). EPGMD's Sea Turtle Conservation Program involves delineating major nesting areas, identifying nests, and relocating endangered nests either to hatcheries or safer areas of the beach.

2. **Commercially important fish or shellfish.** Very little commercial fishing takes place in Broward County waters. Netting, fish traps, and bottom longlines are prohibited

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by the State. Commercial fishing and shellfishing has remained steady for several years with total catch for Broward County of 1.6 million pounds in 1994. Approximately fifty different species were reported.

3. **Wildlife.** Broward County consists of a variety of diverse ecological communities. Nine ecological communities have been identified and described by the Interpretive Section of the Parks and Recreation Division. Numerous species of plants and wildlife inhabit those communities including twenty species of endangered, threatened, or rare plants, mammals, birds, and reptiles. Listings of dominant plants and wildlife can be found according to ecological community in Appendix 13 A. Endangered, threatened, rare, and species of special concern are noted. An inventory of birds sighted in Broward County regional parks is also included in Appendix 13 C. The inventory consists of over 200 species and is considered representative of the birds which can be found throughout the County.

4. **Marine Habitats.** Most of Broward marine habitat is shallow open ocean area along the coast. Since 1967 Broward County has conducted an artificial reef program to provide habitat for marine species and expand recreational diving and fishing opportunities. Artificial reef sites are listed in Appendix 13 H. The estuarine and mangrove habitat areas are depicted on Figure C of the Natural Resource Map Series. These areas provide nesting areas and nurseries for many marine species. An inventory and description of the mangrove community is provided in Appendix 13 A. See the Coastal Management Element for more information on management of estuarine and mangrove habitats.

5. **Vegetative communities.** An inventory of vegetative communities is incorporated in Appendix 13 A Ecological Communities. Also an inventory of endangered and threatened plants is included in Appendix 13 B.

G. Current water needs and sources. ~~The t~~Total average daily raw water demand in Broward County in 2006 was 2267.61 million gallons per day (mgd) or 149 gallons per capita per day. ~~maximum daily demand was mgd.~~ The Biscayne Aquifer is an unconfined aquifer that underlies all of Broward County, Miami Dade County and the southeastern Palm Beach County and is the primary water source for public water supply in these areas. ~~Broward County. The Biscayne Aquifer, is an unconfined aquifer which underlies the County.~~ Aquifer recharge primarily occurs as a result of local rainfall and recharge from result of rainfall the County's expansive canal network which provides a direct connection between surface waters and groundwater in the Biscayne Aquifer. Recharge of the County's canal network is provided through rainfall and surface water deliveries from the Water Conservation Areas located to the west of urban Broward County. Water Conservation Areas also provide aquifer recharge through groundwater seepage. The relative importance of the Water Conservation Areas as a source for aquifer recharge

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~~increases during the dry winter months and periods of drought, using the dry winter months fresh water from the Water Conservation Areas.~~ (See Drainage/Natural Ground □ water Aquifer Recharge Element). While the County receives an average of sixty inches of rainfall a year, because of evapo □ transpiration and runoff discharged directly from canals to the Atlantic Ocean, only fifteen to twenty inches actually reaches the Aquifer.

The South Florida Water Management District (SFWMD) regulates the withdrawal of potable water from the Biscayne Aquifer through the issuance of a consumptive use permit. The standard consumptive use permit is valid for up to five (5) years although permits can be issued for a period of up to twenty (20) years if certain conditions are met. Significant changes in regional water policy occurred with the adoption of the Regional System Water Availability Rule by the South Florida Water Management District’s governing board in February 2007. The rule is designed to ensure that water needed for Everglades restoration and natural system function is retained within the Everglades and will require that local water providers and managers develop strategies to meet future water supply needs without creating additional demands on the regional system through surface water management or wellfield operations. Potential alternative water supplies include the Floridan Aquifer, reclaimed water, desalination, and aquifer storage and recovery. Alternative water supplies may be used to provide direct offsets for potable water demands or wellfield operations through recharge of the canal system and aquifer.

Consistent with regional water policy and as part of water resource planning efforts and as part of the County □ wide Integrated Water Resources Plan, Broward County is developing a County □ wide water management master plan with the application of the County’s integrated surface water and groundwater model. The project will include a County □ wide assessment of water demands and the identification, sizing, and cost estimates for various alternative water supply projects and management strategies capable of fulfilling the County’s water supply needs and water resource goals through 2025.

### III. ANALYSIS REQUIREMENTS

#### A. Water Resources and Water Quality.

1. **Wetlands.** Wetlands acreage in Broward County continues to decline due to development pressure primarily in southwest Broward. To compensate for unavoidable wetland impacts, EPGMD has required appropriate levels of mitigation for these impacts dependent upon the quantity and quality of wetlands that are dredged or filled. These mitigation areas are designed to replace the functions and values lost through development. Conservation Element Policy 13.9.7. summarizes the County’s policy toward wetlands. Figure E of the Natural Resource Map Series is a map of wetlands

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within Broward County developed by EPGMD and updated annually. (See Drainage/Natural Groundwater Aquifer Recharge Element). Objectives 13.8, 13.9, and 13.10 and their implementing policies address the protection and preservation of wetlands.

The only commercial activity of any consequence in the WCAs are 2 airboat/commercial park operations that cater to tourists and residents, and a truck/rest stop operated by the Miccosukee Tribe on I-75. The WCAs do provide opportunities for recreational opportunities for fishing, airboating, and limited hunting. Access points for these activities are located along I-75 and U.S. 27.

The largest pollution threat to wetlands in the WCAs is agricultural runoff from the Everglades Agricultural Area around Lake Okeechobee and within Palm Beach County. Another potential source of pollution is from the backpumping of stormwater runoff from the developed areas. This activity ~~may~~can deliver stormwater runoff from parking lots, roadways, commercial and agricultural operations, and residential lawns into the conservation areas. Agricultural and stormwater runoff contain pollutants such as heavy metals, ~~nitrate~~nutrients (nitrogen and phosphorus), and toxic substances. The S-9 pump station located at the westernmost point on the C-11 Canal, adjacent to the WCA 3B has been a major source of urban pollution from Broward County to the Everglades. As part of flood protection operations, urban stormwater runoff is discharged to WCA 3B through the S-9 pump station following storm events. Additional pumping from the C-11 occurs to return seepage lost from the WCA. The South Florida Water Management District has installed the S-381 structure to separate urban runoff in the C-11 Canal from WCA seepage so that more frequent backpumping with the smaller S-9A pump station returns only clean water to the WCA. The South Florida Water Management District is also developing the Broward Preserve Areas (WPA) as part of the Comprehensive Everglades Restoration Plan. The WPAs will include two impoundments that will store urban stormwater so as to lessen the need for operation of the S-9 pump station during heavy rain events. ~~is purchasing the Everglades Buffer Strip and potentially lands east of US 27 that may be used to filter backpumped water prior to its release into the WCAs.~~

Another threat to wetlands in the developed area, though not necessarily pollution, is the loss of viability of wetlands that are used as on-site mitigation through lack of maintenance or the original quality of the wetland was poor and was not suitable for sustained on-site mitigation.

2. **Rivers and Canals.** During the summer months or rainy season, urban runoff (nonpoint source pollution) from rainfall, combined with high water temperature, creates a concentrated nutrient environment that promotes the growth of aquatic pests such as bacteria, algae, water hyacinths, hygrophyla, and cattail which deplete water of dissolved oxygen. Urban runoff also transports toxic materials such as pesticides, heavy metals,

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hydrocarbons and dissolved inorganic materials. Objective 13.2 addresses water quality.

As development activity increases, the total amount of polluted urban runoff concurrently increases. Therefore, urban development and storm water runoff have a serious negative impact on surface water quality (See Drainage and Natural Groundwater Aquifer Recharge Element). Map 13-3 shows stormwater outfalls regulated by a National Pollutant Discharge Elimination System permit.

There are approximately 29 miles of rivers and canals within the unincorporated area of Broward County. This represents two (2) percent of the nearly 1,800 miles located in the county as a whole. The potential for the protection and conservation of rivers and canals is limited because most of the land surrounding the rivers and canals in the unincorporated area is developed.

Water quality in rivers and canals is important to the county. The Broward River Trails Program establishes linear parks and greenways along rivers and canals which serve as buffers filtering pollutants and preserving water quality. Land is secured by utilizing techniques such as conservation easements, purchase of development rights, and donations. Several pitfalls associated with the implementation of the River Trails Program include property owners concerns over issues such as liability, crime, and litter.

The Middle and New River systems are mainly used by private boat owners for dockage and access to the ICW and the ocean. Major commercial yacht building, repair, and marina facilities are located along the New River as it flows through Fort Lauderdale and along the South Fork of the New River just west of I-95.

The largest pollution threat to surface waters in the county is stormwater runoff from roadways, parking lots, golf courses, and residential lawns. In canals where marinas and private boat dockage are located, a major pollution threat is point source pollution from live aboard boats/vessels and ship repair facilities. Live aboard vessels are known to illegally release raw sewage, degrading the water with pollutant inputs such as floatable debris and coliform bacteria. Marinas contribute debris from construction and repair of vessels. The combination of these factors makes the New River the most contaminated in the county.

The EPGMD has monitored surface water quality in Broward County since 1972. The long term water quality monitoring program involves the sampling and testing of a network of 44 surface water stations located on major waterways of the county. Map 13-1 depicts surface water monitoring sites. Each station is selected to represent the water typically found within a specific drainage basin. The tests measure general water quality and are used to characterize the overall ecological health of the system and to evaluate any potential human health risks. The network is sampled quarterly. The results of this

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testing program have been documented in the Broward County, Florida Historical Water Quality Atlas: 1972-1997 and the data is currently being used by state and federal agencies to assess the water quality condition of the county's surface waters per the United States Clean Water Act and state of Florida's Watershed Restoration Act. This document is being updated to include data collected through 2003.

The EPGMD also conducts special project tests such as drainage basin characterizations which include general water quality testing; testing for metals, pesticides, herbicides, and other organic compounds; and chemical and biological evaluations of bottom sediments.

All sampling and analyses are performed by the Laboratory Services Section of the Environmental Monitoring Division. The laboratory is certified by the U.S. EPA, the Florida DEP, and the Florida HRS as a full-service air and water quality testing facility.

3. **Lakes.** Lake excavation in the County is regulated by Chapter 27 of the Broward County Code. Licenses are required by EPGMD for the creation of lakes, canals, and other water bodies.

In order to obtain a license, the planned lake must meet the requirements presented in Ordinance 93-49 for minimum side slope and vegetation. Previously, many lakes and borrow pits were constructed with little or no side slope, which were dangerous for children and nonswimming adults. Earlier designs also rendered them biologically dysfunctional and provided direct access of polluted runoff to the Biscayne Aquifer. Poorly designed rock pits increased the opportunity for unfiltered or untreated urban runoff to enter the aquifer. Erosion from excavated material contributed to the siltation of the associated rock pit. Further, open rock pits and slag piles became hazards to the general public if not properly safeguarded. Since the licensing program's inception in 1993 newly created lakes have been successfully designed to meet certain side slope and vegetative requirements. Some problems have been encountered with property owners who find vegetation in lakes objectionable and do not allow it to grow. Objective 13.5 addresses soils and soil erosion.

4. **Groundwater.** Protection of groundwater quality in Broward County is dependent upon proper management of the Biscayne Aquifer. Saltwater intrusion is one of Broward County's most serious water quality problems threatening groundwater supplies in eastern portions of the County. The saltwater intrusion line has been moving steadily westward for the past four decades. Saltwater intrusion is caused by historical drainage of freshwater wetlands and resultant loss of freshwater head, and can be exacerbated by increased pumping of groundwater and diversion of surface water flows for drinking water, irrigation, and other purposes. Groundwater protection is addressed through Objectives 13.2,13.8,13.9, and 13.10.

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Saltwater intrusion currently threatens ten major wellfields operated by Broward County and the municipalities of Dania Beach, Deerfield Beach, Fort Lauderdale, Hallandale Beach, Hillsboro Beach, Hollywood, and Pompano Beach. Those wellfields include 1557 wells with a combined pump -capacity of 350 mgd, representing 48% of total wellfield pump capacity Countywide. The U. S. Geological Survey, SFWMD, WWS, and EPGMD operate a groundwater monitoring system designed to track the extent of saltwater intrusion in the County. Annual review of chloride concentrations measured at key groundwater monitoring wells reveals one well with a 0.5 change in chloride concentration, expressed as a logarithm, compared to the baseline condition in 2000. Several additional monitoring wells show a slow, steady increase in chloride concentration, and two others are expected to show a greater than 0.5 logarithm change in 2007.

Another serious water quality issue problem is the potential for wellfield contamination of the public drinking water supply by industrial/ commercial pollution. The Broward County Board of County Commissioners adopted the original Wellfield Protection Ordinance in August, 1984. The current version of the Wellfield Protection Ordinance, No. 93 47, was enacted on November 23, 1993. The purpose of the Ordinance is to safeguard public health by providing criteria for the regulation of storage, handling, use, and production of hazardous and toxic substances within the protected areas of water supply wells. Map 13 2 shows well field protection zones.

EPGMD's Wellfield Protection Team regulates more than 700 businesses within the protected areas of Broward County's 41 wellfields. Nearly 150 businesses located in the most protected areas of the wellfields are required to maintain monitoring wells at their facilities and to provide groundwater analyses to EPGMD on a quarterly basis. Public and private utilities are also required to sample their supply wells and provide the analyses to EPGMD. EPGMD then monitors these sampling results for any trends that suggests contamination of groundwater in the vicinity of the well heads. operates a groundwater monitoring system which consists of 61 wells used to monitor the groundwater surrounding the major wellfields and in undeveloped areas of high aquifer recharge. Map 13 1 shows the locations of groundwater monitoring sites. The Broward County Board of County Commissioners adopted the original Wellfield Protection Ordinance in August, 1984. The current version of the Wellfield Protection Ordinance, No. 93 47, was enacted on November 23, 1993. The purpose of the Ordinance is to safeguard public health by providing criteria for the regulation of storage, handling, use or production of hazardous or toxic substances within the zones of influence of water supply wells. Map 13 1 shows well field protection zones and contaminated sites. Nearly 200 facilities are inspected and licensed to ensure protection of the drinking water supply. The outcomes of well field contamination monitoring will be researched for inclusion as a plan amendment in 1998.

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The EPGMD also engages in numerous programs to protect the natural resources, and especially the groundwater, of Broward County. Implementation of the Hazardous Material Regulations and Storage Tank Regulations prevents discharges to the air, soil, groundwater and surface water by providing specifications for facility design, construction, operation, maintenance and closure which include early detection, containment and recovery of discharges. Approximately 4,600 facilities are currently licensed and are inspected annually. EPGMD maintains a response program to investigate threats of contamination, participate in the cleanup and prepare enforcement cases as appropriate. A remediation program is currently involved in various aspects of contamination cleanups at over 900 sites in Broward County. EPGMD provides technical and nonregulatory assistance to help businesses meet environmental regulations, identify alternative materials to reduce the quantity and toxicity of hazardous materials used. The current version of the Hazardous Materials and Storage Tank Regulations include Ordinance Nos. 93 47 and 93 46, respectively.

- B. **Air Resources.** Since 1990, various control measures such as; the motor vehicle inspection and maintenance program (I/M), lower gasoline volatility during ozone season, and Stage II vapor recovery gasoline systems have helped reduce the frequency of ozone exceedances in Broward County. Based on this improvement, Broward County, (along with Dade and Palm Beach Counties) was redesignated to "attainment" on April 25, 1996, by the EPA. The air quality in Broward County is good 90% of the time and has not exceeded the EPA NAAQS for over ten years. Considering historical growth rates, meeting these standards may become a future challenge unless significant changes are made to the coordination of land development and transportation planning for air quality. The consequences of exceeding emission levels could result in the implementation of more costly pollution control measures and federal sanctions for Broward County. Broward County is within eight to ten years of using all its available land and the impact of future growth should be carefully planned to determine what effect it would have on the air quality.

EPGMD reviews air permit applications and has representation in the Metropolitan Planning Organization Technical Coordinating Committee. As part of this role EPGMD promotes alternative modes of transportation, transit oriented development and walkable communities to alleviate traffic congestion and air pollution. The Department is also involved in the promotion and implementation of alternative fuels and alternative fuel vehicles through participation in local, state and federal initiatives and public-private partnerships. Air resources are addressed through Objective 13.1

- C. **Floodplains.** In general, the County has been managing floodplains successfully since 1977 through the review and permitting process. Flooding problems have been alleviated, to a great extent, by the creation of 1922 drainage/water control districts which

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have developed a system of secondary canals and small manmade lakes (see Drainage and Natural Groundwater Aquifer Recharge Element). Even with the existence of flood control regulations and structures, however, flooding as a result of a natural disaster is still a major issue. As a result, Broward County is a recognized participant community in the Federal Flood Insurance Program.

- D. Commercially valuable minerals. Mining activities by their nature of operation have an impact upon surface water quality. All such activities in the County are surface extractions resulting in open rockpits and slag piles. Rockpits increase the opportunity for unfiltered or untreated urban runoff to enter the Aquifer. Erosion from excavated material contributes to the siltation of the associated rockpit. Further, open rockpits and slag piles become hazards to the general public if not properly safeguarded. Newly adopted state reclamation requirements as specified within the Resource Extraction Reclamation Act of 1986 (Chapter 378, FS), address some of these concerns. In addition, the U.S. Army Corps of Engineers and the SFWMD have adopted standards for the creation of littoral slopes which may introduce biological function to reclaimed rockpits. Objective 13.4 protects and conserves mineral resources.
- E. Soil associations and areas with soil erosion problems. Of Broward County's ten (10) soils associations, only the Hallandale-Margate and Lauderhill-Dania soil associations are generally unsuitable for septic tank usage. In these two (2) soil associations, septic tank usage could potentially cause adverse impacts to groundwater or surfacewaters if residential densities or non-residential intensities are too high. As shown in the Broward County Land Use Plan's Natural Resource Map Series.

Policy 13.2.5 provides for the County to maintain its land development regulations allowing septic tanks where a centralized wastewater system is not available, provided all legal requirements are met. The term "available" as used herein is intended to be interpreted consistent with the Section 64E-6.002(9), FAC. The land development regulations governing septic tank usage are codified in Chapter 34, Article II, Broward County Code of Ordinances (BCCO).

The land development regulations mandating that all premises which abut a sanitary sewer main be connected to the sanitary sewer main, unless exempted, are codified in Chapter 34, Article II, BCCO. The BCCO provides for two (2) exceptions. The first exception is for connection charges that are not just or unreasonable. The second exception, adopted into Chapter 34 on July 14, 1998, is for areas designated with a rural residential designation (1 dwelling unit per acre or less). These two (2) articles, which are considered environmental regulations and thus apply countywide, supplement the standards for onsite sewage treatment and disposal system provisions codified in Chapter 64E-6, Florida Administrative Code (FAC).

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The U. S. Department of Agriculture, Natural Resource Conservation Service (NRCS) has indicated that inland erosion is minimal with the exception of siltation at construction sites. Coastal erosion continues to be the main concern. The Broward County Erosion Prevention District was established in 1963 by special act of the Florida Legislature and given the authority to implement a beach preservation program for the twenty-four miles of ocean shoreline in Broward County. In 1992, DPEP took over the functions of the Erosion Prevention District. (See the Coastal Management Element). Soil erosion is addressed through Objective 13.5.

F. Natural Resource Areas:

1. **Recreationally important fish or shellfish.** Opportunities to enhance or improve recreational saltwater fishing are extremely limited because there is only approximately 1.2 miles of coast line in unincorporated Broward. However, since recreational saltwater fishing is considered to be very important to the county as a whole, EPGMD Artificial Reef Program which is described in the marine habitat category of the natural resource section. Marine habitat and fisheries are addressed by Objective 13.7.

2. **Commercially important fish or shellfish.** Opportunities to enhance or improve commercial saltwater fishing are extremely limited because there is only approximately 1.2 miles of coast line in unincorporated Broward. However, since commercial saltwater fishing is considered to be important to the county as a whole, EPGMD administers an Artificial Reef Program which is described in the marine habitat category of the natural resource section. Marine habitat and fisheries are addressed by Objective 13.7.

3. **Wildlife.** Conservation of wildlife species is dependent upon the conservation of the vegetative resources that provide them with food, shelter, and nesting areas. The Broward County Commission has designated 41 Native Vegetation Category Local Areas of Particular Concern (LAPC) and 73 Natural Resource Areas (NRA), many of which are also LAPCs. Appendix E lists NAPCs and NRAs. These areas represent historic remnants of the vegetative communities that once flourished in Broward County. While these designations do not preclude development, they do limit activities that may occur on the site until a certain level of development approval is received. Development is preceded by an environmental impact report, and mitigation measures may be required. During the development review of the LAPC sites, all or a portion of the designated resource can be set aside as a private or public preservation area.

Of the methods for protecting existing natural resource areas, only designation as an Urban Wilderness Area assures preservation. Designated Urban Wilderness Areas, acquired with public funds, are maintained as passive recreation areas in perpetuity. Appendix F lists the Urban Wilderness Areas.

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Development is projected to continue in Broward County for the foreseeable future, therefore, it is assumed that pressures to develop environmentally sensitive areas will continue. It is assumed that state grants such as the Conservation and Recreational Lands (CARL) program and locally generated funds such as regional park impact fees will be utilized for acquiring sites on the Urban Wilderness Inventory. Appendix G contains the Urban Wilderness Inventory. Additionally, through the 1989 Environmentally Sensitive Land Bond Issue that was approved by the voters of the County, nearly 1000 acres of the most endangered sites have been purchased for conservation and passive park usage. Wildlife is addressed by Objective 13.7.

4. **Marine habitats.** To create additional habitat for marine life, the EPGMD manages an active artificial reef program. Through this program, objects such as derelict ships, oil platforms, and engineered structures are introduced into the marine environment. These underwater structures provide shelter and foraging areas for fish, substrate for benthic organisms, and nursery areas. The effectiveness of the Artificial Reef Program is inconclusive. Certainly, more habitat is being provided. It is not known whether providing an increased quantity of habitat actually leads to an increased abundance of aquatic life or biodiversity, although that is the presumption of many leaders in the field of marine biology and oceanography. Marine habitat is addressed by Objective 13.7.

Manatees, which inhabit rivers, shallow estuaries, and saltwater bays, are found year-round in Broward County. In 1993 the State of Florida approved County-recommended speed restrictions along most major waterways for manatee protection. It is not known how many manatees live in the County waters year-round, however, their numbers increase during the winter months when migration from the central part of the State occurs. The Broward County Audubon Society and the Manatee Survival Foundation have attempted to perform counts of the animals, but accurate numbers are impossible to estimate without performing aerial surveys.

The Port Everglades Authority commissioned a survey of the Manatee Sanctuary which was performed from December, 1985 through April, 1986. Results of the survey showed that January was the month in which the greatest number of the animals populated the Sanctuary; the daily average number of manatees sighted was nineteen. The survey consisted of a combination of aerial, bank, platform, and boat observations. Other studies have reported much higher numbers of manatees, including one which reported over 200 of the animals sighted in January and February, 1985.

A portion of Port Everglades remains designated as a "Manatee Sanctuary" by the Florida Legislature. Additionally, the cooling lakes connected to the inland FPL power plant have been designated "essential manatee habitat" by Broward County and as a "no entry zone" by the State.

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Manatees have no known predators ~~except man.~~ however ~~Pr~~ principal threats to the manatees' existence in Broward County are boat or barge collisions and crushing or drowning in canal locks. Although manatees are protected under the Endangered Species Act and the Marine Mammal Protection Act, a slow decrease in their population is projected by experts in the field.

All three species of sea turtles known to nest in Broward County are designated as either endangered or threatened. There are numerous reasons for the decline in the turtles' populations. Coastal development activities have the greatest negative impact. The Sea Turtle Conservation Program, administered by EPGMD, serves to mitigate the negative effects of development activities by marking and recording nesting sites, and, when necessary, relocating turtle eggs to non-hazardous areas. In the period from 1975 to 1986, over 300,000 sea turtles have been hatched by artificial incubation in Broward County. In addition, 80,000 turtles have been hatched from nests that have been excavated and relocated to safer areas of the beach.

**5. Vegetative communities.** The Tree Preservation Ordinance has provisions for the protection of Natural Forest Communities (NFC). Sites designated as an NFC must preserve portions of their property through a conservation easement in order to receive a Tree Removal License. Municipalities which have their own Tree Ordinances are required to have similar provisions. However, in some cases enforcement of Municipal Tree Ordinances is less stringent and may not provide adequate protection.

Preservation of the native understory vegetation within native communities is accomplished, in part, by the Natural Resource Area provisions of the code which limits the clearing activities that may occur on the site until a certain level of development approval is received. There are 71 sites that have been designated by the Broward County Commission as NRAs.

In order to re-establish the benefits provided by native plants within the developed environment, a certain percentage of native plants is required within landscape plans reviewed by the County. Broward County also administers the NatureScape Broward program with the goal of protecting water quality and quantity, and creating wildlife habitat through appropriate landscaping practices, the prudent use of our water resources, and the planting of native, non-invasive, and other drought tolerant plants in Broward County. Policies 13.3.5 and 13.3.7 reference implementation of the NatureScape Broward program and program principles as part of the County's efforts to achieve water conservation. -Additionally, plant species known to invade natural vegetative communities are precluded from use by the landscape ordinance. Objective 13.6 conserves and protects native vegetative communities.

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E. Projected ~~w~~Water needs and sources.

**TABLE 13-2  
PROJECTED RAW WATER DEMAND  
BROWARD COUNTY**

|   | <u>20050</u>                         | <u>200105</u>                        | <u>201510</u>                        | <u>202015</u>                        | <u>202520</u>                        |
|---|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Population  | <u>1,765,855</u><br><u>1,603,096</u> | <u>1,902,536</u><br><u>1,753,340</u> | <u>2,034,371</u><br><u>1,906,850</u> | <u>2,154,348</u><br><u>2,064,508</u> | <u>2,251,003</u><br><u>2,216,266</u> |
| <u>Biscayne Water Demand</u><br><u>Current treatment</u><br><u>(mgd)</u>  | <u>265258.10</u>                     | <u>285282.29</u>                     | <u>305307.00</u>                     | <u>323332.39</u>                     | <u>338356.82</u>                     |
| <u>Biscayne Water Demand</u><br><u>Membrane treatment</u><br><u>(mgd)</u> | <u>265</u>                           | <u>334</u>                           | <u>365</u>                           | <u>379</u>                           | <u>403</u>                           |

□ Future raw water demands are based on per capita water demands measured in 2005 and population projections provided by Planning Services Division based and estimated using the County's Population Forecasting Model.

The County's population is projected to increase by 34% between 2005 and 2025, from 1.74 to 2.25 million people. The Biscayne Aquifer is currently the primary drinking water source for all of Broward County and even under current demands has been subject to restrictions during periods of water shortage. In the absence of alternative water supply development, raw water demands on the Biscayne Aquifer would be expected to increase at a rate commensurate with population growth, assuming that the treatment technology and the per capita rate of consumption were to remain the same. However, the County's overall raw water demands are likely to -increase at a rate that surpasses that of population growth since many water utilities are expected to upgrade their treatment technologies from lime softening to membrane filtration, the later of which has lower recovery of finished water but produces a higher water quality. Membrane filtration systems will also allow utilities to utilize the brackish Floridan Aquifer as a source water for potable treatment systems through upgrading of filtration-of skids, thereby providing diversification in water sources, increasing overall treatment capacity to meet growing demands, and achieving consistency with the Regional System Water Availability Rule.

Recognizing the potential value of water conservation programs, the Broward County Board of County Commissioners instituted a variety of measures in 1991 in an attempt to reduce per capita water use. The key components of these plans are discussed below. As shown, the water

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conservation programs developed on a County-wide basis are focused on ordinances that require specific irrigation hardware, restriction of outdoor uses of water, low-flow fixtures for indoors, and public education.

1. The County Commission adopted an ordinance that requires the installation of rain sensor devices on all irrigation systems installed after May 1, 1991 (Chapter 39, Broward County Code of Ordinances, Article VII). These sensors prevent irrigation systems from turning on when it is raining. The ordinance does not affect systems installed prior to 1991.

2. The County Commission adopted a county-wide ordinance (Ordinance 91-8, Chapter 36, Broward County Code of Ordinances, Article II) limiting hours of irrigation from 5:00 PM to 9:00 AM. The primary focus of the ordinance is to allow irrigation only during night time hours and to encourage the use of low flow watering by providing exemptions for low volume irrigation systems.

3. The County Commission adopted a county-wide ordinance (Chapter 39, Broward County Code of Ordinances, Article VIII) adopting the principles of xeriscape. This ordinance is intended to conserve water by promoting the use of native plant communities that require less frequent watering.

4. The County Commission adopted a county-wide ordinance (Chapters 5 and 39, Broward County Code of Ordinances, Article III) applying the South Florida Building Code, which requires water conservation fixtures and low flow volume irrigation. The ordinance applies to all construction occurring after the date of ordinance passage but does not address retrofitting of buildings prior to the data of the ordinance.

5. The County Commission approved Resolution 85-867 to adopt FAC Chapter 40E-21 by reference at such time the South Florida Water Management District declares a water shortage condition exists. Graduated, detailed, and specific water reductions are mandated in such an emergency, and are fully enforceable by law enforcement agencies.

In addition to the County-wide ordinances adopted by the Commission, the EPGMD has implemented a County-wide water conservation and educational outreach program called Water Matters, designed to inform provide homeowners, professional property managers, and children about the need for water conservation and the connection between urban water practices and the quality of our natural resources. Several Water Matters program initiatives are implemented in partnership with municipal governments, drainage districts, businesses and other governmental agencies.

1. EPGMD annually coordinates and administers the celebration of Water Matters Day, a County-wide water conservation event to educate residents about the need for water conservation, water management in Broward County, and ways they can help conserve and protect local water resources.

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2. EPGMD implements the nationally recognized Naturescape Broward program which promotes the use of native and other drought tolerant and low maintenance plants in landscaping to protect the quality and quantity of water resources.

3. EPGMD operates a NatureScape Irrigation Service (NIS) designed to achieve significant reductions in landscape irrigation through landscape site evaluations that assist property managers in providing more efficient maintenance and operation of large volume irrigation systems.

4. EPGMD provides Know the Flow training on a monthly basis to landscape professionals, property managers, public works staff, and others. Know the Flow is a 4 hour course in surface water management and best management practices to protect the quality and quantity of local water resources.

5. EPGMD staffs the Broward Everglades Working Group with representation from municipalities, drainage districts, agricultural, and other interest groups, which was convened to develop a pollution reduction action plan for the C-11 West Basin as part of local efforts to increase source controls on pollution in support of Everglades restoration.

EPGMDs programs are intended to make the public, policy makers, and governmental agencies more aware of the value of conserving both the quality and quantity of water resources and increasing their active participation in water conservation efforts as part of daily activities.

The County's water utility, Water and Wastewater Services (WWS), is also focused on achieving significant water savings through more efficient operations, ~~and~~ water conservation and educational programs. WWS originally prepared a Water Conservation Plan to comply with the requirements of the South Florida Water Management District in April 1988. The plan has been updated on a regular basis since that time to reflect the latest conservation measures and policies in the water supply industry. Current elements of the plan include the following programs:

1. Since 1991, WWS has maintained a three tiered rate structure for water pricing. In 2003, the rate structure was amended to further enhance conservation.

2. WWS has implemented a plan for mitigating unaccounted for water losses, which includes a leak detection program utilizing surveillance techniques, certification and calibration of water meters.

3. WWS has developed a public education program that includes the development and distribution provision of brochures and educational materials for elementary and high school students, and presentations to homeowner and condominium associations regarding water supply, treatment and conservation issues.

4. WWS continues to pursue opportunities to increase the amount of reclaimed water used from the North Regional Waste Water Treatment Facility to offset irrigation demands.

5. WWS is partnering with EPGMD to fund the operation of a NatureScape Irrigation Service within its service area to help customers implement improved irrigation practices on their property.

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6. WWS is currently developing a water use profile for each of its four service areas. The profile is designed to identify specific demographic, operational, engineering and fiscal characteristics of each service area that allows WWSBCOES to determine area specific customer patterns within each service area. The proposed data will be used to develop a targeted conservation program for each district. Elements of the program may include revised educational programs, demand management by testing the impact of gradual pressure reductions, rebate programs, or increased use of reclaimed water. Upon completion of the profile, the existing conservation program will be updated.

### IV. IMPLEMENTATION

A. Authority. Programs, policies, and standards related to environmental protection and conservation in Broward County are developed and implemented by federal, state, regional and county public agencies. A list of responsible agencies is provided in Appendix L, which identifies the enabling legislation and authority granted to each public agency. The primary agencies charged with the enforcement of environmental regulations in Broward County are the Florida Department of Environmental Protection (DEP), the South Florida Water Management District (SFWMD), the Broward County Department of Natural Resource Protection (DNRP), and the Broward County Water Management Division (WMD).

#### **Regulatory Efforts to Promote Conservation and Protection of Natural Resources**

The Tree Preservation Ordinance, Section 27-340, Broward County Code of Ordinances, has provisions for protecting Broward's remaining upland habitat. The Ordinance requires a License for tree removal. The Ordinance is enforced by the DNRP.

Under the provisions of the ordinance, DNRP reviews, through a license application, site plans or construction plans for impacts to trees. The applicant is required to preserve trees if possible, and to relocate or replace trees if not possible. There are additional requirements for the preservation of Natural Forest Communities and Specimen Trees, as well as standards for the protection of trees during construction. The Ordinance is county wide; however it is not enforced in a municipality if that municipality has certified that it has an ordinance as stringent as the County's ordinance, and is capable of enforcement.

The County also has an ordinance that regulates the pruning of trees. Section 27-421-425 of the Broward County Code prohibits improper pruning of trees, such as topping. This ordinance is enforced countywide, and has similar municipal exemption language. Broward County's countywide protective land clearing ordinance is designed to regulate removal of native vegetation in designated areas. An owner may only clear property of existing understory in accordance with Ordinance 89-16. Indiscriminate land clearing can, and often does,

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destroy valuable trees by disturbing root systems as well as diminishing the integrity of the resource. Such activity contributes to the loss of natural areas and habitats in the County and, thereby, negatively impacts the quality of life. This Ordinance protects the understory vegetation until such time as appropriate development permits have been issued.

The County has review authority over an environmentally sensitive area if the area has been designated as a Local Area of Particular Concern (LAPC), or has been included in the Urban Wilderness Inventory. Sites so designated or included cannot be developed until an environmental impact report has been completed in accordance with the Broward County Land Development Code. If, upon review of the environmental impact report, the Broward County Commission determines that acquisition of all or part of the land is necessary to prevent adverse environmental impact, the Commission may defer action on the development permit application for a period of up to one year. At that time, approval will be granted subject to specific conditions unless the land has already been acquired by the County.

LAPC's may be designated in six categories according to the types of resources present. LAPC's must have one or more of the characteristics for the respective category. The categories are as follows:

**\* Marine Resource Category**

Coastal areas of unique, scarce, fragile, or vulnerable natural habitat, physical features and scenic importance, or; Coastal areas of high natural productivity or essential habitat for fish, wildlife, and the various trophic levels in the food web critical to their well being, or; coastal areas of substantial recreational value and/or potential, or; areas needed to protect, maintain, or replenish coastal flood plains, coral and other reefs, beaches, offshore sand deposits and mangrove stands.

**\* Natural Landforms and Features Category**

A geological, hydrological, or physiographical feature confined to a small area of Broward County and considered quite rare locally or regionally, or; a representative natural ecosystem and/or its units existing in a few isolated locations, but extirpated from most of the county.

**\* Native Vegetation Category**

Areas containing native plant communities of unique character and/or rare, threatened, or endangered species or species of special concern, or; native vegetative communities exceptionally outstanding in growth, structure, and/or variety, or; isolated or well developed native vegetative communities in urban or rapidly urbanizing areas.

**\* Wildlife Category**

Existing wildlife refuges, reserves, and sanctuaries, or; known habitats of rare, threatened, or endangered species or species of special concern, or; major wildlife

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intensive use areas such as well developed hammock communities, highly productive coastal tidelands, and mangroves, or; areas used for scientific study and research on wildlife.

**\* Economic Resource Category**

Existing ports, marinas, piers, energy resources, and artificial reefs, or; areas noted for scientific study and research concerning economic development.

**\*Cultural Resource Category**

Sites designated on the National Register of Historic Places or on the Florida Master Site File, or; sites related to the general development of the local area, region, or State, or; buildings which are significant examples of the architectural design of their period, or; sites associated with the life/lives of important person(s), or social, political, cultural, or economic movements or with historical events, or; archaeologic sites which have yielded useful information on the area's past.

Unique Natural Areas were first identified in the Broward County Land Use Plan, 1977. These areas were considered to be the last remains of Broward County's natural landscape, having unique and/or ecological significance. Since that time, Unique Natural Areas have been designated LAPC's and are subject to environmental review prior to development.

The Urban Wilderness Inventory is a list of natural areas proposed by the Urban Wilderness Advisory Board for preservation as Urban Wilderness Areas. The Urban Wilderness Advisory Board was established by Chapter 25  $\square$ , Broward County Code of Ordinances. The Board is composed of nine members each having expertise in either biology, botany, zoology, or physical or environmental science. The purpose of the Board is to maintain an inventory of existing natural areas and to make recommendations to the Broward County Commission on acquisition and regulation of those areas. Currently, there are thirteen sites on the Inventory. Exact locations and descriptions of the sites are provided in Appendix 13  $\square$ G.

Preservation of environmentally sensitive areas is accomplished through designation as an Urban Wilderness Area. Chapter 25  $\square$ , Broward County Code of Ordinances provides for the creation of an Urban Wilderness Park System. Upon acquisition by the Broward County Commission and then designation as an Urban Wilderness Area, environmentally sensitive land is preserved in perpetuity as a wilderness area. Five Urban Wilderness Areas currently exist within Broward County. Exact locations and descriptions of the sites are provided in Appendix 13  $\square$ F.

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## V. APPENDICES

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## Appendix A

### Ecological Communities Broward County 2005

#### 1. Beach and Dune Community

**General Description:** Composed of unconsolidated sand facing the open ocean and shaped by the wind, waves, currents, and tides. Behind the beach, sand may be piled up by the wind forming dunes. The key to pronounced dune growth is adequate sand supplies and the existence of pioneer vegetation.

**Geology and Soils:** Ancient coral reef substrate; surface deposits of shell fragments, calcium carbonate and silica sands; soils infertile and unstable; elevation 0 to 5 feet MSL.

**Natural Influences:** Wave action; longshore and offshore currents; tides; storm surges; sea level changes; wind; salt spray; sunlight; hurricanes; vegetative colonization.

**Man's Influences:** Coastal development; jetties; seawalls; beach nourishment; recreational activities; pedestrian and vehicular traffic; beach cleaning equipment; oil spills; ocean dumping.

**Dominant Plant Species:** Sea Oats (*Uniola paniculata*); Sea Grape (*Coccoloba uvifera*); Beach Sunflower (*Helianthus debilis*); Beach Star (*Remirea maritima*) (E); Beach Creeper (*Ernodea littoralis*) (T); Spanish Bayonet (*Yucca aloifolia*); Cocoplum (*Chrysobalanus icaco*); Railroad Vine (*Ipomoea pes-caprae*); Beach Peanut (*Okenia hypogaea*) (E); Beach Croton (*Croton punctatus*); Beach Bean (*Canavalia humifusa*); Saw Palmetto (*Serenoa repens*); Prickly Pear Cactus (*Opuntia humifusa*); Nickerbean (*Caesalpinia bonduc*).

**Dominant Animal Species:** Atlantic Green Turtle (*Chelonia mydas mydas*) (E); Atlantic Hawksbill (*Eretmochelys imbricata imbricata*) (E); Atlantic Loggerhead (*Caretta caretta caretta*) (T); Atlantic Leatherback (*Dermochelys coriacea*) (E); Ghost Crab (*Ocypode quadrata*); variety of shorebirds; variety of fishes.

**Current Status:** Few native beaches and dunes remain along Broward County's 24-mile coastline. The 1.1 mile North Beach Park in the City of Hollywood is the largest. Additional parcels of vegetated beach and dunes exist in John U. Lloyd State Recreation Area and in the Town of Hillsboro Beach

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### 2. Coastal Strand Forest Community

**General Description:** Behind the beach and dunes, forest trees are able to grow protected from salt spray and in soils with some accumulation of organic material. Most of the species are of Caribbean origin brought to our shores as seeds by tropical currents, storms, and migrating seed-eating birds. The tropical hardwood hammock which develops is more specifically called the coastal strand forest.

**Geology and Soils:** Ancient coral reef substrate; sandy soils from former dunes; thin layer of organic material; decreased salinity of soil; elevation 10-12 MSL.

**Natural Influences:** Occasional storm surges; humidity; warming influence of the ocean; proximity to tropical seed sources; hurricanes, protection from wind and salt spray; protection from fire.

**Man's Influences:** Land development; introduction of exotic plant species; recreational overuse and abuse; illegal collection of native plants.

**Dominant Plant Species:** Sea Grape (*Coccoloba uvifera*); Poisonwood (*Metopium toxiferum*); Mastic (*Mastichodendron foetidissimum*); Black Ironwood (*Krugiodendron ferreum*); Paradise Tree (*Simarouba glauca*); Torchwood (*Amyris elemifera*); Spanish Stopper (*Eugenia foetida*); Silver Palm (*Coccothrinax argentata*); Inkwood (*Exothea paniculata*); Gumbo Limbo (*Bursera simaruba*); Sabal Palm (*Sabal palmetto*); Live Oak (*Quercus virginiana*); Strangler Fig (*Ficus aurea*); Red Mangrove (*Rhizophora mangle*); White Mangrove (*Languncularia racemosa*); Marlberry (*Ardisia escallonioides*); White Stopper (*Eugenia axillaris*); Wild Coffee (*Psychotria* spp.); Snowberry (*Chiococca alba*).

**Dominant Animal Species:** Raccoon (*Procyon lotor*); Gray Fox (*Urocyon cinereoargenteus*); migrating Passerines; various squirrels.

**Current Status:** The last remnants of Broward County's coastal strand forests are contained within Hugh Taylor Birch State Recreation Area and the Bartlett Estate in the City of Fort Lauderdale.

### 3. Mangrove Community

**General Description:** Mangrove swamps occur in estuaries, on sheltered coasts, and in protected bays and waterways of tropical and subtropical shallow waters. Mangroves are comprised of salt tolerant trees and shrubs which grow as far inland as the tide ranges. The term "mangrove" encompasses not only a community of plants of several unrelated families/genera, but also the entire habitat including animals and highly organic soils.

**Geology and Soils:** Oolitic limestone substrate; highly organic mud which may cover

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marl deposits; elevation approximately MSL.

**Natural Influences:** Highly saline to fresh water; tidal inundation increases salinity, rain and freshwater runoff decreases salinity; high humidity; protection from wave action; hurricanes; nearly frost-free climate; wood-boring crustaceans.

**Man's Influences:** Degradation of water quality; dredge and fill operations; construction of marinas and seawalls; coastal development; litter; boat wakes.

**Dominant Plant Species:** Red Mangrove (*Rhizophora mangle*); White Mangrove (*Languncularia racemosa*); Black Mangrove (*Avicennia nitida*); Buttonwood (*Conocarpus erectus*); Sea-oxeye Daisy (*Borrchia frutescens*).

**Dominant Animal Species:** Mangrove and fiddler crabs, herons, egrets, spoonbill, osprey, mangrove gribble; mollusks, crustaceans, and other mud animals; juveniles of several game and commercial fish; West Indian Manatee (*Trichechus manatus latirostris*).

**Current Status:** Although the pressures for coastal development are great, the economic importance of mangrove communities to fish and shrimp industries has led to some protection. Broward County has preserved 1500 acres of mangrove-lined estuary within West Lake Tract Park.

### 4. Scrub Community

**General Description:** Scrub is a plant community found on deep, well-drained sand deposits, almost exclusively in Florida. Because of the excessive drainage and intense sunlight, Florida scrub is a harsh, desert-like environment inhabited by specially adapted plants and animals.

**Geology and Soils:** Ancient sand dunes atop oolitic limestone ridge; deep, fine, well-drained sand deposits; acid soil; very low organic content; elevation 10-20 MSL.

**Natural Influences:** Desert-like conditions; little soil moisture; rainwater percolates quickly through sand; water table deep beneath the surface, unavailable to plants; intense sunlight; intense reflection; high temperatures; little shade; occasional fire.

**Man's Influences:** Industrial and residential development; dumping; off-road vehicles; man-caused fires; well fields for drinking water.

**Dominant Plant Species:** Sand Pine (*Pinus clausa*); Rosemary (*Ceratiola ericoides*); Paw-paw (*Asimina reticulata*)(E); Gopher Apple (*Licania michauxii*); Scrub Mint (*Conradina grandiflora*)(T); Spike Moss (*Selaginella arenicola*) (T); Sand Live Oak (*Quercus geminata*); Myrtle Oak (*Quercus myrtifolia*); Chapman Oak (*Quercus chapmanii*); Rusty Lyonia (*Lyonia fruticosa*); Tarflower (*Befaria racemosa*); Saw

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Palmetto (*Serenoa repens*); Shiny Lyonia (*Lyonia lucida*); Tallowwood (*Quercus imenia americana*); Curtiss' Milkweed (*Asclepias curtissi*) (T); Nodding Pinweed (*Lechea cernua*); terrestrial lichens (*Cladonia* spp.); associated wildflowers; vines.

**Dominant Animal Species:** Gopher Tortoise (*Gopherus polyphemus*)(T); Florida Scrub Lizard (*Sceloporus woodi*); Florida Scrub Jay (*Aphelocoma coerulescens* *coerulescens*)(T).

**Current Status:** Scrub occurred in Broward County west of the Intracoastal Waterway to the Everglades from Palm Beach County to Dade County and was transversed by swamps and marshes. Only a few remnants remain of this once extensive natural system; examples of this community are the Jungle, Crystal Lake and Military Trail sites preserved through the Broward County 1989 Environmentally Sensitive Land Bond Issue.

### 5. Pine Flatwoods Community

**General Description:** Pine flatwoods occur where soils are poorly to well drained and are fairly uniform in elevation. Slash pine and saw palmetto predominate in this fire adapted community. Fire eliminates dense vegetation and allows sunlight to penetrate to the understory, which in turn encourages the growth of pine seedlings, grasses, herbs, and shrubs.

**Geology and Soils:** Oolitic limestone substrate; limestone may be exposed or covered with a thin layer of marl or sand; organic material may accumulate in limestone pockets; elevation 10-15 MSL.

**Natural Influences:** Low humidity; frequent low intensity fires; lightning; open sunny environment.

**Man's Influences:** Industrial and residential development; logging; introduction of exotic plants; disruption of the frequency and increase in the intensity of fires; drainage; off-the-road vehicles.

**Dominant Plant Species:** Slash pine (*Pinus elliotii*); Saw Palmetto (*Serenoa repens*); Gallberry (*Ilex glabra*); Rusty Lyonia (*Lyonia fruticosa*); St. John's Wort (*Hypericum* spp.); Tickseed (*Coreopsis leavenworthii*); Pennyroyal (*Piloblephis rigidus*); Cabbage Palm (*Sabal palmetto*); Shiny Lyonia (*Lyonia lucida*); Wax Myrtle (*Myrica cerifera*); associated herbs, shrubs, and grasses.

**Dominant Animal Species:** Great Horned Owl (*Bubo virginianus*); Southern Toad (*Bufo terrestris terrestris*); Box Turtle (*Terrapene carolina bauri*); Tree Frog (*Hyla* spp.); various woodpeckers; various snakes and lizards.

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**Current Status:** No pristine pine flatwoods remain in Broward County. Pinelands have been preserved within Tradewinds Park, Fern Forest Nature Center, Hampton Pines Park, Hillsboro Pineland ESL and Miramar ESL.

### 6. High Hammock Community

**General Description:** High hammock forests are among the most diverse systems in south Florida, containing more than 100 species of trees and shrubs. They are widely distributed and develop only where conditions of favorable land elevation and fire protection occur. Hammocks develop slowly as organic material accumulates building up the land. This association represents the climax community in south Florida. Temperate and tropical plant species are present, accounting for the diversity of high hammocks.

**Geology and Soils:** Oolitic limestone substrate; exposed or covered by consolidated marl limestone or thin layer of highly organic material; organic soils accumulate within pockets in the highly eroded limestone; elevation 10-15 MSL.

**Natural Influences:** High humidity; moisture retention of soil; capillary action of limestone from groundwater to surface; protection from fire; protection from frost and wind; shaded understory; tornadoes.

**Man's Influences:** Residential and commercial development; introduction of exotics; drainage; fire; agriculture; drying effects of roadways; illegal collection of plants; human overuse and abuse.

**Dominant Plant Species:** Live Oak (*Quercus virginiana*); Pigeon Plum (*Coccoloba diversifolia*); Paradise Tree (*Simarouba glauca*); Gumbo-Limbo (*Bursera simaruba*); Willow Busic (*Bumelia salicifolia*); Lancewood (*Nectandra coriacea*); Mastic (*Mastichodendron foetidissimum*); Strangler Fig (*Ficus aurea*); Satinleaf (*Chrysophyllum olivaeforme*) (E); Mulberry (*Morus rubra*); Simpson Stopper (*Myrcianthes fragrans*); Marlberry (*Ardisia escallonioides*); Wild Coffee (*Psychotria* spp.); various ferns.

**Dominant Animal Species:** Bobcat (*Lynx rufus*); Opossum (*Didelphis marsupialis*); Raccoon (*Procyon lotor*); Armadillo (*Dasypus novemcinctus*); various owls, squirrels, foxes; migrating passerines, raptors.

**Current Status:** Historically higher elevations were the prime areas for development. In Broward County, Fern Forest, Snyder Park, and the Pine Island Ridge system remain as examples of the high hammock community.

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### 7. Low Hammock Community

**General Description:** Low hammocks are areas of dense forest vegetation dominated by tree species, such as laurel oak, strangler fig, and cabbage palm. Low hammocks develop on land that is of sufficient elevation to be seldom flooded, but in close proximity to water environments, and is protected from fire. They frequently occur in transitional areas between drier upland communities and lowland vegetation types, such as marsh, wet prairie, cypress swamp, or mangrove.

**Geology and Soils:** Oolitic limestone substrate exposed or covered by fine sands; highly organic, moisture-retaining surface soils; elevation 8-10 MSL.

**Natural Influences:** High humidity; moisture retention of soil; proximity to groundwater and surface water environments; protection from fire; protection from frost and wind; shaded understory.

**Man's Influences:** Residential and commercial development; introduction of exotics; drainage; salt water intrusion; fire; illegal collection of plants; filling.

**Dominant Plant Species:** Laurel Oak (*Quercus laurifolia*); Strangler Fig (*Ficus aurea*); Cabbage Palm (*Sabal palmetto*); Red Maple (*Acer rubrum*); Cocoplum (*Chrysobalanus icaco*); Wild Coffee (*Psychotria* spp.); Marlberry (*Ardisia escallonioides*); Slash Pine (*Pinus elliotii*); various ferns.

**Dominant Animal Species:** Raccoon (*Procyon lotor*); Gray Fox (*Urocyon cinereoargenteus*); Turkey Vulture (*Cathartes aura*); migratory passerines, raptors; various squirrels.

**Current Status:** In Broward County low hammocks were associated with the Hillsboro River, Cypress Creek, Middle River, and New River systems. Extensive areas of hammock forests have been destroyed by urban development. Remnants are preserved within Secret Woods and Fern Forest Nature Centers.

### 8. Cypress Wetland Community

**General Description:** Cypress wetlands occupy the freshwater lowlands of the Atlantic Coastal Plain from the Carolinas to Florida, and along the Gulf of Mexico west to Texas. Temperate deciduous trees dominate areas which are seasonally flooded. Flooding is necessary for the germination of cypress seeds; however, once established young trees can grow in the absence of seasonal inundation.

**Geology and Soils:** Oolitic or bryozoan limestone substrate covered by a thin layer of sand and/or marl; organic soils accumulate in depressions; elevation 4-12 MSL.

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**Natural Influences:** Seasonal flooding; poorly drained land; seasonal changes in light intensity; drought; fire.

**Man's Influences:** Drainage; urbanization; agriculture; logging; salt water intrusion; introduction of exotics; illegal collection of plants.

**Dominant Plant Species:** Bald cypress (*Taxodium distichum*); Red Maple (*Acer rubrum*); Cocoplum (*Chrysobalanus icaco*); Wax Myrtle (*Myrica cerifera*); Dahoon Holly (*Ilex cassine*); Pond apple (*Annona glabra*); Leather Fern (*Acrostichum danaeifolium*); Royal Fern (*Osmunda regalis*); various bromeliads.

**Dominant Animal Species:** Raccoon (*Procyon lotor*); Opossum (*Didelphis marsupialis*); Armadillo (*Dasyus novemcinctus*); Screech Owl (*Otus asio*); Water Moccasin (*Agkistrodon piscivorus*); Box turtle (*Terrapene carolina bauri*); various woodpeckers; various tree frogs.

**Current Status:** Large strands of cypress swamp existed in central Broward County along the historic Hillsborough, Cypress Creek, and New River floodways. Although drainage has allowed for the development of much of our freshwater wetlands, examples of this plant community remain preserved within Tradewinds, Secret Woods, Easterlin, and Fern Forest county parks.

### 9. Everglades Community

**General Description:** The Everglades is a flat expanse of freshwater wetland dominated by sawgrass and dotted with tree islands. Lake Okeechobee lies at the head of this shallow, water filled basin. Before drainage canals were constructed, the water from the lake overflowed into the northern Everglades and, augmented by rainfall, moved slowly southward. Although this sheetflow has been manipulated by man, freshwater remains the key to the survival of the Everglades.

**Geology and Soils:** Miami limestone or Ft. Thompson formation covered with a thin layer of marl limestone, surface soil a rich organic muck or peat; elevation in Broward County 7-8 MSL.

**Natural Influences:** Seasonal inundation for approximately six months; sheet flow; drought; fire; alligator holes.

**Man's Influences:** Water management practices; agriculture; introduction of exotic plants; roadways which impede sheet flow; salt water intrusion; elimination of deer predators; man-made fires; airboats; swamp buggies.

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**Dominant Plant Species:** Sawgrass (*Cladium jamaicensis*); Coastal Plain Willow (*Salix caroliniana*); Wax Myrtle (*Myrica cerifera*); Elderberry (*Sambucus canadensis*); Cattail (*Typha* spp.); Canna Lily (*Canna flaccida*); periphyton; various ferns.

**Dominant Animal Species:** Alligator (*Alligator mississippiensis*) (T); Snail Kite (*Rostrhamus sociabilis*); Apple Snail (*Pomocea paludosa*); Largemouth Bass (*Micropterus salmoides*); bream (*Lepomis* spp.); gar (*Lepisosteus* spp.); crayfish; various water snakes and frogs.

**Current Status:** The Everglades is a unique ecosystem occurring only in south Florida. Historically the Everglades covered an area of 3,900 square miles from Lake Okeechobee to the Gulf of Mexico and Florida Bay. But its great size alone cannot protect this ecosystem from the disruptive effects of water management practices and commercial agriculture. Approximately 500,000 acres of sawgrass have been destroyed; the remaining sawgrass communities have been impacted in varying degrees. The Conservation Areas and the Everglades Buffer Strip in western Broward County are representative of the Everglades Community.

Source: Interpretive Section of the Broward County Parks and Recreation Division, 1987.

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## Appendix B

### Endangered and Threatened Plants and Animals Broward County 2005

| Scientific<br>Name                                     | Common<br>Name  | Designated Status |     |       |
|--|---|-------------------|-----|-------|
|  |   | FGFWFC            | FDA | USFWS |
| <b>Plants</b>  |   |                   |     |       |
| <i>Acrosichum aureum</i>                               | Gold leather fern   |                   |     | E     |
| <i>Acrostichum danaeifolium</i>                        | Giant leather fern  |                   |     | T     |
| <i>Anemia adiantifolia</i>                             | Pine fern   |                   |     | T     |
| <i>Asclepias curtissii</i>                             | Curtiss' milkweed   |                   |     | T     |
| <i>Asplenium abscissum</i>                             | Spleenwort (unnamed)  |                   |     | T     |
| <i>Asplenium serratum</i>                              | Bird's nest spleenwort;<br>wild birdnest fern                           |                   |     | E     |
| <i>Asplenium trichomanes</i> $\square$ <i>dentatum</i> | Spleenwort (unnamed)  |                   |     | T     |
| <i>Bletia purpurea</i>                                 | Pine pink   |                   |     | T     |
| <i>Campyloneurum phyllitidus</i>                       | Strap fern (unnamed)  | T                 |     |       |
| <i>Catopsis floribunda</i>                             | Air plant (unnamed)   |                   |     | E     |
| <i>Chrysophyllum olivaeforme</i>                       | Satinleaf   |                   |     | E     |
| <i>Coccothrinax argentata</i>                          | Silver palm   |                   |     | C     |
| <i>Cocos nucifera</i>                                  | Coconut palm  | T                 |     |       |
| <i>Ctenitis sloanei</i>                                | Comb fern (unnamed)   | T                 |     |       |
| <i>Ctenitis submarginalis</i>                          | Comb fern (unnamed)   | T                 |     |       |
| <i>Encyclia cochleata</i>                              | Shell orchid;<br>clamshell orchid                                       |                   |     | T     |
| <i>Encyclia tampensis</i>                              | Butterfly orchid  |                   |     | T     |
| <i>Epidendrum difforme</i>                             | Unbelled epidendrum   | T                 |     |       |
| <i>Epidendrum nocturnum</i>                            | Night $\square$ scent orchid;<br>night $\square$ smelling<br>epidendrum |                   |     | T     |
| <i>Epidendrum rigidum</i>                              | Rigid epidendrum  |                   |     | T     |
| <i>Ernodia littoralis</i>                              | Beach creeper   | T                 |     |       |
| <i>Eulophia alta</i>                                   | Wild coco; ground<br>coco   |                   |     | T     |
| <i>Habenaria odontopetala</i>                          | Rein orchid (unnamed)   |                   |     | T     |
| <i>Monotropa brittonii</i>                             | Scrub Indian pipes;<br>Britton's pinesap                                |                   |     | UR2   |
| <i>Myrcianthes fragrans</i><br>var. <i>simpsonii</i>   | Simpson's stopper;<br>twinberry   |                   |     | UR2   |
| <i>Nephrolepis biserrata</i>                           | Boston fern (unnamed)   |                   |     | T     |

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|                                |                                  |   |     |     |
|--------------------------------|----------------------------------|---|-----|-----|
| <i>Okenia hypogaea</i>         | Burrowing four-o'clock           |   | E   |     |
| <i>Ophioglossum palamatum</i>  | Hand adder's tongue fern         |   | E   | UR% |
| <i>Osmunda regalis</i>         | Royal fern                       |   | C   |     |
| <i>Peperomia floridana</i>     | Everglades peperomia             | E | UR2 |     |
| <i>Phlebodium aureum</i>       | Golden polypody                  |   | T   |     |
| <i>Pleopeltis revoluta</i>     | Star-scale fern                  | T |     |     |
| <i>Polypodium ptilodon</i>     | Polypody fern (unnamed)          |   | T   |     |
| <i>Psilotum nudum</i>          | Whisk fern; fork fern            | T |     |     |
| <i>Pteris longifolia</i>       | Ladder brake fern                |   | T   |     |
| <i>Pteris tripartita</i>       | Giant brake fern                 |   | T   |     |
| <i>Pteris vittata</i>          | Brake fern (unnamed)             | T |     |     |
| <i>Remirea maritima</i>        | Beach star                       |   | E   |     |
| <i>Sabal etonia</i>            | Scrub palmetto                   |   | T   |     |
| <i>Scaevola plumieri</i>       | Inkberry                         |   | T   |     |
| <i>Selaginella arenicola</i>   | Sand spikemoss                   |   | T   |     |
| <i>Suriana maritima</i>        | Bay cedar                        |   | E   |     |
| <i>Tectaria heracleifolia</i>  | Halberd fern (unnamed)           |   | T   |     |
| <i>Tectaria incisa</i>         | Halberd fern (unnamed)           |   | T   |     |
| <i>Thelypteris dentata</i>     | Downy shield fern                |   | T   |     |
| <i>Thelypteris interrupta</i>  | Aspidium fern (unnamed)          |   | T   |     |
| <i>Thelypteris kunthii</i>     | Aspidium fern (unnamed)          |   | T   |     |
| <i>Thelypteris ovata</i>       | Aspidium fern (unnamed)          |   | T   |     |
| <i>Thelypteris palustris</i>   | Marsh fern                       |   | T   |     |
| <i>Thelypteris reptans</i>     | Creeping fern                    | T |     |     |
| <i>Tillandsia balbisiana</i>   | Wild pine; air plant (unnamed)   |   | T   |     |
| <i>Tillandsia circinata</i>    | Wild pine; air plant (unnamed)   |   | T   |     |
| <i>Tillandsia fasciculata</i>  | Common wild pine                 |   | C   |     |
| <i>Tillandsia flexuosa</i>     | Twisted air plant                |   | T   |     |
| <i>Tillandsia paucifolia</i>   | Wild pine; air plant (unnamed)   |   | T   |     |
| <i>Tillandsia polystachia</i>  | Wild pine; air plant (unnamed)   |   | T   |     |
| <i>Tillandsia setacea</i>      | Wild pine; air plant (unnamed)   |   | T   |     |
| <i>Tillandsia utriculata</i>   | Giant wild pine; giant air plant |   | C   |     |
| <i>Tillandsia valenzuelana</i> | Wild pine; air plant (unnamed)   |   | T   |     |
| <i>Trismeria trifoliata</i>    | Bracken fern (unnamed)           |   | T   |     |
| <i>Vittaria lineata</i>        | Shoestring fern                  |   | T   |     |

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|                            |                          |     |                       |
|----------------------------|--------------------------|-----|-----------------------|
| Zamia integrifolia         | Florida arrowroot        | C   | UR5                   |
| <b>Animals</b>             |                          |     |                       |
| Chenille mydas mydas       | Atlantic Green Turtle    | E   | E                     |
| Eretmochelys imbricata     | Atlantic Hawksbill       | E   | E                     |
| imbricata                  | Turtle                   |     |                       |
| Caretta caretta caretta    | Atlantic Loggerhead      | T   | T                     |
|                            | Turtle                   |     |                       |
| Dermochelys coriacea       | Leatherback Turtle       | E   | E                     |
| Gopherus polyphemus        | Gopher Tortoise          | SSC | UR2                   |
| Alligator mississippiensis | American alligator       | SSC | T(S/A)                |
| Trichechus manatus         | West Indian Manatee      | E   | <del>E</del> <u>T</u> |
| latirostris                |                          |     |                       |
| Rana areolata              | Florida gopher frog      | SSC | UR2                   |
| Crocodylus acutus          | American crocodile       | E   | E                     |
| Drymarchon corais couperi  | Eastern Indigo snake     | T   | T                     |
| Tantilla oolitica          | Miami Black headed snake | T   | UR2                   |
| Falco peregrinus           | Peregrine Falcon         | E   | E                     |
| Pelecania occidentalis     | Eastern Brown Pelican    | T   | E                     |
| carolinensis               |                          |     |                       |
| Pandion halieotus          | Osprey                   | SSC |                       |
| Falco sparverius paulus    | Southeastern American    |     |                       |
|                            | kestrel                  | T   | UR2                   |
| Haenatopus palliatus       | American oyster catcher  | SSC |                       |
| Sterna antillarum          | Least tern               | T   |                       |
| Aphelocoma coerulescens    | Florida Scrub jay        | T   | UR2                   |
| coerulescens               |                          |     |                       |

Plant list was updated by the Broward County Parks and Recreation Division in 1988.

Animal list was updated by the Broward County Cooperative Extension.

- ~~FGFWFC~~  ~~Florida Game and Fresh Water Fish Commission~~
- [FWC](#)  [Florida Fish and Wildlife Conservation Commission](#)
- FDA  Florida Department of Agriculture
- USFWS  U.S. Fish and Wildlife Service
- C  Commercially exploited
- E  Endangered
- T  Threatened
- T(S/A)  Threatened Due to Similarity of Appearance
- SSC  Species of Special Concern

## CONSERVATION ELEMENT

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- UR1  Under review for federal listing, with substantial evidence in existence indicating at least some degree of biological vulnerability and/or threat.
- UR2  Under review for listing, but substantial evidence of biological vulnerability and/or threat is lacking.

Sources: Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida, Florida Game and Fresh Water Fish Commission, 1987.

Florida Cooperative Extension Service.

# CONSERVATION ELEMENT

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## Appendix C

### Birds Sighted in Regional Parks Broward County 2005

The vast diversity of plant habitats found in South Florida provide either temporary or permanent homes for over 250 species of birds. More than 200 species of birds have been sighted in the Broward County Regional Parks. Hardwood hammocks, cypress wetlands and pine flatwoods are among the habitats preserved in the parks for human recreation and wildlife habitat.

Following is a list of birds which have been sighted in Broward County regional parks. The specific parks in which sightings have taken place are noted.

Park abbreviations are as follows:

- M  Markham
- E  Easterlin
- T  Tradewinds
- S  Secret Woods
- TT  Tree Tops
- F  Fern Forest
- W  West Lake
- Q  Quiet Waters
- D  Deerfield Island
- H  Heritage

The abundance notations are in accordance with "Checklist of Southern Florida Birds" compiled by Dr. Ira Joel Abramson and Dr. Oscar T. Owre for the Tropical Audubon Society. The abundance symbols are:

- C  common; often seen or heard in appropriate habitat.
- U  uncommon; usually present, but not always heard or seen.
- R  rare; present in appropriate habitats only small numbers, and seldom seen or heard.
- r  resident; present all year, although abundance may vary seasonally.
- s  summer visitor (includes spring and fall).
- w  winter visitor (includes spring and fall).
- m  migrant; present ordinarily only in migration.
- o  occasional or casual visitor.

Source: Interpretive Section of the Broward County Parks and Recreation Division.

## CONSERVATION ELEMENT

| <u>Bird</u>                    | <u>Abd.</u> | <u>Parks</u>               |
|--------------------------------|-------------|----------------------------|
| Common Loon                    | Uw          | W, H                       |
| Pied billed Grebe              | Cw          | M, E, T, TT, W, Q, H       |
| Brown Pelican                  | Cr          | W, D                       |
| Double crested Cormorant       | Cr          | M, T, W, Q, D, H           |
| American Anhinga               | Cr          | M, E, T, S, TT, W, Q, H    |
| Magnificent Frigatebird        | Cr          | W                          |
| Great Blue Heron (Great White) | Cr          | W, H                       |
| Great Blue Heron               | Cr          | M, E, T, S, TT, W, Q, D, H |
| Green backed Heron             | Cr          | M, E, T, S, TT, F, W, Q, H |
| Little Blue Heron              | Cr          | M, E, T, S, TT, W, Q, D, H |
| Cattle Egret                   | Cr          | M, E, T, S, TT, F, W, Q, H |
| Reddish Egret                  | Ur          | W                          |
| Great Egret                    | Cr          | M, E, T, TT, F, W, Q, D, H |
| Snowy Egret                    | Cr          | M, E, S, TT, W, H          |
| Tri color Heron                | Cr          | M, E, T, S, TT, W, Q, D, H |
| Black crowned Night Heron      | Ur          | M, W, H                    |
| Yellow crowned Night Heron     | Cr          | E, S, W, D, H              |
| Least Bittern                  | Ur          | M, H                       |
| American Bittern               | Ur          | M, H                       |
| Wood Stork                     | Cr          | M, T, TT, W                |
| Glossy Ibis                    | Cr          | M, H                       |
| White Ibis                     | Cr          | M, T, W, D, H              |
| Scarlet Ibis                   | Rr          | W                          |
| Roseate Spoonbill              | Cr          | W                          |
| Fulvous Whistling Duck         | Cr          | W                          |
| Mottled Duck                   | Cr          | M, H                       |
| Blue winged Teal               | Cw          | M, E, W                    |
| American Wigeon                | Cw          | M                          |
| Northern Shoveler              | Cw          | M                          |
| Ring necked Duck               | Cw          | M, E, W, Q                 |
| Lesser Scaup                   | Cw          | M, W, H                    |
| Ruddy Duck                     | Uw          | M                          |
| Red breasted Merganser         | Cw          | S, W                       |
| Turkey Vulture                 | Cr          | All                        |
| Black Vulture                  | Cr          | M, S, TT, F, H             |
| Snail Kite                     | Rr          | M                          |
| Sharp shinned Hawk             | Uw          | All                        |
| Cooper's Hawk                  | Uw          | M, H                       |
| Red tailed Hawk                | Ur          | M, E, T, S, TT, F, W, H    |
| Red shouldered Hawk            | Cr          | M, E, T, S, TT, F, W, Q, H |
| Broad winged Hawk              | Cm          | M, E, S, TT, W, Q, H       |
| Bald Eagle                     | Ur          | T                          |

## CONSERVATION ELEMENT

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|                           |    |                    |
|---------------------------|----|--------------------|
| Northern Harrier          | Cw | M,T,H              |
| Osprey                    | Cr | E,S,F,W,Q,D,H      |
| Peregrine Falcon          | Uw | E,W                |
| Merlin                    | Uw | M,E,S,TT,W,Q,H     |
| American Kestrel          | Cw | All                |
| Common Bobwhite           | Cr | M,T,S,TT,F,H       |
| Sandhill Crane            | Ur | H                  |
| Limpkin                   | Cr | M,H                |
| King Rail                 | Cr | M                  |
| Clapper Rail              | Ur | W                  |
| Sora                      | Cw | M                  |
| Purple Gallinule          | Cr | M                  |
| Common Moorhen            | Cr | M,E,T,S,TT,F,W,Q,H |
| American Coot             | Cw | M,E,T,F,W,Q,H      |
| American Oystercatcher    | Rw | W                  |
| Semipalmated Plover       | Cw | W                  |
| Piping Plover             | Uw | W                  |
| Wilson's Plover           | Ur | W                  |
| Killdeer                  | Ur | M,E,T,S,F,W,H      |
| Black-bellied Plover      | Cw | W                  |
| Common Snipe              | Cw | M,H                |
| Whimbrel                  | Rm | W                  |
| Spotted Sandpiper         | Cw | M,E,T,S,W,Q,D,H    |
| Solitary Sandpiper        | Um | M,E,W              |
| Willet                    | Cr | W                  |
| Ruddy Turnstone           | Cw | W                  |
| Greater Yellowlegs        | Cw | E,W,H              |
| Lesser Yellowlegs         | Cw | E,W,H              |
| Red Knot                  | Uw | W                  |
| Pectoral Sandpiper        | Um | M,H                |
| White-rumped Sandpiper    | Um | W                  |
| Least Sandpiper           | Cw | M,E,W              |
| Dunlin                    | Cw | W                  |
| Short-billed Dowitcher    | Cw | W                  |
| Stilt Sandpiper           | Um | W                  |
| Semipalmated Sandpiper    | Cw | W                  |
| Western Sandpiper         | Cw | W                  |
| Sanderling                | Cw | W                  |
| Black-necked Stilt        | Cs | M,E,T,W,H          |
| Greater Black-backed Gull | Uw | W                  |
| Herring Gull              | Dw | W,D,H              |
| Ring-billed Gull          | Cw | E,S,W,D,H          |
| Laughing Gull             | Cr | E,S,W,D,H          |

## CONSERVATION ELEMENT

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|                           |    |                    |
|---------------------------|----|--------------------|
| Bonaparte's Gull          | Uw | W                  |
| Gull-billed Tern          | Ur | M,W                |
| Forster's Tern            | Cw | M,E,W              |
| Common Tern               | Uw | W                  |
| Little Tern               | Cs | E,F,W,D,H          |
| Royal Tern                | Cr | S,F,W,D            |
| Sandwich Tern             | Cr | W                  |
| Caspian Tern              | Uw | M,W,H              |
| Black Tern                | Cm | M,W,H              |
| Black Skimmer             | Cr | E,W,Q,H            |
| Rock Dove                 | Cr | M,E,T,S,TT,F,Q,H   |
| White-winged Dove         | Rr | TT,H               |
| Mourning Dove             | Cr | All                |
| Ground Dove               | Cr | M,E,W,H            |
| Canary-winged Parakeet    | Cr | S,H                |
| Red-fronted Amazon        | Rr | E                  |
| Yellow-billed Cuckoo      | Cs | All                |
| Black-billed Cuckoo       | Um | E                  |
| Smooth-billed Ani         | Cr | M,E,T,S,TT,F,W,Q,H |
| Barn Owl                  | Cw | M,TT,F,H           |
| Common Screech Owl        | Cr | M,E,T,S,TT,F,H     |
| Great Horned Owl          | Ur | T,F,Q,D            |
| Burrowing Owl             | Ur | M,H                |
| Chuck-will's-widow        | Cr | M,E,T,S,TT,F,H     |
| Whip-poor-will            | Cw | E                  |
| Common Nighthawk          | Cs | All                |
| Chimney Swift             | Rm | E,H                |
| Ruby-throated Hummingbird | Uw | E,T,S,TT,F,H       |
| Belted Kingfisher         | Cw | All                |
| Common Flicker            | Cr | M,E,T,S,TT,F,W,Q,H |
| Pileated Woodpecker       | Ur | E,T,S,TT,F,W,D,H   |
| Red-bellied Woodpecker    | Cr | All                |
| Yellow-bellied Sapsucker  | Cw | All                |
| Downy Woodpecker          | Ur | M,E,T,S,TT,F,W,H   |
| Eastern Kingbird          | Cm | M,E,T,S,W,H        |
| Gray Kingbird             | Cs | S,W                |
| Western Kingbird          | Uw | E                  |
| Eastern Phoebe            | Cw | M,E,H              |
| Great Crested Flycatcher  | Cr | E,S,D,H            |
| Eastern Pewee             | Um | M,E,T,S,TT,F,H     |
| Tree Swallow              | Cw | All                |
| Bank Swallow              | Um | M                  |
| Rough-winged Swallow      | Cw | All                |

## CONSERVATION ELEMENT

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|                              |    |                    |
|------------------------------|----|--------------------|
| Barn Swallow                 | Cm | All                |
| Cliff Swallow                | Um | M                  |
| Purple Martin                | Cm | M,E,T,S,TT,F,Q,H   |
| Blue Jay                     | Cr | M,E,T,S,TT,F,D,H   |
| Fish Crow                    | Cr | All                |
| House Wren                   | Cw | M,E,T,S,TT,F,W,Q,H |
| Carolina Wren                | Cr | M,E,T,S,TT,F,H     |
| Northern Mockingbird         | Cr | All                |
| Gray Catbird                 | Cw | All                |
| Brown Thrasher               | Ur | M,E,T,S,TT,F,W,H   |
| American Robin               | Cw | M,E,T,S,TT,F,W,Q,H |
| Wood Thrush                  | Rm | E                  |
| Hermit Thrush                | Uw | M,E,F              |
| Swainson's Thrush            | Um | E,S,F              |
| Gray-cheeked Thrush          | Rm | E,T,S,TT           |
| Veery                        | Um | M,E,T,S,TT,F       |
| Blue-gray Gnatcatcher        | Cw | All                |
| Ruby-crowned Kinglet         | Uw | M,E,T,S,TT,F       |
| Cedar Waxwing                | Cw | All                |
| Loggerhead Shrike            | Cr | M,T,H              |
| European Starling            | Cr | E,T,S,TT,F,H       |
| White-eyed Vireo             | Cr | M,E,T,S,TT,F,W,Q,H |
| Yellow-throated Vireo        | Cm | M,E,T,S,TT,F       |
| Solitary Vireo               | Cm | M,E,T,S,TT,F,H     |
| Black-whiskered vireo        | Cs | E,TT,W,H           |
| Red-eyed Vireo               | Um | M,E,T,S,TT,F,W,H   |
| Black-and-White Warbler      | Cw | All                |
| Prothonotary Warbler         | Um | M,E,S              |
| Swainson's Warbler           | Rm | E                  |
| Worm-eating Warbler          | Um | M,E,T,S,TT,F,W,H   |
| Tennessee Warbler            | Rm | E,S,H              |
| Orange-crowned Warbler       | Uw | M,E,T,S,TT,F,H     |
| Nashville Warbler            | Rm | E                  |
| Northern Parula Warbler      | Cw | All                |
| Yellow Warbler               | Ur | E,F,W,H            |
| Magnolia Warbler             | Um | E,H                |
| Cape May Warbler             | Cm | All                |
| Black-throated Blue Warbler  | Cm | All                |
| Yellow-rumped Warbler        | Cw | All                |
| Black-throated Green Warbler | Um | E,S,TT             |
| Blackburnian Warbler         | Rm | E,S,H              |
| Yellow-throated Warbler      | Ur | E,S,H              |
| Chestnut-sided Warbler       | Um | E,S                |

## CONSERVATION ELEMENT

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|                        |    |               |
|------------------------|----|---------------|
| Bay-breasted Warbler   | Um | E             |
| Blackpoll Warbler      | Cm | All           |
| Pine Warbler           | Ur | M             |
| Prairie Warbler        | Cw | All           |
| Palm Warbler           | Cw | All           |
| Ovenbird               | Cw | All           |
| Northern Waterthrush   | Uw | All           |
| Louisiana Waterthrush  | Rw | E             |
| Kentucky Warbler       | Um | E             |
| Connecticut Warbler    | Rm | M,E,H         |
| Common Yellowthroat    | Cr | All           |
| Yellow-breasted Chat   | Uw | E,S           |
| Hooded Warbler         | Uw | E,H           |
| Wilson's Warbler       | Um | E             |
| Canada Warbler         | Um | E             |
| American Redstart      | Cm | All           |
| House Sparrow          | Cr | All           |
| Bobolink               | Cm | M,E,H         |
| Eastern Meadowlark     | Cr | M,TT,H        |
| Red-winged Blackbird   | Cr | All           |
| Spotted Oriole         | Cr | E,T,S,H       |
| Northern Oriole        | Cw | E,S,H         |
| Boat-tailed Grackle    | Cr | M,E,T,S,T,D,H |
| Common Grackle         | Cr | All           |
| Brown-headed Cowbird   | Uw | M,H           |
| Stripe-headed Tanager  | Ro | E             |
| Western Tanager        | Rm | E             |
| Scarlet Tanager        | Um | E,S           |
| Summer Tanager         | Ur | E,S,H         |
| Northern Cardinal      | Cr | All           |
| Rose-breasted Grosbeak | Cm | E,S,H         |
| Blue Grosbeak          | Um | E             |
| Indigo Bunting         | Cw | E,T,S,TT,F,H  |
| Painted Bunting        | Cw | E,T,S,TT,F,H  |
| American Goldfinch     | Cw | All           |
| Rufous-sided Towhee    | Ur | M,E,T,H       |
| Savannah Sparrow       | Cw | M,E,F,H       |
| Grasshopper Sparrow    | Ur | M,F,H         |
| Chipping Sparrow       | Rw | M             |
| Swamp Sparrow          | Cr | M             |

## CONSERVATION ELEMENT

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### Appendix D

#### Wetlands Unincorporated Area 1981

| <u>Sector</u> | <u>Type Wetland</u> | <u>Acreage</u> |
|---------------|---------------------|----------------|
| SW            | Cypress             | 37             |
| SW            | Sawgrass            | 92             |
| SE            | Mangrove            | 43             |
| SW            | Melaleuca           | 3,076          |
| SW            | Sawgrass            | 1,647          |
| SW            | Sawgrass            | 463            |
|               |                     | 5,358          |

Source: South Florida Water Management District Land Use and Land Cover Classification Maps, 1981.

## CONSERVATION ELEMENT

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### Appendix DE

Local Areas of Particular Concern (LAPC) and  
Natural Resource Areas (NRA)  
Broward County  
2005

| <u>Site #</u> | <u>Site Name, Location, Description;<br/>Acreage; Municipal Jurisdiction</u>   | <u>Ecological Community<br/>Designation</u> |
|---------------|--|---|
| 2             | Pond cypress head (S36,T47S,R41E);<br>7 acres; Unincorporated Broward County;  | Cypress<br>NRA                              |
| 5             | Parkside Drive (cypress head, figs, pond<br>apples, bromeliads); 3 acres; Parkland   | Cypress<br>NRA                              |
| 8             | Slash pine/cypress (S. of Holmberg Road,<br>W. of NW 87 Avenue); 30 acres; Parkland<br>Acquired by Broward County utilizing park<br>impact fees.                                   | Pine flatwoods, Cypress<br>LAPC             |
| 10            | Three cypress heads (W. of U.S. 441, S. of<br>Sawgrass Expressway); 13 acres; Coral Springs<br>Preserved by development agreement within<br>the Coral Creek development.           | Cypress<br>NRA                              |
| 11            | Cypress head with fern understory (W. of<br>U.S. 441, 8 acres; Coral Springs;<br>Preserved as City park.   | Cypress<br>NRA                              |
| 12            | Cypress head with bromeliads (Wiles Road<br>and U.S. 441);5 acres; <b>Coral Springs</b> ;  | Freshwater swamp<br>NRA                     |
| 13            | Rumors Site (Turtle Run);<br>68 acres; Coral Springs;<br>Parcel north of Sample Road acquired<br>jointly by City/County for park. Parcel<br>south of Sample Road on City ESL list. | Pine flatwoods/Cypress<br>LAPC; NRA         |

CONSERVATION ELEMENT

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| <b><u>Site #</u></b> | <b><u>Site Name, Location, Description;<br/>Acreage; Municipal Jurisdiction</u></b>   | <b><u>Ecological Community<br/>Designation</u></b> |
|----------------------|---|--|
| 14                   | Bosco Site (slash pineland with cypress);<br>44 acres; Coral Springs; Purchased by<br>Coral Springs   | Pine flatwoods<br>LAPC; NRA                        |
| 19A                  | Hillsboro Pineland ESL;(N. of<br>Hillsboro Boulevard, E. of U.S. 441);<br>90 acres (A,B, and C); Coconut Creek;<br>Majority of site purchased by County.    | Pine flatwoods<br>LAPC; NRA                        |
| 20C                  | E. of Lyons Road, S. of Hillsboro Canal;<br>13 acres; Unincorporated Broward County;  | Pine flatwoods<br>LAPC; NRA                        |
| 26                   | Part of Winston Park Nature Preserve;<br>Wilburn Road; 5 acres; Coconut Creek;<br>Land donated to Coconut Creek   | Cypress, pine flatwoods<br>LAPC; NRA               |
| 27                   | Maple Swamp/Cypress;<br>11 acres; Coconut Creek;<br>Site purchased by Broward County.   | Cypress (freshwater swamp)<br>LAPC; NRA            |
| 28A                  | Tradewinds ESL; Adjacent to Tradewinds Park;<br>31 acres; Coconut Creek;<br>Site purchased by Broward County.   | Pine flatwoods<br>LAPC; NRA                        |
| 28B                  | Vinkemulder Road (cypress);<br>9 acres; Coconut Creek; owned by<br>Broward County   | Cypress<br>LAPC; NRA                               |
| 33                   | The Jungle;<br>23 acres; Unincorporated Broward County;<br>Site purchased by Broward County.  | Sand pine scrub<br>LAPC; NRA                       |
| 34                   | Military Trail ESL; Pineland between<br>Crystal Point and Discovery<br>Point; 20 acres; Unincorporated Broward<br>County; Site purchased by Broward County. | Pine flatwoods<br>LAPC; NRA                        |
| 35                   | Cullum Road Cypress Head;<br>14 acres; Coconut Creek;   | Cypress<br>LAPC; NRA                               |

## CONSERVATION ELEMENT

| <u>Site #</u> | <u>Site Name, Location, Description;<br/>Acreage; Municipal Jurisdiction</u>  | <u>Ecological Community<br/>Designation</u>           |
|---------------|---|---|
| 40            | Crystal Lake ESL; NE 3rd Avenue and<br>NE 31 Court; 28 acres;<br>Unincorporated Broward County;<br>Site purchased by Broward County.          | Sand pine scrub<br>LAPC; NRA                          |
| 41            | Rosemary Scrub, Sample McDougald Estate<br>(National Register);<br>7 acres; Unincorporated Broward County;                                    | NRA   |
| 42            | Pompano Air Park, pine scrub<br>81 acres; Pompano Beach;  | Sand pine scrub<br>LAPC                               |
| 44A           | Oak Hammock, Maple Swamp<br>(mixed mesophytic forest);<br>5 acres; Coconut Creek  | Low hammock and<br>Freshwater swamp<br>LAPC; NRA      |
| 44B           | Cypress, hardwoods, N. of Atlantic Boulevard;<br>6 acres; Coconut Creek;  | Low hammock<br>LAPC; NRA                              |
| 45            | Fern Forest buffer (tropical hardwood<br>hammock); 19 acres; Coconut Creek;<br><b>Under development review; majority to<br/>be preserved.</b> | High hammock<br>LAPC; NRA                             |
| 47            | Freidt Kennerly Tract<br>10.5 acres; Hillsboro Beach;<br>Eastern dune area preserved thru<br>development agreement.                           | Beach dune, Coastal<br>strand forest<br><br>LAPC; NRA |
| 51            | NW 79 and NW 80 Avenues (slash pine)<br>19 acres; Tamarac;<br>Site purchased by Broward County.   | Pine flatwoods<br>LAPC; NRA                           |
| 61            | Gopher Tortoise Preserve;<br>16.5 acres; Fort Lauderdale;   | Rosemary scrub/Sand<br>pine scrub<br>LAPC; NRA        |
| 64            | Scrub site (N. of Cypress Creek Road, E. of<br>NW 21 Avenue); 12.5 acres; Fort Lauderdale;  | Sand pine scrub<br>LAPC; NRA                          |

CONSERVATION ELEMENT

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| <b><u>Site #</u></b> | <b><u>Site Name, Location, Description;<br/>Acreage; Municipal Jurisdiction</u></b>  | <b><u>Ecological Community<br/>Designation</u></b> |
|----------------------|--|--|
| 66                   | May Tract (Reflections plat LAPC);<br>12 acres; Fort Lauderdale;   | Freshwater swamp<br>LAPC; NRA                      |
| 69                   | Prospect Road ESL; (W. of NW 21<br>Avenue, S. of Commercial);<br>8 acres; Fort Lauderdale; purchased<br>by Broward County  | Low hammock<br>LAPC; NRA                           |
| 73                   | Carpenters Union Scrub;<br>6 acres; Oakland Park;  | Sand pine scrub<br>LAPC; NRA                       |
| 76                   | Kapok Tree Oak Hammock;<br>38 acres; Davie;<br>Site purchased by Broward County.   | High hammock<br>LAPC; NRA                          |
| 77                   | Long Key Ridge tropical hardwood hammock;<br>25 acres; Davie;<br>Joint purchase Davie/Broward County.  | High hammock<br>LAPC; NRA                          |
| 78                   | Peter's Road scrub/Pine Ridge Nature Trail;<br>28 acres; Unincorporated Broward County;  | Sand pine scrub<br>LAPC; NRA                       |
| 79                   | Pine Island Ridge;<br>130 acres; Davie;<br>Joint County/State purchase of 108 acres.   | High hammock<br>LAPC; NRA                          |
| 90                   | Secret Woods Buffer (Mixed hardwood<br>swamp); 15 acres; City of Dania; Purchased<br>by Broward County   | Freshwater swamp<br>LAPC; NRA                      |
| 93                   | Mangrove Swamp connected to Manatee<br>Sanctuary; 11 acres; Unincorporated<br>Broward County; Portion of site developed<br>with small mangrove stand preserved thru<br>developers agreement. | Mangrove swamp<br>LAPC; NRA                        |

CONSERVATION ELEMENT

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| <b>Site #</b> | <b><u>Site Name, Location, Description;<br/>Acreage; Municipal Jurisdiction</u></b>   | <b><u>Ecological Community<br/>Designation</u></b> |
|---------------|---|--|
| 95            | Southport Mangrove Swamp near Port Turning Notch; 40 acres; Hollywood;<br>Reduced in size due to turning notch, remainder preserved by conservation easement.   | Mangrove swamp<br>LAPC; NRA                        |
| 97            | White mangroves, tidally influenced (Dania Canal); 21 acres; Dania;   | Mangrove swamp<br>LAPC; NRA                        |
| 98            | White mangroves;<br>54 acres; Dania;  | Mangrove swamp<br>LAPC; NRA                        |
| 105           | Pond apple (FPL, I-95 mitigation);<br>10 acres; Unincorporated Broward County;<br>FDOT ownership; to be transferred to County.  | Freshwater swamp<br>NRA                            |
| 110           | Large oak and slash pine;<br>5 acres; Unincorporated Broward County;  | High hammock<br>NRA                                |
| 117           | Oak woodland next to John Williams Park;<br>15 acres; Hollywood;<br>Proposed joint City/County/State purchase using Florida Community Trust funds.  | Low hammock<br>LAPC; NRA                           |
| 121           | Mangroves, salt marsh (borrichia) (E. of US 1, S. of Sheridan; 15 acres; Hollywood;<br>Site purchased by Broward County.  | Mangroves, salt marsh<br>LAPC; NRA                 |
| 122           | Everglades Buffer Strip (US 27 West to Levee); 3,600 acres; Unincorporated Broward County, Miramar, Pembroke Pines;<br>Under acquisition by South Florida Water Management District using a variety of funding sources. | Freshwater marsh<br>(Everglades)<br>LAPC           |
| 123           | Maple swamp (South Fork Middle River, I-95 and Oakland Park Boulevard);<br>20 acres; Fort Lauderdale;   | Freshwater swamp<br>LAPC; NRA                      |

## CONSERVATION ELEMENT

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| <b>Site #</b> | <b><u>Site Name, Location, Description;</u></b><br><b><u>Acreage; Municipal Jurisdiction</u></b>   | <b><u>Ecological Community</u></b><br><b><u>Designation</u></b> |
|---------------|--|---|
| 124A          | Four cypress heads (S. of Sawgrass Expy.);<br>13.5 acres; Coral Springs;<br>Preserved thru developers agreement as<br>private preserves. | Cypress<br>LAPC; NRA  |
| 124B          | Slash pine; cypress (S. of Sawgrass, E. of<br>Riverside Drive);<br>12 acres; Coral Springs.<br>Joint City/County purchase site.          | Cypress<br>Pine flatwood<br>LAPC; NRA                           |
| Source:       | Broward County Comprehensive Plan, 1989; and Department of Natural Resource<br>Protection, 1995.   |   |

## CONSERVATION ELEMENT

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Appendix EF  
Urban Wilderness Areas  
Broward County  
2005

1. Site Name: Secret Woods  
Location: Southeast Sector, unincorporated Broward County  
2701 W. State Road 84.  
Description: Approximately thirty-seven acres of low hammock including Laurel Oak, Live Oak, Strangler Fig, a Cypress-Maple Swamp, and a Mangrove-Pond Apple Community. Owned and operated by Broward County as a regional park. A designated Urban Wilderness Area.
2. Site Name: Fern Forest Nature Center  
Northwest Sector  
201 Lyons Road, South  
Pompano Beach  
Description: Two hundred fifty-four acres consisting of several plant communities, including high and low hammocks, pine flatwoods, and cypress wetland. Owned and operated by Broward County as interpretive nature center and passive recreation area. A designated Urban Wilderness Area.
3. Site Name: Easterlin Park  
Location: East Central Sector  
1000 N.W. 38th Avenue  
Oakland Park  
Description: Approximately forty-size acres of mixed cypress forest and hardwood hammock. Owned and operated by Broward County as a regional park. A designated Urban Wilderness Area.
4. Site Name: Deerfield Island Park  
Location: Northeast Sector, City of Deerfield Beach  
Intracoastal Waterway and north county line.  
Description: Fifty-six acres of developing coastal hammock. Leased to Broward County by the State of Florida for use as a public park. Accessible only by boat. A designated Urban Wilderness Area.
5. Site Name: Tivoli Sand Pine Preserve  
Location: Northeast Sector, City of Deerfield Beach  
South of Hillsboro Boulevard, between I-95 and Old Dixie Highway.  
Description: Encompassing twenty-three acres, this is one of the largest remaining stands of Sand Pine in Broward County. A designated Urban Wilderness Area. Under joint ownership by Broward County and the City of Deerfield

## CONSERVATION ELEMENT

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Beach.

### Appendix FG

#### Urban Wilderness Inventory Broward County 1995

1. Site Name: North New River Bend  
Location: Southeast Sector, unincorporated Broward County East of U.S. Route 441, north of State Road 84.  
Description: Approximately twenty acres of freshwater wetlands similar to those found on South Fork New River site. Site has been purchased and mitigation performed to offset impacts of the Resource Recovery Plant.
2. Site Name: Woodside Village  
Location: Northwest Sector, City of Coral Springs, West of Rock Island Road between Wiles Road and Sample Road.  
Description: Approximately eighty-six acre hardwood hammock community with Cabbage Palm and fern areas. Site has areas which have been disturbed by previous development. The site has been platted with a requirement for plat approval being dedication of approximately five acres.
3. Site Name: May Tract  
Location: Northeast Sector, City of Fort Lauderdale, East of Andrews Avenue Extension, north of Cypress Creek Road.  
Description: Originally thirty-five acres of hardwood swamp including Cypress and Maple trees. The site was illegally cleared by the property owner in 1981. A development requirement was a .5 acre preservation area and a 3.77 acre wetland restoration area.
4. Site Name: Cypress Lake  
Location: Northeast Sector, unincorporated Broward County Cypress Creek Road and I-95, east.  
Description: Approximately fifteen acres of Cypress and Red Maple wetlands existed at the time originally proposed as an Urban Wilderness Area. Presently developed as an office park with a 5 acre site preserved and maintained by the developer.
5. Site Name: South Fork New River  
Location: Southwest Sector, unincorporated Broward County, South of State Road 84 one-quarter mile east of U.S. Route 441.  
Description: Approximately 243 acres of freshwater wetlands including Cypress and

## CONSERVATION ELEMENT

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- Red Maple swamps. Contains 102-acre pond apple slough which has been designated as Ann Kolb Park, a passive recreation area. Approximately 200 acres have been purchased by FDOT as mitigation for I-595 environmental impacts. The remainder is owned by Florida Power and Light.
6. Site Name: Pompano Airport Natural Arboretum  
Location: Northeast Sector, City of Pompano Beach Pompano Airport  
Description: Approximately thirty-five acres of Sand Pine scrub owned by the City of Pompano Beach. Some disturbance to the site.
7. Site Name: Secret Woods Buffer  
Location: Southeast Sector, City of Dania, North side of State Road 84 approximately one mile west of I-95.  
Description: Approximately twenty acres of the same types of communities found at Secret Woods. This site has been acquired by Broward County.
8. Site Name: Pine Ridge Nature Trail  
Location: East Central Sector, unincorporated Broward County S. W. 46th Avenue, south of Peters Road.  
Description: Approximately thirty acres of Sand Pine scrub community. Overlies a wellfield owned by the City of Fort Lauderdale.
9. Site Name: North Beach  
Location: Southeast Sector, City of Hollywood between U.S. Route A1A and the Atlantic Ocean, bounded on north by Franklin Street and on south by Charleston Street.  
Description: Approximately twenty-four acres of coastal strand vegetation. Contains the last remaining environmentally stable sand dune in Broward County. Purchased by the State of Florida; leased by Broward County as part of the Hollywood North Beach Site.
10. Site Name: Swamp 02  
Location: Northwest Sector, City of Coral Springs, North of Wiles Road, approximately one mile west of U.S. Route 441.  
Description: Cypress-Maple forested wetland of approximately fourteen acres. Owned and operated by City of Coral Springs as a park.
11. Site Name: Leitner Tact (Whispering Woods)  
Location: Northwest Sector, City of Coral Springs, North of Wiles Road, east of Riverside Drive.  
Description: Four parcels totalling 16.8 acres of Slash Pine and Cypress.

## CONSERVATION ELEMENT

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12. Site Name: Executive Airport Gopher Tortoise Preserve  
Location: Northeast Sector, City of Fort Lauderdale, Northwest portion of Fort Lauderdale Executive Airport.  
Description: Approximately fourteen acres of Rosemary scrub which provides a habitat for the Gopher Tortoise, a Species of Special Concern.
13. Site Name: Forman Tract  
Location: East of Parkside Drive, between Holmberg Road and Loxahatchee Road in the City of Parkland  
Description: Approximately twenty acres of slash pine and cypress wetlands. Excellent pineland with good plant diversity. Pond cypress head on southern and eastern perimeters. Acquired by Broward County. To be managed by the City of Parkland.

## CONSERVATION ELEMENT

### Appendix GH Artificial Reef Program List of Sites

| SITE | Reef Name                         | Latitude    | Longitude   | Depth/Year     |
|------|-----------------------------------|-------------|-------------|----------------|
| A    | Ancient Mariner                   | 26 18.117 N | 80 03.745 W | 65' □6/9/91    |
| A    | Berry Patch                       | 26 18.117 N | 80 03.745 W | 65' □8/15/87   |
| A    | Chuck □A □Luck                    | 26 18.117 N | 80 03.745 W | 65' □9/12/89   |
| A    | Deerfield Pier                    |             |             | 67' □1992      |
| A    | Hydro Atlantic                    | 26 19.500 N | 80 03.043 W | 184' □12/7/87  |
| A    | Noula Express                     | 26 19.278 N | 80 03.448 W | 71' □10/18/91  |
| A    | Pennel's Reef                     | 26 19.180 N | 80 04.080 W | 30' □12/30/93  |
|      |                                   |             |             |                |
| B    | Alpha                             | 26 13.857 N | 80 04.027 W | 78' □2/28/88   |
| B    | Boating Mag./Wildlife Forever (D) | 26 14.056 N | 80 03.666 W | 156' □4/29/95  |
| B    | Buddy Merrit                      | 26 14.15 N  | 80 03.36 W  | 414' □12/17/87 |
| B    | Caicos Express                    | 26 12.502 N | 80 03.663 W | 240' □11/12/85 |
| B    | Capt. Dan Garnsey (D)             | 26 13.857 N | 80 03.960 W | 109' □2/20/90  |
| B    | Chevron/Rodeo (L)                 | 14271.3     | 62097.1     | 170' □1983     |
| B    | Corey & Chris (D)                 | 26 13.863 N | 80 03.432 W | 244' □5/18/86  |
| B    | Fishamer/Jim Torgerson (D)        | 26 13.642 N | 80 03.896 W | 115' □4/23/94  |
| B    | Imor                              | 26 13.048 N | 80 03.760 W | 165' □8/3/91   |
| B    | Jay Dorman                        | 26 13.857 N | 80 04.027 W | 78' □2/28/88   |
| B    | Kornahrens                        | 26 12.48 N  | 80 03.19 W  | 140' □12/31/90 |
| B    | Lowrance                          | 26 13.202 N | 80 03.640 W | 200' □3/31/84  |
| B    | Mariner 1                         | 26 14.42 N  | 80 03.51 W  | 108' □4/25/92  |
| B    | Mariner 2                         | 26 14.11 N  | 80 03.807 W | 110' □5/1/93   |

## CONSERVATION ELEMENT

| SITE | Reef Name                     | Latitude     | Longitude    | Depth/Year    |
|------|-------------------------------|--------------|--------------|---------------|
| B    | Mako (L)                      | 14272.0      | 62096.2      | 240' □1986    |
| B    | Miller Lite                   | 26 14.207 N  | 80 03.677 W  | 155' □5/17/87 |
| B    | NSWC Array<br>(Ft.Lauderdale) |              |              | 63' □3/26/92  |
| B    | Papas Reef                    | 26 14.102 N  | 80 03.383 W  | 260' □5/14/89 |
| B    | Qualmann Tugs                 | 26 13.857 N  | 80 04.027 W  | 78' □2/28/88  |
| B    | Renegade                      | 26 13.360 N  | 80 03.620 W  | 190' □7/10/85 |
| B    | Rodeo 25                      | 26 13.878 N  | 80 03.813 W  | 122' □5/12/90 |
| B    | Ronald B. Jonsson             | 26 13.880 N  | 80 03.445 W  | 230' □5/15/88 |
| B    | Tote Machines (L)             | 14271.6      | 62096.4      | 200' □1986    |
|      |                               |              |              |               |
| C    | Atria (Jim)                   | 26 09.870 N  | 80 04.225 W  | 112' □9/23/87 |
| C    | Bill Boyd                     | 26 09.088 N  | 80 03.842 W  | 265' □7/18/86 |
| C    | Bud Krohn (L)                 | 14269.8      | 62095.4      | 440' □12/3/89 |
| C    | Chevron 1                     | 26 07.40 N   | 80 04.55 W   | 73' □1983     |
| C    | Chevron 2                     | 26 08.382 N  | 80 04.328 W  | 150' □1983    |
| C    | Chevron 3                     |              |              | 190' □1983    |
| C    | DNR Barge Pieces              | 26 08.557 N  | 80 04.637 W  | 70' □1982     |
| C    | Eagle Scout (D)               | 26 07.4962 N | 80 05.8890 W | 22' □8/25/95  |
| C    | FBT/Bruce Mueller (D)         | 26 10.1162 N | 80 04.7057 W | 65' □2/10/96  |
| C    | Florida League of Anglers     | 26 10.15 N   | 80 03.36 W   | 388' □7/8/86  |
| C    | Great Lakes (L)               | 14263.9      | 62105.1      | 170' □12/1/83 |
| C    | Grouper Grotto                | 26 08.382 N  | 80 04.328 W  | 146' □1983    |
| C    | Harbor Town (L)               | 14265.2      | 62106.3      | 70' □11/21/87 |
| C    | Hog Heaven                    | 26 08.102 N  | 80 04.786 W  | 70' □9/19/86  |
| C    | House Boat (L)                | 14263.7      | 62107.0      | 95' □1974     |
| C    | Jay Scutti                    | 26 09.520 N  | 80 04.760 W  | 64' □9/19/86  |
| C    | Mercedes                      | 26 09.370 N  | 80 04.513 W  | 97' □3/30/85  |

## CONSERVATION ELEMENT

| SITE | Reef Name                        | Latitude     | Longitude    | Depth/Year      |
|------|----------------------------------|--------------|--------------|-----------------|
| C    | Moonshot                         |              |              | 70' □5/6/89     |
| C    | Osborne (L)                      | 14263.1      | 62108.2      | 65' □1972       |
| C    | Paul Sherman                     |              |              | 70' □8/18/91    |
| C    | Pipe & Pont.<br>(Part of Hog H.) | 26 08.102 N  | 80 04.786 W  | 65' □1988       |
| C    | Powell Barge                     | 26 07.888 N  | 80 03.445 W  | 314' □4/10/86   |
| C    | Rebel                            | 26 10.253 N  | 80 04.332 W  | 110' □7/16/85   |
| C    | Reef Balls (Shallow)             | 26 07.53 N   | 80 04.40 W   | 23' □3/21□22/95 |
| C    | Reef Balls (Midwater)            | 26 07.4940 N | 80 04.9123 W | 65' □3/21□22/95 |
| C    | Reef Balls (Deep) (D)            | 26 07.807 N  | 80 04.390 W  | 144' □4/29/95   |
| C    | Reuben Reef (L)                  | 14262.5      | 62109.0      | 70' □1/22/86    |
| C    | Rinker (Shallow)                 | 26 07.3248 N | 80 05.4777 W | 22' □9/28/94    |
| C    | Rinker (Deep)                    | 26.07.71 N   | 80 04.40 W   | 75' □9/29/94    |
| C    | Robert Edmister (D)              | 26 09.193 N  | 80 04.837 W  | 70' □12/11/89   |
| C    | Rubber Reef (D)                  | 26 07.5201 N | 80 04.8513 W | 22' □3/29/93    |
| C    | Spaghetti Barge (L)              | 14263.7      | 62106.7      | 105' □1972      |
| C    | Trio Bravo                       | 26 08.727 N  | 80 04.293 W  | 145' □12/14/82  |
| C    | Wendy Rossheim                   | 26 09.183 N  | 80 04.8205   | 65' □12/26/91   |
|      |                                  |              |              |                 |
| D    | Chris Craft Molds (L)            | 14261.4      | 62107.2      | 70' □1978       |
| D    | FAD,s (L)                        | 14262.0      | 62107.2      | 110' □1982      |
| D    | Marriot (DC□4) (L)               | 14261.4      | 62109.8      | 71' □11/26/85   |
| D    | Monomy (L)                       | 14263.2      | 62107.5      | 60' □1970       |
| D    | N.S.W.C. Cable Spools            | 26 10.49N    | 80 03.22 W   | 150' □10/18/91  |
| D    | Port Everglades Reef             | 26 06.76 N   | 80 04.04 W   | 150' □1/31/89   |
| D    | Te Amo (L)                       | 14261.8      | 62106.6      | 215' □1985      |
| D    | Tracor Drydock                   | 26 06.765 N  | 80 04.233 W  | 220' □6/22/82   |
|      |                                  |              |              |                 |

## CONSERVATION ELEMENT

| SITE | Reef Name                 | Latitude     | Longitude    | Depth/Year     |
|------|---------------------------|--------------|--------------|----------------|
| E    | Capt. DeDe (D)            | 26 00.5746 N | 80 05.5910 W | 74' □10/9/93   |
| E    | Cruz del Sur              | 25 58.167 N  | 80 04.637 W  | 230' □12/19/86 |
| E    | Curry Reef (D)            | 26 00.6481 N | 80 05.6057 W | 75' □8/24/94   |
| E    | Emmi Boggs (D)            | 26 00.6058 N | 80 05.6168 W | 75' □12/8/95   |
| E    | Hollywood Reef (D)        | 26 00.459 N  | 80 05.62 W   | 73' □2/1 □2/95 |
| E    | N.S.W.C. Sea Con Reef (D) | 26 00.6012 N | 80 05.6241 W | 74' □5/14/93   |
| E    | Tenneco Decks             | 25 58.952 N  | 80 05.1000 W | 105' □10/3/85  |
| E    | Tenneco Towers            | 25 58.890 N  | 80 04.798 W  | 190' □10/3/85  |
|      |                           |              |              |                |
| N/A  | Erojacks (Ft. Laud) (L)   | 14259.8      | 62116.7      | 25' □1967      |
| N/A  | Erojacks (Dania) (L)      | 14254.2      | 62123.0      | 15' □1967      |
| N/A  | J.U.L. Reef               |              |              | 10' □1991      |
| N/A  | Sea Emperor (Palm Beach)  | 26 19.350 N  | 80 03.533 W  |                |

## CONSERVATION ELEMENT

### APPENDIX H PRIMARY CANALS

| PRIMARY CANALS   | PURPOSE   |
|--|---|
| Hillsboro Canal  | Provide drainage for 102 square miles in northern Broward County, water for wellfield recharge, convey excess water from WCA 1 to tidewater, control seepage from WCA 2A, and maintain ground water elevations west of Deerfield Lock adequate to prevent saltwater intrusion.                      |
| L36, L37, L33, L35A, L35B, L67A, L67C, L68A, C6 (Miami) Canals | Provide water level control and conveyance in the WCA's.  |
| Pompano Canal  | Provide flood protection to seven square miles in northeastern Broward County, water for wellfield recharge, and maintain ground water elevations west of G57 (a sheet pile dam with a controlled weir) adequate to prevent saltwater intrusion.  |
| Cypress Creek (C14) Canal                                      | Provide flood protection to 59 square miles in northeastern Broward County, water to recharge wellfields, convey excess water from WCA 2A to tidewater, controls seepage from WCA 2A, and maintain ground water elevations west of S37A (a gated spillway) adequate to prevent saltwater intrusion. |
| Middle River Canal (C13)                                       | Provide flood protection to 39 square miles in eastern Broward County, water to recharge wellfields, control seepage from WCA 2B, and maintain ground water elevations west of S36 (a gated spillway) adequate to prevent saltwater intrusion.  |
| Plantation (C12) Canal   | Provide flood protection to 19 square miles in eastern Broward County, maintain ground water elevations west of S33 (a gated spillway) adequate to prevent saltwater intrusion.   |
| North New River (L35) Canal                                    | Provide flood protection to 30 square miles in eastern Broward County, water to recharge wellfields, convey excess water from WCAs 2A, 2B, and 3A to tidewater, and controls seepage from WCA 2B.   |

## CONSERVATION ELEMENT

|                              |  |
|------------------------------|--|
| Dania Cut-off Canal          | Convey water from the C-11 and C-10 canals to tidewater and provide drainage for the area south and east of the Fort Lauderdale-Hollywood International Airport.   |
| South New River (C-11) Canal | Provide flood protection to 104 square miles in south central Broward County, water to recharge wellfields, control seepage from WCA 3a, and maintain ground water elevations west of S-13 (a spillway) adequate to prevent saltwater intrusion.   |
| Hollywood (C-10) Canal       | Provide flood protection to 15 square miles in southeastern Broward County.  |
| Snake Creek (C-9) Canal      | Provide flood protection to 59 square miles in southeastern Broward County and 39 square miles in northeastern Dade County, water to recharge wellfields, irrigation, control seepage from WCA 3B, and maintain ground water elevations west of S-29 (a gated spillway) adequate to prevent saltwater intrusion. |

Source: South Florida Water Management District, April 1995

## CONSERVATION ELEMENT

### APPENDIX I FLOOD ZONE DESIGNATIONS

| ZONE | DESCRIPTION  |
|------|--|
| A    | Special Flood Hazard Area Inundated by 100 Year Flood. No base flood elevations determined.  |
| AE   | Special Flood Hazard Area Inundated by 100 Year Flood. Base flood elevations determined.   |
| AH   | Special Flood Hazard Area Inundated by 100 Year Flood. Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.   |
| AO   | Special Flood Hazard Area Inundated by 100 Year Flood. Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.   |
| A99  | Special Flood Hazard Area Inundated by 100 Year Flood. To be protected from 100 year flood by Federal flood protection system under construction; no base elevations determined.   |
| V    | Special Flood Hazard Area Inundated by 100 Year Flood. Coastal flood with velocity hazard (wave action); no base flood elevations determined.  |
| VE   | Special Flood Hazard Area Inundated by 100 Year Flood. Coastal flood with velocity hazard (wave action); base flood elevations determined.   |
| □    | <p>There are two areas designated as Zone □ on the FEMA Flood Insurance rate map. Shaded: Areas of 500 year flood; areas of 100 year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile and areas protected by levees from 100 year flood.</p> <p>Unshaded: Areas determined to be outside 500 year flood plain.</p> |

Source: Flood Insurance Rate Map, Broward County. Federal Emergency Management Agency, 1992.

## CONSERVATION ELEMENT

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### APPENDIX JK

#### Environmental Legislation and Responsible Public Agencies

#### Water

| <u>Agency</u>  | <u>Legislation</u>   | <u>Functions</u>  |
|--|--|---|
| U.S. Army Corps of Engineers<br>Act of 1972            | Federal Water Pollution Control  | Dredge & fill permitting for navigable waters   |
| U.S. Environmental Protection Agency                   | "  | Establish water quality standards for navigable waters  |
| Florida Department of Natural Resources<br>Control Act | Florida Air and Water Pollution  | Establish water quality standards   |
| Florida Department of Environmental Protection         | "  | Regulate water pollution discharges, including groundwater, surface water, and coastal waters |
| "  | Federal Water Pollution Control Act Amendments of 1977 (Clean Water Act) | Regulate public water systems   |
| Florida Department of Environmental Protection         | Florida Safe Drinking Water Act  | Establish and enforce drinking water standards  |
| Broward County Water Management Division               | Broward County Administrative Code Section 40.11                         | Implement county water resource management program  |
| Broward County Utilities Division                      | Broward County Administrative Code Section 40.10                         | Maintain potable water distribution and wastewater collection systems                         |
| Broward County   | Broward County   | Surface water quality   |

## CONSERVATION ELEMENT

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|   |                                     |   |
|---|-------------------------------------|---|
| Environmental Protection Department     | Charter, Section 8.17               | monitoring; dredge and fill permitting                  |
| South Florida Water Management District | Water Quality Assurance Act of 1983 | Assume permitting authority for water projects from DEP |

### Air

|  |   |   |
|--|---|---|
| U. S. Environmental Protection Agency                    | Clean Air Act of 1970                       | Establish list of hazardous air pollutants; establish pollutant standards; establish vehicle emission standards; regulate fuels, fuel additives |
| Florida Department of Environmental Protection           | Florida Air and Water Pollution Control Act | Regulate air pollution  |
| "  | Florida Electrical Power Plant Siting Act   | Regulate siting of power plants   |
| Florida Division of Forestry                             | Chapter 5112, FAC                           | Prohibits open burning on rural lands   |
| Broward County Department of Natural Resource Protection | Broward County Charter, Section 8.17        | Monitor air quality   |

### Land Use

|  |   |   |
|--|---|---|
| Florida Department of Environmental Protection | Florida Outdoor Recreation and Conservation Act of 1963 | Acquire lands, including public beaches |
| Florida Department of Environmental            | Chapter 377, FS   | Regulate oil and gas exploration        |

## CONSERVATION ELEMENT

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### Protection

|   |   |  |
|---|---|--|
| "   | Chapter 378, FS                                     | Regulate mineral extraction activities   |
| "   | Chapter 258, FS                                     | Establish and protect state-owned park lands   |
| "   | Chapter 253, FS                                     | Permitting of use of submerged and state-owned lands   |
| Florida Division of Forestry  | Chapter 589, FS                                     | Acquire and manage land for state purposes   |
| <u>Florida Fish and Wildlife Conservation Commission</u>                        | Chapter 590, FS                                     | Regulate controlled burning of wild land, prohibit unauthorized burning during drought, prohibit possession of incendiary devices. |
| <u>Florida Fish and Wildlife Conservation Commission</u>                        | Chapter 372, FS                                     | Control and management of state game lands   |
| Florida Department of Environmental Protection                                  | Chapter 378, FS                                     | Adopt a master land reclamation plan consistent with local comprehensive plans   |
| "   | Florida Resource Recovery and Management Act        | Regulate solid waste disposal  |
| <u>Broward County Environmental Protection and Growth Management Department</u> | Broward County Administrative Code Section 110.01   | Implementation of Comprehensive Plan and Land Development Code   |
| Urban Wilderness Advisory Board   | Chapter 25 1/2 of Broward County Code of Ordinances | Advise Board of County Commissioners on acquisition and develop  |

## CONSERVATION ELEMENT

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|--|--|---|
|  |  | ment of Urban Wilderness Areas  |
| Broward County Parks and Recreation Division | Broward County Administrative Code Section 30.09 | Acquire and maintain land for recreation, preservation, and conservation purposes |

**Wildlife Preservation**

|                                |                                |   |
|--------------------------------|--------------------------------|---|
| U.S. Fish and Wildlife Service | Endangered Species Act of 1972 | Identify and protect threatened and endangered species; regulate off-shore marine fisheries |
|--------------------------------|--------------------------------|---|

|  |  |   |
|--|--|---|
| <u>Florida Fish and Wildlife Conservation Commission</u> | Marine Mammal Protection Act Chapter 372, FS | Prohibit taking of marine mammals<br>Regulate hunting and fishing activities; protect endangered and threatened species |
|--|--|---|

|                                   |                 |  |
|-----------------------------------|-----------------|--|
| Florida Department of Agriculture | Chapter 581, FS | Prohibit the willful destruction, sale, harvest, or transplant of plants listed on the state endangered or threatened plant list |
|-----------------------------------|-----------------|--|

|  |                 |  |
|--|-----------------|--|
| Florida Department of Environmental Protection | Chapter 370, FS | Protection of marine turtles, manatees, porpoises, manta rays.<br>Regulate saltwater fishing activities. |
|--|-----------------|--|

|  |   |                                      |
|--|---|--------------------------------------|
| <u>Florida Fish and Wildlife Conservation Commission</u> | Broward County Code of Ordinances, Chapter 13 | Prohibits use of nets in salt water. |
|--|---|--------------------------------------|

|   |                                      |   |
|---|--------------------------------------|---|
| <u>Broward County Environmental Protection and Growth Management Department</u> | Broward County Charter, Section 8.17 | Implementation of Sea Turtle Conservation Program |
|---|--------------------------------------|---|

## CONSERVATION ELEMENT

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Broward County Environmental  
Protection and Growth  
Management Department

Broward County  
Administrative  
Code, Section 20.04

Implementation of the  
County Tree Ordinance

Broward County Environmental  
Protection and Growth  
Management Department

Tree Preservation  
Ordinance (Sec. 27[340])

Regulates Tree Removal

Broward County Environmental  
Protection and Growth  
Management Department

Tree Abuse Ordinance  
(Sec. 27[421][425])

Regulates Tree Pruning

Section 8.04 of the Broward County Charter gives the County authority to protect the environment by prohibiting or regulating air or water pollution, or the destruction of the resources of the County.

## CONSERVATION ELEMENT

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### I. INTRODUCTION

#### ~~Manatee Protection and Boater Safety Component (MPBSC)~~

##### ~~I. INTRODUCTION~~

~~A. General. The purposes of the Manatee Protection and Boating Safety Plan are to: 1) ensure the long range protection of the manatee species and its habitat and 2) make Broward County's waterways safer for the boating public. The West Indian manatee is protected by the Marine Mammal Protection Act (MMPA) of 1972, the Endangered Species Act (ESA) of 1973 and the Florida Manatee Sanctuary Act (FMSA) of 1978. Boating safety regulations are authorized in s. 327.04 F.S., s. 327.46 F.S. and s. 370.021 F.S.; law implemented s.327.46 F.S., s. 327.72 F.S. and s. 327.73(1) F.S., Ch. 86 364, Ch. 89 428, Laws of Florida, as amended.~~

~~B. Service Area. Manatee protection plans have been required by the Florida Fish and Wildlife Conservation Commission (FWC) in thirteen "key manatee protection counties" including Brevard, Broward, Citrus, Collier, Duval, Indian River, Lee, Martin, Miami Dade, Palm Beach, St. Lucie, Sarasota, and Volusia. The Broward County Charter, Section 8.04, gives the Broward County Commission the authority to protect the County's environment by prohibiting or regulating air and water pollution and the destruction of natural resources. Therefore, the regulatory service area for this component is the entire County to the extent that it addresses water quality and the protection of natural resources. Because that state and federal agencies also have jurisdictional and operational responsibilities concerning the conservation and protection of natural resources in the County, efforts have been made to achieve consistency with the plans of those agencies.~~

~~C. Planning Horizon. The short term planning horizon for the Manatee Protection and Boating Safety Plan is the year 2006. The long term planning horizon is the year 2011.~~

~~D. Definitions. The following definitions are provided to assist in the reading of this component:~~

~~**Boat slip** for single family residences is a 20 foot wide by 40 foot long area of water adjacent to a dock or bulkhead in which an averaged sized vessel may be moored.~~

~~**Break Bulk Cargo** refers to ocean cargo that is not containerized, but is shipped in bagged, baled or palletized units within the ship's hold. Break bulk cargo includes lumber, waste paper, and steel, which may also be referred to as neobulk.~~

~~**Coastal Waters**, for the purpose of this plan, are defined as that portion of the County's tidally influenced waterways which have direct access to oceanic waters and which lie east of Florida's Turnpike.~~

## CONSERVATION ELEMENT

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~~A **Commercial Marina** is a boat facility constructed and used for the purpose of sale, lease, or rent of boat dockage (dry storage or wet slips) for profit.~~

~~**Critical Habitats** are any federally designated areas which, pursuant to the Endangered Species Act of 1973, have been determined to include physical and/or biological features that are essential to the survival of an endangered species (such as the manatee) which may require special management considerations or protection.~~

~~**Essential Habitat** is a criterion for determining areas where marine-related facilities should be limited. Essential habitat is any land or water area constituting elements necessary to the survival and recovery of the manatee population from endangered status which may require special management considerations and protective measures. The constituent elements include, but are not limited to: space for individual and population growth and for normal behavior; available food sources with adequate water depth and quality; warm and fresh water sources; sites for breeding and rearing of offspring; and habitats protected from disturbances that are representative of the geographical and seasonal distribution of the species.~~

~~**Existing Marine Facility** refers to a marine facility which was in use on before April 28, 1992.~~

~~**Idle Speed Zone** is a speed regulated area in which vessels create no wake and are not permitted to proceed at a speed greater than that necessary to maintain steerageway of the vessel. [While operating in an idle speed zone, all vessel operators shall exercise a high degree of care for manatee presence.]~~

~~**Lift-On/Lift-Off (Lo/Lo)** are containers and cargo lifted on and off transport ships by cranes.~~

~~**Marina/Boat Facilities** are any facilities used for the wet or dry storage, loading, unloading, and/or launching of boats which are not provided for the sole use of residences or residential land uses adjacent to a coastal water body. Marina/boat facilities include, but are not limited to, commercial marinas, commercial docking structures, and public and private boat launching facilities/boat ramps.~~

~~**Marina/Boat Facility Siting** for the purposes of this plan is defined as the determination of a location for commercial marinas, commercial docking structures, and public/private boat launching facilities.~~

~~A **Multi-slip Docking Facility** is any dock which includes more than one boat slip.~~

~~**Refuge** is defined as a manatee protection area in which the U.S. Fish and Wildlife Service has determined that certain waterborne activities would result in the taking of one or more manatees, or that certain waterborne activities must be restricted to prevent the taking of one or more manatees, including but not limited to taking by harassment.~~

~~**Residential Docking Facilities** are docks and wet slips provided for the sole use of the residents~~

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~~of a residential land use/development adjacent to a coastal water body. These facilities may be for single family or multi-family use.~~

~~**Roll-On/Roll-Off (Ro/Ro)** refers to containers and cargo rolled or driven on and off the transport ships.~~

~~A **Sanctuary** is a manatee protection area in which the U.S. Fish and Wildlife Service has determined that any waterborne activity would result in the taking of one or more manatees, including but not limited to taking by harassment. Sanctuaries are areas reserved exclusively for manatees where they may conduct activities such as breeding, nursing, and resting, free from any harassment by humans.~~

~~A **Single Family Residence** is a building having a roof and outer walls entirely separated from any other structure by space, and occupied by members of a single family.~~

~~**Slow Speed Zone** is a speed regulated area in which vessels are completely off plane and proceeding with minimum wake. Slow speed also means no speed greater than that which is reasonable and prudent to avoid either intentionally or negligently annoying, molesting, harassing, disturbing, colliding with, injuring, or harming manatees.~~

~~A **Travel Corridor** is a waterway through which manatees travel, either daily or seasonally, in order to reach feeding areas, sources of fresh or warm water, or other Essential Habitat areas.~~

~~**Warm Water Refuge** is a natural or man-made warm water habitat which maintains a temperature equal to or greater than the minimum required for manatees' survival (approximately 19 degrees Celsius).~~

## ~~H. DATA REQUIREMENTS~~

~~A. **Habitat.** Five categories of habitat requirements for the West Indian manatee have been recognized by state and federal agencies: 1) warm-water refuges for shelter during periods of cold winter weather; 2) feeding areas near warm-water refuges and other larger areas for summer use; 3) freshwater sources; 4) quiet sheltered areas for normal behaviors such as resting, cavorting (i.e., social interactions such as mating, calving and nursing); and 5) travel and migratory corridors connecting the above habitat elements.~~

~~Manatee habitat use areas were determined by information from FWS through their satellite telemetry program, FWC's and Florida Power and Light's (FPL) aerial survey data, the power plant field surveys and sightings by the public as collected by the Manatee Survival Foundation and Save the Manatee Club.~~

~~1. **Warm Water Refugia.** In winter months, manatees respond to declining water temperatures by congregating at constant temperature springs and warm water power plant and industrial effluents. Arrival at major aggregation sites usually begins in late October~~

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and ends in late April, but exact dates vary greatly with the location of the refugia and weather patterns. FPL's Port Everglades and Lauderdale power plants are the major warm water sites in Broward County. Warm industrial discharges alone are not suitable alternatives to the warm water refugia provided by natural springs because they usually lack the vegetation necessary to sustain the manatees.

2. **Feeding Areas.** Manatees are herbivores that feed opportunistically on a wide variety of submerged, floating and emergent vegetation. Shallow grass beds with ready access to deep channels are the preferred feeding areas in coastal and riverine habitats. Bengtson (1983) estimated the annual mean consumption rate for manatees feeding in the upper St. John's River at 4% to 9% of their body weight per day depending upon season.

3. **Water Quality.** Manatees' reliance on inshore habitats and their attraction to industrial and municipal outfalls has the potential to expose them to relatively high levels of contaminants. Water contaminants including pesticides, herbicides, fertilizers, industrial byproducts and human sewage may cause sub-lethal effects on manatees (Packard, 1983).

All of the canals and waterways in Broward County have been designated as Class III waters by the State of Florida for recreational use and propagation of fish and wildlife. Water quality in Broward's waterways continues to improve, largely due to programs designed to alleviate urban and rural runoff, identify direct or indirect industrial discharge, and minimize the effects of contaminated seepage into groundwater.

The Broward County Department of Planning and Environmental Protection (DPEP) is the local agency with the responsibility for protecting the quality of the county's surface water, groundwater and wetland resources. Since Broward's water resources are substantially interconnected, DPEP's pollution control programs serve to protect the water quality in those sections of the county utilized by the West Indian manatee.

4. **Sanctuary.** Manatees need quiet sheltered areas for normal behaviors such as resting, cavorting (i.e., social interactions such as mating, calving and nursing). When identified, such areas should be designated appropriately and opportunities for manatee-human interaction minimized. In Broward County, identified manatee sanctuary areas include the chain of cooling lakes at the FPL Lauderdale Power Plant and the discharge canal and adjacent mangrove lagoon at the FPL Port Everglades Power Plant.

5. **Travel and Migration Corridors.** Manatee movement has been documented for over 20 years utilizing various tracking methods including radio telemetry, aerial surveys and photo identification. In general, they may remain in one area seasonally or may be transient, lingering for short periods in suitable habitats. During especially cold winter weather, manatees congregate in warm water areas such as the discharge zones near power generating plants and natural warm water springs; in the warmer South Florida waters, they may congregate near salinity control structures. In Broward County, mortality data

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confirm manatees utilize local waterways throughout the year. Nearly one-half (47%) of the total manatee mortality recorded within the county has occurred outside of the manatee “season” (Appendix 13A). Based on the various tracking methods and mortality data, three waterways were identified as primary travel corridors for manatees in Broward County: the New River System; the Dania Cut-Off Canal; and the Atlantic Intracoastal Waterway.

### B. Manatee Human Interaction

1. **Manatee Mortality and Injury.** Since 1974, a well organized manatee carcass recovery program by USFWCC and FWC has existed to record, analyze and report causes of manatee mortality in the southeastern United States. Mortality data indicate a clear increase in manatee deaths over the 24-year recording period (1976 to 1999; Aekerman et al., FWC unpublished data). Most of the increase can be attributed to increases in water craft-related and perinatal deaths (Marine Mammal Commission, 1993.)

Natural causes of death include disease, parasitism, reproductive complications and other non-human related injuries, as well as occasional exposures to cold and red tide. From 1976 to 1999, natural causes accounted for 17% of manatee deaths state-wide with 22% attributed to perinatal causes (FWC unpublished data). During this same period, human-related causes of death from water craft collisions, flood gates and canal locks accounted for at least 31% of manatee deaths. In Broward County, over 40 % of manatee mortality between 1976 and 1999 was due to human-related factors.

Manatee mortality locations in Broward County are depicted on Map 13A. Appendix 13B lists the cause of manatee deaths by year from 1974 to October, 2000.

2. **Speed Restriction Zones.** The creation of boating safety speed zones must be tied to vessel traffic safety or other public safety concerns. The FWC lists five valid reasons for the creation of a speed zone as: 1) the occurrence of boating accidents at that location; 2) obstructed visibility; 3) hazardous tides or currents; 4) vessel traffic congestion; and 5) navigation hazards. Regarding manatee protection, the establishment of speed restriction zones along identified manatee travel and migration corridors serves to reduce water craft injury.

Boating safety speed zones along the Atlantic Intracoastal Waterway (AICW) are currently established by an act of the Florida Legislature. Other waterway speeds can be regulated by the municipality having jurisdiction over the particular waterway, excluding the AICW. There are approximately 13 year-round boating safety speed zones on the AICW most of which are associated with bridges. These zones are recorded in the Chapter 16N-24 Florida Administrative Code.

Various “idle speed” and “slow speed” zones have been established by Broward’s

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municipalities for boating safety. These zones are generally characterized by the presence of bridges and other obstructions to visibility, blind corners, marinas, restaurants, public boat ramps and fueling facilities. These zones are established by official action of the municipality and may or may not appear in the Florida Administrative Code.

3. **Law Enforcement.** Enforcement of boat speeds and manatee protection regulations within Broward County is conducted through a multi-agency enforcement approach. These agencies include the FWC's Bureau of Marine Enforcement, U.S. Fish and Wildlife Service, U.S. Coast Guard, Broward Sheriff's Office and municipal police.

Patrol staffing for these agencies are as follows:

U.S. Coast Guard

U.S. Fish and Wildlife

Florida Fish and Wildlife Conservation Commission 11 officers

Broward Sheriff's Office 1 Sergeant, 9 Deputies

Includes coverage for: Deerfield Beach

Pompano Beach

Sea Ranch Lakes

Port Everglades

Dania Beach

Lighthouse Point 1 marine unit

Lauderdale By The Sea 1 part time marine unit

Wilton Manors 1 part time marine unit

Fort Lauderdale 1 sergeant, 9 officers

Hollywood 4 marine officers

Hallandale Beach 1 marine unit

Municipalities abutting manatee-accessible waterways that do not have marine patrol units include Hillsboro Beach, Oakland Park, Plantation and Davie.

### C. Local Land Development.

1. **Development Standards.** Properly controlled land development is critical to manatee protection. Development activities occurring in a watershed or along shorelines ultimately affects the water body, thus affecting species survival in the aquatic environment. Shoreline and submerged land development activities which are potentially harmful to the aquatic environment include the construction of artificial canal systems, dredging and filling of wetlands, construction of structures (docks, piers, etc.) which eliminate beneficial aquatic vegetation, placement of structures which can trap or crush manatees and placement of bulkheads below the ordinary high waterline.

2. **Marina/Boat Facilities.** Marinas, docks and boat ramps may have a direct effect on

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~~manatees and their essential habitat by: 1) reducing aquatic vegetation in feeding areas, 2) obstructing manatee movements along shallow shorelines, 3) providing a source of contaminants, and 4) disrupting functions of wetlands through dredge and fill activities. It should also be noted that improperly sited facilities may increase the probability of boat collisions with manatees especially if the facilities increase boat traffic in manatee habitat areas (Citrus County, 1991).~~

~~The relationship between manatee habitat and boat traffic needs to be analyzed in order to distinguish the vulnerability of specific areas to the development of docking and launching facilities. Sites suitable for the development of boating facilities should meet the following criteria:~~

- ~~— a) minimize boat travel or reduce boat speed in areas where manatees are regularly sighted;~~
- ~~— b) do not cause destruction of aquatic vegetation eaten by manatees;~~
- ~~— c) meet design standards in wetlands; and~~
- ~~— d) do not cause destruction of areas used by manatees to rest, cavort, calve and nurse.~~

~~3. **Public Boat Ramps.** Public boat ramps allow waterway access to residents that live inland and maintain their boats on trailers. As stated above, boat ramp location may have a direct effect on manatees, particularly when sited in areas of high manatee activity. The adverse impact of existing boat ramps in manatee habitat areas can be lessened by establishing speed restriction zones.~~

~~4. **Residential Docking.** All docks should be subject to construction standards which will ensure that they are designed so that they will not entrap or injure manatees. Single family docks are regulated differently than multi-family or multi-slip residential docks because, if constructed properly, they have a lesser impact on the aquatic environment.~~

~~5. **Port Facilities.** Port Everglades is located on Florida's east coast, 23 miles north of Miami and 312 miles south of Jacksonville. Port Everglades is one of the deepest ports in Florida and has the shortest, straightest entrance channels along the East Coast. Port Everglades in-water facilities include 48 berths, eight Ro/Ro Ramps, three slips, three finger piers and 25,072 linear feet of bulkhead. The Port Jurisdictional Area (PJA) totals approximately 2,190 acres, which includes portions of the jurisdictions of the City of Fort Lauderdale, the City of Hollywood, the City of Dania Beach and the Unincorporated Area of Broward County. Shoreline uses within the PJA include transportation uses (48 berths), institutional uses (the U.S. Navy Surface Weapons Center, the U.S. Coast Guard facility, and the Nova Southeastern University Ocean Science Center), recreational uses (John U. Lloyd State Recreation Area) and commercial uses (Dry Marina). Another significant use~~

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within Port Everglades includes FPL's Fort Lauderdale Power Plant, located on 86 acres. The power plant's discharge canal is a state-designated manatee sanctuary and a site where manatees congregate during colder weather.

Port Everglades contains three distinct areas (Map 13A □2). Northport, located between the 17<sup>th</sup> Street Causeway and Berth 4, presently serves two daily cruise lines, Discovery and SeaEscape, and two multi-day cruise lines, Princess and Imperial Majesty. The Broward County Convention Center is located at Northport, which is part of an approved Development of Regional Impact (DRI) that includes a festival marketplace and proposed hotel complex. In addition, Northport contains a Port-owned parking garage and terminals which serve break-bulk cargo.

Midport, located between Slip 5 and Berth 29, contains the Port's liquid bulk (petroleum), dry bulk (cement) and break bulk terminals. Midport's container terminal is served by two container cranes. Seven multi-day cruise terminals are also located within Midport, together with another Port-owned parking garage, Port Administration and Public Safety buildings. Berthing is available in Midport for Naval vessels and large, private yachts for fueling purposes only.

Southport, located between the Turning Notch and the Dania Cut-off canal, is Port Everglades' primary container facility. It is served by six gantry cranes and a three berth Ro/Ro terminal. The Southport facility includes a 900 foot by 900 foot turning notch. Appendix 13 □1 lists the activities and operations occurring at each berth.

There is one privately operated marina within the PJA which leases Port-owned land. Dry Marina provides indoor and outdoor dry storage for small power boats and is located on the FPL power plant discharge canal. The Florida Marine Patrol operates a dry storage and repair facility north of Dry Marina. The Port also permits the temporary lay-in of large privately-owned yachts within several of its berths.

On the eastern shore of the AICW, four marina facilities are operated by governmental and educational agencies. A launching ramp/dock facility is maintained within John U. Lloyd State Recreation area for transient park users. In addition, the U.S. Coast Guard, the U.S. Navy and Nova Southeastern University operate facilities for the exclusive use of their vessels.

D. Education and Awareness. With manatee mortality attributable to human causes increasing throughout the state, it is imperative that emphasis be placed on educating the public on the status of the manatee, improving public awareness, and improving the availability and distribution of educational information and literature. In addition to Federal, State, and local government efforts, numerous private organizations and groups have undertaken a wide range of public awareness and educational activities.

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The most important factor in improving boater safety in the State of Florida is educating the boat operators. The National Boating Survey by the American Red Cross indicated that only 28% of all boat operators, 16 and older, had ever had a boating safety course. The same survey found strong support (61% of all boaters) for mandatory boat operator licensing and very strong support for mandatory boating safety courses for operators. Boating safety courses are available from several agencies usually free of charge. Courses by the U.S. Power Squadron include classes in boat handling, elementary seamanship, charts and aids to navigation, basic navigation, weather, coastal and regional boating, equipment, regulations and safe operations. The U.S. Coast Guard Auxiliary offers similar topics in their boating safety course.

### E. Government Coordination:

**1. Permit Procedures and Development Review.** Permit and development review for marine facilities, docks and general structures located on the shoreline or submerged lands affecting manatees are conducted by many agencies. Facilities which ultimately affect the manatee are reviewed by the municipality, BCDPEP, FWC, Florida Department of Environmental Protection (FDEP), South Florida Water Management District (SFWMD), U.S. Army Corps of Engineers (ACOE) and the U.S. Fish and Wildlife Service (FWS).

The BCDPEP, Biological Resources Division addresses applications for dredge and fill projects which includes docking facilities. Reviews are conducted solely by this division or jointly with the ACOE, FDEP and SFWMD depending upon the size and location of the project. The Broward County Water Resources Division also works closely with the Biological Resources Division regarding all environmental resource permitting.

**2. Programs and Projects.** Under Chapter 27, Broward County Code of Ordinances, BCDPEP regulates air pollution, solid waste, wetlands, hazardous materials, storage tanks, groundwater, tree protection, Local Areas of Particular Concern and well fields. Additionally, BCDPEP administers numerous projects affecting the quality of Broward County's environment. The New River Restoration Project, supported by federal and state funding, involves dredging portions of the North Fork New River, a designated Manatee Travel Corridor, to restore flowage. The project also includes removal of exotic vegetation and restoration of native plant communities. FDEP is funding a canoe launch site on the river, thus promoting "manatee safe" vessels on the North Fork New River. Broward Urban River Trails (BURT), a local citizens' advocacy group and link to the Florida Greenways Program, is assisting BCDPEP staff with this project.

The BCDPEP maintains a hotline for citizen complaints. This 24 hour service allows residents to report illegal waste dumping, tree removal and filling of wetlands. The Water Resources Division has an Integrated Water Resources Plan, funded by SFWMD, promoting water conservation for both businesses and residents. Water conservation reduces salt water intrusion which aids in maintaining Broward County's fresh water resources.

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~~Broward Beautiful, an advisory board appointed by the Broward County Board of County Commissioners, forms partnerships with business and industry, governmental agencies and civic and neighborhood groups to find practical solutions to community aesthetic, solid waste and litter control problems. Broward Beautiful is a sponsor for the County's annual Waterway Cleanup which removes hazardous and ingestible materials from local waterways.~~

~~In November, 2000 the voters of Broward County approved a \$400 Million bond issue, a portion of which will be utilized for the purchase of environmentally sensitive lands. The BCDPEP has compiled an inventory of undeveloped natural lands to be utilized for identifying potential purchase sites. Listed ecological communities include cypress swamps, pinelands, scrub lands, hammocks, mangroves and marshes. Funding from the bond issue will also be used to remove invasive exotic vegetation from impacted areas and install native vegetation.~~

### ~~III. ANALYSIS REQUIREMENTS~~

~~The designation of sanctuaries, refuges, critical habitats, essential habitats, and speed zones serves to protect the manatee from the impacts of human activity. Sanctuaries, refuges, and critical habitats are federal designations. Essential habitat is a designation established by the State. Speed zones can be established and enforced by federal, state and local governments.~~

~~Sanctuaries, refuges, and critical habitats are designations established by the Endangered Species Act of 1973. Sanctuaries are areas in which human activities are prohibited so that manatees can breed, nurse and rest free from human harassment. Manatee refuges are areas where interaction is allowed but where certain waterborne activities are restricted to prevent the disturbance and harassment of manatees. Critical habitat is a broader designation for areas which are essential to the conservation of the species and require special management considerations or protection.~~

~~Essential habitat is used in this plan as a designation for identifying areas where marine-related facilities should be limited. Essential habitat is any land or water area constituting elements necessary to the survival and recovery of the manatee population from endangered status which may require special management considerations and protective measures. The constituent elements include, but are not limited to: space for individual and population growth and for normal behavior; available food sources with adequate water depth and quality; warm and fresh water sources; sites for breeding and rearing of offspring; and habitats protected from disturbances that are representative of the geographical and seasonal distribution of the species.~~

#### ~~A. Habitat.~~

~~1. **Warm Water Refugia.** The discharge canal at the FPL Port Everglades Power Plant contains several features which would attract overwintering manatees. This plant usually~~

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has at least one generating unit in operation, producing a maximum flow of up to 1303 million gallons of warm water effluent per day (MGD). The section of the discharge canal nearest the plant is a motorboat prohibited area which allows the animals to rest without harassment from well intentioned observers and fisherman. A “nursery” area, located adjacent to the discharge canal, is heavily used by manatees as a resting spot outside the strong currents of the canal proper. The “manatee lagoon” on the south side of the discharge canal near its intersection with the Atlantic Intracoastal Waterway is another sanctuary area in which large numbers of manatees have been surveyed. While the lagoon does not appear to be selectively sought by females with calves, it may be an important location for mating behavior.

The FPL Lauderdale Power Plant, located just east of US 441 (SR 7) near the juncture of the South Fork New River and the Dania Cut-off Canal, was re-powered in the early 1990's and did not generate warm water effluent on a regular basis. Consequently, the numbers of manatee utilizing this power plant during that time period are low (Appendix 13-G). It is now operated 24 hours per day with a maximum flow rate of 167.04 MGD. Recent aerial surveys during periods of cold weather have identified more than 100 manatees in the cooling ponds. As mitigation for this re-powering project, FPL constructed an experimental resting shelf on the edge of the cooling system pond. The shelf allows manatees to rest in shallow, calm and warm protected waters. FPL will continue to treat the 200-acre canal/pond system as a year-round “No Entry” zone for the protection of the manatees. The “No Entry” designation prohibits boating, fishing and swimming in the cooling system pond.

**2. Feeding Areas.** Broward County lacks the broad, shallow waterbodies necessary to support extensive beds of seagrass. While manatees transiting Broward’s waterways forage for submerged and overhanging vegetation, there are no identified “feeding areas” in the County. Manatees seeking refuge in Broward’s power plant discharge areas are thought to take advantage of periods of warmer weather to travel south to Biscayne Bay to feed, returning to Broward’s warm waters or to points further south if temperatures decrease.

**3. Water Quality.** Four BCDPEP programs deal directly with the protection of habitat which is necessary for the survival of the manatee. The first, the Surface Water Quality Monitoring Network, consists of 44 stations on the major waterways of the county. Stations are located in important manatee utilization areas which include the Atlantic Intracoastal Waterway (12) the New River System (9) and the Dania Cut-off Canal (2). Water samples have been collected at least quarterly from these stations since November, 1980. The water is analyzed for physical, chemical and microbiological parameters in order to characterize the ambient water quality of the waterways. The 44 station locations are illustrated on Map 13A-3.

— The following 17 water quality parameters are analyzed on each sample:

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|----------------------|----------------------------|
| temperature          | organic nitrogen           |
| specific conductance | total kjeldahl nitrogen    |
| turbidity            | nitrite + nitrate nitrogen |
| salinity             | Ammonia nitrogen           |
| pH                   | total phosphorus           |
| dissolved oxygen     | total coliform             |
| ortho phosphate      | fecal coliform             |
| total organic carbon | Chlorophyll a              |
| Pheophytin a         |                            |

Protection of the groundwater quality in Broward County is dependent on proper management of the Biscayne Aquifer. Saltwater intrusion is one of the County's most serious water quality problems. Saltwater intrusion is caused by the drainage of freshwater wetlands and resultant loss of freshwater head, and by increased pumping of groundwater and surface water for drinking, irrigation and other purposes. Another serious groundwater quality problem is contamination by industrial/commercial pollution. BCDPEP operates a Ground Water Quality Monitoring Program consisting of a network of 43 wells located in the recharge area of major potable water wellfields and undeveloped areas of high aquifer recharge. In general, the monitoring wells occur in pairs, with one screened at approximately 25-30 feet and the other at approximately 100 feet. Sampling is on a triennial basis. Well locations are illustrated on Map 13A-4.

BCDPEP's Water Laboratory is certified by the Florida Department of Health and Rehabilitative Services and serves to identify, monitor and eliminate water pollution in the County. The actual sampling of bodies of water, such as canals, rivers and lakes, is undertaken by this lab. The Water Laboratory is used for long term monitoring of ground and surface water quality, analyzing samples to support enforcement actions, and to assist other public agencies.

BCDPEP's Water Resources Division issues permits for dredging and filling, while the Pollution Prevention and Remediation Division (PPRD) monitors solid waste disposal and administers the County's Surface Water Management Program. The Dredge and Fill Licensing Program addresses adverse impacts on wetland resources by regulating construction of docks and sea walls, lake and canal excavation and filling and other land development activities that impact jurisdictional wetlands. In order to protect the functional value of Broward's wetlands, efforts are made to minimize potential impacts or require mitigation where adverse impacts are unavoidable. Mitigation requirements address the functional value of the specific wetland being impacted. Accordingly, the actual amount and type of mitigation required to offset adverse impacts varies from site to site. The PPRD is also responsible for the management of surface water runoff. Storms can wash pollutants such as pesticides, herbicides, construction dust and vehicle oils from

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streets and parking lots into Broward's waterways. Through the plan review process recommendations are made to manage storm water discharges from projects both during and after construction.

4. **Sanctuary.** Manatees need quiet sheltered areas for normal behaviors such as resting, cavorting (i.e., social interactions such as mating; calving and nursing.) In Broward County, identified manatee sanctuary areas include the chain of cooling lakes at the FPL Lauderdale Power Plant and the Discharge Canal and adjacent Mangrove Lagoon at the FPL Port Everglades Power Plant.

Within Port Everglades, the FPL Discharge Canal is a designated Motorboat Prohibited area from the point of discharge to a point north of the Dry Marinas, Inc., which allows the animals to rest without harassment from well-intentioned observers and fishermen. This same area was designated as a manatee sanctuary by the Florida Legislature in 1978 in the Florida Manatee Sanctuary Act, Chapter 370, Subsection 370.12 (2) Florida Statutes. In 1992, Broward County designated the entire discharge canal, from the point of discharge to its intersection with the AICW, as Essential Habitat.

The FPL Lauderdale Power Plant, located east of US 441 (SR 7) near the juncture of the South Fork New River and the Dania Cut-Off Canal, was re-powered in the mid-1990's. The flow from the re-powered plant is 167.04 MGD for two units. As mitigation for the re-powering project, FPL constructed experimental "resting shelves" along the shoreline of the cooling lake closest to the power plant. Additionally, FPL treats the 200-acre canal/lake system as a year-round No Entry Zone for the protection of the manatees. This designation prohibits boating, fishing and swimming in the cooling lake system. Additionally, in 1992, Broward County designated the entire cooling lake system, including the discharge canal north of the lake system, as Essential Habitat. These two Essential Habitat areas are depicted on Map 13A-5.

5. **Travel and Migration Corridors.** Manatee movement has been documented for over 20 years utilizing various tracking methods including radio telemetry, aerial surveys and photo identification. Based on the various tracking methods and mortality data, three waterways were identified as primary travel corridors for manatees in Broward County: the New River System; the Dania Cut-Off Canal; and the Atlantic Intracoastal Waterway.

**a. New River System.** The New River System is comprised of the New River from the Atlantic Intracoastal Waterway west to the fork in the river, the South Fork New River south and west to the saltwater barrier at US 441, the North New River Canal from the salinity barrier east to its confluence with the South Fork New River, and the North Fork New River from the Broward Boulevard bridge east to its juncture with the South Fork New River.

A tour of this waterway by air and boat and a review of aerial photographs illustrate

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~~the great extent to which land abutting this waterway has been developed with single family and multi-family residences, commercial marinas, a public boat ramp, and public utilities. Portions of the adjacent land area are also dedicated to conservation use. Due to the extent of development and in a effort to reduce the chance of boat/manatee impact as well as heighten boater safety, year round speed restrictions were instituted throughout the New River system in 1993.~~

~~b. **Dania Cut-off Canal.** The Dania Cut-off Canal adjacent land uses are also similarly developed. Single-family residential, existing public boat ramps and commercial marinas, conservation areas, public utilities and industrial uses dominate most of the available shoreline. As on the New River System, year-round waterway speed restrictions were implemented to provide manatee protection and boating safety.~~

~~c. **Intracoastal Waterway.** The Atlantic Intracoastal Waterway (AICW) through Broward County is predominantly a narrow waterway, 300 to 700 feet in width. Shoreline areas are utilized for commercial, single and multifamily residential, marina, park and conservation uses. Remaining undeveloped areas are few and many of these are designated conservation or recreation land use. Boating safety slow and idle speed restrictions exist on the AICW within the City of Fort Lauderdale and at eleven (11) bridge crossings in several jurisdictions. As this waterway is utilized by the migratory manatee population during the winter months and is similarly heavily traveled by boaters during this season, particularly on weekends and holidays, speed restrictions were instituted to reduce manatee and boating fatalities.~~

~~In May, 1993 the Governor and Cabinet approved year-round manatee protection speed restriction zones for the New River System, the Dania Cut Off Canal and the AICW, as well as the C-10 Canal, Middle River, Cypress Creek and the Hillsboro Canal (Map 13A -6a, 6b and 6c.)~~

### B. ~~Manatee Human Interaction:~~

~~1. **Manatee Mortality and Injury.** Since 1974, a well organized manatee carcass recovery program by FWC and FWS has recorded, analyzed and reported causes of manatee mortality in the southeastern United States. From 1974 to September, 2000, 3996 manatee mortalities were documented throughout the State of Florida. Of these, 117 (2.9 %) manatee mortalities were recorded in Broward County. Causes of death include: 42 due to watercraft-related incidents; 31 from undetermined causes (including animals verified dead but not recovered); 28 animals which were listed as "perinatal," or dependent calves; 4 due to other human causes; 6 in flood control structures; and 4 due to natural causes. Map 13A -1 shows the locations of recovered carcasses in Broward County and the causes of death is found in Appendix 13-B-1.~~

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Manatee mortality records for Broward County indicate that slightly less than one half of the deaths (44%) are from human related causes. Manatee mortality in Broward County is predominantly due to watercraft related incidents (36%). The 42 deaths in this category include animals which have been injured by propellers (22) as well as those which have been crushed by the hulls of vessels (20). The next highest category of manatee deaths is the undetermined category with 31 animals (27%). As indicated by the title, no specific cause of death could be determined for these animals due to either no evidence of trauma (15) or the carcasses were verified but not recovered (3).

In 1992 Broward County transmitted the Manatee Protection and Boating Safety Plan (MPBSP) to the FDEP, formerly FDNR. Since that time, with the State implementation of the manatee protection speed restriction zones recommended in the MPBSP, and the installation of associated signage by the Florida Inland Navigation District (FIND), overall human related manatee mortality (i.e. watercraft, floodgate and other human categories) in Broward County has decreased from 55% (1974-1991) to 44% (1992-2000) (Appendix 13-D.) Manatee mortality by watercraft dropped from 41% of total deaths in the 1974-1991 period to 30% in the 1992-2000 period. Based on these data, it appears that speed restriction zones have contributed to a reduction in overall watercraft related manatee mortality rates in Broward County.

Of concern, however, is the increase in perinatal deaths from 7 between 1974 and 1991 to 21 between 1992 and 2000. The cause of this significant increase in perinatal deaths warrants serious investigation by the FWC.

**2. Speed Restriction Zones.** Broward County waterways have speed restriction zones for both manatee protection and boater safety. State designated boating safety speed restriction zones (Maps 13A-7a and 7b) are year round slow or idle speed zones, most of which are associated with bridges along the AICW. Additional boating safety speed restriction zones have been placed in non state regulated waters by local municipalities.

Manatee protection speed restriction zones are illustrated on Maps 13A-6a, 6b and 6c. Based upon recommendations contained in the 1992 MPBSP, in 1993 the Governor and Cabinet placed year round speed restrictions on the Dania Cut Off Canal, the C-10 Canal, the New River System, the Middle River west of U.S. 1 and Cypress Creek west of U.S. 1. Additionally, a year round 50 foot slow speed buffer zone was created on the south side of the Hillsboro Canal (the canal centerline is the county boundary). On the AICW, an important manatee travel and migratory corridor, the maximum speed was reduced from 30 MPH to 25 MPH and a 50 foot slow speed buffer zone was established throughout. Seasonal slow and idle speed zones were created along most of the AICW and the waters in and around Port Everglades and the port basin were designated for year round slow and idle speeds.

**3. Law Enforcement.** Boat speed and manatee protection regulations in Broward County

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are enforced primarily by municipal marine patrols, the Broward Sheriff's Office, FWC, FWS and the U.S. Coast Guard. The most important aspect of improving law enforcement efficiency regarding manatee protection and boater safety is to increase coordination between the various agencies and offices. Developing a working relationship between all enforcement agencies and personnel would enhance boating safety by ensuring that the regulated areas and zones were patrolled to provide full and efficient coverage. Also, increasing personnel and equipment would allow the agencies to monitor and enforce laws throughout the critical areas in the coastal waters.

To assist in "increasing personnel and equipment," on March 8, 1994, the Broward County Board of County Commissioners (BCBCC) adopted Ordinance No. 94-19 and Resolution 94-285 enacting the Local Option Vessel Registration Fee pursuant to F.S. 327.22 and 327.25. Through the adopted Ordinance and Resolution, the BCBCC directed the Broward County Marine Advisory Committee (BCMAC) to develop the policies and procedures and administer the Broward County Enhanced Marine Law Enforcement Grant (EMLEG) program. The BCBCC adopted the policies and procedures for the EMLEG program in Resolution 94-138 on December 13, 1994. One provision of the Local Option Vessel Registration Fee is that one dollar for each registered vessel be sent to the State for manatee protection. In 1995 \$43,891 and 1996, \$43,546 were sent to Tallahassee. In 1997, \$41,669 were collected for manatee protection. The total dollars raised by the EMLEG program for manatee protection from its inception to 1997 is \$129,106.

The purpose of the EMLEG program is to improve manatee protection and boating safety in Broward County by the placement of additional marine law enforcement patrols on the waters of the County during peak recreational boating times (weekends and holidays for eight hours each day). The BCMAC sends out grant applications to the various municipalities and marine law enforcement agencies for this purpose. The BCMAC has subdivided the County into 11 EMLEG Zones of Concern which include the Atlantic Intracoastal Waterway, Port Everglades, the Dania Cut-off Canal, New River, Middle River, the Hillsboro Canal, certain fresh water canals, and the Everglades. The BCMAC reviews the EMLEG grant applications and makes funding recommendations to the Broward County Commission. Appendix 13 F-1 provides a history of EMLEG program funding.

Several entities are developing innovative programs regarding manatee protection and boater safety. The Broward Sheriff's Office, the Center for Environmental Education and Research, Inc., (CEERI) and the BCDPEP are working cooperatively to initiate a Boater Education Billboard Program. The billboards will be moved to various waterfront locations on a monthly basis and will display manatee protection and/or boating safety information. The U.S. Coast Guard conducts "Operation Sea Cow" at the beginning of each manatee season, notifying boaters in the Port Everglades Basin and Inlet areas of the changes in speed regulations.

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~~While the number of county and municipal marine law enforcement personnel has remained approximately the same since 1990, the number of FWC officers available to patrol Broward County has been reduced from 17 to 11. Miami Dade County also lost 6 patrol officers during this period. This reduction in state marine law enforcement personnel was raised as a concern at the Governor's October 2000 Manatee Summit. Participants at the summit emphasized the need for enhanced enforcement of existing regulations.~~

### ~~C. Local Land Development.~~

~~1. **Development Standards.** Unlike many of the other "key" manatee counties, Broward County does not contain an abundance of undeveloped waterfront property. Broward's riverine systems, particularly the New River, were first selected for development by early settlers due to an economy dependent upon boat and barge traffic. Many of the residential developments occurring in eastern Broward County in the 1940's, 50's and 60's were adjacent to existing waterways or along dredged canals. As the location maps of existing marinas (Map 13A □8) and public boat ramps (Map 13A □9) indicate, many of the older marinas and boat construction/repair facilities were are located along the New River.~~

~~2. **Marina/Boat Facilities.** Marinas, docks and boat ramps may have a direct effect on manatees and their essential habitat by: 1) reducing aquatic vegetation in feeding areas; 2) obstructing manatee movements along shallow shorelines; 3) providing a source of contaminants; and 4) disrupting functions of wetlands through dredge and fill activities. It should also be noted that improperly sited facilities may increase the probability of boat collisions with manatees especially if the facilities increase boat traffic in manatee habitat areas.~~

~~The relationship between manatee habitat and boat traffic needs to be analyzed in order to distinguish the vulnerability of specific areas to the development of docking and launching facilities. Sites suitable for the development of boating facilities should meet the following criteria:~~

- ~~a) minimize boat travel or reduce boat speed in areas where manatees are regularly sighted;~~
- ~~b) do not cause destruction of aquatic vegetation eaten by manatees;~~
- ~~c) meet design standards in wetlands; and~~
- ~~d) do not cause destruction of areas used by manatees to rest, cavort, calve and nurse.~~

~~Consistent with the above criteria, new marinas will be prohibited from designated Essential Habitat Areas. Existing marinas in these areas, with the exception of those related to law enforcement, will be legal nonconforming uses. This classification would allow the marina to operate but would prohibit expansion, and, should the use as a marina cease, the property could not be used for this purpose.~~

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~~Marinas are to be located so as to require minimal or no dredging and have good tidal flushing. If dredging is required, both the initial and subsequent dredging should be minimized. Sites selected will be reviewed for any significant environmental impacts on manatee habitat including manatee travel and migration corridors, and sea grass beds. All docks, mooring pilings or other structures must utilize design standards which do not entrap or injure manatees.~~

~~3. **Boat Ramps.** Broward County has 12 public boat ramps (Appendix 13 [E]) serving the waterways east of the salinity barriers. Boat ramps greatly contribute to the number of boats entering the Broward County water ways. With the exception of law enforcement purposes, new ramps shall be prohibited within designated manatee essential habitat areas. Boat ramps constructed in waters east of the salinity barriers shall be located in sites that minimize potential manatee/boat overlap and disturbance of manatee habitat. In addition, priority shall be given to sites within existing speed restriction zones.~~

~~4. **Residential Docking Facilities.** Residential docking facilities are defined as docks and wet slips provided for the sole use of the residents of a residential land use adjacent to a water body. Residential docking facilities are prohibited in designated Essential Habitat Areas. As certain docking facility construction designs are known to cause manatee mortalities, all docks should be subject to construction standards that do not entrap or injure manatees.~~

~~5. **Port Facilities.** Threats to the manatee within the Port Jurisdictional Area include: the transfer of petroleum products; Port operations, including vessel docking; recreational use of the eastern section of the FPL Port Everglades power plant discharge canal; and recreational boating density in the Port Everglades basin due to the proximity of the Port Everglades Inlet and vessels transiting the AICW.~~

~~a. *Transfer of Petroleum Products.* Port Everglades serves as the primary port of entry for petroleum products for thirteen counties within South Florida. These petroleum products are generally off loaded from vessels to privately owned oil tank storage facilities through at dock manifolds and underground pipelines. Spillage of petroleum products could pose a serious threat to manatees traveling to and congregating at the FPL Port Everglades power plant discharge canal. Accordingly, Port Everglades implements several precautionary measures with regard to the loading and off loading of petroleum through its Port Tariff. All vessels transferring petroleum products must be boomed off from the dock to the vessel at the point of transfer. This process involves the deployment of a floating boom which is designed to contain petroleum product spillage. Gasoline is considered too dangerous to confine in this manner and will evaporate. The evaporation process is accelerated by agitating the gasoline with water from a high pressure hose. When fuel is transferred from a barge to a ship, both vessels are boomed off. However, when the fuel is transferred from a landside tanker or bulkhead outlet to a ship, the ship is boomed off~~

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~~only at the point of transfer. The mouth (open end) of all slips have the capability of being boomed off utilizing spill booms stored at the end of each slip.~~

~~There is an established notification protocol between Port Everglades, the U.S. Coast Guard and various other regulatory agencies in the event of a spill. The Port Everglades Public Safety Division serves as the first line of defense if a spill of unknown origin or content occurs, a ship fails to follow notification protocol regarding a spill, or the ship/oil company's cleanup contractor is too slow in responding to the occurrence.~~

~~b. — *Port Operations.* Port Everglades' 25,072 linear feet of bulkhead (berths 1 through 33) is protected by approximately 500 Seibu, Type □2 fenders spaced at 50□ foot intervals. The fender's 4 foot by 4 foot facing is designed to maintain docked vessels a minimum of 3 feet waterward of the bulkhead in order to keep manatees from being crushed against the bulkhead. Port Everglades budgets over \$500,000 yearly for fender maintenance, which is performed on a full □time basis by a crew of four.~~

~~As a reminder to businesses utilizing port facilities, prior to manatee season the port provides a letter to both the Port Everglades Pilots Association and Hvide Marine (Tug Division) requesting their vessels leave the dock earlier than normal to reduce the need to speed through the port basin to pick up vessels offshore.~~

~~The port has a maintenance dredging program which includes all slips, berths adjacent to the AICW, turning basins and the turning notch. An incidental benefit of the program is the reduced opportunity for manatees to become trapped between the bottom of the vessel and the sea bed. With regard to water depth in berthing areas, port staff has established a project depth with regard to water depth which is controlled by the design depth of the bulkheads [Note: dredging deeper than the design depth of the bulkhead would lead to destabilization of the bulkhead]. Maintenance dredging occurs when water depth is one to two feet less than project depth. Project depth for each berth is listed in Appendix 13 □C □.~~

~~In addition to the port's existing vessel docking procedures, it is recommended that port □employed line handlers who facilitate vessel docking should receive an annual review on the importance of checking for manatees between the bulkhead and the docking ship.~~

~~c. — *Florida Power and Light Power Plant Discharge Canal.* A portion of the FPL Port Everglades Power Plant Discharge Canal is a state designated No Entry Zone. Dry Marina, Inc., located directly adjacent to the Discharge Canal, is a private marina located on property leased from Broward County for its operation. Due to the proximity of Dry Marina, Inc., to the FPL Port Everglades Discharge Canal, and the use of the discharge canal by both port operations and FWC marine enforcement~~

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vessels, the non-designated section of the discharge canal has been speed restricted to idle speed during the manatee season and slow speed the remainder of the year. Land-based fishing has been prohibited throughout the port, with heightened enforcement along the banks of the FPL Port Everglades Discharge Canal. The port has fenced the entire length of the FPL Port Everglades Discharge Canal to prevent interaction between port visitors and manatees. The port has posted signs prohibiting fishing from port property and feeding of or swimming with manatees. Port Everglades has provided pilings, barrels and signage to prevent water craft from entering the FPL Port Everglades Discharge Canal and nursery area north of Dry Marina, Inc. No entry signage also has been placed at the entrance to the Mangrove Lagoon on the south side of the FPL Port Everglades Discharge Canal. Port Everglades and the FWC's Bureau of Marine Enforcement work together to monitor activities in the FPL Port Everglades Discharge Canal.

In addition to the above listed protective measures, Port Everglades staff monitors access to the FPL Port Everglades Discharge Canal, allowing only researchers authorized by the U.S. Fish and Wildlife Service or contractors working on Port projects. Port Everglades staff also complies with a request from the U.S. Fish and Wildlife Service to provide fresh water to manatees during the winter months via hoses at the nursery area and behind the Port Administration Building.

d.—*Recreation Boating Use of Port Basin.* The Port Everglades port basin is a focal point for recreational boating in Broward County. All vessels transiting the AICW through Broward County must pass through the port basin. Additionally, the closest deep water access for most of Broward County and the northern part of Miami-Dade County is the Port Everglades Inlet. To protect manatees transiting this area, and to protect boaters, the port basin is regulated for slow speed year round, with an idle speed zone in the vicinity of the FPL Port Everglades Discharge Canal during the manatee season. The port basin is regularly patrolled by local, state and federal marine law enforcement officers.

### D.—Education and Awareness.

1.—At the Manatee Summit held by the Governor in October, 2000, most participants agreed that emphasis be placed on improving public awareness and the availability and distribution of educational information and literature. Local, state and federal government efforts and numerous private organizations and groups have undertaken a wide range of public awareness and educational activities including, but not limited to, the following:

#### — a.— Federal Agencies:

**U.S. Fish and Wildlife Service (USFWS).** The USFWS is the lead federal agency responsible for conservation of the nation's wildlife. Its primary responsibilities are

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for migratory birds, endangered species, freshwater and anadromous fisheries, and certain marine mammals including the endangered manatee.

~~**The National Wildlife Refuge System**~~ is the largest and most diverse collection of lands set aside for wildlife in the world. Many of the 500 refuges include areas of importance for manatees.

The ~~USFWS Ecological Service~~ office lead the federal effort to protect and restore manatees and other endangered species and their habitats under provisions of the Endangered Species Act and Marine Mammal Protection Act. Information on recovery efforts carried out by the manatee recovery program can be obtained at no charge from the Jacksonville, Florida office.

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### b. State Agencies.

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~~**Florida Fish and Wildlife Conservation Commission (FWC)**~~. The FWC regulates and enforces all marine-related statutes and rules including boat speeds in marine sanctuary areas. The Commission monitors a 24-hour toll-free number to report dead or injured manatees.

~~**The Florida Fish and Wildlife Conservation Commission: Florida Marine Research Institute**~~. The Florida Marine Research Institute provides a manatee suitcase exhibit. It is an educational tool designed to inform students about Florida's marine resources and ongoing conservation efforts. The suitcase includes resources such as brochures, slide shows, photographs, activities and videos and other teaching aids. The manatee suitcase is the first completed exhibit and is available for educators within the Tampa Bay Area.

~~**Florida Fish and Wildlife Conservation Commission: Bureau of Protected Species Management**~~ The Bureau of Protected Services Management began the official Manatee Voluntary Contribution Campaign in 1992. The campaign allows for a vessel registrant to provide a voluntary contribution of \$5.00 or more to the Save the Manatee Trust fund and receive a sticker or emblem by the tax collector. The decals signify support for the Save the Manatee Trust fund. The donations support manatee search, rehabilitation and educational programs.

~~**Florida Department of Environmental Protection (FDEP)**~~. FDEP reviews, coordinates and implements manatee management and research efforts. It also monitors state and federal permit applications affecting manatees and oversee the sanctuary and sign posting programs on the waterways.

~~**Florida Department of Education**~~. The department's Office of Environmental Education established the Florida Interdisciplinary Learning Resources in Environmental Education Database in 1991. It is designed for use by educators in

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~~Florida schools, districts, colleges and universities.~~

~~**Florida Department of Motor Vehicles.** The Florida Department of Motor Vehicles began selling manatee license plates in March, 1990. The license plates have raised money for research and education on a state level and have increased public awareness of the manatee.~~

~~**John U. Lloyd State Recreation Area.** John U. Lloyd State Recreation Area displays manatee educational information including a manatee sign and a small display case at the marina.~~

~~c. Broward County Agencies~~

### ~~**Broward County Schools**~~

~~1. **Elementary School.** Items regarding manatees are distributed to educators throughout the county. Elementary schools may participate in the Save the Manatee Club's Adopt A Manatee program as determined by individual teachers.~~

~~2. **Middle School.** The School Board of Broward County provides a web site to its secondary school teachers to find creative ways to incorporate endangered species issues into their lesson plans. This subject is school based as opposed to curriculum based and does not specifically address manatee protection problems. The web site is [www.endangeredeearth.com](http://www.endangeredeearth.com). The Center for Environmental Education and Research, Inc.'s Boater 101 Program is available for integration into a science curriculum.~~

~~3. **High School.** The Center for Environmental Education and Research, Inc., provides certification to high school teachers to instruct its Boater 101 program which includes a segment on manatee protection and avoidance.~~

~~**Secret Woods Nature Center.** Secret Woods Nature Center provides information regarding manatees during guided nature walks along the South Fork New River.~~

~~**Anne Kolb Nature Center.** Anne Kolb Nature Center at West Lake Park, a State Conservation and Recreation Lands acquisition area, offers a manatee theme play area.~~

~~**Deerfield Island Park.** Deerfield Island Park, the only County park with water only access, has manatee information at the kiosk near the park's marina.~~

~~d. Nonprofit Organizations~~

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~~**Florida Audubon Society (FAS).** The FAS is Florida's oldest and largest conservation organization with over 35,000 members. The FAS conducts aerial surveys to monitor manatee populations, produces educational materials, slide show and films and works closely with other groups involved in manatee protection.~~

~~**Broward County Audubon Society.** The Broward County Audubon Society lobbies for manatee protection at local and state levels.~~

~~**Save The Manatee Club (SMC).** Save the Manatee Club, Inc., is a nonprofit member-based organization that promotes manatee education/awareness. The Adopt A Manatee program provides funding for public awareness and education projects, manatee research, rescue and rehabilitation efforts, advocacy and legal action to ensure better protection for manatees and their habitat. To promote public awareness, the SMC press kits and press releases on manatee issues go out to local, state and national media on a regular basis. SMC maintains a web site on the Internet, posts new manatee information and answers email questions about manatees. The SMC produces public awareness waterway signs that alert boaters to the presence of manatees. The SMC also produces waterproof decals for boats providing recommendations to reduce manatee injury and death.~~

~~The SMC has produced two public awareness brochures. One highlights the problems associated with feeding manatees and the other provides manatee protection information for divers, swimmers and boaters. The SMC also provides free manatee education packets and school presentations by SMC staff. An educator's guide, four-color poster, and coloring and activity book is also distributed free to educators in the U.S. and internationally. The SMC and the Florida Advisory Council on Environmental Education have produced a video titled "Manatee Messages: What You Can Do!" The SMC also offers free in-service programs to educators in Florida and provides volunteer speakers to schools and civic groups in Florida and select areas across the U.S.~~

~~**Center for Environmental Education and Research, Inc. (C.E.E.R.I.)**~~

~~The Center for Environmental Education and Research, Inc. (CEERI), is a Florida nonprofit organization that promotes boater and manatee education and environmental awareness to Broward County secondary schools.~~

~~In order to increase the number of students participating in education, CEERI is capitalizing on existing technology, and will be offering the Boater101 Program in a Distance Learning or Video Conferencing format. This will increase program availability and provide interactive content among students. This method of instruction will enhance both the level of awareness and education within our community regarding safe boating and the preservation of manatees and their~~

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environment. The program expansion started in the form of a pilot program offered to six (6) public schools in Broward County, four (4) of which participated. The pilot program presented a five-day Boating and Environmental program to 220 students through the use of the Broward County School Systems video conferencing equipment. The majority of the initial funding will come through in-kind contributions from a partnership with the Broward County School Board grant contributions from the Broward County Enhanced Law Enforcement Grant and cash contributions from EnviroCare, Inc. and the MIA SF.

In 1996, CEERI developed and implemented the Boater101 Program (“formerly known as BoaterED”), a boater education, safety and environmental awareness course. This program consists of a six (6) chapter course manual designed to be taught primarily in the environmental science curriculum. One chapter is dedicated entirely to manatees and the environment and is intended to promote public awareness. The course material was approved by the National Association of State Boating Law Administrators (NASBLA), the Florida Department of Education (DOE) and the Florida Department of Environmental Protection (DEP) Boating Safety Division, now a part of the Florida Fish and Wildlife Conservation Commission (FFWCC). A component in this program requires the presence of manatee and environmental information. We believe that by educating boaters about the marine environment, its inhabitants, and related conscientious boating habits, the future generation will help to sustain our marine environment.

The Boater101 program, now in its fifth year, has been taught to many school aged children throughout Broward County Public Schools. Additionally, our community classes and participating boat dealers educate families and individuals receiving boating citations, as well as, providing instruction and general information on preserving our waterways.

Now, with the ability to utilize “interactive” technology and video conferencing methods, we have the opportunity to simultaneously educate students throughout the county at various classroom locations. This method of instruction will reach a far greater number of people than in previous years.

Furthermore, two double sided mobile billboards 10'x12' displaying manatee awareness and education will be circulated by the Broward County Sheriffs Office (BSO) to State, County, and local Parks and Recreation locations throughout Broward County.

**Marine Industries Association of South Florida** (MIA SF) is a not-for-profit leadership organization created to promote and protect the sound growth of the marine industry in South Florida for the benefit and education of its members, the community and the environment. The MIA SF facilitates the publication and

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~~distribution of numerous brochures informing Florida boaters about the manatee.~~

~~This organization is also an annual sponsor of the “Waterway Cleanup,” a county-wide effort to which remove trash and debris from Broward’s waterways.~~

### ~~d. — Private Companies~~

~~**Science Eye.** The Science Eye promotes environmental education through the schools by taking Broward School children on field trips. The Science Eye Conducts the manatee on field trips called “Beach Reach” which provides information about manatees and beach awareness for Pre-K to 2<sup>nd</sup>-grade students.~~

~~**Florida Power & Light.** FPL is one of the state’s largest electric utilities and many of the company’s power plants provide important winter refuges for manatees. FPL is an important contributor to manatee research and observation; offering various manatee educational booklets and brochures to boaters on how to avoid injuring the manatee. FPL produced a movie titled “Silent Siren: Manatees in Peril.”~~

~~**Port Everglades.** Port Everglades supports public awareness by providing manatee literature and information. It also participates in various community involvement projects that increase public environment awareness including an annual Manatee Days festival.~~

### ~~E. — Government Coordination~~

~~1. **Permit Procedures and Development Review.** The objectives and policies regarding the development of marine facilities should be incorporated into the appropriate section of the Broward County Code of Ordinances to ensure compliance.~~

## **IV. IMPLEMENTATION**

~~A. — Authority. Programs, policies and standards related to environmental protection and conservation in Broward County are developed and implemented by federal, state, regional and local agencies. A list of responsible agencies is provided in Appendix K of the Conservation Element (Chapter 13) which identifies the enabling legislation and authority granted to each agency. The primary agencies charged with the enforcement of environmental regulations in Broward County are the U.S. Army Corps of Engineers (ACOE), Florida Department of Environmental Protection (FDEP), Florida Fish and Wildlife Conservation Commission (FWC) and the Broward County Department of Planning and Environmental Protection (DPEP). The West Indian manatee is protected by the Marine Mammal Protection Act (MMPA) of 1972, the Endangered Species Act (ESA) of 1973 and the Florida Manatee Sanctuary Act (FMSA) of 1978. Boating safety regulations are authorized in s. 327.04, 327.46 F.S. and s. 370.021 F.S.; law implemented s. 327.46 F.S., s.327.72 F.S., and s. 327.73(1) F.S., Ch. 86 364, Ch. 89 428,~~

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~~Laws of Florida, as amended.~~

~~B. Sources.~~

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# CONSERVATION ELEMENT

## Broward County Manatee Protection Plan Component (MPPC)

### Executive Summary

This Manatee Protection Plan (MPP) was prepared to meet the requirements of Section 370.12(2)(t), Florida Statutes, which requires the counties identified in the Governor and Cabinet’s October 1989 Policy Directive (Broward County was one of the counties identified) to develop Manatee Protection Plans (MPPs) consistent with Florida Fish & Wildlife Conservation Commission (FWC) criteria based upon Attachment K of the directive, and to submit such protection plans for review and approval by the FWC. The statute further requires that each MPP include a Boat Facility Siting Plan (BFSP). Attachment K states that the objective of a BFSP is to determine appropriate dock densities for particular areas.

The MPP includes descriptive information and aerial maps of all County waterways accessible to manatees and describes manatee distribution and abundance as determined by aerial surveys and telemetry data. State and county manatee mortality data are also presented and were used in conjunction with boating use data to determine patterns of impact between boats and manatees.

For purposes of the BFSP, the County is divided into three waterway regions: the North, Center, and South. Based on an analysis of data, the BFSP allows increasing the dock density for each area. Dock density is calculated by dividing the number of existing docks (i.e., wet slips, dry slips, boat ramp parking spaces, or transient docks) by the feet of shoreline. The shoreline measurements are adjusted to exclude shoreline that has little potential for future development, such as shoreline adjacent to parks, preserves, or roadways. In addition, four “areas of special concern” are designated based on manatee carcass recovery and waterway usage. Three of these areas (South Fork New River, Dania Cutoff Canal Middle/C-10 Canal, and Dania Cutoff Canal West) are assigned specific proposed dock density increases designed to minimize manatee impacts.

| <u>BFSP Zone</u>                      | <u>Existing Docks</u> | <u>Proposed Dock Increase</u> |
|---------------------------------------|-----------------------|-------------------------------|
| <u>North</u>                          | <u>5,597</u>          | <u>1,353</u>                  |
| <u>Center</u>                         | <u>6,381</u>          | <u>619</u>                    |
| <u>South</u>                          | <u>10,242</u>         | <u>1,033</u>                  |
| <u>Port Everglades</u>                | <u>2</u>              | <u>0</u>                      |
| <u>South Fork New River</u>           | <u>4,653</u>          | <u>471</u>                    |
| <u>Dania Cutoff Canal Middle/C-10</u> | <u>3,415</u>          | <u>806</u>                    |
| <u>Dania Cutoff Canal West</u>        | <u>449</u>            | <u>110</u>                    |
| <u>Total docks</u>                    | <u>30,739</u>         | <u>4,392</u>                  |

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These increases in dock density were predicated on the County's commitment to implement additional manatee protection measures including increased law enforcement, monitoring, and education/awareness. When a County license is issued for slips in a region, the number available for future licensing in that region will be reduced. Similarly, when facilities are closed or reconfigured to fewer slips, these slips will be added back to the available slip count in that region. The proposed increase in number of slips in the North and Center waterways exceeds current and anticipated requests, whereas the proposed number for the South only marginally surpasses the number of currently requested slips. Demand is expected to be highest in the South and there has been some concern from local interests that the proposed number may become a limitation in the future. However, this plan must be reviewed during regular Evaluation and Appraisal Report (EAR) cycles of the Comprehensive Plan as required by the Department of Community Affairs (DCA). Increases to density could be sought upon re-evaluation of the plan at that time or intermittently if supported by new data or information.

To further reduce impacts to manatees, the BFSP proposes additional monitoring, education, and protection efforts that are to be funded by a combination of new slip fees at the time of licensing for marine facility expansions and an annual manatee mitigation fee on slips regulated by this plan.

### **1.0 Introduction**

#### **1.1 Background**

Protection of manatees in Florida began in 1893 with State legislation prohibiting the hunting and killing of manatees. Florida is one of the fastest growing states in the nation. The human population has grown from 6.8 million in 1970 to 15.7 million residents in 2000, and is expected to exceed 18 million by 2010 and 20 million by 2015 (U.S. Census Bureau 2000). This increase has created a conflict of use between growing human related pressures and limited availability of coastal resources. Along with population increases, there will be an increase in boat traffic as coastal areas become increasingly crowded, although data in Broward County comparing growth of boating with population increases shows minimal boater growth (6%) in spite of large population increases (20%) from 1995 to 2000. The cumulative effects from both natural and human related mortalities, combined with habitat loss and low reproductive rate, continue to jeopardize the long-term existence of the Florida manatee subspecies of the West Indian manatee.

Because of increased incidental manatee mortalities, Florida manatees are now protected by several forms of legislation, including the Marine Mammal Protection Act of 1972 (amended in 1996), the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act of 1978. As a result of concerns over the long term sustainability of the species, the U.S. Fish and Wildlife Service developed a Manatee Recovery Plan in 1989. The objectives of the Manatee Recovery Plan are to downlist and ultimately delist the Florida manatee from its State threatened and Federal endangered status. This plan was revised in 1996 and again in 2001 (FWS 1996, 2001). In conjunction with the Manatee Recovery Plan, the State of Florida identified 13 "key counties"

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with significant manatee populations (Brevard, Broward, Citrus, Collier, Duval, Indian River, Lee, Martin, Miami-Dade, Palm Beach, Sarasota, St. Lucie, and Volusia). The Florida Governor and Cabinet directed these counties to develop a comprehensive Manatee Protection Plan (MPP) in order to minimize human-related threats to the species. The Florida Fish and Wildlife Conservation Commission (FWC) produced a document entitled “Recommendations to Improve Boating Safety and Manatee Protection for Florida Waterways” which was presented to the Governor and Cabinet on October 24, 1989. A portion of that document, known as “Attachment K”, lists the following necessary components that should be included in each county’s Manatee Protection Plan (Figure 1):

- location and capacity of all marine facilities (including dry storage) in the county (proposed and existing);
- location of all boat ramps in the county (proposed and existing);
- boating activity patterns, including travel routes and major destination areas;
- manatee sighting information for the county;
- manatee mortality information for the county;
- any aquatic preserves, Outstanding Florida Waters or other refuge/reserve information;
- port facility information;
- location of significant habitat resources, such as seagrass beds, warm water discharges and fresh water sources;
- location of manatee protection and boating safety speed zones in the county (proposed and existing);
- location of manatee information displays;
- other relevant data as determined by the FWC.

The effective date of Broward County’s Manatee Protection Plan (MPP) is the date of a FWC approval letter. The plan is submitted to FWC seeking this approval following the approval by the Broward County Board of County Commissioners. Subsequently, the approved plan is forwarded to the Department of Community Affairs (DCA) to initiate incorporating the MPP into the Manatee Protection Plan in the County’s comprehensive plan. This and other portions of the Manatee Protection Plan may be updated as required with the necessary approvals.

### **1.2 General Setting**

Located in South Florida’s Gold Coast region with the Atlantic Ocean to the east, Broward County (2000 population: 1.6 million) lies between Palm Beach County to the north and Miami-Dade County to the south. Hendry and Collier counties are to the west and encompass 1,197 square miles. The western portion of Broward County contains 787 square miles (two-thirds of the entire area) consisting of water conservation areas and parts of both the Miccosukee Indian Reservation (reaching into Miami-Dade) and the Big Cypress Seminole Indian Reservation

## CONSERVATION ELEMENT

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(extending into Hendry County). The 410 square miles of developed area to the east includes the City of Fort Lauderdale, not only the county seat, but also the most populous of Broward's 32 municipalities (Figure 2) and a popular tourist destination. The aesthetic and economic importance of Fort Lauderdale's New River and Atlantic Intracoastal Waterway (ICW) System is evidenced by the city's distinction as both the "Venice of America" and the "Yachting Capital of the World."

Broward County's tidal waterways are unique compared to other Florida counties. Characterized as predominantly linear, the marine waterways rarely exceed 1000 feet in width and most shorelines are stabilized with a seawall, riprap, or other erosion control system. Broward is also home to one of the nation's busiest ports located at one of three inlets (although, Boca Raton Inlet is located in Palm Beach County) serving County boaters.

Trends in Broward County development show a conversion of waterfront property from commercial to residential land use. Examples of this trend are reflected on the New River in Fort Lauderdale where existing marine facilities are converting to high density multi-family residential. Other facilities adjacent to the ICW near the Stranahan River have reconfigured existing docks to accommodate larger vessels, often by reducing the number of slips at a site. New development located adjacent to the C-10 canal includes a dry stack facility, but the Dania Cutoff Canal is experiencing the development of residences and associated dockage. Although changes to these areas reflect the recent increased demand for residential and mega-yacht dockage, other areas of the County, such as the South Fork New River, have changed little from the existing use where a significant number of service and storage facilities remain.

Rising human-related pressures and increasingly limited coastal resources increasingly conflict. As population increases, there may also be an increase in boat traffic, although it is unclear if a saturation level will be reached. The adverse impact of watercraft on manatees is well documented. Reynolds and Gluckman (1988) demonstrated that the vast majority of adult manatees throughout Florida have scars that are representative of either single or repeated collisions with watercraft. In addition, a correlation between the number of registered vessels in Florida and the number of watercraft-related manatee mortalities has been shown to be statistically significant (Wright et al. 1995). However, a statistically significant trend of manatee mortality is lacking in Broward County due to the relatively small data set from the past 12 years (see following table). Therefore, Broward County lacks a consistent number of watercraft related manatee mortalities to make a statistical projection of future mortality trends. However, spatial locations of mortalities show groupings where further enforcement and education may be directed.

| <u>Watercraft-Related Manatee Mortalities 1994-2006</u> |            |
|---|------------|
| <u>Mean</u>   | <u>2.5</u> |
| <u>Median</u>   | <u>2</u>   |
| <u>Standard Deviation</u>                               | <u>1.8</u> |
| <u>Minimum</u>  | <u>0</u>   |
| <u>Maximum</u>  | <u>5</u>   |
| <u>Sum</u>  | <u>33</u>  |

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This document presents the background information and an inventory of existing conditions needed for the preparation of a Boat Facility Siting Plan (BFSP), one of three parts of the Broward County Manatee Protection Plan (MPP). A MPP is a state- and county-approved summary of manatee data, strategies, and management actions aimed at protecting manatees in a specific area or county, including the 13 “key” counties described previously in this document. Such a plan consists of the following three components: Boating Safety, Education and Awareness, and Boat Facility Siting. Manatee Protection Plans are important for the long-range planning needed to ensure the survival of the endangered manatee in the rapidly growing State of Florida. The BFSP component provides countywide guidance for future expansion of boat facilities. Such a plan specifies the appropriateness of locations for boating-related facility development based upon an evaluation of manatee protection needs and subsequent minimization of boater/manatee overlap.

**1.3 Planning Horizon.** The short-term planning horizon for the Manatee Protection Plan is five years or the year 2012. The long-term planning horizon is 10 years or the year 2018.

### **14 Broward County Waterways**

To protect manatees and their habitats, a review of county waterways is essential. Most of the over 220 miles of waterways with ocean access in Broward are man-made canals or channelized rivers with the exceptions being remnants of a few historically freshwater rivers such as Cypress Creek, Middle, and New Rivers. The basic canal network construction throughout the County began in the early 1900s for drainage and flood control to facilitate land development. Water control structures were authorized by Congress in 1948 as part of the Central and Southern Florida Project for purposes including flood control and prevention of saltwater intrusion. These structures compose the westernmost extent of brackish (a mixture of salt and fresh water) surface waters and the inland extent of waterways addressed by this MPP. Today, seven primary canals and numerous secondary and tertiary canals provide water supply and flood protection.

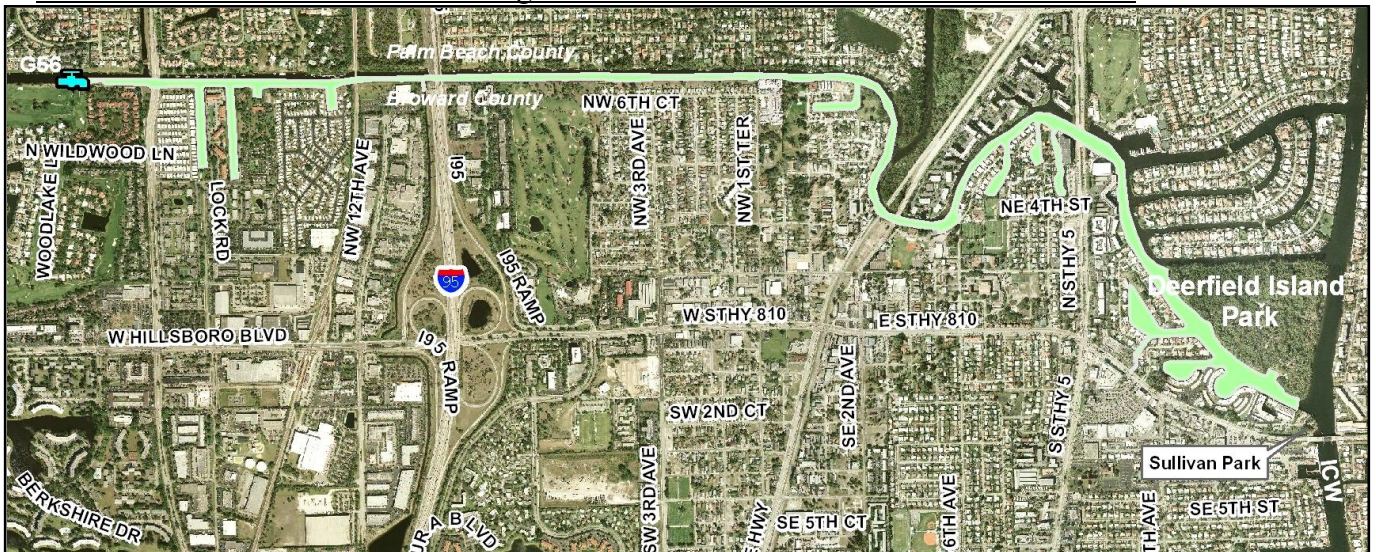
Based on locations of the region’s three inlets, three waterways were identified as primary travel corridors for boaters in Broward County: North, Center, and South Waterways. These and other referenced Broward County waterways are shown in Figure 3. These corridors also represent the source for boater/manatee overlap. Access is gained through the Hillsboro and Port Everglades inlets along the Atlantic Ocean and from adjacent counties via the ICW. In 1993, State manatee protection speed zones were adopted county-wide throughout tidally influenced waterways, and by 1994, signs posting these zones were installed (Comp. Plan, Vol. 4 Support Documents, p. 13-92).

### **Hillsboro Canal**

The Hillsboro Canal represents the northern jurisdictional boundary shared with Palm Beach County. From the west, the Hillsboro Canal, starts with the salinity control structure, G56, located approximately 1000 feet west of Military Trail. The canal takes a turn to the south meeting Dixie Highway, then back to the north at Federal Highway before heading southeast, connecting to the

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ICW. This area is composed of about 8 miles of shoreline excluding the Palm Beach side of Hillsboro Canal. The Canal width ranges from less than 90 feet to more than 180 feet.



More than 4500 feet of the Hillsboro Canal shoreline is composed of Deerfield Island Park, a County managed park owned by the Florida Inland Navigation District. In addition, Pioneer Park, with a boat ramp and 12 trailer parking spaces, is located less than 500 feet east of Dixie Highway. Furthermore, three marinas are located along this waterway with a capacity to hold about 981 vessels.

Residential use makes up for the majority of the canal shoreline. Single family homes make up more than two miles of shoreline, while multi family homes, including condos, compose about a mile of shoreline. Two trailer parks exist near the western extent of the waterway with significant dock capacity.

### **Institutional Limitations**

The Hillsboro Canal is regulated by two manatee protection speed zones. A “50 foot slow speed buffer”, a zone restricting vessels to slow speed within 50 feet from the shoreline, extends from the salinity control structure to Deerfield Island Park. A “slow speed” manatee protection zone extends from the westernmost portion of Deerfield Island Park to the southeast, including about 1000 feet south from the confluence with the ICW, overlapping a boating safety speed zone “slow speed, no wake”.

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### **Hillsboro River**

Beginning at the northern shoreline of Deerfield Island Park, the Hillsboro River travels south along the ICW from the Palm Beach County line towards the Hillsboro Inlet, ending approximately 1000 feet north of Sample Road. Fifteen secondary canals extend between 600 and 4500 feet in length to the west terminate before reaching Federal Highway. These canals connect predominantly residential land uses, with a potential for over 1300 single family docks, with the ICW.

A marina and a yacht club exist in this area with a combined capacity less than 90 boat slips. In addition to Deerfield Island Park, this section of waterway also borders Sullivan Park and Peg DeGroff Park, all lacking docks and ramps. Multi-family and single-family residential make up the major source of boats for this area.

### **Institutional Limitations**

Hillsboro River is regulated by both manatee protection and boating safety speed zones. Except for approximately 1000 feet at the Hillsboro Canal, this area is designated as a manatee protection “slow speed zone on the weekends from November 15–March 31, and 25 mph with a 50 ft slow speed buffer for the remainder of the year”. The area at the Hillsboro Canal is “slow speed” year round. The boating safety “slow speed, no wake” zone extends from approximately NE 2<sup>nd</sup> Street to SE 4<sup>th</sup> Street, from north of the mouth of the Hillsboro Canal extending south about 300 yards.

### **Hillsboro Inlet**

Spanning less than 1.5 miles both north and south of the Hillsboro Inlet, this area includes waterways from beyond Sample Road in the north to Atlantic Boulevard in the south. This inlet



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lies about six miles south of the Boca Raton Inlet, and about twelve miles north of the Port Everglades Inlet less than 4.5 miles south of the Palm Beach County line. Like the Hillsboro River portion, this inlet area hosts several finger lakes or canals extending between 600 and 4000 feet inland.

This area includes three marinas with a capacity for 388 vessels and a public boat ramp at Alsdorf Park containing 80 trailer spaces. Other parks adjacent to the waterway include Fletcher Park, Exchange Club Park, Sunset Park and Harbors Edge Park.

### **Institutional Limitations**

This area is regulated by manatee protection and boating safety speed zones. For manatee protection, the area including a mile north and south of the inlet is zoned for “slow speed Nov. 15 – Mar. 31, with a 25 mph, 50ft slow speed buffer during the remainder of the year.” Beyond that point in both directions, the regulation is “slow speed weekends Nov. 15 – Mar. 31: 25 mph with 50ft slow speed buffer remainder of year.” This waterway is also regulated by four boating safety speed zones. The inlet is regulated as a “slow speed, minimum wake” zone. An “idle speed, no wake” zone exists on the ICW from the northern boundary of the waterway to about 900 feet south of the inlet. Then, a “slow speed, minimum wake” zone immediately follows for about 4500 feet to an “idle speed, minimum wake” zone that runs about 1500ft., to Sunset Park.



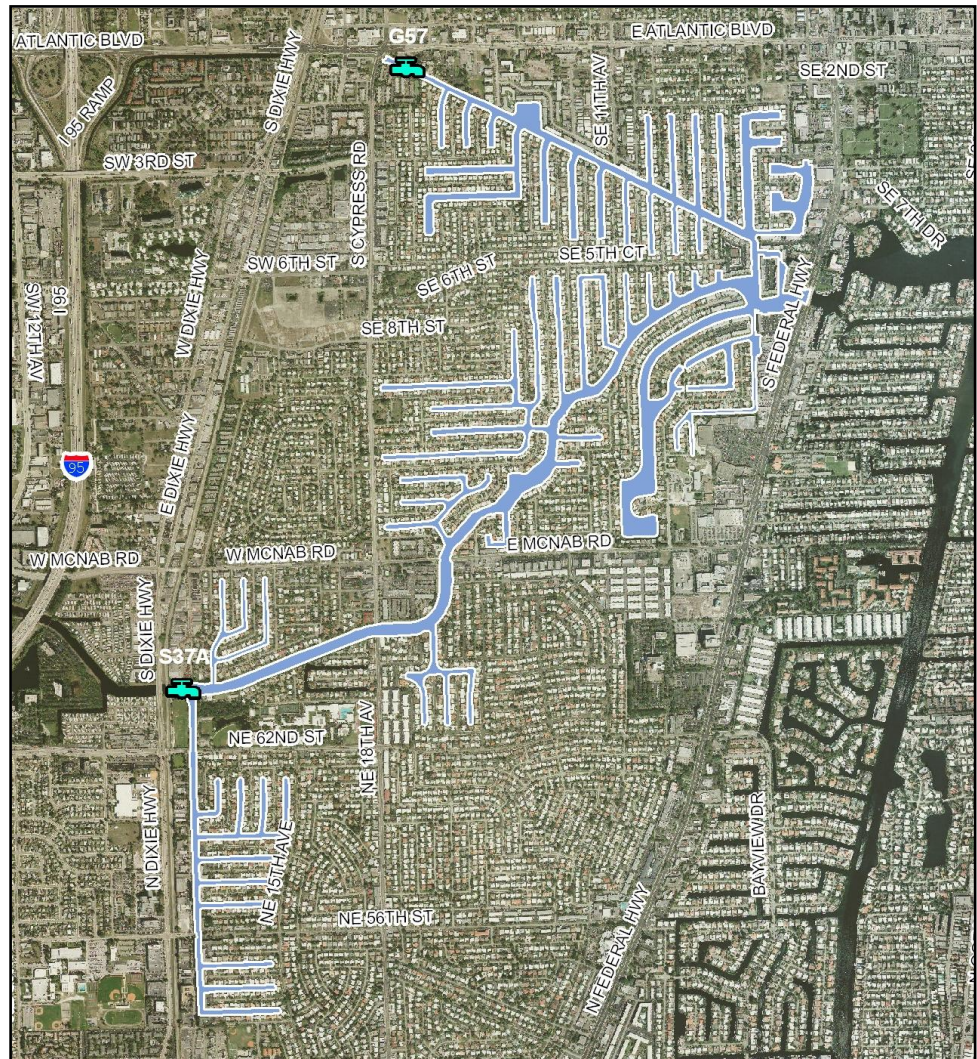
## CONSERVATION ELEMENT

### Cypress Creek Area

The Cypress Creek Area waterway includes Cypress Creek and the Pompano Canal. This waterway is characterized mainly as a series of smaller, residential finger canals off of two main branches converging on approach to the ICW. The area is confined within the following boundaries: Atlantic Boulevard to the north, Commercial Boulevard to the south, Dixie Highway to the west and Federal Highway to the east. The majority of the shoreline is developed as residential with over 2000 parcels adjacent to the water.

Two salinity control structures restrict boating access upstream. On the Cypress Creek Canal, S37A is located about 250 feet east of Dixie Highway and on the Pompano Canal, G57 is located at the southeast quadrant of the intersection of Atlantic Avenue and Cypress Road.

This waterway lacks access through public parks, but two marinas exist with a 196 combined boat storage capacity.



### Institutional Limitations

The manatee protection speed zone is regulated as a “slow speed” zone from the salinity control structures east to Federal Highway. This area lacks boating safety speed zone restrictions.

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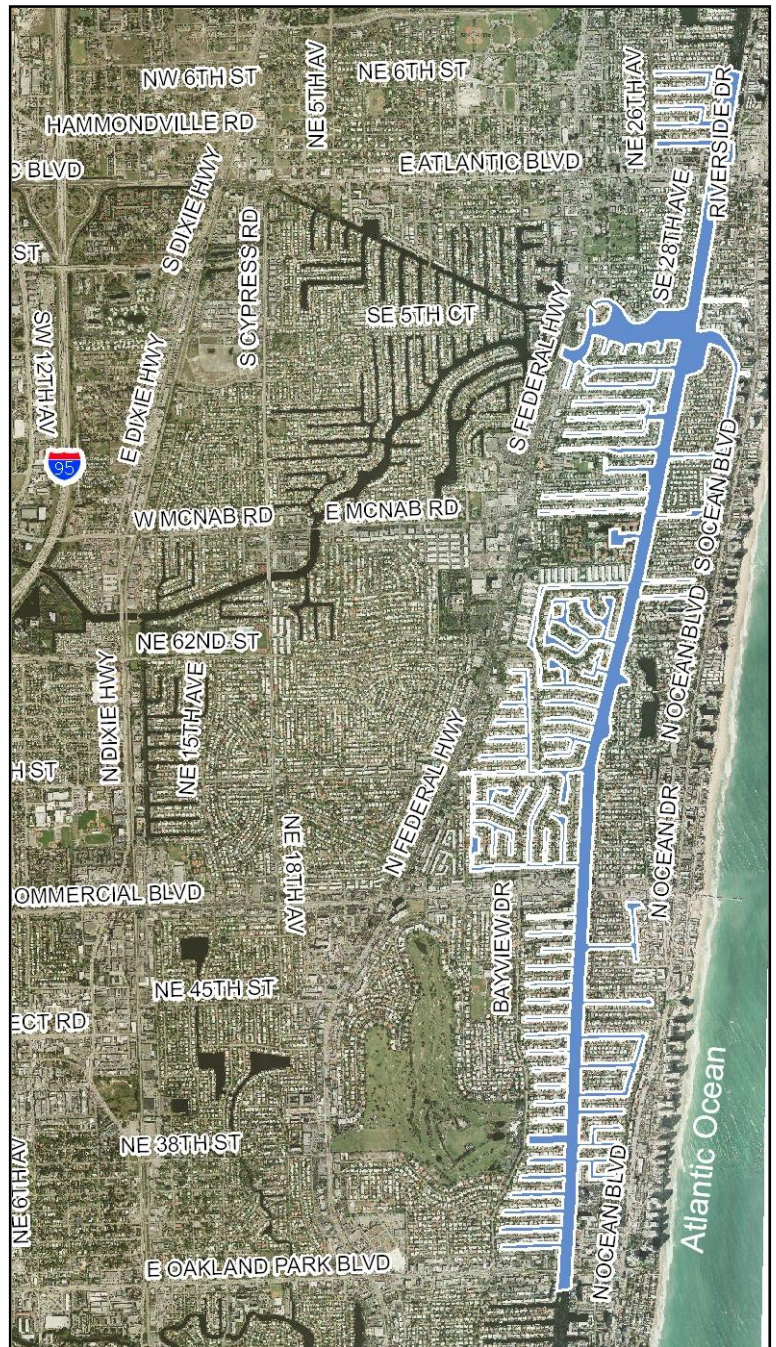
### **Intracoastal Waterway (ICW) Central Part A**

The ICW Central Part A lacks direct access to the ocean or areas west of Federal Highway. The northern boundary is located at Atlantic Boulevard with the southern boundary being Oakland Park Boulevard and it has the Cypress Creek Area branching off to the west at about 3200 feet south of Atlantic Boulevard. More than three dozen finger canals branch off to the west with lengths between 700 and 2500 feet. Most of these canals service residential communities. Likewise, more than a dozen canals service the east side of the ICW containing predominantly single family houses.

Multi family residential and commercial uses, including marinas, also exist in this waterway. Nine marinas or boat storage facilities have a total storage capacity of over 300 vessels. The waterway lacks any parks on the shoreline.

### **Institutional Limitations**

This area is regulated by manatee protection and boating safety speed zones. Manatee protection speed restrictions require boaters to observe “slow speed” on the weekends from Nov. 15 – Mar. 31, and 25 mph with a 50ft slow speed buffer the remainder of the year. This area also contains three “idle speed, no wake” boating safety zones near bridges for Atlantic Boulevard, Commercial Boulevard, and Oakland Park Boulevard.



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### **Intracoastal Waterway (ICW) Central Part B**

ICW Central Part B begins at Oakland Park Boulevard and ends south of Sunrise Boulevard at the foot of the Stranahan Canal/River system. This segment of the ICW, similar to ICW Central Part A, has smaller finger canals connecting to both sides although extending farther from the western banks.

This area includes single- and multi-family residential housing, and commercial uses including marinas, in addition to conservation at Hugh Taylor Birch State Park and Bonnet House. The State Park makes up over 5500 feet of shoreline; however, this waterway lacks any public boat ramps. Four boat storage facilities, including marinas and a yacht club, can store up to 97 vessels.

### **Institutional Limitations**

This area is regulated with manatee protection and boating safety speed zones. The entire length of the ICW Central Part B is restricted to “slow speed on weekends from Nov. 15 – Mar. 31, with a 25 mph, 50ft slow speed buffer for the remainder of the year.” There are two “idle speed, no wake” boating safety speed restriction zones near the Oakland Park Boulevard and Sunrise Boulevard bridges. About 1300 feet south of Sunrise Boulevard, “slow speed, minimum wake: Sat, Sun & Holidays” encompasses the remainder of the waterway continuing through the next waterway to the south, the Stranahan Canal/River System. Furthermore, the City of Fort Lauderdale established Sunrise Bay as a watersports area. This designation allows for recreational



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usage such as water skiing pursuant to City Code of Ordinance section 8-1 and 8-166(c).

### **Middle River Area**

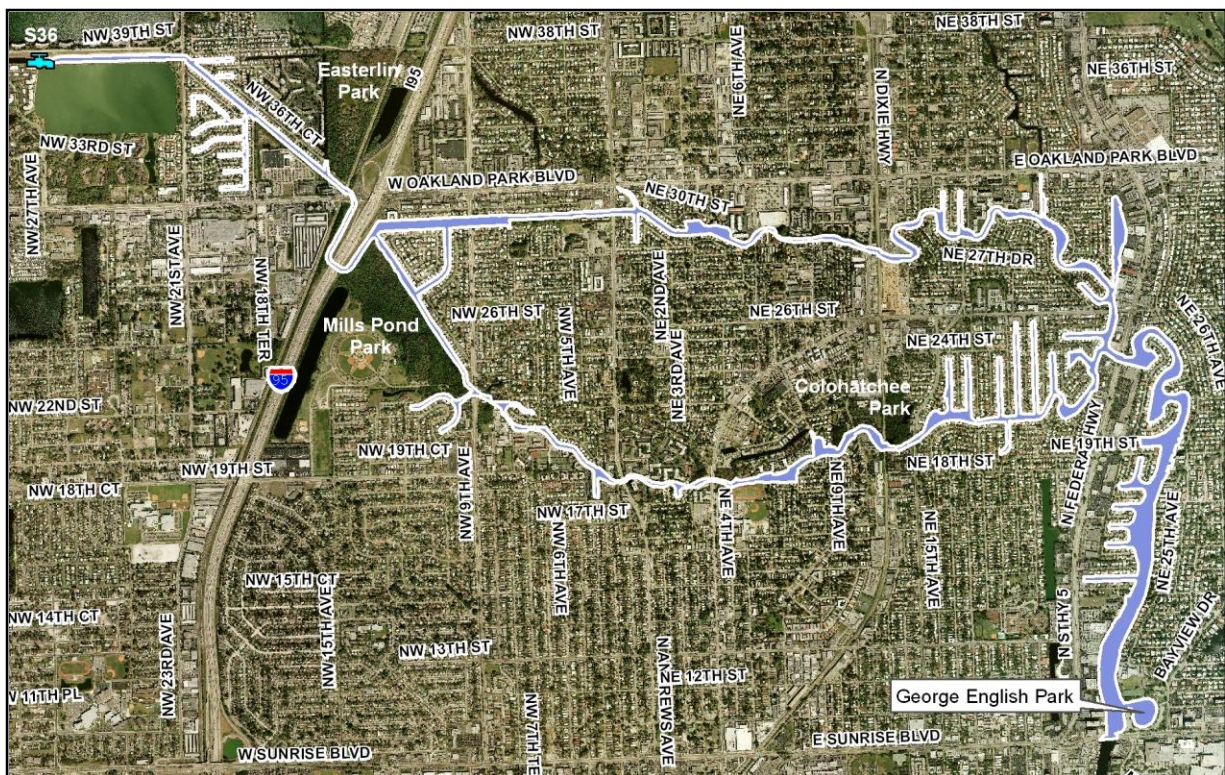
The Middle River Area begins from the west at the salinity control structure S36 and dissects to the North and South Fork east of I-95 then converges 2 miles before reaching the ICW.

Residential land use dominates the shoreline with more than 1300 units. Two commercial boat facilities provide space for 5 boats. Three boat ramps at public parks, including George English Park, provide 77 trailer parking spaces. Park land shoreline on this waterway exceeds 6300 feet and includes Mills Pond Park, Colohatchee Park, and George English Park.

### **Institutional Limitations**

A “slow speed” manatee protection speed zone exists from S36 to the eastern convergence of the North and South Fork. This waterway lacks any boating safety speed restriction zones.

Furthermore, the City of Fort Lauderdale established 5000 feet of the Middle River, north from George English Park, as a watersports area. This designation allows for recreational usage such as water skiing pursuant to City Code of Ordinance section 8-1 and 8-166(c).



### **North Fork New River**

From the west, the salinity control structure, S33, initiates the North Fork New River waterway. The North Fork continues in a southeast direction under I-95 and Broward Boulevard to meet its terminus at the South Fork New River.

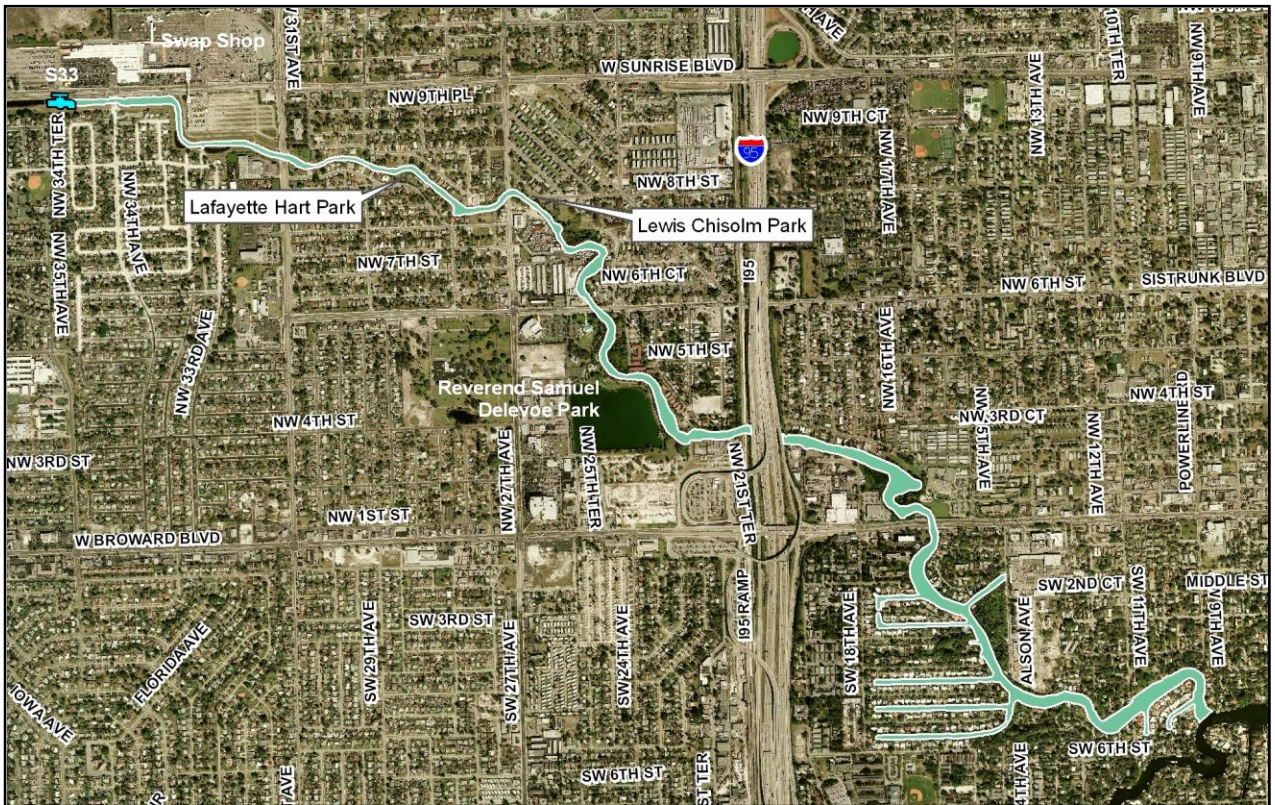
## CONSERVATION ELEMENT

From the S33 to Broward Boulevard the majority of the land use is single family residential with small, but significant shorelines of commercial (more than 1700 feet), namely the Swap Shop, and more than 2500 feet along parks, specifically the Reverend Samuel Delevoe Park. Between Broward Boulevard and the North Fork's terminus at the South Fork, the land use is composed of single and multi family residences and commercial businesses.

This waterway includes one commercial boat storage facility with a capacity of 5 boats, but lacks public boat ramps.

### **Institutional Limitations**

A "slow speed" manatee protection speed zone exists throughout the waterway; however, it lacks any boating safety speed restriction zones.



### **New River Junction**

The New River Junction connects the North and South Forks of the New River to the ICW, passing through downtown Fort Lauderdale. This system also includes the Tarpon River tying into the south side of the western and eastern extents. Additionally, the Himmarshee Canal spurs to the north 1300 feet west of the eastern boundary of this system.

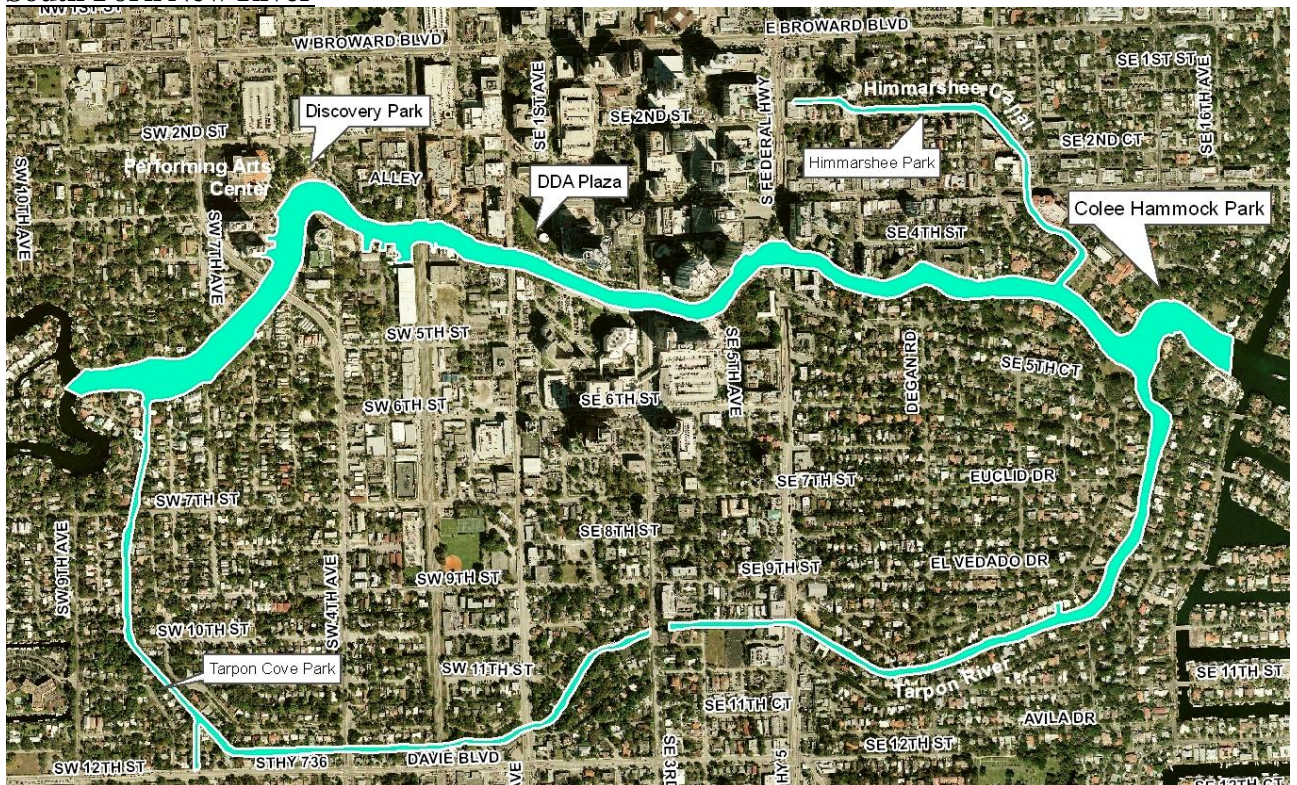
## CONSERVATION ELEMENT

The New River Junction includes many recreational, commercial, and residential uses. More than 7700 feet of shoreline close to downtown is utilized as the Fort Lauderdale Riverwalk including the Performing Arts Center, Discovery Park, and DDA Plaza. Colee Hammock Park is located near the ICW on the New River while Tarpon Cove Park and Himmarshee Park are located on the Tarpon River and Himmarshee Canals, respectively. Six boat storage facilities, including Cooley's Landing, lend to a total capacity of 483 vessels. In addition, Cooley's Landing includes three boat ramps servicing 22 trailer parking spaces. Nearly 280 vessels may be attributed to single and multi family residential uses.

### **Institutional Limitations**

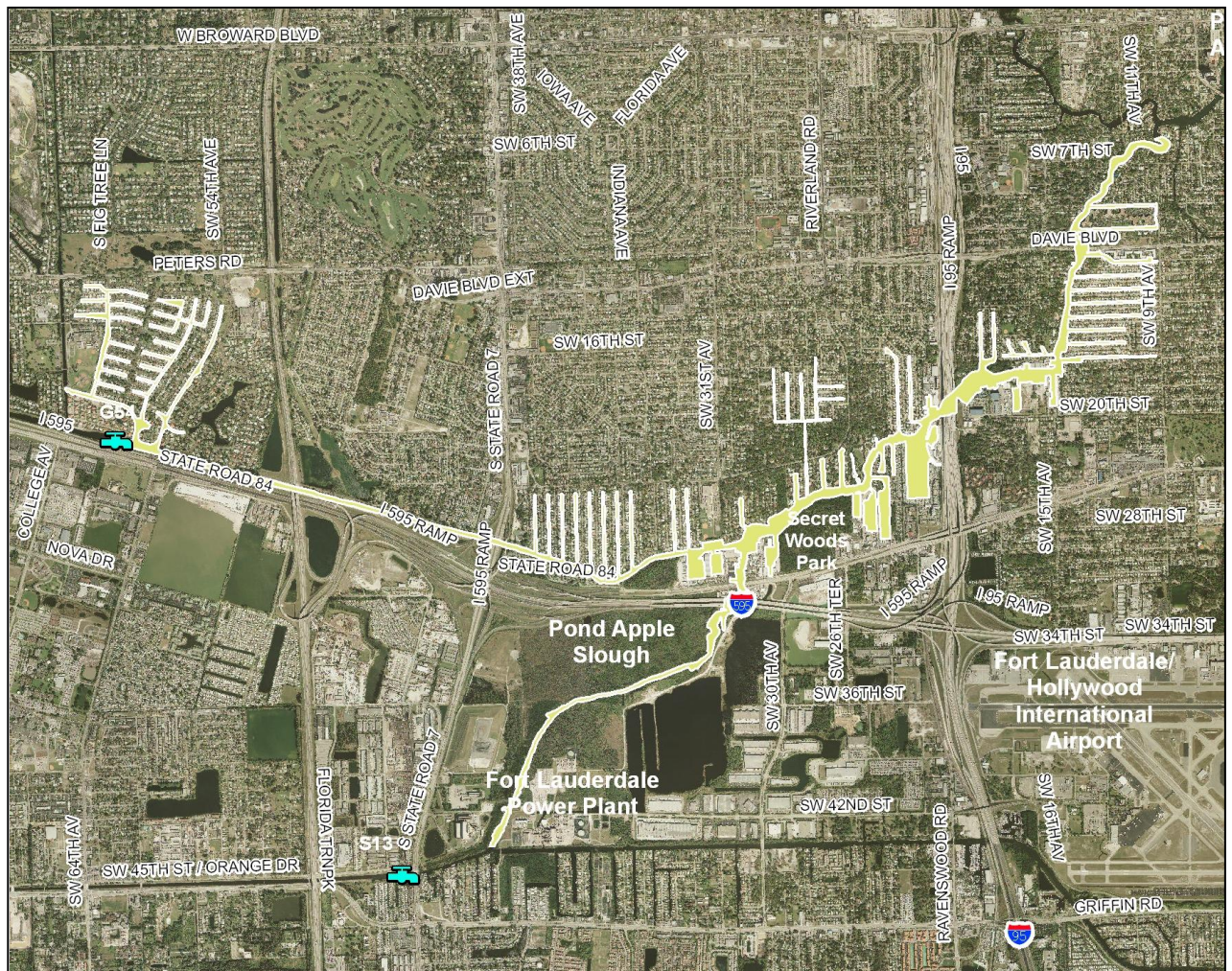
The New River Junction lacks boating safety speed restriction zones; however, a manatee protection "slow speed" zone encompasses both the New River and Tarpon River.

### **South Fork New River**



The South Fork New River includes the North New River Canal west to the salinity control structure G54, and South New River Canal to Dania Cutoff Canal. Additionally, this waterway links the ICW via the New River Junction and Stranahan River to the Lauderdale Power Plant, a significant destination for manatees during winter months. This waterway usually contains on average three manatees as sited during the bimonthly monitoring. During the winter months of 2005, two thirds of the sited manatees were seen in transit towards the Lauderdale Power Plant. In the past two years, manatee counts during the winter months, typically the highest of the year, are more than 110. This waterway is an area of special concern.

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This waterway is designated an 'area of special concern' due to the high probability of boater/manatee overlap. This area includes the second highest number of manatee carcass recoveries in the County. Since 1977, 24 carcasses were reported including six attributed as human related. In contrast, 75% of the carcasses recovered in Port Everglades were caused by human interaction within that period.

Survey records show eight perinatal carcass recoveries in this waterway since 1986. Five of the eight perinatal carcasses have been reported since 1989 in the westernmost extent of this waterway, north of the New River Canal, adjacent to single family land use,

This waterway has the highest capacity for commercial and potential residential vessel storage in the County. Seventeen boat storage facilities have a capacity totaling 1829 vessels. Single family and multi family residential uses may account for an additional 2700 vessels. One new boat ramp is located in this waterway east of State Road 7/US 441 with a capacity of 9 trailer parking spaces.

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More than 2 miles of shoreline is managed for preservation including cypress and mangrove wetlands located in Pond Apple Slough and the Secret Woods Nature Center, inclusively.

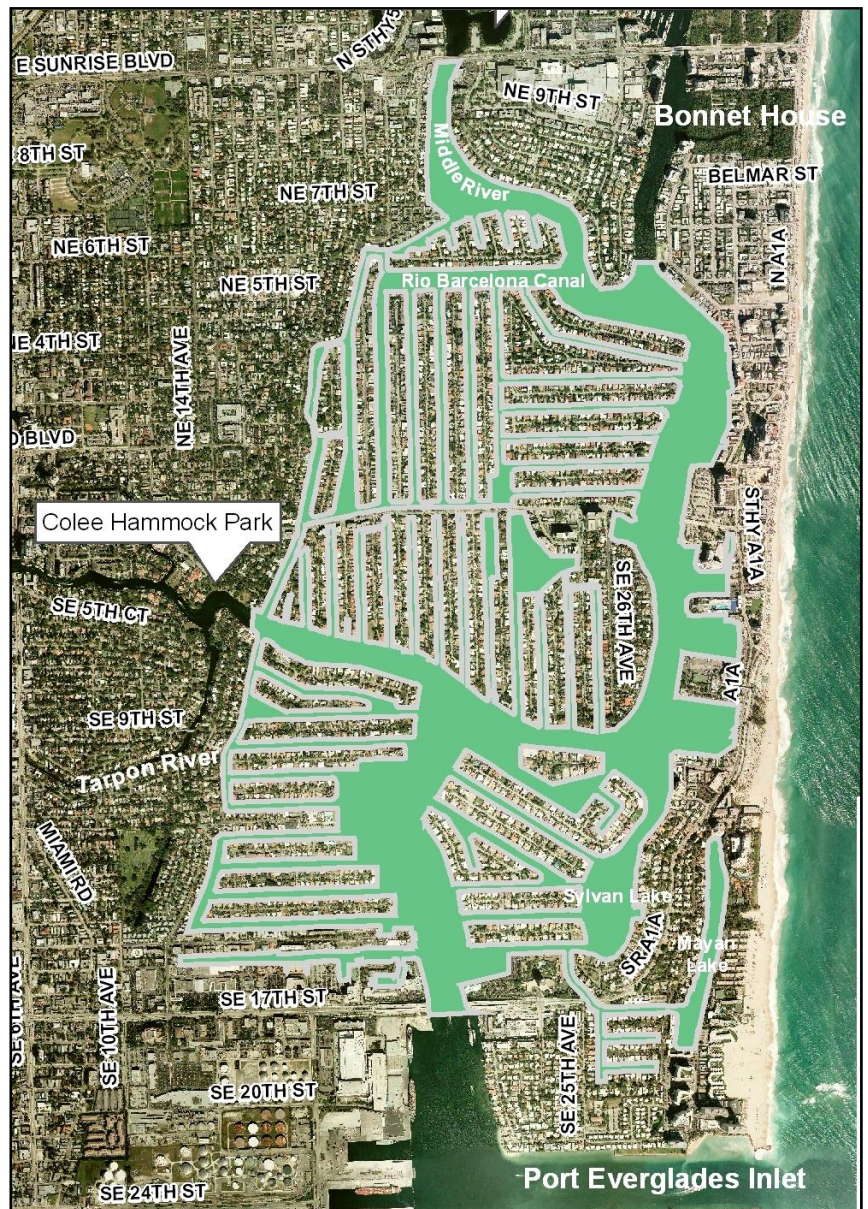
### **Institutional Limitations**

The South Fork New River area lacks boating safety speed restriction zones; however, manatee protection zones exist throughout. A majority of this area is mandated as “slow speed” for manatee protection with the only exception is within 2400 feet of where the North and South New River Canals converge on the South Fork New River. This area is regulated as an “idle speed” zone.

### **Stranahan River and Canals**

The Stranahan River and Canals area links the Port Everglades to the south to the northern Broward waterways via the ICW. Furthermore, this waterway connects the New River Junction and Middle River Areas to the ICW. Other features of this area include the numerous finger canals servicing single and multi family residential uses, the major land use of this waterway. The Stranahan River is the name for the ICW between Las Olas Boulevard and SE 17<sup>th</sup> Street.

The majority of vessels originating from this area embark from commercial and private storage. More than 1163 vessels may be stored at the sixteen commercial boat storage facilities. Commercial tourist vessels regularly use this waterway. This area also includes the potential for more than 2500 vessels housed at single and multi family residential sites. The waterway



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includes one boat ramp located at SE 15<sup>th</sup> Street with a trailer parking capacity of 58, although this quantity is often surpassed.

This area lacks shoreline managed as natural parks.

### **Institutional Limitations**

Three boating safety speed zones and two manatee-related speed zones exist in this waterway. The boating safety speed zones are limited to the ICW. A “slow speed minimum wake” boating safety speed zone extends about 3000 feet north and south of the mouth to the New River. Beyond that location to the south, exists the “idle speed, no wake” zone to SE 17<sup>th</sup> Street bridge. A separate “idle speed, no wake” zone also extends north about 4800 feet to a “slow speed minimum wake: Sat, Sun & holidays” zone that completes the run to the northern edge of the waterway.

From the northern boundary of this waterway to the first bend to the west of the ICW, manatee related boat speed is regulated to “slow speed weekends Nov 15 – Mar 31: 25mph with 50ft slow speed buffer remainder of year”. For the remaining portion of the ICW in this waterway including the portion of the New River and finger canals to the south, the manatee related speed zone is “slow speed.” Furthermore, the City of Fort Lauderdale established Rio Barcelona Canal, the mouth of the Middle River, Sylvan Lake, and Mayan Lake as watersports areas. This designation allows for recreational usage such as water skiing pursuant to City Code of Ordinance section 8-1 and 8-166(c).

### **Port Everglades**

Port Everglades Inlet is a primary access to the Atlantic Ocean for the County and serves cargo and passenger ships, recreational boaters, and the occasional navy vessel. This corridor also is the route for hundreds of manatees seeking the warm waters of the Port Everglades Power Plant effluent during the winter months.

Facilities exist in the waterway with a capacity to hold 553 vessels. The marinas include Nova Southeastern University and the U.S. Coast Guard, both located on the west side of the barrier island across from the

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Port Everglades facility. One boat ramp exists with trailer parking for 74 vehicles. The south bank of the Dania Cutoff Canal is managed as mangrove habitat in West Lake Park.

Potential boater/manatee overlap is reflected in the more than 40 carcass recoveries reported since 1974. Human related activities such as watercraft operation attributed to 30 of those manatee deaths.

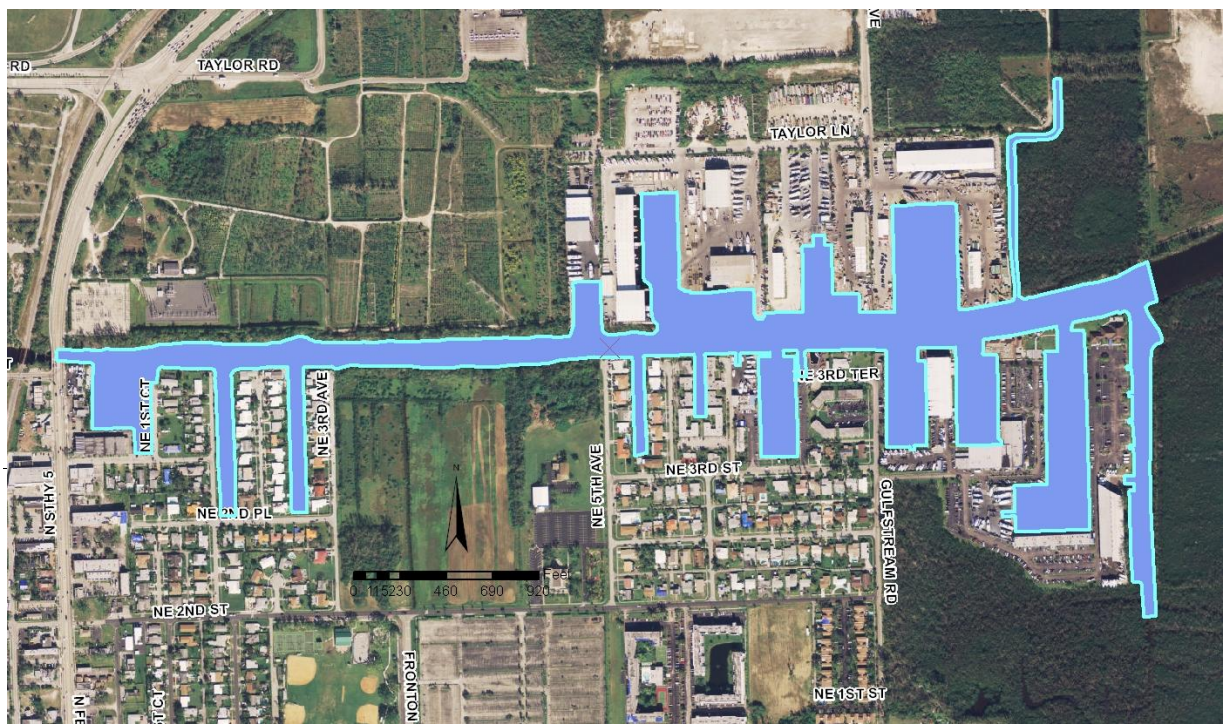
Port Everglades is located about 23 miles north of Port of Miami and about 12 miles south of the Hillsboro Inlet. The waterway includes the shoreline of the port operations from SE 17<sup>th</sup> Street bridge south to the length of the Dania cutoff canal adjacent to the Port's container storage area.

The warm water refuge areas from the power plant located within this area are designated by Broward County as Manatee Essential Habitat (1989 Comprehensive Plan Vol. 4, 13A(42). Broward County's Comprehensive Plan prohibits the construction of new marinas or expansion of existing marinas, docking facilities, and boat ramps, except those related to law enforcement, within Manatee Essential Habitat Areas (1997 Comprehensive Plan, Policy 13(A.3.1, Ordinance Number 96(39).

This shoreline includes areas dedicated to natural resource protection such as the County's West Lake Park and John U. Lloyd Stat Park. Additional shoreline comprised of mangroves exists at the mouth of the power plant's effluent canal.

### **Institutional Limitations**

Boating safety and manatee related speed regulations in addition to a Federal security speed zone exist in this area. The effluent canal originating from the power plant and mangrove area within the Port are restricted as a "no entry zone." "Idle speed from Nov. 15 – Mar. 31, and slow speed the remainder of the year" regulates the length of waterway 2600 feet north and south of the mouth of this canal on the ICW. Beyond this zone, the ICW and Port area is designated as "slow speed" zones. The U.S. Department of Homeland Security recently established a "slow speed zone" within the inlet extending about 1300 feet from the ICW to increase port security.



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The waterway lacks boating safety speed restriction zones, however; the entire length is regulated as “slow speed” for manatee protection.

### **Dania Cutoff Canal Middle/C-10 Canal**

The Dania Cutoff Canal Middle/C-10 Canal is located on the Dania Cutoff Canal between the SW 30<sup>th</sup> Avenue and US1 and includes the C-10 Canal and C-10 Spur. There are numerous secondary canals off the Dania Cutoff Canal that provide navigational access to single family homes, as well as smaller areas of industrial and commercial land uses. The C-10 Canal connects to the Dania Cutoff from the south nearly a mile downstream from I-95. The Spur breaks off west from the Canal a half mile south of Stirling Road and extends west to water control structure CS22. Industrial and commercial land uses comprise most of the C-10 Canal shoreline north of the Spur intersection; however, south of that point including the Spur, residential and recreational opportunities, such as golf courses, predominate.

This area has a high perinatal concentration, with two perinatal mortalities since 1977, and the Dania Cutoff Canal section is a primary travel corridor for manatees. For these reasons, this zone is designated an “area of special concern”.

Significant physical barriers for this waterway include the fixed bridges at US1 and the adjacent FEC railroad that limits vessel vertical clearance.

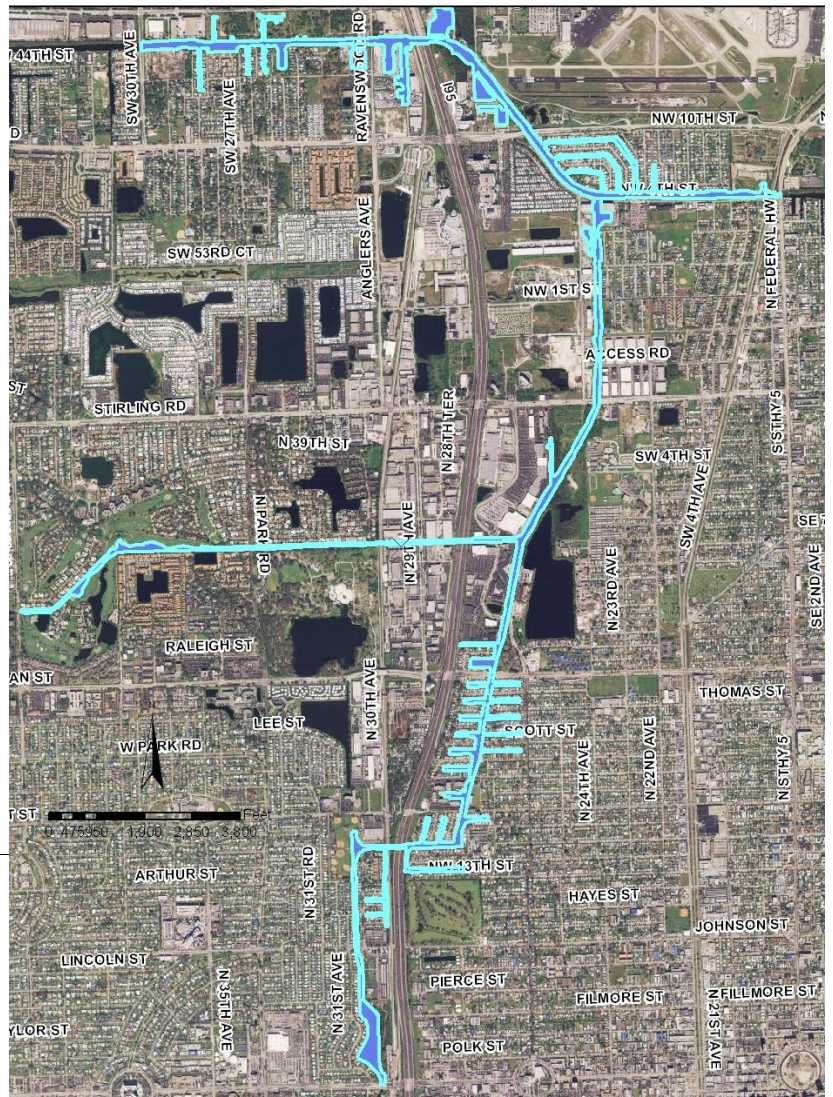
Fifteen boat storage facilities exist in this zone with a capacity of 2462 vessels, including a new storage facility recently opened with a capacity of more than 210 vessels. There are also two boat ramps with parking for ten trailers total.

The Dania Cutoff Canal portion of this zone has a significant amount of shoreline managed for natural preservation.

### **Institutional Limitations**

The waterway lacks boating safety speed restriction zones, however; the entire length is regulated as “slow speed” for manatee protection.

Broward County  
Volume 4, Support Documents



## CONSERVATION ELEMENT

### Dania Cutoff Canal West

The Dania Cutoff Canal West east-west canal located between the S13 control structure on the west and SW 30<sup>th</sup> Avenue. This waterway terminates at State Road 7 due to the S13 water control structure. This terminus is 1780 feet west of the location where the South Fork New River converges with the Canal. There are numerous secondary canals off the Dania Cutoff Canal that provide navigational access to single-family homes, as well as smaller areas of industrial and commercial land uses.

Human related activities including watercraft and flood gate operation explained four of fifteen mortality records. This area has been the location of perinatal mortalities and is also a travel corridor for manatees and has been designated an “area of special concern”.

Since 1977, mortality surveys include eight perinatal records, which equates to the number of perinatal deaths reported in the South Fork New River since 1989. Most of the mortalities in this waterway are reported at the westernmost extent of Dania Cutoff Canal West.

Significant physical barriers for this waterway include the fixed bridges at US1 and the adjacent FEC railroad that limit vessel vertical clearance.

This waterway includes two boat storage facilities storing 45 vessels. This length of the Dania Cutoff Canal has a significant amount of shoreline managed for natural preservation.



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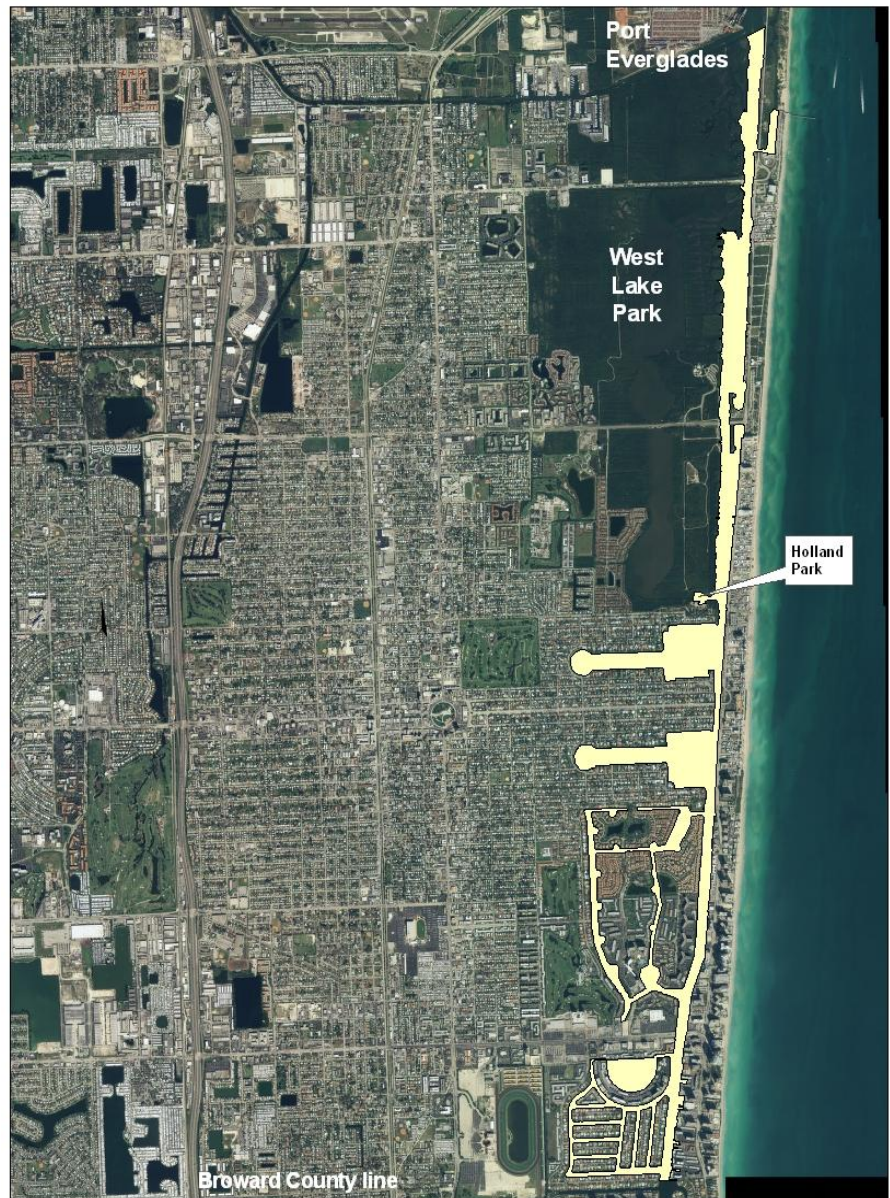
### **Institutional Limitations**

The waterway lacks boating safety speed restriction zones, however; it is regulated as “slow speed” for manatee protection, with the vicinity of the Lauderdale Power Plant as an exception. This exception is a mile of the canal including secondary waterways from the South Fork New River east towards SW 30<sup>th</sup> Avenue that is regulated as “idle speed Nov. 15 – Mar. 31” and “slow speed the rest of the year”.

### **Intra-coastal Waterway (ICW) South**

The ICW South includes the ICW and associated basins plus canals from the Dania Cutoff Canal south more than six miles to the County boundary with Miami-Dade. This area includes the gamut of uses including commercial, single- and multi-family residential, marina, and park and conservation. Remaining undeveloped areas are predominately designated as conservation or recreation.

Facilities exist in the waterway with a capacity to hold 434 vessels. The marinas include SeaTech/Seafair and the Diplomat Hotel on Hollywood Beach. Two boat ramps exist with trailer parking for 93 vehicles. More than three miles of the ICW west bank located south of the Dania Cutoff Canal is managed as mangrove habitat in West Lake Park.



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### **Institutional Limitations**

This area includes both manatee protection and boating safety speed restrictions. Speed restrictions include three “idle speed” zones: the Dania Beach Boulevard bridge, south of Sheridan Street past Hollywood Boulevard, and north of Hallandale Beach Boulevard. There are also two “slow speed, minimum wake” zones located at Sheridan Street and Hallandale Beach Boulevard bridges. The manatee protection speed zone is predominantly regulated as “25mph with a 50ft slow speed buffer” although the speed is regulated as “slow speed” from the Dania Cutoff Canal extending south for about a mile.

### **Lauderdale Power Plant**

The Lauderdale Power Plant is located west of the Fort Lauderdale/Hollywood International Airport, south of I 595, east of State Road 7 and north of the Dania Cutoff Canal.



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This waterway includes a warm water refuge area resulting from effluent of power generation and is designated by Broward County as Manatee Essential Habitat (1989 Comprehensive Plan Vol. 4, 13A(42). Broward County's Comprehensive Plan prohibits the construction of new marinas, docking facilities, and boat ramps or expansion of existing marinas, except those related to law enforcement, within Manatee Essential Habitat Areas (1997 Comprehensive Plan, Policy 13(A.3.1, Ordinance Number 96(39). The typical winter manatee counts in this area exceed 100 individuals.

The waterway lacks existing boat storage facilities and boat ramps.

### **Institutional Limitations**

This area's "no entry zone" regulation exceeds the need to designate speed zones.

## **2.0 Manatees in Broward County**

### **2.1 Introduction**

The Florida manatee (*Trichechus manatus latirostris*) is a distinct subspecies of the West Indian manatee (*Trichechus manatus*) and is listed as endangered throughout its range. Manatees (Order Sirenia) evolved from land mammals more than 60 million years ago and have a fossil record extending from approximately 45 million years ago. While information on manatees prior to the first half of the 20<sup>th</sup> century is limited, it is known that these marine mammals were hunted in Florida as early as the Paleo Indian period (8500(6000 B.C). This time period coincides with the earliest known occupation of Florida by aboriginal Indians (Reynolds and Odell 1991). Analysis of historical records suggest the routine hunting of manatees in Florida by both Indians and settlers in the 1800s (FWS 2005).

Florida represents the northern limit of the typical geographic range of the manatee, though some individuals have been known to occasionally travel farther north along the eastern seaboard and west along the Gulf of Mexico states (FWS 2001). They can be found in riverine (fresh), estuarine (brackish), and coastal (marine) environments in the southeastern United States. These areas include many habitat types, including vegetated freshwater bottoms, coastal marshes, seagrass meadows, tidal creeks, and man-made canals. In addition, manatees also utilize natural springs, artificial warm water sites such as power plants for warmth, quiet secluded tributaries and creeks for resting, calving, and nurturing their young, and open waterways and deep channels including man-made dredged canals as travel corridors (FWS 2001). Figure 4 shows essential manatee habitats located in Broward County. In summary, while manatees tend to have preferred areas and aggregation sites, they can be found in a wide variety of coastal habitats.

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### 2.2 Population Status

Long term studies suggest four relatively distinct regional subpopulations of the Florida manatee: Northwest, Southwest, Atlantic (including the St. Johns River north of Palatka), and St. Johns River (south of Palatka). These divisions are based primarily on documented manatee use of wintering sites and from radio tracking studies of individuals' movements. Although some movement occurs among subpopulations, researchers found that analysis of manatee status on a regional level provided insights into important factors related to manatee



The following is from the Population Status Working Group Statement in 2001 (FWS 2001) regarding the Atlantic coast subpopulation:

*Scientists are concerned that the adult survival rate (the percentage of adults that survives from one year to the next) is lower than what is needed for sustained population growth. The population on this coast appears to have been growing slowly in the 1980s but now may have leveled off, or could even be declining. In other words, it's too close to call. This finding is consistent with the high level of human-related and, in some years, cold-related mortality in the region.....In order to assure high adult survival the group emphasizes the urgent need to make significant headway in reducing the number of human-related manatee deaths.*

A Biological Status Review of the Florida manatee was finalized in December 2002 by FWC's Florida Wildlife Research Institute (FWRI). This review states that, statewide, the rate of increase in watercraft-related manatee deaths over the past decade (expressed as annual percentage increase) exceeds estimates of population growth rate. In addition, it also states that it is likely that there will be a 50% decline in the Florida manatee population within the next 45 years (FWC 2002).

### 2.3 Abundance and Distribution

Data on manatees observed in Broward County are available from a variety of sources:

1. distributional survey, Broward County, 1991-1992, 2004-present
2. distributional survey, FWC, 1988-90

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3. synoptic survey, FWC, 1991–present.
4. proximity to Broward County power plants, FPL, 1977–present
5. telemetry data, U.S. Geological Survey Sirenia Project, 1986–1998
6. mortality and necropsy data, FWC, 1974–present

These data provide a long term database of information on manatee abundance and trends in Broward County. The following discussion reviews their pertinence in the process of establishing appropriate locations for boat facilities.

### **2.3.1 Distributional Surveys**

Low level aerial surveys are generally accepted as the most effective method for collecting information on manatee distribution, and are typically used to determine minimum estimates of the manatee population size (Ackerman 1995). Survey techniques typically follow methods described by Irvine et al., (1982) and Packard et al., (1989), and involve the flying of a standard flight path, with repeated circles over areas where manatees are sighted. Surveys typically utilize a fixed wing aircraft at a speed of approximately 90 knots and at an altitude of 500 feet or a helicopter at a similar altitude. Survey frequency is usually a function of the level of funding support, however monthly or twice monthly surveys are most common.

Three aerial survey datasets of Broward County are available for review. The first series of surveys was conducted by FWC between 1988–1990 (48 flights). The second series of surveys were conducted by Broward County staff between 1991–1992 (12 flights) and the third a year round bi-monthly survey initiated in 2004. The Broward surveys include the major tributaries, such as the New River, while FWC surveys within the County were limited to the ICW and routinely conducted twice monthly. The 1991–1992 Broward County surveys essentially focused on winter months. However, limited surveys were also conducted between April and October to identify an “off season” manatee population to validate the need for year-round speed zones for manatee protection in waterways west of the ICW. The flight path for Broward County and FWC surveys are shown in Figure 5.

A composite of aerial survey data from Broward County and FWC flights conducted between 1988 and 2006 is provided in Figure 6. These surveys documented the presence of manatees along the entire length of the ICW in Broward County, with higher concentrations in proximity to both tidal inlets and near the FPL Port Everglades Power Plant. As Broward County surveys extend farther west along the New River System, additional sighting data is also available for both the New River and the FPL Lauderdale Power Plant, indicating that these are high-use areas for manatees as well.

Analysis of aerial survey data also suggests a strong seasonal component of use by manatees in Broward County. A summary of monthly aerial survey data of FWC and Broward survey flights (various datasets between 1988–2006) is shown in Figure 7. While manatees occur in Broward County year-round, significantly greater numbers of animals occupy County waters during the

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winter months, with an average of more than 100 animals observed per survey flight during the months of December, January, and February. Broward County had fewer than 20 manatees per month as observed from March to November during these distributional surveys. Carson and Ackerman (2004) also determined seasonal differences in manatee counts to be statistically significant.

Distributional survey results from Broward County should be approached with some caution. While data collected to date provides documentation of manatee use along the ICW, tidal inlets, and warm water refugia, it lacks enough adequate information to assess manatee use in numerous other areas. The distribution of manatees as determined by aerial surveys is largely a function of survey effort. Many significant waterways in Broward County, including Cypress Creek and Canal, Pompano Canal, Middle River, and the upper portions of the New River and Dania Cutoff Canal, were either not surveyed or the survey effort was limited. As a result, the use (or lack of use) of some of these waterways by manatees cannot be determined based solely upon available aerial survey data. While aerial surveys have been used extensively to count and map manatee distribution, they are somewhat limited by the fact that manatees are difficult to detect and count accurately and are assumed to be an underestimate of the actual population size (Lefebvre et al. 1995). In Broward County, a comprehensive aerial survey is currently being conducted on a weekly basis during manatee season (Nov. 15 – March 31). Ongoing synoptic (discussed in the next section) and power plant surveys show reasonable accuracy at least in areas where flight paths overlap. Current observations show similar seasonal trends, characterized by low manatee use during non-winter season.

Broward County has lacked year long manatee distributional survey data for more than a decade allowing the non-winter distribution of manatees in Broward County to remain unclear. However, since 2004, the Broward County EPGMD has been conducting aerial distributional surveys to determine the current seasonal distribution and minimum non-winter population of manatees. Flights were scheduled twice monthly along a desired flight path as permitted due to clearance at Fort Lauderdale-Hollywood International Airport. Unlike previous aerial surveys conducted in Broward County, the flight path included areas not previously surveyed extensively. These areas were both the North and South Forks of the New River, Dania Cutoff Canal, Hillsboro Canal, and Middle River. Actual flight paths were recorded along with notes describing each survey conducted. These aerial surveys provide additional insight on both spatial distributions of manatees in the county, along with temporal (seasonal) variations in minimum animal population. This information may serve to enhance boat facility siting, along with providing useful information relevant to speed zones and protection areas. Information to date confirms that manatee use of Broward County waters is significantly reduced during the non-winter season.

Because the waterways in Broward County are relatively narrow and restrictive, there are a limited number of possible travel corridors from which animals can migrate to or from their preferred sites. Aerial survey data (including synoptic survey data) suggest that the New River and the ICW serve as important migratory corridors for manatees. Manatees also appear to utilize the Atlantic Ocean; however, siting frequency is much lower than in the ICW.

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### **2.3.2 Synoptic Surveys**

Statewide aerial synoptic manatee surveys are flown following significant cold fronts, when manatees aggregate near established warm-water refuge sites. Surveys are conducted by an interagency team coordinated by FWC and are useful in determining minimum population estimates (Ackerman 1995). Synoptic surveys have been flown since 1991 with the exception of 1993 and 1994. The frequency of surveys varies from year to year depending upon the number of cold fronts in a given year.

Synoptic survey data from Broward County consistently show large aggregations of manatees at both the FPL Lauderdale Power Plant and the Port Everglades Power Plant. Surveys also show frequent manatee use of the ICW and lower portion of the New River. Because synoptic surveys are flown under varying weather and sighting conditions, results typically vary from year to year. Synoptic surveys are flown following severe cold fronts and show high concentrations of manatees that are essentially limited to the thermally enhanced areas near the power plants. When synoptic surveys are flown during more mild cold fronts, manatee distribution tends to be more widespread, and more sightings occur along the ICW and in proximity to tidal inlets. A summary of synoptic survey data is provided in Figure 8.

In general, manatee data from synoptic surveys are consistent with aerial distributional survey data, and indicate that the areas of significant recurrent use in Broward County tend to be in proximity to warm water refugia and along the entire ICW corridor during the months of December, January, and February. As is the case with aerial distribution surveys however, the spatial distribution of manatees is largely a function of the survey flight path, resulting in numerous areas in Broward County for which there are no available survey data.

### **Power Plant Surveys**

Manatees are unable to tolerate water temperatures below approximately 68°F (20°C) for extended periods of time. During winter months, they seek out both natural and man-made warm water refugia in places such as natural warm water springs and discharge canals near power generating plants. Among the most important artificial warm water sites in Florida are Florida Power & Light Company's (FPL) Cape Canaveral, Lauderdale, Port Everglades, Riviera, and Fort Myers power plants, and the Tampa Electric Company's Apollo Beach power plant (Reynolds and Odell 1991). Many manatees return to the same refuges each year, though some use different refuges in different years.

Aerial surveys of manatees at Broward County's FPL Lauderdale and Port Everglades Power Plants have been conducted annually since 1977 (Reynolds 2006). A summary of survey data from both Broward County power plants is provided in Figure 9. Survey results indicate that overall use of these power plants by manatees has increased, although there is a high level of variability in use from year to year. This variability may be due to a combination of factors. Since the aggregation of manatees at warm water sites is a response to cold weather, the number of manatees at power plants will vary depending upon the severity of the cold weather, which differs from year to year. In 2002-2003, for example, high counts of manatees at both Broward

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County plants (265 animals observed at the Port Everglades Power Plant and 173 animals observed at the Lauderdale Power Plant) corresponded to an exceptionally cold winter. The following year (2003–2004), survey counts were relatively low (155 animals observed at the Port Everglades Power Plant and 64 animals at the Lauderdale Power Plant) during a somewhat mild winter. The highest one-day census of the two Broward power plants counted 503 manatees on January 8, 2006. For the most recent series of FPL surveys, calves comprised 6.7% of all animals sighted at all FPL power plants, with higher percentages found at both the Port Everglades Power Plant (9.0%) and the Lauderdale Power Plant (8.2%).

Additional variation in counts from year to year can also be attributed to variations in the level of operation of individual plants. Since manatees are known to routinely travel between power plants, their preference for a specific power plant discharge may change from year to year (Deutsch 2000). In some cases, a power plant may temporarily go offline with little or no warm water output, resulting in a “shift” in winter distribution through time. Such a shift occurred in 2003 when the FPL Riviera Power Plant temporarily went offline, resulting in an increased number of manatees observed at the FPL Lauderdale and Port Everglades Power Plants. Over the past ten years, manatee sightings at Broward County power plants have comprised 30% of all east coast FPL survey sightings.

Differences in survey counts may also be attributed to other factors. The effectiveness of aerial surveys is highly dependent upon survey conditions, including weather conditions, water surface conditions, and water clarity. Additional variability has also been introduced due to recently added security measures, which, at times, have limited the ability to effectively conduct surveys in proximity to power plants.

While survey counts demonstrate a high level of variability from year to year, both FPL power plants in Broward County show an apparent trend toward increasing numbers of manatees through time. This may be indicative of an overall trend along the Florida east coast (Reynolds 2003). Analysis of east coast power plants suggests that the Atlantic manatee population increased during the 1980s, then stabilized or slightly decreased in the early 1990s. In summary, FPL aerial survey data indicate that power plants in Broward County provide refuge for a significant proportion of the east coast manatee population, and the level of use at these power plants, though highly variable, appears to have increased over the past two decades.

### **2.3.3 Telemetry Studies**

While aerial surveys are the most common method of characterizing manatee population abundance and distribution, they are somewhat limited by the fact that they only provide the location (or “snapshot”) of individuals at a particular moment in time. Little can be interpreted from aerial surveys regarding site fidelity, movement patterns, travel corridors, habitat use, migratory ranges, or other behavioral information. For this reason, other techniques such as tagging and tracking/monitoring (telemetry) studies are employed. In Broward County in

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particular, telemetry data provides important supplemental information on manatee distribution because previous aerial surveys were not inclusive of many major waterways.

Between 1986 and 1998, a comprehensive research project examining manatee migratory patterns and site fidelity along the Florida east coast was coordinated by The U.S. Geological Survey Sirenia Project (Deutsch et al. 2003). During this study, 78 manatees were radio-tagged and monitored. Most of the 78 study animals were tracked remotely with the Argos satellite system and all were regularly tracked in the field using conventional radio telemetry methods. The combined effort yielded more than 93,000 locations (“hits”) over 32,000 tag-days. The median duration of tracking was 8.3 months per individual; however, some individuals were tracked for several years. Surveys included 46 adult females, 21 adult males, 5 sub-adult females, and 6 sub-adult males; 4 of the sub-adults were tagged as large dependent calves, and then tracked after weaning. Sixty-five of these were tagged in the wild and 13 individuals (11 adults and 1 mother-calf pair) had been rescued and rehabilitated in oceanaria for short periods and then radio-tagged at release. Sixty-three manatees were tracked with satellite-monitored platform transmitter terminal (PTT) tags and 15 others carried only field-monitored VHF tags. Manatees carrying VHF tags were located an average of 3 days per week, and those with PTT tags were located in the field once per week, on average. More than 1,000 sightings of tagged manatees by the public related to individual animals. This information was used to supplement field observations (Deutsch et al. 2003).

A composite map of selected radio-tagged manatees within Broward County is provided in Figure 10. Most frequent locations of tagged animals were in proximity to both Broward County power plants. A large number of sightings (represented by a single animal over multiple years) were also observed along the North Fork of the New River. Analysis of telemetry data suggests that manatee use is county-wide, with documented sightings along most major waterways (ICW, New River, Dania Cutoff Canal, Stranahan River, and C-10 Canal. Only a limited number of sightings were documented in the Middle River, Cypress Creek, and Pompano Canal. The ICW along the entire east coast was determined to be a migratory corridor for manatees (Deutsch et al. 2003). This finding is reinforced by numerous sightings of animals in the ICW during aerial and synoptic surveys, however it should be noted that tags are unable to transmit while the animal is traveling underwater.

For tagged manatee TBCO9 (“C-Cow”), its migratory range essentially includes the entire Florida east coast, though it has repeatedly returned to Broward County in the winter over at least an eight-year period (Figure 10). In addition, offspring of this animal also exhibited the same migratory patterns. Sightings of tagged manatee TPEO1 (“Spot”) also indicate seasonal (winter) use at the Port Everglades Power Plant and C-10 Canal, and documented movement along the ICW (Figure 10). This animal used the Port Everglades Power Plant effluent over six consecutive winters (Deutsch et al. 2003). TBCO3 (“Moon”) showed strong fidelity to the Port Everglades Power Plant effluent canal, visiting the site over eight consecutive years (Figure 10). Similar results were found for other tagged manatees and demonstrate recurrent use in Broward County over multiple years, along with winter site fidelity at one or both Broward County power plants.

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Telemetry data also emphasize the importance of travel corridors in Broward County. While sightings within the ICW are less frequent, this is likely due to the fact that manatees use the waterway to travel to and from their preferred destinations while not remaining in the waterway for a significant period of time. This is also supported by other datasets, particularly distributional and synoptic survey data which documented numerous sightings of animals within the ICW.

In summary, telemetry data have been useful for characterizing manatee movements in Broward County in a number of ways. First, these data support and confirm other datasets by further documenting seasonal use by manatees at both the Lauderdale and Port Everglades Power Plants. Secondly, the data serve to document manatee use in areas not previously surveyed. Finally, telemetry studies provide evidence of site fidelity with a number of animals returning to the same sites each year.

### **2.4 Manatee Mortality Data**

Manatee carcasses have been routinely recovered and examined by federal and state agencies since 1974, and a Manatee Carcass Salvage Program was initiated by the State of Florida (FWC) in July 1986. In 1992, a dedicated laboratory and necropsy facility was constructed to perform post-mortem examinations. Currently staff from four field stations collect carcasses from the southeastern United States and transport them to the Marine Mammal Pathobiology Laboratory in St. Petersburg, Florida. The purpose of the manatee carcass retrieval program has been to determine the cause of death in order to develop possible corrective actions and to obtain information on manatee morphology and physiology to better understand the biological limitations of the species. The laboratory produces monthly and annual report summaries by county as well as overall mortality values for the State of Florida (<http://myfwc.com/manatee>).

From 1974 through 2006, 6146 manatee mortalities were documented throughout the State of Florida. A total of 174 manatee deaths have been recorded in Broward County from 1974 through 2006. Causes of death include: 63 due to watercraft-related incidents, 47 from undetermined causes (including animals verified dead but not recovered), 36 animals which were listed as “perinatal,” or dependent calves, 7 due to other human causes, 7 in flood control structures, and 7 due to natural causes. While the absolute number of human-related manatee deaths in Broward County is relatively low (ranked 7<sup>th</sup> among the 13 key Florida counties; Figure 11), the relative proportion of deaths from human causes (44%) is ranked 3<sup>rd</sup> among the 13 key counties. By comparison, human-related deaths account for 29% of all manatee deaths among the 13 key Florida counties and 30% among all Florida counties combined. The counties with the highest proportion of human-related deaths are all located in southeast Florida (Miami-Dade, Palm Beach, and Broward Counties, from highest to lowest proportion). This trend indicates that areas of conflict between manatees and human-related activity are particularly significant in the most highly developed areas of the state. A summary of Broward County manatee mortalities through time is shown in Figure 12. Both total mortality and watercraft-related mortality show a general annual increase.

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Since 1994, boating safety and manatee protection speed zones have been visually distinguished by signage on Broward waterways. Even with the State implementation of the manatee protection speed restriction zones and the installation of associated signage, overall watercraft-related manatee mortality in Broward County has increased (Figure 13). From the period of 1974 through 1993, 29 watercraft-related mortalities were reported, while the period from 1994-2006 recorded 34 watercraft-related mortalities (an increase of 56%).

Of significance is the continual increase in watercraft-related mortality even after waterway signage was implemented. Twenty-three of the watercraft-related deaths occurred in the latter half (2000-2006) of this time period nearly doubling the number of watercraft-related deaths that occurred during the previous six years (1994-1999). This may indicate a disregard by boaters of specified manatee protection speed zones, excessive numbers of boats thus denying manatees a safe habitat, or both.

With regard to watercraft collision, it is generally accepted that an animal may be seriously injured and succumb later to secondary complications, perhaps far removed from the initial collision site. However, post-mortem examinations of carcasses recovered in proximity to the tidal inlets in Broward County indicate that in many instances traumatic injury was so severe the animal likely succumbed quickly. An acute diagnosis would suggest that the point of collision and the point of recovery may be in relatively close proximity. Most acute mortalities are located in the Port Everglades Area although other occurrences are documented at the Hillsboro Inlet and near the South Fork New River (Figure 16).

Since 1974, the majority of all carcass recoveries (64%) occurred during November through March when manatees frequent the warmer waters around the power plants (Figure 14). The remaining 36% of carcasses recovered serve as an indication that, while winter use in Broward County is well established, many animals utilize the waters year-round.

Mortality data may be used to supplement other forms of population data for better understanding spatial and temporal distribution of manatees. While the spatial accuracy of recovered carcasses provides limited information on the precise area where injury or death occurred, it does provide useful information on overall use of an area by manatees. Additionally, while the spatial distribution of carcasses in other portions of the county are represented by a variety of different death categories (perinatal, cold stress, other natural, watercraft-related, undetermined), a much higher proportion of watercraft-related deaths are documented near both inlets. The distribution of recovered carcasses in Broward County is similar to the observed distribution of live animals, which confirms many of the preferred areas suggested in the aerial survey datasets. The locations of recovered carcasses (all categories) in Broward County are shown in Figure 15. To date, the highest numbers of carcasses have been found in proximity to warm water refugia, tidal inlets, and along the ICW.

Typically, maps displaying the spatial distribution of recovered carcasses should be approached with caution because plotted points only represent points of recovery, not necessarily points where

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animals were injured or expire. In Broward County, however, areas of recovery may be more spatially accurate than other counties due to the number of boaters available to report sightings. If carcasses are reported relatively quickly upon initial discovery, the recovery/response time can be reduced. The configuration of Broward County's waterways is also in contrast to counties such as Lee County or Collier County, where carcasses in less populated areas may not be reported for several days and may drift over large expanses of coastal waterway prior to initial report and subsequent recovery.

Perinatal (manatee calf) mortality differs spatially from watercraft-related mortalities. Calf mortality, not caused by watercraft, is less common along the high boat traffic areas such as the ICW and in the vicinity of tidal inlets. Most of these carcasses are recovered along the intermediate and upper portions of major tributaries and canals such as the New River and Dania Cutoff Canal (Figure 16). This observation shows a low association with human use and suggests that the distribution of female manatees with dependent calves (cow-calf pairs) may differ from the distribution of other manatees in Broward County. Manatees with calves are more likely to seek quiet, less disturbed areas for calving and/or nursing of young.

However, of special concern is the increase in perinatal deaths from 13 between 1974 and 1993 to 23 between 1994 and 2006. The cause of this significant increase in perinatal deaths warrants further investigation by FWC.

### **3.0 Habitat**

#### **3.1 Introduction**

The West Indian manatee is an opportunistic species with a wide range of tolerances to environmental variations. The third revision, approved in 2001, of the Florida Manatee Recovery Plan by the FWS includes the following excerpts that describe this gamut of factors:

*Based on telemetry, aerial surveys, photo identification sighting records, and other studies over the past 20 years, manatee distribution in the southeastern United States is now well known (Marine Mammal Commission 1984, 1986; Beeler and O'Shea 1988; O'Shea 1988; Lefebvre et al. 2001). In general, the data show that manatees exhibit opportunistic, as well as predictable patterns in their distribution and movement. They are able to undertake extensive north-south migrations with seasonal distribution determined by water temperature.*

*...  
When ambient water temperatures drop below 20° C (68°F) in autumn and winter, manatees aggregate within the confines of natural and artificial warm-water refuges (Lefebvre et al. 2001) or move to the southern tip of Florida (Snow 1991). Most artificial refuges are created by warm-water outfalls from power plants or paper mills. The largest winter aggregations (maximum count of 100 or more animals) are at refuges in Central and Southern Florida.*

*...  
During mild winter periods, manatees at thermal refuges move to nearby grassbeds to feed, or even return to a more distant warm season range (Deutsch et al. 2000). For example, ...*

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animals using the Port Everglades power plant feed in grass beds in Biscayne Bay 24 to 32 km (15 to 20 mi) to the south (Marine Mammal Commission 1988)...

...  
Perhaps the most obvious questions center around why manatees need to seek warm-water refuges in winter. Gallivan and Best (1980) and Irvine (1983) documented the surprisingly low metabolism of manatees, and scientists suggested that water temperatures below 19° C triggered manatee behavioral changes, such as movements to warm-water sources. Recent research suggests that the temperature eliciting metabolic and behavioral changes in manatees is closer to 17° C, but upper and lower critical temperatures for manatees (the points at which they become metabolically stressed) remain unclear (Worthy et al. 1999). It is also unclear, but vital to understand, how manatees would react physiologically and behaviorally to reductions, cessations, or other changes in availability of warm water in winter.

...  
Scientists have noted that manatees seek freshwater sources to drink. Hill and Reynolds (1989) suggested that the structure of the manatee kidney should permit the animals to survive well without regular access to freshwater. In other words, fresh water may be an attractant, without being required for survival, by manatees. Although manatees can tolerate a wide range of salinities (Ortiz et al. 1998), they prefer habitats where osmotic stress is minimal or where fresh water is periodically available (O'Shea and Kochman 1990). Ortiz et al. (1998) report that "manatees may be susceptible to dehydration after an extended period if freshwater is not available."

...  
Manatees are herbivores that feed opportunistically on a wide variety of submerged, floating, and emergent vegetation. Because of their broad distribution and migratory patterns, Florida manatees utilize a wider diversity of food items and are possibly less specialized in their feeding strategies than manatees in tropical regions (Lefebvre et al. 2000).

Five categories of habitat requirements for the West Indian manatee have been recognized by state and federal agencies: 1) warm-water refuges for shelter during periods of cold winter weather; 2) feeding areas near warm-water refuges and other larger areas for summer use; 3) freshwater sources; 4) quiet sheltered areas for normal behaviors such as resting, cavorting (i.e., social interactions such as mating, calving, and nursing) and 5) travel and migratory corridors connecting the above habitat elements.

Manatee habitat use areas were determined by information from the U.S. Fish and Wildlife Service (FWS) through their satellite telemetry program, FWC's and Florida Power and Light's (FPL) aerial survey data, the power plant field surveys, and sightings by the public as collected by the Manatee Survival Foundation and Save the Manatee Club.

### **3.2 Warm Water Refugia**

In winter months, manatees respond to declining water temperatures by congregating at constant

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temperature springs and warm water power plant and industrial effluents. Arrival at major aggregation sites usually begins in late October and ends in late April, but exact dates vary greatly with the location of the refugia and weather patterns.

Broward County contains two warm water refuges for manatees: Florida Power and Light's Lauderdale and Port Everglades power plants. While these are artificial warm water sources, manatees are both habituated and dependent upon their existence. The importance of these facilities as warm water refuges to manatees has been well documented; and have been determined to be among the most important manatee aggregation sites for the Atlantic population (Laist and Reynolds 2005, Mezich 2001, Deutsch 2000). The highest single day manatee count at the Lauderdale Power Plant was in January 2006 at 273 individuals, while the highest recent single day manatee count at the Port Everglades Power Plant was 290 individuals in 2000/2001. While the figure in 2000/2001 corresponded to a severe cold winter, the 2006 figure occurred following a cold front, but during a relatively mild winter.

Warm industrial discharges alone are not suitable alternatives to the warm water refugia provided by natural springs because they usually lack the vegetation necessary to sustain the manatees.

### **Lauderdale Power Plant**

The Lauderdale Power Plant, located east of State Road 7/US 441 near the juncture of the South Fork New River and the Dania Cutoff Canal, was the first FPL plant in Florida beginning operations in 1926 and re-powered in the mid-1990s. Intake water is drawn from the nearby Dania Cutoff Canal and Biscayne Aquifer and discharges up to 332 million gallons per day. The discharge canal leads to an approximate 200 acre cooling lake which is treated as a year-round "No Entry" zone for the protection of the manatees. The "No Entry" designation prohibits boating, fishing and swimming (Figure 4).

### **Port Everglades Power Plant**

The Port Everglades Power Plant has a "once-through" cooling process using a maximum water flow of approximately 1348 million gallons per day according to the U.S. Environmental Protection Agency permit. Intake water is drawn directly from within the boat basin at Port Everglades (Slip B). Heated water is discharged along a 5200 foot canal that connects to the ICW. This canal is designated by the County as critical manatee habitat and a site where manatees congregate during colder weather (Figure 4).

Historically, the Port Everglades discharge canal was a place for public viewing of manatees, but this is now a prohibited area for security reasons. Manatees are frequently found in the port area year round, however, the largest numbers are found during the winter months of the year.

To protect these mammals, various programs have been instituted to address manatee awareness and protection, as highlighted in the Port Everglades section.

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### **3.3 Seagrasses and Submerged Aquatic Vegetation**

Manatees are herbivores that feed opportunistically on a wide variety of submerged, floating and emergent vegetation. Shallow grass beds with ready access to deep channels are the preferred feeding areas in coastal and riverine habitats. Bengtson (1983) estimated the annual mean consumption rate for manatees feeding in the upper St. John's River at 4% to 9% of their body weight per day depending upon season.

Broward County's waterways are generally characterized as deep and channelized with hardened shoreline and lack the broad, shallow water bodies necessary to support extensive beds of seagrass. However, smaller areas of seagrass have been identified throughout the Intracoastal Waterway and within the adjacent canals. Additionally, some seagrasses occur near both Hillsboro and Port Everglades Inlets in Broward County and the Boca Raton Inlet in Palm Beach County (Carson and Ackerman 2004). While manatees transiting Broward's waterways forage for submerged and overhanging vegetation, there are no identified "feeding areas" in the County, however seagrass and aquatic vegetation may be found at various locations such as the Dania Cutoff Canal, ICW, and the North Fork New River. Improved water quality of the North Fork New River may increase the occurrence of seagrasses, although its significance has not been studied. The majority of seagrasses available to manatees are located in Miami Dade County's Biscayne Bay, about 16 miles to the south and Palm Beach County's Lake Worth, located about 40 miles to the north of the Port Everglades Power Plant, respectively. If substantial beds of seagrass are found in Broward County, marking of the areas will be done in accordance with the uniform waterway marking system.

### **3.4 Water Quality and Fresh Water Sources**

Manatees' reliance on inshore habitats and their attraction to industrial and municipal outfalls has the potential to expose them to relatively high levels of contaminants. Water contaminants including pesticides, herbicides, fertilizers, industrial byproducts and human sewage may cause sublethal effects on manatees (Packard, 1983).

Water quality in Broward County waterways continues to improve, largely due to programs designed to reduce urban and rural runoff, correct historic municipal discharges, minimize the effects of contaminated seepage into groundwater, and aide in the passage of local ordinances.

The canals and waterways in Broward County have been designated as Class III waters by the State of Florida as required by the Federal Clean Water Act. This classification defines surface waters that are conducive to promoting recreational use and propagation of a healthy, well balanced population of fish and wildlife. Chapter 62-302 F.A.C gives specific language and jurisdiction regarding the preservation and anti-degradation of water quality. The Broward County Environmental Protection and Growth Management Department (EPGMD) is the local agency with the responsibility for protecting the quality of the County's surface water, groundwater, and wetland resources (Section 27-191 & 331 of the Code of Broward County). Since Broward's water resources are substantially interconnected, EPGMD's pollution control

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programs serve to protect the water quality in those sections of the county utilized by the West Indian manatee.

Residential, commercial, industrial, and municipal land uses composed Broward's shorelines before the enactment of many current day water quality standards, but water quality has improved since the passage of these standards. For example, between July 1993 and August 1994, the Las Olas Isles, located at the eastern extent of the New River Junction, was the location of unacceptable levels of waterborne bacteria attributed mainly to the inhabited and semi-permanently moored vessels. In 1997, the City of Fort Lauderdale passed an ordinance requiring owners of habitable boats to have marine sanitation pump-out facilities installed and connected to docked boats. Water quality in this area has been characterized as good since that time. In November 2005, Broward County released a draft of the C-11 West Basin Pollution Reduction Action Plan reflecting the continued efforts to improve water quality.

Most of Broward County's major water quality improvements occurred between the late 1970s into the late 1980s when over 90 small localized wastewater treatment plant discharges to local waters ceased. Since the late 1980s, ambient water quality has generally been good in many portions of the county. Fluctuations in ambient water quality since 1990 has primarily been a function of meteorological and hydrological conditions of the highly manipulated canal system. Specific ordinances (e.g., Las Olas Isles) and coordinated efforts (e.g., C-11 working group) has brought about water quality improvements in specific sub-basins. In addition, components of the Broward County's National Pollution Discharge Elimination System permit and delegated Environmental Resource Permit Program (from the South Florida Water Management District and Florida Department of Environmental Protection) are ensuring stormwater improvements in several areas of the county.

Despite these improvements in water quality protection, a few eastern estuarine waterbodies have continued to exhibit poor ambient water quality in areas that were primarily developed before stormwater regulations existed. In particular, the New River (especially North Fork) and Middle River have been deemed polluted by the state of Florida Department of Environmental Protection. While the water quality in these rivers is better than 25 years ago, some challenges still exist primarily due to stormwater inputs and hydrological modifications. It is anticipated the Middle River and New River will be part of total maximum daily load program for nutrients (nitrogen and phosphorus) and bacteria (fecal coliform) per both the federal Clean Water Act and portions of the state administrative code.

Broward County EPGMD's Environmental Monitoring Division (EMD) is certified by the Florida Department of Health and Rehabilitative Services and monitors water quality in the County. EMD regularly samples bodies of water, such as canals, rivers and lakes. The Environmental Monitoring Division maintains long-term surface and ground water quality monitoring programs, analyzes samples to support enforcement actions, and assists other public agencies.

One such surface water monitoring program that deals directly with the protection of habitat

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necessary for the survival of the manatee is the Surface Water Quality Monitoring Network. The network consists of 45 sites, 25 of which are in estuarine waters. Stations are located in important manatee utilization areas which include the Atlantic Intracoastal Waterway (12) the New River System (9) and the Dania Cut-off Canal (2). Water samples have been collected at least quarterly from these stations since November, 1980. The water is analyzed for physical, chemical and microbiological parameters in order to characterize the ambient water quality of the waterways. The following 16 water quality parameters are analyzed on each sample:

|                             |                                   |
|-----------------------------|-----------------------------------|
| <u>temperature</u>          | <u>organic nitrogen</u>           |
| <u>specific conductance</u> | <u>total Kjeldahl nitrogen</u>    |
| <u>turbidity</u>            | <u>nitrite + nitrate nitrogen</u> |
| <u>salinity</u>             | <u>ammonia nitrogen</u>           |
| <u>pH</u>                   | <u>total phosphorus</u>           |
| <u>dissolved oxygen</u>     | <u>fecal coliform</u>             |
| <u>ortho phosphate</u>      | <u>Chlorophyll a</u>              |
| <u>total organic carbon</u> | <u>Pheophytin a</u>               |

Additionally, Broward County initiated a dredging project to remove the contaminated sediments from areas of the North Fork New River which was completed in September 2003.

Broward County EPGMD's Biological Resources Division issues permits for dredging and filling, while the Pollution Prevention and Remediation Division (PPRD) monitors solid waste disposal and Water Resources Division (WRD) administers the County's Surface Water Management Program. The Dredge and Fill Licensing Program addresses adverse impacts on wetland resources by regulating construction of docks and sea walls, lake and canal excavation and filling and other land development activities that impact jurisdictional wetlands. In order to protect the functional value of Broward's wetlands, efforts are made to minimize potential impacts or require mitigation where adverse impacts are unavoidable. Mitigation requirements address the functional value of the specific wetland being impacted. Accordingly, the actual amount and type of mitigation required to offset adverse impacts varies from site to site. The WRD is also responsible for the management of surface water runoff. Storms can wash pollutants such as pesticides, herbicides, construction dust and vehicle oils from streets and parking lots into Broward's waterways. Through the plan review process recommendations are made to manage storm water discharges from projects both during and after construction.

Salinity gradients also exist in the County's waterways. The area of the North Fork New River adjacent to the S33 salinity control structure experiences periodic freshwater discharges, usually associated with storm events. Similarly, freshwater flow is restricted at the remaining salinity control structures responsible for controlling freshwater flows from the Everglades system to the Atlantic Ocean. Additionally, other sources of freshwater to Broward's tidally influenced canal network include groundwater inflow and storm water runoff.

Port Everglades staff also complies with a request from the U.S. Fish and Wildlife Service to provide fresh water to manatees during the winter months via hoses at the nursery area and

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behind the Port Administration Building.

### **3.5 Sanctuary**

Manatees need quiet sheltered areas for normal behaviors such as resting and cavorting (i.e., social interactions such as mating, calving, and nursing). When identified, such areas should be designated appropriately and opportunities for manatee/human interaction minimized. In Broward County, identified manatee sanctuary areas include the chain of cooling lakes at the FPL Lauderdale Power Plant and the discharge canal and adjacent mangrove lagoon at the FPL Port Everglades Power Plant.

When the FPL Lauderdale Power Plant was re-powered in the early 1990s, as mitigation for this re-powering project, FPL constructed an experimental resting shelf on the edge of the cooling system lake. The shelf allows manatees to rest in shallow, calm, and warm protected waters.

Port Everglades designated the former “E.P.A. Slip” adjacent to the power plant discharge canal as a Manatee Nursery Area to restrict the area’s use by boaters and observers. The area has been found to be heavily used as a resting spot outside the strong currents of the canal proper by calving mothers and other manatees (Figure 4).

A shallow lagoon exists in the northern portion of the Port’s mangrove forest that provides a habitat for the manatees’ winter stay at Port Everglades. It was observed that manatees only used this area during the higher portions of the tidal cycle so the Port proposed deepening the lagoon to provide manatees with a more permanent tidal habitat. With State approval, this area was dredged to 15.0 feet, providing the depth necessary for manatees to use this area throughout the complete range of the tidal cycle. Both entrances to the lagoon are restricted from boating traffic and the area is used by manatees as a safe haven. Recent distributional surveys record manatee use of the lagoon year-round in addition to the heavy winter use. While the lagoon does not appear to be selectively sought by females with calves, it may be an important location for mating behavior.

As part of the Port’s mitigation program associated with construction of a turning notch, a lagoon conducive to use by manatees was barricaded to boating traffic at John U. Lloyd State Recreation Area, however, the area has lacked use, possibly due to the lack of appropriate depth. Public opposition halted past proposals by the Port to deepen the lagoon to increase manatee use that proved successful in the mangrove area located at the south side of the Port Everglades Power Plant discharge canal.

### **3.6 Travel and Migration Corridors**

Manatee movement has been documented for over 20 years utilizing various tracking methods including radio telemetry, aerial surveys, and photo identification. In general, manatees may remain in one area seasonally or be transient, lingering for short periods in suitable habitats. During especially cold winter weather, manatees congregate in warm water areas such as the

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discharge zones near power generating plants and natural warm water springs; in the warmer South Florida waters, they may congregate near salinity control structures. In Broward County, mortality data confirm manatees utilize local waterways throughout the year. Nearly one-half (47%) of the total manatee mortality recorded within the County has occurred outside of the manatee “season” (mid-November through the end of March). Based on the various tracking methods and mortality data, three waterways were identified as primary travel corridors for manatees in Broward County: the New River System, Dania Cut-Off Canal, and the Intracoastal Waterway.

**1) New River System** – The New River System is comprised of the New River from the ICW west to the fork in the river, the South Fork New River south and west to the saltwater barrier at US 441, and the North New River Canal north west to the salinity barrier at Sunrise Blvd.

A tour of this waterway by air and boat and a review of aerial photographs illustrate the great extent to which land abutting this waterway has been developed with single family and multi-family residences, commercial marinas, a public boat ramp, and public utilities. Portions of the adjacent land area are also dedicated to conservation use. Due to the extent of development and in an effort to reduce the chance of boat/manatee impact as well as heighten boater safety, year round speed restrictions were instituted throughout the New River system in 1993.

**2) Dania Cut-off Canal** – The Dania Cut-Off Canal, located at the south end of Port Everglades runs from the ICW west to the salinity control structure at US 441. Adjacent land uses are also similarly developed to those of the New River System. Single-family residential, existing public boat ramps and commercial marinas, conservation areas, public utilities, and industrial uses dominate most of the available shoreline. As on the New River System, year-round waterway speed restrictions were implemented to provide manatee protection and boating safety.

**3) Intracoastal Waterway** – The Intracoastal Waterway (ICW) through Broward County is predominantly a narrow waterway, 300 to 700 feet in width. Shoreline areas are utilized for commercial, single- and multi-family residential, marina, park, and conservation uses. Remaining undeveloped areas are few and many of these are designated conservation or recreation land use. Boating safety slow and idle speed restrictions exist on the ICW within the City of Fort Lauderdale and at eleven (11) bridge crossings in several jurisdictions. As this waterway is utilized by the migratory manatee population during the winter months and is similarly heavily traveled by boaters during this season, particularly on weekends and holidays, speed restrictions were instituted to reduce manatee and boating fatalities.

In May, 1993 the Governor and Cabinet approved year-round manatee protection speed restriction zones for the New River System, Dania Cut-Off Canal, and the ICW, as well as the C-10 Canal, Middle River, Cypress Creek, and Hillsboro Canal.

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### **4.0 Boating Activity in Broward County**

#### **4.1 Existing boat facilities**

Understanding boater use of Broward County waterways is critical in addressing the Boat Facility Siting Plan (BFSP) and minimizing the boater/manatee overlap. In addition to a major seaport, Port Everglades, Broward County has more than 51,000 vessels registered in 2006 and includes a significant number of boaters originating from outside the County (FDHSMV 2007). To accommodate these boaters, a major marine industry exists in the County. The boating environment of the County consists of narrow waterways with year round and seasonal speed zones. Effective enforcement of speed zones may lead to the preservation of the Florida manatee population.

#### **4.1.1 Port Everglades**

Port Everglades is located on Florida's east coast, 23 miles north of Miami and 312 miles south of Jacksonville. Port Everglades is one of the deepest ports in Florida and has the shortest, straightest entrance channel along the East Coast. Port Everglades in-water facilities include 48 berths, eight roll-on/roll-off (ro/ro) ramps, three slips, three finger piers and 25,222 linear feet of bulkhead. The Port Jurisdictional Area (PJA) totals approximately 2,380 acres, which includes portions of the jurisdictions of the cities of Dania Beach, Fort Lauderdale, Hollywood, and the unincorporated area of Broward County. Within the total jurisdictional area, there are approximately 450 acres of port-owned bottom land. Shoreline uses within the PJA include transportation uses (48 berths), institutional, recreational, and commercial uses. Another significant use within Port Everglades includes FPL's power plant, located on 86 acres. The power plant's discharge canal is a state-designated manatee sanctuary and a site where manatees congregate during colder weather.

Port Everglades contains three distinct areas. Northport, located between the 17<sup>th</sup> Street Causeway and Berth 4, presently serves daily and multi-day cruise lines. The Broward County Convention Center is located at Northport, which is part of an approved Development of Regional Impact (DRI) that includes a festival marketplace and proposed hotel complex. In addition, Northport contains a Port-owned parking garage and terminals which serve break-bulk cargo.

Midport, located between Slip 5 and Berth 29, contains the Port's liquid bulk (petroleum), dry bulk (cement), and break-bulk terminals. Midport's container terminal is served by two container cranes. Seven multi-day cruise terminals are also located within Midport, together with another Port-owned parking garage, Port Administration, and Public Safety buildings. Berthing is available in Midport for naval vessels and large private yachts for fueling purposes only.

Southport, located between the Turning Notch and the Dania Cut-off canal, is solely dedicated for the utilization of container vessels. It is served by seven all-electric gantry cranes and a three berth Ro/Ro terminal. The Southport facility includes a 900 foot by 900 foot turning notch.

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**Port Facilities.** Threats to the manatee within the Port Jurisdictional Area include: the transfer of petroleum products; Port operations, including vessel docking; recreational use of the eastern section of the FPL Port Everglades power plant discharge canal; and recreational boating density in the Port Everglades basin due to the proximity of the Port Everglades Inlet and vessels transiting the ICW.

Transfer of Petroleum Products. Port Everglades serves as the primary port of entry for petroleum products for thirteen counties within South Florida. These petroleum products are generally offloaded from vessels to privately-owned oil tank storage facilities through at-dock manifolds and underground pipelines. Spillage of petroleum products could pose a serious threat to manatees traveling to and congregating at the FPL Port Everglades power plant discharge canal. Accordingly, Port Everglades implements several precautionary measures with regard to the loading and off loading of petroleum through its Port Tariff. All vessels transferring petroleum products must be boomed off from the dock to the vessel at the point of transfer. This process involves the deployment of a floating boom which is designed to contain petroleum product spillage. Gasoline is considered too dangerous to confine in this manner and will evaporate. The evaporation process is accelerated by agitating the gasoline with water from a high pressure hose. When fuel is transferred from a barge to a ship, both vessels are boomed off. However, when the fuel is transferred from a landside tanker or bulkhead outlet to a ship, the ship is boomed off only at the point of transfer. The mouth (open end) of all slips have the capability of being boomed off utilizing spill booms stored at the end of each slip.

There is an established notification protocol between Port Everglades, the U.S. Coast Guard and various other regulatory agencies in the event of a spill. The Port Everglades Public Safety Division serves as the first line of defense if a spill of unknown origin or content occurs, a ship fails to follow notification protocol regarding a spill, or the ship/oil company's cleanup contractor is too slow in responding to the occurrence.

Port Operations. Port Everglades' 25,222 linear feet of bulkhead (berths 1 through 33) is protected by approximately 500 Seibu, Type □2 fenders spaced at 50-foot intervals. The fender's 4 x 4 ft facing is designed to maintain docked vessels a minimum of 3 feet waterward of the bulkhead in order to keep manatees from being crushed against the bulkhead. Port Everglades budgets over \$500,000 yearly for fender maintenance, which is performed on a full-time basis by a crew of four.

### **Manatee Protection Strategies**

As a reminder to businesses utilizing port facilities, prior to manatee season the port provides a letter to both the Port Everglades Pilots Association, McAllister Towing, and Seabulk International Towing Services (formally Hvide Marine) requesting their vessels leave the dock earlier than normal to reduce the need to speed through the port basin to pick up vessels offshore.

The Port has a maintenance dredging program which includes all slips, berths adjacent to the ICW, turning basins, and the turning notch. An incidental benefit of the program is the reduced

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opportunity for manatees to become trapped between the bottom of the vessel and the sea bed. With regard to water depth in berthing areas, port staff has established a project depth with regard to water depth which is controlled by the design depth of the bulkheads [Note: dredging deeper than the design depth of the bulkhead would lead to destabilization of the bulkhead]. Maintenance dredging occurs when water depth is one to two feet less than project depth.

Manatee Protection Plan for Dredging – This plan provides that, if feasible, dredging activities are scheduled outside of the designated winter manatee season. If not possible, the protection program puts a system in place where trained staff initiates an intensive manatee watch for the duration of the project. As a result, no injuries or deaths of manatees have ever been observed. This program is now incorporated into all federal and state dredging permits.

Manatee Protection Plan for Blasting – As part of the expansion program to the south, a blasting project was necessary for widening and deepening of the ICW. By employing a Manatee Protection Plan similar to that used for dredging, no manatees were either injured or killed during the operation. The Manatee Protection Plan will be enacted for any future blasting projects.

As described above, mechanisms are in place to avoid or reduce threats to the manatee within the Port Everglades Jurisdictional Area. Through the comprehensive planning process, the County recognizes that existing and successful operational strategies should continue to be implemented. In particular, the County has recommended the following practices:

- The utilization of appropriate “boom” techniques, spill notification protocols, and spill response procedures to avoid or mitigate hazardous and/or pollutant situations, which may be associated with the transfer of petroleum products.
- The location and use of fenders designed to protect docking ships from contacting the bulkhead, also aide in preventing manatees from being crushed. The Southport has old fenders; the Port is in the process of replacing these with larger fenders to accommodate larger vessels. Fender dimensions are as follows: Midport, the fender panel is 89”H x 79”W with the distance between the front of the fender panel and the face of the seawall at 41”; Southport, the fender panel is 89”H x 98”W with the distance between the front of the fender panel and the face of seawall at 47”.
- The implementation of maintenance dredging and construction dredging programs (planned through 2008) to prevent manatee entrapments between vessel bottoms and the channel bed. Dredging for 2005 consisted of the north extension of the main turning basin and berths 1, 2, and 3 with dredging of the jetty at the channel entrance still to be completed. Dredging for 2012 is expected to involve global improvements to the Port Harbor entrance channel to the Dania Cutoff Canal and all bottom areas in between. The U.S. Army Corps of Engineers serves as the project managers, and the Florida Department of Environmental Protection ensures that water quality standards will be met. In general, dredging is managed through current processes at the state and federal levels (Allan Sosnow, Port Everglades Department, personal communication).

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- The use of manatee exclusion structures (i.e., grates) on culverts/outfalls in the Port Basin to minimize manatee mortality associated with this type of water control structure. Grates are also used in other areas of the Port, including the discharge canal, and the Dania Cutoff Canal (Allan Sosnow, Port Everglades Department, personal communication).
- The enforcement of appropriate vessel docking procedures, accompanied by annual educational reviews and training for Port employed line handlers, to avoid manatee entrapments. Appropriate docking procedures typically involve a pilot who controls vessels and tug assistance. Linesmen examine bulkhead areas when a vessel is leaving the dock. Arrivals do not normally involve linesmen (someone watching for manatees) (Allan Sosnow, Port Everglades Department, personal communication).
- The utilization of fencing along the entire length of the FPL Port Everglades Discharge Canal to prevent interaction between Port visitors and manatees.
- The monitoring of the “no entry” zone of the FPL Port Everglades discharge canal.
- The distribution and use of the educational booklet entitled “With Respect for Nature  Port Everglades Manatee Awareness and Other Environmental Programs.”

Recommendations in the comprehensive plan state that future actions should consider the following:

- Though “fresh water attractants” are not deemed a problem at the current time, if changing conditions are observed, the investigation of how much fresh water is entering the port basin and berthing areas should occur to determine if it is in significant or periodic volumes to attract manatees. There are several sources of data about freshwater flows at the Port that could be used: e.g., new sampling data from existing surface water monitoring sites; periodic checks of manatee congregating areas with an eye toward assessing the role that freshwater plays in their gatherings. The lack of fresh water discharges within the Port is usually associated with Florida’s dry season (winter). As such, during the colder winter months, when manatees congregate in the Port, there are no fresh water discharges. Research could also be done to find out how other ports obtain and utilize fresh water flow information.
- The use of the Harbor Safety Committee as appropriate, to develop measures to enhance manatee protection, with a focus on reducing the risks from large vessels. These could also include efforts to assist the Florida Fish and Wildlife Conservation Commission staff in their periodic evaluation of the adequacy of Manatee zone and boating safety signage at the Port.

In addition to the Port’s existing vessel docking procedures, it is recommended that port  employed line handlers who facilitate vessel docking should receive an annual review on the

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importance of checking for manatees between the bulkhead and the docking ship.

*Florida Power and Light Power Plant Discharge Canal.* A portion of the FPL Port Everglades Power Plant Discharge Canal is a state designated No Entry Zone. Dry Marina, Inc., although currently not in operation, is a private marina located directly adjacent to the discharge canal on property leased from Broward County. Due to the proximity of Dry Marina, Inc. to the FPL Port Everglades discharge canal, and the use of the discharge canal by both port operations and FWC marine enforcement vessels, the non-designated section of the discharge canal has been speed restricted to idle speed during the manatee season and slow speed the remainder of the year.

Land-based fishing has been prohibited throughout the port, with heightened enforcement along the banks of the FPL Port Everglades discharge canal. The Port has fenced the entire length of the discharge canal to prevent interaction between port visitors and manatees and has posted signs prohibiting fishing from port property and feeding of or swimming with manatees. Port Everglades has also provided pilings, barrels, and signage to prevent watercraft from entering the discharge canal and nursery area north of Dry Marina, Inc. while “No entry” signage has been placed at the entrance to the mangrove lagoon on the south side of the discharge canal. Activities in the discharge canal are monitored jointly by Port Everglades and FWC’s Bureau of Law Enforcement which allow only researchers authorized by the U.S. Fish and Wildlife Service or contractors working on Port projects.

*Recreation Boating Use of Port Basin.* The Port Everglades port basin is a focal point for recreational boating in Broward County. All vessels transiting the ICW through Broward County must pass through the port basin. Additionally, the closest deep water access for most of Broward County and the northern part of Miami Dade County is the Port Everglades Inlet. To protect manatees transiting this area, and to protect boaters, the port basin is regulated for slow speed year round, with an idle speed zone in the vicinity of the FPL Port Everglades discharge canal during the manatee season. The port basin is regularly patrolled by federal, state, and local marine law enforcement officers.

Dry Marina provided indoor and outdoor dry storage for small power boats and is located on the FPL power plant discharge canal. FWC operates a dry storage and repair facility north of Dry Marina. The Port also permits the temporary lay-in of large privately-owned yachts within several of its berths.

On the eastern shore of the ICW, four marina facilities are operated by governmental and educational agencies; the U.S. Coast Guard and the U.S. Navy operate facilities for the exclusive use of their vessels while Nova Southeastern University allows rental of berths at their facility.

Lastly, a launching ramp/dock facility is maintained within John U. Lloyd State Recreation area for transient park users.

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### **4.1.2 Marine Facilities**

Marinas, docks and boat ramps may have a direct effect on manatees and their essential habitat by: 1) reducing aquatic vegetation in feeding areas, 2) obstructing manatee movements along shallow shorelines, 3) providing a source of contaminants, and 4) disrupting functions of wetlands through dredge and fill activities. It should also be noted that improperly sited facilities may increase the probability of boat collisions with manatees especially if the facilities increase boat traffic in manatee habitat areas (Citrus County, 1991).

The relationship between manatee habitat and boat traffic needs to be analyzed in order to distinguish the vulnerability of specific areas to the development of docking and launching facilities. Sites suitable for the development of boating facilities should meet the following criteria:

- a) minimize boat travel or reduce boat speed in areas where manatees are regularly sighted;
- b) do not cause destruction of aquatic vegetation eaten by manatees;
- c) meet design standards in wetlands;
- d) do not cause destruction of areas used by manatees to rest, cavort, calve and nurse.

With the current pressure from high-density residential development along Broward waterways, the number of active marinas has been decreasing. At the time of this publication, the following number of marine facilities existed: over 100 marinas and boatyards with a capacity of more than 10,000 slips (Table 1) and 14 boat ramps with a total of 508 trailer parking spaces (Table 2). High concentrations of marinas are located on the South Fork New River area, the New River Junction, the ICW north of Port Everglades, and at the Dania Cutoff Canal/C-10 Canal (Figure 17).

### **4.1.3 Public Boat Ramps**

Public boat ramps allow waterway access to residents that live inland and maintain their boats on trailers and can greatly contribute to the number of boats entering the Broward County water ways. Boat ramp location may have a direct effect on manatees, particularly when sited in areas of high manatee activity. The adverse impact of existing boat ramps in manatee habitat areas can be lessened by establishing speed restriction zones. Broward County has 12 public boat ramps, which provide a capacity for 508 boats, serving the waterways east of the salinity barriers.

### **4.1.4 Residential Docking**

Residential docking facilities are defined as docks, wet slips, and private boat ramps provided for the sole use of the residents of a residential land use adjacent to a water body. These include both single- and multi-family parcels. All single-family parcels with water access are included in the “existing” slip inventory as a single slip. In contrast, the number of new multi-family slips permitted will be subtracted from the available number of allowable new boat slips allocated in this Plan. See 6.4 Licensing, Periodic Plan Review and Revision Section for details of this process.

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Residential dock space accounts for 62% of the existing slip count with single-family docks making up more than half of the existing docks in Broward County. These docks are permitted throughout Broward County for single-family residential use. Multi-family docks are usually found with a higher dock density than single-family (Table 3), although all parcels tend not to take advantage of boat storage.

The process to attain the two residential dock values is significantly different. GIS aided in counting single-family residential parcels adjacent to identified waterways. This count equates to one slip per parcel regardless of the presence or absence of a dock. If a property is re-platted, subsequent to the approval of this Plan, to allow a higher density of waterfront single-family parcels than what was initially counted in the Plan inventory, the increased number of parcels will be subtracted from the available number in the new boat slip allocation. On the contrary, multi-family residential parcels were reviewed individually and only working docks with five (5) or more slips were counted pursuant to FWC's definition of a multi-slip facility. Together, the single-family slip count may ultimately represent an over-count at any one time of the actual number of docks, and the multi-family an undercount. However, this estimate represents the best available information that represents the boat/manatee overlap although little effort was attempted to calculate the potential error of the values.

### **4.1.5 Transitory Docks**

Docks utilized for transitory purposes were also counted as part of the existing slip count. Transitory uses include restaurants, shopping, fuel service, transportation services, parks, hotels, and tourism. Section 6.2.2 Data Review describes the characteristics of these slips in more detail.

### **4.2 Boating Use**

Broward County experienced a 18% increase in vessel registrations from 1996 to 2006, while the County's general trend in pleasure boat registration is an increase of about 800 vessels a year. Throughout the State of Florida, there was a 33% increase in vessel registrations from 1996 to 2006. Of the 51,375 registered boats in Broward County (FDHSMV 2007), over 75% are considered trailer-able (under 26 feet in length). These data and analyses are shown in Figure 18. Boating use of Broward waterways is further characterized as containing 1,400 mega-yachts (>80ft) visiting South Florida annually, and 1,300 relying on area boatyards for service, refit, and repair (Florida Atlantic University 2004).

Four surveys of boaters using Broward County waterways have been conducted by various organizations. These are summarized in the section below.

### **Mote Marine Laboratory Boating Traffic and Use Study (Gorzelay 2005)**

The goal of this project was to provide a characterization of Broward County boating patterns. The FWC requested the study from the Mote Marine Laboratory which presented the project on

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June 2005. The benefit of utilizing the Mote Marine Laboratory in studying these patterns is their experience in similar studies in South Florida, particularly Lee and Sarasota Counties.

The research team approached the project in two different ways to collect desired data. The major tidal water bodies were flown using a fixed wing aircraft and photographed with a video camera in a pattern designed to capture morning and afternoon, weekday and weekend, as well as summer and winter boat traffic. Data compiled from the video regarding the location and motion of all boats in use was transferred to a GIS system for mapping.

In addition to aerial surveys, three fixed point surveys were conducted (at similar timing intervals, but for longer periods of time) on the ICW at Hugh Taylor Birch State Park, the New River at Colee Hammock Park, and at John U. Lloyd State Park across from the Dania Cutoff Canal. "For each boat observation the time of day, vessel type, size origin, destination, registration number (when possible) and qualitative speed were recorded" (Gorzelany 2005).

This study found many significant recreational and commercial vessel characteristics that differed from other southern Florida counties. Specifically, this study found that more than 20% of vessels on Broward waterways were larger than 40 feet and vessels larger than 64 feet made up 5% of boat traffic. These figures are compared to Lee and Sarasota Counties where only 5% and 1% of boat traffic fit into these respective classifications. Those vessels registered in Broward by the Florida Department of Highway Safety and Motor Vehicles greater than 26 feet make up 25% of the County's total; although in contrast, Gorzelany (2005) observed that 48% of the County's vessels fit this class.

The proportion of commercial vessels in Broward County was also higher than in Lee and Sarasota Counties: 9% compared to 2%, respectively. The study attributed the increase to Port operations and vessels that operated on a regular scheduled such as Water Taxi and Water Bus.

Survey data show that the Dania Cutoff Canal is a source for a significant number of vessels to the ICW, most of which are destined for Port Everglades (Gorzelany 2005). Furthermore, the volume observed during fixed point surveys exceeds that found in the nearby ICW and can reach several hundred vessels during the weekends, a time of peak boating activity.

The study also characterized the level of boater compliance to posted speed zones. The study included three fixed observation points at Colee Hammock on the New River, in addition to Hugh Taylor Birch State Park and John U. Lloyd State Park, both located adjacent to the ICW, north and south of Port Everglades, respectively. Overall compliance at these locations were 78%, 52%, and 59%, while blatant non-compliance was about 1%, 3%, and 2%, respectively. The study compares the high compliance at Colee Hammock and relatively low blatant non-compliance to results of the Lee County study that indicated high levels of compliance directly related to high vessel traffic. Colee Hammock is located at a narrow and significant bend of the New River, which may limit vessel speed, especially during times of high traffic.

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### **Florida Inland Navigation District Study (FIND 1998)**

The Florida Inland Navigation District (FIND) commissioned a study of boating activity along the ICW in 1998. Conducted concurrently from August 8 – August 16, 1998, the survey aimed at gauging both boat traffic and recreational water use. Researchers noted that the survey was undertaken in good weather and was considered representative of peak non-holiday (off-season) summer activity. (November through April is considered the peak boating season because of the influx of winter residents and may be as much as three times more active than the summer season.) The boat traffic study consisted of an observational component with data (estimating boat size, type, speed, use, and wake size) collected 24 hours per day on the weekend and 18 hours per day (5:00 a.m. to 11:00 p.m.) on weekdays. Direction of travel was also recorded. Survey sites for this study included the Hillsboro Inlet, the ICW across from the Middle River, the ICW across from Lake Santa Barbara, and the ICW slightly south of Hallandale Beach Boulevard (at the Hemispheres Condominiums and Marina). Boating activity at Port Everglades was not surveyed.

Results included detailed characteristics for 21,656 boats that passed the four observation points in Broward County during the study period. (The report cautions that, for a variety of reasons, all data elements were not recorded for all boats. p.10.) Hillsboro Inlet was the most active site evaluated and, based on the directional survey, it was used primarily by Broward County boaters for recreational purposes (77.3%). The Lake Santa Barbara site was also frequently used, followed by the Middle River and Hallandale sites. Interestingly, sightseeing and water bus (water taxi) trips comprised 12.8% of traffic at the Middle River. The study found that 97% of the weekday traffic and 97.7% of the weekend traffic produced wakes within the desired legal parameters.

The Recreational Water Use Survey of 327 boaters (interviewed at various launch sites) had two purposes: (1) to gather information on the economic impact of the ICW in Broward County and (2) to collect data on boating characteristics to supplement those obtained by observation only. Results indicated that 95.6% of respondents resided in Broward County; 4.4% were from neighboring Miami Dade and Palm Beach counties. Most (63.2%) owned outboard boats, 15.6% had inboard/outboard boats, and 13.1% owned personal watercraft. Only 6.9% had inboard boats; this result was not unexpected because most interviews were conducted at sites unsuitable for launching larger vessels.

Those surveyed said they launched in Broward County 82% of the time and did 83% of their boating in Broward. General respondent comments concerned boating conditions on the ICW, including crowding on the waterways, problems with personal watercraft, and a desire for fewer speed/no wake zones, additional ramps, and more parking.

### **University of Miami Study: Recreational Boaters in Broward County (Baker 1992)**

This study was conducted by the Boating Research Center of the Rosenstiel School of Marine and Atmospheric Science at the University of Miami for the Marine Industries Association of South Florida. The two-part project included a survey of recreational boaters in Broward County and a survey of 25 leading marine related businesses in the county. The boater survey included

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questions regarding boat use patterns, boater expenditures, and water use preferences. It was mailed to 1,200 randomly selected boat owners in Broward, with a 16 percent rate of return. In addition to the mailed survey, ramp intercept surveys were conducted at various public and private ramps in Broward County, on weekends between February 15 – March 22, 1992, from 12 p.m. to 5 p.m. A total of 173 responses were obtained from the ramp surveys and 192 from the mailed surveys.

Results included the following:

- 50% of the boaters who responded have boats between 16 and 25 feet in length.
- More than 50% of the boaters surveyed said they leave for their destination between 8 a.m. and 12 p.m., returning between 2 and 6 p.m.
- Boat trips are most frequent on summer and winter weekends.
- Fishing was the most popular activity, with more than 60% of owners of boats less than 25 feet in length using their boats for fishing at least half the time.
- 50% of owners of boats more than 25 feet in length spent at least half their time cruising.
- Offshore locations were the most popular destinations for boaters with boats less than 41 feet.
- 20% of all boaters frequent the ICW, while 25% of boaters with boats less than 16 feet frequent canals and rivers. Boats larger than 40 feet usually frequent the Bahamas.

### **Broward County Parks and Recreation Study**

The Broward County Parks and Recreation Division, in conjunction with the County’s Marine Advisory Committee, conducted a point – intercept and mail – out survey from December, 2003, through February, 2004, in an effort to quantify the needs of marine facilities. Six thousand mail – out surveys were distributed to a random selection of county boat registrants, based proportionately on the number of registered vessels in each size class. Roughly 10% (N=557) were returned, with an additional 340 point – intercept surveys completed at boat ramps during the two days of the Holiday Boat Parade (December 13 – 14, 2003).

Preliminary overall results indicated that 80% of respondents owned vessels that were less than 26 feet in length (in other words, “trailer – able”), which is similar to the County’s total registrations (2006) in this size class of 76%. Included among the challenges of owning watercraft in Broward County, many boat owners reported that they were unable to keep their boat at their residence due to city codes. Forty – eight percent said that dockage was either unavailable or too expensive, and others remarked on the problems of using trailers in general. Approximately two – thirds of those surveyed said they use their boat for recreational purposes, mainly to go fishing. More than 50% go boating on either a daily or weekly basis, and one – third

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take the boat out monthly. Suggestions for improvement of conditions for Broward's boaters included a desire to have more of the following: ramps and parking, waterfront destinations, marina slips, mooring spaces, dry stacks, short term storage places, and dinghy dockage.

### 4.3 Speed Zones

The creation of boating safety speed zones must be tied to vessel traffic safety or other public safety concerns. Florida Fish and Wildlife Conservation Commission lists five valid reasons for the creation of a speed zone as: 1) the occurrence of boating accidents at that location; 2) obstructed visibility; 3) hazardous tides or currents; 4) vessel traffic congestion; and 5) navigation hazards. Regarding manatee protection, the establishment of speed restriction zones along identified manatee travel and migration corridors serve to reduce watercraft related manatee injuries.

Florida Fish and Wildlife Conservation Commission's Division of Law Enforcement, Boating and Waterways Section has the authority to establish and post vessel speeds necessary for the safety of the public (Ch.327.46(1) F.S.). Both layers of boating speed zones (manatee protection and boating safety) are enforced by FWC's Division of Law Enforcement, Bureau of South Operations as well as County and municipal law enforcement. Broward County speed zone parameters are defined in Section 68C22.010 of the Florida Administrative Code (FAC) and are represented geographically in Figures 19 22. Speed restrictions were instituted throughout the New River system in 1993, while the required signage was installed by 1994.

Various "idle speed" and "slow speed" zones have been established by Broward's municipalities for boating safety. These zones are generally characterized by the presence of bridges and other obstructions to visibility, blind corners, marinas, restaurants, public boat ramps and fueling facilities. These zones are established by official action of the municipality and may or may not appear in the Florida Administrative Code. The different classes of speed zones found in Broward County are described below in addition to iterations that specify duration:

"No entry zone" means a limited areas of critical importance as a safe haven for manatees to rest, feed, reproduce, give birth, nurse, or otherwise habituate undisturbed by human activity. No vessel of any kind, whether power driven or non motorized ... including every description of watercraft, barge, and airboat, shall be permitted within the designated area. No other vessel or flotation device, including but not limited to a seaplane, sailboard, surfboard, raft, or any water toy or other like object intended for or capable of use as a means of transportation on the water, shall be permitted within the designated area, nor shall other human activities including but not limited to diving, snorkeling, swimming, fishing..., and the introduction by persons of food or other objects, that involves disturbance of these waters or the manatees so inhabiting them, be permitted within such a designated area...68C22.002(17) FAC.

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**“Idle speed zone”** means an area where vessels may not be operated at greater than Idle Speed (the minimum speed that will maintain the steerageway of a motorboat □no wake). 68C□22.002(3) (FAC).

- year round
- Idle Speed Zone (November 15 through March 31)/Slow Speed Zone (Remainder of year)

**“Slow speed zone”** means an area where vessels may not be operated at greater than Slow Speed (the speed at which a vessel proceeds when it is fully off plane and completely settled into the water □minimum wake.) 68C□22.002(8) FAC.

- year round
- weekends, holidays
- weekends, November 15 □March 31
- November 15 □March 31

**“Maximum 25 MPH Speed Zone/Slow Speed Buffer Zone”** means a controlled area within which a vessel’s speed made good over the bottom, measured in statute miles, shall not exceed 25 mph. Although it is the intention of the Commission to allow those vessels capable of attaining a planning configuration at 25 mph to do so, this speed limit shall not be construed as permitting the reckless or careless operation of a vessel, in violation of Section 327.33, F.S., or authorizing any vessel to travel at an unsafe speed, in violation of 33 U.S.C. s. 2006, as adopted pursuant to Section 327.33, F.S., by reason of

- Having an elevated bow which restricts visibility, or
- Producing an excessive wake which endangers other vessels or natural resources of the state. 68C□22.002(11) F.A.C.

Based upon recommendations contained in the 1992 MPBSP, in 1993 the Governor and Cabinet placed year round speed restrictions on the Dania Cut Off Canal, C□10 Canal, New River System, Middle River west of U.S. 1, and Cypress Creek west of U.S. 1. Additionally, a year □round 50□foot slow speed buffer zone was created on the south side of the Hillsboro Canal (the canal centerline is the county boundary). On the ICW, an important manatee travel and migratory corridor, the maximum speed was reduced from 30 mph to 25 mph and a 50□foot slow speed buffer zone was established throughout. Seasonal slow and idle speed zones were created along most of the ICW with the waters in and around Port Everglades and the port basin designated year□round slow and idle speeds. Manatee Protection Speed Zones and Boating Safety Speed Zones in Broward County are shown in Figures 19□22.

### **4.4 Law Enforcement**

Enforcement of boat speeds and manatee protection regulations within Broward County is conducted through a multi□agency enforcement approach. These agencies include the FWC’s Division of Law Enforcement, U.S. Fish and Wildlife Service, U.S. Coast Guard, Broward Sheriff’s Office and municipal police.

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Patrol staffing for these agencies are as follows:

U.S. Coast Guard

U.S. Fish and Wildlife Service

FWC 11 officers

Broward Sheriff's Office 1 sergeant, 9 deputies

includes coverage for:

Dania Beach

Deerfield Beach

Hillsboro Beach

Lauderdale By The Sea

Pompano Beach

Port Everglades

Sea Ranch Lakes

Lighthouse Point 1 marine unit

Wilton Manors 1 marine unit (part time)

Ft. Lauderdale 1 sergeant, 9 officers

Hollywood 1 sergeant, 2 officers

Hallandale Beach 1 marine unit

Municipalities abutting manatee accessible waterways that do not have marine patrol units include Hillsboro Beach, Oakland Park, Plantation, and Davie.

The most important aspect of improving law enforcement efficiency regarding manatee protection and boater safety is to increase coordination between the various agencies and offices. Developing a working relationship between all enforcement agencies and personnel would enhance boating safety by ensuring that the regulated areas and zones were patrolled to provide full and efficient coverage. Also, increasing personnel and equipment would allow the agencies to monitor and enforce laws throughout the critical areas in the coastal waters.

While the number of county and municipal marine law enforcement personnel has remained approximately the same since 1990, the number of FWC officers available to patrol Broward County has been reduced from 17 to 11. This reduction in state marine law enforcement personnel was raised as a concern at the Governor's October 2000 Manatee Summit. Participants at the summit emphasized the need for enhanced enforcement of existing regulations.

To assist in "increasing personnel and equipment," on March 8, 1994, the Broward County Board of County Commissioners (BOCC) adopted Ordinance No. 94-19 and Resolution 94-285 enacting the Local Option Vessel Registration Fee pursuant to F.S. 327.22 and 327.25. Through the adopted Ordinance and Resolution, the BOCC directed the Broward County Marine Advisory Committee (MAC) to develop the policies and procedures and administer the Broward County Enhanced Marine Law Enforcement Grant (EMLEG) program which is currently administered by the Broward County Parks and Recreation Department. The BOCC adopted the

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policies and procedures for the EMLEG program in Resolution 94-1438 on December 13, 1994. One provision of the Local Option Vessel Registration Fee is that one dollar for each registered vessel be sent to the State for manatee protection. The total dollars raised by the EMLEG program for manatee protection from 1995-2006 is over \$550,000.

The purpose of the EMLEG program is to improve manatee protection and boating safety in Broward County by the placement of additional marine law enforcement patrols on the waters of the County during peak recreational boating times (weekends and holidays for eight hours each day). The MAC sends out grant applications to the various municipalities and marine law enforcement agencies for this purpose. The MAC has subdivided the County into 11 EMLEG Zones of Concern which include the ICW, Port Everglades, Dania Cut-off Canal, New River, Middle River, Hillsboro Canal, certain fresh water canals, and the Everglades (Figure 23). The MAC reviews EMLEG grant applications and makes funding recommendations to the Broward County Commission. The jurisdiction and number of hours per year that each agency spends on patrol is presented in Figure 23.

### **5.0 Education and Awareness**

#### **5.1 Introduction**

With manatee mortality attributable to human causes increasing throughout the state, it is imperative that emphasis be placed on educating the public on the status of the manatee, improving public awareness, and improving the availability and distribution of educational information and literature.

At the Manatee Summit held by the Governor in October, 2000, most participants agreed that emphasis be placed on improving public awareness and the availability and distribution of educational information and literature. Federal, state, and local government efforts and numerous private organizations and groups have undertaken a wide range of public awareness and educational activities including, but not limited to, the following:

#### **5.2 Federal Agencies**

**U.S. Fish and Wildlife Service (FWS)** is the lead federal agency responsible for conservation of the nation's wildlife. Its primary responsibilities are for migratory birds, endangered species, freshwater and anadromous fisheries, and certain marine mammals including the endangered manatee.

**FWS Ecological Service** office lead the federal effort to protect and restore manatees and other endangered species and their habitats under provisions of the Endangered Species Act and Marine Mammal Protection Act. Information on recovery efforts carried out by the manatee recovery program can be obtained at no charge from the Jacksonville, Florida office.

**The National Wildlife Refuge System** is the largest and most diverse collection of lands set

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aside for wildlife in the world. Many of the 500 refuges include areas of importance for manatees.

**U.S. Coast Guard** conducts manatee zone enforcement in the Port Everglades Basin and Inlet areas in conjunction with FWC when the slow speed/manatee zones change twice a year.

### **5.3 State Agencies**

**Florida Fish and Wildlife Conservation Commission (FWC)** regulates and enforces all marine-related statutes and rules including boat speeds in marine sanctuary areas. The Commission monitors a 24 hour toll free number to report dead or injured manatees. The FWC Division of Law Enforcement Boating and Waterway Section oversees the sanctuary and sign posting program on the waterways.

**Florida Fish and Wildlife Conservation Commission: Imperiled Species Management Section** began the official Manatee Voluntary Contribution Campaign in 1992. The campaign allows for a vessel registrant to provide a voluntary contribution of \$5.00 or more to the Save the Manatee Trust fund and receive a sticker or emblem by the tax collector. The decals signify support for the Save the Manatee Trust fund. The donations support manatee search, rehabilitation, and educational programs.

**Florida Department of Environmental Protection (FDEP)** provides educational materials at state parks and aquatic preserves.

**Florida Department of Education** Office of Environmental Education established the Florida Interdisciplinary Learning Resources in Environmental Education Database in 1991. It is designed for use by educators in Florida schools, districts, colleges and universities.

**Florida Department of Motor Vehicles** began selling manatee license plates in March, 1990. The license plates have raised money for research and education on a state level and have increased public awareness of the manatee.

**John U. Lloyd State Recreation Area** displays manatee educational information including a manatee sign and a small display case at the marina.

### **5.4 Nonprofit Organizations**

**Florida Audubon Society (FAS)** is Florida's oldest and largest conservation organization with over 35,000 members. The FAS conducts aerial surveys to monitor manatee populations, produces educational materials, slide show and films and works closely with other groups involved in manatee protection.

**Broward County Audubon Society** lobbies for manatee protection at local and state levels.

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**Save The Manatee Club (SMC), Inc.**, is a nonprofit member based organization that promotes manatee education/awareness. The Adopt A Manatee program provides funding for public awareness and education projects, manatee research, rescue and rehabilitation efforts, advocacy and legal action to ensure better protection for manatees and their habitat. To promote public awareness, the SMC press kits and press releases on manatee issues go out to local, state and national media on a regular basis. SMC maintains a web site on the Internet, posts new manatee information and answers email questions about manatees. The SMC produces public awareness waterway signs that alert boaters to the presence of manatees. The SMC also produces waterproof decals for boats providing recommendations to reduce manatee injury and death.

The SMC has produced two public awareness brochures. One highlights the problems associated with feeding manatees and the other provides manatee protection information for divers, swimmers and boaters. The SMC also provides free manatee education packets and school presentations by SMC staff. An educator's guide, four color poster, and coloring and activity book is also distributed free to educators in the U.S. and internationally. The SMC and the Florida Advisory Council on Environmental Education have produced a video titled "Manatee Messages: What You Can Do!" The SMC also offers free in-service programs to educators in Florida and provides volunteer speakers to schools and civic groups in Florida and select areas across the U.S.

**Center for Environmental Education and Research, Inc. (CEERI)**, doing business as Marine University, is a Florida nonprofit organization that promotes boater and manatee education and environmental awareness to Broward County secondary schools and to the general public through boat dealerships.

In 1996, CEERI developed and implemented the Boater101 Program ("formerly known as BoaterED"), a boater education, safety and environmental awareness course. This program consists of a six (6) chapter course manual designed to be taught primarily in the environmental science curriculum. One chapter is dedicated entirely to manatees and the environment and is intended to promote public awareness. The course material was approved by the National Association of State Boating Law Administrators (NASBLA), the Florida Department of Education (DOE) and the Florida Department of Environmental Protection (FDEP) Boating Safety Division, now a part of the Florida Fish and Wildlife Conservation Commission (FWC). A component in this program requires the presence of manatee and environmental information. CEERI believes that by educating boaters about the marine environment, its inhabitants, and related conscientious boating habits, the future generation will help to sustain our marine environment.

The Boater101 program, now in its 13<sup>th</sup> year, has been taught to many school aged children throughout Broward County Public Schools. Additionally, community classes and participating boat dealers educate families and individuals receiving boating citations, as well as, providing instruction and general information on preserving Broward's waterways. The program is supported by a variety of marine industry sponsors including the MIAASF, Brunswick, Formula, KeyBank, INAMAR Marine Insurance, National Marine Manufacturers Assoc., OMC

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Foundation, and Volvo Penta.

Marine University has developed multi-faceted learning tools that assist in the widespread dissemination of Boater101. These tools include an online boating safety education course, a published book called Boater101: A Full-reference Guide to Boating Basics and a comprehensive instructor program that includes lesson plans and a PowerPoint Presentation. Utilizing a variety of tools, Boater101 and its instruction method can be tailored to its audience in order to increase visibility and the effectiveness of the program (Christa Jewett, Marine University, personal communication).

The Broward Sheriff's Office, CEERI, and EPGMD are working cooperatively on a Boater Education Billboard Program. The billboards are moved to various waterfront locations on a monthly basis and display manatee protection and/or boating safety information.

**Marine Industries Association of South Florida (MIASF)** is a not-for-profit leadership organization created to promote and protect the sound growth of the marine industry in South Florida for the benefit and education of its members, the community, and the environment. The MIASF facilitates the publication and distribution of the Broward Safe Boating Guide brochure informing Florida boaters about the manatee.

This organization is also an annual sponsor of the "Waterway Cleanup," a county-wide effort to remove trash and debris from Broward's waterways.

### **5.5 Broward County Agencies**

#### **Broward County Schools**

**Elementary School** - Items regarding manatees are distributed to educators throughout the county. Elementary schools may participate in the Save the Manatee Club's Adopt-A-Manatee program as determined by individual teachers.

**Middle School** - The School Board of Broward County provides a web site ([www.endangerearth.com](http://www.endangerearth.com)) to its secondary school teachers to find creative ways to incorporate endangered species issues into their lesson plans. This subject is school based as opposed to curriculum based and does not specifically address manatee protection problems. The Center for Environmental Education and Research, Inc.'s Boater 101 Program is available for integration into a science curriculum.

**High School** - The Center for Environmental Education and Research, Inc., provides certification to high school teachers to instruct its Boater101 program which includes a segment on manatee protection and avoidance.

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### **Parks and Recreation**

**Secret Woods Nature Center** provides information regarding manatees during guided nature walks along the South Fork New River.

**Anne Kolb Nature Center** at West Lake Park, a State Conservation and Recreation Lands acquisition area, offers a manatee theme play area.

**Deerfield Island Park**, the only County park with water only access, has manatee information at the kiosk near the park's marina.

### **5.6 Private Companies**

**Science Eye** promotes environmental education through the schools by taking Broward School children on field trips. The Science Eye conducts manatee field trips called "Beach Reach" which provides information about manatees and beach awareness for Pre-K to 2<sup>nd</sup> grade students.

**Florida Power & Light (FPL)** is one of the state's largest electric utilities and many of the company's power plants provide important winter refuges for manatees. FPL is an important contributor to manatee research and observation; offering various manatee educational booklets and brochures to boaters on how to avoid injuring the manatee. FPL produced a movie titled "Silent Siren: Manatees in Peril."

**Port Everglades** has funded studies that provided information regarding manatee migrations and feeding habitats within restricted areas. This information was used to develop the port expansion plan and for manatee protection, as well as for future enhancement and creation of manatee habitats.

In addition, an educational facility was constructed in the PJA area of John U. Lloyd State Park for use by park personnel to provide information to the public. An observation boardwalk allows visitors to observe the surrounding wetlands.

### **5.7 Signage**

Unlike private marinas, public facilities provide boating and water access to many more people per slip. In 2004, Broward County installed 50 informational kiosks at 15 public boat ramps, parks, and marinas east of the salinity barriers. Seven different signs were used: *Be a Better Boater*, *Be a Safe Boater*, *Florida Manatee*, *Protecting the Gentle Giant*, *What Signs Mean* (bilingual), *What Signs Mean* (English), and *While on the Water*. Each facility had three kiosks with each kiosk containing one different sign.

The Boater Education Billboard Program is a cooperative program between the Broward Sheriff's Office, CEERI, and EPGMD. The mobile billboards display manatee protection and/or boating safety information and are moved by BSO to various waterfront locations on a monthly

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basis.

### **6.0 Boat Facility Siting Plan**

#### **6.1 Introduction**

The Boat Facility Siting Plan, one component of the Manatee Protection Plan (MPP), is a County-wide plan for the development of boat facilities, including docks, piers, dry storage areas, marinas and boat ramps. The plan specifies preferred locations for boat facility development based on an evaluation of natural resources, manatee protection needs, recreation, and economic demands. While the main goal of the resulting boat facility siting criteria is to minimize the amount of interaction between manatees and boats, there is a need to balance recreational and economic uses of waterways with manatee protection. Part of this goal is also to track and evaluate impacts of boat facility developments on manatee habitats.

The characteristics of Broward County challenge the development of a successful BFSP. The County contains narrow waterways, a large boat population and two power plants providing warm water effluent attracting hundreds of manatees in the winter. Unfortunately, the County continues to post manatee mortalities following the institution of speed limited areas. This plan further attempts to protect the threatened Florida manatee while understanding the value of recreational boating and economic benefit of the marine industry in Broward County.

The BFSP employs a concept that allows future boat facility development based on an allotment of ‘slips’, deemed acceptable based on the location, manatee use, and offsetting measures in this plan (increased law enforcement and increased education). Slips will be allocated from the MPP pool through the county licensing process once staff has determined that an application meets the criteria of “good faith” including payment of the \$100 per new slip application fee. [tpq14]

Broward County will entertain new requests for slip allocation based on availability only for those projects with a licensed application status as stated in the Licensing, Permitting, Periodic Plan Review, and Revision Section (6.3). Slips from facilities that are no longer in operation or have been replaced with lower capacity boat facilities will, upon final development of the facility, [tpq15]result in the difference returned to the allotment as available slips for pending licenses in that region. Slip allocations may not be transferred.

Broward’s BFSP recommendations will be applied from the time of its approval. For example, if a boat facility with five (5) or more slips has been permitted and/or developed [tpq16] as of the effective date of this plan, the slips will be counted towards the existing dock density. The future total dock density count will include those docks with construction completed in addition to those permitted.

The provisions of the facility siting plan do not pertain to single-family residences or projects involving construction of facilities with less than a total of five wet or dry slips. For the purposes of this siting methodology, one boat slip, dry slip, parking space designated for a boat

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trailer, or about 30 feet of transitory dockage will be considered to be numerically equivalent. The recommendations in this document do not preempt existing rules or ordinances, or create requirements outside the authority of federal, state, and local regulations.

Areas that are deemed acceptable for new or expanded facilities by manatee and natural resource criteria may not have appropriate zoning or future land use classifications. Changes in zoning and future land use classification are based on social needs and political decisions which may occur independently of natural resource considerations. A presumption of this document is that zoning, future land use classification and present financial constraints might not be limiting factors for future facility development. In addition, it is recognized that databases for manatee distribution, habitat, and boat use may also change or that new data may become available that suggest changes to the document. Therefore, this plan should be updated at intervals consistent with updates of the Broward County Comprehensive Plan.

This section is the “boating facility siting element” as referenced in Florida Statutes, Chapter 370.12(2)(t)3. This section also fulfills Objective 13 A.3 of the Broward County Comprehensive Plan, Conservation Element: “Ensure that new marinas/boat facilities and boat ramps will, through proper facility siting and construction techniques, be located on sites that would minimize potential manatee/boat overlap, injury to manatees and disturbance of manatee habitat.”

The development of the manatee protection boat facility siting criteria is consistent with Objective 13 A.3 and Policy 13 A.3.2 of the Broward County Comprehensive Plan (Conservation Element).

### **6.2 Data Trend Observations**

After a review of various information, several factors which play a major role in the decision making process became apparent.

- 1) Under the existing Broward County Land Use Plan, the remaining undeveloped parcels cannot provide the number of housing units needed to accommodate projected future growth. Most available land in Broward County has already been developed to some degree. Therefore, redevelopment is inevitable, in order to accommodate growth and meet future demand for housing. Broward County has limited nonresidential land that could be redesignated for residential development. (Broward County 2003).
- 2) The Broward County waterways shoreline appears to be approaching build out with respect to wet mooring capacity.
- 3) Aerial synoptic survey data, along with data from FPL power plant surveys, indicate that manatee use of Broward County appears to be increasing.

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- 4) Some shifts in the relative distribution of manatees have probably occurred as a result of increased warm water discharge from the Lauderdale Power Plant.
- 5) Manatee mortality, including human-related mortality, has been steadily increasing since the start of the record history. In addition, the ratio of watercraft-related deaths to the total number of manatee deaths is higher than the statewide average.
- 6) The boat registration growth rate has been approximately 1% over the last 5 years. This rate is flat in comparison to statewide growth and is the lowest of all 13 key counties.

### **6.2.1 Data Collection**

The first step in evaluating Broward's waterways was to collect data as required by Attachment K. Attachment K, the Governor and Cabinet's October 1989 Policy Directive (Figure 1), includes the nine specific sets of data listed below. Once gathered, a geographic information system (GIS) database served as storage for data and assistance in visualizing the information.

Nine data sets required in a BFSP as listed in Attachment K:

1. Marine facilities database
  - a. location and capacity of all marina facilities (proposed and existing)
  - b. location of all boat ramps in the county (proposed and existing)
2. Boat activity study
3. Manatee sighting data
4. Manatee mortality
5. Refuges including aquatic preserves, Outstanding Florida Waters, and other refuge/reserve information
6. Port Everglades information
7. Manatee habitat location including significant habitat resources and warm water/seagrass beds
8. MPP and Boating Safety speed zones (proposed and existing)
9. Outreach and education materials including the location of manatee information displays

### **6.2.2 Data Review**

The second step was to develop a way to review all of the mapped data, referred to in this plan as criteria, for analysis. It was apparent that the configuration of waterways in Broward, primarily a linear system of canals, needed to be divided for ease in examining the datasets both individually and in combination with each other. The waterway polygon analysis resulted in the division of Broward's canal system into three discreet waterways.

This method of data review was conducted using the waterway polygons, a GIS designation of two-dimensional area to represent the extent of inland, tidal waterways with ocean access for Broward County. Locations of manatee mortalities (specifically those caused by watercraft from

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1994), boating speed zones, and aerial survey results combined show the locations where high mortality exists despite the establishment of speed zones.

The analysis focuses on mortalities from 1994 to the present because this period of time follows the establishment of boat speed zones. This distribution will show the locations to direct further action.

### **Waterway Regions**

Dividing the County into three waterway regions (North, Central, South) assists in examining available data within the County. Proximity to an ocean access inlet dictates the extent of the three regions. Most watercraft related manatee mortalities in Broward County exist at three locations, Hillsboro Inlet, Port Everglades Inlet and the South Fork New River. Synoptic surveys conducted following a cold front, show significantly more manatees near Port Everglades and cooling canals of the Lauderdale Power Plant, which also serves as an artificial warm water source for manatees. When compared to the Mote Marine laboratory boater use study, the analysis shows a correlation between the number of boaters and manatees with an increased number of manatee mortalities.

### **Data**

Staff reviewed the following data sets using professional judgment and knowledge of waterways in Broward. Limitations of the field data, more specifically the representation of each data point on a map and assumptions of each data set, were considered during data review and are described below:

### **Watercraft-related manatee deaths**

The key information for this criterion includes the number and location of watercraft related deaths in Broward County between 1994 and 2006 as represented in Figure 15. FWC reports of manatee mortalities begin in 1974, however, the more pertinent information is the period since the established boating safety and manatee protection speed zones. These more recent data may signify the locations where further action is necessary for better manatee protection.

### **Criterion Description:**

Watercraft related deaths represent a manatee carcass recovered where the cause of death was positively determined to be from watercraft impact. Further examination of the carcass may have revealed if the probable cause of death resulted from an acute or chronic impact. An acute injury is noted when a severe trauma is observed such as a bisection, whereas a chronic injury represents a less severe trauma. Acute watercraft injuries likely resulted in death in less than 24 hours. Improvements in the description of the cause of death have provided more information about carcasses recovered (Figure 16).

Manatee mortality data have been somewhat further refined by additional necropsy analysis which attempts to assign the death to an acute or chronic category. The chronic categorization represents a weak correlation between carcass recovery and location of the impact location, but

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acute injuries not only may closer tie the impact to the place of recovery, but gives a specific occurrence and example of an intense unacceptable boater/manatee overlap with that location. Nine of the eleven acute mortalities since 1994 have occurred in the Port area, characterizing it as a high risk area to manatees. Two other similarly characterized mortalities occurred in separate areas of special concern: South Fork New River and Hillsboro Inlet. Further efforts are being made by FWC to classify the size of the striking vessel, based on the nature of the wound.

### Criterion Representation:

Watercraft related deaths are represented by a point on a map illustrating the location at which a manatee carcass was recovered.

### Data Assumptions:

- The mapped point is the location of carcass recovery, but not necessarily the point at which the death occurred or the point of impact by watercraft;
- Carcasses may float and sink while being carried by tidal influence;
- Injuries may occur to manatees that may not kill an animal immediately, and these chronic injuries may result in the carcass recovery location being a great distance for the initial injury location. It is believed that some chronically injured animals seek out quiet backwaters or known refuges, and therefore, are recovered in those locations;
- Carcasses near residential areas are more likely to be reported than those in offshore or uninhabited areas.

### **Perinatal deaths**

The number perinatal (dependent calves) deaths located within a specific waterway.

### Criterion Description:

Perinatal deaths are those carcass recoveries where the animal measures less than 150 cm (5 feet). This criterion will aide to determine where potential nursery areas exist.

### Criterion Representation:

Perinatal deaths are represented by a point on a map illustrating the location at which a manatee carcass was recovered. The representation of the carcass does not always represent the point of death, rather the location the carcass was recovered.

### Data Assumptions:

- The animal is a *dependent calf* inferring that an adult is accompanying the calf.
- Nursing or calving areas are present where clusters of perinatal deaths are recorded.
- The cause of death is recorded in addition to the size of the individual.
- A dependent calf killed by a watercraft would be listed as a watercraft related mortality and is not included in this criterion.
- The reason for the perinatal death is not always known.
- Weaker currents at head waters may fix recovery location with the location of death more accurately.

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### **Aerial Surveys**

The number and location of manatees observed per aerial survey flight.

#### *Criterion Description:*

Manatee observations from aircraft (airplanes or helicopters) are recorded using a standardized methodology. Individual sightings are entered into a database to better evaluate areas of manatee use. In Broward, several surveys contribute to this criterion:

Distributional surveys (Figure 6) – These surveys represent minimum abundance, distribution, and use patterns of manatees for a specific time for the areas contained within the flight path. They were conducted between 1988 and 1990 (a total of 48 flights), 1991 and 1992 (a total of 11 flights), and on a bi-monthly basis between the Spring 2004 – Spring 2007.

Synoptic surveys (Figure 8) – A statewide survey of manatees is flown following significant cold fronts to assist in determining the minimum population estimate. Surveys have been conducted since 1991 with the exception of 1993 and 1994.

Florida Power and Light Power Plant surveys (Figure 9) – Surveys of manatee use of the warm water discharge areas at the two power plants in Broward have been conducted annually since 1977.

#### *Criterion Representation:*

Aerial survey data are represented by points on a map illustrating the location at which a manatee was sighted. The number of sightings is totaled and used to calculate a minimum number of manatees in the region for a given period of time.

#### *Data Assumptions:*

- Surveys are conducted in the eastern portion of Broward, the study area, but surveys do not necessarily comprehensively cover all waters where manatees may be present. Further, the flight plan of all surveys is not available so it should not be assumed that manatees were not present in waterways where none are shown;
- External factors (e.g. water clarity) affect the quality of each survey and the ability to see all manatees;
- Aerial surveys do not capture all manatees in the region.

### **Number of Slips and Dock Density**

This criterion includes the best estimate of the number of boat slips from marine facilities such as single- and multi-family residences, marinas, boat ramp parking spaces and transient dockage located within a specific waterway. This value is then compared to the linear shoreline length to arrive at a dock density displayed as number of docks per 100 feet of shoreline (Table 4). This density is calculated in order to fulfill the requirements of a BFSP as described in the Governor and Cabinet's Attachment K (Figure 1).

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Criterion Description:

The number of boat slips represents the number of slips available to store vessels both in water and adjacent properties in the eastern portion of Broward. In addition, this criterion addresses destinations such as restaurants and transportation stops by counting transient or short term dockage. Slips include the number of slips at single family residences adjacent to waterways, multi family residences with 5 or more docks adjacent to waterways, marina facilities with both slips in water and dry storage, boat ramps with dry storage and parking spaces. Transitory destination slips (assuming parallel mooring) are counted as the number of 30 foot lengths included along the property.

| <u>Dock Category</u>   | <u>Value</u>                               | <u>Source</u>  | <u>Determination Process</u>   |
|--|--|--|--|
| <u>single family, residential</u>  | <u>1 slip per lot adjacent to waterway</u> | <u>Broward County Property Appraiser, 2005</u>             | <u>GIS exercise</u>  |
| <u>multi family, residential</u>   | <u>5 or more</u>                           | <u>Realty Atlas (FARES 2004)</u>                           | <u>staff review of aerial photography</u>                                |
| <u>marina facility (dry and wet storage, brokerages, service)</u>            | <u>inventoried capacities</u>              | <u>MIASF database</u>                                      | <u>inventory verified by phone, advertisements and business websites</u> |
| <u>transitory dockage (restaurants, fuel services, Water Bus/Taxi stops)</u> | <u>1 slip per 30 feet of dockage</u>       | <u>Realty Atlas (FARES 2004)</u>                           | <u>staff review of aerial photography</u>                                |
| <u>boat ramp</u>   | <u>1 slip per parking space</u>            | <u>Broward County Parks and Recreation Inventory, 2005</u> | <u>annually updated by Broward County</u>                                |

The dock density is calculated from the sum of the above slips for each region as it relates to the distance of Broward County shoreline. GIS calculates the shoreline length from georectified 2004 aerial photography. However, excluded from this value is shoreline associated with “no entry” zones, shoreline along highway corridors and natural areas including Deerfield Island Park, Mills Pond Park, Pond Apple Slough and West Lake Park. Refer to Broward County Waterway section.

Slip count adjustments:

If the owner of a marina, multi family residential, boat ramp, or transitory dockage facility is not in agreement with the existing slip count on record with the Broward County Environmental Protection and Growth Management Department and presented in this document, they may request adjustment. The request for adjustment must be accompanied by documentation supporting the number of slips claimed. Acceptable documentation includes the following:

1. Licensed or permitted number of slips.
2. Historical aerial photographs or official site inspection records.

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3. Official operational records from the facility.
4. Other government/official documents such as plat or zoning records.
5. Single-family density for the area.

Should additional slips need to be added or subtracted from an existing facility following review of the documents submitted, the additional slips would not be drawn from or added to the available slip pool (Table 4) for that region.

### *Criterion Representation:*

Boat slips are represented in several formats. Single-family residences, which will not be regulated at the County and State level for the purposes of this document, were assumed to be present at each single-family resident parcel property listed in the County Property Appraiser's database. Trailer parking spaces at boat ramp facilities are used to calculate the maximum capacity of a boat ramp. The number of slips at each ramp facility is listed in Table 2.

The provisions of the facility siting plan do not pertain to single-family residences. Multi-family residential projects along these waterways with less than a total of five wet or dry slips were excluded from the existing county slip count. In addition, for the purposes of this siting methodology, one wet boat slip, one dry slip, every 30 feet of transitory dockage, or a parking space designated for a boat trailer will be considered to be numerically equivalent. The recommendations in this document do not preempt existing rules or ordinances, or create requirements outside the authority of federal, state, and local regulations.

### *Data Assumption:*

- Each single-family home adjacent to waterway with ocean access has a dock or slip.
- Multi-family slips were evaluated based on visible docking usage or appearance of use.
- Multi-family facilities without visible boat moorings were excluded from the slip count.
- Every 30 feet of transitory dock length equates to one slip.

### **Boater Use**

Boater use of Broward County waterways had not been studied recently or comprehensively prior to the undertaking of this version of the BFSP. In the spring of 2004, the FWC contracted with Mote Marine Laboratory to undertake a boater use study for Broward County. A document titled "Recreational Boat Traffic Surveys of Broward County, Florida" was completed in 2005.

### *Criterion Description:*

The Mote Marine Laboratory research team approached the project in two different ways to collect desired data. Major tidal water bodies were flown using a fixed wing aircraft and photographed with a video camera in a pattern designed to capture morning and afternoon, weekday and weekend as well as summer and winter boat traffic. Data compiled from the video regarding the location and motion of all boats in use were transferred to a GIS system for mapping.

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In addition to the aerial surveys, three fixed point surveys were conducted (at similar timing intervals but for longer periods of time) on the ICW at Hugh Taylor Birch State Park, the New River at Colee Hammock Park and at John U. Lloyd State Park across from the Dania Cutoff Canal. “For each boat observation the time of day, vessel type, size origin, destination, registration number (when possible) and qualitative speed were recorded” for future analysis (Gorzelany 2005).

### Criterion Representation:

The results of the aerial surveys verified previous studies as well as the anecdotal evidence from waterway users in that boat use is highest around the inlets followed by the ICW and the New River. This information is depicted in Figures 24 and 25. The fixed point surveys provided a different suite of information for each of the three points including vessel size, type, speed, speed zone compliance and direction. Compliance with speed limits was broken into three categories, compliance, technical non-compliance and blatant non-compliance. Technical non-compliance was defined as a vessel traveling at one speed category faster than the posted speed such a slow in an idle zone or at any excessive speed for a short distance in a slower speed zone. Blatant non-compliance is low at all three sites but technical non-compliance is higher than desired. Reducing non-compliance will be addressed as part of the implementation plan and could include some combination of improving signage, enforcement or boater education and awareness.

### Data Assumptions (Gorzelany 2005):

- a vessel “in use” was defined as either a vessel underway or a stationary vessel in the process of being used;
- flight path and altitude was occasionally modified when instructed by local air traffic control;
- Distinctions between boat speeds were difficult in certain instances: the more conservative slower speed was selected.

### **Registered Vessels**

Vessel registration is a primary way to determine the number of boaters using a specific waterway system and to establish the relative likelihood of manatee boater overlap. However, this criterion is specific only to the County level. Further analysis of aerial photography shows that Broward tidal waterways are used by significantly more boaters than registered.

### Criterion Description:

Vessel registration data is available from the Florida Department of Highway Safety & Motor Vehicles (FDHSMV) and is categorized by size class and fiscal year. In a corollary study, Broward County staff counted boats found in Broward County tidal waterways from 2002 aerial photos to determine if a difference existed between the number of observed boats and those registered with the State. Table 5 illustrates the three different size classes observed and the values counted from the aerial photos. The sum of the values was then compared to the number of vessels registered with FDHSMV of the same time period.

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### Criterion Representation:

Figure 18 shows trends in vessel registrations between fiscal years 1995 –2005. Non-commercial vessels were compared to the total number of registered vessels. Also displayed is the decreasing trend of the percentage of the total registration made up by non-commercial vessels. In contrast, an overall increasing trend exists of the total number of non-commercial vessels. Table 5 shows a significant difference in the number of visiting vessels in each of the three size classes surveyed.

### Data Assumptions:

- Data shows registered vessels only at a county level;
- Registration rules changed for the 1999/2000 fiscal year, creating an artificially high registration value which was considered an aberration in the analysis;
- A small, although unknown, percentage of the observed values from the aerial photograph study are based on a 2004 ground truthing event;
- Most of vessels observed during the ground truthing were assigned to the larger vessel size class.

### **Speed Zones**

This criteria includes established state or local manatee protection and boating safety vessel speed zones located within a specific waterway. In addition to boater safety and manatee protection speed zones, the City of Fort Lauderdale has established five local ordinances, which allow certain size boats to engage in water sports with restrictions. This information is depicted in Figures 19 through 22 and the individual waterway description in “Broward County Waterways” in the first section of this document.

### Criterion Description:

The maps illustrate the presence of boating safety and manatee protection speed zones in Broward waterways.

### Criterion Representation:

The speed zones are represented by color codes on a map.

### No data assumptions

### **Essential Habitat Designation**

Essential manatee habitat is any land or water area constituting elements necessary to the survival and recovery of the manatee population from endangered status, which may require special management considerations and protective measures. The constituent elements include, but are not limited to: space for individual and population growth and for normal behavior; available food sources with adequate water depth and quality; warm and fresh water sources; sites for breeding and rearing of offspring; and habitats protected from disturbances that are representative of the geographical and seasonal distribution of the species. Essential Habitat is a criterion for determining areas where marine-related facilities should be limited. (Broward County Comprehensive Plan 1997)

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### Criterion Description:

Essential habitat designations represent areas needing additional protection for manatees due to high use such as warm water refuge. These areas correspond and are marked “no entry zones” by FWC pursuant to 68C-22.010 (1) (a) 2. FSS prohibiting or limiting boating activity in known manatee habitat areas.

### Criterion Representation:

Areas are represented as color coded waterways.

### No data assumptions

### **Use by tagged manatees**

A number of manatees were fitted with satellite telemetry tags located within a specific waterway (Figure 10).

### Criterion Description:

Manatee migratory patterns from 1986 through 1998 are recorded with the use of telemetry tags.

### Criterion Representation:

The transmitter signal from a tagged manatee was recorded and displayed to evaluate overall seasonal movement of manatees in Broward and movement of an individual manatee regionally. Figure 10 shows telemetry data as a series of dots.

### Data Assumption:

The data illustrate the regional movement of a small number of manatees along the Atlantic coast of Florida.

### **Future Development**

During development of the BFSP, staff gathered additional data for analysis. This new information includes examination of areas potentially available for new or expanded marina development.

Future development prospects for boat facilities fall into several categories, including expansion or redevelopment of existing boat facilities, development of currently vacant land into a boat facility and the conversion of another type of land use such as commercial, office, industrial or residential into a boat facility. Based on current trends of land use amendments, it is unlikely that new boat facilities could be located in areas that are predominantly single family residential. On the contrary, most land use changes are toward more residential according to the Broward County’s Department of Urban Planning and Redevelopment. Figure 26 shows parcels located adjacent to tidal waterways with a commercial and single family residential land use while Figure 27 shows those that are vacant. Based on discussions with County planning staff, the residential areas are unlikely locations for boat facility development.

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Because of the narrowness of Broward waterways it is usually difficult to expand docking facilities substantially into the channel. Some sites are proposing to moor boats perpendicular to a bulkhead rather than parallel, increasing density several fold. Given the value of waterfront uplands and land use trends previously explained, we see limited pressure to expand a marine basin into the uplands. In looking at several recent dry stack developments which seem to have optimized the development potential of the site the general belief that after accounting for drainage and typical site planning requirements (parking, setbacks, fire access, etc.) that approximately 80 – 90 forty foot slips can be designed per gross acre.

Broward County’s Environmental Protection and Growth Management Department, through its Biological Resources Division is currently processing more than 30 license applications for multi-slip facilities representing a net increase of approximately 1800 slips throughout the County. These slips will be drawn from the slips pools in their respective regions. Several other potential projects are awaiting the outcome of this study which could add a substantial number of slips. Several partially permitted projects exist that may be approved pending the outcome of the BFSP.

### **6.2.3 Data Analysis**

All data were considered in an attempt to categorize areas of Broward County by importance and risk to manatees, balanced with the need to locate additional boat facilities. Important in this process is the consideration of manatee protection and boating safety speed zones that are already in place and the location of existing boating facilities, both residential and commercial. As a result, it is recognized that Broward is unique as characterized below:

- Broward County waterways are all canals or rivers, there are no open water bodies such as a bay or lagoon.
- Broward County is approaching build-out and is densely developed (most densely populated County in the state considering only the urban area).
- Broward County has a large number of navigable residential canals and as a result, a large number of single family residential docks.
- It is not anticipated that the residential areas of Broward County will convert to commercial use where marinas could be built. County planners state the current land use conversion trend is towards residential uses; therefore, the County lacks significant opportunities for the development of new marinas.
- The navigable waterways in Broward County have established speed zones, and increased speed zone compliance may be attributed to canal-type waterways with high traffic volume (Gorzelany 2005). In his 2005 study, Gorzelany states that “low levels of blatant non-compliance... [may] be due in part to the relative high levels of traffic and narrowness of the waterway system. Gorzelany also states a similar situation exists in Lee County: “a negative correlation between numbers of vessels and vessel speed was determined (Gorzelany 2000).”
- A boat maintaining an appropriate slow speed in a controlled speed zone area will be significantly less likely to collide with a manatee. However, due to the many large

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vessels, and many small, narrow waterways, boat traffic congestion in these waterways may make it difficult for animals to move out of the way.

- Trends show a replacement of marine facilities to high density residential development such as condominiums. Most marina development may be directed to areas in proximity of the Dania Cutoff Canal due to available vacant land and close proximity to the airport which makes the location less attractive for residential uses.
- A significant trend toward a reduction in the number of slips of some marinas allows the accommodation of larger boats such as mega yachts. Current pending dock permits show about one third of the projects are requesting a decrease in the number of slips.
- Because the majority of Broward County waterways are regulated slow or idle speed, and boating studies indicate that boats are mostly operating at appropriate speeds in speed zone areas, potential limited increases in boat dock density outside of the areas of special concern are not expected to result in a significant potential for harm to manatees. However, this is not unequivocally supported by boat study and manatee mortality data.

Many of Broward's waterways are linear which aids in speed zone enforcement, and therefore, encourages compliance. The number of registered vessels has maintained a minimal increase for the past 10 years (Figure 18), although more than twice the number of registered vessels in the larger size classes may be utilizing Broward waterways (Table 5). Therefore, boating activity in Broward is suspected to remain somewhat similar to historical and current numbers and activity.

The presence of manatees and boater uses have been documented. Four general areas have been identified as they relate to boater/manatee overlap due to carcass recoveries and a presence of live animals. Those areas are Hillsboro Inlet, Dania Cutoff Canal, Port Everglades Inlet, and the South Fork of the New River. All of these areas have existing manatee protection and boating safety speed zones. The use of inlets by boaters is high with speed zone compliance similar to the study's ICW observation points, potentially due to increased law enforcement presence (Gorzelany 2005). Also in the 2005 study, Gorzelany found that blatant non-compliance is low; so the desirable focus would be to reduce technical non-compliance levels. The South Fork of the New River is zoned "Slow Speed Minimum Wake/Idle Speed No Wake", has many curves and is stabilized with sea walls throughout most of its length. All of these characteristics aid in regulating the speed of vessels using this waterway.

The result of the information and data analysis was the identification of three County-wide Zones with nested Areas of Special Concern (ASC). These Zones consist of the North, Center, and South Waterways with the following four ASCs: Port Everglades Inlet, South Fork of the New River, Dania Cutoff Canal Middle/C10 Canal, and Dania Cutoff Canal West.

### **Broward County Waterway Zones**

The three waterway zones, boundaries designated by proximity to the closest local inlets, are depicted in Figure 3. The following section describes in detail how data were analyzed for each waterway zone.

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### North Waterway Zone

#### Geographic Boundaries

The North Zone encompasses the Hillsboro Canal limited to the west by the salinity control structure G-56, the Intracoastal Waterway from the north County line to the Atlantic Boulevard bridge including associated residential canals. Boaters in this area are likely to use either the Boca Inlet located in Palm Beach County, or the Hillsboro Inlet.

#### Manatee Habitat

Vegetation surveys carried out by Broward County should be expanded to include the Hillsboro Canal as improved water flows may result in submerged aquatic vegetation. Of note is the consistent clarity of the water in the Intracoastal Waterway near Hillsboro Inlet northward to the County line which may aide boaters in spotting manatees. The waterways also have shallow buffer areas along the seawalls where manatees often favor over the depths in the middle of the channels as noted during aerial surveys.

#### Manatee Protection and Boating Safety Speed Zones

Seasonal slow speed zones and idle speed, no wake zones exist in this zone. When seasonal slow speed periods are not in effect, much of the ICW is regulated at 25 mph outside of the narrow shoreline buffers.

#### Manatee sighting

Manatees have been sighted throughout the waterway during synoptic and aerial surveys, and documented using telemetry.

#### Manatee mortality

Six manatee carcasses have been recovered in this waterway between 1994 and 2006. Four deaths occurred from watercraft-related causes, one perinatal carcass was recorded in the northern portion of the Intracoastal Waterway, and one death from undetermined causes was recorded in the nearshore of the Atlantic Ocean.

#### Boating activity

A 2005 boating study by Mote Marine Laboratory illustrates moderate use (about 21.9 and 68.1 vessels per square mile on weekdays and weekends, respectively) of the waterway with the highest concentration of boaters determined in the study at the Hillsboro Inlet (about 36.7 and 122.6 vessels per sq mile on weekdays and weekends, respectively) (Gorzelany 2005). Compliance of boaters may be similar to the ICW study sites. Gorzelany (2005) found that blatant non-compliance was low, so the focus will be directed to reducing technical non-compliance (2005). Access points consist of boat ramps, marinas as well as multi-family and single-family docks. Two boat ramps exist in the waterway with a total of 92 parking spaces. Marina data reflects a cluster of facilities on the Hillsboro Canal and others located sporadically throughout the Intracoastal Waterway. The total number of boat slips in the area is 5,597. Single-family residential docks account for 3,004 slips, multi-family account for 614 slips, marinas account for 1,811 slips, boat ramp parking spaces account for 92 slips, and transitory docks account for 76 slips in this waterway zone.

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This region lacks vacant land available for new marina development. Currently, nine facilities are proposing to expand.

### *Dock densities*

The current dock density based upon the comparison between the total number of slips, which is the sum of commercial, residential (single and multi-family), parking spaces at boat ramps and transient slips with the linear feet of shoreline is 1.55 per 100 feet (1.55:100) of shoreline.

### **Center Waterway Zone**

#### *Geographic Boundaries*

The Center Zone includes the Intracoastal Waterway from the Atlantic Boulevard bridge to the Sunrise Boulevard bridge. The Pompano and Cypress Creek Canals and other smaller residential canals are also included in this area extending west to salinity control structures G157 and S137A. Boaters in this area are likely to use either the Hillsboro Inlet or the Port Everglades Inlet.

#### *Manatee Habitat*

The waterway has anecdotal reports of a calving and nursing area in the Pompano Canal and Cypress Creek Canal area. Sightings from residents along the canals and perinatal carcass recoveries recorded in the area support the claim.

#### *Manatee Protection and Boating Safety Speed Zones*

Seasonal and annual slow speeds are posted along the zone with idle speeds near the bridges on the Intracoastal Waterway. When seasonal slow speed periods are not in effect, much of the ICW is regulated at 25 mph outside of the narrow shoreline buffers. The area contains one water sports zone.

#### *Manatee sighting*

Telemetry, aerial and synoptic surveys illustrate manatee use of this waterway.

#### *Manatee mortality*

Twelve manatee carcasses have been recovered in this waterway between 1994 and 2006. Two deaths occurred from watercraft-related causes, one from other human-related causes, three perinatal, two from cold stress and four deaths from undetermined causes.

#### *Boating activity*

The 2005 boating study reflects moderate use (about 11.2 and 27.8 vessels per square mile on weekdays and weekends, respectively) of the waterway (Gorzelay 2005). Compliance of boaters is probably similar to the ICW study sites. In 2005, Gorzelay found that blatant non-compliance was low, so the focus will be directed to reducing technical non-compliance. In the study area access to the waterway consists of marinas and single-family and multi-family docks. This waterway lacks boat launching ramps. Marina data reflect a grouping of facilities near the intersection of the Pompano and Cypress Creek Canals and the Intracoastal Waterway. The total number of boat slips in the area is 6,381. Single-family residential docks account for 4,635 slips,

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multi-family residential accounts for 987 slips, marinas account for 690 slips, and transitory docks account for 69 slips in this waterway zone.

This region lacks significant vacant land for new marina development.

### *Dock densities*

The current dock density based on the total number of slips, both commercial and residential and the linear feet of shoreline is 1.20:100 feet of shoreline.

### **South Waterway Zone**

#### *Geographic Boundaries*

The South Zone encompasses the waterways from the Miami-Dade County line northward to Sunrise Boulevard along the Intracoastal Waterway and associated waterways westward including a portion of the Dania Cutoff Canal, the C-10 Canal, the New River Canal system (North Fork, South Fork and New River Canal), the Middle River and numerous secondary residential canals. The area is bounded from the west by salinity control structures S-13 on the Dania Cutoff Canal, G-54 on the North New River Canal, S-33 on the C-12 Canal (North New River Canal) and S-36 on the C-13 Canal (Middle River). Port Everglades Inlet is the nearest ocean access point.

The area contains essential manatee habitat, manatee protection, and boating safety speed zones and several water sports areas.

#### *Manatee Habitat*

Essential manatee habitat areas are present at the Lauderdale power plants. Intake water for the Lauderdale Power Plant is drawn from the nearby Dania Cutoff Canal and Biscayne Aquifer. The discharge canal of this inland power plant includes approximately 200 acres of cooling lakes (Mezich 2001) while the Port Everglades Plant discharges into a 1.5 mile canal designated as a 'no entry zone'.

Telemetry studies, aerial survey data, and sightings by the public illustrate use of these waterways by manatees on a regular basis. The South Fork of the New River appears to be used as a travel route for manatees seeking to access the inland power plant cooling lakes. In addition, manatees utilize the Dania Cutoff Canal.

#### *Manatee Protection and Boating Safety Speed Zones*

This area is regulated by a combination of local and state manatee protection and boating safety speed zones including no entry, slow speed, and idle speed or 25 mph outside of manatee season. The state manatee protection speed zones adopted in 1993 include no entry zones for the warm water refuges near the power plant, idle speed during manatee season and slow speed remainder of year along the Intracoastal Waterway south of Port Everglades, and portions of the South Fork of the New River. Slow speed restrictions for the Intracoastal Waterway, South Fork New River, New River Canal, Middle River, and Dania Cutoff Canal from the C-10 Canal. Twenty-five miles per hour with 50 ft slow speed buffers exist from south of East Dania Beach Boulevard to

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the County line. Slow speed Nov. 15 – Mar. 31; 25 mph with 50 ft slow speed buffer remainder of year is established in a small region just south of the East Dania Beach Boulevard bridge. Five water sports areas exist in the City of Ft. Lauderdale.

### *Manatee sighting*

Manatees are sighted throughout this waterway year round, with concentrations near the power plants during the winter months.

### *Manatee mortality*

Excluding the Areas of Special Concern, fourteen manatee carcasses have been recovered in this waterway zone between 1994 and 2006. Two deaths occurred from watercraft-related causes, two from floodgate/lock causes, three perinatal, one from cold stress, one from other natural causes and five deaths from undetermined causes.

### *Boating activity*

Marinas can be found in concentrations along the New River in the downtown Ft. Lauderdale and South Fork areas, along the Dania Cutoff Canal and the ICW. The majority of county-wide boat ramps exist throughout this waterway. Fixed bridge heights limit the type of vessels that access upstream portions of this waterway, specifically in the Middle River, North Fork of the New River and the Dania Cutoff Canal. Excluding areas of special concern, the total number of slips in this zone is 10,240 including 4,571 single-family home docks, 1,355 multi-family slips, 3,623 marina slips, 397 parking spaces at boat ramps, and 294 transient slips.

In 2005, Gorzelany illustrated heavy use (about 13 and 31.3 vessels per square mile on weekdays and weekends, respectively) of this region. Compliance, as documented in the earlier FIND study, is fair in the southern portion of the county with improved compliance near the Port and New River (FIND 1998). The Mote Marine Study found blatant non-compliance to be low at the John U. Lloyd State Park and in the New River at Colee Hammock Park (Gorzelany 2005). Compliance was better in the New River than at the ICW adjacent to John U. Lloyd State Park (Gorzelany 2005). Increased security presence in the vicinity of Port Everglades may result in better speed zone compliance in this area.

A significant amount of vacant land is available for new marina development in this waterway, particularly on the Dania Cutoff Canal.

### *Dock densities*

The current dock density based upon the total number of slips both commercial and residential and parking spaces at boat ramps and the linear feet of shoreline is 1.37:100 feet of shoreline.

### *Areas of Special Concern*

The following specific areas are noted as areas of particular importance to manatees. These areas are identified as areas of concern because recent high manatee watercraft deaths have occurred, or data reflects it is a high use manatee area with a significant level of boating use and the potential for development of boat facilities. The South Fork of the New River, Dania Cutoff

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Canal Middle/C 10 Canal, and Dania Cutoff Canal West include specific slip allocations separate from the regional allocation.

### South Fork of the New River

This portion of the South Fork of the New River is an area of concern due to the number of carcass recoveries and the presence of manatees using the waterway to access the Lauderdale Power Plant cooling lakes. The presence of manatees as well as the high number of marine facilities and subsequent use by boaters increases the opportunity for boater/manatee overlap and the effects their interaction.

#### Geographic Boundaries

From the east, this waterway begins at the confluence of the North and South Forks of the New River with western terminus at the S 13 on the Dania Cutoff Canal, G 54 on the North New River Canal.

#### Manatee Mortality

Fifteen manatee carcasses have been recovered in this waterway between 1994 and 2006. Two deaths occurred from watercraft-related causes, one from other human-related causes, five perinatal, one from cold stress and six deaths from undetermined causes.

#### Boating Activity

This area ranks 13<sup>th</sup> and 32<sup>nd</sup> for weekday and weekend traffic, respectively (16.5 and 15.4 boats per square mile) among the 40 sites surveyed of Broward County waterways (Gorzelay 2005).

#### Dock densities

The current dock density based upon the total number of slips both commercial and residential and parking spaces at boat ramps and the linear feet of shoreline is 1.80:100 feet of shoreline.

### Dania Cutoff Middle/C 10 Canal and Cutoff Canal West

The Dania Cutoff Canal displays high perinatal mortalities which translates to high usage by calves and accompanied adult manatees. For the purposes of slip allocations, the Dania Cutoff Canal has been subdivided into the Dania Cutoff Canal Middle/C 10 Canal and Dania Cutoff Canal West

#### Geographic Boundaries

Dania Cutoff Canal Middle/C 10 Canal: This stretch of the Dania Cutoff Canal spans from SW 30<sup>th</sup> Avenue east to US 1 and includes the C 10 Canal and C 10 Spur Canal.

Dania Cutoff Canal West: This stretch of the Dania Cutoff Canal spans from the salinity control structure S 13 located at SR 7 east to SW 30<sup>th</sup> Avenue.

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### Manatee Mortality

Thirteen manatee carcasses have been recovered in this waterway between 1994 and 2006. One death occurred from flood gate/lock causes, nine perinatal, one from cold stress and two deaths from undetermined causes.

### Boating Activity

This area ranks 35<sup>th</sup> and 40<sup>th</sup> for weekday and weekend traffic, respectively (3.4 and 3.0 boats per square mile) among the 40 sites surveyed of Broward County waterways (Gorzelany 2005).

### Dock densities

Dania Cutoff Canal Middle/C-10 Canal: The current dock density based upon the total number of slips both commercial and residential and parking spaces at boat ramps and the linear feet of shoreline is 2.23:100 feet of shoreline.

Dania Cutoff Canal West: The current dock density based upon the total number of slips both commercial and residential and parking spaces at boat ramps and the linear feet of shoreline is 0.87:100 feet of shoreline.

### Port Everglades Zone

#### Geographic Boundaries

This zone includes the shoreline of the Port Everglades operations within the Port Jurisdictional Area (PJA). The eastern boundary is the eastern end of the inlet jetties.

#### Manatee Habitat

Port Everglades is a corridor for hundreds of manatees seeking the warm waters of the Lauderdale and Port Everglades power plant effluents during the winter months.

The warm-water refuge areas from the power plant located within this area are designated by Broward County as Manatee Essential Habitat (1989 Comprehensive Plan Vol. 4, 13A-42). Broward County's Comprehensive Plan prohibits the construction of new marinas or expansion of existing marinas, docking facilities, and boat ramps, except those related to law enforcement, within Manatee Essential Habitat Areas (1997 Comprehensive Plan, Policy 13-A.3.1, Ordinance Number 96-39).

#### Manatee Protection and Boating Safety Speed Zones

Boating safety and manatee related speed regulations in addition to a Federal security speed zone exist in this area. "Idle speed from November 15 – March 31, and slow speed the remainder of the year" regulates the length of waterway 2600 feet north and south of the mouth of this canal on the ICW. Beyond this zone, the ICW and Port area is designated as "slow speed" zones. The U.S. Department of Homeland Security recently established a "slow speed zone" within the inlet extending about 1,300 feet from the ICW to increase port security.

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The immediate area of the Port Everglades power plant discharge canal is a ‘no entry zone’ designation, however, the movement of manatees to and from the power plant’s warm water discharge causes a high manatee/boater overlap culminating in the winter months.

In addition, the Port designated the former “E.P.A. Slip” in the FPL discharge canal as a Manatee Nursery Area to restrict the area’s use from boaters and people. The area has been found to be used by calving mothers (Figure 16).

### *Manatee sighting*

The most significant time of year for manatee sighting is in the winter months, from December through February.

### *Manatee mortality*

Thirty-five manatee carcasses have been recovered in this waterway between 1994 and 2006. twenty-two deaths occurred from watercraft-related causes, two perinatal, two from other natural causes, and nine deaths from undetermined causes. It should be noted that carcass recovery does not ascertain that a watercraft-related impact occurred within the bounds of the Port. Manatees with non-acute injuries acquired elsewhere may have died in the Port area, or a carcass may have been carried by currents to the Port area confluence of the north and south Intracoastal Waterway sections and the Port Everglades Inlet.

### *Boating activity*

Port Everglades Inlet is a primary access to the Atlantic Ocean for the County and serves cargo and passenger ships, recreational boaters, and navy vessels. Gorzelany’s 2005 study shows the area ranks seventh in weekday and weekend boating traffic (23.5 and 52.6 boats per square mile, respectively) compared to other waterways surveyed with ocean access. The study showed that compliance in this area was 59% overall (2005). However, blatant non-compliance was also low at 2% (Figure 28, Gorzelany 2005).

### *Dock densities*

Dock densities in the jurisdiction of the Port Everglades Zone are not addressed by this plan. Expansion of the Port and associated berths and slips will be addressed by state and federal agencies on a case-by-case basis.

### Port Everglades Power Plant and Inlet

The Port Everglades Power Plant, more specifically its associated warm-water discharge canal and adjacent waters, is an area of concern due to the high number of manatees sighted during the winter months and the elevated number of carcasses recovered attributed to watercraft-related mortality. The immediate area of the discharge canal is less of a concern due to the ‘no entry zone’ designation, however, the movement of manatees to and from the power plant’s warm-water discharge causes a high boater/manatee overlap culminating in the winter months when a high number of manatees utilize the area for the warm temperatures.

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High boat traffic in the area also lends to the special concern status. Gorzelany (2005) shows the area ranks 7th in weekday and weekend boating traffic (23.5 and 52.6 boats per square mile, respectively) compared to other waterways surveyed with ocean access. The most significant time of year for manatee siting is in the winter months, from December through February.

The Gorzelany (2005) study shows that compliance in this area was 59% overall. However, blatant non-compliance was also low at 2% (Figure 25, Gorzelany 2005).

### **6.2.4 Outcomes**

The final step is to determine appropriate slip densities for the North, Center, South Waterways, and Areas of Special Concern in line with the requirements of the Governor's Cabinet Attachment K (Figure 1). Existing densities were calculated by comparing the number of documented boat slips (both single- and multi-family residences, marine facilities, boat ramps, and transient slips) with the linear feet of shoreline in the waterway. The results were reviewed as they relate to manatee data and boater/manatee interaction. Recommendations for a measured increase in the number of slips for each of the three waterways were based on the relative manatee data between each of these waterways, assessment of potential risk for boater/manatee interaction, ultimate slip to shoreline ratios, and growth (determined from pending boating facility applications). A manatee risk mitigation program for the areas of special concern includes limiting the allowable number of increased slips and/or focusing law enforcement efforts to reduce technical and blatant non-compliance.

The data were reviewed and compared to mortality data conveying the relative success of compatible boater/manatee interaction. No carcass recoveries occurred in the area between the Boca Inlet (located in extreme southern Palm Beach County) and the northern Broward County line, however Hillsboro Inlet is the location of three carcass recoveries attributed to watercraft related mortalities between 1994 and 2006. In contrast, Port Everglades Inlet is the site of 22 carcass recoveries attributed to watercraft-related mortalities in that period. Since generally fewer deaths are documented in the North region, a greater dock density is allocated. The following table summarizes the proposed dock densities for the three Zones and ASCs (Table 4):

| <u>Waterway Zone or</u>                  | <u>Existing dock density</u> | <u>Proposed dock density</u> |
|--|------------------------------|------------------------------|
| <u>Area of Special Concern (□)</u>       |                              |                              |
| <u>North</u>                             | <u>1.55 : 100ft.</u>         | <u>1.93 : 100ft.</u>         |
| <u>Center</u>                            | <u>1.20 : 100ft.</u>         | <u>1.32 : 100ft.</u>         |
| <u>South</u>                             | <u>1.37 : 100ft.</u>         | <u>1.51 : 100ft.</u>         |
| <u>Port Everglades □</u>                 | <u>0.00 : 100ft.</u>         | <u>0.00 : 100ft.</u>         |
| <u>South Fork New River □</u>            | <u>1.80 : 100ft.</u>         | <u>2.02 : 100ft.</u>         |
| <u>Dania Cutoff Canal Middle/C □10 □</u> | <u>2.23 : 100ft.</u>         | <u>2.76 : 100ft.</u>         |
| <u>Dania Cutoff Canal West □</u>         | <u>0.87 : 100ft.</u>         | <u>1.08 : 100ft.</u>         |

The BFSP employs a concept that allows future boat facility development based on an allotment of 'slips', deemed acceptable based on the location, manatee use, and offsetting measures in this

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plan (increased law enforcement and increased education). Refer to Table 4 for a summary of slip densities and slip allotments based on waterway or region.

Broward's BFSP recommendations will be applied from the time of its approval. For example, if a boat facility with five (5) or more slips has been permitted and/or developed<sup>[tpq17]</sup> as of the effective date of this plan, the slips will be counted towards the existing dock density. The future total dock density count will include those docks with construction completed in addition to those permitted. Slips from facilities that are no longer in operation or have been replaced with lower capacity boat facilities will be returned to the allotment as available slips for pending permits in that region. Existing, operating slips that are removed from the South Waterway zone will be returned to the South zone allotment; however, slip reductions within the South zone but outside of the boundaries of the Areas of Special Concern (ASC) may not be allocated to the ASCs.

Broward County will entertain new requests for slip allocation based on availability only for those projects with a licensed application status as stated in 6.4 Licensing, Permitting, Periodic Plan Review, and Revision. Any decrease of slips upon final development will result in the difference returned to the allotment as available slips for pending permits in that region. Slip allocations may not be transferred.

Consistent with criteria listed in 4.1.2 Marine Facilities, new marinas will be restricted from designated Essential Habitat Areas. Existing marinas in these areas, with the exception of those related to law enforcement, will be legal nonconforming uses. This classification would allow the marina to operate, but would prohibit expansion and, should the use as a marina cease, the property could not be used for this purpose.

Marinas are to be located so as to require minimal or no dredging and have good tidal flushing. If dredging is required, both the initial and subsequent dredging should be minimized. Sites selected will be reviewed for any significant environmental impacts on manatee habitat including manatee travel and migration corridors, and seagrass beds. All docks, mooring pilings or other structures must utilize design standards which do not entrap or injure manatees.

Broward County has a variety of marine facilities addressing storage, access, service, and sales of watercraft via private and public residential and commercial venues. This BFSP component addresses public or private structures, or operations where boats are moored and/or launched, including commercial, recreational, private, governmental, residential marinas, and boat ramps.

While considered in the existing dock density calculations for this plan, single-family docks are not regulated by this Plan. Single-family docks are regulated differently because, if constructed properly, they have a lesser impact on the aquatic environment than multi-family or multi-slip residential docks. Nevertheless, as certain docking facility construction designs are known to cause manatee mortalities, all docks are subject to construction standards that do not entrap or injure manatees.

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With the exception of law enforcement purposes, new ramps shall be prohibited within designated manatee essential habitat areas. Boat ramps constructed in waters east of the salinity barriers shall be located in sites that minimize potential manatee/boat overlap and disturbance of manatee habitat. In addition, priority shall be given to sites within existing speed restriction zones.

### **North County Outcomes**

Existing dock density in the North County waterway (north county line to Atlantic Boulevard bridge) is 1.55 slips to 100 linear feet of shoreline. The potential allowed increase for this area is 1,353 resulting in a density of 1.93:100, a 25% increase in the number of slips in this waterway (Figure 4). Two hundred (200) of the 1,353 slips will be held for development by local governmental entities to develop public boat facilities for a period of five (5) years. The proposed projects are: Pioneer Park (50 slips), Deerfield Island Park (10 slips), Exchange Park (15), Alsdorf Park (125). At the end of 5 yrs, if the specific project does not have an active permit application on file with Broward County, the slips will be released for other development on a first-come/first-serve basis.

Recommendations for the area include an investigation of the use of the Pompano Canal and Cypress Creek Canal by nursing and calving mothers. A designation of the area as a nursing and calving ground may require additional monitoring of the area for both manatee presence and boater compliance.

### **Center County Outcomes**

Existing dock density in the Center County waterway (south of Atlantic Boulevard bridge to Sunrise Boulevard bridge) is 1.20 slips to 100 linear feet of shoreline. The potential allowed increase for this area is 619, resulting in a density of 1.32:100, a 10% increase in the existing number of slips in this waterway (Figure 4). The region's reliance on the Port Everglades Inlet, with the high occurrence of manatees, limits further dock density permission. There are no projected public boat facility projects in this area.

### **South County Outcomes**

Existing dock density in the South County region (south of Sunrise Boulevard bridge to the County line) is 1.37 slips to 100 linear feet of shoreline excluding the areas of special concern. The potential allowed increase for this area is 1,033 resulting in a density of 1.51:100, a 10.5% increase in the number of vessels in this waterway (Table 4). Two hundred and forty-eight (248) of the 1,033 slips will be held for development by local governmental entities to develop public boat facilities for a period of five (5) years. The proposed projects are: Birch Las Olas (50), Coconut Island (4), New River Floating Docks (24), Port Everglades (60), Whiskey Creek Marina (15), Hollywood N. Beach/West Lake Park (20), Hollywood Marina (50), Public Boat Docks (25). At the end of 5 yrs, if the specific project does not have an active permit application on file with Broward County, the slips will be released for other development on a first-come/first-serve basis.

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### **Areas of Special Concern Outcomes:**

The Areas of Special Concern include the South Fork of the New River, Dania Cutoff Canal Middle/C10, Dania Cutoff Canal West, and Port Everglades (see waterway boundaries in Section 1.C.) The manatee risk mitigation program for these areas of concern includes limiting the allowable number of additional slips as follows:

South Fork New River – a potential allowed increase for this area is 471, resulting in a density of 1.98:100, a 10.0% increase in the number of vessels in this waterway (Table 4). Five (5) of the 471 slips will be held for development by local governmental entities to develop a public boat facility for a period of five (5) years; the proposed project is at the Secret Woods Nature Center . At the end of 5 years, if the specific project does not have an active permit application on file with Broward County, the slips will be released for other development on a first come/first serve basis.

Dania Cutoff Canal Middle/C10 – a potential allowed increase for this area is 806, resulting in a density of 2.76:100, a 23.7% increase in the number of vessels in this waterway (Table 4). Sixty (60) of the 806 slips will be held for development by local governmental entities to develop a public boat facility for a period of five (5) years. The proposed project is at Boaters Park. At the end of 5 years, if the specific project does not have an active permit application on file with Broward County, the slips will be released for other development on a first come/first serve basis.

Dania Cutoff Canal West – a potential projected increase for this area is 110, resulting in a density of 1.08:100, a 24% increase in the number of vessels in this waterway (Table 4). There are no projected public boat facility projects in this area.

Law enforcement efforts to reduce speed zone non-compliance will be directed to Areas of Special Concern with the addition of a law enforcement officer dedicated full time to these regions in conjunction with regular marine patrols from law enforcement agencies.

Recommendations for the area include an investigation of the use of the Dania Cutoff Canal and the North New River Canal by nursing and calving mothers. A designation of these areas as a nursing and calving ground may require additional monitoring of the area for both manatee presence and boater compliance.

### **6.3 Implementation Plan**

In addition to the boat facility siting locations and slip densities, additional manatee protection measures are proposed to assure that increasing boat densities in the County will not significantly or adversely affect manatees.

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### **6.3.1 Monitoring**

The County will conduct weekly and quarterly aerial and/or in-water surveys of manatee presence and activity depending on specified climatic characteristics and allowable access. Areas near the Port Everglades power plant will be surveyed via kayak if air traffic limits adequate aerial access.

In addition to cooperating with FWC on satisfying Florida State Statute 370.12 (4), which requires an annual, impartial, scientific benchmark census of the manatee population, Broward County will conduct weekly cool season surveys of the Port Everglades and Lauderdale Power Plants plus the South Fork New River, Dania Cutoff Canal, and ICW. This survey will be conducted with helicopter and/or kayak depending on airspace restrictions. Similar to FWC synoptic survey criteria, Broward County weekly surveys will attempt to be conducted during the period of time meeting all of the following conditions at manatee aggregation sites such as Port Everglades Power Plant and Lauderdale Power Plant:

- Air temperatures forecasted to be less than or equal to 49°F on at least 3 of 5 days prior to the survey,
- Water temperature below 68°F,
- On the survey days, no winds forecasted above 15 knots in the entire survey area,
- On survey days, no sky conditions forecasted as “mostly cloudy” or “rainy” in the entire survey area.

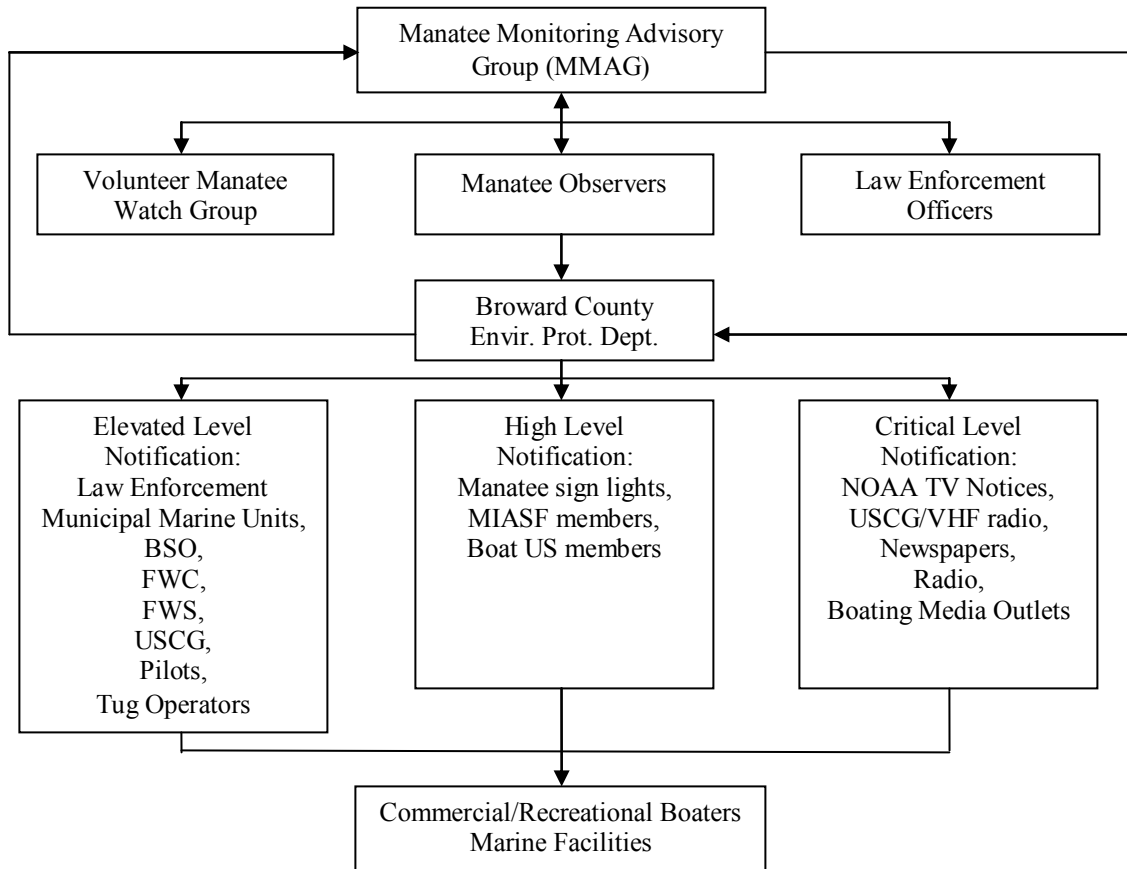
Quarterly surveys will include helicopter flights surveying the tidally influenced waterways consistent with the flight path designated by FWC (Figure 5). The spring survey will be timed in an attempt to capture calving or nursing activities. Areas near the Port Everglades Power Plant will be surveyed via kayak if air traffic limits adequate aerial access.

With a count greater than 15 manatees (which represent more than the maximum warm season manatee count) in the weekly cool season or quarterly survey, the number and location of observed manatees will be communicated to respective regional law enforcement units and posted on the County website using the following manatee use factors:

|          | Cumulative Count near Port Everglades<br>and Lauderdale Power Plants |
|----------|--|
| Factor   |  |
| Normal   | 15 and below   |
| Elevated | between 15 and 100 manatees  |
| High     | from 100 to 200 manatees   |
| Critical | more than 200 manatees   |

Additional notification procedures will be developed and implemented to include all law enforcement marine units (e.g. BSO, FWC, FWS, USCG), Port pilots and tug operators, commercial/recreational boaters, and the general public.

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Higher factor rating corresponds to a higher call to action by law enforcement groups to curb non-compliant boating speeds. Furthermore, elevated, high, and critical manatee counts in turn illuminate the proposed network of manatee caution signs in Port Everglades and South Fork New River.

Areas suspected as manatee calving areas will be investigated for degree of use. These suspected areas are designated by the number of perinatal carcass recoveries.

Further aerial and/or kayak monitoring may be used to gain more information in areas of high manatee use.

Boater speed compliance pursuant to the protocol found in Gorzelany (2005) and/or manatee observation monitoring similar to Nova Southeastern University's program will be monitored on an annual basis as funds are available. The major areas of focus for these studies may include the Areas of Special Concern.

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### **6.3.2 Signage**

Broward County will pursue the installation and maintenance of informative signage at boat ramps and in select waterways of increased manatee mortalities. Boat ramps will feature regional maps of the vicinity displaying manatee protection and boating safety speed zones in addition to historic siting densities from recent synoptic and distributional surveys.

The County will also pursue the installation of flashing caution signage that will signify an elevated potential of manatee presence in waterways where the highest watercraft related manatee mortalities were located. These locations include adjacent waterways to the Port Everglades and Lauderdale power plants. The County anticipates that four signs from the New River at Stranahan River to the intersection of Dania Cutoff Canal at the ICW. An additional sign is planned for the South Fork New River near Secret Woods Natural Area.

The illumination of the signage will be determined based on a manual and automatic interface. The signs may be activated manually, however the signage will be primarily controlled by a switch tied to the correlation between temperature and historic regional manatee observations and/or current manatee monitoring activities.

### **6.3.3 Funding**

Costs for Manatee Protection Plan conservation measures will be funded through a dual fee combination of new slip fees and an annual manatee mitigation slip fee. The economic demand for new slips will require offsetting protection measures as outlined in this BFSP, so new slip fees will fund the beginning costs. However, as there are a limited number of available new slips, there is a limited source of funding for the 5 year or greater life expectancy of the plan. To provide a continual source of funding in subsequent years, an annual manatee mitigation slip fee will be instituted for all slips at facilities with 5 or more slips as managed by this plan. This will spread the protection cost over a wider segment of the boating community, thus minimizing the actual fee amount. The fee amounts are established by county ordinance and will be adjusted annually to ensure that there are adequate funds to maintain the programs described in the plan.

The new slip fee, as established in the fee schedule of the Broward County Natural Resource Protection Code, Chapter 27, Article I, as amended, will be collected in two separate payments. The first will be due as an application fee at the time the Environmental Resource License application is submitted to Broward County EPGMD. This payment will be \$100 per new slip over the facilities' current licensed or historical number of slips. Slips will not be allocated until staff has determined the application meets the "good faith" criteria, including payment of this fee. The application fee is non-refundable and non-transferable. The second payment, the new slip fee is determined by the number of new slips (over the facility's currently licensed or historical number of slips) multiplied by the new slip fee for the current fiscal year at the time of license issuance.<sup>[tpq18]</sup>

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The annual manatee mitigation slip fee, as established in the fee schedule of the Broward County Administrative Code, will be collected for all slips managed by this plan. This fee will be implemented as of 10/1/2008 (Fiscal Year 2009).

The projected fee amounts, including a 4% inflation factor, for the next 5 years are listed below.

| <u>Fiscal year</u> | <u>New slip fee per additional slip</u> | <u>MPP mitigation slip fee per existing slip</u> |
|--------------------|---|--|
| <u>2008</u>        | <u>\$400.00</u>                         | <u>\$0.00</u>                                    |
| <u>2009</u>        | <u>\$416.00</u>                         | <u>\$20.00</u>                                   |
| <u>2010</u>        | <u>\$432.64</u>                         | <u>\$20.80</u>                                   |
| <u>2011</u>        | <u>\$449.95</u>                         | <u>\$21.63</u>                                   |
| <u>2012</u>        | <u>\$467.94</u>                         | <u>\$22.50</u>                                   |

A portion of these funds will be used to support two (2) positions. One will be EPGMD staff responsible for implementing the BFSP fee licensing program and inspection of existing facilities. The other position will be a full time law enforcement officer dedicated to patrolling the ASCs. A portion of these funds will also be directed towards weekly cool season and quarterly aerial surveys, construction and maintenance of four flashing caution lights, boat ramp information kiosks, speed zone compliance monitoring and manatee research.

### **6.3.4 Mitigation/Conservation Measures for Construction**

The following are typical conditions that will be required for facilities, when appropriate, to protect manatees and educate the public. While typical, conditions for projects are not limited to these measures and additional conditions may be recommended on a case by case basis.

The licensee shall comply with the following manatee protection construction conditions as specified by the FWC through permitting and licensing authorizations of regulatory agencies:

- a. Any culvert less than 8 feet or greater than 8 inches shall be covered with grates or screens with spaces less than 8 inches wide apart to prevent manatee entrapment. These grates/screens shall be maintained to prevent upland flooding.
- b. For all approved construction or expansion of 10 permanent moorings or greater, permanent manatee educational signs must be installed and maintained as per the Florida Fish and Wildlife Conservation Commission's Imperiled Species Management Section guidelines. Transitory or temporary slips may be required to include educational signs regardless of the number of moorings.
- c. For all approved construction or expansion of 30 permanent moorings or greater, a comprehensive marina manatee educational program must be implemented before completion of project construction. Such a plan shall be developed with the assistance of

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and approved by the Florida Fish and Wildlife Conservation Commission's Imperiled Species Management Section. The program shall include, at a minimum, permanent signs and kiosks, speed zone booklets, and manatee educational brochures and pamphlets. The licensee will be responsible for the cost of the signs and the printing of the pamphlets. Signs and kiosks should be installed prior to facility opening and beginning operations, be replaced in the event of fading or becoming damaged, and be ongoing for the life of the permitted docking facilities. The licensee shall request, in writing, guidance in developing and approving this marina manatee educational program by contacting: FWC/ISM, 620 South Meridian Street, 6A, Tallahassee, Florida, 32399 (850)922-4330). While this provision addresses facility construction or expansion of 30 moorings or greater, the County has the discretion to require any facility to incorporate additional educational elements if appropriate.

### **6.3.5 Law Enforcement Recommendations**

The enforcement of existing boat-related speed zones is critical for high compliance rates, which are expected to offset adverse impacts to manatees from boats. A Law Enforcement task force will be developed that is representative of all enforcement entities (federal, state, county, and municipal) with on-water manatee regulatory zone enforcement. This task force will:

- a. Conduct coordinated patrols of Broward County's waterways;
- b. Provide ongoing information on manatee/law enforcement related issues in the region, such as seasonal changes in speed zones or areas of high or increasing watercraft-related mortality;
- c. Reduce the number of watercraft related manatee mortalities through coordinated enforcement of manatee regulatory zones;
- d. Coordinate for joint marine enforcement training as it relates to enforcement of manatee regulatory zones;
- e. Coordinate for Special Marine Events as it relates to enforcement of manatee regulatory zones;
- f. Pursue streamlining the on-water citation process for law enforcement.

Law enforcement efforts to reduce speed zone non-compliance will be directed to Areas of Special Concern with the addition of a law enforcement officer dedicated full-time to these regions in conjunction with regular marine patrols from law enforcement agencies.

### **6.3.6 Manatee Monitoring Advisory Group**

The Core Group of stakeholders which aided in developing the BFSP will transition into a voluntary Manatee Monitoring Advisory Group (MMAG). Composition of the MMAG will tentatively consist of MIAF, environmental groups, Port Everglades, Ft. Lauderdale Marine Advisory Committee, Broward County Marine Advisory Board, recreational boating, law enforcement, Broward County Planning Services Division, and Broward County EPGMD.

The MMAG will establish a volunteer group of boaters and adjacent waterfront home owners to provide continual manatee awareness. The group will be organized by the MIAF members of

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the MMAG. EPGMD staff will order manatee awareness materials for distribution from organizations that publish such material (i.e. FWC, FIND).

The MMAG will have a pre-season meeting and then meet once a month during manatee season to discuss the weekly report from the law enforcement officer in the Areas of Special Concern, other marine patrol officers, manatee observer groups and to provide input to EPGMD staff.

### **6.3.7 Website**

The County will maintain a website for the purpose of providing information regarding the projects associated with the Manatee Protection Plan. The website will include, but is not limited to: past and present aerial survey results, carcass recoveries, status of regional permitting, and the availability of remaining slips.

### **6.3.8 Habitat Impacts**

Several steps are taken to identify and protect submerged aquatic vegetation (i.e., seagrass) in Broward County. The County requires seagrass and natural resource surveys to be performed by qualified consultants and submitted with applications. If an Environmental Resource License is sought, and seagrass is present in a project area, the County pursues avoidance and minimization of impact through redesign of projects, e.g. changing dock height, width, and configuration, eliminating areas of dredging or filling, etc. All of these designs are consistent with current County code, and authority and procedures described therein.<sup>[tpq19]</sup>

Seagrass mitigation does not have a good history of success, thus the lack of mitigation success lends support to the emphasis put on avoidance and minimization. This approach is consistent with current County code.<sup>[tpq20]</sup>

### **6.3.9 Water Quality**

Chapter 62-302 F.A.C gives specific language and jurisdiction regarding the preservation and anti-degradation of water quality. Monitoring and enforcement of water quality standards are the responsibility of Broward County EPGMD under Section 27-191 of the Code of Broward County. Water quality in Broward County waterways continues to improve, largely due to programs designed to reduce urban and rural runoff, correct historic municipal discharges, minimize the effects of contaminated seepage into groundwater, and aide in the passage of local ordinances. Restoration efforts began following the discovery of water quality problems in key Broward County locations in the early 1990s. Broward County initiated a dredging project to remove the contaminated sediments from areas of the North Fork New River which was completed in September 2003.

Residential, commercial, industrial and municipal land uses composed Broward's shorelines before the enactment of many current day water quality standards, but water quality has improved since their passage. For example, between July 1993 and August 1994, the Las Olas Isles, located at the eastern extent of the New River Junction, was the location of unacceptable levels of waterborne bacteria attributed mainly to the inhabited and semi-permanently moored vessels. In 1997, the City of Fort Lauderdale passed an ordinance requiring owners of habitable

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boats to have marine sanitation pump-out facilities installed and connected to docked boats. Water quality in this area has been characterized as good since that time. In November 2005, Broward County released a draft of the C-11 West Basin Pollution Reduction Action Plan reflecting the continued efforts to improve water quality.

### **6.4 Licensing, Permitting, Periodic Plan Review and Revision**

Boat facilities and dock development will comply with the licensing and permitting processes established by the federal, state, county, and city agencies as appropriate. Applicants for county licensing will follow the application requirements and standards as described in Chapter 27 Article I of the Broward County Code of Ordinances, Aquatic and Wetland Resource Protection. Broward County will allocate slips to a project according to the date of determination<sup>[tpq21]</sup> of a good faith application for an environmental resource license which, at a minimum, includes: water quality analysis, sediment and soil analysis, natural resource surveys, and proof of ownership. Following allocation of slips, the associated number of slips will be subtracted from the remaining allowable slips from the respective zone. Subsequent to determination of a good faith application, payment of any remaining fees, receipt of any other information necessary to evaluate the proposed project, including avoidance and minimization of natural resource impacts, and appropriate mitigation of any unavoidable impacts that remain, an Environmental Resource License may be issued.

The current allowable number of slips in the respective region will be available at the time of initiating the license for the applicant to better judge the possibility of getting a license for the requested number of slips. However, this value is subject to change as previously submitted applications for additional slips are licensed.

The officially authorized plan for each facility will be reviewed for compliance at the completion of construction and compared to the “as-built” drawings as required per Chapter 27, Section 27-334(h). Upon verification by EPGMD staff, any reduction of slips documented will be returned to the MPP allotment pool at this time.<sup>[tpq22]</sup>

Expansion or relocation of law enforcement marine facilities will be exempt from the Boat Facility Siting Component of the MPP<sup>[tpq23]</sup>, however will still be subject to all other required licensing requirements.

All applicants will use the Florida Fish and Wildlife Conservation Commission’s *Standard Manatee Protection Construction Conditions (2005)* and *Dock Construction Guidelines for Florida* (ACOE and NOAA) as may be amended, and may be subject to a restriction of any in-water construction work to only during the period of March through November, to reduce the possibility of injuring or killing a manatee.

Following approval by FWC, FWS, and DCA, the MPP will be adopted by reference as a stand-alone document, however, specific elements may be adopted into the Broward County Comprehensive Plan (Conservation Element), as required by State of Florida Statute. The

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Broward County Manatee Protection Plan will be routinely evaluated consistent with the County's Comprehensive Plan review cycle. Changes and amendments can be considered more frequently at the request of the Broward County Board of County Commissioners or affected parties.

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### Other County Plans

Brevard, Citrus, Martin, Miami-Dade, Palm Beach, Sarasota, St. Lucie & Volusia

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### **8.0 Manatee Protection Plan Ordinance**

#### ORDINANCE NO. 2007134

AN ORDINANCE OF THE BOARD OF COUNTY COMMISSIONERS OF BROWARD COUNTY, FLORIDA, AMENDING ARTICLE XI, AQUATIC AND WETLAND RESOURCE PROTECTION, SECTIONS 271332, 271334, AND 271337 OF THE BROWARD COUNTY CODE OF ORDINANCES, RELATING TO ADOPTION OF MANATEE PROTECTION PLAN FEES; AMENDING THE DEFINITION OF THE ENVIRONMENTAL PROTECTION DEPARTMENT; PROVIDING FOR A NEW SLIP FEE AND MANATEE MITIGATION FEE; PROVIDING FOR A MANATEE PROTECTION PLAN FUND; AMENDING TABLE REFERENCES; CREATING SECTION 271342, RELATING TO MARINE FACILITY OPERATING LICENSES; PROVIDING FOR SEVERABILITY; PROVIDING FOR INCLUSION IN THE CODE; AND PROVIDING FOR AN EFFECTIVE DATE.

(Sponsored by the Board of County Commissioners)

WHEREAS, Subsection 370.12(2)(t), Florida Statutes, requires each county identified in the Governor and Cabinet's October 1989 Policy Directive ("Policy Directive") to develop a Manatee Protection Plan ("MPP") consistent with Florida Fish & Wildlife Conservation Commission ("FWC") criteria; and

WHEREAS, Broward County is one of the counties identified in the Policy Directive;  
and

WHEREAS, Broward County has worked with stakeholders to develop a MPP that meets the requirements of the Policy Directive and has been determined by FWC to be making significant progress towards the development of a MPP; and

WHEREAS, Subsection 370.12(2)(t), Florida Statutes, requires that a Boat Facility Siting Plan be established as a component of a MPP; and

WHEREAS, FWC review criteria include establishment of adequate funding dedicated to fulfilling the MPP.

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BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS OF  
BROWARD COUNTY, FLORIDA:

Section 1. Chapter 27, Article XI, Section 27-332, "Definitions," is hereby amended  
as follows:

...

~~EDP~~ EPGMD means the Broward County Environmental Protection Department.

...

Section 2. Chapter 27, Article XI, Section 27-334, "Application requirement and  
standards," is hereby amended as follows:

...

(c) Fees:

(1) Each application shall be accompanied by a nonrefundable filing fee, as adopted  
by resolution of the ~~board~~ Board. Processing of an application will not begin until  
the appropriate fees are received by EPGMD.

(2) Pursuant to the Broward County Manatee Protection Plan ("MPP"), each  
Environmental Resource License applicant proposing one or more new boat slips  
above the historical number of slips present, except for projects at a single family  
residence as defined in the MPP, is required to pay to EPGMD a nonrefundable  
application fee of one hundred dollars (\$100.00) per new slip as partial payment  
of the total new slip fee in Table I. The application fee portion of the new slip fee  
is due at the time an application is submitted. At the time that an application is  
determined by EPGMD to be in "good faith" pursuant to the MPP, slips for the  
proposed project are allocated to the project from the pool of slips available under  
the MPP. A nonrefundable payment of the current fiscal year's total new slip fee,  
less any application fee already paid pursuant to this Subsection, is due and must

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be received by EPGMD after the completion of the application process and prior to issuance of the Environmental Resource License. If an application denial becomes final without legal challenge, or a denial is upheld as the end result of any legal challenge, the slips allocated to the proposed project from those available pursuant to the MPP shall return to the pool of slips. Additionally, starting in Fiscal Year 2009 (on October 1, 2008) and in accordance with Section 27-342, each multi-slip facility with five (5) or more slips shall also pay to EPGMD an annual manatee mitigation fee in accordance with Table I on or before the anniversary date of the issuance of the facility's Marine Facility Operating License.

TABLE I  
MANATEE PROTECTION PLAN FEES

TABLE INSET:

| <u>Fiscal Year</u> | <u>New-Slip Fee</u><br><u>per proposed slip</u> | <u>Manatee Mitigation Fee</u><br><u>per each existing slip</u> |
|--------------------|---|--|
| <u>2008</u>        | <u>\$400.00</u>                                 | <u>\$0.00</u>  |
| <u>2009</u>        | <u>\$416.00</u>                                 | <u>\$20.00</u>   |
| <u>2010</u>        | <u>\$432.64</u>                                 | <u>\$20.80</u>   |
| <u>2011</u>        | <u>\$449.95</u>                                 | <u>\$21.63</u>   |
| <u>2012</u>        | <u>\$467.94</u>                                 | <u>\$22.50</u>   |
| <u>2013</u>        | <u>\$486.66</u>                                 | <u>\$23.40</u>   |
| <u>2014</u>        | <u>\$506.13</u>                                 | <u>\$24.33</u>   |
| <u>2015</u>        | <u>\$526.38</u>                                 | <u>\$25.31</u>   |
| <u>2016</u>        | <u>\$547.44</u>                                 | <u>\$26.32</u>   |
| <u>2017</u>        | <u>\$569.34</u>                                 | <u>\$27.37</u>   |

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New slip fees and manatee mitigation fees not specifically listed in Table I shall continue to increase at a rate of four percent (4%) per year. There is created a Manatee Protection Plan Fund ("MPP Fund"), which is to be supervised and utilized by the County to expend monies to meet its obligations under the MPP. The MPP Fund shall consist of all monies collected as new slip fees and manatee mitigation fees received pursuant to this Subsection, in addition to any other monies as may be authorized to be deposited or transferred into the MPP Fund by resolution of the Board or as otherwise established by County ordinance.

...

Section 3. Chapter 27, Article I, Section 27-337, "Criteria for issuance or denial of an environmental resource license," is hereby amended as follows:

...

(d) *Mitigation Functional Assessment Methods.*

...

### TABLE I. II BASE REPLACEMENT RATIOS FOR MITIGATION

...

d. EPGMD shall evaluate wetland quality in accordance with Table H III, Wetland Benefit Index. The ~~board~~ Board requires and delegates the authority for EPGMD to develop a standard operating procedure for the Wetlands Benefit Index. The standard operating procedure shall be based upon commonly accepted scientific criteria and methodology and used by EPGMD to evaluate the categories of Table H III.

### TABLE H III

#### WETLAND BENEFIT INDEX

...

Section 4. Section 27-342 is hereby created to read as follows:

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### Section 27[342. Marine Facility Operating Licenses.

Pursuant to the MPP, a Marine Facility Operating License is hereby established. Each existing, new, or reconstructed multi[slip facility with five (5) or more slips located in coastal waters as defined in the MPP is required to apply for and obtain a Marine Facility Operating License and pay the manatee mitigation fee required in Subsection 27[334(c)(2) prior to operation of the facility. Applications must be made on forms approved by EPGMD. Existing facilities must apply for a Marine Facility Operating License on or before October 1, 2008. A Marine Facility Operating License is valid for one (1) year and must be renewed annually prior to expiration. Renewal of a Marine Facility Operating License requires payment of the manatee mitigation fee applicable during the current fiscal year as established in Subsection 27[334(c)(2).

### Section 5. SEVERABILITY.

If any portion of this Ordinance is determined by any Court to be invalid, the invalid portion shall be stricken, and such striking shall not affect the validity of the remainder of this Ordinance. If any Court determines that this Ordinance, or any portion hereof, cannot be legally applied to any individual(s), group(s), entity(ies), property(ies), or circumstance(s), such determination shall not affect the applicability hereof to any other individual, group, entity, property, or circumstance.

### Section 6. INCLUSION IN CODE.

It is the intention of the Board of County Commissioners that the provisions of this Ordinance shall become and be made a part of the Broward County Code; and that the sections of this Ordinance may be renumbered or re lettered and the word "ordinance" may be changed to "section," "article," or such other appropriate word or phrase in order to accomplish such intentions.

### Section 7. EFFECTIVE DATE.

This Ordinance shall become effective as provided by law.

ENACTED November 27, 2007

## CONSERVATION ELEMENT

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FILED WITH THE DEPARTMENT OF STATE December 6, 2007

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EFFECTIVE December 6, 2007

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## V. APPENDICES

# CONSERVATION ELEMENT

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## CONSERVATION ELEMENT

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### Appendix 13-A-1 Manatee Mortality By Month From 1974 to ~~2005~~ 2006 In Broward County, Florida

|           |                         |
|-----------|-------------------------|
| January   | <u>32</u> <del>25</del> |
| February  | <u>37</u> <del>30</del> |
| March     | <u>19</u> <del>18</del> |
| April     | <u>13</u> <del>12</del> |
| May       | <u>9</u> <del>10</del>  |
| June      | 9                       |
| July      | <u>12</u> <del>12</del> |
| August    | <u>8</u> <del>7</del>   |
| September | 3                       |
| October   | 8                       |
| November  | <u>12</u> <del>10</del> |
| December  | <u>12</u> <del>10</del> |

**Source:** Florida Fish and Wildlife Conservation Committee, ~~2005~~ 2006

## CONSERVATION ELEMENT

### Appendix 13-B-1 Causes of Manatee Deaths by Year from 1974 to October ~~2005~~ 2006 in Broward County, Florida

|                    | WATER<br>CRAFT | FLOOD<br>GATE | OTHER<br>HUMAN | PERI-<br>NATAL | OTHER<br>NATURAL | UNDETER-<br>MINED | TOTAL      |
|--------------------|----------------|---------------|----------------|----------------|------------------|-------------------|------------|
| 1974<br>to<br>1990 | 23             | 3             | 4              | 7              | 4                | 16                | 57         |
| 1991               | 2              | 1             | 0              | 0              | 0                | 0                 | 3          |
| 1992               | 2              | 0             | 0              | 5              | 0                | 2                 | 9          |
| 1993               | 2              | 0             | 0              | 1              | 0                | 1                 | 4          |
| 1994               | 3              | 0             | 0              | 1              | 0                | 0                 | 4          |
| 1995               | 0              | 1             | 0              | 4              | 0                | 0                 | 5          |
| 1996               | 1              | 0             | 0              | 2              | 1                | 2                 | 6          |
| 1997               | 0              | 0             | 0              | 1              | 0                | 2                 | 3          |
| 1998               | 2              | 1             | 0              | 2              | 0                | 2                 | 7          |
| 1999               | 5              | 0             | 0              | 4              | 1                | 5                 | 15         |
| 2000               | 2              | 0             | 0              | 1              | 0                | 1                 | 4          |
| 2001               | 4              | 0             | 0              | 3              | 1                | 1                 | 9          |
| 2002               | 3              | 0             | 1              | 1              | 1                | 4                 | 10         |
| 2003               | 5              | 0             | 1              | 1              | 0                | 1                 | 8          |
| 2004               | 1              | 1             | 0              | 1              | 1                | 2                 | 6          |
| 2005               | <u>2</u>       | 0             | 0              | 1              | <u>2</u>         | <u>4</u>          | <u>9</u>   |
| <u>2006</u>        | <u>6</u>       | <u>0</u>      | <u>1</u>       | <u>1</u>       | <u>3</u>         | <u>4</u>          | <u>15</u>  |
| <b>Totals</b>      | <u>63</u>      | 7             | <u>7</u>       | <u>36</u>      | <u>14</u>        | <u>47</u>         | <u>174</u> |
| % of<br>Totals     | 36%            | 4 %           | 4%             | <u>21%</u>     | <u>8%</u>        | <u>27%</u>        | 100%       |

VNR  Verified, Not Recovered

**Source:** Florida Fish and Wildlife Conservation Commission, 2005

## CONSERVATION ELEMENT

### Appendix 13-C-1 Existing Berth Inventory, Port Everglades, Broward County, Florida

| BERTH            | LENGTH   | DEPTH | USAGE  |
|------------------|----------|-------|--|
| <b>NORTHPORT</b> |          |       |  |
| 1A               | 180'     | 11'   | LAY IN   |
| 1B               | 220'     | 17'   | LAY IN   |
| 1, 2, 3          | 534' ea. | 29'   | CRUISE, LO/LO, CARGO                               |
| 4                | 900'     | 42'   | CRUISE, LO/LO, CARGO, RO/RO                        |
| 4A               | 290'     | 42'   | OIL SPILL DRILLS                                   |
| 5                | 900'     | 42'   | PETROLEUM, RO/RO, LO/LO, BULK CARGO                |
| 6                | 380'     | 33'   | RO/RO, LO/LO                                       |
| 7, 8             | 600' ea. | 38'   | PETROLEUM  |
| 8A               | 290'     | 38'   | MISC.  |
| 9, 10            | 600' ea. | 38'   | PETROLEUM  |
| 11               | 500'     | 32'   | PROPANE, LAY IN, MISC.                             |
| 12, 13           | 613' ea. | 37.5' | PETROLEUM  |
| 13A              | 290'     | 25'   | INTAKE FOR FPL                                     |
| 14, 15           | 613' ea. | 37.5' | CEMENT   |
| <b>MIDPORT</b>   |          |       |  |
| 16, 17           | 549'     | 36'   | RO/RO, LO/LO, MISC. CARGO                          |
| 18               | 549'     | 36'   | CRUISE, LO/LO, RO/RO, LO/LO, MISC. CARGO           |
| 19               | 650'     | 36'   | CRUISE, LO/LO, RO/RO, MISC. CARGO                  |
| 20               | 650'     | 36'   | CRUISE, LO/LO, MISC. CARGO                         |
| 21               | 738'     | 36'   | CRUISE, RO/RO, LAY IN, NAVY, YACHT CARRIERS        |
| 22               | 738'     | 36'   | CRUISE, NAVY, LAY IN                               |
| 23               | 186'     | 36'   | USCG (COAST GUARD)                                 |
| 24               | 685'     | 38.3' | LAY IN, NAVY, CRUISE                               |
| 25               | 685'     | 40'   | CRUISE, LO/LO, NAVY, LAY IN, CARGO, YACHT CARRIERS |
| 26, 27           | 669' ea. | 39'   | CRUISE, LO/LO, NAVY, LAY IN, CARGO, YACHT CARRIERS |
| 28A              | 480'     | 25'   | SEABULK TUGS                                       |
| 28B              | 275'     | 25'   | MISC.  |
| 28C & D          | 350'     | 25'   | MCCALLISTER TUGS                                   |
| 28E              | 275'     | 25'   | GRADY MARINE'S TUG EQUIPMENT                       |
| 28F              | 400'     | 22'   | CARGO, LO/LO, RO/RO                                |

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|                  |       |     |   |
|------------------|-------|-----|---|
| 29               | 800'  | 40' | CRUISE, LO/LO, CARGO, YACHT CARRIERS,<br>LAY-IN |
| <b>SOUTHPORT</b> |       |     |   |
| 30               | 900'  | 44' | LO/LO, YACHT CARRIERS                           |
| 31               | 1000' | 44' | LO/LO, YACHT CARRIERS                           |
| 32               | 1000' | 44' | LO/LO   |
| 33A              | 800'  | 44' | RO/RO, LO/LO                                    |
| 33B, C           | 400'  | 44' | RO/RO   |

— **Source:** Port Everglades Department, 2006

CONSERVATION ELEMENT

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**Appendix 13-DC-1**

**Trends in Manatee Mortality from 1974 Through 2006 ~~2005~~ in Broward County, Florida**

1974 to 1991

|                 | <b>WATER<br/>CRAFT</b> | <b>FLOOD<br/>GATE</b> | <b>OTHER<br/>HUMAN</b> | <b>PERI-<br/>NATAL</b> | <b>OTHER<br/>NATURAL</b> | <b>UNDETER-<br/>MINED</b> | <b>TOTAL</b> |
|-----------------|------------------------|-----------------------|------------------------|------------------------|--------------------------|---------------------------|--------------|
| 1974<br>to 1991 | 25                     | 4                     | 4                      | 7                      | 4                        | 16                        | 60           |
| % of<br>Totals  | 41%                    | 7%                    | 7%                     | 12%                    | 7%                       | 26%                       | 100%         |

1974 to ~~2000~~ 2006

|                        | <b>WATER<br/>CRAFT</b>     | <b>FLOOD<br/>GATE</b>      | <b>OTHER<br/>HUMAN</b>     | <b>PERI-<br/>NATAL</b>       | <b>OTHER<br/>NATURAL</b>   | <b>UNDETER-<br/>MINED</b>  | <b>TOTAL</b>                 |
|------------------------|----------------------------|----------------------------|----------------------------|------------------------------|----------------------------|----------------------------|------------------------------|
| 1974 to<br><u>2006</u> | <u>63</u><br><del>42</del> | <u>7</u><br><del>6</del>   | <u>7</u><br><del>4</del>   | <u>36</u><br><del>28</del>   | <u>14</u><br><del>6</del>  | <u>47</u><br><del>31</del> | <u>174</u><br><del>117</del> |
| % of<br>Totals         | 36%                        | <u>4%</u><br><del>5%</del> | <u>4%</u><br><del>3%</del> | <u>21%</u><br><del>24%</del> | <u>8%</u><br><del>5%</del> | 27%                        | 100%                         |

1992 to ~~2005~~ 2006

|                        | <b>WATER<br/>CRAFT</b>       | <b>FLOOD<br/>GATE</b>    | <b>OTHER<br/>HUMAN</b>     | <b>PERI-<br/>NATAL</b>       | <b>OTHER<br/>NATURAL</b>   | <b>UNDETER-<br/>MINED</b>  | <b>TOTAL</b>                |
|------------------------|------------------------------|--------------------------|----------------------------|------------------------------|----------------------------|----------------------------|-----------------------------|
| 1992 to<br><u>2006</u> | <u>38</u><br><del>31</del>   | <u>3</u><br><del>3</del> | <u>3</u><br><del>2</del>   | <u>29</u><br><del>28</del>   | <u>10</u><br><del>6</del>  | <u>31</u><br><del>26</del> | <u>114</u><br><del>96</del> |
| % of<br>Totals         | <u>33%</u><br><del>32%</del> | 3%                       | <u>3%</u><br><del>2%</del> | <u>25%</u><br><del>30%</del> | <u>9%</u><br><del>6%</del> | 27%                        | 100%                        |

**Source:** Florida Fish and Wildlife Conservation Commission, 2007 ~~2005~~

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**Appendix 13-ED-1  
Public Boat Ramps in  
Broward County, Florida**

| <b>Name and Location</b>  | <b>Boat Ramps</b> | <b>Parking Spaces</b>  |
|---|-------------------|--|
| George English Park<br>1101 Bay View Dr. (Sunrise Blvd. and Bay View Dr.) Fort Lauderdale | 4                 | 24 single cars; 30 truck/trailers                                  |
| Cherry Creek Ramp<br>2950 N.E. 12th Terr. Oakland Park                                    | 1                 | 2 single cars; 3 trucks/trailers                                   |
| Colohatchee Park<br>1975 N.E. 15th Ave.<br>Wilton Manors                                  | 1                 | 8 single cars; 7 trucks/trailers; 25 single cars across the street |
| Cooley's Landing<br>450 S.W. Seventh Ave. (at New River Bridge)<br>Fort Lauderdale        | 6                 | 22 single cars; 18 trucks/trailers                                 |
| Southeast 15th Street Boat Ramp<br>1784 S.E. 15th St. Fort Lauderdale                     | 1                 | 58   |
| Harbour Town Marina<br>851 N.E. 3 Street Dania Beach                                      | 2                 | 73   |
| Hollywood Rotary Park<br>3100 Taft Street<br>Hollywood                                    |                   | No Trailer Parking   |
| Pioneer Park<br>425 N.E. Third St. Deerfield Beach  | 2                 | 12   |
| Alsdorf Park<br>N.E. 14th St. Cswy. and Intracoastal Waterway Pompano Beach               | 3                 | 80 single cars; 84 truck/trailers                                  |
| Riverland Woods Park<br>4000 Riverland Road Fort Lauderdale                               |                   | 9  |
| Griffin Marine Park<br>S.W. 30th Avenue and Dania Cut-off Canal<br>Dania Beach            |                   | 10   |
| John U. Lloyd State Park Boat Ramp<br>A1A north of Dania Beach Blvd.                      | 2                 | 74   |
| Hollywood Marina<br>700 Polk Street Hollywood   | 4                 | 37   |
| S.S. Holland Park<br>Johnson Street & N. 9th Avenue Hollywood                             | 3                 | 56   |

CONSERVATION ELEMENT

**Appendix 13-F-1  
Broward County's Enhanced Law Enforcement Grant Summary, 1994 to Present**

| Year         | Number of Agencies   | Budget                | Actual Funding        | Patrol Hours (Day, OUI, etc.) | Education/Information and Equipment | Patrol Equipment/Facilities |
|--------------|--|-----------------------|-----------------------|-------------------------------|-------------------------------------|-----------------------------|
| 1994/1995    | 9<br>2 <input type="checkbox"/> Non-Patrol<br>7 <input type="checkbox"/> Patrol Agencies   | \$369,699.00          | \$321,279.00          | 1,125                         | \$31,075.00                         | \$264,326.00                |
| 1995/1996    | 9<br>2 <input type="checkbox"/> Non-Patrol<br>7 <input type="checkbox"/> Patrol Agencies   | \$365,227.00          | \$370,300.00          | 10,049                        | \$0.00                              | \$25,420.00                 |
| 1996/1997    | 11<br>1 <input type="checkbox"/> Non-Patrol<br>10 <input type="checkbox"/> Patrol Agencies | \$719,040.00          | \$698,368.00          | 11,027                        | \$36,500.00                         | \$123,387.00                |
| 1997/1998    | 10<br>1 <input type="checkbox"/> Non-Patrol<br>9 <input type="checkbox"/> Patrol Agencies  | \$428,010.00          | \$402,520.00          | 11,025                        | \$40,000.00                         | \$13,500.00                 |
| 1998/1999    | 13<br>3 <input type="checkbox"/> Non-Patrol<br>10 <input type="checkbox"/> Patrol Agencies | \$757,344.00          | \$569,111.00          | 11,631                        | \$51,390.00                         | \$130,279.00                |
| 1999/2000    | 11<br>2 <input type="checkbox"/> Non-Patrol<br>9 <input type="checkbox"/> Patrol Agencies  | \$560,000.00          | \$559,343.00          | 12,777                        | \$45,612.00                         | \$25,697.00                 |
| 2000/2001    | 10<br>2 <input type="checkbox"/> Non-Patrol<br>8 <input type="checkbox"/> Patrol Agencies  | \$711,638.00          | \$711,638.00          | 13,069                        | \$129,447.00                        | \$123,367.00                |
| <b>Total</b> | N/A  | <b>\$3,910,958.00</b> | <b>\$3,632,559.00</b> | <b>70,703</b>                 | <b>\$334,024.00</b>                 | <b>\$705,976.00</b>         |

(94/95 and 95/96) Annual/cyclical funding was combined to provide enough seed monies to start the program:  
 (98/99) — \$400,000 (Revenue and Forecast) + \$357,344 (Reserves)  
 (99/00) — \$400,000 (Revenue and Forecast) + \$160,000 (Reserves)  
 (00/01) — \$440,000 (Revenue and Forecast) + \$271,638 (Reserves)

**Source:** Broward County Planning Services Division, 2001

## CONSERVATION ELEMENT

### Appendix 13-G-1

**Maximum Number of Manatees Sighted During Aerial Surveys at Port Everglades and  
Lauderdale  
Florida Power and Light Power Plants During the Last 27 Manatee Seasons in Broward County,  
Florida**

| SURVEY<br>YEAR | PORT EVERGLADES<br>POWER PLANT | LAUDERDALE<br>POWER PLANT |
|----------------|--------------------------------|---------------------------|
| 1977-78        | 114                            | 36                        |
| 1978-79        | 125                            | 27                        |
| 1979-80        | 86                             | 36                        |
| 1980-81        | 110                            | 52                        |
| 1981-82        | 57                             | 19                        |
| 1982-83        | 56                             | 16                        |
| 1983-84        | 35                             | 11                        |
| 1984-85        | 234                            | 29                        |
| 1985-86        | 185                            | 30                        |
| 1986-87        | 182                            | 16                        |
| 1987-88        | 276                            | 20                        |
| 1988-89        | 173                            | 6                         |
| 1989-90        | 227                            | 23                        |
| 1990-91        | 73                             | 8                         |
| 1991-92        | 212                            | 7                         |
| 1992-93        | 70                             | 0                         |
| 1993-94        | 224                            | 14                        |
| 1994-95        | 207                            | 41                        |
| 1995-96        | 123                            | 66                        |
| 1996-97        | 60                             | 35                        |
| 1997-98        | 183                            | 37                        |
| 1998-99        | 60                             | 18                        |
| 1999-00        | 134                            | 124                       |
| 2000-01        |                                |                           |
| 2001-02        |                                |                           |
| 2002-03        | 265                            | 173                       |

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| <b>SURVEY<br/>YEAR</b> | <b>PORT EVERGLADES<br/>POWER PLANT</b> | <b>LAUDERDALE<br/>POWER PLANT</b> |
|------------------------|--|-----------------------------------|
| <u>2003</u> -04        | 155                                    | 64                                |
| <u>2004</u> -05        |  |                                   |
| <u>2005</u> -06        |  |                                   |

**Source:** ~~Distribution and Abundance of the West Indian Manatee (*Trichechus manatus*) Around Selected Florida Power Plants Following Winter Cold Front. John E. Reynolds, III. (Surveys conducted annually.)~~

————— Table prepared by the Broward County Planning Services Division, 2006

**CONSERVATION ELEMENT**

**Appendix 13-H-1**

**Existing Marina/Boat Facilities in Broward County, Florida**

| <b>FACILITY</b>                             | <b>ADDRESS</b>          | <b>CITY</b> | <b>PRIMARY</b>             |
|---|-------------------------|-------------|----------------------------|
| 1st Performance Marine                      | 1900 SE 15th street     | FL          | Boatyard                   |
| Allied Richard Bertram Marine               | 401 SW 1st Avenue       | FL          | Sales/ Service             |
| Allied Richard Bertram Marine Group         | 1455 SE 16 St           | FL          | Marina                     |
| American Off Shore Marina                   | 1451 Old Griffin Rd     | DB          | Marina                     |
| Aqua Toy Store fka The Collection           | 800 S. Federal Hwy      | PB          | Marina/Retail              |
| Artmarine Inc.                              | 3100 W STATE ROAD<br>84 | FL          | Marina                     |
| Associated Marine Technologies,             | 490 Taylor Lane         | DB          | Marine Repair              |
| Atlantic Village Marina                     | 1541 Griffin Rd         | DB          | Marina                     |
| Bahia Mar Yachting Center                   | 801 Seabreeze Blvd      | FL          | Dockage                    |
| Banyan Bay Marina                           | 4491 Anglers Ave        | DB          | Marina                     |
| Best Western Marina Inn & Yacht harbor      | 2150 SE 17 St Cswy      | FL          | Marina/Hotel/Resturant     |
| Billfish Marina                             | 2955 W State Rd 84      | FL          | Marina                     |
| Boat House                                  | □16 St                  | FL          | Marina                     |
| Bonnie's Ravenswood Marina                  | 4470 Ravenswood Rd      | DB          | Boatyard                   |
| Bradford Marine, Inc.                       | 3051 W State Rd 84      | FL          | Marine Repair              |
| Broward Yachts, Inc. (dba: Brow-<br>Marine) | 750 NE 7 Avenue         | DB          | Boat Sales                 |
| Cable Marine Inc. East Yard                 | 1517 SE 16 Street       | FL          | Boatyard                   |
| Cable Marine Inc. West Yard                 | 2491 W State Rd 84      | FL          | Marina/Marine Repair       |
| City of Ft Lauderdale □Cooley's<br>Landing  | 450 SW 7th AVE          | FL          | Marina                     |
| City of Ft Lauderdale □Las Olas Marina      | 240 E. Las Olas Circle  | FL          | Marina/Public<br>Anchorage |
| City of Ft Lauderdale □New River            | 2 SE New River Dr       | FL          | Marina/Public              |
| Coral Ridge Yacht Club                      | 2800 Yacht Club Blvd    | FL          | Yacht Club                 |
| Cove Marina                                 | 1755 SE 3RD CT          | DF          | Marina                     |
| Cozy Cove Marina                            | 300 N Federal Hwy       | DB          | Marina                     |
| Dania Beach Boat Club                       | 90 N. Bryan Road        | DB          | storage                    |
| Derecktor of Florida                        | 775 Taylor Ln           | DB          | Marina                     |
| Diplomat Resort                             | 3555 S Ocean Dr         | HW          | Marina/Hotel               |
| Doubletree Galleria Hotel                   | 2670 E Sunrise          | FL          | Marina/Hotel               |
| Dry Marinas                                 | Port Everglades         | HW          | Marina/Storage             |
| Dusky Marine, Inc                           | 110 N Bryan Rd          | DB          | Marine Services            |
| Fort Lauderdale Marine Enforcement<br>Unit  | 1784 S.E. 15 Street     | FL          | Enforcement                |
| Four Points Yacht & Ship Brokers            | 4419 W Tradewinds Ave   | FL          | Boat Sales                 |
| Freedom Marina                              | 790 NW 1 Ave            | DF          | Marina                     |
| Hall of Fame Marina □A Westree Marina       | 435 Seabreeze Blvd      | FL          | Marina                     |
| Harbor 1 Marina                             | 1495 Old Griffin Road   | DB          | Marina                     |

## CONSERVATION ELEMENT

| <b>FACILITY</b>                          | <b>ADDRESS</b>            | <b>CITY</b> | <b>PRIMARY</b>          |
|--|---------------------------|-------------|-------------------------|
| Harbor Beach Surf Club                   | 1702 Cordova Road         | FL          | Marina                  |
| Harbor Islands Marina                    | 1050 Marina Dr            | HW          | Marina                  |
| Harbour Towne Marina/A Westree Marina    | 801 NE 3 St               | DB          | Marina                  |
| Hidden Harbor Marina                     | 2315 NE 15 Street         | PB          | Marina/Storage          |
| Hideaway Marina                          | 599 S. Federal Hwy        | PB          | Marina                  |
| Hillsboro Inlet Marina Fishing           | 2629 N RIVERSIDE DR       | PB          | Marina/Public Access    |
| Holiday Inn Pompano Beach                | 1350 S Ocean Blvd         | PB          | Marina/Hotel            |
| Hollywood Marina                         | 700 Polk ST               | HW          | Marina                  |
| Hyatt Regency Pier 66 Resort and Marina  | 2301 SE 17 St             | FL          | Marina/Hotel/Resturant  |
| InterMarine fka J & J Mrna or USA Marina | 4550 Anglers Ave.         | FL          | Marina                  |
| J Woods Marine Group                     | 808 NE 20 Ave             | FL          | Boat Sales              |
| Jackson Marine Sales, Inc                | 1915 SW 21 Ave            | FL          | Marina                  |
| Lauderdale Marina inc                    | 1900 SE 15 St             | FL          | Marina                  |
| Lauderdale Marine Center                 | 2001 SW 20 St             | FL          | Boatyard                |
| Lauderdale Small Boat Club               | 1740 SW 42 St             | FL          | Marina                  |
| Lauderdale Yacht Club                    | 1725 SE 12 St             | FL          | Marina/Yacht            |
| Le Club Marina International             | 2900 NE 9 St              | FL          | Marina/Private          |
| Legacy Fisherman aka Dania Boat Yard     | 10 Bryan Road             | DB          | Sales                   |
| Lighthouse Point Marina Inc              | 2831 Marina Circle        | LP          | Marina                  |
| Lighthouse Point Yacht & Racquet Club    | 2701 NE 42 St             | LP          | Yacht Club              |
| LMC East Yard                            | 1601 SW 20th Street       | FL          | Marina                  |
| Lou's Tackle & Marina                    | 3463 Griffin Rd           | DB          | Marina/Storage          |
| Marina at Marina Bay                     | 2525 Marina Bay Dr. West  | FL          | Marina                  |
| Marina Mar of Fort Lauderdale            | 3100 E Oakland Park Blvd  | FL          | Marina                  |
| Marina Mile Shipyard, Inc                | 2698 SW 23 Ave            | FL          | Yacht Brokerage         |
| Marina One, Inc.                         | 609 N Federal Hwy         | DF          | Marina                  |
| Marine Unlimited                         | 232 Basin Drive           | LBTS        | Yacht Sales             |
| MarineMax                                | 700 South Federal Highway | PB          | Sales                   |
| Marriott Portside Marina                 | 1875 SE 17 St             | FL          | Marina/Hotel/Resturant  |
| Mega Marine Yacht Services, Inc.         | 750 NE 7 Ave              | DB          | Boatyard                |
| Midriver Marine                          | 413 SW 3rd Avenue         | FL          | service                 |
| New River Boating Center                 | 3000 West State Road 84   | FL          | Marina                  |
| New River Marina                         | 3001 SR 84                | FL          | Marina/Marine Repair    |
| Northeast Trailer Park & Marina          | 4500 Ravenswood Rd        | DB          | Marina                  |
| Nova Oceanographic                       | 8000 N Ocean Dr           | DB          | Marina/Institute        |
| Pennell Marina                           | 418 NE River Dr           | DF          | Marina                  |
| Pier 17 fka Summerfield                  | 1500 SW 17th Street       | FL          | Marina                  |
| Playboy Marine Ctr                       | 760 TAYLOR RD             | DB          | Marina                  |
| Pompano Beach Marine Center              | 701 S Federal Hwy         | PB          | Sales, 60-150 land strg |

## CONSERVATION ELEMENT

| <b>FACILITY</b>                     | <b>ADDRESS</b>        | <b>CITY</b> | <b>PRIMARY</b>             |
|-------------------------------------|-----------------------|-------------|----------------------------|
| Port Condominiums                   | 1801 SE 17 St         | FL          | Marina/Storage             |
| Ramgoh Marina                       | 4500 S STATE ROAD 7   | FL          | Boatyard                   |
| River Bend Marina                   | 1515 SW 20 St         | FL          | Marina/Marine Repair       |
| Riverfront Marina                   | 420 SW 3 AVE          | FL          | Marina/Storage             |
| Rolly Marine                        | 2551 W State Road 84  | FL          | Boatyard                   |
| Roscioli Yacht Center               | 3201 W STATE ROAD 84  | FL          | Boatyard                   |
| Royale Palm Yacht Basin, Inc.       | 629 NE 3 St           | DB          | Yacht Club                 |
| Sandpiper Resort Apartment & Marina | 91 Isle Of Venice Dr  | FL          | Dockside/Restaurant        |
| Sands Harbor Hotel & Marina         | 125 N Riverside Dr    | PB          | Dockside/Restaurant        |
| SeaTech                             | 101 N Beach Rd        | DB          | Marina University          |
| Seven Seas Yacht Sales              | 1500 W. Broward Blvd. | FL          | Sales/ Service             |
| Sun Dream Yacht Charters            | 852 NE 20 Ave         | FL          |                            |
| Sundance Ft. Lauderdale             | 1335 SW 16 Street     | FL          | Sales/ Service/<br>Dockage |
| Sunrise Harbor Megayacht Marina     | 1030 Seminole Dr      | FL          | Marina                     |
| Sunseeker                           | 750 S. Federal Hwy    | PB          | Yacht Sales                |
| Taha Marina                         | 3109 E. Atlantic Blvd | PB          | Marina                     |
| Thunderboat Marina                  | 2051 Griffin Rd       | DB          | Marina/Storage             |
| US Coast Guard                      | 7000 N. Ocean Drive   | DB          |                            |
| Westport Yacht Sales                | 2957 SR 84            | FL          | Yacht Sales                |

## CONSERVATION ELEMENT

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### **Appendix 13-I-1**

#### **List of Best Management Practices Documents and Manatee Protection and Boater Safety Guideline Documents Presently in Use in Broward County, Florida**

~~“Attention: Swimmers, Boaters, Divers, Guidelines for Protecting Manatees,” Florida Power & Light Company, 1994.~~

~~“Best Management Practices for Marine Facilities,” Broward County Department of Planning and Environmental Protection, August 1, 1999.~~

~~“Broward County Boating Safety and Manatee Protection Zones,” Florida Inland Navigation District, September, 2000.~~

~~“Broward Safe Boating Guide, 2001-2002,” Marine Industries Association of South Florida.~~

~~“Clean Boating Habits,” a handbook associated with Florida’s Clean Marina Program, Florida Department of Environmental Protection.~~

~~“Commonly Asked Questions About: Manatees, Manatee Protection Rules, The Manatee Program and Funding Sources, Florida Fish and Wildlife Conservation Commission, May, 2001.~~

~~“Manatee Anatomy Facts,” Florida Fish and Wildlife Conservation Commission, February, 2002.~~

~~“Manatees, Miss Her Now or Miss Her Forever, A Guide for Boating, Diving and Snorkeling Around Manatees,” Florida Fish and Wildlife Conservation Commission, February, 2002.~~

~~“Manatees, Florida’s Gentle Giants, A Coloring and Activity Book,” Florida Fish and Wildlife Conservation Commission.~~

~~“SeaStats, Manatees, Florida’s Gentle Giants,” Florida Fish and Wildlife Conservation Commission, April, 2000.~~

~~“South Florida Boater’s Guide to Manatee Protection,” Marine Industries Association of South Florida, funded by a grant from the BoatU.S. Foundation.~~

~~“Standard Manatee Protection Construction Conditions,” Florida Fish and Wildlife Conservation Commission, March 1996 as amended.~~

~~“Standard Manatee Protection Construction Conditions for Aquatic Related Activities,” U.S. Army Corps of Engineers.~~

## CONSERVATION ELEMENT

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~~“The Florida Manatee,” Florida Power & Light Company, 1989 Revised 2001.~~

~~“With Respect for Nature, Port Everglades Manatee Awareness and Other Environmental Programs,” Broward County Port Everglades Department.~~

~~**Source:** List Prepared by Broward County Planning Services Division, 2003.~~

**Attachment K**  
**MANATEE PROTECTION PLAN GUIDELINES**

Area-specific manatee protection plans need to be developed by all counties in which manatees regularly occur to ensure the long-range protection of the species and its habitat. The objective of manatee protection plans are: to reduce the number of boat-related manatee mortalities; to achieve an optimal sustainable manatee population (the goal of the Marine Mammal Protection Act); to protect manatee habitat; to promote boating safety; and to increase public awareness of the need to protect manatees and their environment. These plans will address manatee-human interactions, land use (including boat facility siting), and the protection of suitable habitat (including water quality, thermal refugia, freshwater sources, and grass beds). The information needed to prepare manatee protection plans will include manatee studies, habitat assessments, and, if available, boating studies to evaluate boater use patterns and activities.

Boat facility siting elements are necessary components of area-specific manatee protection plans. Boat facility siting must address marinas with wet slips and dry storage, and boat ramps. The objectives of boat facility siting plans are: to determine appropriate dock densities for particular areas; and to develop criteria for designating special use areas (i.e.; for water skiing, jet skiing, and commercial fishing).

Necessary components of a manatee protection plan are:

An Information Base

- a. location and capacity of all marina facilities (including dry storage) in the county (proposed and existing);
- b. location of all boat ramps in the county (proposed and existing);
- c. boating activity patterns, including travel routes and major destination areas;
- d. manatee sighting information for the county;
- e. manatee mortality for the county;
- f. any aquatic preserves; Outstanding Florida Waters or other refuge/reserve information;
- g. port facility information;
- h. location of significant habitat resources, such as grass beds, warm water discharges and fresh water sources;
- i. location of manatee protection and boating safety speed zones in the county (proposed and existing);
- j. location of manatee information displays; and
- k. other relevant data as determined by the Department of Natural Resources.

## CONSERVATION ELEMENT

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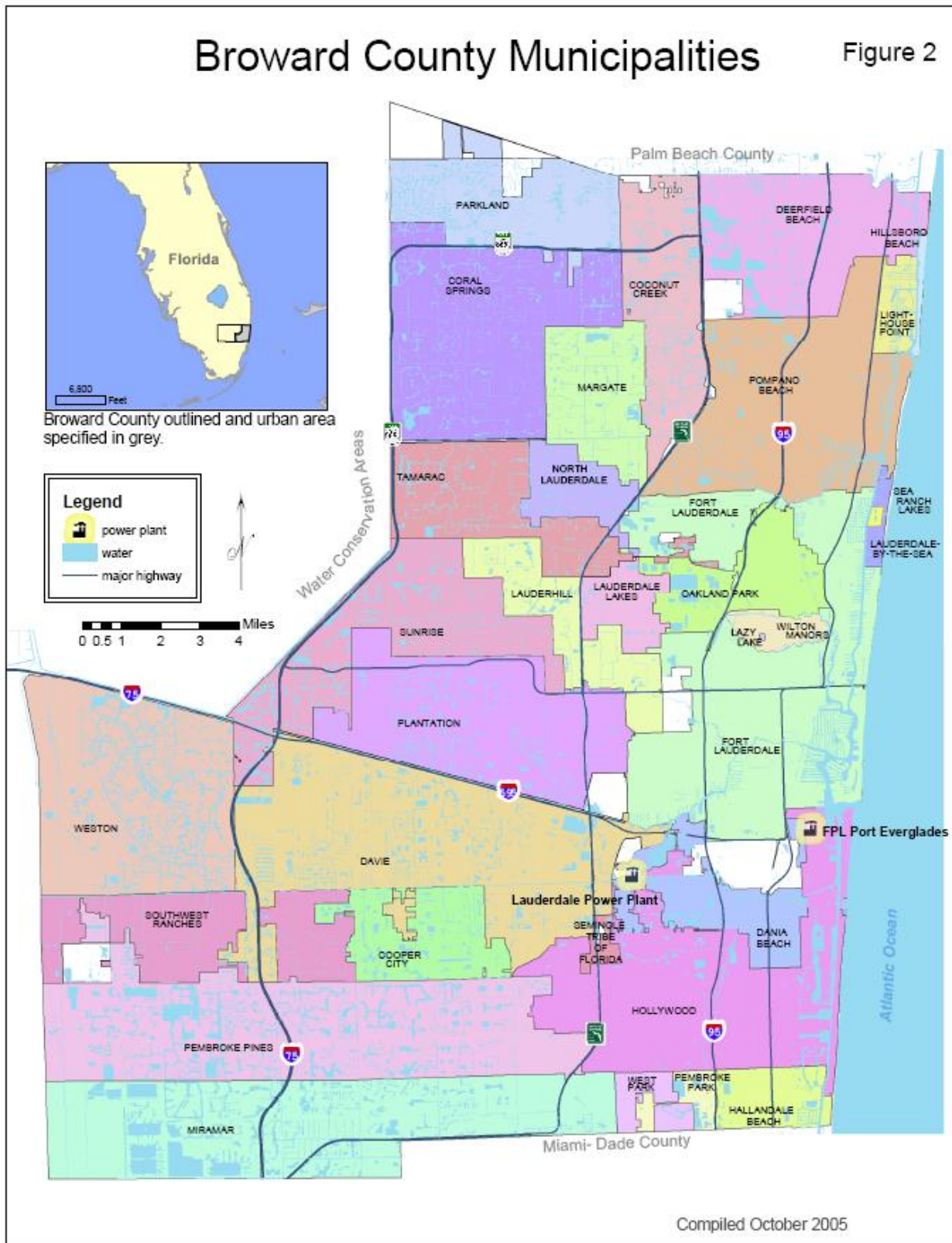
### Recommendations—with an Accompanying Implementation Schedule—to Increase Manatee Protection in the County

- a. boating expansion criteria;
- b. identification of recommended areas for water-related activities requiring high boat speeds, such as water skiing, boat races and certain types of commercial fishing;
- c. a plan for marking navigation channels in currently unmarked waterways used by manatees.
- d. new or expanded speed zones, refuges or sanctuaries for the regulation of boat speeds in critical manatee areas;
- e. installation of manatee educational displays at all boating facilities;
- f. development and dissemination of a pamphlet to county boaters describing manatee protection and boating safety speed zones in the area, and recommendations for boaters on how to avoid hitting manatees;
- g. inclusion of manatee and marine habitat educational material in the county school board's elementary, middle school and high school curricula;
- h. development of appropriate aquatic plant control methods in manatee areas;
- i. identification of land acquisition projects to increase refuges, reserves and preserves for manatee protection; and
- j. other actions as specified by the Department of Natural Resources.

# CONSERVATION ELEMENT

## Broward County Municipalities

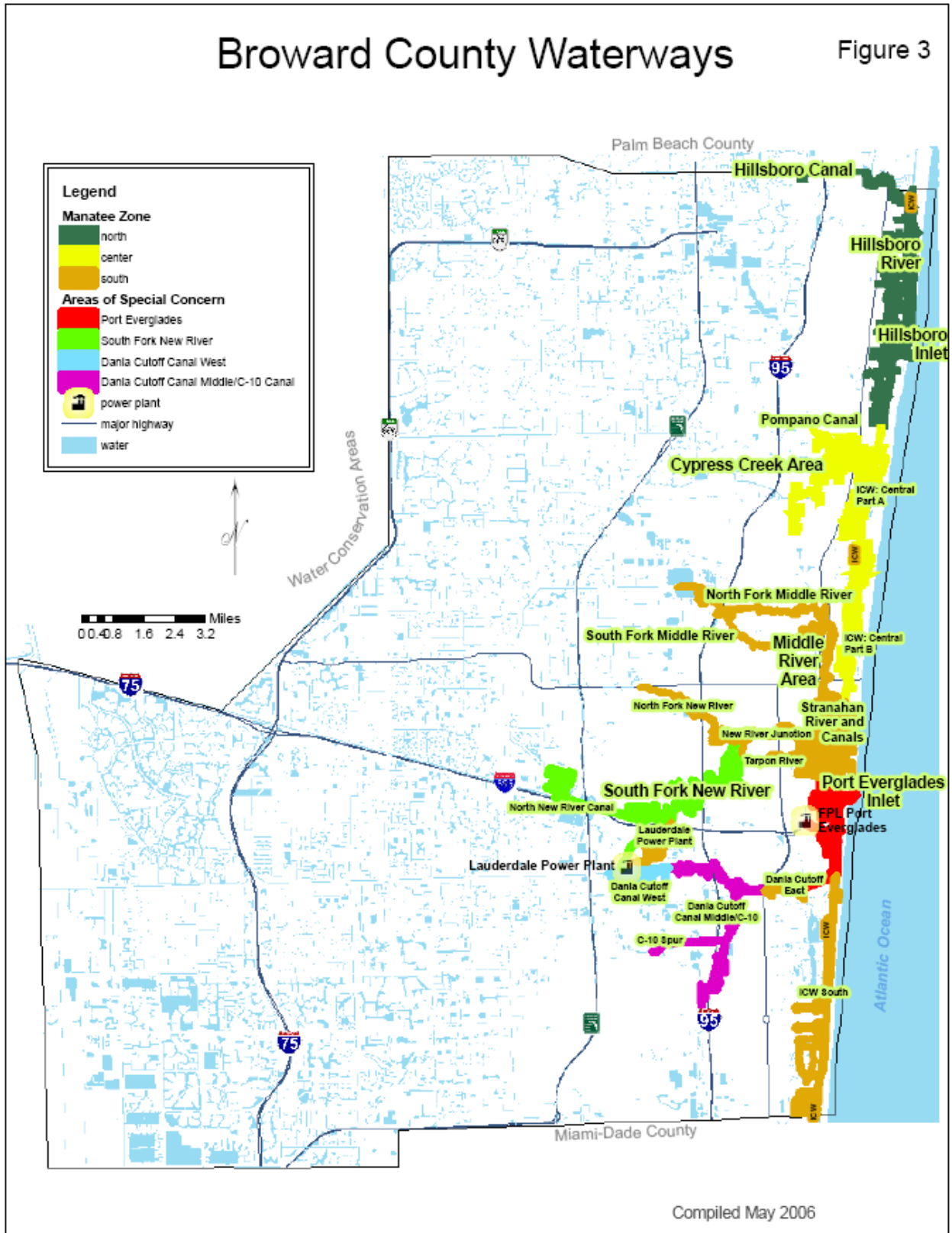
Figure 2



CONSERVATION ELEMENT

Broward County Waterways

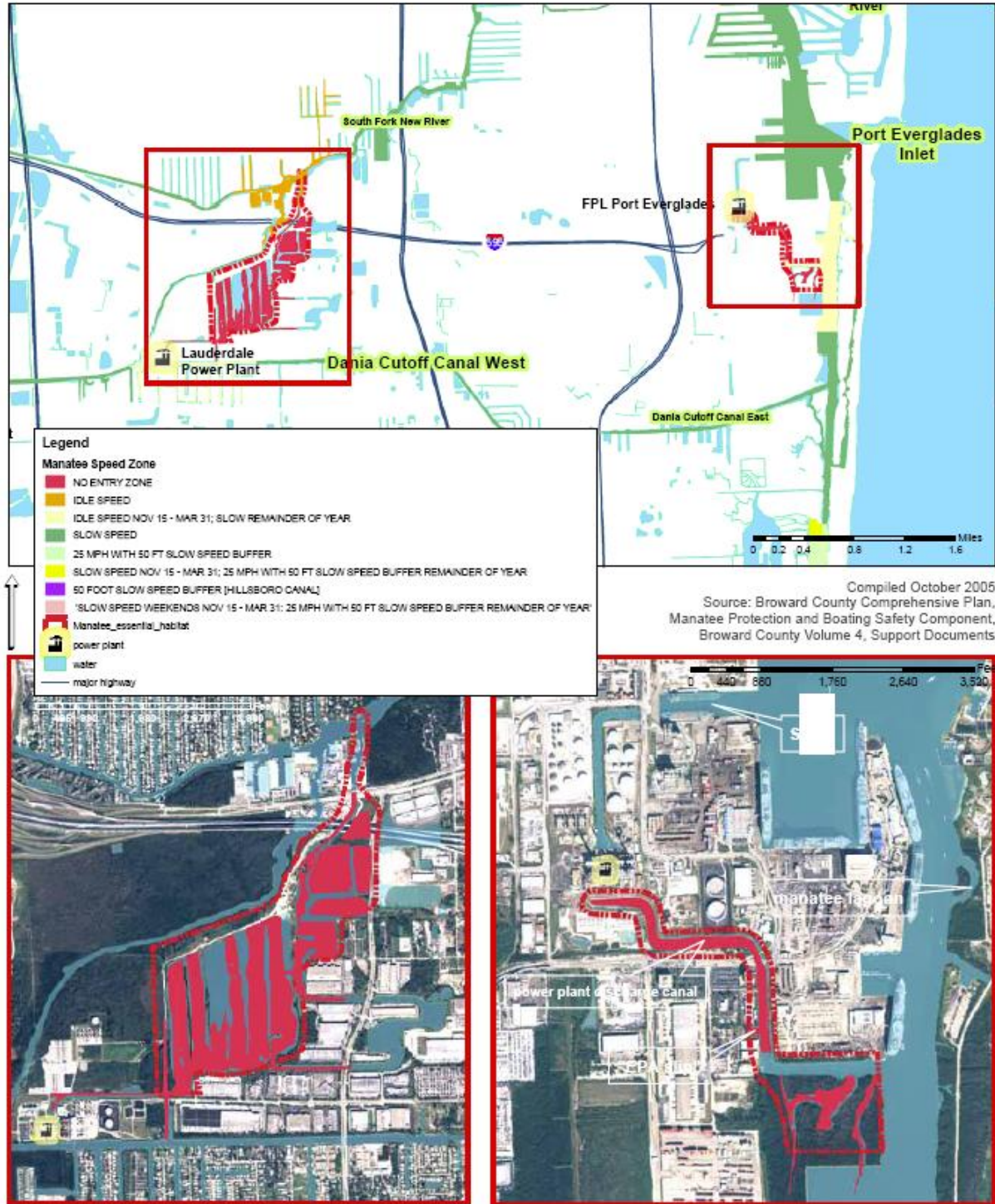
Figure 3



CONSERVATION ELEMENT

Essential Manatee Habitat Areas

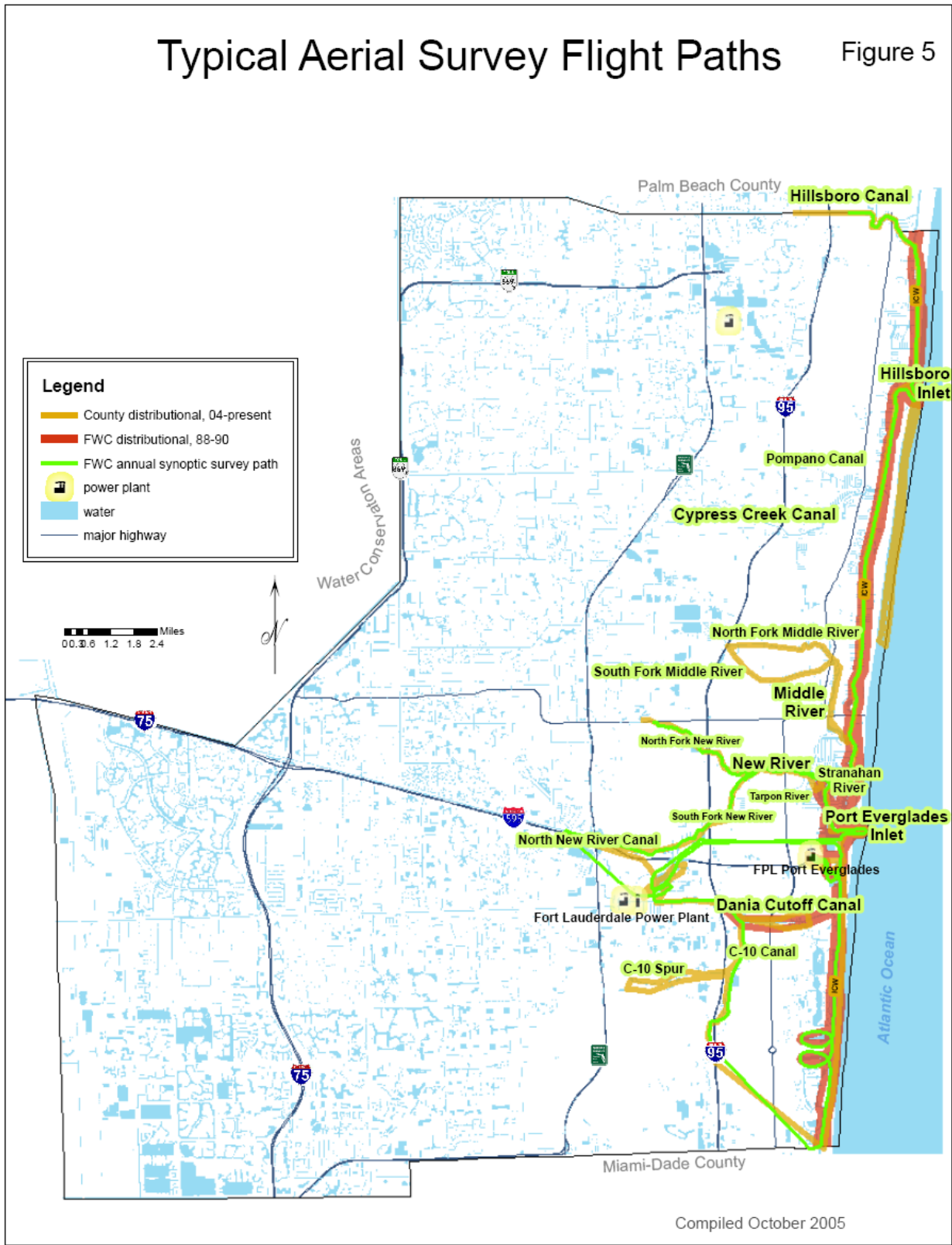
Figure 4



CONSERVATION ELEMENT

Typical Aerial Survey Flight Paths

Figure 5

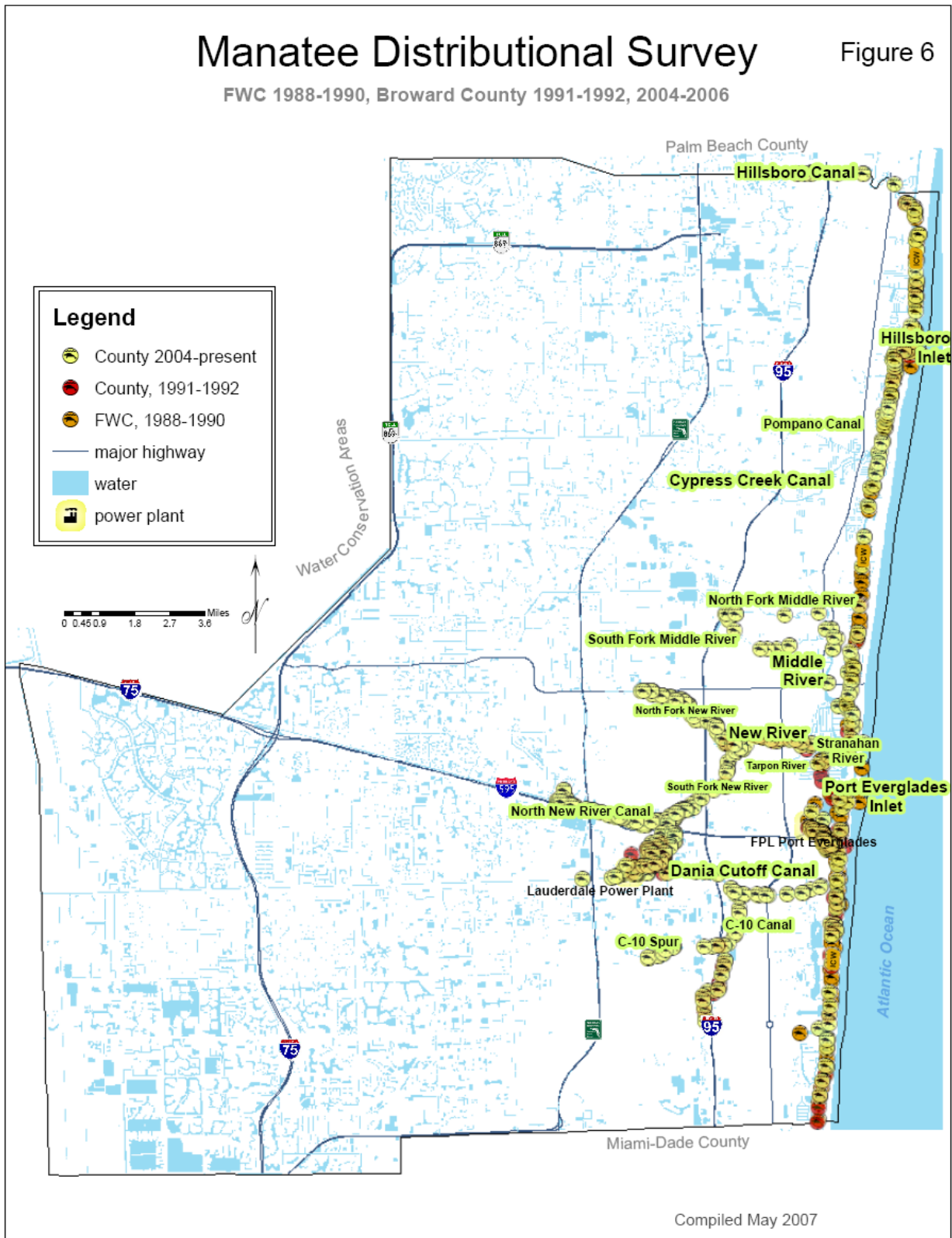


CONSERVATION ELEMENT

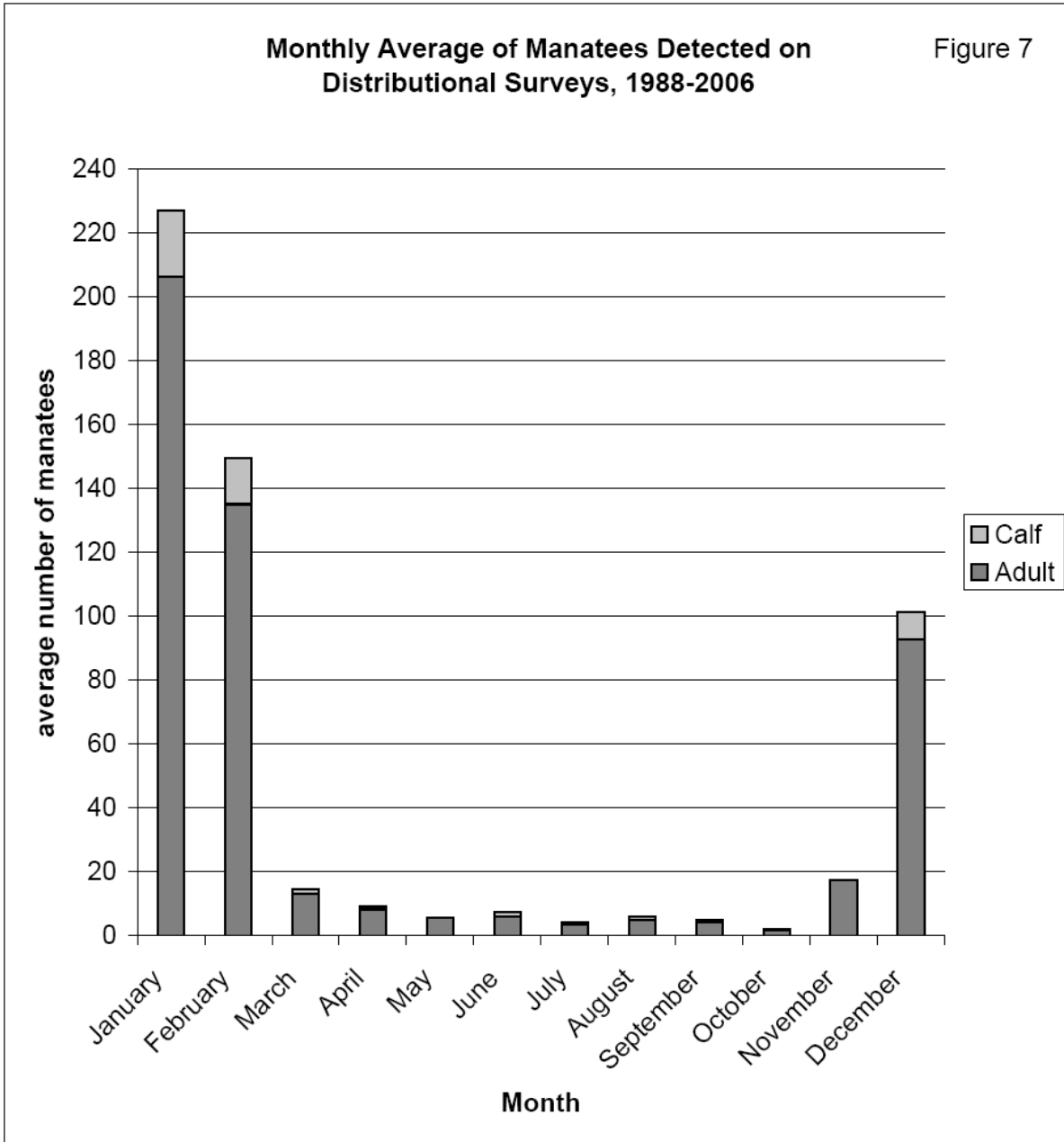
# Manatee Distributional Survey

Figure 6

FWC 1988-1990, Broward County 1991-1992, 2004-2006



CONSERVATION ELEMENT

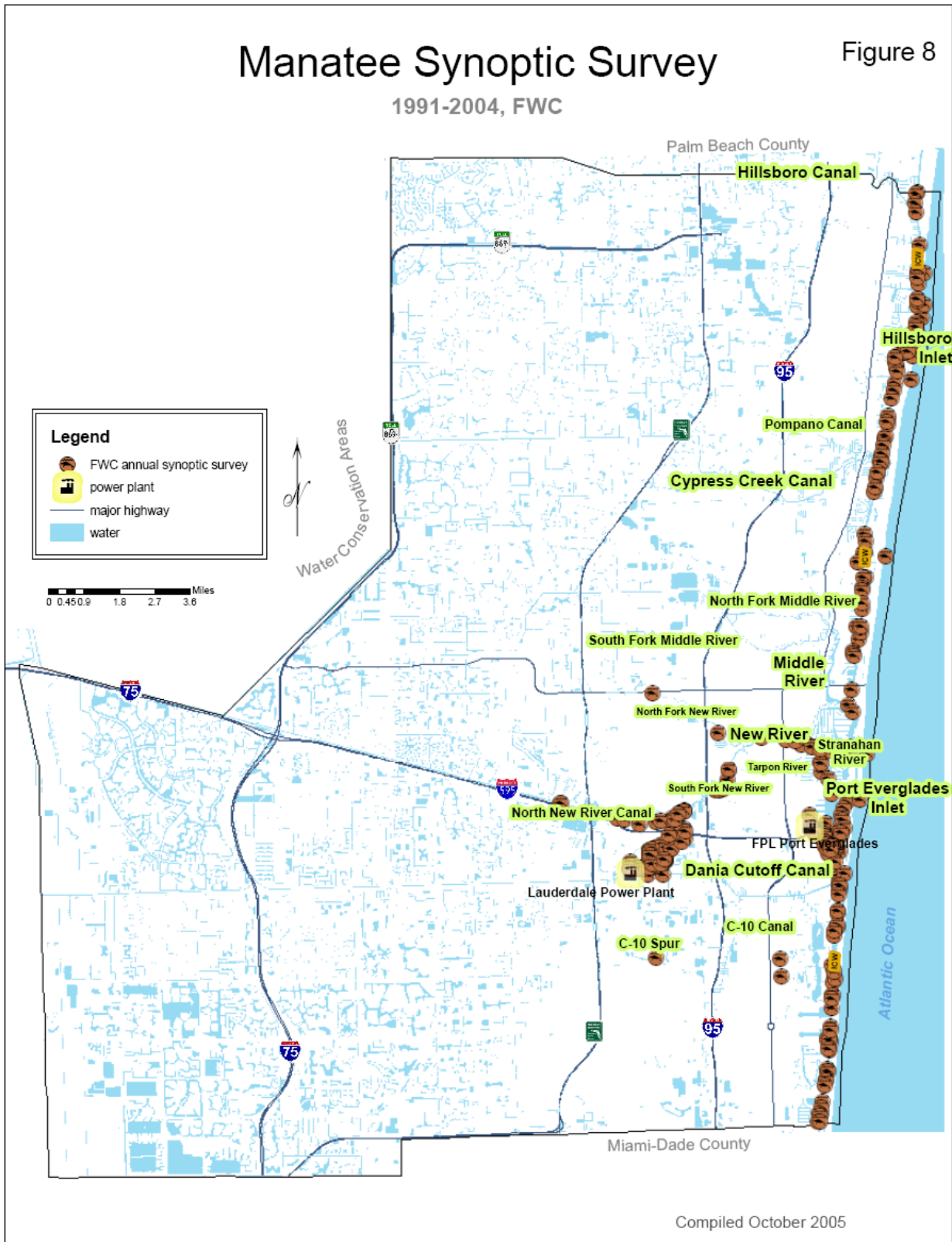


CONSERVATION ELEMENT

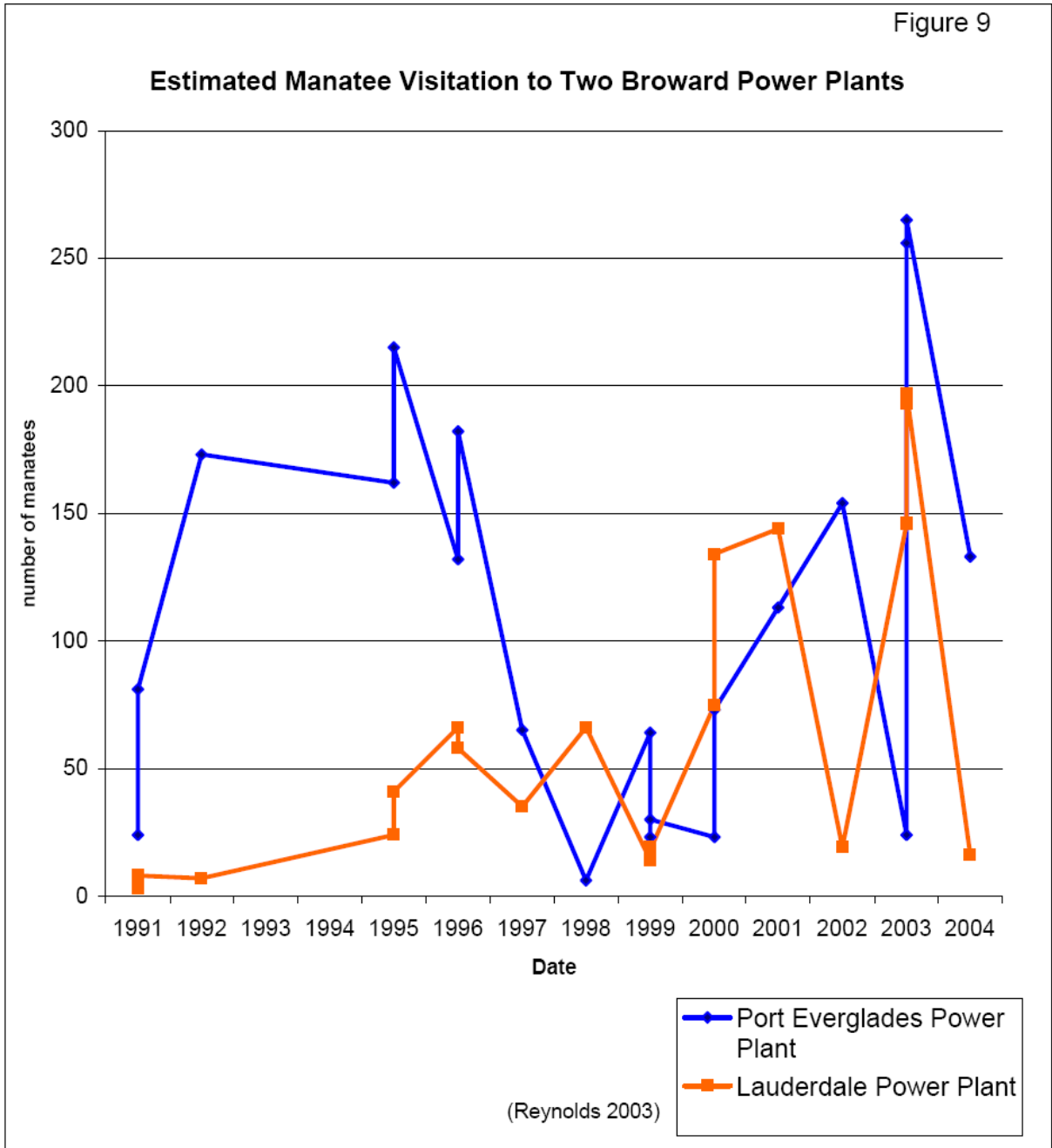
# Manatee Synoptic Survey

Figure 8

1991-2004, FWC



CONSERVATION ELEMENT



CONSERVATION ELEMENT

# Telemetry Data

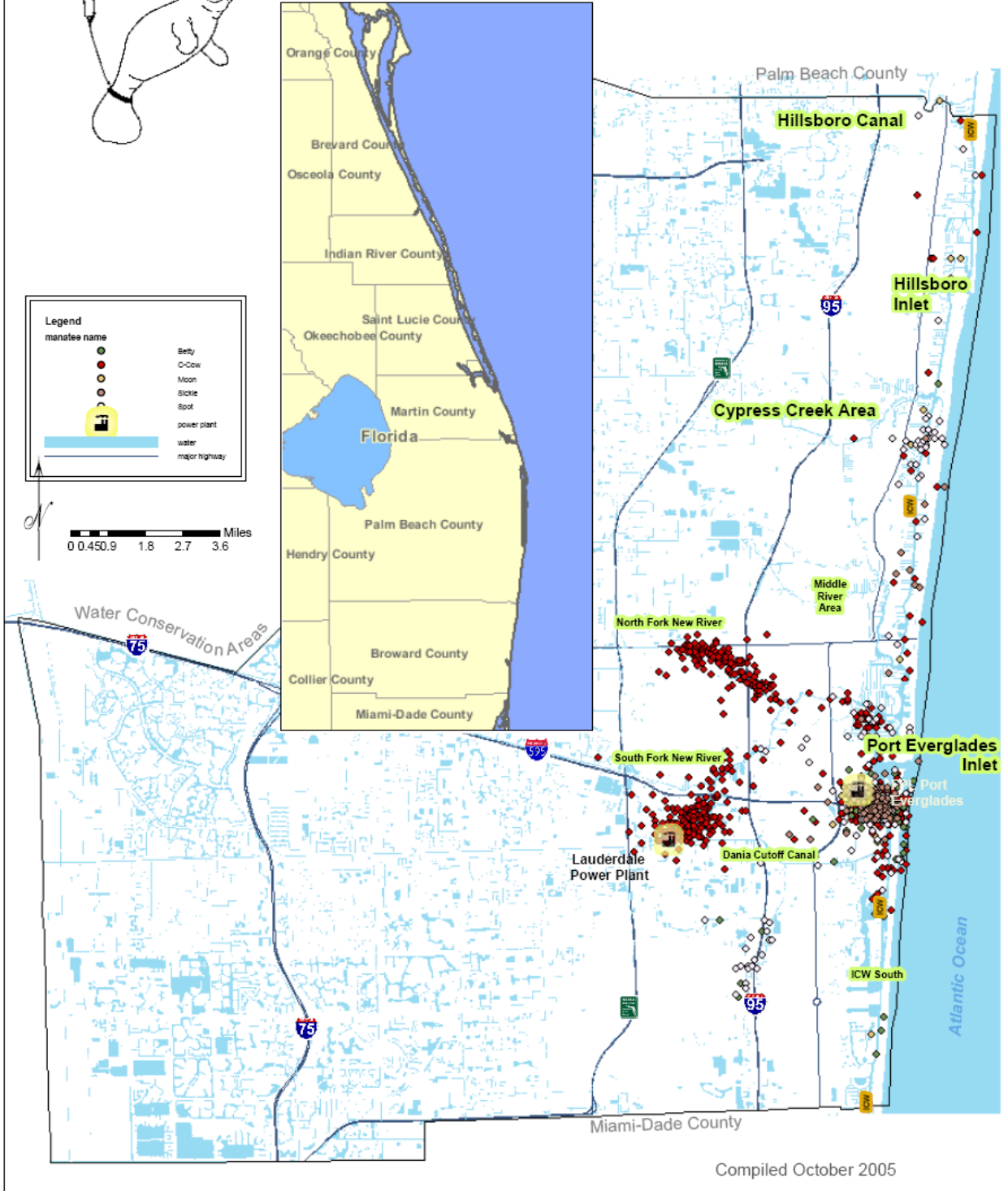
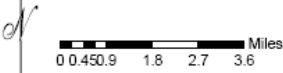
Figure 10

Top five manatees most frequently detected from November through March between 1986-1998.  
 Inset shows statewide telemetry data for C-Cow.



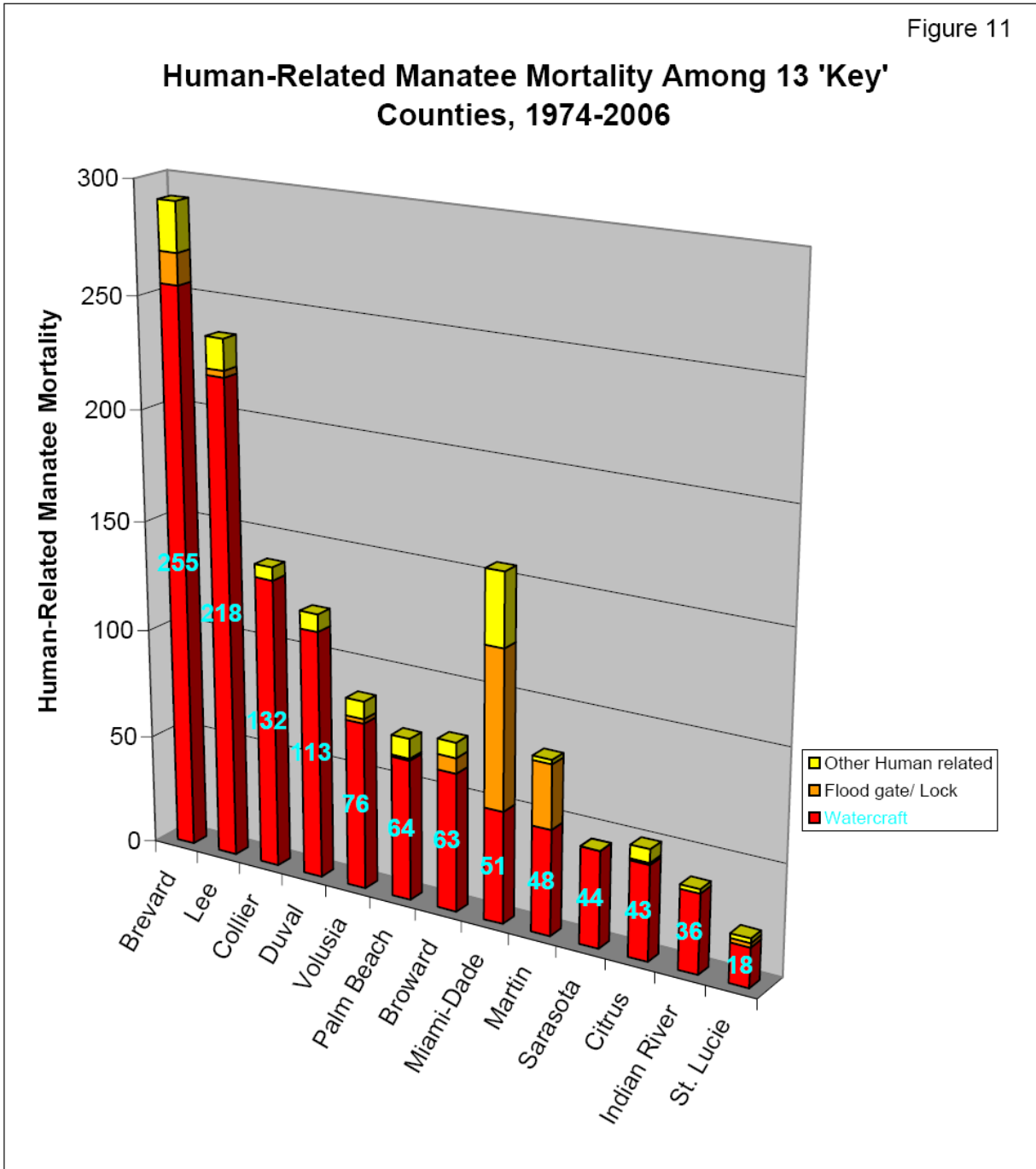
**Legend**

|   |               |
|---|---------------|
| ● | Betty         |
| ● | C-Cow         |
| ● | Moon          |
| ● | Slickie       |
| ● | Spot          |
| ⬜ | power plant   |
| ⬜ | water         |
| ⬜ | major highway |

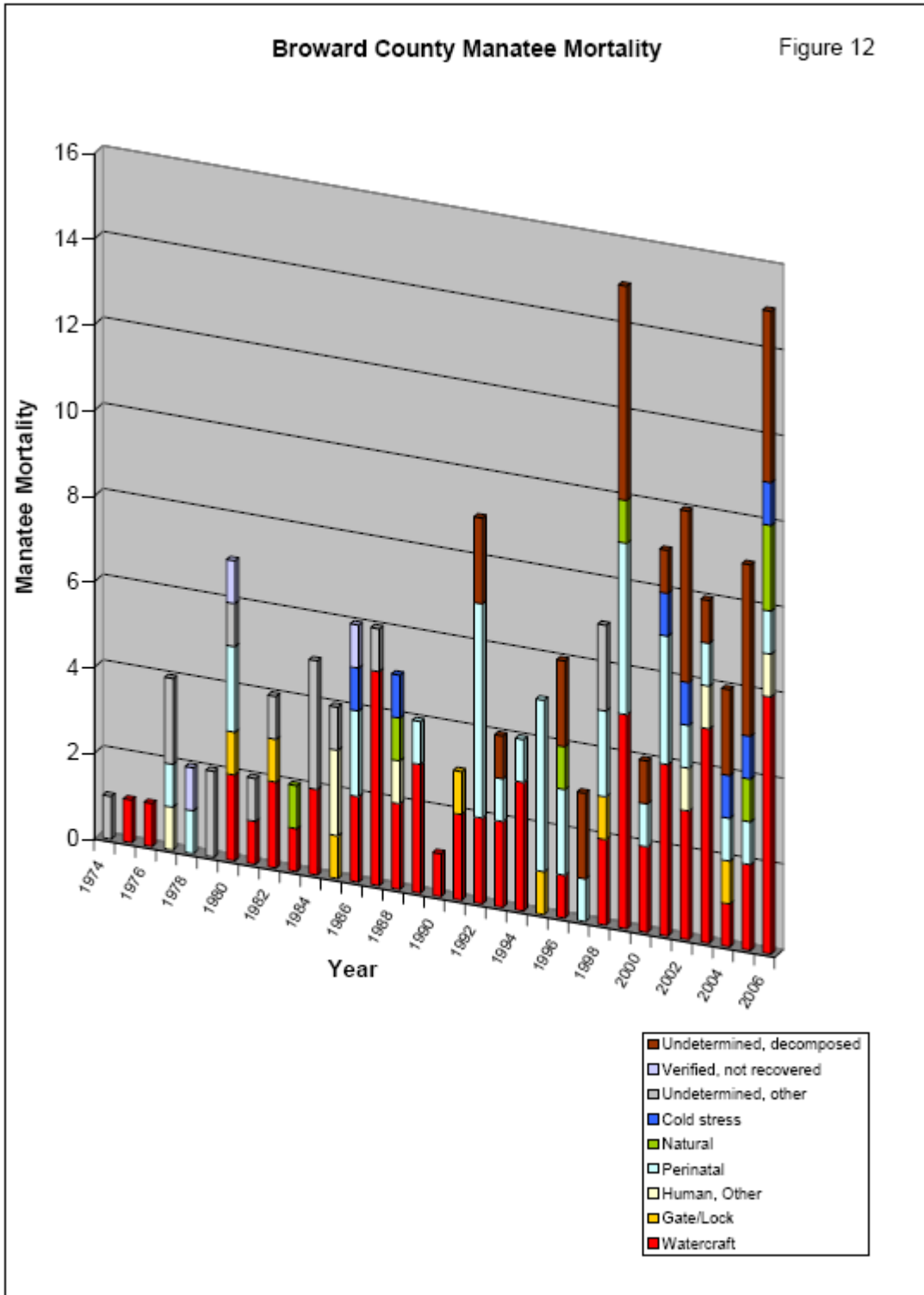


Compiled October 2005

Figure 11

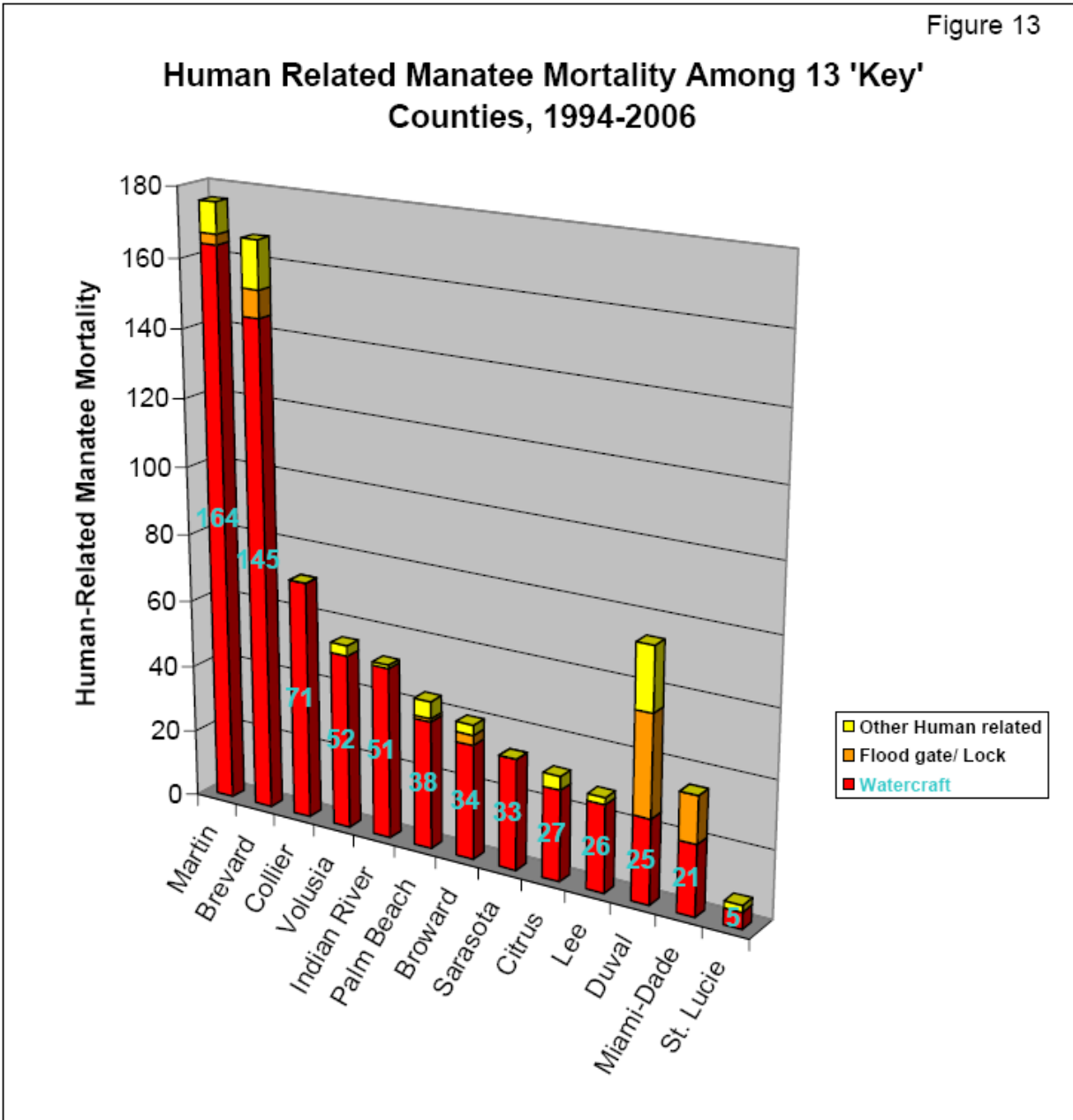


CONSERVATION ELEMENT



CONSERVATION ELEMENT

Figure 13



# CONSERVATION ELEMENT

Figure 14

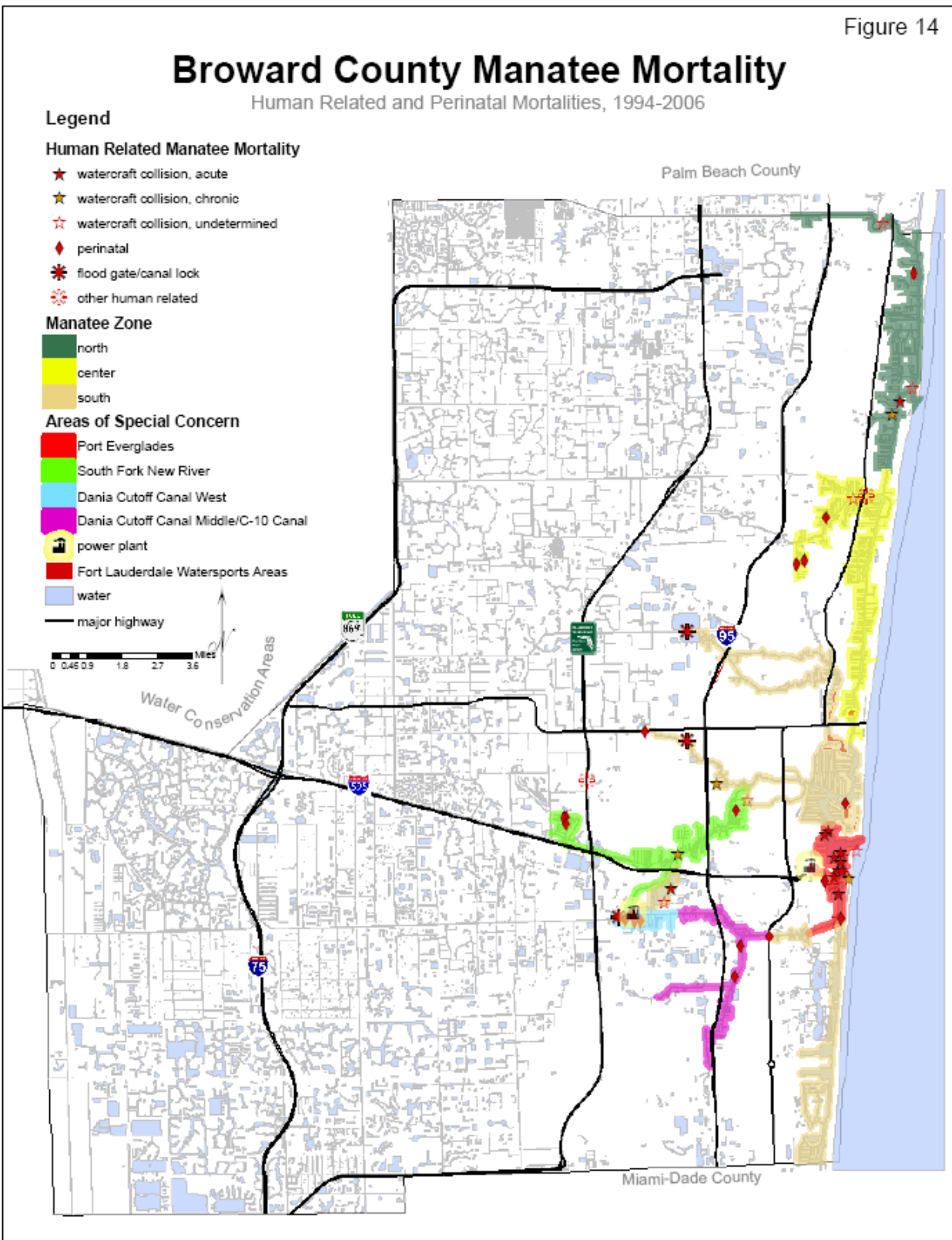
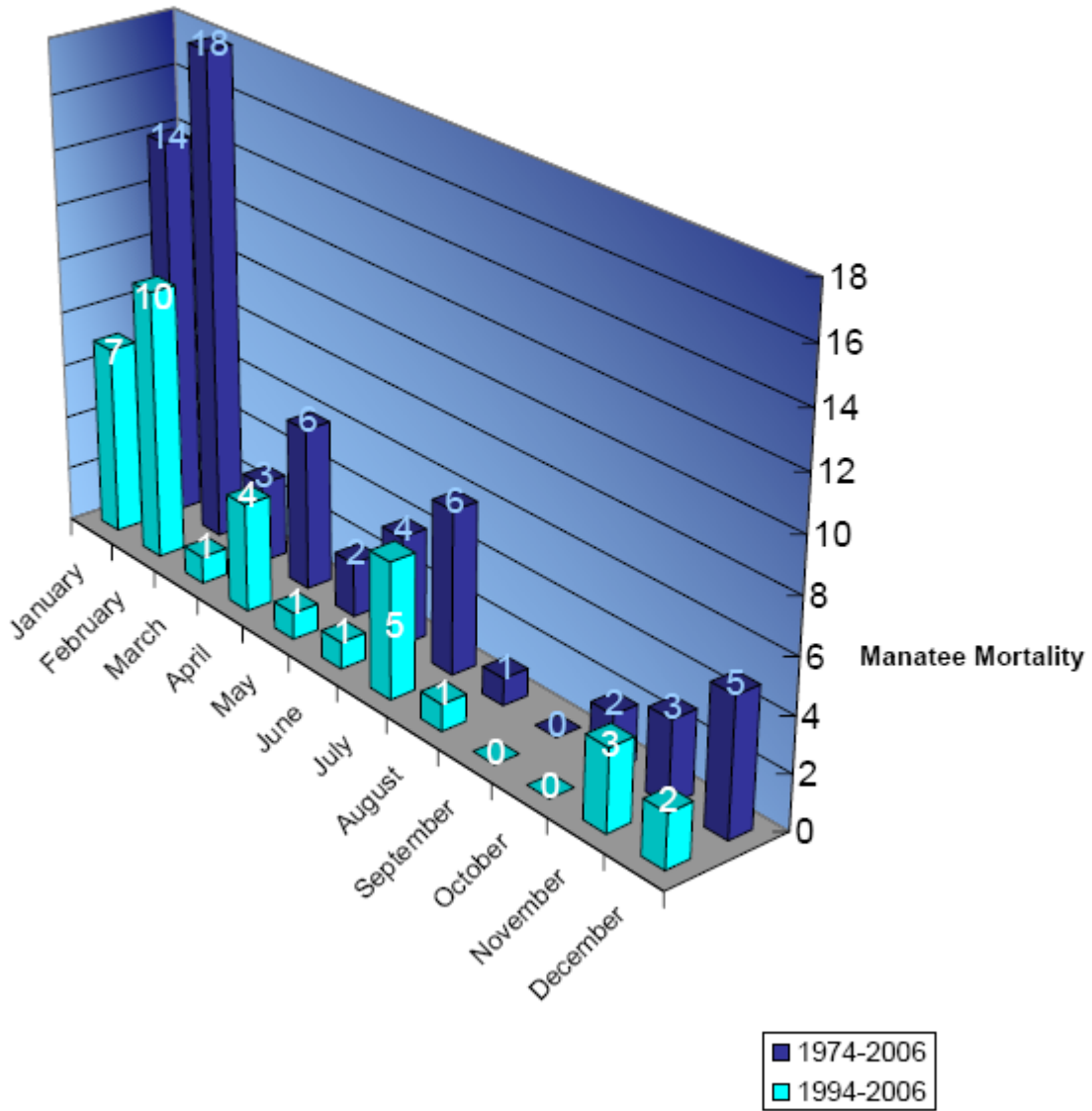


Figure 15

### Watercraft Mortality in Broward County per Month on a 33- and 13-year cycle

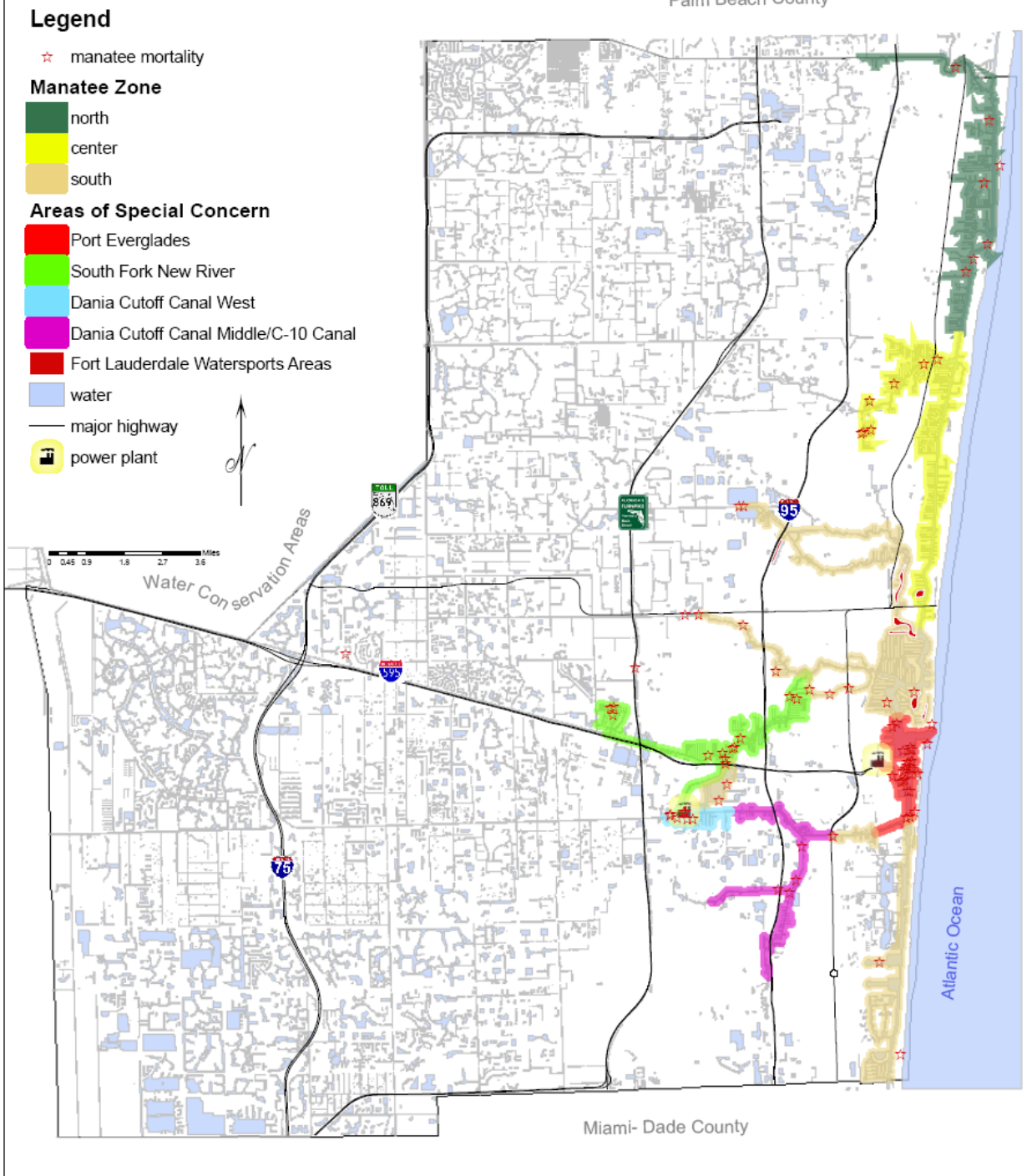


CONSERVATION ELEMENT

Figure 16

# Broward County Manatee Mortality

1994-2006

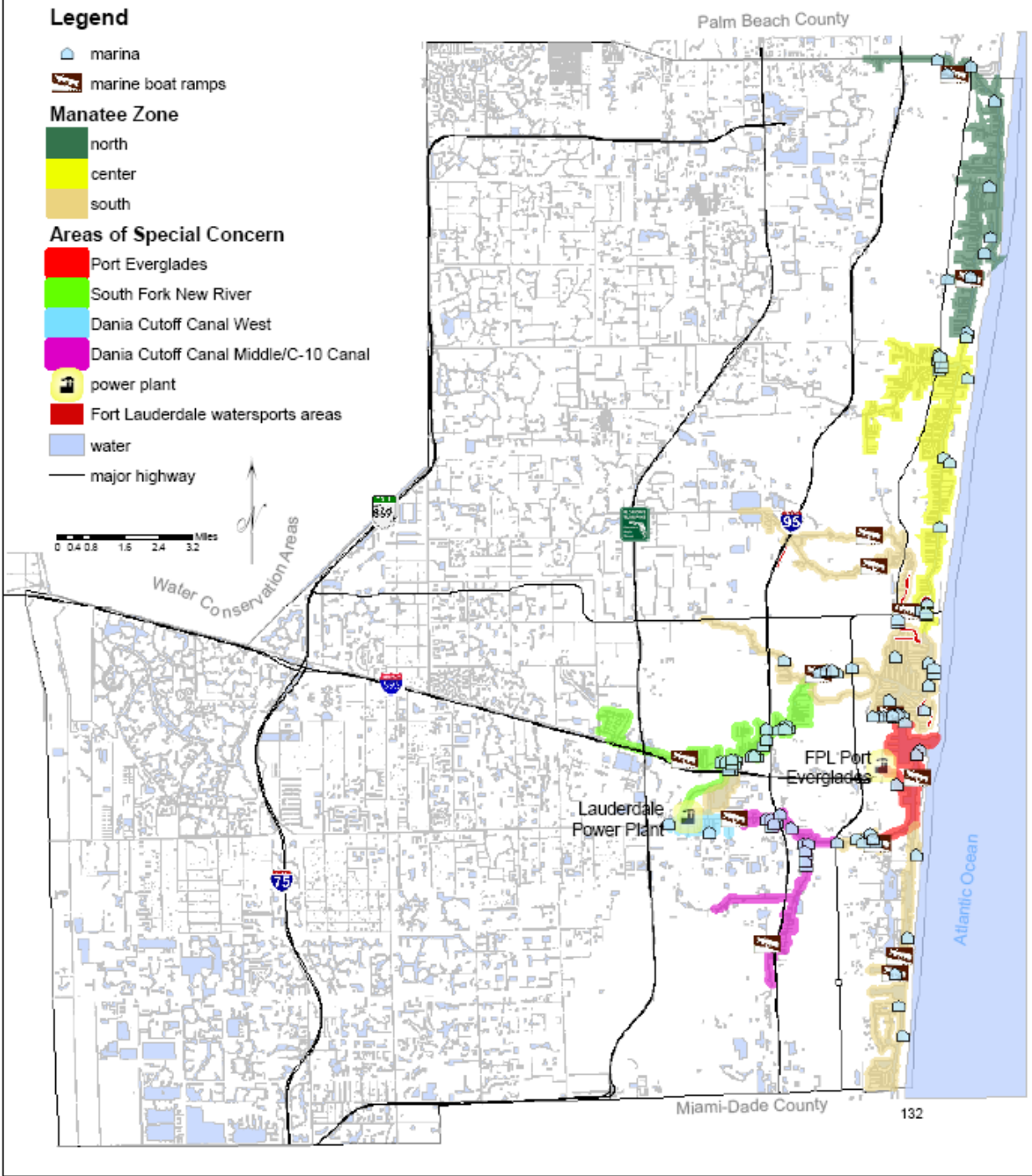


CONSERVATION ELEMENT

Figure 17

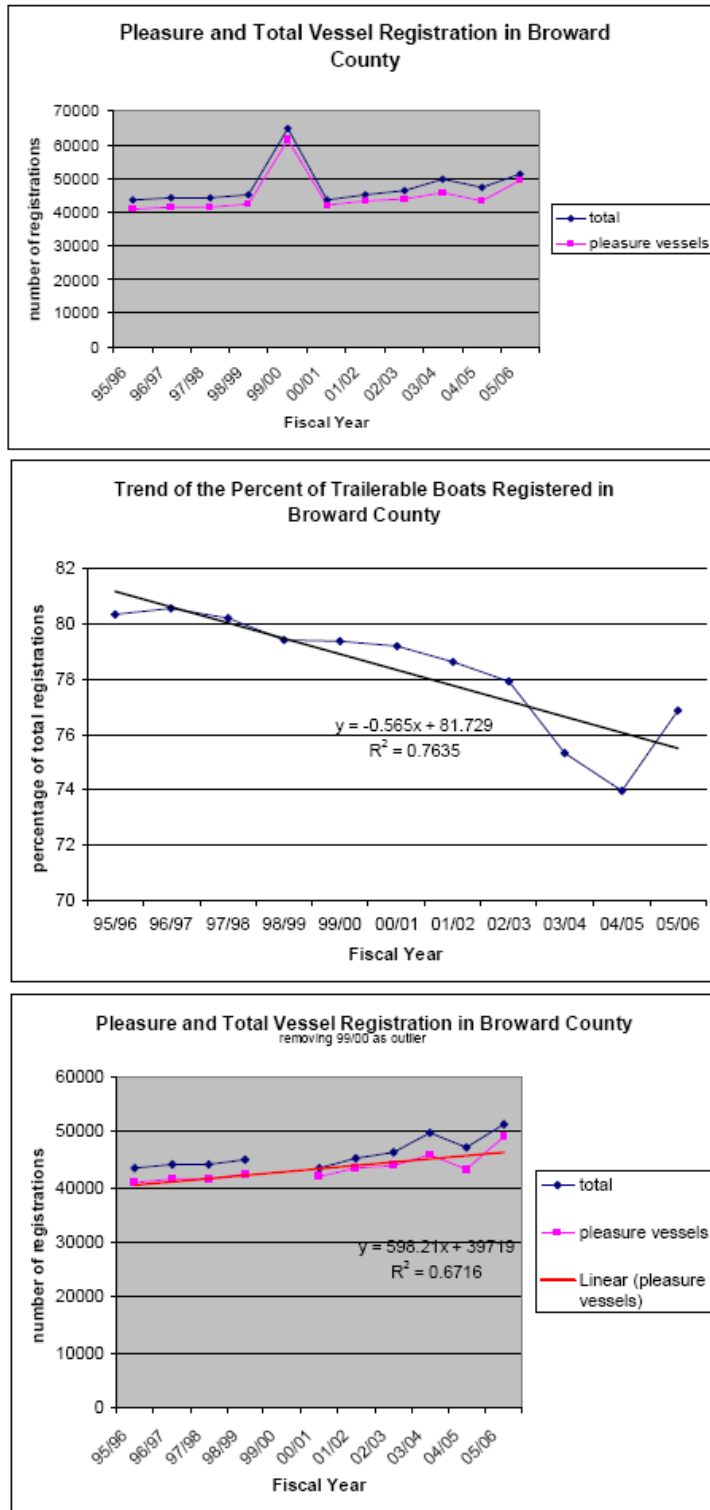
# Broward County Boating Facilities

Marinas and Boat Ramps



# CONSERVATION ELEMENT

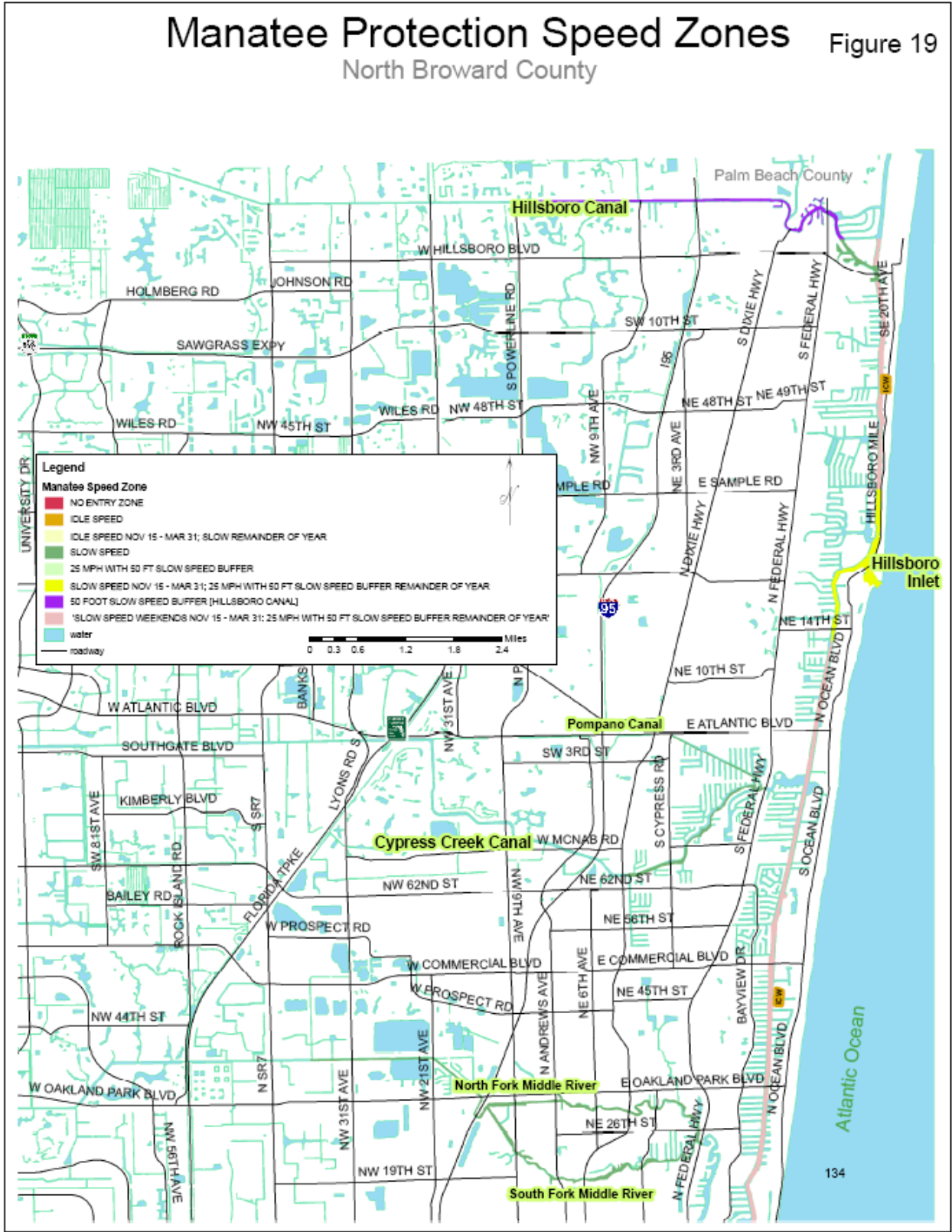
Figure 18



CONSERVATION ELEMENT

Manatee Protection Speed Zones  
North Broward County

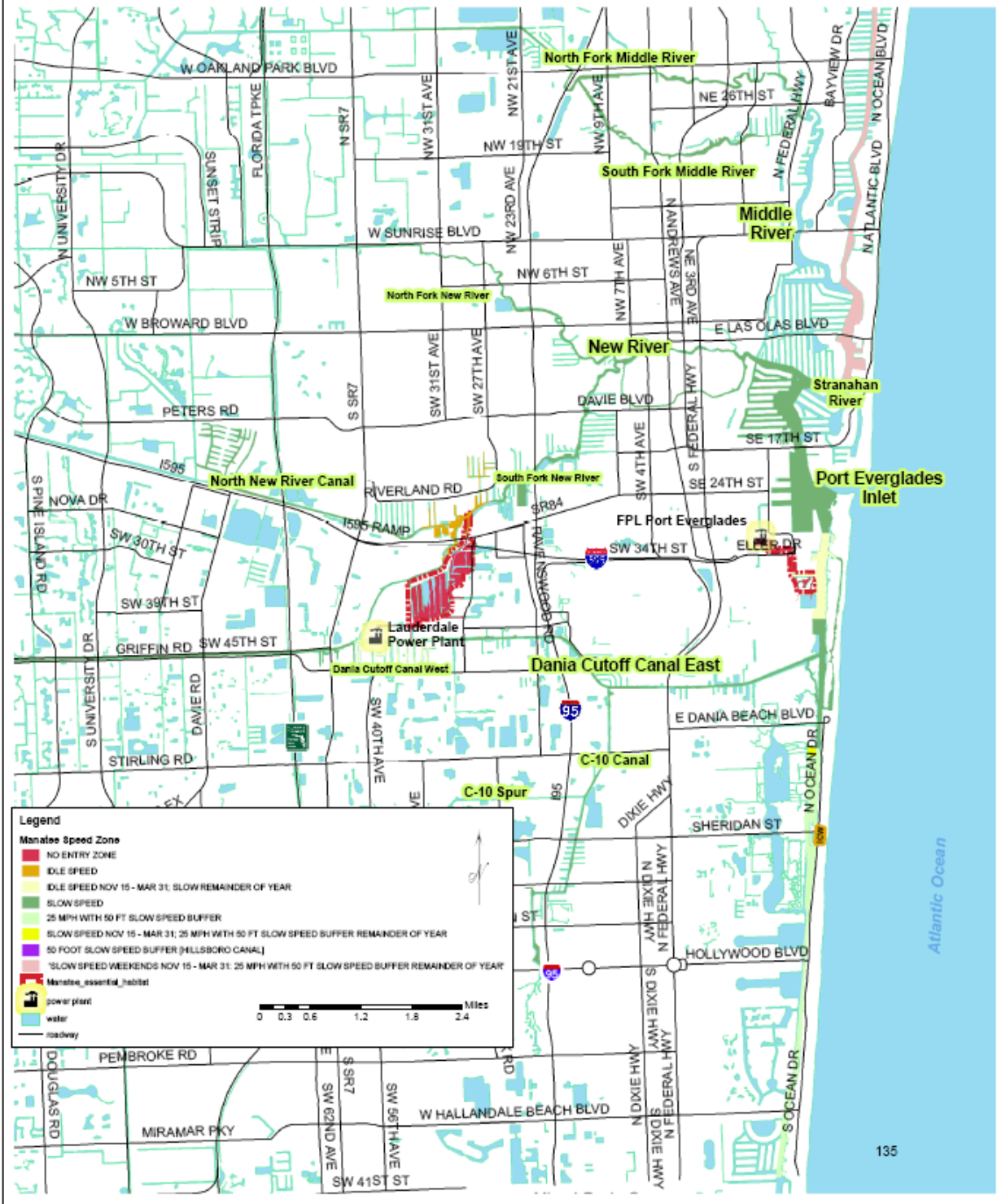
Figure 19



CONSERVATION ELEMENT

Manatee Protection Speed Zones  
South Broward County

Figure 20

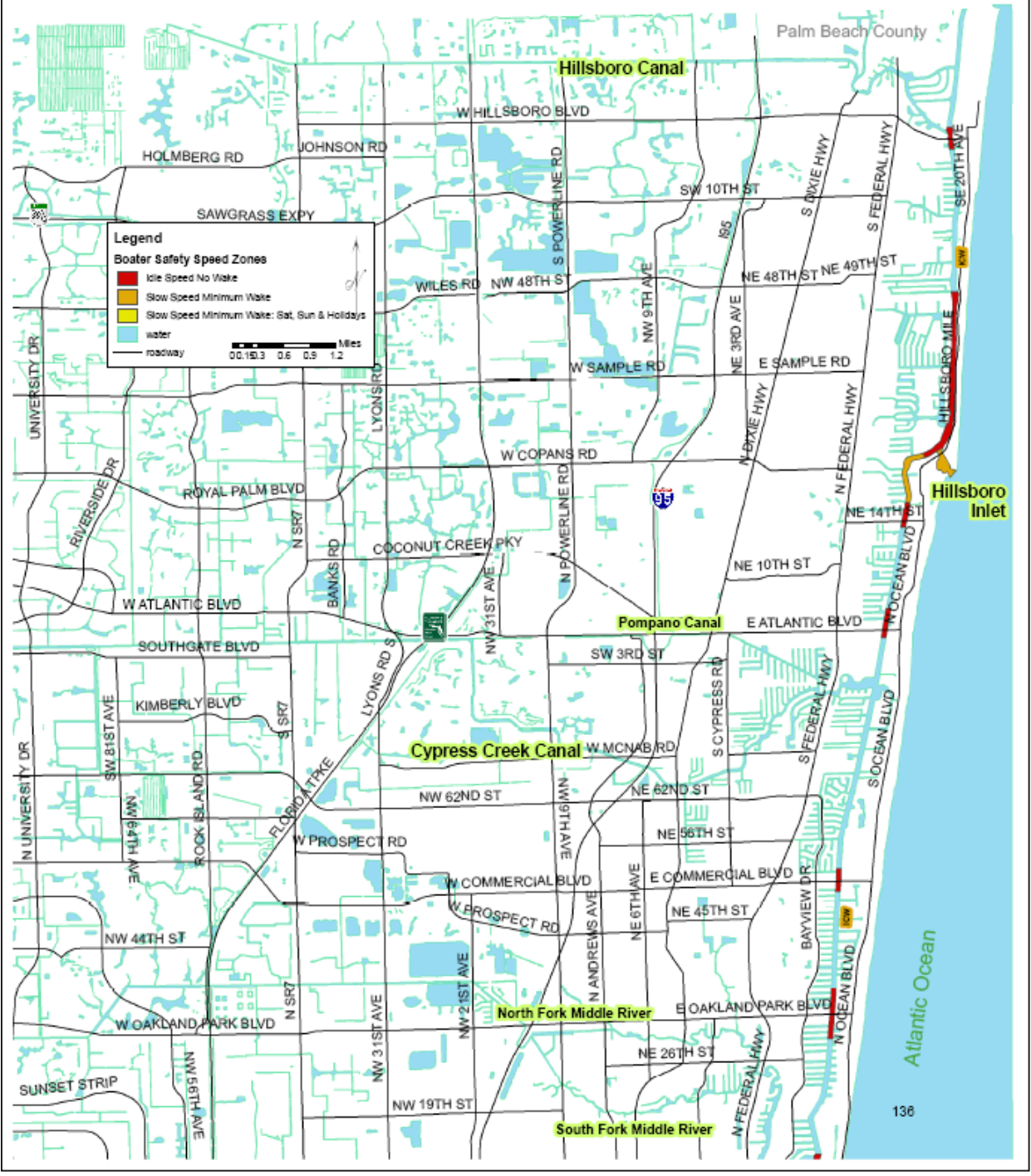


CONSERVATION ELEMENT

Figure 21

# Boater Safety Speed Zones

## North Broward County



CONSERVATION ELEMENT

# Boater Safety Speed Zones

## South Broward County

Figure 22

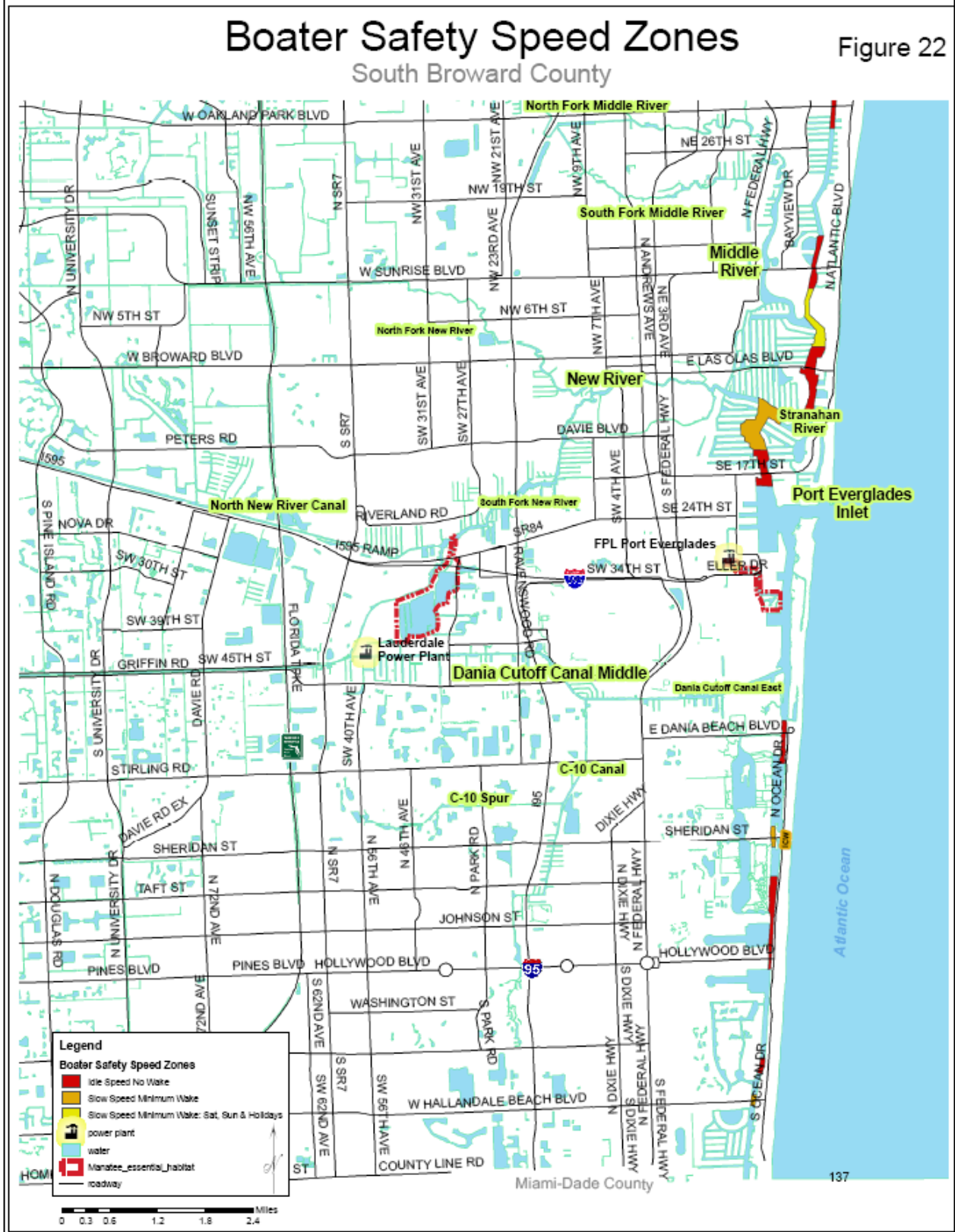
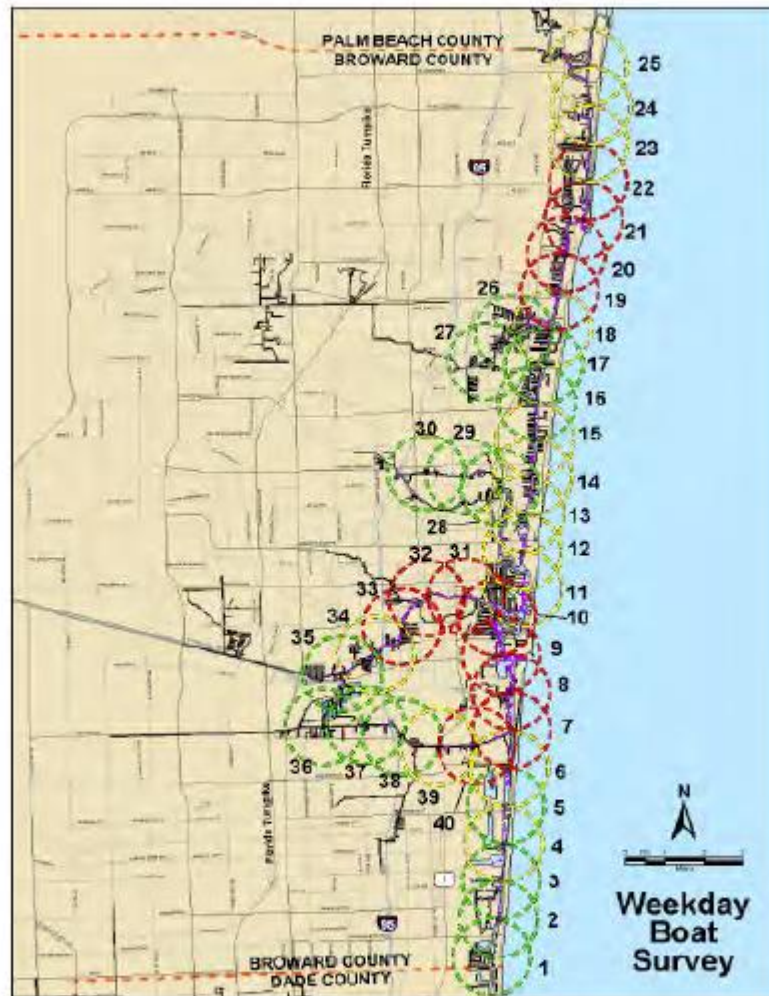


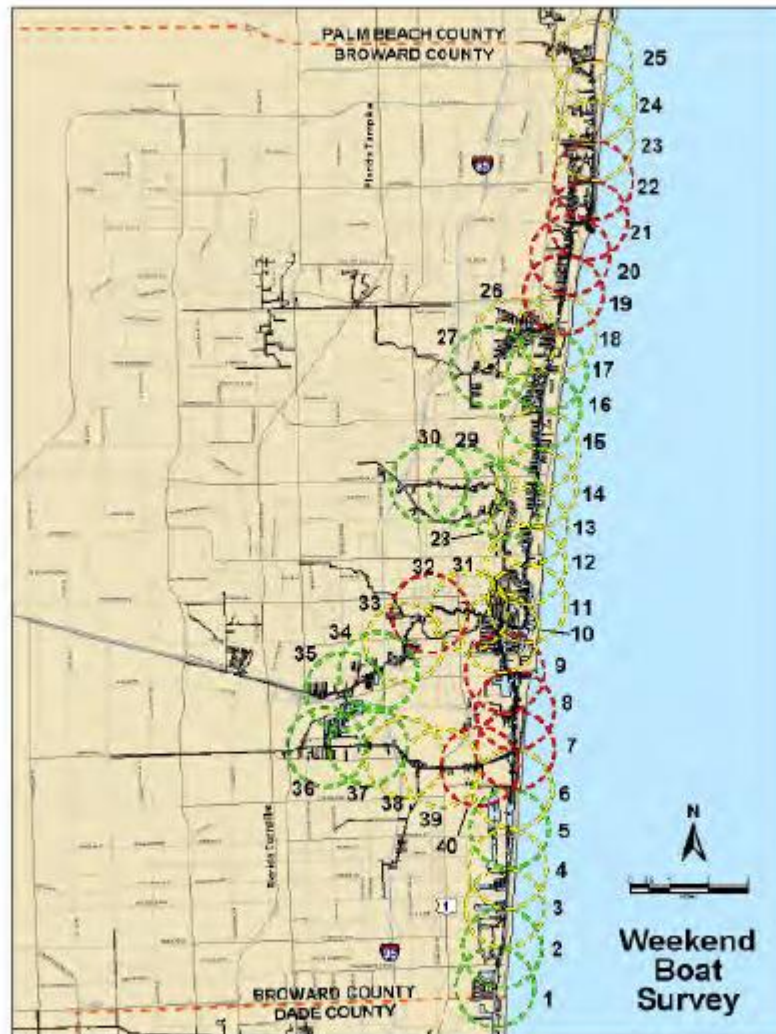


Figure 24



Relative abundance of boat traffic from weekday aerial survey data. Green circles indicate areas of relatively low activity, yellow areas indicate areas of relatively moderate activity, and red areas indicate relatively high activity. (Gorzelay 2005)

Figure 25



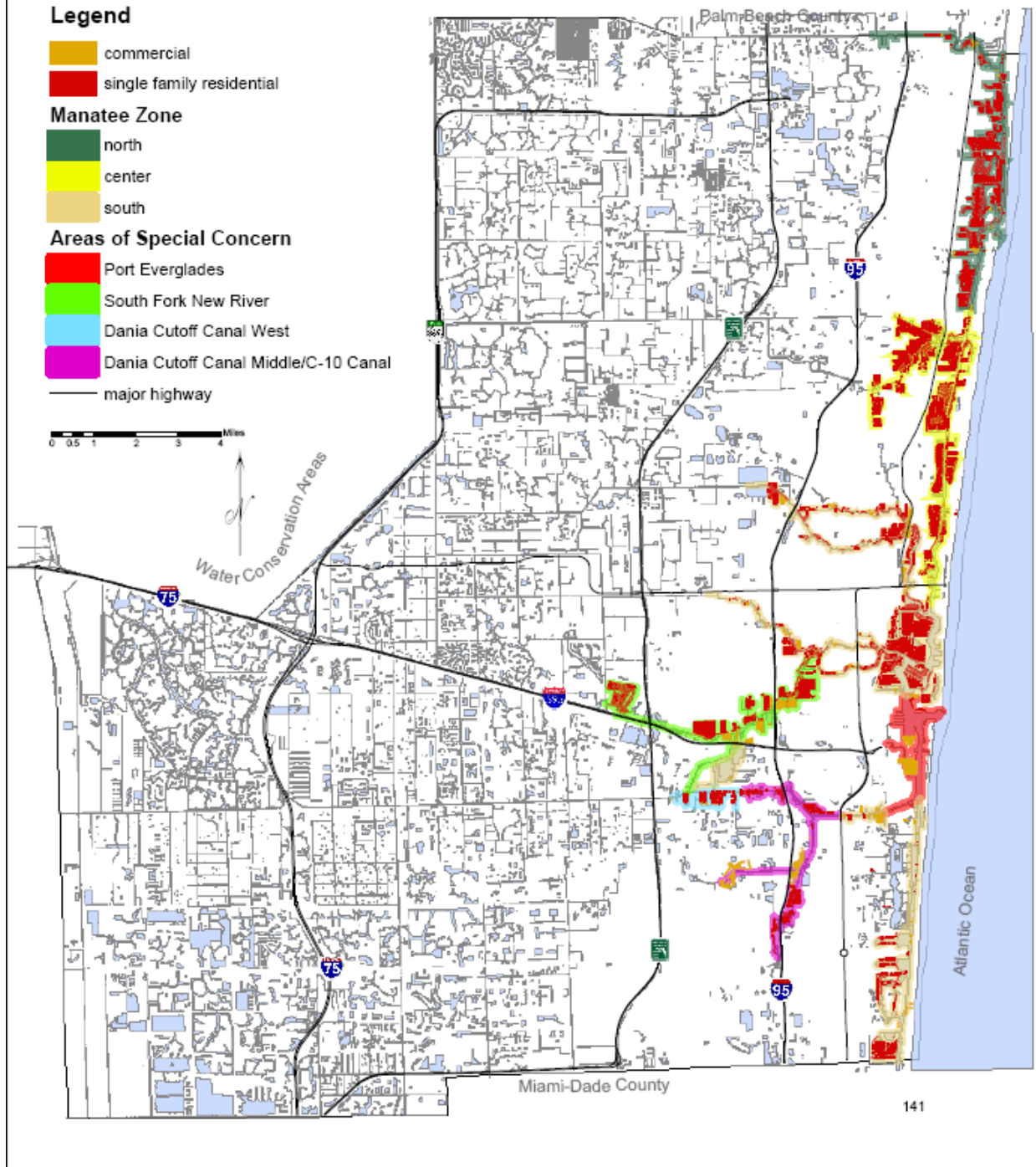
Relative abundance of boat traffic from weekend aerial survey data. Green circles indicate areas of relatively low activity, yellow areas indicate areas of relatively moderate activity, and red areas indicate relatively high activity. (Gorzelany 2005)

CONSERVATION ELEMENT

# Commercial and Single Family Residential Land Use

Figure 26

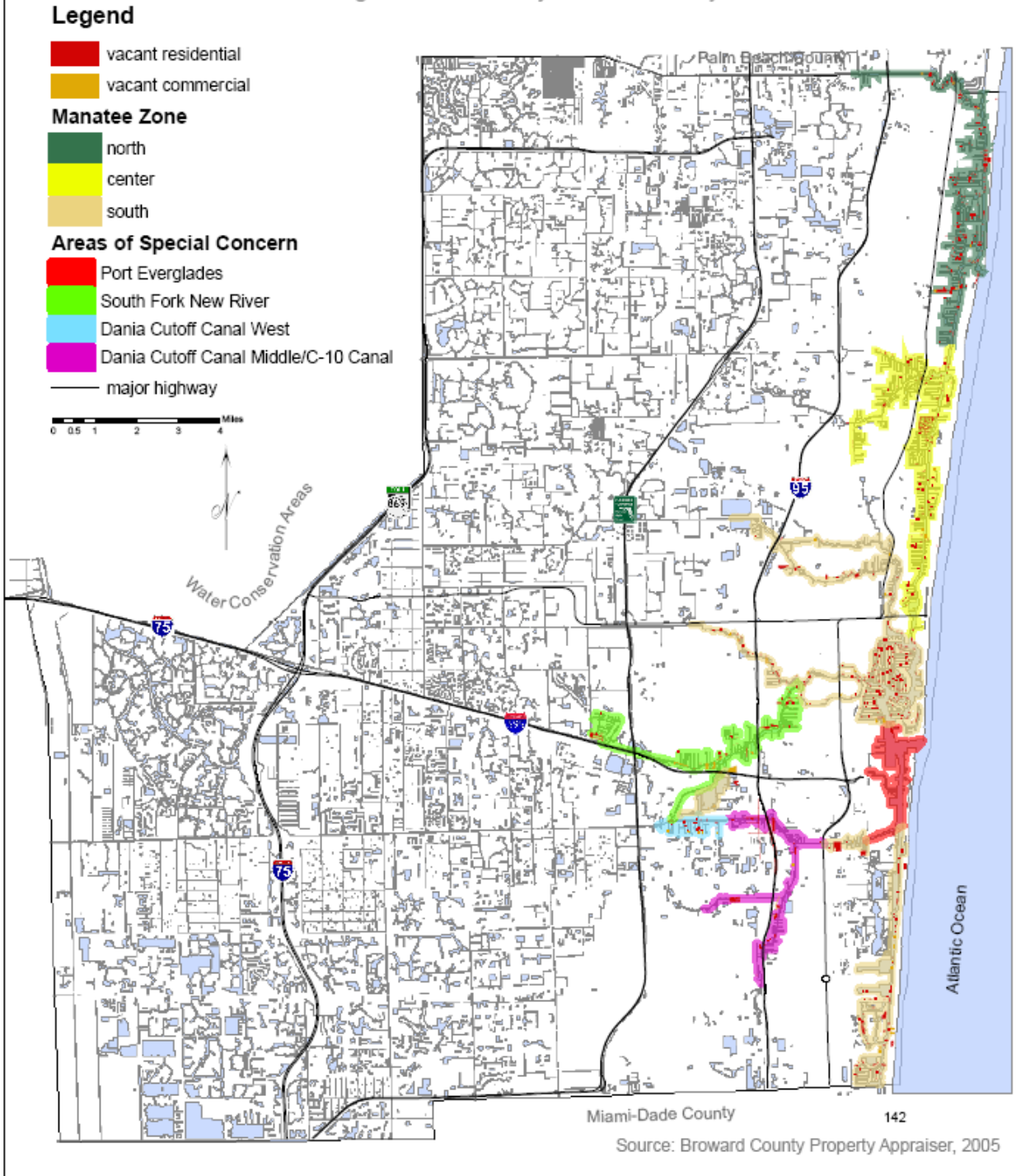
Along Broward County Tidal Waterways



CONSERVATION ELEMENT

# Vacant Commercial and Single Family Residential Land Use Along Broward County Tidal Waterways

Figure 27



## CONSERVATION ELEMENT

### Marina Facilities in Broward County 2007

Table 1

| Facility Name                            | Dry Slip | Wet Slip |
|--|----------|----------|
| 1st Performance Marine                   | 10       | 9        |
| Allied Richard Bertram Marine            | 9        | 9        |
| Allied Richard Bertram Marine Group      | 0        | 27       |
| American Off Shore Marina                | 250      | 0        |
| Aqua Toy Store fka The Collection        | 43       | 26       |
| Artmarine Inc.                           | 4        | 8        |
| Atlantic Village Marina                  | 0        | 80       |
| Bahia Mar Yachting Center                | 0        | 245      |
| Banyan Bay Marina                        | 157      | 96       |
| Best Western Marina Inn & Yacht harbor   | 0        | 27       |
| Billfish Marina                          | 8        | 43       |
| Boat House                               | 0        | 7        |
| Bonnie's Ravenswood Marina               | 60       | 121      |
| Bradford Marine, Inc.                    | 0        | 150      |
| Broward Yachts, Inc. (dba: Brow. Marine) | 15       | 14       |
| Cable Marine Inc. East Yard              | 5        | 8        |
| Cable Marine Inc. West Yard              | 20       | 55       |
| City of Ft Lauderdale - Cooley's Landing | 0        | 32       |
| City of Ft Lauderdale - Las Olas Marina  | 0        | 70       |
| City of Ft Lauderdale - New River        | 0        | 100      |
| Coral Ridge Yacht Club                   | 0        | 59       |
| Cove Marina                              | 0        | 28       |
| Cozy Cove Marina                         | 5        | 55       |
| Crazy Greg's Marina                      | 0        | 9        |
| Dania Beach Boat Club                    | 210      | 0        |
| Diplomat Resort                          | 0        | 48       |
| Doubletree Galleria Hotel                | 0        | 6        |
| Dry Marinas                              | 500      | 0        |
| Dusky Marine, Inc                        | 100      | 0        |
| Fort Lauderdale Marine Enforcement Unit  | 0        | 18       |
| Fort Lauderdale Shipyard                 | 46       | 59       |
| Four Points Yacht & Ship Brokers         | 0        | 2        |
| FPL easement                             | 190      | 0        |

## CONSERVATION ELEMENT

| Facility Name                         | Dry Slip            | Wet Slip            |
|---------------------------------------|---------------------|---------------------|
| Midriver Marine                       | 19                  | 9                   |
| New River Boating Center              | 86                  | 34                  |
| New River Drydock (Marina Mile Ship.) | 12                  | 34                  |
| New River Marina                      | 39                  | 22                  |
| Northcoast Trailer Park & Marina      | 0                   | 10                  |
| NSU Oceanographic Center              | 0                   | 20                  |
| Pennell Marina                        | 215                 | 0                   |
| Pier 17 fka Summerfield               | 0                   | 65                  |
| Pipewelders Marine                    | 0                   | 30                  |
| Pompano Beach Marine Center           | 50                  | 16                  |
| Port Condominiums                     | 125                 | 7                   |
| Powell Bros./Playboy Marine Ctr       | 37                  | 3                   |
| Ramgoh Marina                         | 0                   | 40                  |
| River Bend Marina                     | 147                 | 68                  |
| Riverfront Marina                     | 297                 | 30                  |
| Rolly Marine                          | 0                   | 20                  |
| Roscioli Yacht Center                 | 52                  | 24                  |
| Royale Palm Yacht Basin, Inc.         | 15                  | 50                  |
| Ruffy's Restaurant & Marina           | 0                   | 49                  |
| Sandpiper Resort Apartment & Marina   | 0                   | 14                  |
| Sands Harbor Hotel & Marina           | 0                   | 50                  |
| SeaTech (Seafair, Cty Dania Marina)   | 0                   | 92                  |
| Seven Seas Yacht Sales                | 26                  | 5                   |
| Sun Dream Yacht Charters              | 0                   | 1                   |
| Sundance - Ft. Lauderdale             | 190                 | 24                  |
| Sunrise Harbor Megayacht Marina       | 0                   | 22                  |
| Taha Marina                           | 0                   | 15                  |
| The Riverside Hotel                   | 0                   | 3                   |
| Thunderboat Marina                    | 400                 | 52                  |
| US Coast Guard                        | 0                   | 6                   |
| Westport Yacht Sales                  | 0                   | 26                  |
| <b>Grand Total:</b>                   | <b><u>6,548</u></b> | <b><u>4,081</u></b> |

## CONSERVATION ELEMENT

| Facility Name                            | Dry Slip | Wet Slip |
|--|----------|----------|
| Freedom Marina                           | 500      | 0        |
| G & G Shipping                           | 0        | 4        |
| Garden Isle Marine Service               | 20       | 10       |
| Hall of Fame Marina-A Westrec Marina     | 0        | 42       |
| Harbor 1 Marina                          | 250      | 0        |
| Harbor Beach Surf Club                   | 0        | 16       |
| HarbourTowne Marina/A Westrec Marina     | 443      | 183      |
| Hidden Harbor Marina                     | 353      | 0        |
| Hideaway Marina                          | 200      | 0        |
| Hillsboro Inlet Marina Fishing           | 0        | 15       |
| Holiday Inn Pompano Beach                | 0        | 14       |
| Hollywood Marina                         | 0        | 55       |
| Hyatt Regency Pier 66 Resort and Marina  | 0        | 113      |
| InterMarine fka J & J Mrna or USA Marina | 162      | 28       |
| J Woods Marine Group                     | 0        | 4        |
| Jackson Marine Sales, Inc                | 320      | 70       |
| Lauderdale Marina inc                    | 29       | 63       |
| Lauderdale Marine Center - East Yard     | 45       | 29       |
| Lauderdale Marine Center - West Yard     | 45       | 116      |
| Lauderdale Small Boat Club               | 34       | 225      |
| Lauderdale Yacht Club                    | 97       | 64       |
| Le Club Marina International             | 0        | 10       |
| Legacy Fisherman aka Dania Boat Yard     | 100      | 18       |
| Lighthouse Point Marina Inc              | 0        | 125      |
| Lighthouse Point Yacht & Racquet Club    | 0        | 54       |
| Loggerhead Club & Marina (Harb. Is.)     | 0        | 190      |
| Lou's Tackle & Marina                    | 39       | 7        |
| Marina at Marina Bay                     | 0        | 197      |
| Marina Mar of Fort Lauderdale            | 150      | 6        |
| Marina One, Inc.                         | 375      | 6        |
| Marine Max                               | 0        | 16       |
| Marine Max (Assoc. Mar. Tech.)           | 21       | 24       |
| Marine Max Pompano (Sunseeker)           | 5        | 20       |
| Marine Unlimited                         | 0        | 15       |
| Marriott Portside Marina                 | 0        | 33       |
| Merritt Boat & Engine Works              | 18       | 57       |

## CONSERVATION ELEMENT

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Table 2

### Boat Ramp Capacity Inventory for Broward County

| Manatee Zone        | Facility Name                      | Trailer Capacity  |
|---------------------|------------------------------------|-------------------|
| <b>North</b>        |                                    |                   |
|                     | Pioneer Park                       | 12                |
|                     | Alsdorf Park                       | 80                |
|                     | <b>North Total</b>                 | <b>92</b>         |
| <b>South</b>        |                                    |                   |
|                     | George English Park                | 67                |
|                     | Cherry Creek Ramp                  | 3                 |
|                     | Colohatchee Park                   | 7                 |
|                     | Cooley's Landing                   | 22                |
|                     | Southeast 15th Street Boat Ramp    | 58                |
|                     | Harbour Town Marina                | 73                |
|                     | Hollywood Rotary Park              | 0                 |
|                     | Riverland Woods Park               | 9                 |
|                     | Griffin Marine Park                | 10                |
|                     | John U. Lloyd State Park Boat Ramp | 74                |
|                     | Hollywood Marina                   | 37                |
|                     | S.S. Holland Park                  | 56                |
|                     | <b>South Total</b>                 | <b>416</b>        |
| <b>Grand Total:</b> |                                    | <b><u>508</u></b> |

## CONSERVATION ELEMENT

### Multi-family Dock Facilities in Broward County

Table 3

| Facility Name                                   | Slip Count |
|---|------------|
| 1 Isle of Venice                                | 5          |
| 100 Isle of Venice Klarmont Family Century East | 12         |
| 108 Hendrix Isle                                | 12         |
| 120 Isle of Venice                              | 5          |
| 443 Hendrix Isle Schuman Prop.                  | 7          |
| 48 Hendrix Isle                                 | 10         |
| 49th Street Townhouse                           | 27         |
| 50 Isle of Venice                               | 8          |
| 534 Hendrix Isle                                | 9          |
| 90 Isle of Venice Aqua Mar                      | 7          |
| Alexander Hamilton co-op                        | 6          |
| Americas of the Park Condo.                     | 12         |
| Anchor Club Condo.                              | 22         |
| Apts. Inc. Co-op                                | 30         |
| Aqua Isles                                      | 20         |
| Banyan Marina Condo.                            | 8          |
| Barclay Square Condo.                           | 7          |
| Bay Colony Club Condo.                          | 96         |
| Bay Island Villas Condo.                        | 7          |
| Beach Villas                                    | 6          |
| Beacon Tower Rental                             | 14         |
| Boathouse of Hendrix Isle Condo.                | 12         |
| Cadillac Villas                                 | 8          |
| Camelot Shores Condo.                           | 12         |
| Caravel Condo.                                  | 10         |
| Cariyle Condo                                   | 10         |
| Casa La Quinta                                  | 10         |
| Chagrin Valley Racquet Club                     | 6          |
| Club at Hendrix Isle                            | 11         |
| Coastal Landings Condo.                         | 10         |
| Coastal Waterways Inc. co-op                    | 10         |
| Coconut Bay Resort Condo.                       | 11         |
| Coral Cove Assn. co-op                          | 15         |
| Cordova Arms                                    | 6          |
| Country Manor co-op                             | 7          |
| Cranwell House co-op                            | 9          |
| Cromwell East                                   | 34         |
| Cromwell West                                   | 30         |
| Cypress Club Condo.                             | 21         |
| Cypress Creek Condo.                            | 14         |
| Cypress Island Apts. co-op                      | 35         |
| Cypress Lake East #2                            | 8          |
| Cypress Lake East Apts. co-op                   | 30         |
| Cypress Lake Inc.                               | 32         |
| Dania Condo.                                    | 12         |
| Devon House Condo. 2751 NE15thSt                | 9          |
| DiamondHead Condo.                              | 5          |
| Dock Side Village                               | 25         |
| Dockside Loft                                   | 8          |
| Durham Apts. co-op                              | 9          |

## CONSERVATION ELEMENT

| Facility Name                          | Slip Count |
|--|------------|
| East Point Towers Condo.               | 10         |
| Embassy Condo.                         | 18         |
| Envoy Apts.Inc. co-op                  | 8          |
| Fabio Croce                            | 6          |
| Fort Lauderdale Waterfront Inns        | 14         |
| Fountain View on the Water             | 22         |
| Four Seasons Condo.                    | 10         |
| Francis Terr. Condo.                   | 6          |
| Garden - Aire Village Sea Haven Condo. | 39         |
| GardenPoint Condo.                     | 8          |
| Germaine Terr. Condo                   | 5          |
| Glenco Capital                         | 7          |
| Golden Bay Towers                      | 11         |
| Golden Horn Condo.                     | 9          |
| Golden Horn South                      | 9          |
| Golden Isles Condo.                    | 16         |
| Golden Surf Towers Condo.              | 10         |
| GoldenIsles Yacht Condo.               | 11         |
| Grand View Arms Condominium            | 12         |
| Hamilton Landings Condo.               | 7          |
| Hampton House & Hampton House East     | 12         |
| Harbor View Condo                      | 13         |
| Harbor Wood Condo.                     | 79         |
| Hemispheres Condo.                     | 15         |
| Hendrix Investment                     | 6          |
| Hendrix Isle Development               | 8          |
| Hendrix Villas Corp                    | 5          |
| Heritage Landings Condo.               | 20         |
| High Point                             | 12         |
| Hillsboro Cove Condo.                  | 55         |
| Hillsboro Island Condo.                | 13         |
| Hillsboro Landings Condo.              | 15         |
| Hillsboro LeBaron Condo.               | 9          |
| Hillsboro Mile Ocean Apts. Inc. co-op  | 36         |
| Hillsboro Ocean Club                   | 11         |
| Hillsboro Yacht Club Town Homes        | 13         |
| Hilton Terr. Condo.                    | 10         |
| Imperial Condo.                        | 6          |
| Indigo Point                           | 26         |
| Intracoastal 31 Condo.                 | 10         |
| Intracoastal Reality NE14th St         | 9          |
| Inwood Prop.                           | 9          |
| Isla Del Sol Town Homes                | 11         |
| Island Club Condo.                     | 15         |
| Island Club Condo.                     | 110        |
| Island House co-op                     | 9          |
| Isle Of Paradise co-op                 | 40         |
| L.O.B.                                 | 8          |
| Lake Point Tower Condo.                | 19         |
| Lake View Apts.                        | 10         |
| Lake View Lodge Inc. co-op             | 7          |
| Lake View West Apts. Inc co-op         | 7          |
| LakeShore Lodge Inc. co-op             | 10         |
| Landfall co-op                         | 7          |

## CONSERVATION ELEMENT

| Facility Name                                  | Slip Count |
|--|------------|
| Largo Mar                                      | 14         |
| Las Olas First Develop.                        | 10         |
| Le Club Towers                                 | 11         |
| Lindal Condo.                                  | 11         |
| Luciano Prop.                                  | 5          |
| Lugano   | 10         |
| Marina Del Mar Condo.                          | 12         |
| Marine Colony Villas co-op                     | 10         |
| Mediterranea                                   | 10         |
| Middle River Villas Condo.                     | 11         |
| Nantucket Land Trust                           | 6          |
| Nielsen Prop.                                  | 12         |
| Nobel Point Condo.                             | 90         |
| North Envoy Condo.                             | 7          |
| Norwich Condo.                                 | 9          |
| Oakland Arms Condo                             | 7          |
| Oakland Hills Apts. co-op                      | 6          |
| Oasis Condo.                                   | 6          |
| Ocean Grand                                    | 20         |
| Ocean Marine Yacht Club                        | 12         |
| Ocean View Towers Condo.                       | 20         |
| Oceanage Condo.                                | 16         |
| Olympus Condo.                                 | 26         |
| Overlook Condo.                                | 19         |
| Palm Terr. Condo.                              | 12         |
| Palm-Air at Coral Key Apts.& Condo.            | 46         |
| Paradise Harbor Apts. Inc                      | 12         |
| Paradise Towers co-op                          | 10         |
| Park Layne Towers                              | 10         |
| Peets Prop.                                    | 6          |
| Penthouse Condo.                               | 14         |
| Pine Tree Apts.                                | 44         |
| Pine Tree Landings Condo                       | 32         |
| Pine Tree M/H Park                             | 48         |
| Pilot House Condo.                             | 17         |
| Place Des Arts Holding                         | 10         |
| Plaza 15 Condo.                                | 5          |
| Pompano Lodge Condo.                           | 10         |
| Pompano Yacht & Beach Club Condo.              | 22         |
| Port Repose Inc.                               | 6          |
| Portofino on the Intracoastal Condo.           | 15         |
| Portsmouth at Port Royal Condo.                | 22         |
| Prestige Builders South                        | 8          |
| Rachtanov Prop.                                | 5          |
| Ray Hippele 3rd                                | 9          |
| Reflections of Los Loas                        | 10         |
| Residences on Hollywood Beach Docking Facility | 8          |
| Ridge View Towers Condo.                       | 14         |
| Rio Nuevo Condos.                              | 60         |
| River Bend Condo.                              | 9          |
| River Bend Condo.                              | 5          |
| River House Terr.                              | 10         |
| River House Towers                             | 16         |
| River Landings                                 | 20         |

## CONSERVATION ELEMENT

| Facility Name                             | Slip Count          |
|---|---------------------|
| River Reach Condos.                       | 88                  |
| River View Garden Apts.                   | 10                  |
| Robert Pierson Prop.                      | 16                  |
| Royal Lauderdale Landings Condo.          | 8                   |
| Royal Mariner Condo.                      | 14                  |
| S.J.C.                                    | 12                  |
| Santa Barbara Shores                      | 10                  |
| Scan Invest LLC                           | 10                  |
| Scott York Condo.                         | 6                   |
| Sea Side Villas - Prestige Builders North | 16                  |
| Sidman Prop.                              | 6                   |
| Sobchak                                   | 8                   |
| South East Islander                       | 8                   |
| South Hampton Apts.                       | 7                   |
| Stranahan Point                           | 24                  |
| Sunny Court Condo                         | 14                  |
| Sunrise Bay Club co-op                    | 10                  |
| Symphony condominiums                     | 14                  |
| Tara Hall Condo.                          | 7                   |
| The Enclave                               | 11                  |
| The Islander                              | 7                   |
| The Moorings at Sheridan                  | 38                  |
| The Oaks at Hidden Harbor fka Cape Fear   | 6                   |
| The Oasis                                 | 14                  |
| Tide Water Est.                           | 15                  |
| Town Houses at Harbor Beach               | 16                  |
| TownHouse Isle                            | 6                   |
| Treasure Cove                             | 67                  |
| Vebi & Rose Hodza                         | 8                   |
| Venetian Condo. Inc.                      | 22                  |
| Villa Rio Condo.                          | 12                  |
| Villa Sorrento                            | 9                   |
| Villa Venezia                             | 8                   |
| Vista Las Olas                            | 7                   |
| Water Line Homes                          | 5                   |
| Water View Lodge co-op                    | 17                  |
| Waterford Point Condo.                    | 35                  |
| Watergate Condos.                         | 12                  |
| Waterside on the ICW                      | 6                   |
| Wayne House                               | 9                   |
| Wellington Condo.                         | 10                  |
| Westchester House                         | 7                   |
| Whitezell                                 | 13                  |
| Williamsberg Condo.                       | 7                   |
| Wilshire East Condo.                      | 7                   |
| Wilton Station                            | 0                   |
| Winsor Condo.                             | 11                  |
| Yacht Harbor Apts. co-op                  | 9                   |
| Yacht Harbor Villas Condo.                | 40                  |
| Yacht Haven                               | 120                 |
| <b>Grand Total:</b>                       | <b><u>3,349</u></b> |

# CONSERVATION ELEMENT

## Existing Dock and Shoreline Compilation, Density Calculation, and Proposed Dock Density

Rev. 05.26.07

| BFSP Zone                          | Single Family | Multi-family | Marina | Boat ramps | Transitory | Shoreline (feet) |
|------------------------------------|---------------|--------------|--------|------------|------------|------------------|
| <b>NORTH</b>                       |               |              |        |            |            |                  |
| 1, Hillsboro Canal                 | 136           | 257          | 1096   | 12         | 9          |                  |
| 2, Hillsboro River                 | 1301          | 212          | 82     | 0          | 12         |                  |
| 3, Hillsboro Inlet                 | 1567          | 145          | 633    | 80         | 55         |                  |
| <i>North Total</i>                 | 3,004         | 614          | 1,811  | 92         | 76         | 359,979.77       |
| <b>CENTER</b>                      |               |              |        |            |            |                  |
| 4, Cypress Creek Areas             | 2063          | 477          | 296    | 0          | 9          |                  |
| 5, ICW Central Part A              | 2081          | 403          | 297    | 0          | 31         |                  |
| 6, ICW Central Part B              | 491           | 107          | 97     | 0          | 29         |                  |
| <i>Center Total</i>                | 4,635         | 987          | 690    | 0          | 69         | 531,402.56       |
| <b>SOUTH</b>                       |               |              |        |            |            |                  |
| 7, Middle River Areas              | 1337          | 75           | 0      | 77         | 13         |                  |
| 8, North Fork New River            | 322           | 18           | 31     | 0          | 2          |                  |
| 9, Junction New River              | 268           | 24           | 508    | 22         | 28         |                  |
| 11, Stranahan River/ Canals        | 1917          | 703          | 1230   | 58         | 79         |                  |
| 13, Dania Cutoff Canal East        | 47            | 0            | 869    | 73         | 12         |                  |
| 16, ICW South                      | 680           | 535          | 987    | 167        | 160        |                  |
| 17, Lauderdale Power Plant         | 0             | 0            | 0      | 0          | 0          |                  |
| <i>South Total</i>                 | 4,571         | 1,365        | 3,625  | 397        | 294        | 745,953.95       |
| <b>PORT EVERGLADES</b>             |               |              |        |            |            |                  |
| 12, Port Everglades Inlet          | 0             | 0            | 0      | 0          | 2          |                  |
| <i>Port Everglades Total</i>       | 0             | 0            | 0      | 0          | 2          | 55,990.54        |
| <b>AREAS OF SPECIAL CONCERN</b>    |               |              |        |            |            |                  |
| 10, South Fork New River           | 2476          | 288          | 1874   | 9          | 6          | 258,303.60       |
| 14, Dania Cutoff Canal Middle/C-10 | 727           | 85           | 2543   | 10         | 50         | 152,960.10       |
| 15, Dania Cutoff Canal West        | 343           | 20           | 86     | 0          | 0          | 51,612.01        |
| <i>Grand Total</i>                 | 15,756        | 3,349        | 10,629 | 508        | 497        | 2,156,202.53     |

|                                | (number of docks/ 100 feet) |                       |                  |                        |
|--------------------------------|-----------------------------|-----------------------|------------------|------------------------|
|                                | Existing Docks              | Existing Dock Density | Proposed Density | Proposed Dock Increase |
| North                          | 5,597                       | 1.55                  | 1.93             | 1,353                  |
| Center                         | 6,381                       | 1.20                  | 1.32             | 619                    |
| South                          | 10,242                      | 1.37                  | 1.51             | 1,033                  |
| Port Everglades                | 2                           | 0.00                  | 0.00             | 0                      |
| South Fork New River           | 4,653                       | 1.80                  | 1.98             | 471                    |
| Dania Cutoff Canal Middle/C-10 | 3,415                       | 2.23                  | 2.76             | 806                    |
| Dania Cutoff Canal West        | 449                         | 0.87                  | 1.08             | 110                    |
| <b>Total docks</b>             | <b>30,739</b>               | <b>1.43</b>           | <b>1.63</b>      | <b>4,392</b>           |

Table 4

## CONSERVATION ELEMENT

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Table 5

Fiscal Year 2001/2002 Registered Vessels Compared to Observed Vessels in Specific Size Class

|                             | Class 3, 40' to 65' | Class 4, 66' - 110' | Class 5, 110'> |
|-----------------------------|---------------------|---------------------|----------------|
| <b>Observed</b>             | 3434                | 804                 | 138            |
| <b>Registered</b>           | 1618                | 169                 | 31             |
| <b>Difference</b>           | 1816                | 635                 | 107            |
| <i>Percentage increased</i> | 112%                | 376%                | 345%           |