IDENTIFICATION AND EVALUATION OF LOCAL, STATE, AND FEDERAL RULES TO IMPROVE COMPLIANCE AND ENFORCEMENT OF REGULATIONS DESIGNED TO PROTECT CORAL REEF RESOURCES AND MINIMIZE REEF IMPACTS

A PROJECT OF
THE SOUTHEAST FLORIDA CORAL REEF INITIATIVE (SEFCRI)
FISHING, DIVING, AND OTHER USES (FDOU) AND MARITIME INDUSTRY AND COASTAL CONSTRUCTION IMPACTS (MICCI) FOCUS TEAMS

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FINAL REPORT

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June 15, 2012

Completed in Fulfillment of Contract RM045 for

Southeast Florida Coral Reef Initiative
Fishing, Diving, and Other Uses (FDOU) &
Maritime Industry and Coastal Construction Impacts (MICCI) Focus Teams
Local Action Strategy Project 1

and

Florida Department of Environmental Protection
Coral Reef Conservation Program
1277 N.E. 79th Street Causeway
Miami, FL 33138

This project and the preparation of this report were funded in part by Award No. NA16OZ2440 from the National Oceanic and Atmospheric Administration (NOAA) through a contract with the Office of Coastal and Aquatic Managed Areas of the Florida Department of Environmental Protection. The total cost of the project was $86,885, of which 100 percent was provided by NOAA. The views expressed herein are those of the authors and do not necessarily reflect the views of the State of Florida, NOAA or any of its sub agencies.

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ABBREVIATIONS AND ACRONYMS

AA ..... Awareness and Appreciation
ASACW ..... Assistant Secretary of the Army for Civil Works
BCBRD ..... Broward County Biological Resource Division
BCEPD ..... Broward County Environmental Protection Department
BEACH Act ... Beaches, Environmental Assessment and Coastal Health Act
BMP ..... Best Management Practice
BSO ..... Broward Sheriff's Office
CCA ..... Coastal Conservation Association
CFMC ..... Caribbean Fishery Management Council
CFR ..... Code of Federal Regulations
CRPA ..... Coral Reef Protection Act
CWA ..... Clean Water Act
CZMA ..... Coastal Zone Management Act
DCA ..... Department of Community Affairs
DHSMV ..... Department of Highway Safety and Motor Vehicles
DIN ..... Dissolved Inorganic Nitrogen
EEZ ..... Exclusive Economic Zone
ESA ..... Endangered Species Act
FAC ..... Florida Administrative Code
FDACS ..... Florida Department of Agriculture and Consumer Services
FDEP ..... Florida Department of Environmental Protection
FDOU ..... Fishing, Diving, and Other Uses
FFF ..... Fishing For Freedom
FIM ..... Fishery Independent Monitoring
FKNMS ..... Florida Keys National Marine Sanctuary
FLCIR ..... Florida Legislative Committee on Intergovernmental Relations
FMLA ..... Florida Marine Life Association
FMP ..... Fishery Management Plan
FMSA ..... Florida Manatee Sanctuary Act
FOCC ..... Florida Oceans and Coastal Council
FOSI ..... Finding of Significant Impact
FPC ..... Florida Port Council
F.S. ..... Florida Statutes
FSTDEC ..... Florida Seaport Transportation and Economic Development Council
FWC ..... Florida Fish and Wildlife Conservation Commission
FWCDLE ..... FWC Division of Law Enforcement
FWRI ..... Fish and Wildlife Research Institute
GMFMC ..... Gulf of Mexico Fishery Management Council
HEA ..... Habitat Equivalency Analysis

ICC ..... International Coastal Cleanup
ICRAN ..... International Coral Reef Action Network
IMDCC.....Interagency Marine Debris Coordinating Committee
LAS.....Local Action Strategies
LBSP ..... Land-Based Sources of Pollution
LNG..... Liquid Natural Gas
LRPP.....Long Range Program Plan
MDDERM.....Miami-Dade Department of Environmental Resource Management
MIASF .....Marine Industries Association of South Florida
MICCI .....Maritime Industry and Coastal Construction Impacts
MPA ..... Marine Protected Area
MRCP.....Marine Resource Conservation Partnership
MRCTF..... Marine Resources Conservation Trust Fund
MRFSS..... Marine Recreational Fisheries Statistics Survey
MRIP ..... Marine Recreational Information Program
MSD..... Marine Sanitary Devices
MSRA.....Magnuson-Stevens Fishery Conservation and Management Reauthorization Act
MSST ..... Minimum Stock Size Threshold
NAS.....National Academy of Sciences
NCCOS ..... National Centers for Coastal Ocean Science
n.d..... No Date provided for reference cited
NDZ ..... No Discharge Zones
NEPA ..... National Environmental Policy Act
NGO.....Non Governmental Organization
NMDMP ..... National Marine Debris Monitoring Program
NMFS ..... National Marine Fisheries Service
NOAA..... National Oceanic and Atmospheric Administration
NOAA CSC..... NOAA Coastal Services Center
NOS..... National Ocean Service
NRC..... National Research Council
NRPMD ..... Broward County Natural Resources Planning and Management Division
NSU.....Nova Southeastern University
OCRA..... Oceans and Coastal Resources Act
OEC.....Outer Entrance Channel
OFF ..... Organized Fishermen of Florida
OLE ..... Office for Law Enforcement
OOCRM..... Office of Ocean and Coastal Resource Management
OPPAGA ..... Office of Program Policy Analysis and Government Accountability, Florida Legislature

ORR ..... Office of Response and Restoration
PBCDERM..... Palm Beach County Department of Environmental Resource Management
PBCSO..... Palm Beach County Sheriff's Office
PDF..... Portable Document Format
REEF..... Reef Environmental and Education Foundation
RS..... Restricted Species
RP .....Responsible Party
SAFMC ..... South Atlantic Fishery Management Council
SAL..... Special Activities License
SBMSY ..... Spawning Biomass at Maximum Sustainable Yield
SCUBA..... Self Contained Underwater Breathing Apparatus
SEDAR..... Southeast Data, Assessment and Review
SEFCRI..... Southeast Florida Coral Reef Initiative
South Atlantic: .....Refers to *Southern, North Atlantic Ocean*
SPL..... Saltwater Products License
SPR ..... Spawning Potential Ratio
TAC..... Total Allowable Catch
TBD..... To Be Determined
TCP..... Trap Certificate Program
UMAM.....Uniform Mitigation Assessment Method
USACE..... U.S. Army Corps of Engineers
USCG ..... US Coast Guard
USCRTF ..... United States Coral Reef Task Force
USFWS.....United States Fish and Wildlife Service
VMS..... Vessel Monitoring System
WFF ..... Wildlife Foundation of Florida
WRDA.....Water Resources Development Act

1. Background

In 1998, Presidential Executive Order 13089 created the US Coral Reef Task Force (USCRTF) to lead in the conservation of the nation's coral reefs. In 2002, the USCRTF adopted the Puerto Rico Resolution, which stipulated that each of the seven member US jurisdictions (American Samoa, the Commonwealth of the Northern Marianna Islands, Guam, Hawaii, Puerto Rico, the US Virgin Islands, and Florida) develop Local Action Strategies (LAS) to identify, develop, and implement priority actions and projects to minimize major threats to coral reef ecosystems.

With guidance from the USCRTF, the Florida Department of Environmental Protection (FDEP) and the Florida Fish and Wildlife Conservation Commission (FWC) jointly convened an interagency team, known as the Southeast Florida Coral Reef Initiative (SEFCRI) Team, to develop a Local Action Strategy in 2003. The Florida LAS focus on four areas of concern: 1) Awareness and Appreciation (AA); 2) Land-Based Sources of Pollution (LBSP); 3) Fishing, Diving, and Other Uses (FDOU); and 4) Maritime Industry and Coastal Construction Impacts (MICCI). This report is the product of the Combined FDOU and MICCI LAS Project #1.

2. Goals and Objectives

The main goal of this study was to identify and evaluate local, state, and federal laws and rules to minimize reef impacts and improve compliance and enforcement of regulations designed to protect coral reef resources. Regulations pertaining specifically to the southeast Florida region (Miami-Dade, Broward, Palm Beach, and Martin counties, Figure 2.1) were identified and evaluated for analysis in this report. Only regulations specifically focused on issues related to FDOU and the impacts of MICCI projects on coral reef resources were included (Table 3.1). Although LBSP are also a major threat to the continued integrity of coral reef ecosystems, they are outside of the scope of the current project.

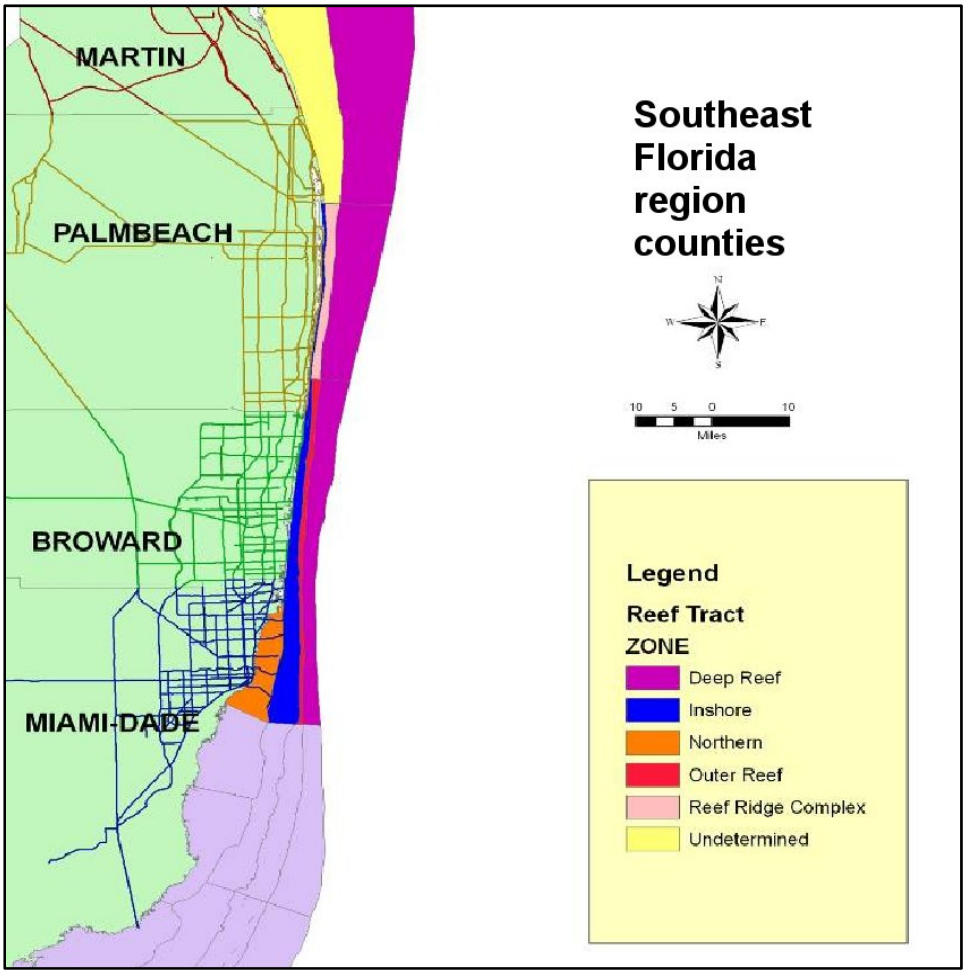


Figure 2.1. Counties within the southeast Florida region.

3. Analytical Approach

In this study, 1,500 tables were generated from coral reef-related laws pertinent to southeast Florida. These included eight federal acts, 16 state laws [Florida Statutes (F.S.) and Florida Administrative Code (F.A.C.)], and 4 municipal codes. These laws were integrated into a legislative database that the study used as a tool in analyzing complementation, overlap, and gaps in the laws that were reviewed.

The database facilitated the analysis of the existing regulations, policies, processes, and use of funds acquired through enforcement by highlighting the targets of a specific regulation (rows), and its components (columns) in a matrix format.

For both permitting and non permitting activities, data and information were collected using publicly accessible websites as well as through structured interviews of key agency personnel during the period February to May, 2007. Resource persons by government agency are listed in Appendix 3.1.

Recommendations included modifications of existing as well as new regulations, policies, processes, and mechanisms for the use of funds to increase effectiveness of coral reef protection. The analysis also identified existing and recommended regulations for use as "standard conditions" for coral reef protection. Interagency workgroups, committees, and panels relevant to the six major topics were likewise identified and summarized in appendices for each chapter. The details of the database approach are contained in Appendix 3.2.

4. Coral reef fisheries

The coral reefs of the southeast Florida region support highly diverse fisheries for commerce and recreation. Over the period 1990-2000, Johnson et al. (2007) estimated average annual landings of about 4.8 million pounds (lbs). Recreational fishers aboard personal vessels and headboats landed 73% of this, and commercial fishers contributed the remaining 27%. Recreational fishers catch fish for leisure or personal consumption or for their aquaria. Commercial fishers catch food or ornamental species for profit. Over the last thirty years for which data exist, significant changes have occurred such as the significant decrease in total catch and effort by the commercial sector, and the increase among the recreational sector using similar indices. In addition, scientific findings indicate declining finfish wild populations, some of which have been categorized as experiencing overfishing or have been depleted to biomass levels classified as overfished (Ault & Franklin, 2011).

This chapter examines state and relevant federal regulations that govern coral reef fisheries in the region to identify those that are effective and those that may need to be improved. The role of scientific information or lack thereof in rule-making is discussed. The roles of state and federal agencies as well as citizen groups that participate in the process of developing, reviewing, and modifying the regulatory framework are analyzed. The resulting status of various fisheries including the snapper-grouper complex, the Spiny Lobster and those collected by the live ornamental trade are highlighted. The issues of law enforcement and citizen compliance are examined. Finally, this chapter includes recommendations to improve the governance of coral reef fisheries in southeast Florida.

4.1. Oversight

4.1.1. Lead institution and its mandate

The FWC was created in 1998 when the citizens of Florida voted for State Constitutional Revision 5 that called for the creation of a single agency that would manage, protect, and conserve the state's freshwater and marine fisheries, and its aquatic and terrestrial wildlife. Merging the Marine Fisheries Commission, the Game and Freshwater Fish Commission, the Florida Marine Patrol, the Florida Marine Research Institute, and the Bureau of Protected Species Management created FWC. In addition to natural resource management, FWC also oversees boating safety and navigation. The policy and state standards for saltwater fisheries are further discussed in section 4.2.2.

In order to fulfill its mandate, the FWC has rule-making authority under its constitutional and statutory authority. Section 9, Article IV of the State Constitution states that the FWC is "required to establish procedures to ensure adequate due process in the exercise of its regulatory and executive functions." The Conservation Amendment of the State Constitution (Revision 5) required the FWC to make rules in exercise of the agency's statutory authority as provided by § 120, F.S. The FWC follows the Uniform Rules of Procedure established in Title 28, F.A.C. when developing rules associated with its constitutional authority, and abides by the procedures provided by §120, F.S. when doing so because of its statutory powers. It observes the notice requirements provided in § 120, F.S. for all notices of its meetings and workshops and of rule development.

Rules enforcing FWC's constitutional authority can be challenged in the circuit courts, while those implementing the agency's statutory authority can be challenged following § 120.56, F.S. During a rule challenge proceedings, the implementation of the challenged rule is not usually suspended unless a judge orders it. Because FWC's constitutionally based rules are very difficult to challenge, the agency's due process procedures have been questioned by advocacy groups like Fishing For Freedom (FFF), while fully supported by others such as the Coastal Conservation Association (CCA).

Recommendations coming from any FWC Division or in collaboration with other local, state, or federal agencies, or from civil groups are basis for rules to evolve in response to changing fisheries. The development of rules is heavily supported by science, provided directly by FWC's Fish and Wildlife Research Institute (FWRI; formerly, the Florida Marine Research Institute) or by state and federal research partners or other research institutions, Non Governmental

Organizations (NGOs), and civic groups. Once a rule is approved by majority of the Commissioners, it becomes part of the FWC body of regulations. These rules are established in Title 68B, F.A.C., the official publication of Florida rules. Statutory fishing regulations are contained in § 379, F.S., and which merges § 370 and § 372, F.S., since 2008. The § 379, F.S. integrates a tiered penalty system for fishing and wildlife violations by statute and by rule.

Although the FWC was given the state's executive and rule-making powers over wild animal life, freshwater aquatic life, and marine fish, the authority to establish license fees and penalties for violations of the FWC rules resides with the State Legislature. Oversight for planning, budgeting, personnel management, and purchasing likewise are by general law enacted by the State legislature.

4.1.2. Structure of FWC

Divisions whose functions have direct relevance to marine fisheries include the Division of Marine Fisheries Management, the FWRI, Division of Habitat and Species Conservation, and Division of Law Enforcement (FWCDLE). See Figure 4.1 for the organizational chart.

The Division of Marine Fisheries Management is responsible for developing regulatory and management recommendations for the consideration by the FWC Commissioners. The role of the Commissioners is to ensure the long-term conservation of the state's marine fisheries resources. The activities of the Division include conducting recreational and commercial marine fisheries outreach and education programs, facilitating artificial reef development and deployment, preparing fishery strategic plans, issuing of special activities licenses, conducting wholesale fish dealer audits, and assisting in trap retrieval efforts. It convenes Workgroups or Advisory Boards to solicit public comment on marine fisheries issues that could inform rule-making (see section 4.1.5).

The FWRI deals with both freshwater and marine fisheries, aquatic and terrestrial wildlife, imperiled species, and red tides. It is responsible for assessment and restoration of the ecosystems within State jurisdiction. It is also responsible for developing the scientific information needed by natural resource managers and stakeholders. For commercial fisheries, FWRI has provided annual summaries of commercial landings since 1986 by month, county, coast, and the entire state. A separate data summary scheme is used for commercial marine life, which cover tropical ornamental species, and which use total numbers instead of pounds to report statewide landings. In addition, commercial fishing license summaries are summarized by fiscal year starting 1990-1991, by county, coast, and statewide.

For recreational fisheries, FWRI estimates recreational total catch, releases, and landings collected that are estimated using data from angler interviews (for kinds and number of fish caught, angler demographics, and fishing trip characteristics), as well as data from the telephone surveys conducted by the Marine Recreational Fisheries Statistics Survey (MRFSS). Both direct angler interviews and the MRFSS phone surveys have been hampered by the absence of a statewide registry of recreational anglers that would provide the population size of recreational fishers to make sampling statistically sound.

FWRI also generates and provides information using its Fishery Independent Monitoring (FIM) Program since 1992. Data obtained from direct finfish and shellfish sampling includes determination of age, growth, reproduction, abundance of young of the year, and presence of abnormalities as indicators of anthropogenic stressors.

FWRI has provided annual Status and Trends Report summarizing all the data from commercial and recreational landings, fishing effort, fishery catch rates, and fisheries-independent sampling data in the last 15 years. An examination of uploaded information and publications species accounts

The Division of Habitat and Species Conservation is concerned with the protection of habitat and species for both the terrestrial and marine zones. This division is responsible for integrating scientific data with applied habitat management for the purpose of maintaining stable or increasing populations of fish and wildlife resources. The research and management effort is based upon an ecosystem wide approach in order to benefit to the greatest diversity of species and habitats.

The FWCDLE implements compliance with all of Florida's laws, including fishing and hunting regulations, and enforces state and federal laws that protect threatened and endangered species. It also enforces regulations that deal with commercial trade of wildlife and wildlife products, and the enforcement of boating safety laws and regulations.

4.1.3. Coordination with Regional fisheries Councils and NMFS

A number of major fisheries of the state extend to federal waters in the Atlantic Ocean well as in the Gulf of Mexico. These include the Spiny Lobster, snapper-grouper complex, coastal sharks, and the Stone Crab fisheries. The FWC and the South Atlantic Fisheries Management Council (SAFMC) with North Carolina, South Carolina, Georgia, and Florida as member states, coordinate the management of these fisheries in the Florida Atlantic waters. The FWC and the

Gulf of Mexico Fisheries Management Council (GMFMC) which member states are Texas, Louisiana, Mississippi, Alabama and Florida, do the same for populations inhabiting Gulf waters. The Spiny Lobster, and the snapper-grouper complex are reef dwelling organisms and their management is discussed here.

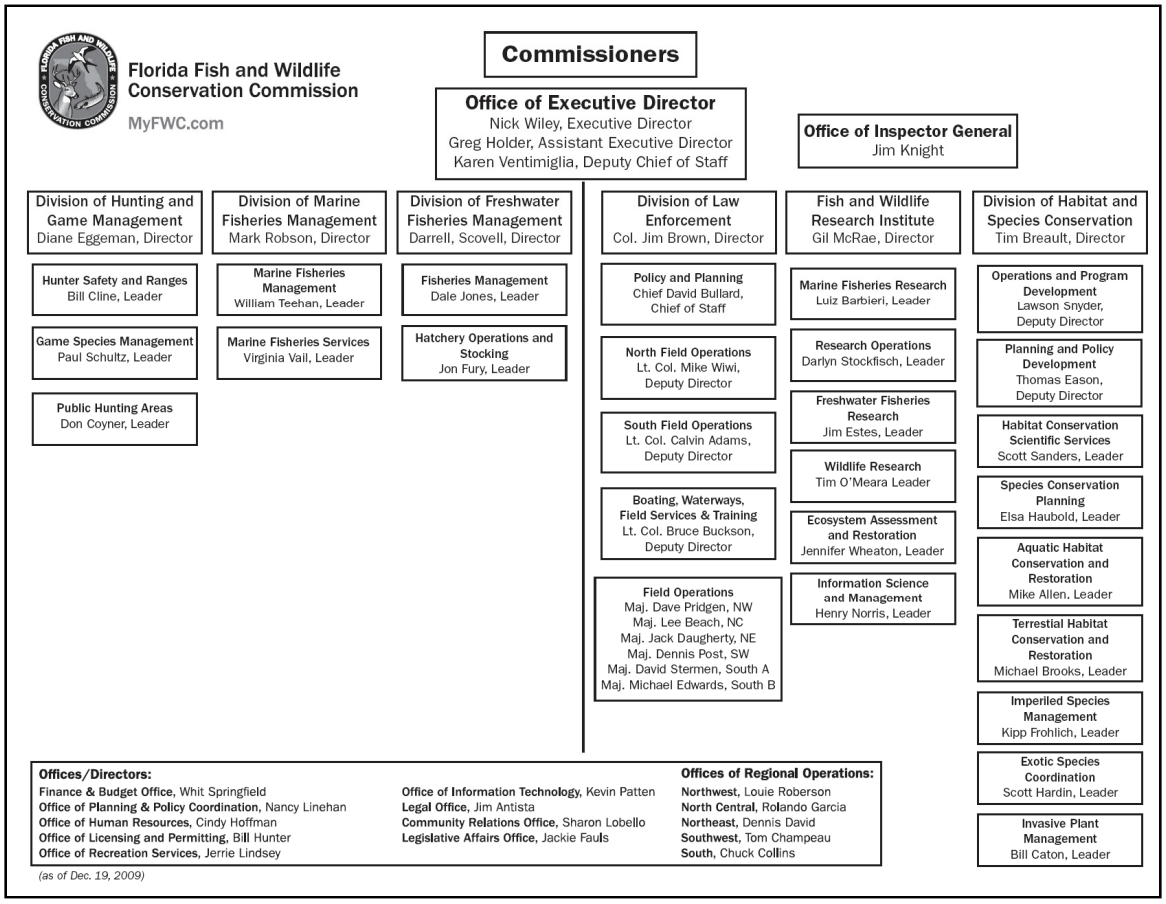


Figure 4.1. Organizational chart of FWC as of Dec 19, 2009 (FWC website).

Both regional fishery management councils manage fisheries in federal waters. They do so by developing Fishery Management Plans (FMPs) and by drafting regulations aimed at maintaining appropriate fish stocks. The reauthorized Magnuson Stevens Fishery Conservation and Management Act (2007) mandates FMPs to include annual catch limit requirements, and rebuilding plans for overfished stocks. The bases for making FMPs are stock assessments conducted by the Southeast Data, Assessment and Review (SEDAR) Program, scientific data and public comment. The National Marine Fisheries Service (NMFS) reviews the FMPs and regulations and is the approving authority as an agency of the US Department of Commerce.

FWC is a state member of both regional councils, and collaborate with members of both councils to ensure consistency between state and federal fisheries regulations. In addition, FWC cooperates with the regional Councils and NMFS in data collection, research, and fish stock assessment and law enforcement.

Florida is also a member of two interstate marine fisheries commissions: the Atlantic States Marine Fisheries Commission and the Gulf States Marine Fisheries Commission. The Interstate Commissions work together to manage shared resources in the members' interstate waters. Thus, FWC, as the state representing agency, collaborates with these commissions in such areas as research, data sharing, habitat conservation, and law enforcement.

For the management of the snapper-grouper complex and the Spiny Lobsters, FWC collaborates with the SAFMC and GMFMC as well as with the Gulf States Marine Fisheries Commission. Shared resources with the Atlantic States Marine Fisheries Commission do not include any reef-based living resource.

4.1.4. Science-based fisheries management through the SEDAR Process

SEDAR is a collaborative process initiated in 2002 by the SAFMC, GMFMC, and the CFMCs in coordination with NMFS and the Atlantic and Gulf States Commissions. Its goal is to provide a scientifically sound, transparent and reliable process of implementing fishery stock assessments in the southeast Atlantic federal waters so that FMPs are founded on these scientific assessments, while engendering participation from constituent and stakeholder groups. Each SEDAR of a major fishery is made up of three workshops: a data workshop where datasets are documented, compiled and analyzed; an assessment workshop during which quantitative population analyses and modeling are conducted to estimate and refine population parameters, the state of fishing, and the status of fishery stocks; and a review workshop where an independent expert panel reviews the data and assessment, and evaluates the soundness of quantified parameters and indices of fishing and stock status. A SEDAR project requires a minimum of six months, exclusive of data collection and model development and other preparatory work.

Table 4.1 lists benchmark and update assessments conducted and scheduled to date, as well as workshops examining SEDAR quantitative methods and modeling. As of the end of 2009, 19 SEDAR benchmark assessments have been finalized. Those relevant to coral reef fisheries management in southeast Florida include benchmark assessments for the following 13 finfish and 1 crustacean species: Red Porgy (2002), Vermilion Snapper (2003, 2008), Yellowtail Snapper (2003), Tilefish (2004), Snowy Grouper (2004), Goliath Grouper (2004), Hogfish

(2004), Florida Spiny Lobster (2005), Gag Grouper (2006), Greater Amberjack (2007), Red Snapper (2007), Mutton Snapper (2007), Black Grouper (2009), Red Grouper (2009) (Carmichael, 2007).

The SEDAR outcomes underpin the design of FMPs and regulations at the regional level. To achieve state-federal regulatory consistency, state fisheries agencies such as the FWC may opt to align state regulations with federal regulations. At both state and regional scales, the SEDAR process provides rigorous and sound scientific bases for fisheries management. For the South Atlantic, Gulf of Mexico and US Caribbean coastal states, the SEDAR process provides excellent opportunity to contribute statewide fisheries data as well as participation in the quantitative stock assessments for fish and shellfish populations that occur in both state and federal management jurisdictions. Because the SEDAR process invites national and international fisheries experts to ensure the use of state-of-the-art and innovative stock assessment methods, the state constituents benefit in using the same for statewide assessments.

Table 4.1.a. SEDAR history and schedule of implementing benchmark and update assessments including methods and procedures workshops (2002 to present) (data from Carmichael, 2007). Those species relevant to coral reef fisheries in southeast Florida include: Black Grouper (19), Black Sea Bass (2), Gag (10), Greater Amberjack (15), Red Grouper (19), Red Porgy (1), Red Snapper (15), Snowy Grouper (4), Spiny Lobster (8), Vermilion Snapper (2).

SEDAR BENCHMARK ASSESSMENT LIST			
SEDAR	**SPECIES**	**YEAR**	**STATUS**
1	SAFMC Red Porgy	2002	Final
2	SAFMC Vermilion Snapper and Black Sea Bass	2003	Final
3	SAFMC and GMFMC Yellowtail Snapper Review ASMFC Atlantic Menhaden and Croaker	2003	Final
4	SAFMC Tilefish and Snowy Grouper	2004	Final
5	SAFMC and GMFMC King Mackerel	2004	Final
6	SAFMC and GMFMC Goliath Grouper and Hogfish	2004	Final
7	GMFMC Red Snapper	2004	Final
8	CFMC Yellowtail Snapper and Spiny Lobster Review FK Spiny Lobster	2005	Final
9	GMFMC Vermilion Snapper, Greater Amberjack and Gray Triggerfish	2005	Final
10	SAFMC and GMFMC Gag Grouper	2006	Final
11	HMS large coastal sharks	2006	Final
12	GMFMC Red Grouper	2006	Final
13	HMS small coastal sharks	2007	Final
14	CFMC Yellowfin Grouper, Mutton Snapper and Queen Conch	2007	Final
15	SAFMC Greater Amberjack and Red Snapper Review SAFMC and GMFMC Mutton Snapper	2007	Final
16	SAFMC and GMFMC King Mackerel	2008	Final
17	SAFMC Spanish Mackerel and Vermilion Snapper	2008	Final
18	Atlantic Red Drum	2009	Final
19	SAFMC and GMFMC Black Grouper, SA Red Grouper	2009	Final
20	ASFMC Menhaden and Croaker Review	2010	Ongoing

21	HMS Sharks: Sandbar, Dusky, Blacknose	2010	Tentative
22	GMFMC Yellowedge Grouper and Tilefish	2010	Scheduled
23	SA: Speckled Hind, Warsaw Grouper	2011	Scheduled
24	FL Yellowtail Snapper	2011	Scheduled
25	SA and GOM Coastal Migratory Pelagics	2012	Tentative
26	HMS Sharks: Species TBD	2012	Tentative
27	SA White Grunt, Scamp, Wreckfish: SA and GOM Hogfish	2013	Scheduled
28	GOM Red Snapper, SA and GOM Goliath Grouper	2014	Tentative
29	Shark TBD	2014	Tentative
30	SA Dolphin, Wahoo, Golden Crab	2015	Tentative
31	GOM TBD	2016	Tentative

Table 4.1.b. SEDAR Assessment Update Status.

SEDAR ASSESSMENT UPDATE STATUS			
Year	**Species (Benchmark)**	**Council**	**Status**
2005	Black Sea Bass (2)	SA	Final
2006	Red Porgy (1)	SA	Final
2007	Vermilion Snapper (2)	SA	Final
2009	Gag and Red Grouper (10/12)	GOM	Final
2009	Red Snapper (7)	GOM	Final
2010	Spiny Lobster (8)	SA & GOM	Scheduled
2010	Black Sea Bass (2) Snowy Grouper (4) Red Snapper (15)	SA	Scheduled
2010	Greater Amberjack (9)	GOM	Scheduled
2011	Gag (10)	SA	Scheduled
2011	Vermilion Snapper	GOM	Scheduled

	Gray Triggerfish (9)		
2012	Red Porgy (1) Vermilion Snapper (17) Greater Amberjack (15)	SA	Tentative
2012	King Mackerel (16) Spanish Mackerel (17)	SA & GOM	Tentative
2013	Red Snapper (7) Gag (10) Red Grouper (12)	GOM	Tentative
2014	Black Grouper (19) Red Grouper (19) Red Snapper (15)	SA	Tentative
2015	Yellowedge Grouper (22) Tilefish (22) Greater Amberjack (9)	GOM	Tentative

Table 4.1.c. SEDAR Workshops.

SEDAR METHODS AND PROCEDURES WORKSHOPS		
Number	**Topic**	**Year**
1	Indices Development and Evaluation	2008
2	Evaluating and Modeling Catchability	2008
3	Caribbean Data Review	2009
4	Evaluating Assessment Uncertainty	2010

4.1.5. In-State Coordination

At the state level, FWC co-chairs the Florida Oceans and Coastal Council (FOCC) with the FDEP. The Council, created by the Oceans and Coastal Resources Act (OCRA), § 161.70, F.S., in 2005, is tasked to coordinate coastal and marine research in the state, create an annual research plan, and recommend new strategies to better manage and conserve Florida's coastal and marine resources. Voting members of the Council are five appointees of the FWC Executive Director, five appointees of the FDEP Secretary, and five appointees of the Florida Department of Agriculture and Consumer Services (FDACS), with the ex-officio participation of three agency heads or their designees (Florida Oceans and Coastal Council, 2009). For the fiscal year 2009-2010, identified research priorities of relevance to coral reef fisheries included evaluating effectiveness of Marine Protected Areas (MPAs) such as habitats, spawning areas, and developing rapid benthic habitat assessment tools (FOCC, 2009).

The FWC is a partner of the SEFCRI, a local action strategy for coral reef conservation in southeast Florida, and participates in identifying and implementing strategic actions in four areas: LBSP; MICCI; FDOU; awareness and appreciation. The SEFCRI is coordinated by FDEP through its Office of Coastal and Aquatic Managed Areas and has been an excellent platform for the systematic discussion of coral reef conservation at the ecosystem level. This paper is one of the outputs of the SEFCRI. In addition, it is worth noting that FDEP and FWC signed a Memorandum of Agreement on February 21, 2007 to launch the Marine Resource Conservation Partnership (MRCP). The aim of the partnership is to solicit and welcome partners from the broad suite of interested parties to design and implement "non-regulatory saltwater recreational outreach and education programs through inter-agency coordination and cooperation in accordance with state-approved management plans, and contingent on available funding" (Marine Resource Conservation Partnership, 2007).

The Commission convenes Advisory Boards and Workgroups that are either formed by statute or by Commission rule and with limited lifespan, to solicit public comment or expertise on marine fisheries issues as inputs in rule-making. Members have academic discipline- or experience-based expertise or have economic or conservation interests in the fishery. The meetings are open to the public and inputs may be used in advising the Commission. The use of Workgroup or Advisory Board recommendations in recommendations to the FWC for potential rule-making triggers the conduct of formal public hearings to gather additional input and comments from the public.

Of relevance to coral reef fisheries management are the work of the following Advisory Boards and Workgroups, all but one of which were created by FWC rules: Ad Hoc Spiny Lobster Board, Marine Stock Enhancement Advisory Board, Artificial Reef Advisory Board, Marine Life Workgroup, and the Trap Certificate Technical Advisory and Appeals Board (created by § 372.673, F.S., 2006). As of this writing, the Ad Hoc Spiny Lobster Board and the Trap Certificate Technical Advisory and Appeals Board have been terminated because their work has been completed. Documentation of some of the group reports and recommendations are available in the FWC website, some of which are referenced in sections below.

4.2. Fishing Regulations

4.2.1. Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 as national context.

In discussing the efficacy of state fishing regulations for coral reef fisheries, it is important to take into account the national standards that federal fishing regulations must meet as set by the MSRA of 2006, the nation's principal law regulating fisheries in federal waters. Although the MSRA does not extend or diminish the authority of state powers to oversee fisheries in state waters (Section 306, MSRA), it aims to "balance state authority with federal conservation and management goals, principally through coordination activities (such as through the regional fishery management councils and the interstate fisheries commissions) and the advice of the (Department of Commerce) Secretary and NMFS rather than direct oversight of state fishery management" (Buck & Waldeck, 2005). The ten national standards are as follows (National Marine Fisheries Service, 2007):

Conservation and management measures shall:

(1) Prevent overfishing while achieving optimum yield.

(2) Be based upon the best scientific information available.

(3) Manage individual stocks as a unit throughout their range, to the extent practicable; interrelated stocks shall be managed as a unit or in close coordination.

(4) Not discriminate between residents of different states; any allocation of privileges must be fair and equitable.

(5) Where practicable, promote efficiency, except that no such measure shall have economic allocation its sole purpose.

(6) Take into account and allow for variations among and contingencies in fisheries, fishery resources, and catches.

(7) Minimize costs and avoid duplications, where practicable.

(8) Take into account the importance of fishery resources to fishing communities to provide for the sustained participation of, and minimize adverse impacts to, such communities (consistent with conservation requirements),

(9) Minimize bycatch or mortality from bycatch.

(10) Promote safety of human life at sea.

The MSRA in its reauthorized form aims foremost to end and prevent overfishing (National Standard 1). It requires fishery managers to set science-based annual catch limits (ACLs) and accountability measures (AMs) for all U.S. fisheries. All stocks currently subject to overfishing will have the ACLs and AMs for implementation by 2010, and by 2011 for all other stocks. The statutory requirements to achieve National Standard 1 as enumerated by Stump (2009) include the following:

- The FMPs must specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished and to contain measures to prevent overfishing or end overfishing and rebuild the fishery [16 U.S.C. section 1853(a)(10)]

- Regional Fishery Management Councils must establish and maintain each a Science and Statistical Committee (SSC) [16 U.S.C. section 1852(g)(1)(A)]

- Councils' SSCs must make recommendations for acceptable biological catch (ABC), preventing overfishing, and other related management advice [16 U.S.C. section 1852(g)(1)(B)]

- Councils must establish annual catch limits that may not exceed fishing level recommendations of the SSC or the scientific peer review process [16 U.S.C. 1852(h)(6)]

- FMPs must establish a mechanism for specifying annual catch limits such that overfishing does not occur in a fishery, including measures to ensure accountability [16 U.S.C. section 1853(a)(15)]

- Fishery managers must prepare and implement a rebuilding plan within two years of notification to end overfishing [16 U.S.C. section 1854(e)(3) & (4)]

- Fishery managers may not allow a period of overfishing under a rebuilding plan [16 U.S.C. section 1854(e)(4)(A)].

4.2.2. Marine fisheries – policy and standards of Florida (§ 379.2401, F.S.)

To determine how the state may decide to respond to federal fisheries regulations, and to the stringent federal rule-making triggered by the MSRA, the existing policy and standards of the state are examined. These were first articulated by the Florida legislature in 1983 (Ch. 83-134, § 4, 5, L.O.F.) and have been amended eight times to its current text as § 379.2401, F.S.

The policy of the state is "to be management and preservation of its renewable marine fishery resources, based upon the best available information, emphasizing protection and enhancement of the marine and estuarine environment in such a manner as to provide for optimum sustained benefits and use to all the people of this state for present and future generations" (§ 379.2401(1), F.S.).

All rules relating to saltwater fisheries adopted by the commission are subject to the following standards (§ 379.2401(3) (a) – (h), F.S.):

(a) "The paramount concern of conservation and management measures shall be the continuing health and abundance of the marine fisheries resources of this state.

(b) Conservation and management measures shall be based upon the best information available, including biological, sociological, economic and other information deemed relevant by the commission.

(c) Conservation and management measures shall permit reasonable means and quantities of annual harvest, consistent with maximum practicable sustainable stock abundance on a continuing basis.

(d) When possible and practicable, stocks of fish shall be managed as a biological unit.

(e) Conservation and management measures shall assure proper quality control of marine resources that enter commerce.

(f) State marine FMPs shall be developed to implement management of important marine fishery resources.

(g) Conservation and management decisions shall be fair and equitable to all the people of this state and carried out in such a manner that no individual, corporation or entity acquires an excessive share of such privileges.

(h) Federal FMPs and FMPs of other states or interstate commissions should be considered when developing state marine FMPs. Inconsistencies should be avoided unless it is determined that it is in the best interest of the fisheries or residents of this state to be inconsistent."

As of the 3rd quarter of the calendar year 2009, overfished stocks in the South Atlantic management jurisdiction are all coral reef finfish such as the Snowy Grouper, Black Sea Bass, Red Porgy, and Red Snapper except for the Pink Shrimp (National Marine Fisheries, 2009a). Stocks in the South Atlantic management jurisdiction that are subject to overfishing are all coral reef fisheries. These are the Vermilion Snapper, Snowy Grouper, Red Grouper, Gag, and the Speckled Hind (National Marine Fisheries, 2009b).It is incumbent upon the constituent states and the SAFMC to address all measures to rebuild the overfished coral reef fish stocks, and to halt the overfishing of those currently subjected to overfishing. As discussed below, some of the rules governing the snapper-grouper complex have been examined by the FWC for federal consistency, and a number have been adopted for implementation in state waters. Some major and very recent federal regulations await consistency studies by FWC, which has to exercise judgment to ascertain that "inconsistent regulations should be avoided unless inconsistency is in the best interest of Florida fisheries or residents" (§ 379.2401, F.S.). FWC actions on consistency determinations and other rulings are examined further below.

State-federal consistency during this period when both state and federally managed coral reef fisheries are subject to overfishing and some stocks showing overfished biomasses calls for decisive action at the state level. Adopting consistent standards in federally and state managed waters are predicted to end overfishing, rebuild overfished stocks and to prevent other populations from

depletion, more efficiently and requiring less rebuilding time than when the state and federal management regimes do not complement one another.

As a first major recommendation, FWC which is the steward of the state's fishery resources must align its policy and state standards with those stipulated for by the MSRA at the federal level. National standard 1 must be adopted at the state level by ensuring that state FMPs contain measurable criteria for identifying stocks subjected to overfishing, and accountable measures to end overfishing and a rebuilding plan for overfished stocks. A timetable with a six month synchronicity with the regional council schedule is desirable for ensuring consistent and complementary state and federal rule-making and regulatory implementation.

4.2.3. Overview

In general, coral reef fisheries in southeast Florida are multi-species exploited by recreational and commercial fishers using diverse fishing gear. They present a challenging level of complexity for management and protection.

Table 4.2 lists the major harvested and regulated species taken from Florida reefs. These include finfish for food, Spiny Lobsters, conch, and ornamental fish, invertebrates, and plant species. These are regulated by Title 68B, F.A.C. and by § 379, F.S.

The majority of fishing regulations is either species- or taxonomic group-specific or are user-oriented (i.e., commercial or recreational). Thus, for each harvested species or group, rules of protection or harvest and disposition of catch for recreational and commercial fishers are specified. In addition, these rules indicate license and certificate requirements, catch and size limits, allowable gear, fishing seasons, and the disposition of the catch. For rules regulating protected species, prohibitions of harvest, possession, and sale are specified. In addition, penalties to be meted out for violations of these rules are likewise prescribed following § 379, F.S.

The regulations for recreational and commercial fishers are enforced mainly through the use of licenses, permits and endorsements, and the regulations for each species are publicized annually on the FWC website for download in PDF format as well in the form of brochures distributed through bait and tackle shops, and which can be mailed to fishers upon request through the FWC website.

Table 4.2. Rule basis for reef dwelling organisms regulated in state waters. General provisions and a number of species-specific stipulations for violations and penalties are found in **§** 379, F.S.

Group	**Common names of species or subgroups**		**Rule Basis in F.A.C.**
Jack	Greater Amberjack Lesser Amberjack	Banded Rudderfish Almaco Jack	Chapter 68B-14
Grouper	Black Grouper Coney Grouper Gag Goliath Grouper* Graysby Misty Grouper Nassau Grouper*	Red Grouper Red Hind Rock Hind Scamp Snowy Grouper Tiger Grouper Yellowfin Grouper Yellowmouth Grouper	Chapter 68B-14
Hogfish	Hogfish		Chapter 68B-14
Conch	Queen Conch*		Chapter 68B-16
Porgy	Red Porgy		Chapter 68B-14
Sea bass	Bank Sea Bass Black Sea Bass Rock Sea Bass		Chapter 68B-14
Snapper	Black Snapper Blackfin Snapper Cubera Snapper Dog Snapper Gray Snapper Lane Snapper Mahogany Snapper Mutton Snapper	Queen Snapper Red Snapper Schoolmaster Silk Snapper Vermillon Snapper Wenchman Snapper Yellowtail Snapper	Chapter 68B-14
Tilefish	Golden Tilefish		
Triggerfish	Gray Triggerfish Ocean Triggerfish		Chapter 68B-14

Lobster	Caribbean Spiny Lobster		Chapter 68B-24
Lobster	Slipper Lobster		Chapter 68B-24
Sponges	Assorted		Chapter 68B-28
Marine life	**FISH**: Angelfish – Blue Angelfish – French Angelfish – Gray Angelfish – Queen Angelfish – Rock Beauty Balloonfish Basslets Batfish Blennies Butterflyfish Cardinalfish Clingfish Combtooth Blenny Cometfish Cubbyu Damselfish Filefish Frogfish (Sargassum fish) Gobies Hamlet Hawkfish High-hat Hogfish- Cuban (Spotfin) Hogfish – Spanish Jackknife-fish Jawfish Moray Eels Parrotfish Pipefish	**INVERTEBRATES**: Brittlestars Calcareous tubeworms Crabs- Blue-legged Crabs-Decorator Crabs-False Arrow Crabs-Furcate Spider Crabs- Nimble Spray Crabs-Polkadotted Hermit Crabs-Spotted Porcelain Crabs-Thinstripe Hermit Crabs-Tricolor Hermit Crabs-Yellowline Arrow Featherduster Worms Fileclams Nudibranchs Octopods except Common Octopus Sea Anemones –Giant Caribbean or Pink- Tipped Sea Cucumbers Sea Fans except Common, Venus Sea Lilies Sea Slugs Sea Urchins except Longspine*, Sand dollars, Sea Biscuits Shrimp (Cleaner, Peppermint, Coral & Snapping) Siphonophores/ Hydroids Octocorals except Common, Venus SeaFans Sponges except Sheepswool,	Chapter 68B-42

	Porkfish Reef Croakers Sea basses except Rock, Bank, Blank, Twospot Seahorses Sharpnose Puffer Sleepers Snake Eels Spotted Drum Striped Burrfish Surgeonfish Sweepers Tangs Toadfish Triggerfish except Gray and Ocean Trumpetfish Trunkfish/ Cowfish Wrasse/ Razorfish	Yellow, Grass, Glove, Finger, Wire, Reef & Velvet Sponges Starfish except Bahama starfish* Starsnails Upside-down jellyfish **PLANTS**; Caulerpa Coralline Red Algae Halimeda/ Mermaid's Fan/Mermaid's Shaving Brush	
Live Rock*			68B-42.008

Table 4.3. Comparison of licenses by species and by fisher including which licenses are required for commercial vs. recreational collection of reef organisms.

Reef Organism	**Commercial Fishing Licenses**	**Recreational Fishing Licenses**
Crawfish (Spiny Lobster)	Saltwater Product License (SPL), Restricted Species Endorsement;(RS), Crawfish Endorsement (with trap tags) (C #), C# (with no trap tags), Commercial Dive Permit (CD #), Trap Tags/ Certificates RULE BASIS: Rule 68B-24.0035, F.A.C.; Rule 68B-24.0055, F.A.C.; § 379.361, F.S.	Saltwater Fishing License, Lobster Permit RULE BASIS: § **379.354; § 379.355, F.S.**
Reef fish	SPL, RS RULE BASIS: § 379.361, F.S.	Saltwater Fishing License RULE BASIS: § 379.354, F.S.
Marine Life	SPL, RS, Quinaldine (SA), Marine Life Transferable Dive (MLD #), Marine Life Non-Transferable Dive (MLN #), Marine Life Bycatch (MLB #) RULE BASIS: Rule 68B-42.0065, F.A.C., § 379.361, F.S.	Saltwater Fishing License RULE BASIS: § 379.354, F.S.
Sponge	SPL, Sponge Endorsement (Q #) – any species belonging to Dictyoceratida – sheepswool, yellow, grass, glove, finger, wire, reef and velvet sponges RULE BASIS: Rule 68B-28.0036, F.A.C., § 379.361, F.S.	Saltwater Fishing License – any species except those belonging to Order Dictyoceratida RULE BASIS: § 379.354, F.S.
Any as applied for	Special Activity License (SAL) Program to regulate activities such as scientific research, education/exhibition, aquaculture, use of innovative gear, use of marine chemicals, release of marine organisms, and use of dredges RULE BASIS: Ch. 68B-8, F.A.C.	

4.2.4. Fishing Licenses

Fishing license systems have been employed by coastal states in the U.S. to generate revenues to pay for the costs of fisheries management and enforcement. They are also used to evaluate fishing effort when license numbers, along with appropriate data such as landed catch, vessel and gear specifications, and duration and number of fishing trips, are analyzed.

4.2.4.1. Commercial Licenses

For commercial harvest and sale of catch thereafter, the system of licenses, permits and endorsements provide the State the means to track seafood from sea through to wholesale and retail dealers. The Saltwater Products License (SPL) is required to harvest or sell all saltwater products. For reef organisms declared as Restricted Species (RS), an RS endorsement is needed to harvest and sell these. To obtain an RS, licensed commercial anglers must show proof of income in terms of trip tickets or out-of-state landings reported under their license (along with a copy of their out-of-state license if applicable). In terms of indicators showing harvest pressure on reef organisms at industrial scale, the number of RS endorsements sold is good to use as shown in Figure 4.2. There are additional state and federal endorsements and permits or certificates necessary to commercially harvest and sell Spiny Lobster, marine life and sponges.

Wholesale dealers holding wholesale dealer's licenses may distribute commercial catch to licensed retail dealers or other licensed wholesale dealers. A retail dealer with a retail dealer's license or if licensed by the Division of Hotels and Restaurants, can purchase saltwater products from a whole seller and sell to the consumer. Commercial sales are reported to FWC in the form of trip tickets, annual records of which are provided to the license holders by FWC, and are used to reckon total commercial fishing effort and catch. Thus, for commercial catch, the license system is effective in that it requires mandatory licenses to harvest and sell saltwater products including reef organisms. Furthermore, renewal of these licenses for continued commercial operations depends on licensees' previous compliance with the license and permitting system. The FWC is therefore able to tract all licenses and transactions by name to a license holder or boat registration number issued in the name of the applicant. Records of commercial licenses issued by FWC and its predecessor for the period 1994 to present are available for download by county, coast, and for the entire state. However, the publicly accessible database does not include numbers of commercial fishers by year by license type.

Figure 4.2. shows trends in the number of and SPLs that have been issued over the period 1987-2007 (top left panel) and the landings (bottom left panel) for the period 1982-2007. In 2007, an estimated 6,820 SPL holders landed about 83 million pounds of saltwater products, both numbers (licenses and landed catch) recorded as the lowest over the period observed. The trends could be due to a number of factors. The commercial sector is competing with an increasing recreational sector for finite fishery resources, which are experiencing a net increase in fishing pressure.

For as long as commercial fishers report fisheries data required by their license agreements, the total landed catch for various fisheries are well estimated. However, fisheries regulation may have to move toward a more active mode in determining the total number of commercial and recreational licenses that each major fishery can support in order to be sustainable on the long-term. These determinations would depend on defining the total allowable catch (TAC) for each fishery, and allocating this among fishing sectors as required by the MSRA. The implications for three major fisheries are discussed below.

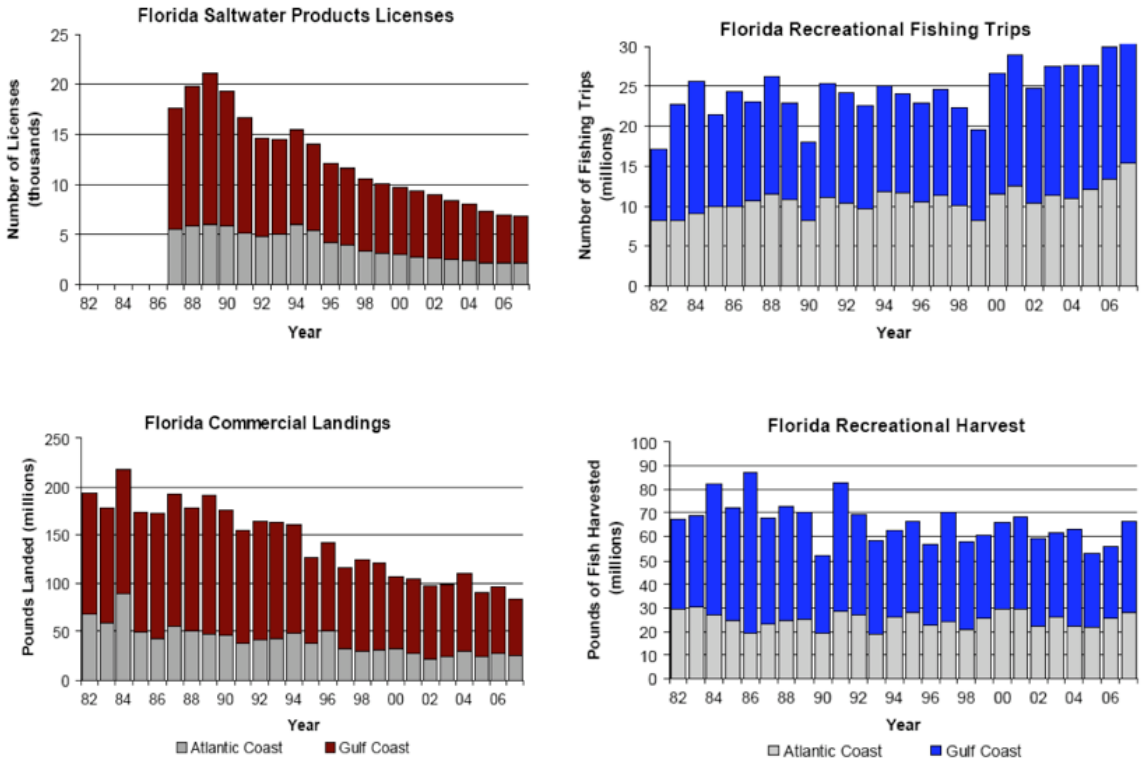


Figure 4.2. Commercial saltwater products licenses (top-left) and commercial landings (bottom-left). Recreational fishing effort measured in trips (top-right) and catch (bottom-right)(FWC FWRI 2009a).

Figure 4.2 above (top right) shows an increasing trend in recreational fishing effort measured in fishing trips. The bottom right panel indicates a minimum estimate of landed catch because values do not include all fish landed. For the license year 2007-2008, a total of 1.08 million recreational licenses were issued with 38% sold to non-resident fishers. The increase in fishing trips may be attributed to an increase in the number of recreational fishers.

To estimate the number of recreational fishers, the MRFSS database, recently renamed Marine Recreational Information Program (MRIP) was accessed. MRIP is designed by NMFS to monitor recreational effort and catch through intercept surveys and phone interviews. Figure 4.3 shows a long-term trend of increasing number of recreational fishers with resident and out-of-state estimates closely tracking each other. The estimates remain suspect given a major drawback in the current survey and interview system that is the absence of a universal list of state recreational fishers that would serve as a benchmark population for developing a statistically sound sampling protocol at state and regional levels (National Research Council, 2006). The numbers may be overestimates in that total resident fishers were obtained by summing up estimates for both west and east coasts of the state. Double counting those who fish on both coasts may bias numbers upwards (Bohnsack, pers. comm.). However, FWC adds west and east coast numbers to estimate the statewide number of recreational fishers.

To address the need to refine estimates of recreational fishing effort, NMFS published a final rule on Dec. 30, 2008 establishing a national registry of recreational fishers (50 *CFR* 600.1400 to 600.1417). The registry will build on existing data from the licensing systems of certain coastal states including Florida. Persons holding licenses by a state that provides data determined to be adequate for the national registry need not register with NMFS. The rule takes effect on January 29, 2010 with some provisions (50 *CFR* 600.1405) in effect as early as January 1, 2010.

Florida has a system of licensing recreational fishers and qualifies as an exempted state, i.e., recreational fishers holding Florida state recreational licenses for marine and anadromous fishes, need not register with NMFS. An exempted state will "annually submit to NMFS the name, address, telephone number and date of birth of all persons and for-hire vessels and for-hire vessel operators licensed to fish, or who are registered as fishing, in the Exclusive Economic Zone (EEZ), in the tidal waters of the state, or for anadromous species" 50 *CFR* 600.1416 (a). Florida exempts fishers below 16 years of age and senior fishers age 65 and older from holding saltwater fishing licenses. The registry ruling acknowledges the minor age exemption and hopes to capture information on young fishers through adults who would be interviewed. For senior exempt

fishers, the ruling requires additional data submissions on name, address and telephone number of excluded anglers over age 59, and those with state lifetime and multi-year licenses, or with state combination license [50 *CFR* section 600.1416 (d) (1) to (3)].

To become fully compliant as an exempt state, Florida instituted a new regulation that requires that a person fishing from coastal shores must buy a saltwater shoreline license costing $9.00/year, unless a fisher already holds a resident salt fishing license which covers fishing from shore, dock, jetty, or a boat. The rule became effective in July 2009.

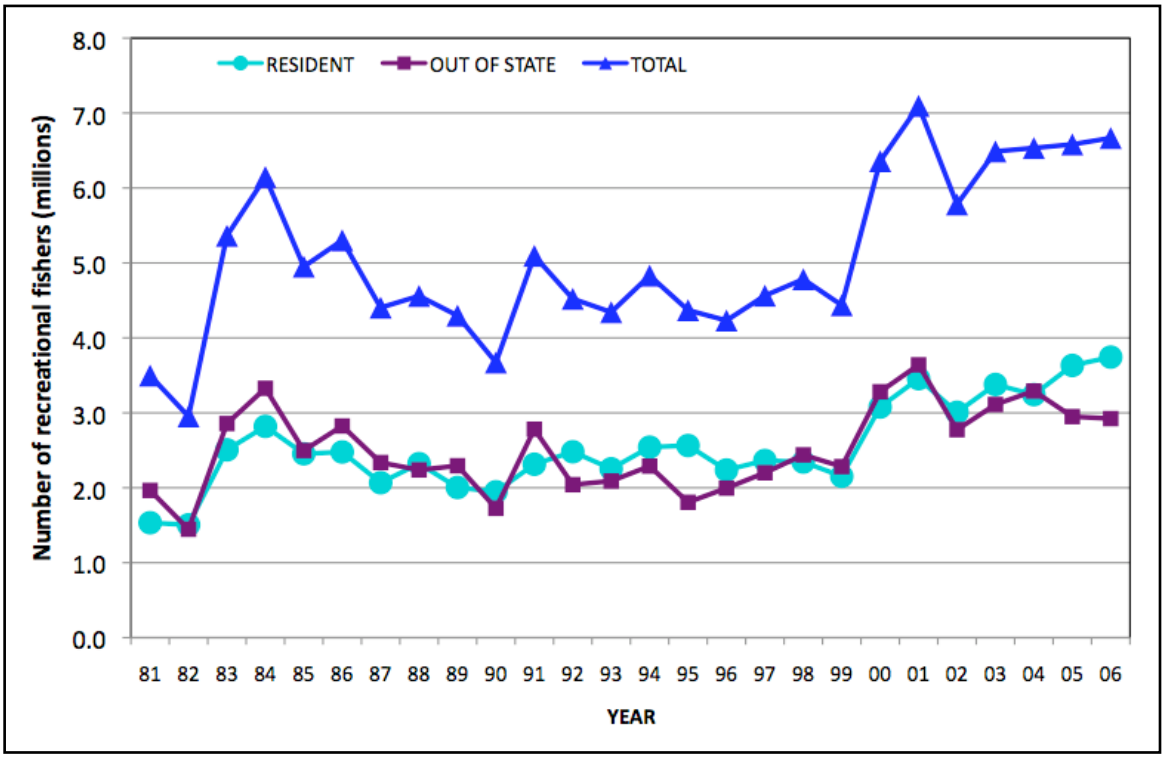


Figure 4.3. Estimated number of recreational fishers in Florida for the period 1982 to 2006 using data from the MRIP previously known as MRFSS.

FWC must ensure that the state database of recreational anglers are fully compliant with federal requirements in the soonest possible time so that statewide analyses could be done to determine recreational allocations and evaluate subsequent economic impacts of management options using the best data available. Those fisheries currently dominated by the recreational sector and which are experiencing overfishing or are depleted below spawning biomass levels may be prioritized for immediate review.

Some ideas on modifying the existing license fee system for recreational saltwater fishing are discussed in section 4.4.2.

4.2.4.2. Special Activity Licenses

In addition to recreational and commercial harvest regulations, permits for special activities that may require waiver of existing state regulations are provided for under the Special Activity License (SAL) Program Chapter 68B-8, F.A.C. Activities covered by SALs include scientific research, education/exhibition, aquaculture, the use of non-conforming or innovative gear, the use of marine chemicals, the release of marine organisms and the use of dredges, among others.

4.2.5. Species- or taxonomic group-based regulations

The species that make up the coral reef fisheries of the state are managed in various ways. Queen conch, marine life, and sponge fisheries are managed solely by FWC in both the Atlantic and Gulf state waters. NMFS and FDACS that regulate the leases, jointly manage the harvest of live rock. The FWC and the two regional councils jointly manage all other species that comprise the major coral reef fisheries of the state (Greater Amberjack, Black Sea Bass, the grouper-snapper complex, Red Porgy, Spiny Lobster, Golden Tilefish, and Gray Triggerfish). For the latter species, the Commission works closely with the regional councils in the compilation of data for SEDAR stock assessments as well as in the formulation of FMPs for federally managed waters. For Spiny Lobster and Yellowtail Snapper, the regional councils usually defer to the Commission for data and management recommendations. For jointly managed stocks, the Commission has the option to align its management with those of the regional councils to achieve consistency in regulations, or to enforce inconsistent rulings which make for confusing enforcement and may potentially short-change commercial fishers who hold federal permits and who must abide by federal regulations even while fishing in state waters. With less stringent state laws, recreational and charter fishers will fish with less restrictions. To date, the SAFMC has FMPs for (1) coral, coral reef, and live/hardbottom habitat; (2) snapper-grouper complex with 73 species; and (3) Spiny Lobster, all of which are relevant to coral reef fisheries management in southeast Florida.

At the regional council level, rule-making is supported by stock assessments such as those carried out through the SEDAR process (i.e., 13 reef fish and 1 Spiny Lobster assessments). At the state level, SEDAR assessments are even more critical as there appears to be a dearth of stock assessments that focus on nearshore populations. Over the last 12 years, FWRI has implemented 21 stock

assessments, of which 3 target reef organisms (greater amberjack in 1999, yellow snapper in 2003, and the Spiny Lobster in 2005). In addition to these, FWRI has prepared 15 annual compilations of available fisheries data beginning 1994. These compilations are used to update species accounts including life history information, statewide landed catch, trends in catch rates, and results of recent stock assessments (FWC FWRI website, 2009). FWRI emphasizes that trend summaries are not stock assessments (FWC, 2009a). Combining the SEDAR and FWC initiated stock assessments for coral reef fisheries, as well as the annual trends and status reports, FWC releases biannual revisions of recreational and commercial fishing regulations. However, the dearth in stock assessments for nearshore organisms such as shallow water snappers and groupers appears to limit the extent to which the Commission can make independent ecologically sound and economically optimal decisions at the species level. In the absence of good science, management decisions can be compromised by short-term economic considerations which have unintended long-term impacts on the fisheries and fishers.

4.2.5.1. Finfish including Snapper-Grouper Complex: Management history and state of fish stocks.

Table 4.4, Table 4.5, and Table 4.6 show detailed regulations for the period 1986 to 2009 for major grouper, snapper, and other reef finfish species, resp. The changes in regulations were extracted from Schlesinger (2009). The tables also include the current status of the fish stocks obtained from recent independent, state, and SEDAR fish stock assessments where available. Increases in minimum size limits, decreases in bag and vessel limits, and imposition of temporal closures are typical trends in the way regulations evolved to cope with increasing fishing mortality.

Of the twelve reef finfish species examined here to illustrate the evolution of fishery controls such as size and bag limits, seasonal closures, and most recently, commercial catch quotas, only the greater amberjack in Atlantic federal waters is not subject to overfishing and its biomass is not overfished (SEDAR, 2008a). Table 4.7 shows that the minimum size limits broadly allow for fish to reproduce before capture assuming high compliance with these regulations. However, it must be noted that size controls do not take into account slow growth rates such as those for groupers and Hogfish (Ault, Smith, & Bohnsack, 2005).

The Black Grouper, Gag, Red Grouper, Gray Snapper, Mutton Snapper, Red Snapper, Vermillion Snapper, Gray Triggerfish, Red Porgy, Hogfish, and Golden Tilefish populations are either experiencing overfishing, or have overfished

biomasses in both Atlantic state and federal waters. In the Florida Keys, which exhibit intense fishing mortality because fishing is a major tourism activity, these snapper and grouper species exhibit spawning potential ratios (SPRs) lower than the 30% limit, indicating their overfished status (Figure 4.4) (Ault, Bohnsack, Smith, & Luo, 2005). Thus it appears that these traditional control measures appear insufficient to prevent overfishing in a number of coral reef fisheries.

Species-specific measures (see Appendix 4.2) are important but they only control catch and effort to a certain extent. They also do not take into account slow growth rates among groupers and Hogfish (Ault, et al., 2005). Furthermore, the high influx of recreational fishers may easily overwhelm bag and size limits, even with their full compliance with species-directed control measures. Only one of the twelve species, the Red Grouper, is mainly a commercial fishery. The difficulty in monitoring recreational fishing effort and catch may have contributed largely to the exploitation of reef finfish that are popular among recreational fishers. A consequence of poor monitoring data would be ineffective control measures, even species-specific ones.

The Commission should explore a fundamentally different approach that asks the basic question "how much fish should be left to sustain coral reef ecosystems and the fisheries these support" instead of the usual focus on how much fish can be caught (Safina, 2009). More holistic measures should be used as a complementary strategy to species-specific regulations. These include the determination of TAC and catch allocation among recreational and commercial sectors. In addition, permanent closures will need to be established to allow full rebuilding of populations so that these can sustain further exploitation for the long-term. Permanent closures can protect and nurture species interactions such as predator-prey relationships, the density of forage organisms, and habitat function. By identifying critical fish habitats, and coordinating with authorities such as with the FDEP that have statutory authority to safeguard submerged sovereign lands as well as benthic ecosystems, the Commission's mandate will be well served.

At the regional level and driven by the MSRA mandate to end overfishing, the SAFMC passed in June 29, 2009 Amendment 16 to the Snapper-Grouper FMP initially adopted in 1983 (South Atlantic Fisheries Management Council, 2008; National Marine Fisheries Service, 2009c). The final rule has been in effect since July 29, 2009. Amendment 16 embodies desperate measures to address the serious declines in spawning biomasses and the heavy fishing pressure exerted by commercial and recreational fishers on this reef fish complex. The major provisions of Amendment 16 are:

(1) January-April ban on recreational and commercial harvest of shallow water grouper species (Gag, Black Grouper, Red Grouper, Scamp, Rock Hind, Red Hind, Coney, Graysby, Yellowfin Grouper, Yellowmouth Grouper, and Tiger Grouper);

(2) November-March ban on recreational harvest of Vermilion Snapper;

(3) Vermilion Snapper commercial quota of 315,523 lbs gutted weight (January to June); and 302,523 lbs gutted weight (July-December);

(4) Gag commercial quota of 352,940 lbs gutted weight;

(5) Reductions in recreational bag limits for grouper aggregate (3 fish); Vermilion Snapper (5 fish); Gag/Black Grouper bag limit within aggregate (either 1 Gag or Black Grouper);

(6) Requirement for all fishers to use dehooking tools when necessary.

(7) Amendment 16 provisions govern federal permit holders when they fish in state and federal waters.

(8) Captain and crew of for-hire vessels have zero bag limits for Vermilion Snapper and grouper aggregate (Misty Grouper, Red Grouper, Scamp, Tiger Grouper, Yellowedge Grouper, Yellowfin Grouper, Blueline Tilefish, Sand Tilefish, Coney, Graysby, Red Hind, and Rock Hind; Snowy Grouper, Golden Tilefish).

The FWC initially opposed these federal actions because of their "major impact on Florida's economy and fishing interests" (Robson, 2009a). Despite these initial reactions, FWC agreed to adopt federal rules for the Vermilion Snapper on Sept 10, 2009, and which took effect in state waters on Oct. 16, 2009. FWC approved state regulations consistent with federal rules on grouper fishery on Dec. 10, 2009, and which would become effective on Jan. 19, 2010.

To address overfishing of Atlantic Red Snapper, the SAFMC issued an interim rule on December 3, 2009, to ban commercial and recreational fishing for Red Snapper for six months beginning January 4, 2010 to June 2, 2010, with a possible extension of another six months if necessary. The council is expected to issue long-term measures to NMFS mid-year. FWC expressed opposition against this interim rule because of adverse economic impacts to the state's fishing industries (Robson, 2009a). The commission is participating in the council deliberations and may address any potential regulation changes for state waters.

On December 15, 2009, the SAFMC approved measures outlined in Amendment 17B to the South Atlantic Snapper-Grouper FMP and which focus on deepwater closures in federal Atlantic waters 240ft deep seaward where fishing for Speckled Hind, Warsaw Grouper, Snowy Grouper, Blueline Tilefish, Yellowedge Grouper, Misty Grouper, Queen Snapper and Silk Snapper would be prohibited (SAFMC, 2010). Amendment 17B established a combined allowable catch limit (ACL) for Gag, Black, and Red Grouper of 662,403 lbs (gutted weight) for the commercial fishery, and 648,663 lbs (gutted weight) for the recreational fishery. According to Robson (2009a), FWC expressed support for deepwater grouper restrictions since there is no significant deepwater grouper fishery in the state. No analogous state regulations to deepwater closures have been established to date. As of this writing (August 2010), a final rule has not been passed (SAFMC website).

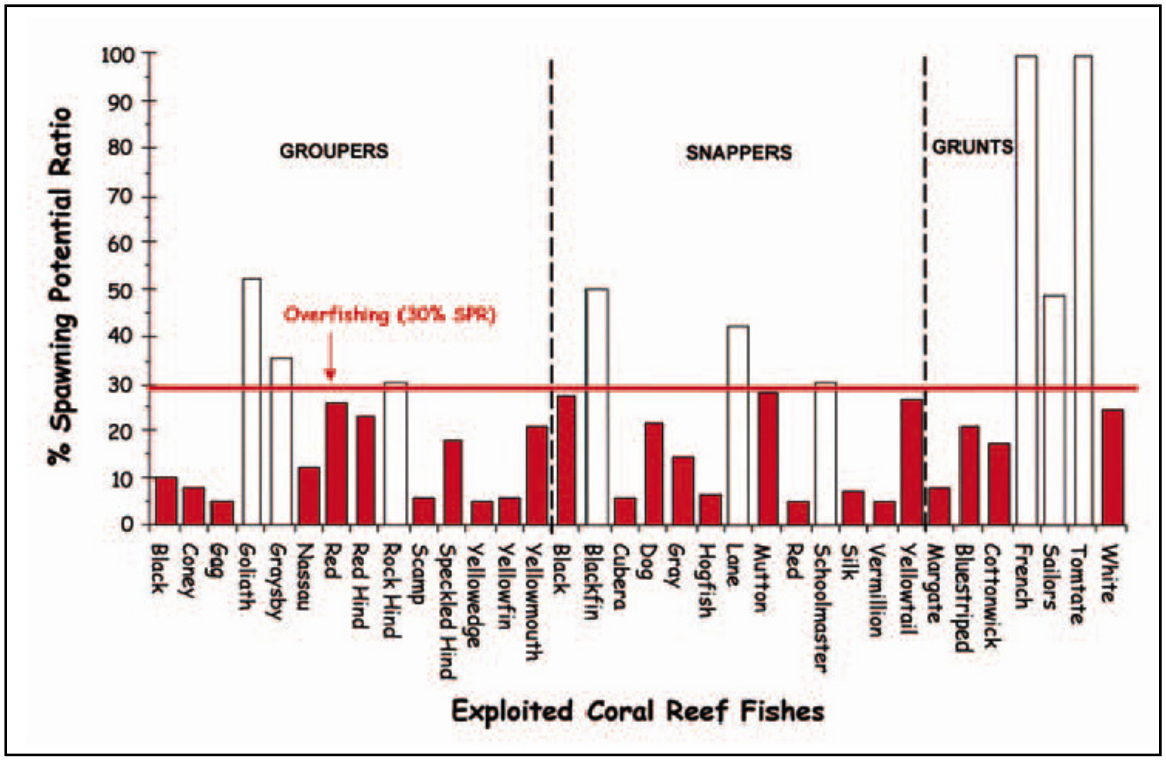


Figure 4.4. Twenty-five of 34 four species belonging to the snapper-grouper complex in the Florida Keys for the period 2000-2002 have SPR lower than the 30% SPR standard for determining overfished stocks (red bars) (Ault, et. al, 2005).

4.2.5.2. Caribbean Spiny Lobster

This species sustains one of the most important commercial fisheries for the state of Florida, and its recreational fishery is perhaps the most popular recreational lobster fishery globally (FWC, 2005). The Spiny Lobster is a co-managed species with the SAFMC for the Atlantic state and federal waters, and with the GMFMC for Gulf state and federal waters. The federal FMPs that covers the Gulf of Mexico and the South Atlantic waters, was implemented on July 2, 1982 and to date, has undergone nine amendments. Given that majority of landings from both commercial and recreational fisheries originate from state waters off South Florida and the Florida Keys, the Spiny Lobster FMP was written as an extension of the state management plan. Over the last 27 years, both the state and federal initiatives have collaborated towards greater consistency, while at the same time giving each other latitude to explore options in the best interest of the resource and the fishers.

4.2.5.2.a. Caribbean Spiny Lobster: *Management history.*

Amendment 8 (Caribbean Fishery Management Council, Gulf of Mexico Fishery Management Council, & South Atlantic Fishery Management Council, 2008) provides an excellent historical narrative of crawfish management in the state and the milestones are discussed here for context to show how management evolves in response to market, social and political realities of the century. Until the early 1900s, the lobster fishery was pursued largely for finfish bait. The construction of the Overseas Railroad in 1912 allowed for a market expansion northward from southern Florida's rich lobster grounds and spurred the growth of the fishery. By 1919, the State Legislature responded to the growing commercial lobster trade by establishing a seasonal closure from March 1 to June 1 and later was amended to be from March 21 to June 21. In the meantime, the fishery was widening its grounds to include deeper areas, so that the gear went from cast and gill nets and haul seines to include bully nets and wire traps for use in deeper waters.

During the fishing period from 1925-26 to 1927-28, total landings increased by an order of magnitude from 88,000 lbs to 873,000 lbs, prompting the state in 1929 to lengthen the closed season from three to four months (March 21 to July 21) and to institute for the first time a minimum size limit of one pound.

The development of deep-freeze storage techniques led to another decade of 9-fold growth in landings from 0.4 million pounds to 3.58 million pounds from 1940 to 1949.

The 1950s featured an expansion in the number of vessels from 102 in 1952 to 254 in 1959 and, in the number of traps used in the fishery from 17,000 in 1951 to 52,000 in 1959. In addition, new technology was used to increasing fishing efficiency. SCUBA diving was used to facilitate catching lobsters with spear guns. Hydraulic systems were first employed to aid in hauling traps. Undersized lobsters were also discovered to be excellent bait and the use of shorties became an increasingly entrenched practice. Thus, the commercial landings doubled from 1.56 million lbs in 1950 to 3.18 million lbs in 1959.

The ever-growing industry necessitated tighter regulation by the State. The timing of the four month closed season was changed to the period from April 15 to August 15, and the legal size limit was defined as a minimum tail size of six

inches. By 1954, the State started to require permits and for fishers to report the number of traps fished.

In the 1960s, thousands of Cubans migrated to Florida, many who initially intended to fish lobsters in the Bahamas. With the closure of Bahamian waters to foreign fishers in 1975, these migrant fishers harvested lobsters in Florida. Gear restrictions began to be imposed in 1965 including the use of permit numbers for traps and marker buoys. The state also chose three inches minimum carapace length.

By the 1970s, conflicts between commercial and recreational divers began to escalate. In 1975, the State passed legislation creating the two day sport season on the last consecutive Wednesday and Thursday of July, and which is one week before the start of the commercial season. Sport season bag limits allowed six lobsters per person per day in Monroe County and Biscayne Bay National Park and up to 12 lobsters in other state waters. Regular season recreational limits are six lobsters per person per day. The first fisheries management plan was adopted in 1987, incorporating existing regulations and practices. In 1988, the then Florida Marine Fisheries Commission implemented a three year moratorium on the issuance of new permits to limit total commercial effort. In 1990, the crawfish was designated a restricted species. The following year, a recreational Spiny Lobster license was created and was required for recreational fishers with saltwater fishing license to continue fishing for lobsters.

For two decades, the number of lobster traps increased unbridled from 219, 100 in 1970 to 979,766 in 1991 exacerbating recreational and commercial fisher conflicts, increased mortality among undersized lobsters (shorties), decreasing catch per trap, and increasing concerns about trap debris and their environmental impacts. In 1992, the state implemented the crawfish Trap Certificate Program (TCP) which aimed to gradually decrease the number of trap certificates be decreasing an individual's traps by up to 10% annually. This reduction was carried out in 1994, 1995, 1996 and 1999. In 2001, FWC targeted a total of 400,000 certified traps by implementing subsequent "passive/active" annual reductions of 4%. Over the last three fishing seasons since 2005-2006, trap certificates averaged at 482,101 traps (FWC, 2005).

No fisher with one or more lobster trap certificates can buy a commercial dive permit. From Jan 1, 2005 to Jan 1, 2010, no new commercial dive permits will be issued and only those active during the 2004-2006 lobster season may be renewed by September 30 of each year. Eligible permits that are not renewed are forfeited to the state. Under the trap certification reduction program, the number of commercial trap fishers decreased from 3700 in the 1993-94 season to 629 at the

start of the 2004-05 season (FWC, 2005). Over the same period, the numbers of commercial divers remained relatively stable with about 402 in 1993-94 to 370 during 2004-05, but catching an increasing share of the total catch.

Throughout this management history, critical reference limits such as TAC limits or catch allocations across the fishing sectors were not established. Examining the trend in landed catch after the introduction of the trap certificate reduction program, Figure 4.5 shows a significant overall decrease in the commercial catch from 4.7 million lbs in 1993 to 3.4 million lbs in 2004. Despite the decreasing trend, the percent of total catch contributed by the commercial section was variable within a range of 72% to 80%. A closer look at catch trends by gear type provides additional insight. The regulation of the commercial trap fishery did significantly reduce total catch but caused an unintended shift in effort with the increase in catch contribution from the commercial diving sector (Figure 4.6). In addition, the contribution of the recreational sector steadily increased from a low of 19% in the 1998-99 season to levels 23% or higher in subsequent years (Figure 4.5).

To prevent further shifts within the commercial sector (trap and diving), FWC imposed a daily trip limit of 250 lobsters per day for commercial divers beginning in the 2003-04 season, as well as declared harvest of lobster from artificial habitats "lobster casitas" illegal. In addition, FWC disallowed the simultaneous possession of a commercial dive endorsement and trap certificates. To address the steady increase in recreational catch portion of total catch, FWC reduced recreational bag limit during the regular lobster fishing season from 24 per boat or six per person limit in state waters to just six per person per day beginning in the 2003-04 season. In 2004, the Commission suspended the trap reduction process for three years for further evaluation. In 2009, the trap reduction schedule was modified to state that once trap certificates or sold or transferred outside of the immediate family of a certificate holder, the number of certification received by the purchaser would be reduced by 10%. Such reduction mechanism would be used to reach a desired target total of 400,000 traps, after which no further reduction would be implemented except through forfeiture (Rule 64B-24.009, F.A.C.).

4.2.5.2.b. Caribbean Spiny Lobster: ***Status of the fishery.***

To date, the status of the Spiny Lobster fishery is equivocal. Using fishery-independent data, the SEDAR Stock Assessment Panel (SEDAR, 2005) stated that the stock was not overfished using the 20% static SPR reference level specified in the FMP. In the last three years of the period examined (2001 to 2003), the ratio was above the reference limit (Figure 4.7). However, the panel stated that the study was unable to determine the status based on the Spawning Biomass at Maximum Sustainable Yield (SBMSY) or the Minimum Stock Size Threshold (MSST) in the absence of a Caribbean-wide stock assessment. Because of the similarity in genetic composition of Spiny Lobster populations across most Caribbean sites, it is hypothesized that recruitment into the Florida fishing grounds includes larvae dispersing from locations upstream of Florida. Thus a proper evaluation of the Florida-based fishery must include estimates of spawning stocks in source areas (SEDAR, 2005). The allocation across fishery sectors (commercial trap, commercial diving, and the recreational sector) should follow the determination of fishing status.

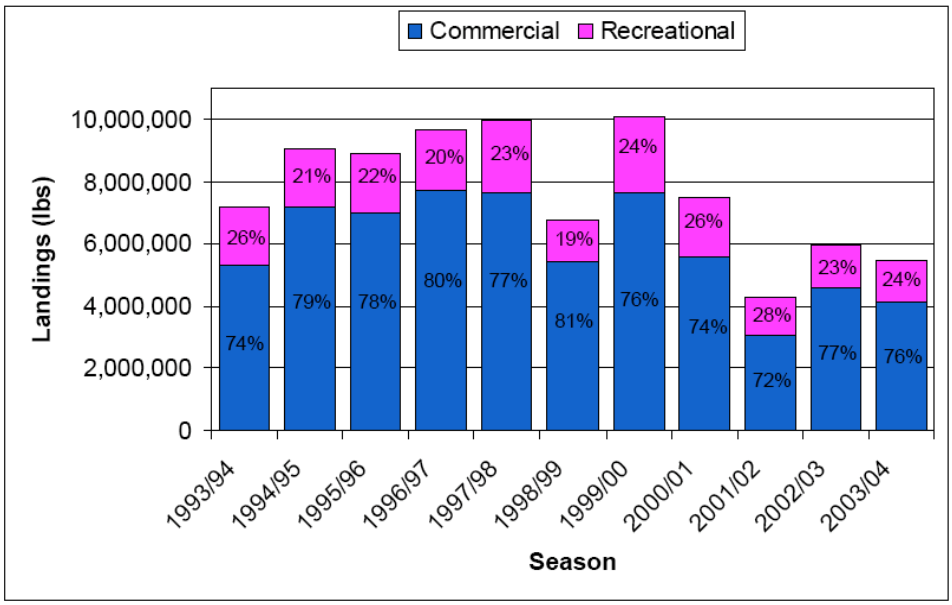


Figure 4.5. Landings of Caribbean Spiny Lobster in Florida over the period 1993-2004 (FWC, 2005).

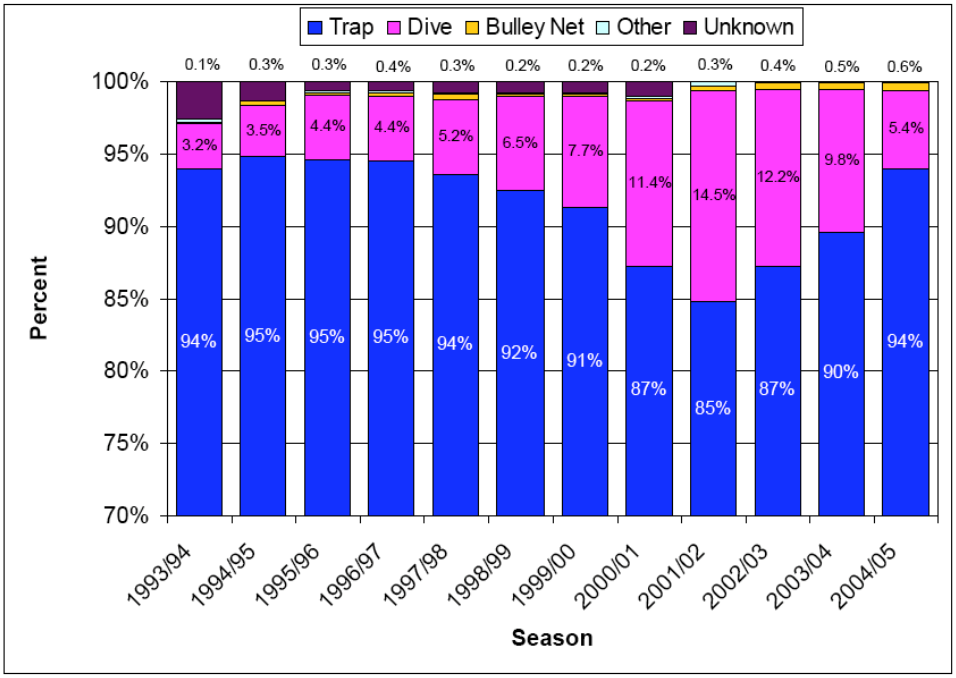


Figure 4.6. Statewide Spiny Lobster catch by gear type using annual catch data averaged over the period 1997-2006 by gear type (FWC, 2005).

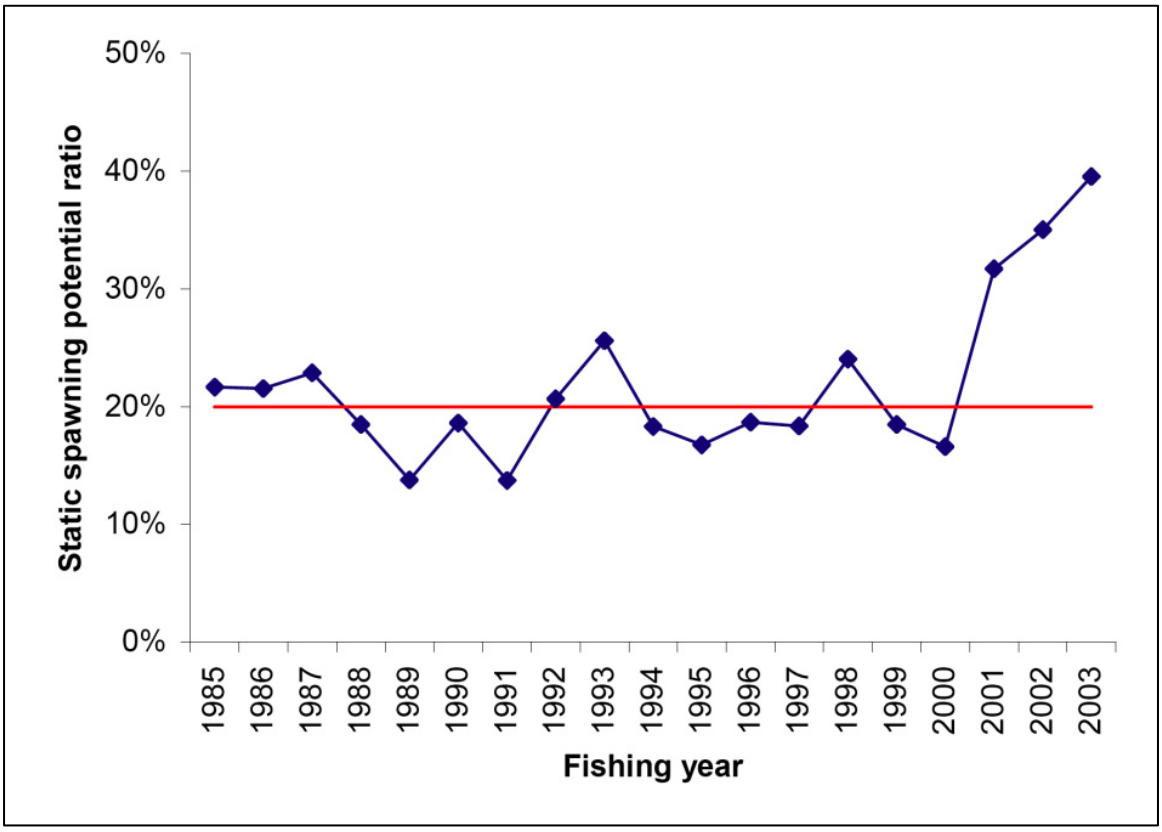


Figure 4.7. Static SPRs for *Panulirus argus* in southeast United States for the period 1985-2003 (SEDAR, 2005).

4.2.5.3. Marine life

4.2.5.3.a. Marine life: *Management history.*

The collection of coral reef organisms categorized as marine life (Table 4.2) for the live aquarium trade in Florida possibly started in the 1960's. Collections of shells, hard corals, and other invertebrates for sale as curio (dried) to tourists preceded live collection, and concern for damage caused by unregulated collection was the motivation behind the establishment in 1963 of the John Pennekamp State Coral Reef Park, the first undersea park created in the United States.

Regulating the collection of live coral reef organisms for trade in the aquarium industry came about in response by the Florida Marine Fisheries Commission to a petition made by the Florida Marine Life Association (FMLA), a group of marine life collectors, in 1988 (McCawley, Feb 22, 2008 presentation). The latter requested for standards that would regulate the collection of live reef organisms

and avoid exacerbating the observed local decline in populations of collectible organisms including the prized angelfish, resulting from unregulated collection in previous years. Current collecting sites are in Palm Beach, Broward, Dade, and Monroe Counties with the Marathon area accounting for the highest value of landings for the period 1990-1998 (McCawley, February 22, 2008 presentation; Larkin & Adams 2003).

In 1990, the Marine Fisheries Commission established harvest regulations and the State Legislature created a $75 (equivalent of $124 in 2009) marine life endorsement that would be required for commercial collection, control effort as well as to identify commercial collectors (Ch. 64B-42, F.A.C.). The number of marine life permitted fishers was 150 when the regulations began in 1990 and by 1998 climbed to 727, of which only 27% reported marine life landings. Because of the 5-fold increase in permitted collectors over an eight year span, the FMLA made its second petition to the State Legislature, this time to impose a moratorium on issuing new permits. The State Congress adopted a moratorium effective July 1998 to last until 2002 and then subsequently extended to June 30, 2005. In 1998, the FWC was created and subsumed the functions of the state Marine Fisheries Commission.

To further curb fishing effort, the FWC worked with the marine life industry to develop and implement a tiered licensing system that was meant to cap the number of commercial collectors, terminate inactive endorsements, and allow new entrants who needed to buy transferable licenses before they could participate in the commercial fishery. The tiered license system included the following permits (endorsements):

(1) Marine Life Transferable Dive Endorsement – allows permit holders to collect marine life full time by diving or using other legal gear. This will be issued to previous Marine Life endorsement holders with reported income from marine landings of at least $5,000 during one of the license years between July 1, 1999 and June 30, 2003. In addition, Transferable Dive Endorsement holders can endorse up to two SPLs, (one vessel and one individual or two vessel licenses).

(2) Marine Live Transferable Bycatch Endorsement – allows permit holders to collect marine life primarily as bycatch in other fisheries using gear other than diving gear. Qualified fishers should have had reported income of less than $5,000 during one of the qualifying years (July 1, 1999 to June 30, 2003), and are limited to endorse one Saltwater Products license.

(3) Marine Life Non-Transferable Diver Endorsement – Qualified collectors were those who had less than $5,000 in marine life landings or hold state live rock lease or federal live rock permit during one of the qualifying years and wish to harvest by diving. Collectors are limited to endorse one Saltwater Products license. This permit is only transferable in the event of death or permanent disability of the permit holder.

In 2007/2008 license year, there were 108 transferable dive endorsements, 38 transferable bycatch permits, and 22 non-transferable dive endorsements. The total of 168 endorsements serves as the current cap to commercial marine harvest. Recreational collection of live aquarium species is allowed for holders of recreational saltwater fishing license with which they can harvest each a total of 20 individual organisms per day for their personal aquarium, observing applicable size limits and gear restrictions. At no time should a recreational collector sell his catch. It is not known whether the MRFSS recreational fishing database accounts for recreational marine life catch, as no estimates for this sector's catch over time has been found. It is a recommendation that recreational catch be accounted for in order to have a more complete picture of the rates and magnitudes of removal.

Since the inception of marine life regulation, the FWC has added species to the list to make sure that the collection of target species is managed. In 2005, an ad hoc Marine Life Workgroup was formed in 2005 to review the species listing and to update size and bag limits in response to the state aquarium industry's knowledge of demand. The Workgroup consists of 13 members representing dive collectors, non-transferable dive endorsement holders, collectors with live rock leases, and bycatch collectors, 1 representative of the Florida Keys National Marine Sanctuary (FKNMS), 1 member from an NGO, and another representing the Aquaculture Review Council. Because there is no monitoring data for recreational marine life collectors, the Workgroup did not include one to represent this sector. Given the lack of knowledge on the population dynamics of target marine life species, the FWC deemed it prudent to tap experiential knowledge of collectors in subsequent rule-making. Their participation would also logically result in a high level of compliance.

In July 2009, following the extensive inputs from the Marine Life Workgroup and a detailed public comment process, FWC implemented substantive changes to marine life regulations including adding finfish and invertebrates to its regulated species list, setting size and slot limits, and decreasing bag and vessel limits for species that appear to be declining (angelfish, butterfly fish), setting harvest procedures for zoanthids and corallimorphs, and reducing daily recreational

limits to five of any one species for a daily total of 20 organisms with maximum two day possession or a total of 40 organisms.

4.2.5.3.b. Marine life: *Status of marine life fishery.*

Since FWC began to regulate live marine ornamental collection in 1990, the industry has advanced in terms of aquarium technology, which has spurred, in turn, a desire among marine hobbyists to recreate the coral reef as more suitable habitat for their colorful and exotic tropical marine fish. Thus the demand for invertebrates with ecological functions such as grazers or filter feeders has steadily increased. Examining marine life landings from 1994 to 2008 (as shown in Figure 4.8), this paper found that the numbers of invertebrates collected were always a magnitude higher than those of fish, and that these increased 5-fold over a 15-year period. In the meantime, those for finfish decreased to a third of their 1994 number.

In terms of annual dockside values that were adjusted for inflation using year 2000 as base year to allow for inter-annual comparisons, this paper estimated that the total value of finfish (45%) was on par with that of invertebrates (44%) only in 1997 (Figure 4.9). Thereafter, dockside value of invertebrates has steadily dominated total revenues, contributing $2.2M or 74% of a total of $3.0M in 2008. The contribution of finfish has declined to 18% of total proceeds in 2008. The shift could be due to consumer demand as well as declining fish populations in the wild. It is important to note that total dockside revenues remained stable at about $3M for the period 2004 to 2008 and any desire to increase profit would mean greater pressure on invertebrates if current preference for herbivorous invertebrates continues.

Although the FWC considers marine life collection to have minimal environmental impacts because the commercial fishery is highly regulated, small and with limited entry, emerging scientific research and environmental concerns remain that favor conservative if not cautionary management of marine life collection from coral reefs. A recent study by Rhyne, Rotjan, Brucker, and Tlusty (2009) examined the invertebrate composition of marine life landings in Florida for the period 1994 to 2007. They found that an increasing number of grazers such as snails and crabs have been collected and with increasing diversity to fill the market demand (Figure 4.10). Finfish and invertebrate grazers with diverse grazing patterns and heterogeneous target plant species from algal turf, benthic diatoms to macro-algae in reefs, play a significant role in preventing algal overgrowth that interferes with coral settlement by colonizing free space. Mixed patterns of herbivory can check macroalgal abundance efficiently and allow the growth of crustose coralline algae, which are preferred recruitment sites for coral

planulae (Burkepile & Hay, 2008). Thus, the removal of key herbivores, especially parrotfishes, can make localized grazer-depleted areas less resilient to cope with coral-algal phase shifts in addition to the impact of other stressors such as nutrient loading (Burkepile & Hay, 2008; Albert, Udy, & Tibbetts, 2008; Littler & Littler, 2007).

The status of coral reef fish is monitored in the FKNMS and in sites along the southeast Florida counties from Martin to Miami-Dade periodically or on a project basis. Some of the significant results indicate declines in marine ornamental species. Phelan (2009) of the Florida Oceanographic Society examined the reef fish sightings and density data from 1999 to 2008 that were collected by volunteer divers and reported to and compiled by the Reef Environmental and Education Foundation (REEF), an NGO. The data set covered reef sites adjacent to the Jupiter-Miami corridor, and in Key Largo and Dry Tortugas. The marine ornamental trade exploits 15 of the 28 indicator species used in the study, and the overall changes in sighting frequency and density of these finfish over the 10 year period are shown in (Figure 4.11). Seven species show declines in sighting frequency and densities greater than 10%. These include the Sargeant Major, Butter Hamlet, Trumpetfish, Blue Tang, Stoplight Parrotfish, Redband Parrotfish, and the Bicolor Damselfish. Targeted studies in the FKNMS indicate a slow decline in the density of the Stoplight Parrotfish in fished areas for the period 1996 to 2002, and a definite decrease in the density of the angelfish, Rock Beauty, over the same period (Figure 4.12) (Bohnsack, McClellan, Harper, Ault, Smith, Meester, & Luo, 2006; Reef Environmental Education Foundation, 2006). It could be that the decline in marine life finfish landings indicates dwindling wild finfish populations for some of the more popular species. Note in Figure 4.12.a. that the density of Stoplight Parrotfish in fished areas is tending to fall below the reference band on average for the years 1998-2002 (Bohnsack, et al., 2006)

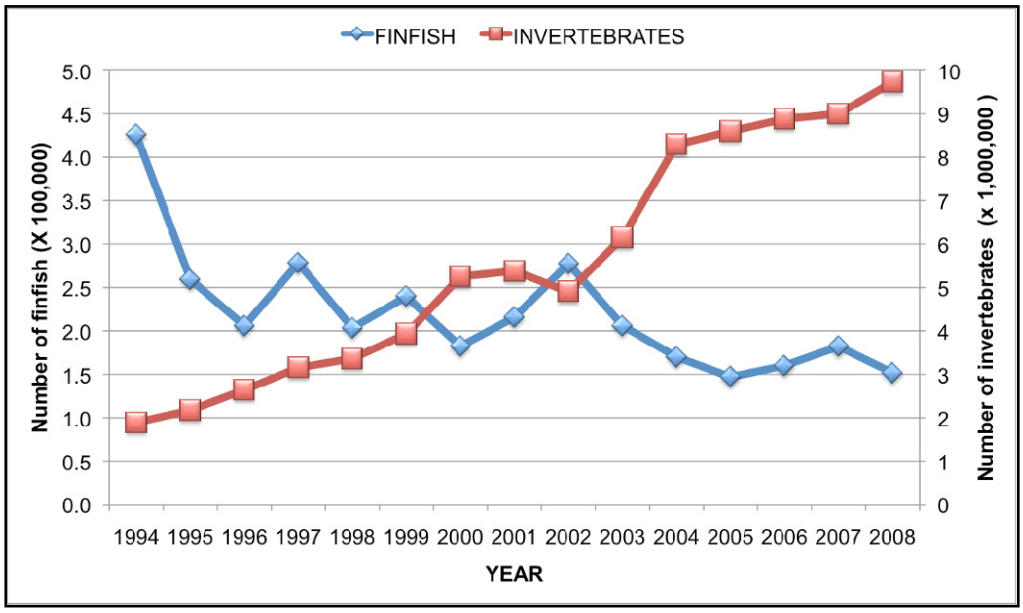


Figure 4.8. Numbers of finfish (left vertical axis (x100,000) and invertebrates (x 1,000,000) reported as commercial marine life catch for the period 1994-2008. (Data from FWC commercial marine life landings reports).

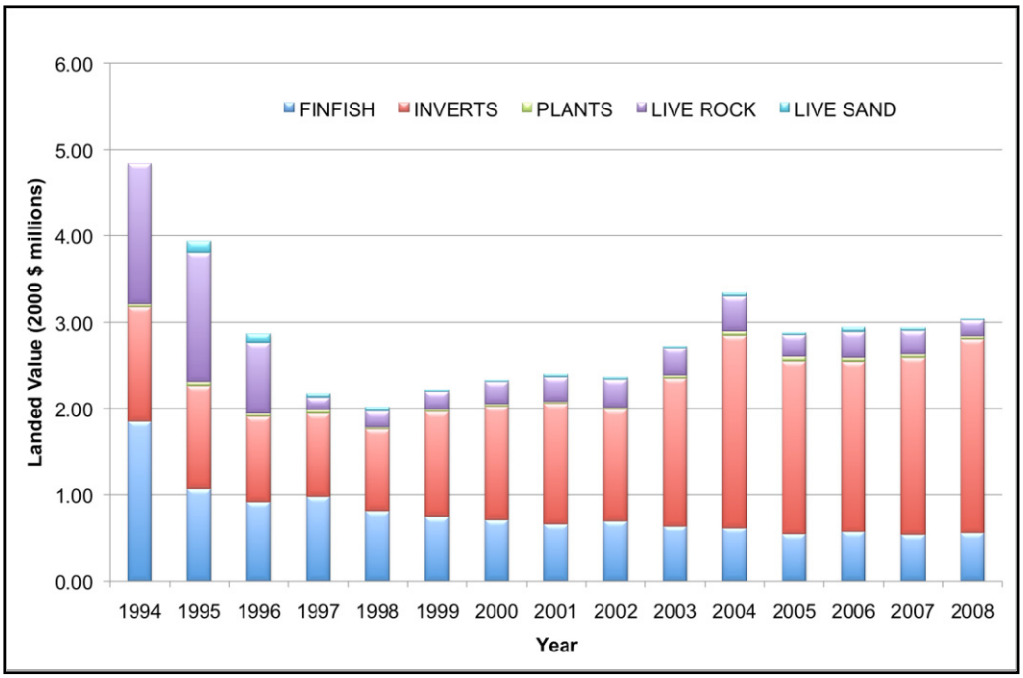


Figure 4.9. Estimated value of commercially collected marine life for the period 1994 to 2008. Values have been adjusted for inflation and expressed in year 2000 dollars to allow comparison over time. (Data from FWC commercial marine life landings reports).

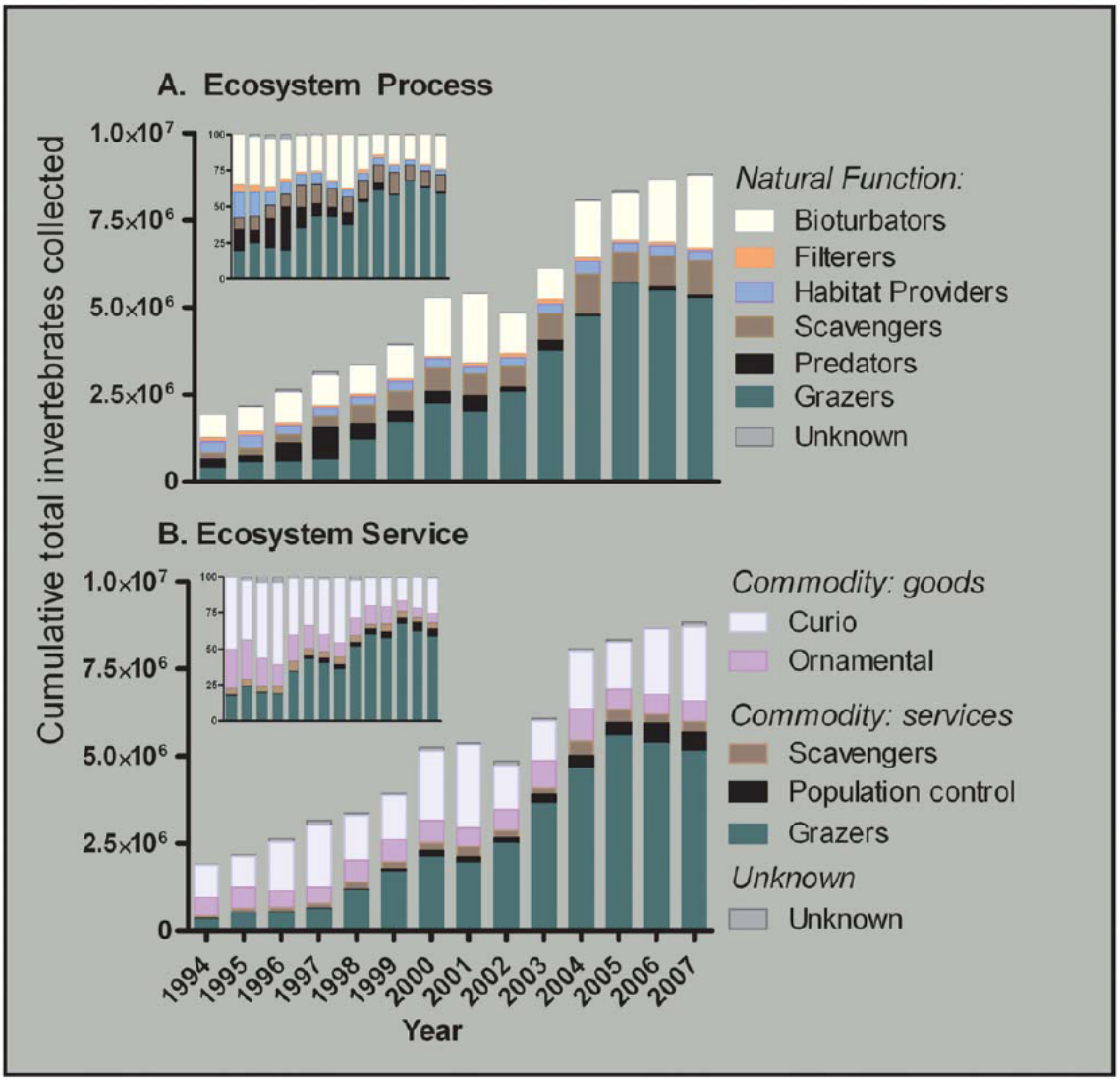


Figure 4.10. The invertebrate component of marine life landings for the period 1994 to 2007 classified by (A) ecological roles in their native habitats and by (B) their contribution to trade as curio or live ornamentals. Insets in both panels indicate percent total catch. (From Rhyne, et al., 2009).

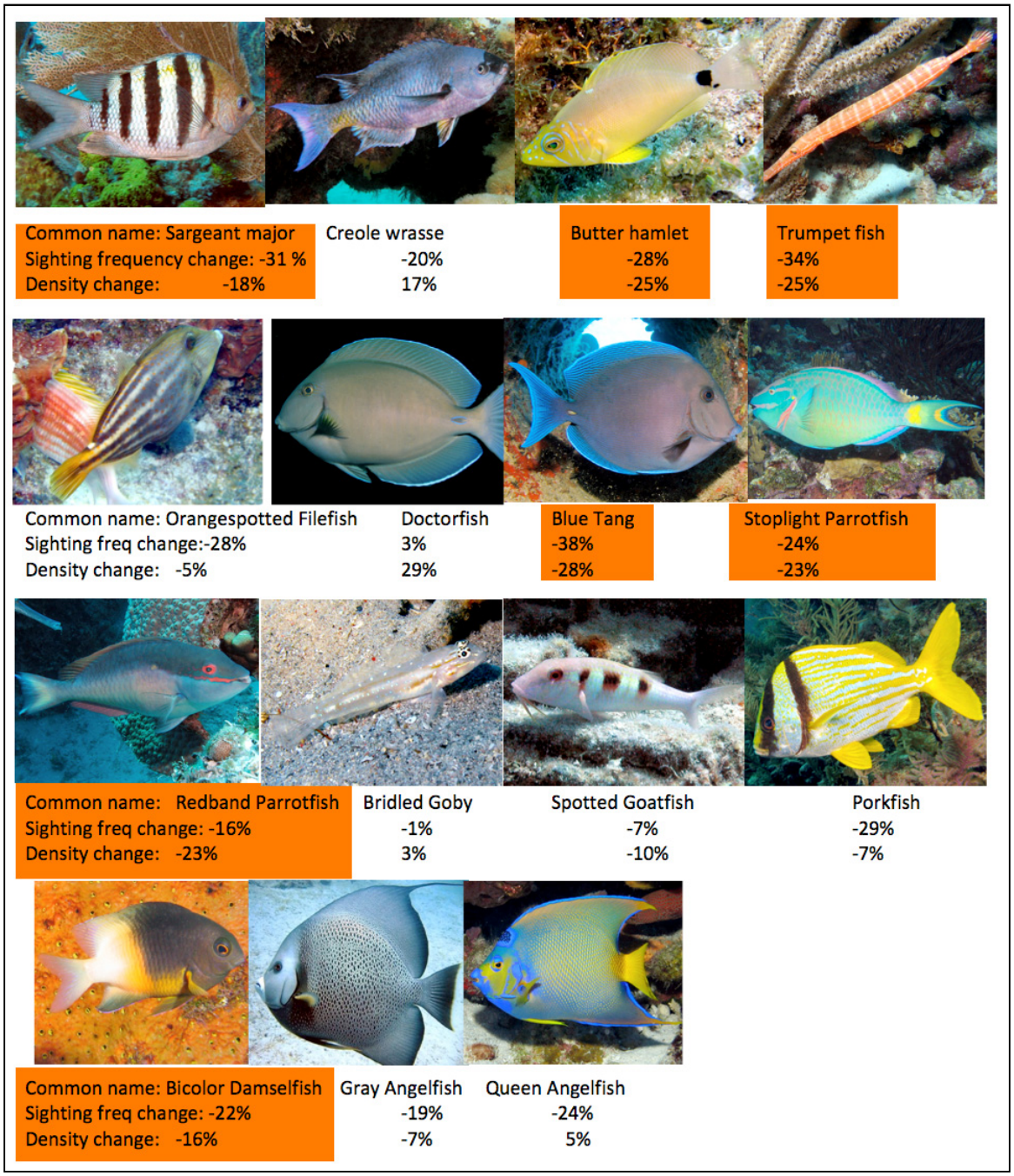


Figure 4.11. Changes in sighting frequency and density for indicator coral reef finfish from 1999 to 2008 over observation sites in Jupiter-Miami, Florida Keys, and the Dry Tortugas along the Florida reef tracts (Phelan, 2009). Orange boxes indicate greater than 10% decreases in sighting frequency and density. (Photo credits: Charpin, Reefguide.org).

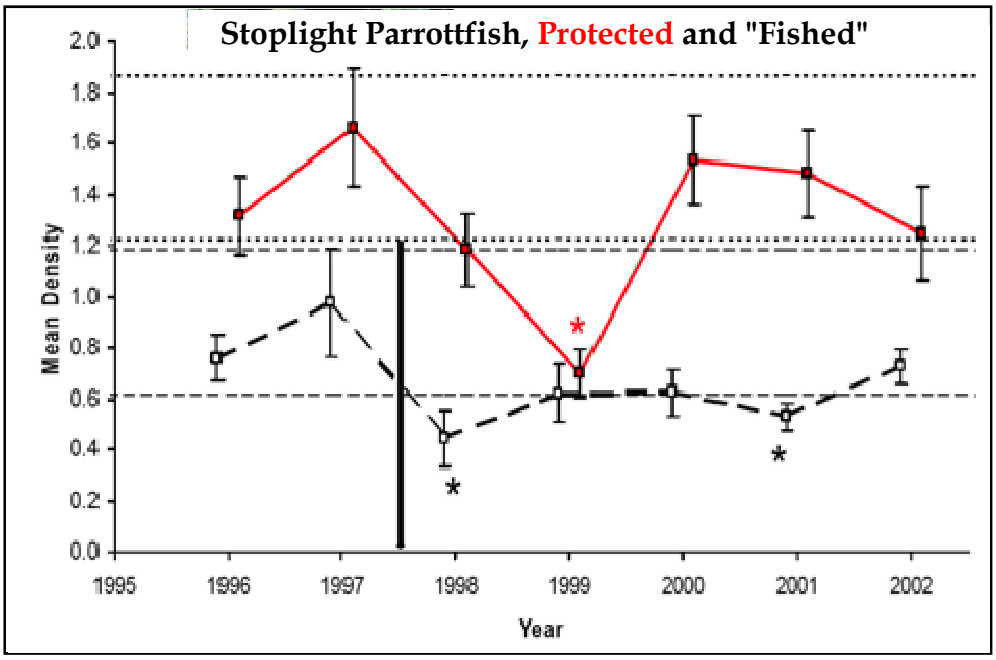


Figure 4.12.a. Abundance of marine ornamental species in the FKNMS protected and fished areas. Vertical bar indicates start of no-take protection. The horizontal (Sanctuary Preservation Areas) and dashed (reference areas) bands indicate model predictions based on 1994-1997 95% annual performance measures.).

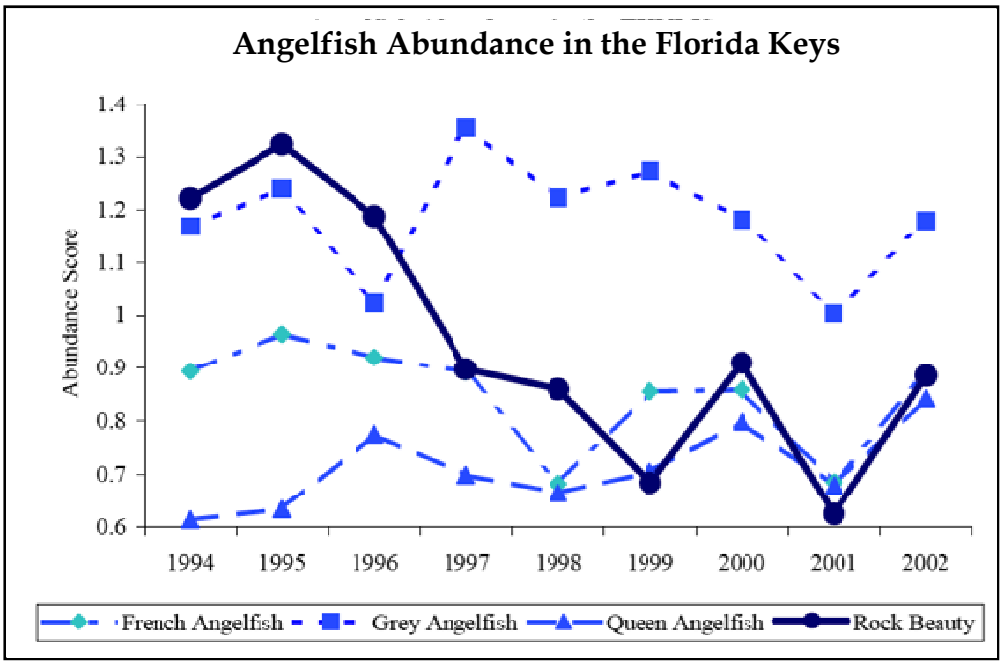


Figure 4.12.b. Angelfish abundance at 27 sites in the FKNMS with Rock Beauty showing significant decline compared to three other species (REEF, 2006).

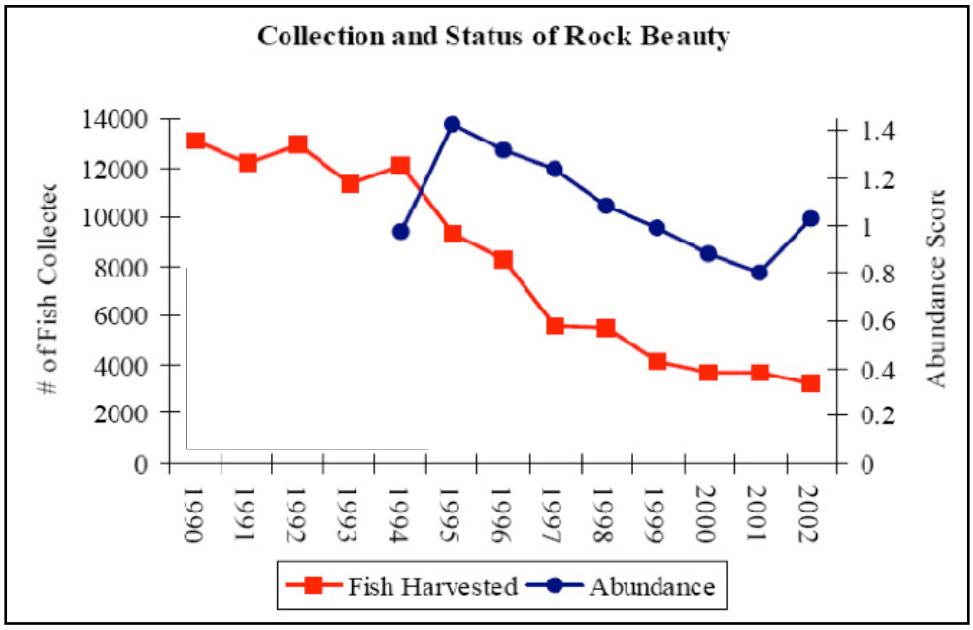


Figure 4.12.c. The correlation in the decline of abundance of Angelfish versus the number of Rock Beauty collected.

The Relative Dominance Model in Figure 4.13 by Littler & Littler (1984, 2007) predicts which group (corals, crustose coralline algae, turf algae, frondose macroalgae) will dominate along a nutrient axis (bottom-up control) and along a grazing activity axis (fishing or top-down control). Using a well functioning reef (i.e., low nutrients) with a good population of herbivores who can graze plants at >50% loss in six hours yellow box) as a baseline, three trajectories of change are predicted. When nutrients increase, but grazing activity remains high, crustose coralline algae will dominate. When grazer populations decline because of fishing pressure and under conditions of low nutrients, dense turf algae dominates. The least desirable scenario occurs when grazing is reduced and water quality has deteriorated because of elevated nutrients, and the proliferation of frondose macroalgae is favored.

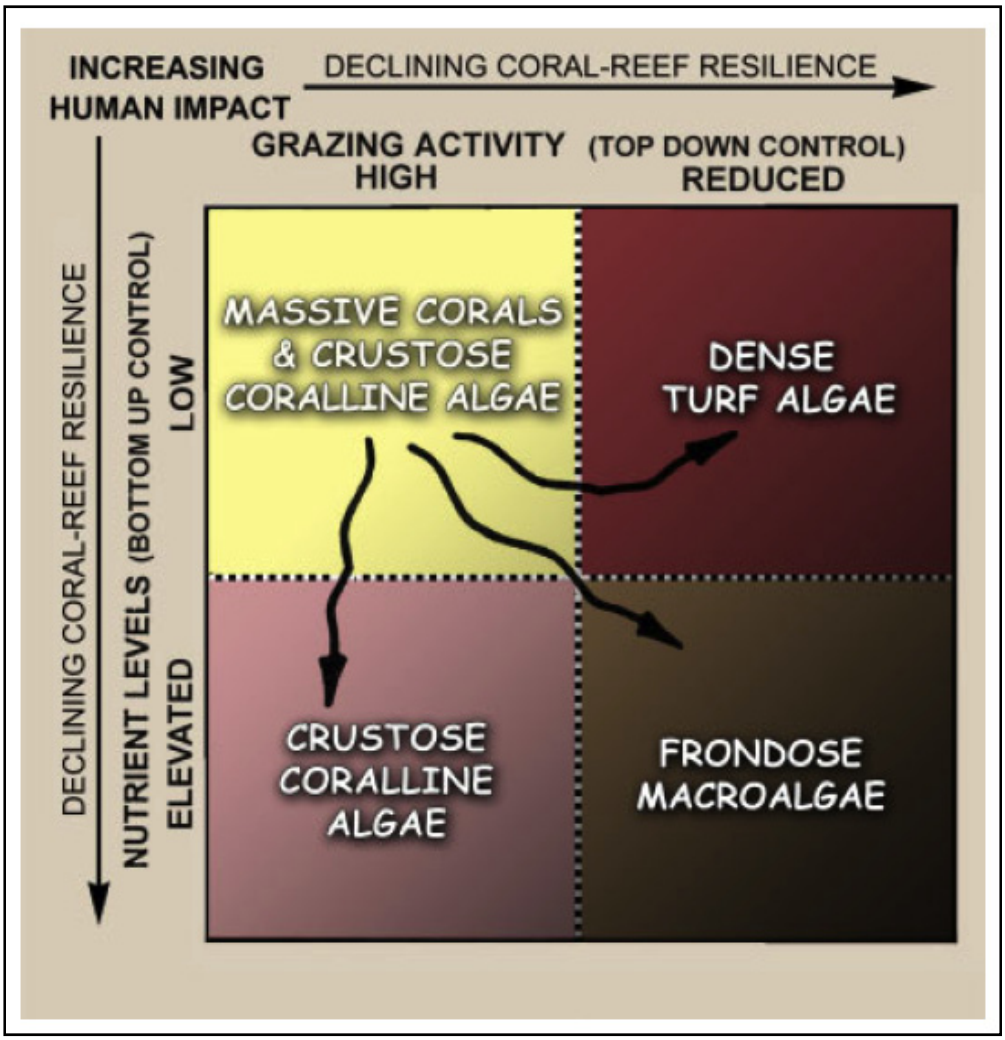


Figure 4.13. The Relative Dominance Model by Littler & Littler (1984, 2007).

4.2.6. Penalties

The Conservation Amendment to the State Constitution that created the FWC empowers the State Legislature to prescribe penalties and fees for the violation of FWC regulations. The § 379.401, F.S. prescribes specific penalties for fishing violations, including those associated with recreational fishing.

The system of penalties for both violations of rules and statutes governing fishing has been updated in three major ways by the passage of Ch. 2006-304, L.O.F. First, it provides penalties for violations related to commercial harvest of saltwater fish. Second, the act establishes four levels of violations of fish and wildlife statues and FWC rules governing recreational fisheries. Within each

violation level, penalties are made successively heavier for repeat violations. Finally, it makes Florida a signatory state to the Wildlife Violators Compact. This legally binding agreement allows Florida in conjunction with 21 other signatory states to recognize fish and wildlife violations by residents of these member states and facilitates information sharing among member states. The Compact aims to promote compliance with wildlife and fishing laws among recreational hunters and fishers across signatory states, greatly discouraging roving offenders.

The tiered penalty system for recreational fishers in violation of fish and wildlife statutes and FWC rules relevant to coral reef organisms are detailed in Appendix 4.3

- Level 1 violations are non-criminal infractions that disobey statutory provisions relating to fishing and trapping licenses (including "No License" violations), and to FWC rules relating to daily use permits.

- Level 2 violations are charged as criminal 2nd degree misdemeanor. They violate FWC rules relating to season, bag and size limits, landing requirements for saltwater fish, and statutory provisions for crawfish.

- Level 3 violations are deemed 1st degree misdemeanor and are in violation of FWC rules governing the sale of saltwater fish, statutory provisions on the harvest of saltwater fish with nets, and statutory provisions on fishing with a suspended or revoked license.

- Level 4 violations constitute felony of the 3rd degree and include violations of statutory provisions on the molestation of crawfish gear and statutory provisions on forgery of a license or possession of a forged one.

Penalties are as effective as the ability of enforcement to catch non-compliant citizens and the cost of litigation on the part of the State and violators is high. Their ultimate purpose is to deter non-compliant behavior by placing fair consequence in exchange for non-compliant behavior. The bottom line gauge of their effectiveness is the extent to which the resources and livelihoods are sustained. They are most effective when compliance is high and therefore exist as violation-deterring mechanisms.

Penalties cannot be evaluated in isolation of the entire regulatory system. The lack of output controls such as TAC, and the absence of clear pre-harvest allocation of the fisheries among component sectors (commercial, recreational, headboat based, gear-based groups, etc.), diminish the ability of current

regulations to prevent and control overfishing, even with full compliance with existing rules. Penalties therefore cannot compensate for the lack of major catch controls in regulating the State's fisheries. At the same time, the existence of violation prevention programs such as educational outreach activities or remedial schools for non-criminal violations (Level 1) are mechanisms that strengthen the penalty system through promoting citizen compliance.

The penalty system for saltwater fisheries in general follows a tiered schedule of penalties and penalty fees. The following recommendations are made to update this system:

(1) The penalty fees should include payment for ecological damages incurred by the violation and should not just be based on the fair market value of the illegal harvest. Level 3 violations of commercial fishing rules such as possession of illegal fin or shellfish or prohibited species, and level 2 and 3 violations of recreational fishing regulations (seasonal closures, bag and size limits, sale of saltwater fish for example) should incorporate ecological damages. These fees may be earmarked for use in much needed monitoring of ecosystem level indicators associated with the declines in target reef fish populations and their rebuilding.

(2) Penalty actions for noncriminal violations (level 1) of recreational fishing rules may include attendance in remedial school where fishing regulations and basic ecology classes are taught for a prescribed number of hours. A certificate of attendance and completion of required classes may be considered sufficient compliance of prescribed penalties. The design of a remedial educational program to engage level-1 violators of recreational fishing regulations is the focus of a SEFCRI project.

(3) A disclosure of harvest information by commercial and recreational fishing license holders must be made mandatory in order to allow better estimation of total catch and total effort. This should be required even when licenses or endorsements are not used within a license calendar year. Imposing a base penalty fee for first time offenders and a revocation of licenses for repeated offenders may be considered. These penalties should be consistent with the requirements of the federal registry program for recreational anglers. With a reference listing of recreational anglers, a system to keep tract of catch reporting can be put in place. Reporting options can include the use of cell phones or online methods.

(4) Commutation of penalties associated with level 2 convictions for violators of recreational fishing regulations should be considered in favor of community

hours for helping to monitor fish populations and coral ecosystem status. This way the penalty includes an educational aspect that would have longer-term impact on promoting compliance.

4.3. Enforcement and Compliance

The rules and regulations discussed above for coral reef fisheries in southeast Florida are as effective as the manner with which they are enforced by law enforcement agencies and the degree to which the fishing public complies with them. In federal waters, the NOAA Fisheries Office for Law Enforcement (OLE) leads in the enforcement of federal fishery regulations and collaborates tightly with the US Coast Guard (USCG) that provides in-water infrastructure for effective enforcement. The latter is also in charge of maritime law enforcement include civil marine transportation. In state waters as in those surrounding southeast Florida, FWC DLE takes the lead in enforcing state fishery laws. For state fisheries that are co-managed, state and federal agencies collaborate through the Cooperative Enforcement Program of OLE. FWC law enforcement officers are cross-deputized to enforce federal marine fisheries and wildlife laws to ensure consistency in natural resource protection at state and federal levels.

In evaluating the enforcement of fishery laws of the state, it is important to review here the other functions of FWCDLE. In addition to their duties pertaining to fish and wildlife protection, FWC officers have full police powers and statewide jurisdiction to do the following (FWC webpage on Law Enforcement):

(1) Educate the public about boating safety and enforce boating rules,

(2) Enforce rules governing public safety,

(3) Coordinate with federal, state, local and private stakeholder groups in developing and enforcing regulations,

(4) Provide search and rescue services, and

(5) Respond to disasters and other critical incidents when needed.

Given the scope of activities that FWC law enforcement officers need to police, an appropriate evaluation would be one that examines the percentage of time that they devote to these duties including fisheries and wildlife protection.

4.3.1. ArrestNet Violation Database – Time Trends in Violation types

We examined a 10 year data set of violations for which FWC law enforcement officers issued citations for the period 1997 to 2006. These citations were encoded into the FWC enforcement database ArrestNet as a single listing of citations per year. For this paper, the authors first created a listing of all rules cited, and synonymized the different rule numbers that a particular rule used as citation basis had been assigned over time because of rule modifications of content, or because of addition of new rules and deletion of redundant or obsolete rule text. The violations from the raw listing were then grouped by rule citation, and then further aggregated broadly into fishing, diving, boating, and other land-based violations. Data sorting was made difficult when data cells contained data in varying formats such as the case for dates and rule numbers. A significant amount of data format standardization had to be implemented by one of the project leaders (M. Estevanez) to allow another project leader (L. Talaue-McManus) to apply data sorting routines on the 10 year dataset. A matrix of 10 years, with an annual average of 44,000 violations comprised the violation data set analyzed here.

In describing trends, there currently is no statistical way to validate how representative the police coverage was spatially because location data (longitude and latitude points) are very poorly represented in the database. If use frequency could be mapped out, so that heavily frequented areas would be more policed than less frequented locations in broadly proportionate ways, and dynamically change over time to reflect seasonal use of marine areas, then trends would be able to capture less biased incidences of violations. In the absence of these baseline references in time and space, the universe of 439,750 violations over the 10 year period were assumed to represent an unbiased pool of violation encounters between citizens and law enforcement officers. Fishing and boating violations were analyzed for linear correlation with time, using degrees of freedom n = 8, at 5% (*) and 1% (**) levels of significance. Trends significant at both 5% and 1% probability levels were deemed to be either increasing or decreasing within the time frame of the dataset examined.

Figure 4.14 shows four types of marine fisheries violations. Of these four violation types, only those noncompliant with manatee protection would be easy to spot visually. For the other three types, law enforcement officers would need to approach fishers and examine their catch or request for identification and fishing license to determine if fishing activities were illegal. The graph indicates that the frequency of fishers caught fishing with no recreational license was significantly increasing with time. Tests of linear correlation with time show significant increasing trends in fishing with no license, illegal coral reef fishing,

and illegal freshwater fishing at 5% significance level. Similarly, illegal coral reef and noncompliant freshwater fishing increased significantly from 1997 to 2006.All increases in the three fishing violation types may be attributed broadly with the increasing recreational fishing effort. With an estimated two million recreational fishers fishing in Florida waters annually, the likelihood of catching violators with no license would likely increase. Manatee violations, which are easier to detect, showed no significant change over time. If spatial data were collected with the citation tickets, it would be possible to overlay the manatee violations, reduced speed manatee zones, and non-speed zones to better resolve if violations would be more likely to occur in recently established manatee zones. A desirable trend would be a reduction in manatee violations. The Spearman-Pearson correlation coefficients for all four fishing violation types are shown in Table 4.4.

Figure 4.15 indicates trends for boating, snorkeling, diving, and personal craft violations. Boating illegally in restricted areas as well as diving, snorkeling, and personal craft violations are relatively easy to detect. Over the 10 year period this paper examined, the frequencies of occurrence for these two violation categories appeared to be stable. Boats operating without vessel registrations were significantly reduced by a third over the ten year period indicating that simple regulation to paint hull numbers on the forward half of the vessel on both sides above the waterline with letters 3" high in a color contrasting to the hull, was highly effective in identifying unregistered and unnumbered vessels. Over the 10-year period, citations for unsafe boating nearly doubled, a highly significant increase. Again, the rise in recreational boating can lead to greater likelihood of unsafe boating practices by inexperienced boaters, even if they were driving registered vessels. The correlation coefficients for significantly changing frequencies of boating violations are shown in Table 4.4. As reference for rule bases of the citations, Table 4.5 summarizes rules relevant to marine-based activities.

In summary, the trends discussed above in terms of noncompliant behavior by both the fishing and boating public indicate that violations that are easily detectible show a significantly decreasing trend (e.g., no boat registration) or no significant change over the 10-year period examined (i.e., no significant difference from a horizontal line). Unsafe boating and fishing with no license are significantly increasing from 1997-2006, perhaps as a result of the increasing number of recreational fishing and boating public. Given that the trends were obtained from ten years of data with a total of 440,000 citations, the results are statistically robust and indicate that greater effort has to be directed to reducing saltwater fishing and boating violations as both categories have significant impacts on the environment. These have important implications on the way FWC law enforcement has to actively allocate police effort for conservation relative to its other duties to society.

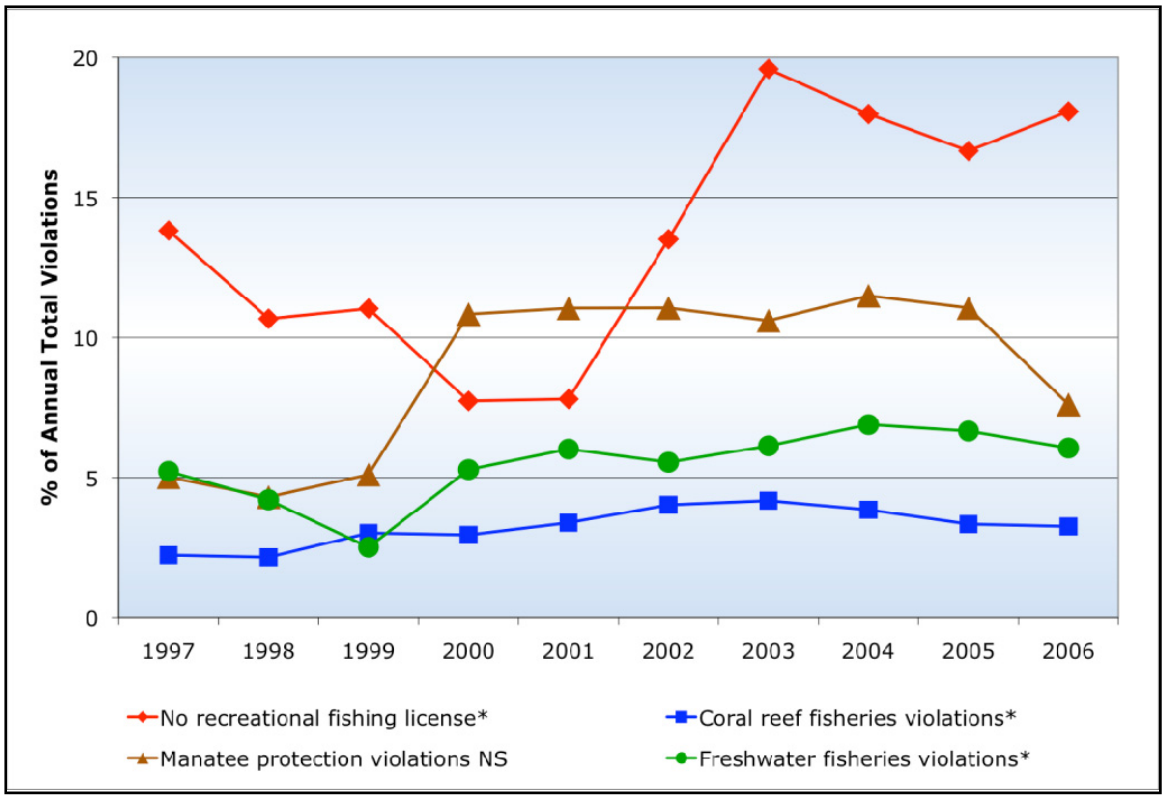


Figure 4.14. Fishing violations in Florida for the period 1997 to 2006. (Data from FWC ArrestNet). Correlation coefficients are in Table 4.4.

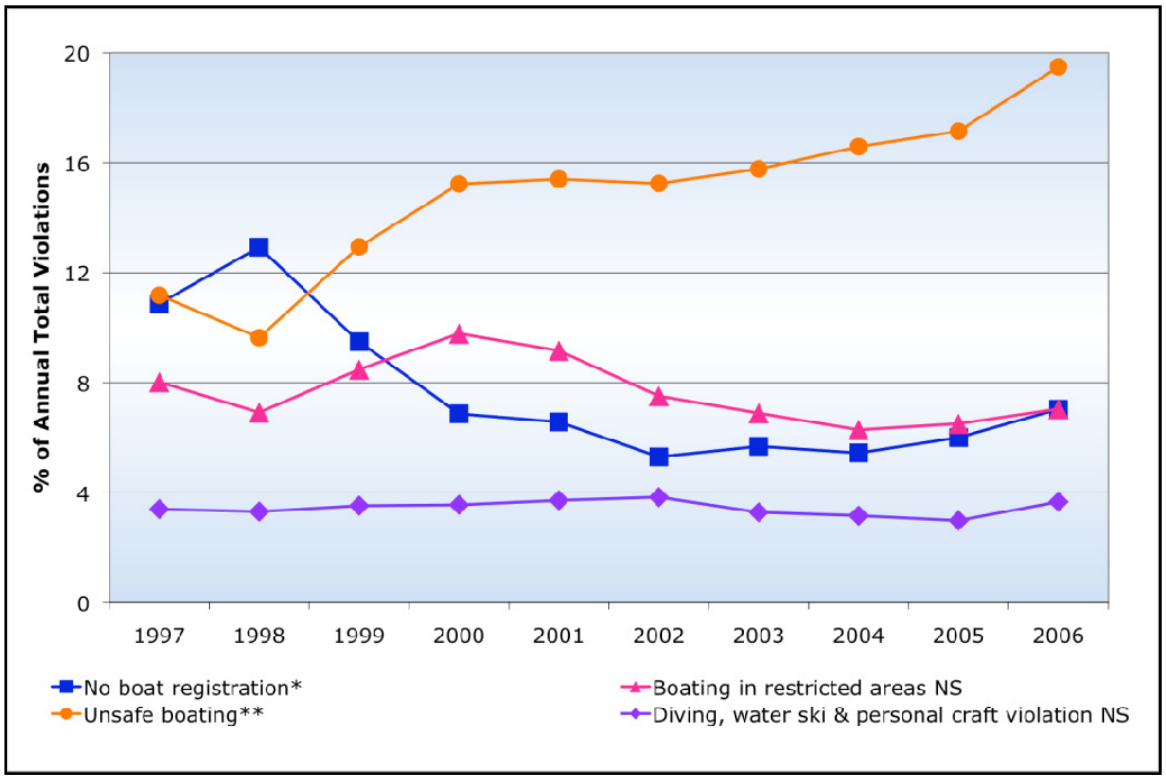


Figure 4.15. Boating violations in Florida for the decade 1997 to 2006. (Data from FWC ArrestNet). Correlation coefficients are shown in Table 4.4.

Table 4.4. Summary of ArrestNet violations that were documented for the period 1997 to 2006 (data provided by FWCDLE). Note that only violations relevant to fishing and boating were analyzed for linear correlation with time, using degrees of freedom, n = 8; and 5% (*=R>0.632) and 1% (**=R>.765) levels of significance.

VIOLATION CATEGORY	**Correlation Coefficient, R (df = 8)**
1. Marine Fisheries	
1.1 No recreational fishing license	0.664*
1.2 Coral reef fisheries	0.696*
2. Manatee Protection	0.629
(1-2) Marine natural resource violations excluding those committed inside National Marine Sanctuary	15,535
3. Freshwater species	0.692*
(3) Freshwater species violations	2,404
4.0 Boating	
4.1 Boating safety	0.931**
4.2 Boating in restricted areas	0.516
4.3 Boat registration	0.763*
4.4 Diving, water ski & personal craft	0.164
(4) Boating violations including BUI	18,544
(1-4) Subtotal Water-based including those committed within National Marine Sanctuary	36,716
5.0 Land-based violations	
5.1 Motor vehicle violations	2,847
5.2 Civil society violations	1,861
5.3 Other land-based violations	2,552
(5) Subtotal Land-based	7,260
Total recorded violations	43,976

Table 4.5. Regulatory basis of violations as codified in the F.S. and the F.A.C. that are applicable to FDOU activities.

VIOLATION CATEGORY	STATUE and RULE BASES
Boating safety	§ 327.395, F.S., § 327.50 F.S., and 33 *CFR* 175
Boating in restricted areas	§ 327.50 F.S., Ch. 68D-24, F.A.C.
Boat registration	§ 328.46, § 328.48, § 328.72
Diving, water ski & personal craft	§ 327.37 F.S., 861.065 F.S., § 327.37 F.S., and § 327.39 F.S.
No recreational fishing license	§ 379.401, F.S.
Manatee protection	§ 379.2432, F.S., Title 68C, and Ch. 16-N22, F.A.C.
Freshwater species	Ch. 68A, 39, F.A.C.
Coral reef fisheries	Ch. 68B-14, 68B-24, Ch. 68B-42, F.A.C.

4.3.2. Police effort distribution time by violation type

Using a slightly reduced data matrix of nine years (1997-2005) by annual average of 43,975 violations, this paper examined the mean number of citation tickets for each major violation type to determine the annual effort distribution of police activity using citing violations as the effort indicator. Because it was not possible to disaggregate the current annual summaries into finer time scales such as monthly or quarterly periods, we used the annual sums by citation category. Subsequent data gathering should ascertain that date formats adhere to strict standards. Data could be binned by time periods to reflect seasonality of fishing and boating activities in subsequent analysis. Here, the author calculated 3-year averages for the periods 1997-99, 2000-02 and 2003-05.

Figure 4.16 shows that the mean percent of boating citations decreased over the period studied. Saltwater fishing citations on the other hand significantly increased as well as freshwater and other wildlife citations, though the latter is a minor component at 7% in 2003-05. During the latter period, boating and saltwater fishing citations both numbered 38% and 39% of 3-year mean total annual citations. Land-based violations such as motor vehicle infractions and civil society safety violations stabilized to 15% of citations in the later 6-year period (1999-2005). It must be noted that in-water citations take longer work hours per citation than land- or freshwater-based citations because of travel time and wider amount of area to patrol. Subsequent analysis should factor in labor

cost to determine an optimal deployment of police power to cover violation hotspots during different peak activity seasons of the year for fishing and boating.

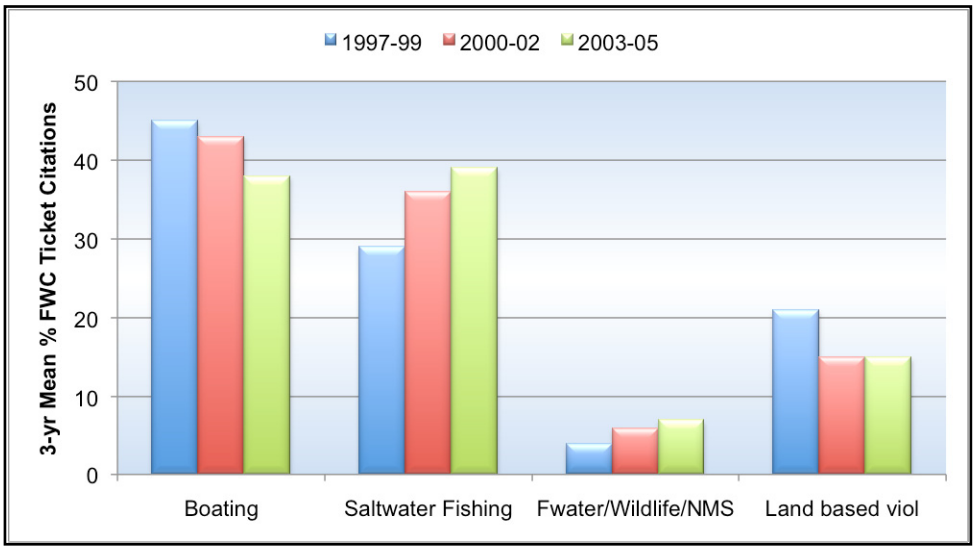


Figure 4.16. ArrestNet citation ticket data were averaged for three 3-year periods (1997-99, 2000-02, 2003-05) to show trends in police time distribution by FWC law enforcement officers. Citation categories are boating, saltwater fishing, freshwater-wildlife-national marine sanctuary, and land-based violations.

If the task of regulating the boating public could be given to another enforcement agency, there is no doubt that FWC could attend to its conservation duties in a more focused manner than it possibly can under its currently broad mandate. However, it will take a constitutional amendment to change this, and the current economic realities dictate the use of resources and assets to achieve multiple goals. Thus, it appears more realistic to look for ways that FWC can develop smart strategies to improve its ability to enforce fishery regulations given the upswing in fishing without a license, and in illegal activities in the collection of coralline living resources.

Specific capabilities need to be added to obtain data on recreational boating and fishing activities. An investment on technology for fishing and boating vessel surveillance through on-board GPS instrumentation may warrant additional trained manpower and capital infrastructure. This will require a partnership with NMFS and the USCG in the fields of training, infrastructure and coordination of in-water assets. Extending the presence of enforcement through prudent use of wireless communication technology is almost necessary with the growth in recreational boating to a million, and to the number of recreational

anglers to over 2 million. The use of the technology may lead to a reduction in total man-hours for in-water patrol, realizing savings that may be used for other needs. More importantly, an expected increase in compliance both for human safety and less damage on natural resources are sufficient reasons for acquiring this technology. Currently, the Vessel Monitoring System (VMS) is used by FWC according to the federal regulations in monitoring commercial fishing vessels targeting federally managed species or have federal permits and fish in state waters. The use of the VMS to include recreational fishing and boating vessels needs serious study. There will be issues regarding infringement on personal privacy, and which must be weighed along with the advantages for reporting recreational catch and for boaters to report violations in real time. Wireless location technology is used innocuously to support motor vehicle repair or search and recover services (e.g., Lojack system), as well as cell phone search and find options for GPS-enabled cell phones. The VMS for recreational fishing and boating may be so designed to use the on-board wireless technology to include location services and for real-time recreational fishery reporting required by the national angling registry database.

4.4. Funding

4.4.1. Funding needs

The FWC obtains annual appropriations from the State Legislature using general revenue and trust funds. The trust funds are defined in Appendix 4.4. Over the non-contiguous fiscal years of publicly available data, the real value of FWC budgets reckoned to year 2000 as base year has increased from $206M in 2004-05 to $232M in 2004-05 (Figure 4.17). Because of the economic downturn that officially started during the last quarter of 2007, the mix of funding for FWC has changed with the percentage contributed by general revenues decreasing from 26% in 2004-05 to 11% in 2009-10. FWC has to become increasingly self-reliant to fund its operations that are critical to conserving the State's natural resources. The programs that are crucial to safeguarding coral reef fisheries are research, marine Fisheries Management, and law enforcement. Over the last four noncontiguous fiscal years shown in Figure 4.18, research received on average about 18% of funding, law enforcement 37% and marine fisheries management 2%. To estimate operating monies devoted to marine fisheries, the author calculated the following:

Assuming 40% of law enforcement budget (based on % marine fisheries violations) + 30% of research (based on budget allocation for marine research) + 100% of marine fisheries management + $1.5M administrative support (FWC Sunset Review 2007), the

amount spent by FWC for marine fisheries conservation is roughly about $50M in constant dollars, on average, in the last five years.

Since the State earns each year about $5.4B from recreational saltwater fishing and another $1.2B from commercial fishing and seafood processing, a minimum of $50M roughly estimated for marine fisheries represents 0.8% investment and 99.2% return. With the status of the major coralline fisheries such as snappers and groupers mostly experiencing overfishing, and the stocks mostly with overfished biomasses, it is imperative that the percentage of current investment for marine fisheries be seriously reviewed to determine the operating budgets that can be optimally allocated within current fiscal constraints. A significant increase (e.g., 30%) increase in research to focus on marine stock assessments with the goal of quantifying TAC for major finfish species and Spiny Lobster is required to meet the national standards of ending overfishing and rebuilding overfished stocks. A major (e.g., 50%) increase in the operating budget of the marine fisheries management program is sorely needed to provide economic studies detailing pre-harvest allocation of TACs by the fishery sector (recreational and commercial), and the serious review of an individual fisher quota system to minimize the race to fish and give fishers the latitude to fish with greater security and concern for safe fishing/ boating practices. TACs and regulatory allocation distribution policies where appropriate both underpin the national effort to curb overfishing. FWC should be in a position to objectively evaluate various TAC and catch distribution scenarios to its constituents with credibility and transparency.

Funding for law enforcement should support the expanded use of VMS as discussed above, and the improvement of the violation citation database. The refinement, quality control, product development, and database maintenance of the violation citation database is critical and nicely complements user patterns that would be derived from the VMS so both can provide data for a more strategic deployment of enforcement assets. The partnerships with NGOs to observe fisheries infractions such as bag and vessel limits and size and gear restrictions, especially during peak activity periods, will greatly augment the law enforcement capabilities during peak seasons.

4.4.2. Funding strategies

The funding requirements for expanded research and marine fisheries management, as well as for setting up a recreational VMS necessitates a review of current funding trends for FWC operations. Of the trust funds the State Legislature has established, the MRCTF consistently contributes the most to the overall budget requirements of the FWC and to the needs of marine fisheries

conservation. MRCTF holds revenues from the sale of recreational and commercial saltwater fishing licenses, permits, fees, and violation fines (Florida Senate, 2008), all of which make up 33% of the MRCTF. It also includes vessel registration fees, marina fuel taxes, boating fines, fees, and penalties, and contributes another 30%.

Averaging $55M as inflation adjusted value (2000 base year) during the noncontiguous fiscal years from 2004 to 2009, the MRCTF contributed 25% to the total annual FWC budget. Half (50%) of MRCTF was used for law enforcement, 33% for research, and 6% for marine fisheries management. Thus, in practice, the MRCTF is the major means by which marine fisheries conservation is funded at the level of the FWC.

Is there scope to increase this fund? The prices of the salt-fishing licensing system, and perhaps those of the other recreational fishing and hunting licenses needs to be adjusted not only for inflation but to include the cost of ecological monitoring and management as well as to meet the requirements of the national angler registry. The same can be argued for the boating permits. The recreational fishing licensing fee system should be reviewed for potential modification to include the following ideas:

(1) Create a tiered marine licensing fee, repealing all age or military exemptions, such that exemptions are modified into licenses requiring the lowest fees, but not necessarily nominal in that they should include an ecological management fee. These licenses should focus on permitting fishing as an activity regardless of the vessel that permit holders use. Thus all anglers will have licenses regardless of where they fish, how they fish, and what vessel they use.

(2) The licenses should explicitly include an ecological management fee, just like what is charged when motor oil or car tires are changed. The ecological management fee may be around 20% of the total license fee, for which a trust fund should be established.

(3) These should be adjusted for inflation cost using the Consumer Price Index, and a standard base year of 2000 may be used so that the changes in license fees can be tracked beginning the base year of 2000, as done in the analysis of budgets and funds in this section. The real price of the license must be maintained to a base value so that prices need to be periodically adjusted for inflation over a three year period. Price adjustments should be done every three years, and not five years.

(4) All licenses should be single activity licenses requiring annual renewals, and for monitoring and tracking, but with options to be bought at reduced prices if bought in combination with at least other recreational license.

(5) All licenses should have a bar code ID system that needs to be scanned in scanner stations to be put in place in major marinas upon return travel to land. If return arrival is made to non-scanner station locations, the numerical ID associated with the bar code should be sent to an FWC dedicated line for this purpose. This mechanism may be used to track fishing trips and report of trip catch by species number and size, following the requirements of the national angler database.

(6) The cost of the license is something to consider. If recreational anglers on average spend $1046 to engage in their sport, a $25 license plus $5 ecological management fee cost amount to $2 of overall annual expenditures. Annual car tags for compact cars are about $40 current price. The combination license fees can be applied when customers opt to have more than one activity license.

(7) All species-specific permits, tags or endorsement should include the ecological management fee for a maximum of two charges. For additional permits, tags, and endorsements, the ecological management fee may be waived.

(8) For non-residents, the ecological fee should be greater than that levied for resident fishers, at least.

In addition to revamping the salt fishing license system, this paper recommends the ongoing initiatives of the Wildlife Foundation of Florida (WFF), in particular, the expansion of "legacy" reefs such as the pioneering effort for the Charles Stroh Fund for the Restoration of Davis Reef. The identification of MPAs to be offered for adoption through estate planning may be something to consider. The multiplier effects of protected areas to help rebuild degraded populations of finfish and invertebrates are significant and would be ecologically critical in improving adjacent degraded reefs.

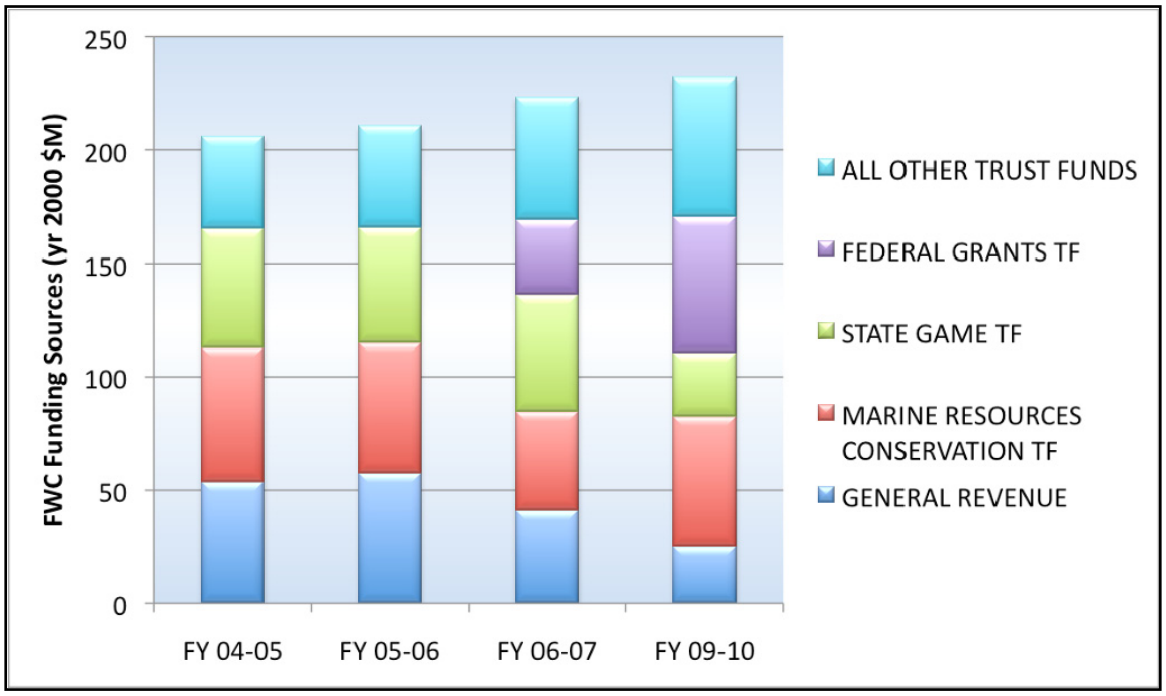


Figure 4.17. FWC funding sources in constant dollars reckoned to base year 2000, (data from Florida Senate, 2008, FWC 2009d).

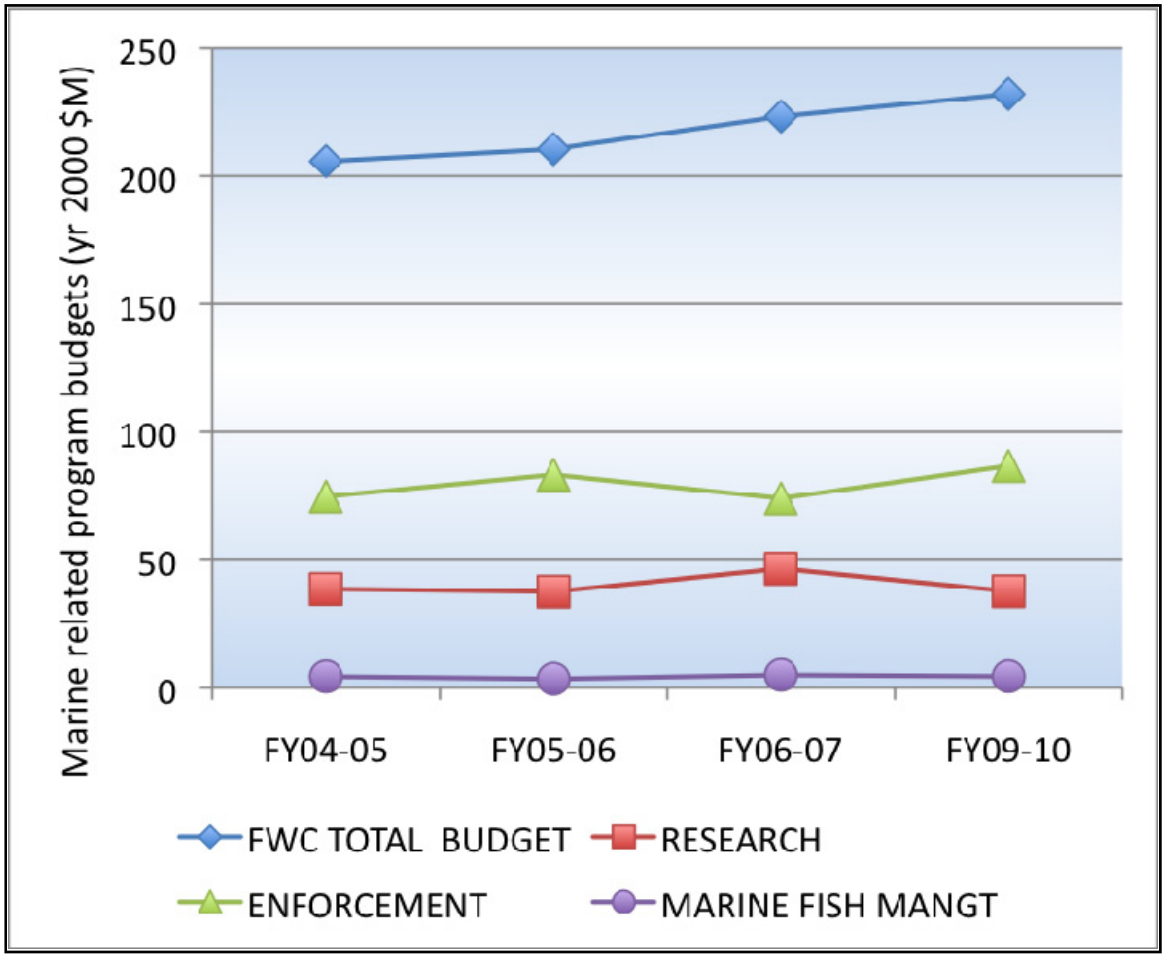


Figure 4.18. Budgets for marine-related FWC programs including research, law enforcement, and marine fisheries management are shown for fiscal years 2004-05, 2005-06, 2006-07 and 2009-10. Note that data for 2007-08 and 2008-09 are not included (data from Florida Senate, 2008, FWC, 2009b).

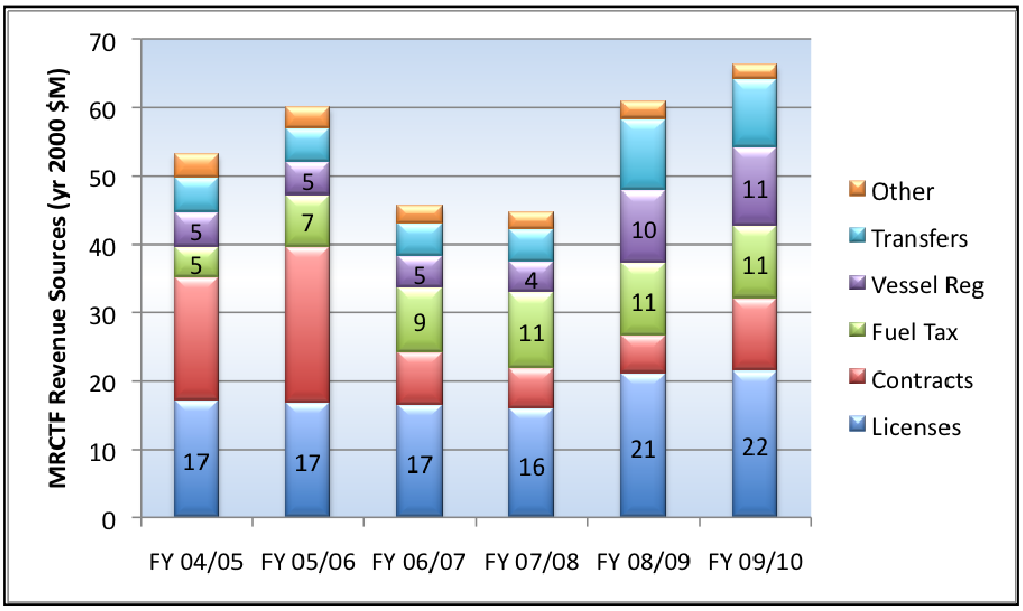


Figure 4.19. **Sources of funding for MRCTF. Fy Percentage (shown on bars).** Values have been adjusted for inflation using 2000 as base year (data from Florida Senate ,2008; FWC, 2009b).

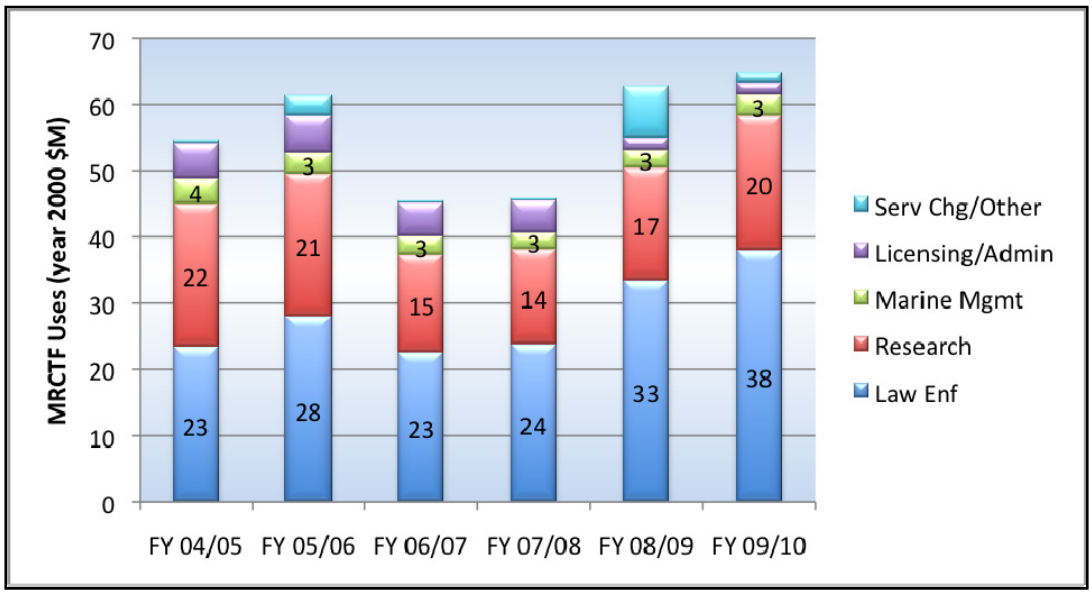


Figure 4.20. The MRCTF funds Law Enforcement (50% of the trust fund), FWRI Research (33%) and Marine Fisheries Management (6%) on average over non-contiguous fiscal years. Values have been adjusted for inflation with 2000 as base year (data from Florida Senate, 2008; FWC, 2009d).

4.5 Recommendations

To redress the current state of overfished coral reef finfish resources, it is clear that the FWC has to consider fundamental changes in the way it integrates a more stringent federal fisheries policy into state policy and in how it evaluates more holistic approaches to fisheries management. The following recommendations are made to help identify how these may be achieved:

(1) The Commission should consider how to integrate national standards as part of state policy and prioritize ending overfishing and rebuilding fish populations. Rebuilt fish populations provide a sustainable livelihood base and longer term economic returns, both of which more than make up for short term negative impacts of restrictive fishing regulations;

(2) The FWC should use the SEDAR assessments to evaluate total catch and catch allocation-by-sector regulations for major targeted species in the snapper-grouper complex and in other species where these have not been determined. Without these major reference limits, size and bag limits as well as seasonal closures become piece-meal measures that will not be effective in addressing overfishing.

(3) FWC should identify habitats for permanent closures so that targeted fish populations have refuges where growth and reproduction can occur unimpeded and can sustain harvest in adjacent fishing grounds in the long term. This can be done collaboratively with FDEP so that common goals for coastal ecosystem protection can be met. The SEFCRI provides good foundation for this and may be formalized through the creation of a committee charged with the management of such permanent closures through joint rule-making and management by both agencies.

(4) FWC should implement an economic analysis of inconsistency and consistency options, examining the costs and benefits to society of proposed management measures. Such economic analysis is an integral part of federal FMPs in fulfillment of National Environmental Policy Act (NEPA) requirements. State FMPs are currently not required to provide an economic analysis for various management options. Economic analyses provide objective bases for determining benefits of rule changes, and without which the regulatory process may become more prone to vested advocacy interests.

4.5.1. General for Snapper-Grouper fisheries

1) Adopt the national standards of the MSRA as part of state policy and prioritize ending overfishing and rebuilding fish populations.
2) FWC should use the SEDAR assessments to evaluate TAC limits and to determine catch allocation by fishing sector for major targeted species for food such as the snapper-grouper complex and the Caribbean Spiny Lobster.
3) FWC should identify habitats for permanent closures so that targeted fish populations have refuges where growth and reproduction can occur unimpeded and can sustain harvest in adjacent fishing grounds in the long term.
4) FWC should implement an economic analysis of inconsistency and consistency options, examining the costs and benefits to society of proposed management measures.

4.5.2. Caribbean Spiny Lobster Recommendations

1) The SEDAR process should be used to update SEDAR (2005) with the participation of other Caribbean nations throughout the distributional range of the Caribbean Spiny Lobster *Panulirus argus* with an overall goal of assessing the crawfish stock at Caribbean-wide scale. This would allow for determining sizes of self-seeding spawning biomass versus recruited biomass from EEZs eastward of Florida. Both would provide objective bases for determining TAC not only in Florida but also possibly in nations across the geographic range of the species.
2) In the event that a Caribbean-wide assessment does not happen in the next two years, FWC and the regional councils should determine historical landings as bases for setting an interim level of TAC. Total landings averaged 3.84 million lbs for the period 2005-2008; and 4.20 million lbs for a seven year run from 2001 to 2008.
3) On May 15, 2007, the Spiny Lobster Ad Hoc Advisory Board unanimously adopted an allocation baseline by user group (Blair, 2007). Commercial trap fisheries gets 72% with a range from 67-77; commercial divers get 5% with a range of 3-8%; recreational fishers get 22% with a range of 18-26% and bully net users get 1% with a range of 0.1 to 3%. A review by the Advisory Board to develop recommendations is triggered when an allocation share falls outside the set range for two consecutive years.

A fundamental problem with the allocation mechanism as adopted by the FWC with the Ad Hoc Advisory Board's advice is that the called allocation by user group is postharvest and passive, and not pre-harvest. There is no reason to believe that the distribution of harvest would keep to these ranges simply as a result of all the regulatory measures that control catch limits by user group as previous experience on unintended shifts has shown. In fact, post harvest sectoral catches are not allocations as these were not predefined targets.

This paper recommends that the allocation baseline by user group be underpinned by a TAC limit and should be set prior to the fishing season. Economic studies should be conducted to determine how the allocation for the commercial user groups would result in profitable fisheries by evaluating various effort scenarios. For example, the studies should determine whether 72% of a set TAC could use 480,000 traps and remain profitable. If not, further effort control measures will need to be taken to ensure profitability of the commercial sector. For the recreational sector, a major question is whether sales of over 100,000 recreational fishing permits annually is sustainable given a 22% allocation of TAC. If not, measures to make the recreational sector of limited entry may need to be considered.

Once an allocated catch volume is reached, the user group should stop fishing for the fishing season. If the catch volume does not reach a set allocation limit for the current fishing season, management actions to deal with the unused allocation may be considered. These can include a carryover into the following fishing season, or an extension of the fishing period for the sector.

4) There is an existing draft rule to extend the moratorium on the issuance of new commercial lobster dive endorsements until July 1, 2015 from the original end date of July 1, 2010. Since the creation of the endorsement for the 2004-05 fishing year, attrition from 404 original endorsements to 320 in 2009 has occurred (Podney, 2009). This paper supports the draft rule, and recommends that an economic evaluation be done on the viability of the fishery given the current number of endorsements, and the daily commercial vessel limit of 250 lobsters.

4.5.3. Marine Life Recommendations

1) Given the critical role of parrotfishes in grazing algae to maintain open spaces for coral settlement (Mumby, et al., 2006, Mumby, et al., 2007) the collection of these species should be banned. With nutrient loading from land, macroalgal growth rates are enhanced and continued collection can diminish the ability

of grazers to control algal overgrowth if their populations continue to be fished

2) Because of the high diversity of species being collected for the live ornamental trade, it is not ecologically meaningful or logistically possible to control collection via size and bag/vessel limits for each species alone. More holistic measures are needed to complement species or groups specific regulations already in place, including those for the top 15 most popular finfish and invertebrate species. The Marine Life Workgroup has to be commended for their thoroughness in designing such regulations. However, they need to consider more integrative measures to ensure the viability of the marine ornamental industry in the light of degraded reef function. Replenishment areas for both food and ornamental species must be set aside along reef tracts of southeast Florida to ensure that there are sizable coral reef sections where growth and reproduction occur can occur without fishing pressure.

3) Collection sites must be monitored for declines in populations of targeted finfish and invertebrate species. Consistent decreases in densities over a five year period should trigger collection bans. The joint monitoring efforts between FWC and NMFS in the FKNMS and the continuing volunteer monitoring efforts of diver groups and REEF should be commended and supported to the extent possible by the Commission. Long monitoring data sets are invaluable in establishing exploitation trends as well as the responses of fish populations to environmental perturbations including changes in climate or the loss of major functional groups such as corals or diademnid sea urchins.

4) In open fishing and protected areas, monitoring should adopt ecosystem level methods to determine the biomasses of functional groups including various grazer assemblages that should remain in the coral reef ecosystem to maintain its integrity. Figure 4.13 shows the Relative Dominance Model developed by Littler and Littler (1984, 2007) to help in the design of monitoring protocols. The model predicts which group (corals, crustose coralline algae, turf algae, frondose macroalgae) will dominate along a nutrient axis (bottom-up control) and along a grazing activity axis (fishing or top-down control). Using a well functioning reef as a baseline (i.e., low nutrients) with a good population of herbivores who can graze plants at >50% loss in six hours yellow box), three trajectories of change are predicted. When nutrients increase, but grazing activity remains high, crustose coralline algae will dominate. When grazer populations decline because of fishing pressure under conditions of low nutrients, dense turf algae dominates. The

least desirable scenario occurs when grazing is reduced and water quality has deteriorated because of elevated nutrients, and the proliferation of frondose macroalgae is favored.

Nutrient tipping points established by earlier studies are 0.1 uM of soluble reactive phosphorus (SRP) and 1.0 uM of dissolved inorganic nitrogen (DIN) (Bell, 1992; Lapointe, Littler, & Littler, 1993). In terms of herbivory, the numbers of grazers able to exert a >50% grazing loss per six hours is indicative of an appropriate level of herbivory (Littler, Littler, & Brooks, 2006). Once the level of herbivory is established, FWC and other scientific and monitoring groups are in better stead to determine the field densities of major organisms that need to be maintained in the wild and conversely, how many of these can be removed without jeopardizing ecosystem functioning. The desirable state is a highly functional reef with 150X more grazers than low herbivory sites (Littler & Littler, 2007).

5) Once herbivory levels are determined, the numbers of grazers, excluding parrotfishes (which should be protected and prohibited from harvest), may be determined. Socioeconomic studies to determine the economic viability of ecologically set levels of harvest in terms of revenues by the current size of commercial harvest would be needed. As indicated earlier, the recreational take should also be estimated to ensure that collection volumes are as accurate to the extent possible. Inclusion of marine ornamental species in the MRIP should be a major action point to achieve this.

6) As important is the need for full disclosure of harvest information monthly or as appropriate, by all commercial permit holders including non-use of endorsements. Failure to report for three consecutive months must be meted with appropriate sanctions.

7) Ecosystem monitoring as envisioned above will require the collaboration with local, state, and federal agencies, as well as civic groups such as REEF and the Florida Oceanographic Society. Beyond numbers monitoring, the relatively simple indices of nutrients, and more labor intensive protocols for herbivory require collaborative work and sharing of resources. It is therefore suggested that volunteer or funded scientists be identified to help launch these field protocols so that they can become routine field methods.

8) The tight collaboration with the marine ornamental industry has allowed FWC to write regulations that command high compliance. This should be maintained and FWC should engender the participation of recreational

collectors to ensure that illegal and unsustainable practices are vetted in the discussions and appropriately dealt with in rule-making.

4.5.4. Recommendations for Penalties

1) The penalty fees should include payment for ecological damages incurred by the violation and should not just be based on the fair market value of the illegal harvest.
2) Penalty actions for noncriminal violations (level 1) of recreational fishing rules may include attendance in remedial school where fishing regulations and basic ecology classes are taught for a prescribed number of hours.
3) A disclosure of harvest information by commercial and recreational fishing license holders must be made mandatory in order to allow better estimation of total catch and total effort.
4) Exchange of penalties associated with level 2 convictions of violators of recreational fishing regulations, should be considered in favor of community hours for helping to monitor fish populations and coral ecosystem function.

4.5.5. Enforcement Recommendations

1) The ArrestNet Citation Database should include spatial documentation where violations occur so that hotspots are objectively identified for better patrol coverage. The database should be comprehensively analyzed to develop spatially explicit products such as frequency maps of boating and fishing violations by time of year to inform the deployment of law enforcement personnel on a periodic basis. Quality control of data encoding and data format standards should be improved to ensure consistency and usability of the encoded data.
2) Public reporting of marine fishing infractions should be encouraged and documented. This is particularly important for coralline areas, where policing multi-species and multi-gear fisheries can be challenging. The snapper-grouper complex, the Spiny Lobster, and marine life species demands a significant level of enforcement that can only be achieved with FWC law enforcement forging partnerships with civil groups that can help observe violations related to bag or vessel limits, size limits, and seasonal closures. These observations should be particularly useful in the rule-making process but also in the identification of fishing violation hot spots.

   Adopt-A-Reef program has been used by a number of organizations to raise funds. In the case of southeast Florida, it may be used both to raise funds but more importantly for civic groups to help monitor and protect the reef

fisheries of the region. During busy boating and fishing seasons, these volunteer groups can be trained to help observe for violations and to intervene by providing regulatory information to the public. The use of mobile technology to allow for quick transfers of information between observing groups and on-air or in-water police assets should be sufficient to make the law more palpable to the public during peak user activities.

3) FWC should consider adopting a VMS to track all vessels in state waters using currently required onboard communication instruments, and similar to what NMFS instituted in 2005, but greatly expanded in vessel and activity coverage. The VMS "achieves near-perfect compliance with open and closed seasons and protected areas…" and "can be used to provide a more comprehensive surveillance framework and to more efficiently direct the limited number of law enforcement" (NMFS, 2005). FWC recently received an authorization to implement the NMFS VMS (FWC, 2009c).

4.5.6. Funding Recommendations

1) Create a tiered marine licensing fee, repealing all age or military exemptions, such that exemptions are modified into licenses requiring the lowest fees, but not necessarily nominal in that they should include an ecological management fee.
2) License fees should be adjusted for inflation cost using the Consumer Price Index, and a standard base year of 2000 may be used so that the changes in license fees can be tracked in this decade.
3) All licenses should be single activity licenses requiring annual renewals, and for monitoring and tracking, but with options to be bought at reduced prices if bought in combination with at least one other recreational license.
4) All licenses should have a bar code ID system for use to document fishing trips and to provide data required by the national angler registry system.

   All species-specific permits, tags, or endorsement should include the ecological management fee for a maximum of two charges. For additional permits, tags, and endorsements, the ecological management fee may be waived.

5. Derelict Fishing Gear and Marine Debris

Fishing gear poses a unique threat upon coral reef ecosystem. The specific type of gear (longlines, gill nets) may strip the reef of its biological resources and impact untargeted species or may disturb the fragile framework by damaging the delicate coral reef ecosystem. Certain gear such as lobster traps and mobile

fishing gear physically destroy the benthos. For example, mobile fishing gear reduces habitat complexity by directly removing or damaging epifauna, smoothing sedimentary bedforms and reducing bottom roughness, and removing organisms which produce structure of the reef (Larkin & Milon, 2000). Even when commercial fishing gear is used properly and for its intended purpose, there can be unintentional stress upon the reefs. A major concern, which will be addressed in this paper, is what the regulations cover and what activities are in place for when nets and traps do become lost at sea. Lost or derelict fishing gear can consequently become a threat to the integrity of the coral reef habitat as well as to species conservation. Drift nets and abandoned lobster traps have the potential to continue "ghost fishing", the term used for lost or derelict fishing gear that continues to catch fish. When ghost nets steamroll through sensitive centers of biodiversity, such as coral reefs, they can have a detrimental effect on the habitat. Habitat destruction can also occur when plastic sheeting covers sea grass beds or other bottom dwelling species, deadening important feeding and breeding grounds (Hetherington, et al., 2005).

5.1. Federal Level

5.1.1. Oversight

The National Oceanic and Atmospheric Administration (NOAA) and the USCG are the lead agencies in the efforts to control marine debris. In 2005, the United States Congress enacted the Marine Debris Research, Prevention, and Reduction Act in which President George W. Bush signed into law in 2006. This bill directs NOAA and USCG to establish programs to help identify and determine sources of marine debris, as well as to assess, reduce, and prevent marine debris and its adverse impacts on the marine environment. It is the intent of this act that the programs would be carried out in cooperation with other local, state, and federal partners. In addition, the bill also directs NOAA and the USCG to reestablish the Interagency Marine Debris Coordinating Committee (IMDCC), develop a federal marine debris information clearinghouse, and work with the global community to reduce marine debris on an international scale.

The US Commission on Ocean Policy recognized marine debris as one of the major threats to our nation's marine resources and to human health and safety along our coasts. However, no federal program existed that dealt specifically with the problem of marine debris. The Marine Debris Research, Prevention, and Reduction Act aims to address this regulatory gap.

The NOAA Marine Debris Program was adopted in 2005 when the Office of Response and Restoration (ORR) of NOAA's National Ocean Service (NOS)

received a line item budget of $5M for Marine Debris. It was legally authorized with the establishment of the Marine Debris Research, Prevention, and Reduction Act. ORR is the NOAA lead office in responding to issues on marine debris.

5.1.2. Federal Regulations and Activities

Before the Marine Debris Research, Prevention, and Reduction Act was passed, there were already several federal laws that mandated NOAA to address problems associated with marine debris. All contain directives for the control or reduction of marine debris. These include the Marine Protection, Research, and Sanctuaries Act of 1972, section 309 of Coastal Zone management Act of 1972 (CZMA), and the Marine Plastic Pollution Research Control Act of 1987, the Coral Reef Conservation Act of 2000 and the Beaches, Environmental Assessment and Coastal Health (BEACH) Act of 2000. The Marine Protection, Research, and Sanctuaries Act, also known as the Ocean Dumping Act, regulates the dumping into ocean waters of any material which would adversely affect human health and the marine environment. NOAA is charged to conduct long range research on the effects of dumping to the marine environment. One of the provisions of Section 309 of the Coastal Zone Management Act, also known as Coastal Zone Enhancement Grants, mandates the federal government to make grants available to coastal states for activities or programs that would reduce marine debris entering the coast and ocean environment. The Marine Plastic Pollution Research Control Act of 1987 implemented the provisions of Annex V of the International Convention for the Prevention of Pollution from Ships as they apply to all vessels over which the United States has jurisdiction. The Coral Reef Conservation Act contains a section that states that NOAA must "provide assistance to States in removing abandoned fishing gear, marine debris, and abandoned vessels from coral reefs to conserve living marine resources"(§6406). The BEACH Act amends the Clean Water Act (CWA). It incorporates new directives to reduce the risk of illness to beach bathers. It requires all coastal states and those bordering the Great Lakes to adopt bacteria standards by April 2000. The purpose of this act is to protect beach bathers from bacteria causing illnesses present in coastal waters.

5.1.2.1. The Marine Debris Research and Reduction Act

The Marine Debris Research and Reduction Act has five key components:

1. Establish the Marine Debris Prevention and Removal Program within NOAA.

   The program will be responsible for developing an inventory of marine debris in all US navigable waters and the EEZ, will develop methods to

tract marine debris, and develop protocols for the prevention and removal of marine debris. The act specifically targets fishing gear as a marine debris and allows efforts for the prevention and recovery of lost fishing gears. The program will also increase funding for its education and outreach program.

The Marine Debris program is now established and administered by NOAA. Its mission is to support national and international projects to prevent, identify and reduce marine debris to protect the nation's natural resources, oceans, and waterways. To aid in meeting its mission, the program partners with other federal agencies, state and local governments, and NGOs in efforts to reduce the hazardous impacts of marine debris.

2. Enhance the USCG Marine Debris Program.

   The act directs the USCG to improve its monitoring and enforcement activities under the Marine Plastic Research Pollution Act. The USCG is also required to contract the National Research Council to submit a report that will evaluate the international and domestic implementation of Annex V of MARPOL and the Act to Prevent Pollution from Ships. Annex V regulates the disposal of garbage from vessels and completely prohibits the disposal of plastics from ships.

   To meet this mandate, the USCG activities related to marine debris are preventive. The USCG must ensure compliance of US ports and terminals in providing adequate receptacles for the appropriate disposal of plastics and other garbage. The Act authorizes the USCG to initiate a voluntary reporting program so that commercial and recreational boaters can enhance waste management on board their vessels.

3. Reactivate the Interagency Committee on marine debris.

   The primary goal of the committee is to coordinate all federal mitigation efforts with non-federal entities. This allows for a comprehensive approach in research and reduction of marine debris in the federal level. The committee includes representatives from the USCG, EPA, US Navy, Maritime Administration, US Fish and Wildlife, Department of State, Marina Mammal Commission, and will be chaired by NOAA representative. The committee is directed to provide a status report and recommendations for the marine debris programs every other year.

4. Establish a Federal Information Clearinghouse for Marine debris.

   The Act directs NOAA to maintain a clearinghouse of marine debris data that will be accessible by interested parties.

5. Authorizes funding for the Act.

   The Act provides grants through the Marine Debris Prevention and Removal Program. The federal funds can be used to fund up to 50% of the total project costs. Matching share for the project could be in the form of in-kind contributions and other noncash support.

This key provision has allowed NOAA to initiate the NOAA community based Marine Debris Prevention and Removal Grants through its Marine Debris Program. The grants provide funding for community-based marine debris prevention and removal projects and educational and outreach projects in the community.

5.1.2.2. EPA BEACH Program

The BEACH Act requires coastal states and those bordering the Great Lakes to submit and adopt bacteria standard to EPA. As of 2004, 14 of the 35 states and territories that must adhere to the provisions of this act have already submitted and adopted water quality standards that meet the EPA recommended criteria.

The EPA BEACH program also provides program development and implementation grants. The grants allow state and local governments to develop and implement programs for monitoring and notification of coastal recreation waters used by the public.

5.1.2.3. National Marine Debris Monitoring Program

The National Marine Debris Monitoring Program (NMDMP) is one of the nation's most comprehensive land-based studies on debris monitoring. Created by the EPA and the Ocean Conservancy, the goal of the NMDMP is to address the lack of information regarding the extent and nature of the problem, with the main focus on tracing the source of marine debris. The program divides U.S. coastline into nine regions based on prevailing ocean currents. Surveys and cleanups are conducted on a 28 day interval, during which time volunteers survey the same 500m stretch of beach. The data is analyzed by the Ocean

Conservancy and made available to the public on the organization's website. The NMDMP is one example of land-based marine monitoring. This program is designed to identify sources and trends of marine debris.

5.1.2.4. International Coastal Cleanup

The Ocean Conservancy, with help from EPA and other federal agencies sponsors the annual International Coastal Cleanup (ICC). This is the largest volunteer effort to clean up beaches, lakes, and streams both on land and underwater. Volunteers collect data on the types and amount of marine debris. The Ocean Conservancy compiles these data and generates an annual report. The data helps the organization in its effort to prevent marine debris through education and outreach.

5.2. State Level

5.2.1. Oversight

The FDEP and the FWC are the lead agencies in the state's efforts to retrieve and reduce marine debris in the coastal waters. The directive to FDEP came with the enactment of, and amendments to, the Comprehensive illegal dumping, litter, and marine debris control and prevention Act and the OCRA. The main principles of these two acts are to provide education and outreach programs on marine debris and to develop a statewide ocean research plan. The FWC are directed to manage the trap debris and retrieval programs. All levels of law enforcement and designated county and municipal personnel are involved in the enforcement of the provisions of these laws.

5.2.2. State Regulations and Activities

5.2.2.1. Comprehensive illegal dumping, litter and marine debris control and prevention (§ 403.41315, F.S.)

The § 403.41315, F.S., also known as the Comprehensive illegal dumping, litter, and marine debris control and prevention, directs the FDEP to develop a comprehensive illegal dumping, litter, and marine debris control and prevention program that should include a public awareness and educational campaign program, enforce the Florida Litter Law, a statewide adopt a shore program, placement of approved identifiable litter and recycling receptacles, and enforcement officers who could educate the public in addition to enforcing litter

and illegal dumping violations. The program must also include a local illegal dumping, litter, and marine debris control and prevention program.

The § 403.413, also known as Florida Litter Law, prohibits any person from dumping litter on any freshwater lake, river, canal, or stream or tidal or coastal water of the state. The law also states that the operator or owner of the boat is in violation of this section if litter is thrown or discarded from a boat. Enforcement of this law is the responsibility of all law enforcement officers and persons designated by the counties or municipalities to enforce the provisions of the law. Penalties for violations of the Florida litter law include:

a) If the litter is less than or equal to 15 pounds in weight or 27 cubic ft. in volume and not for commercial purposes, the person is guilty of a noncriminal infraction, punishable by a civil penalty of $100. Fifty Dollars ($50) of the penalty shall be deposited into the Solid Waste Management Trust Fund to be used for the solid waste management grant program

b) If the litter is more than 15 pounds in weight or 27 cubic ft. in volume, but not exceeding 500 pounds in weight or 100 cubic ft. in volume and not for commercial purposes is guilty of a misdemeanor of the first degree, punishable as provided in § 775.082, Fla. Stat. or § 775.083, Fla. Stat. If the violation occurs in a boat or vessel, the incident will be reported to the Department of Highway Safety and Motor Vehicles (DHSMV) and a penalty of three points will be recorded on the violator's driver's license pursuant to the point system established by § 322.27, Fla. Stat.

(c) If the litter exceeds 500 pounds in weight or 100 cubic ft. in volume or in any quantity for commercial purposes, or dumps litter which is a hazardous waste as defined in § 403.703, Fla. Stat. the violator is guilty of a felony of the third degree, punishable as provided in § 775.082, Fla. Stat. or § 775.083, Fla. Stat.

In all instances, the court may require the violator to remove or render harmless the litter that was dumped, repair or restore property damaged by dumping, or pay damages for any damage arising out of dumping the litter, and perform public service related to marine debris. Any boat or vessel used to dump litter that exceeds 500 pounds in weight or 100 cubic ft. in volume will be declared contraband and is subject to forfeiture.

5.2.2.2. Trap Retrieval and Trap Debris Removal Act

Title 68B-55, F.A.C. Trap Debris Removal Act provides that "local, state, or federal governmental entities, nonprofit NGOs, fishery participant organizations, or other community or citizens groups are hereby authorized to remove trap debris from shoreline areas landward of mean low water, and from mangroves or other shoreline vegetation when they organize, promote, and participate in coastal cleanup events for the purpose of removing marine debris." (68B-55.002, F.A.C.) Seaward of the mean low water line (MLWL) the FWC must authorize cleanup in order to assure proper supervision of trap retrieval in areas that are permanently closed to trapping, i.e., retrieval of illegal traps. In addition, for areas that are permanently closed to trapping, local, state, or federal government personnel may retrieve traps without prior authorization from FWC. The law provides funding for a Trap Retrieval Program (§ 370.143, F.S.) and also requires that all traps retrieved under this program be documented by the commission's FWCDLE office (Rule 68-55.003, F.A.C.).

5.2.2.3. Oceans and Coastal Resources Act of 2005

The § 161.72, F.S. also known as the Oceans Coastal Resources Act directs the FDEP to create the Oceans and Coastal Council that will aid in the identification of new management strategies to protect and conserve Florida's ocean and coastal resources. The law was enacted in response to the recommendation of the United States Commission on Ocean Policy and the President's Ocean Action Plan to better protect and preserve our oceans. The Council has the responsibility of developing priorities for ocean and coastal research and establishing a statewide ocean research plan. The list of research priorities is submitted to the state legislature for consideration in the state budget. The Council is composed of three non-voting members and fifteen voting members. The FDEP, FWC, and Department of Agriculture and Consumer Services (DACS) appoint all Council members.

5.2.2.4. Monofilament Recovery and Recycling Program

The FWRI, a division of the FWC, conducts an outreach program entitled Monofilament Recovery and Recycling Program, which is geared toward reducing marine fishing line debris from recreational harvesters (FWRI MRRP, 2007). The goals of this program are to heighten awareness about the negative impacts of fishing line debris, decrease the amount of fishing line entering the natural environment, and increase the amount of fishing line being recycled. There are over 119 recycling centers throughout the southeast Florida region making it accessible for fishers to recycle their used fishing lines.

5.3. County Activities

5.3.1. Martin County

Keep Martin Beautiful is a 501(c)(3) non-profit, volunteer-based, community action organization based in Martin County, Florida. The organization's mission is to preserve and enhance the quality of life in Martin County through litter prevention, waste reduction, beautification, and community improvement, environmental stewardship, and education. Aside from spearheading cleanup events in Martin County, the organization also administers the adopt a shore program.

5.3.2. Annual Waterway Cleanup

Marine Industries Association of South Florida's (MIASF) annual waterway cleanup in Broward County sponsored by FDEP and organized by the MIASF as part of the public awareness campaign to Keep Our Waterways Clean. The purpose of Waterway Cleanup is to remove bulk waste and non-biodegradable materials from Broward County and to increase community awareness on marine debris.

5.3.3. Broward County Osborne Reef Waste Tire Removal Pilot Project

The FDEP, in partnership with the Broward County Environmental Protection Department, Navy Salvage Divers (Norfolk, Virginia) and the NOAA Marine Debris Program launched this project to pilot test the removal of waste tires from Osborne Reef. About 2 million tires spread over 36 acres were placed in the 1970s to act as artificial reef substrates. The tires are damaging the reefs as they move with waves and storms. To date, the project has completed an evaluation of the pilot phase. The estimated time it will take to remove 650,000 tires from a 30 acre priority area is 3 years, each year to log 120 days of retrieval.

5.3.4. Miami-Dade Baynanza

The Miami-Dade County Department of Environmental Resource Management (MDDERM) sponsors a yearly Biscayne Bay Clean-up Day event called Baynanza. Volunteers sign up for this one day event to help clean up Biscayne Bay. Baynanza is sponsored by local, state, and federal agencies, NGOs and private corporations. On January 8, 2008, DERM received a Bulky Marine Debris Prevention and Removal grant of $200,000 from Senator Mel Martinez that will be used to expand the scope of Baynanza. This funding will allow cleanup of

bulky marine debris such as abandoned vessels, docks, pilings, and piers, and other bulky items that cannot be bagged by volunteers.

5.4. Enforcement

Enforcement of state regulations covering derelict non-trap fishing gear and marine debris falls within the Florida Litter Law (§ 403.413, F.S.). Because of the broad definition of litter, the enforcement of the Florida Litter Law may be carried out by any law enforcement officer of "the Florida Highway Patrol, a county sheriff's department, a municipal law enforcement department, a law enforcement department of any other political subdivision, the department, or the FWC. In addition, and solely for the purposes of this section, "law enforcement officer" means any employee of a county or municipal park or recreation department designated by the department head as a litter enforcement officer" (§ 403.413 (2) (c), F.S.).

For crustacean and Black Sea Bass traps, their collection and retrieval as derelict gear are specified under Rules 68B-55.001 to 55.005, F.A.C., and which was amended in 2007. FWC plays a major role in enforcing this regulation.

In evaluating the effectiveness of enforcement, we examined the amounts of marine debris collected in Florida and in southeast Florida region sites, where possible. Ideally, multi-year datasets can provide trends in amount of debris collected to proxy behavioral changes in debris generation as a result of educational programs and marine debris reduction and collection mechanisms. The data assembled here represent reference levels, with the hope that long term data sets will be generated to allow for more insightful understanding of the nature and mitigation of marine debris.

For fishing gear like nets and hook-and-line assemblies, disposal to coastal and marine waters are often prompted by accidents in deployment. When snagged in the bottom topography, fishers deem it prudent to cut them loose rather than invest in risky and costly retrieval. For traps, storms and hurricanes move them away from their deployed locations, and owners who cannot locate these have little choice but to abandon them. In addition, trap fishers abandon their traps when logistical problems of storage, transport, and disposal ensue (Guillory, McMillen-Jackson, Hartman, Perry, Floyd, Wagner, & Graham, 2001). Thus, the production of marine debris from fishing gear is caused by both deliberate and unintentional actions. In any case, the proliferation of abandoned fishing gear results in unwanted impacts to organisms and habitats and has to be addressed.

The contribution of abandoned fishing gear to marine debris awaits systematic monitoring and sampling of coastal and oceanic areas. The Ocean Conservancy's International annual Coastal Cleanup initiatives worldwide provide a broad-based systematic monitoring of the nature of marine debris through both beach and underwater clean-ups. Disaggregated data for the 2006 Florida Coastal Cleanup is shown in Table 5.1 and Figure 5.1. Results of the 2006 coastal cleanups show that abandoned fishing gear accounted for 6% of all debris as compared to 45% from smoking-related products and 47% for shoreline and recreational activities. Similarly, the Coastal Cleanup in Palm Beach in 2007 showed that derelict fishing gear contributed 8% of all debris while smoking related products and shoreline and recreational activities accounted for 43% and 47% respectively. Given that coastal cleanups concentrate on beach and near-shore debris, it is logical that land-based debris represents the highest proportion of trash collected.

In comparison, the few studies that focused on submerged debris demonstrate that the proportion of abandoned fishing gear becomes much larger. Chiappone, Dienes, Swanson, and Miller (2005) conducted a study of the impacts of lost fishing gear on coral reef invertebrates at 63 offshore reef sites in the FKNMS in 2001. Of the 298 occurrences of marine debris, hook and line fishing gear accounted for 87% of all debris recorded and was responsible for 84% of the incidents that led to tissue abrasion of invertebrates. Branching gorgonians, fire corals, and sponges were the most impacted groups.

More recently, Herren, Monty, & Stokes (2007) completed an underwater survey of marine debris in the Saint Lucie Inlet Preserve State Park Coral Reef. They documented that 61% of all recorded debris was either abandoned traps or fishing gear and that another 15% was discarded boating debris (Figure 5.2).

Data from the shoreline cleanups and from the two underwater surveys described above indicate that abandoned fishing gear is a persistent source of debris accumulating on land and in submerged habitats. In either case, it is imperative that a more systematic approach to identify marine debris hot spots and implement cost effective retrieval mechanisms be designed alongside educational programs to reduce fishing-generated marine debris effectively.

Table 5.1. Composite data on the ICC conducted in Florida in 2006. Numbers are units collected.

Shoreline and Recreational Activities	
Bags	36,739
Balloons	4,860
Beverage bottles (plastic)	32,382
Beverage bottles (glass)	30,252
Beverage cans	30,526
Caps/Lids	73,141
Clothing/Shoes	6,189
Cups/Plates/Forks/ Knives/Spoons	30,339
Food wrappers	52,516
Pull tabs	7,322
Six-pack holders	2,382
Shotgun shells	1,069
Straws/Stirrers	31,244
Toys	5,377
Ocean/ Waterway Activities	
Bait containers	2,892
Bleach/Cleaners	1,089
Buoys/Floats	2,131
Crab/Lobster/Fish traps	489
Crates	371
Fishing lines	9,126
Fishing lures/Light sticks	2,602
Fishing nets	1,146
Light bulbs	638
Oil/Lube bottles	1,071
Pallets	7,058
Rope	8,474
Strapping bands	3,294
Smoking related Activities	
Cigarettes/Cigarette filters	299,821
Cigarette lighters	3,629
Cigar tips	13,916
Tobacco packaging	8,772
Dumping Activities	
Appliances	135
Batteries	1,057
Building materials	10,203
Car/Car parts	1,028
55-Gallon drums	78
Tires	1,312
Medical/ Personal Hygiene	
Condoms	1,310
Diapers	767
Syringes	438
Tampons	1,070
TOTALS	728,645

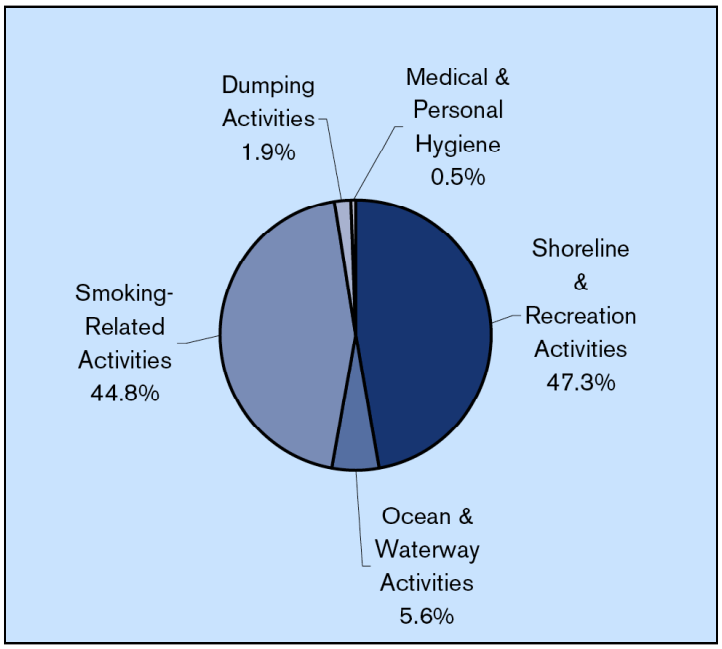


Figure 5.1. Sources of marine debris collected by the 2006 Florida Coastal Cleanup. (Ocean Conservancy, 2007).

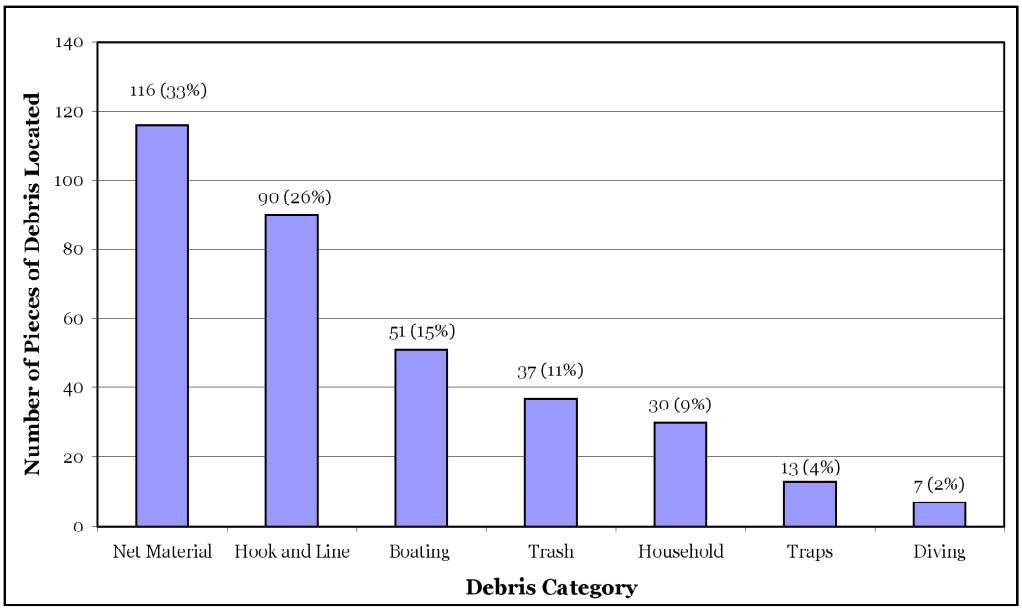


Figure 5.2. Proportion of different types of debris recorded at St. Lucie Inlet Preserve State Park during surveys conducted from April 2006 to January 2007 (Herren, et al., 2007).

5.5. Evaluation of the regulatory system

As discussed above, federal legislation provides country-scale provisions to monitor and track marine debris with the aim to heighten awareness and reduce the proliferation and impacts of marine debris. By providing monitoring and information infrastructure including funds for these and awareness programs, federal programs support statewide initiatives. State laws provide the regulatory framework to provide disincentives and penalties against willful action that leads to litter production in general, and to fishing-based marine debris generation in particular. Here we analyze the regulatory system designed to discourage willful dumping of fishing generated marine debris (nets, hook-and-line gear, traps). Needless to say, the information database on marine debris generation, hotspots, and number or volume retrieved, is currently inadequate.

5.5.1. Non-trap fishing gear

For fishing nets and hook-and-line gear, the absence of specific provisions in Chapter 68B, F.A.C. on their retrieval as abandoned gear places them as marine debris as covered by the Florida Litter Act. The latter prohibits dumping of litter "in or on any freshwater lake, river, canal, or stream or tidal or coastal water of the state, including canals. When any litter is thrown or discarded from a boat, the operator or owner of the boat, or both, shall be deemed in violation of this section" (§ 403.413 (4) (b), F.S.). For dumping litter less than 15 lbs or 27 cubic ft. in volume and which is a non-criminal offense, a civil penalty of $100 is levied, of which $50 is deposited to the Solid Waste Management Trust Fund. For unloading litter between 15 to 500 lbs or 27 to 100 cubic ft., a first degree misdemeanor, penalties include community service and three penalty points on the violator's driver's license. For trash exceeding 500 lbs or over 100 cubic ft., the penalty is for a third degree felony, which is imprisonment not exceeding five years.

The existing provisions above, which apply to abandoned fishing nets and hook-and-line gear, do not give any guidance on what fishers need to do should abandonment become an option. This study recommends that periodic inventory of appropriately labeled gear be a necessary requirement for obtaining fishing licenses and permits, for both recreational and commercial fishers, as appropriate. Mechanisms for reporting lost gear with proximate GPS locations within 24 hours of occurrence should be put in place with incentives for compliant fishers, such as merit points for discounted license or permit fees. A geographic information system associated with a report hot line should provide much needed data on the distribution of fishing associated marine debris.

Systematic retrieval efforts can then be appropriately initiated on a timely basis with spatial focus. In addition, proper disposal procedures of retrieved material should be in place. Federal grants can be tapped for creatively designed proposals that integrate broad-base participation of fishers and other community groups in partnership with governmental agencies.

5.5.2. Crustacean and Black Sea Bass traps

In the case of traps for Spiny Lobsters, Stone Crabs, Blue Crabs, and Black Sea Bass, a detailed and updated procedure of retrieval for derelict traps (those set during closed seasons, or without proper FWC trap tags and required elements such as a buoy, line, current trap tag, current license during open fishing season) is described in Ch. 68B-55, F.A.C. that was recently amended in 2007.

As amended, local, state, or federal personnel may remove derelict traps without prior FWC approval. For nonprofit NGOs, fishery participant organizations or other civil groups, these must secure FWC approval before removing derelict traps. In both cases, there should be a Commission approved retrieval plan including the following:

- Operational area and time period proposed
- Number of vessels
- Methods of disposition
- Number and qualifications of supervisory personnel
- Notification of the FWCDLE no less than 24 hours before commencement of retrieval
- Final float plan information – contact information, vessel registration numbers, trip times, and number of days

Dodson (2008) describes the process of trap retrieval:

> "Trap retrieval" requires scheduling and completing each trip in a designated area, disposing of debris, and completion of work vouchers and Commission retrieval observation records. During a trap retrieval trip, an FWC observer records the area patrolled, the number of traps retrieved, and the crawfish or Stone Crab endorsement number indicated on each trap retrieved. All buoys, ropes, and plastics are removed from the traps and returned to shore for

> proper disposal at a county landfill. The disabled trap is disposed of at sea within specifically designated coordinates approved by the Commission. Plastic and wire traps are returned to shore for resale to the original owner or disposal in a landfill. Trap owners frequently do not purchase their retrieved wire or plastic traps."

The removal of derelict traps is conducted while at the same time protecting legitimate traps from being vandalized. Tampering with traps and their catch belonging to another fisher is a 3rd degree felony and is punishable by permanent revocation of fishing privileges plus a $5,000 fine.

In the event of hurricanes, trap owners have 10 days to claim their retrieved traps from FWC or FWC authorized groups, after which these will be disabled and disposed of at a landfill by FWC or FWC authorized groups. For unclaimed traps, cleanup groups previously authorized FWC are required to dispose the traps in a landfill and to submit proof of disposal.

Funding for trap retrieval is generated from a trap retrieval fee of $10 per abandoned trap retrieved from waters during the closed season. Beginning 2001, $25 from each Stone Crab license fee is set aside for the trap retrieval program. In 2004, an increase of $25 in the cost of the Crawfish endorsement was established for the same program. For Stone Crab license and crawfish endorsement holders, they enjoy a waiver of five traps per license, i.e., they do not pay for the extra $25 for each of five traps per license. Funds are deposited in the Marine Conservation Trust Fund to be used solely for the trap retrieval program.

To evaluate the efficacy of the program, this study searched for trap retrieval data containing the required documentation as described above. Given that retrieval programs have been in place since 1985 and with the formation of the FWC in 1999, it was assumed that an accessible database on trap retrieval with mandated documentation was in place. Unfortunately, the FWC does not have a website or any reference documents that contain this information. However, invoice data and trap numbers categorized by different Florida regions was obtained from the website of FFF, an NGO (FFF n,d,) . The data is shown in Table 5.2. According to David Grix, Vice President of FFF, the data on invoice paid by FWC to a trap retrieval contractor, the Organized Fishermen of Florida (OFF), represent the only data available for the period 2002 to 2007.

Table 5.2. Traps retrieved by the Organized Fishermen of Florida (OFF, n.d.)

Invoice Date	Number of traps retrieved	Unit cost Of retrieval, $	Total retrieval cost paid by FWC, $	Total disposal cost paid by FWC, $	Total cost paid by FWC, $
July 10 2002	1,059	7.00	7,413.00	0	7,413.00
July 30 2002	767	7.00	5,369.00	0	5,369.00
Aug 22 2002	1,710	7.00	11,970.00	380.00	12,350.00
Jun 20 2003	378	7.50	2,835.00	0	2,835.00
Jun 25 2003	288	7.50	2,160.00	0	2,160.00
July 21 2003	2,302	7.50	17,265.00	0	17,265.00
Oct 29 2003	156	7.50	1,170.00	517.92	1,687.92
Jun 10 2004	2,814	7.50	21,105.00	0	21,105.00
Aug 24 2004	187	7.50	1,402.50	96.60	1,499.10
Aug 22 2006	3,132	12.50	39,150.00	4,200.00	43,350.00
Oct 16	1,182	12.00	14,184.00	2,400.00	16,584.00

2006					
Jun 15 2007	61	15.00	915.00	900.00	1,815.00
July 26 2007	2,678	15.00	40,170.00	5,900.00	46,070.00
TOTAL	17,041		170,013.50	16,994.52	187,008.02

Since the data in Table 5.2 were taken from actual invoices, documentation on the location, kind of trap, numbers retrieved by owners, numbers disposed of, were not available. A more systematic and transparent record keeping and publication of the annual results of trap retrieval is a good way to engender reciprocal compliance among participating user groups and to promote citizen participation in reducing the number of derelict traps. Table 5.3 shows the distribution of traps retrieved for year 2006 and 2007 (current to September 2007). According to FFF, FWC started this documentation only in 2006, contrary to the provisions of Chapter 68B-55 which required documentation since inception of the program in 1985.

It would be extremely helpful if the mandated documentation for trap retrieval is systematically maintained as a database with spatial and temporal attributes as a way to gauge the efficacy of the retrieval program. The information can be integrated with the trap licensing data as a way to inventory the number of traps deployed and the percentage of derelict gear retrieved each year. In addition the participation of both commercial and recreational fishing groups should be promoted.

Table 5.3. Stone Crab traps retrieved by region provided to FFF by FWC (FFF, n.d.)

Year	Region	Counties	No. Stone Crab Traps Retrieved	No. of Retrieval Trips Conducted
2006	Big Bend	Taylor, Dixie, Levy, Citrus. Hernando	29	2
	Florida Keys	Monroe, Dade	674	14
	Marquesas Keys	Monroe	2	2
	SW Florida	Collier, Lee	1,184	5
2007	Big Bend	Taylor, Dixie, Levy, Citrus. Hernando	61	3
	Florida Keys	Monroe, Dade	673	14
	Marquesas Keys	Monroe	91	1
	SW Florida	Collier, Lee	384	4

The participation of trappers in minimizing derelict traps is key to a successful trap retrieval program. It is critical to maintain a transparent process in contracting retrieval services, and to follow due process of law associated with disposal or resale of retrieved traps. In the limited data above, it is not clear why the OFF appears to be the sole contractor for five years from 2002 to 2007. The FFF group expressed its concerns over the fact that the OFF heavily lobbied for the Stone Crab, Spiny Lobster, and Blue Crab retrieval programs. Its monopoly

of the retrieval service contract granted by FWC over a five year period appears self-serving.

5.6. Recommendations

1. Draft legislation to provide guidance and incentives for fishers to report, retrieve, and properly dispose of fishing nets. The current Monofilament Recovery and Recycling Program of FWC makes for an excellent venue to identify areas of consensus and common concerns that legislation must address to strengthen this and similar programs.

2. Amend the current trap retrieval program so it contains transparency in regards to contractual agreements and disposition of retrieved traps. Broad base participation by responsible fishing organizations is highly desirable and must be promoted.

3. Maintain documentation of retrieved fishing gear in an accessible spatially explicit database for education and monitoring purposes. Hot spots of marine debris accumulation can be identified and prioritized as targets for debris retrieval programs.

4. Establish priority coastal areas where systematic monitoring and retrieval for abandoned fishing gear should be carried out. The cooperation and participation of recreational and commercial fishers are critical in this step.

5. Publicize retrieval data, participating groups, costs, and benefits in the worldwide web to promote wider participation and increased awareness on the critical need to reduce marine debris and derelict fishing gear.

6. Call for public-private partnerships in conceptualizing and implementing projects that enhance knowledge and understanding of the generation and likely hotspots of marine debris and those that implement derelict gear reduction and impact mitigation. Federal grants may be tapped for supporting these initiatives.

6. Recreational Boating and Mooring

With almost a million boats registered, recreational boating is big business in Florida (FWC, 2008a). The Florida marine industry estimates a total economic output of over $18.4B in sales and over $220,000 in boating related jobs (Marine Industry Association of the Treasure Coast). In southeast Florida, where there are

almost 170,000 registered boats, a 2009 study shows that the direct and indirect effects of boater trip spending are $325M in sales, 3,581 jobs, and $104M in labor income (Wiggen et. al., 2009). But southeast Florida is also home to coral reefs that span 170 km from the northern border of Biscayne National Park in Miami-Dade to St. Lucie Inlet in Martin County. The protection and management of these natural resources have become a big challenge with the continued increase in the boating population within southeast Florida and the documented decline in coral cover in the region.

6.1. Federal Level

6.1.1. Oversight

The USCG is charged with setting regulatory standards for all recreational vessels in the United States. Navigation and Navigable Waters, Title 33 Code of Federal Regulations (33 *CFR* 101.1) mandates the USCG to prescribe rules and regulations for the use, administration, and navigation of all navigable waters of the United States for the purpose of protection of life and property. This mandate also extends to any public navigable canals with provisions authorizing the agency to stipulate regulations for speed and movement of vessels in any public navigable channel that has been improved under authority of Congress.

6.1.2. Federal Regulations and Activities on Recreational Boating

Recreational Vessels, Chapter 43 Title 46 of the United States Code authorizes the USCG to regulate the manufacture and safety standards of recreational boats (and boat related equipment) that operate on waters under the jurisdiction of the United States or that are owned in the United States, and while operating on the high seas. It mandates the USCG to prescribe regulations that establish minimum safety standards for recreational vessels and associated equipment, and procedures and tests required to measure conformance with those standards for recreational vessel safety (46 U.S.C. § 4301). The code provides flexible regulatory authority to establish uniform standards for the design, construction, materials, and performance of recreational boats and boating equipment (46 U.S.C. § 4302). It also requires the display and permitting of seals, labels, plates, or devices on boats that certify compliance with the United States safety regulations and standards for recreational vessels and associated equipment.

6.1.3. Federal Environmental Law

Water Pollution Prevention and Control Act provides for regulations addressing environmental concerns associated with recreational boating. The Act prohibits the discharge of fuel, oil, oily wastes, and hazardous substances in the navigable waters of the United States, adjoining shorelines, or the waters of the contiguous zone (33 U.S.C. § 1321). Up to $125,000 civil penalty can be imposed for violations of this regulation. Methods and Procedures for the Removal of Discharged Oil, Section 153.05 of Title 33 Code of Federal Regulation directs the responsible party to control the source of the discharge, prevent further discharges and remove as much of the substance using mechanical means (33 *CFR* 153.305). Civil penalties are imposed on violations of this regulation.

The Ocean Dumping Act prohibits any person transporting any material to the United States from dumping the material into the territorial sea or into the zone contiguous to the territorial sea of the United States, extending to a line twelve nautical miles seaward from the baseline from which the breath of the territorial sea is measured (33 USC § 1401). Penalties for violation of this prohibition include fines not exceeding $50,000.00 and imprisonment up to five years.

Section 312 of the CWA prohibits the discharge of untreated sewage within the three mile U.S. territorial limit. 33 *CFR* 159.7 also prohibits the discharge of treated or untreated wastes into federally designated No Discharge Zones (NDZs) (33 *CFR* 159.7). NDZs are ocean and freshwater aquatic areas where boaters are prohibited to discharge any vessel sewage.

Both the CWA and 33 *CFR* 159.7 regulate the use of Marine Sanitary Devices (MSD). Penalties in the form of fines can be imposed for violating these provisions. The Marine Plastic Pollution Research and Control Act also requires boats 26ft and longer to display an informational placard on the subject of these prohibitions (33 *CFR* 151.59) . The placard must be at least 9" x 4", made from a durable material, and must be placed in an area where the crew and passengers can read it.

The CWA allows states and territories to petition the EPA for an NDZ. NDZs can only be approved by EPA if it is determined that there are available and adequate facilities for the safe and sanitary removal and treatment of sewage. Neither treated nor untreated waste can be released from a vessel into NDZ designated waters. NDZs are tools that can aid states in protecting their aquatic habitats and drinking water intake zones. On June 19, 2002, all state waters within the FKNMS became an NDZ. This is the only NDZ in the state of Florida.

The CWA requires EPA to develop performance standards for MSD and the USCG is mandated to promulgate regulations consistent with EPA's standards. All MSDs must be certified as meeting the EPA standards and USCG regulations. The Clean Vessel Act of 1992 provides funds to states for the construction, renovation, operation, and maintenance of pump out stations and waste reception facilities.

Citizen suits are permitted under the guidelines and procedures set forth in USC 33, Section 1365. This section gives the citizens the right to sue violators of the Clean Water Act if they are or will be adversely affected by the violation. This section of the Act provides further that states, their political subdivisions and interstate agencies are not preempted from adopting or enforcing standards, limitations or requirements as long as they are no less stringent than their federal counterparts (33 U.S.C. 1365).

6.1.4. Federal Anchorage and Mooring Regulations

The Rivers and Harbors Act of 1899 (33 U.S.C. § 403) prohibits the creation of any unauthorized obstruction in navigable waters of the United States. It also authorizes the U.S. Army Corps of Engineers (USACE) to regulate the building of wharf, pier, jetty, and other structures in the waters of the United States. Permanent mooring structures and permanently moored floating vessels are subject to this regulation. The Act authorizes the USCG to establish anchorage areas and anchorage grounds related to maritime commerce and navigation (33 USC § 471). However, the Act also allows for the establishment of special anchorage areas that could be used by recreational vessels less than 65ft. The Act states that " vessels less than 20 meters in length while at anchor in special anchorage shall not be required to exhibit the anchor lights and shapes required by the Coast Guard Navigation Rules" [33 USC §c2030(g)] . The establishment of the special anchorage areas and the implementation of rules within these areas are delegated to the USCG.

Sections 110.73 – 110.74 of Title 33 of the Code of Federal Register establish the special anchorage areas in Florida. These are St. Johns River, Indian River at Sebastian, Indian River at Vero Beach, Okeechobee Waterway at St. Lucie River in Stuart, Marco Island at Marco River at Manatee River in Bradenton, and Apollo Beach (33 *CFR* 110.73-110.74) . The special anchorage area at St. Lucie River is primarily used by recreational boaters.

Additional federal statutes pertaining to anchorages include Section 209 of Titl**e** 33 of the US Code which states that **"** Every vessel shall, if the circumstances of the case admit, avoid anchoring in a narrow channel and that "a vessel shall so

far as practicable avoid anchoring in a traffic separation scheme or in areas near its terminations." (33 USC § 209).

6.2. State Level

6.2.1. State Recreational Boating Regulations

The FWC is the state agency charged with establishing rules and enforcing boating regulations in Florida. The § 327, F.S., also known as the Florida Vessel Safety Law, is the main law that governs the safe use and operation of recreational vessels in State waters. Provisions of the statute include:

1. Vessel Operation

A. Reckless Operation

The § 327.33, F.S. of the Florida Vessel Safety Law states that it is unlawful to operate a vessel in a reckless manner (§ 327.413). Reckless operation includes

a) operating any vessel, water skis, aquaplane, or similar devices in a manner that disregards or jeopardizes the safety of others.
b) not complying with navigation rules including improper speed and exceeding maximum loading or horsepower.
c) operating a vessel in a prohibited manner or to carry on any prohibited activity in designated restricted areas.

B. Divers Down Flag

Under § 327.321, F.S. in the Florida Vessel Safety Act, any person operating a vessel on a river, inlet, or navigation channel must make a reasonable effort to maintain a distance of at least 100ft from any divers-down flag. On waters other than a river, inlet, or navigation channel, vessel operators must make a reasonable effort to maintain a distance of at least 300ft from any divers-down flag. The law also requires that any vessel approaching a divers down flag must proceed no faster than necessary to maintain headway and steerageway. All vessels must lower their divers-down flag once all divers are aboard the vessel. It is also unlawful to operate any vessel displaying a divers-down flag unless it has one or more divers in the water.

C. The § 327.30, F.S. requires the operator of a vessel involved in a collision, accident, or other casualty, to render necessary assistance to other persons affected by the collision, accident, or other. The operator must report the accident to one of the following agencies: the FWCDLE; the sheriff of the county within which the accident occurred; or the police chief of the municipality within which the accident occurred. It is unlawful for a person operating a vessel involved in an accident to leave the scene of an accident or injury without giving all possible assistance to or locating persons involved in the accident.

2. Vessel and Equipment Regulations

The § 327.50, F.S. in the Florida Vessel Safety Act requires vessels operating in state waters to carry, store, maintain, and use safety equipment in accordance with current United States Coast Guard safety equipment. It requires that every person under six years of age on board a vessel less than 26ft in length wear a type I, type II, or type III Coast Guard approved personal flotation device while the vessel is underway. It also requires that all vessels are equipped with properly serviceable lights and shapes/buoys required by the navigation rules.

3. Boater Education

The § 327.395, F.S. requires persons 21 years of age and under who operate a vessel powered by 10 horsepower or larger engine to pass an FWC approved boater safety course. While boating he/she must carry photo identification and a boating safety card issued by the FWC at all times.

The § 327.731, F.S. requires mandatory boater education for persons who have been convicted of two (2) non-criminal boating safety infractions within a 12 month period and for any person convicted of a boating infraction which resulted in a reportable boating accident, or convicted of any criminal boating violation. They must enroll in, attend, and successfully complete any National Association of State Boating Law Administrators or State of Florida approved boating safety course. Individuals charged with criminal boating violations must also complete an approved safe boating course for violators.

4. Marine Sanitation

The § 327.53, F.S. of the Florida Vessel Act require all vessels in waters of the State to comply with MSD requirements of the USCG. It also requires that raw sewage shall not be discharged from any vessel in Florida waters. All waste shall be disposed in an approved waste reception facility.

5. Boating Under the Influence

Under §327.35, F.S. in the Florida Vessel Safety Act, a person is guilty of the offense of boating under the influence if the person is operating a vessel and he or she is under the influence of alcoholic beverages, any chemical substance, any controlled substance prohibited by law and has a blood-alcohol level of at least 0.08 grams of alcohol per 100 milliliters of blood or has a breath-alcohol level of at least 0.08 of alcohol per 210 liters of breath.

6. Restricted Areas:

The § 327.46, F.S. in the Florida Vessel Safety Act authorizes the FWC to "establish by rule, pursuant to chapter 120, restricted areas on the waters of the state for any purpose deemed necessary for the safety of the public, including, but not limited to, vessel speeds and vessel traffic, where such restrictions are deemed necessary based on boating accidents, visibility, hazardous currents or water levels, vessel traffic congestion, or other navigational hazards. Each such restricted area shall be developed in consultation and coordination with the governing body of the county or municipality in which the restricted area is located and, where required, with the USCG and the USACE"(§ 327.46, F.S.)

This section limits the operation or activities of a vessel in the restricted areas. Prohibited activities are those that are deemed as safety hazards or those that interfere with navigation within a restricted water area. The restricted area must be clearly marked by regulatory markers as authorized by the statute.

The § 327.461, F.S. prohibits operation of a vessel within areas designated as safety zones, security zones, regulated navigation areas, or naval vessel protection zones as defined and established by 33 *CFR*. These zones were established to allow state and local enforcement agencies to operate in the federally designated exclusion zones specified. State and local enforcement agencies can enforce these zones at the request of a federal authority.

7. Vessel Title and Registration Requirements

The § 328, F.S., Vessels: Title Certificates; Liens; Registrations, requires the documentation, titling, and registration of recreational vessels in Florida. The law directs the DHSMV to administer the vessel registration and titling of recreational boats in Florida. DHSMV is responsible for vessel registration, and title applications, certificates and collecting vessel registration and title fees.

The § 328, F.S. require all operators of vessels operating with mechanical propulsion devices (such as gas or electric outboards) are required to be registered. The vessels must be registered within thirty days of purchase. Vessels operating in the waters of Florida must be registered yearly.

The § 328.73, F.S. authorizes county tax collectors to act as agents of the DHSMV to issue registration certificates, vessel numbers, and decals to applicants as provided by the state law and in accordance to the rules promulgated by the department. The § 328.66, F.S. allows a county to impose additional annual registration fees, equivalent to fifty percent of the state's registration fee, on vessels that are operated and stored within the county jurisdiction. It is further mandated that a dollar from the county fee will be deposited in the Save the Manatee Trust Fund of the FWC and the remainder will be used for the patrol, regulation, and maintenance of the lakes, rivers, and waters and for other boating-related activities. The county is also authorized to establish with its municipalities an agreement on the use of these funds for boating related projects within the municipalities.

6.2.2. State Anchoring and Mooring Regulations

The § 253.03(7b), F.S. authorizes the Board of Trustees of the Internal Improvement Trust Fund to regulate anchoring, mooring, and the establishment of anchorages. Regulations must not interfere with commerce or transit of vessels.

The § 327.42, F.S. prohibits mooring to, or damaging, markers or buoys placed by any government agency. The § 327.44, F.S. prohibits anchoring, except in an emergency, in a manner that constitutes a navigational hazard or interferes with other vessels. The law also prohibits anchoring under bridges or within or adjacent to heavily traveled channels if deemed unreasonable under the prevailing circumstances.

The § 373.118, F.A.C. mandates the FDEP to adopt rules for general permits for local governments to construct, operate, and maintain boating related facility construction projects, including public mooring fields. The general permits adopted by rule will include the criteria for a state programmatic general permit issued by the USACE under Section 404 of the CWA. Facilities must be consistent with the manatee protection plan of the local government. It should also obtain Clean Marina Program status before it opens for operation and must maintain this status for the life of the facility.

Permitted mooring fields shall not exceed an area of 50,000 sq. ft. over wetlands and other surface waters and will be maintained and operated for the exclusive use of the general public.

The § 327.60, F.S. allows local governments to enact and enforce regulations which prohibit or restrict the mooring or anchoring of floating structures or live-aboard vessels within their jurisdictions or of any vessels within the marked boundaries of permitted mooring fields.

However, local authorities cannot regulate the anchoring of non-live-aboard vessels in navigation outside of these mooring fields. The § 327.4105, F.S. directs FWC in consultation with FDEP to establish a pilot program to explore potential options for regulating the anchoring or mooring of non-live-aboard vessels outside the marked boundaries of public mooring fields. The purpose of this program is to encourage the establishment and use of public mooring fields. Each location selected for inclusion in the pilot program must be associated with a properly permitted mooring field. FWC in consultation with FDEP will select two locations off the east coast of the state, two locations off the west coast of the state, and one location within Monroe County. Approval of the pilot program may allow a county or municipality selected to regulate by ordinance the anchoring of vessels, other than live-aboard vessels outside of a mooring field.

There are other state rules dealing with anchoring in Florida. These are Chapter 68D-24, F.A.C. implemented by FWC, and Chapters 18-20 and 62D-2, F.A.C. implemented by FDEP. Chapter 68D-24, F.A.C. identifies areas in Florida which are designated as restricted areas. These areas have assigned speed zones. Additionally, anchoring is not permitted in these restricted areas. Chapter 18-20, F.A.C. Florida Aquatic Preserve, and Chapter 62D-2, F.A.C., State Recreation Areas and Parks, address management and use of Florida's Aquatic Preserves and State Parks. The aims of Chapter 18-20, F.A.C. are to preserve the submerged lands within the Aquatic Preserves, to maintain the propagation of fish and wildlife within the Aquatic Preserves, and to maintain the natural or existing conditions of the Preserves so that their aesthetic, biological and scientific values may be enjoyed by future generations. The purpose of Chapter 62D-2, F.A.C. is "to provide maximum public use consistent with the preservation of the natural features and historic value" of the restricted areas within State Parks. Title 62D, F.A.C. prohibits mooring or anchoring within 100ft of shoreline in designated restricted areas within the park.

6.2.3. State Environmental Boating Laws (by regulated area)

1. Litter.

The Florida Litter Law prohibits dumping of litter in or on any freshwater lake, river, canal, or stream, or tidal or coastal water of the state. If the litter is thrown from a boat, the operator or owner of the boat, or both, will be deemed in violation of the law. The law also makes it illegal to dump raw human waste from any vessel upon the waters of the state.

2. Florida Manatee

The Florida Manatee Sanctuary Act of 1978 (FMSA) designated the State of Florida as a refuge and sanctuary of manatees. The Act gives FWC regulatory authority to protect manatees and their habitat, and to regulate the operation and speed of motorboat traffic in order to protect manatees from harmful collisions and harassment. Chapter 68C-22 of the F.A.C. implements the FMSA. Its purpose is to establish restrictions to a.) Protect manatees from harmful collisions with motorboats and from harassment, b.) To protect manatee habitat, such as seagrass beds, from destruction by boats or other human activity and c.) To provide limited safe havens where manatees can rest, feed, reproduce, give birth, or nurse undisturbed by human activity. Chapter 68C-2, F.A.C. designates manatee zones for different counties and municipalities. For the southeast Florida region, manatee zones are designated for Miami-Dade, Broward, Palm Beach, and Martin counties.

3. Seagrass

The intent to protect seagrass is present in several Florida statutes specific to protection of marine habitat within the boundaries of the state. Among these statutes are the FMSA; § 403, § 376.121, F.S., and § 379.2431(2)(n). F.S. specifically states that FWC may adopt rules to protect manatee habitat, such as seagrass beds from destruction by boats or other human activity. The § 403, F.S. establishes restrictions on coastal projects and activities that can adversely affect the quality of waters and the benthic habitat under the jurisdiction of the state. The § 376.121, F.S. establishes a schedule for compensation for damage to the state's natural resources, including seagrass beds.

4. Coral Reefs

In April 29, 2009 Florida House Bill 1423 was passed creating the Coral Reef Protection Act (CRPA). The purpose of the CRPA of 2009 (§ 403.93345, F.S.) is to increase protection of the coral reefs on sovereign submerged lands off the coasts of southeast Florida: Monroe, Miami-Dade, Broward, Palm Beach and Martin counties. The § 403.93345(4), F.S. recognizes FDEP as the state's trustee of the coral reef resources and authorizes FDEP to protect coral reefs through timely and efficient assessment and recovery of damages to coral reefs resulting from vessel groundings and anchoring-related injuries. The § 403.93345(9), F.S. authorizes FDEP to enter into delegation agreements with another state agency or any coastal county with coral reefs within its jurisdiction to carry out the intent of the Act.

The (CRPA) requires the party responsible for the damage of the coral reef a) to notify FDEP of such an event with 24 hours, b) to remove the grounded or anchored vessel within 72 hours after the initial incident occurred in a manner that avoids further damage to the coral reefs and in consultation with FDEP, and c) to cooperate with FDEP to undertake damage assessment and primary restoration of the coral reef in a timely fashion.

The § 4903.93345(6), F.S. authorizes FDEP to recover all damages from the responsible party including a) cost for replacing, restoring, or acquiring the equivalent of the coral reef injured or value of lost use and services of the injured coral reef, b) cost of damage assessment, c) cost of activities undertaken by or at the request of FDEP to minimize or prevent further injury to the injured coral reef, d) cost of monitoring the inured, restored, or replaced reef for at least 10 years if the total damage to the coral reef is less than or equal to 1 sq. meter and e) cost of enforcement actions taken in response to the destruction, loss of or injury to coral reef. In addition to compensation for damages, FDEP may assess civil penalties for anchoring a vessel on a coral reef. The penalties range from $150 for damage to coral reef less than 1 sq. meter to $1000 per sq. meter for damages more than 10 sq. meters. There will be an additional penalty of $1,000 for aggravating circumstances and $1,000 for damages occurring within a state park of aquatic preserve. The total amount of penalties cannot exceed $250,000 per occurrence. All damages recovered will be deposited to the Ecosystem Management and Restoration Trust Fund of FDEP.

6.2.4. State Boating Advisory Council

The § 327.803, F.S., mandates the creation of the Boating Advisory Council within FWC. The purpose of the council is to make recommendations to FWC and the Department of Community Affairs (DCA) on issues affecting the boating community. These issues include boating and diving safety education, boating-related facilities, boat usage and access, and working waterfronts. The council is composed of 18 members which representatives from various agencies and industries. The council is chaired by a representative from FWC.

6.2.5. Voluntary Programs

The state offers several voluntary programs on environmental stewardship for the state's boating community. These programs include the Clean Marina Program, the Clean Boatyard Program, the Clean Marine Retailer Program and the Clean Boater Program. While ostensibly voluntary, newly issued permits very strongly encourage participation. These programs encourage the boating industry to implement environmentally friendly practices in the operation of their marine businesses.

Participants of the Clean Marina Program receive assistance in implementing Best Management Practices (BMP) through on-site and distance technical assistance, mentoring by other Clean Marinas and continuing education. BMPs are policies and procedures that are put into practice to mitigate adverse environmental impacts of running a marina. These policies and procedures address critical environmental issues such as sensitive habitat, waste management, stormwater control, spill prevention and emergency preparedness. Marinas which implement these environmental measures receive voluntary designation as Clean Marinas.

Similar to the Clean Marina Program, all other programs are voluntary designation programs. The Clean Marine Retailer Program encourages marine retailers to educate boaters by providing information to those who purchase vessels on clean boating practices. The Clean Boatyard Program encourages boatyards to implement environmentally conscious practices such as using dustless sanders, oil and solvent recycling, and recirculating pressure wash systems to recycle wastewater. The Clean Boater Program encourages boaters adopt environmentally friendly practices such as proper trash management and using bilge socks and fueling collars.

The Clean Vessel Act Program grants funding through the Clean Marina Program for the construction of pump out facilities and pump out vessels at marinas and boatyards. It also provides for public awareness programs on the importance and practice of keeping raw sewage out of Florida's waterways. The Florida Department of Law Enforcement manages the grant program for the Clean Marina Program and Clean Vessel Act Program (FDEP, 2009).

6.3. Local (County and Municipalities)

6.3.1. Local (County and Municipalities) Regulations

The § 327.22, F.S. (regulation of vessels by municipalities or counties) gives counties and municipalities authority to adopt ordinances related to recreational boating. It specifically states that "… Nothing in this chapter shall be construed to prohibit any municipality or county that expends money for the patrol, regulation, and maintenance of any lakes, rivers, or waters, and for other boating-related activities in such municipality or county, from regulating vessels resident in such municipality or county. Any county or municipality may adopt ordinances which provide for enforcement of noncriminal violations of restricted areas which result in the endangering or damaging of property, by citation mailed to the registered owner of the vessel. Any such ordinance shall apply only in legally established restricted areas which are properly marked as permitted pursuant to § 327.40, F.S. and § 327.41, F.S. Any county and the municipalities located within the county may jointly regulate vessels."

The § 327.60, F.S. authorizes local governments within the state to adopt ordinances relating to the operation of recreational vessels within the jurisdictions of the local governments. However, these local ordinances cannot be adapted to the Florida Intracoastal Waterway and should not be in conflict with the provisions of the state's boating laws.

The § 327.40, F.S. prohibits any person, municipality, county, or other government agency to place safety or navigation markers in, on, or over the waters or shores of the state without a permit from FWC. It further requires that application for markers under the jurisdiction of the USCG will be made with the Division of Law Enforcement of FWC.

The § 327.60, F.S. allows local governments to enact and enforce regulations which prohibit or restrict the mooring or anchoring of floating structures or live-aboard vessels within their jurisdictions or of any vessels within the marked boundaries of permitted mooring fields. However, local authorities cannot

regulate the anchoring of non-live-aboard vessels in navigation outside of these mooring fields.

The four counties in the southeast Florida area and some of their municipalities have established rules and regulations relating to recreational boating. The basic tenet of these rules and regulations is that the provisions of § 373, F.S. (Water Resources) affecting the waters within the counties are affirmed and validated.

6.3.1.1. Miami-Dade County

6.3.1.1.1. Miami-Dade County Boating Laws

Article II Chapter 7 of the Code of Miami-Dade County, Motorboats, contains provisions regulating motorboat use in Miami-Dade County. The Article gives the County Manager the power and authority to promulgate rules and regulations on motorboat operations to ensure boating safety in any waters lying within the boundaries of Miami-Dade County, with the exception of the Florida Intracoastal Waterway. However, the rules and regulations are only effective upon the approval of the Board of County Commissioners.

Section 1 of Chapter 7 reaffirms the applicability of State Boating Laws to all waters within Miami-Dade County.

Section 7-22 articulates requirements for registration of vessels operated or stored in the county. This section states the annual registration fee that will be imposed by the county for vessels that are required by state law to be registered. It authorizes the county tax collector to collect the annual county vessel registration fee. It also stipulates the amount from the fees that will be distributed to the Motorboat Revolving Trust Fund and to the Biscayne Bay Environmental Enhancement Fund. The Motorboat Revolving Trust Fund provides for recreational channel marking, public launching facilities, law enforcement and quality control program, manatee and marine mammal research, protection and recovery programs, aquatic weed control. The Biscyane Bay Environmental Enhancement Fund contributes to programs that improves and enhances Biscayne Bay.

Section 26 of Chapter 7 identifies motorboat restricted zones and the rules established in these zones. Violations for the prohibitions in these zones are also stated in this section.

6.3.1.1.2. Miami-Dade County Anchoring and Mooring Regulations

Article III of Chapter 7, also known as the Miami-Dade County Vessel Mooring Code provides rules and regulations for mooring and anchoring in Biscayne Bay, Miami River, and their tributaries within the limits of Miami-Dade County. The rules in this article apply to all crafts and vessels including barges and floating structures that are operated and stored in the county. The legislative intent of this article is based on the potential danger, of insecure and improper mooring of vessels, leading to navigation and grounding incidents and their adverse impact to tourism and property values.

Generally, Article III prohibits mooring to the bank or shore. It also prohibits mooring to trees, structures on shore, to bridges, bridge approaches, and bridge fenders. In addition, all moored vessels must be secured by attachment to bitts, cleats, bollards or pilings. All vessels are required to have adequate mooring lines. Table 6.1 defines adequate mooring for specific length of the vessel.

Table 6.1. Adequate Mooring lines (Sec 7-36 Miami-Dade County Code).

Vessel Length	Required Mooring Lines	Other Requirements
Greater than or equal to 50 ft.	four (4) strong lines with each line having no less strength than a manila line three (3) inches in circumference and retaining seventy five (75) percent of its original tensile strength.	1 line shall be a bow line
		1 line shall be a stern line
		2 lines shall be an amidship line
Between 25 and 50 ft.	three (3) strong lines with each line having no less strength than a manila line three (3) inches in circumference and retaining seventy five (75) percent of its original tensile strength.	1 line shall be a bow line
		1 line shall be a stern line
		1 line shall be an amidship line
Less than 25 ft.	two (2) strong lines with each line having no less strength than a manila line two (2) inches in circumference and retaining seventy five (75) percent of its original tensile strength.	1 fore
		1 aft

Vessels in violation of the mooring code of Miami-Dade County, and those which are abandoned or sunk, for more than seven days are declared public nuisances and subject to penalties imposed by the County. Penalties include a fine not to exceed $250.00, imprisonment not to exceed 30 days or both.

6.3.1.1.3. Miami-Dade Pilot Mooring Buoy Program

MDDERM implements the Miami-Dade Pilot Mooring Buoy Program. This program aims to establish 37 moorings for recreational boaters at nine different sites in Miami-Dade County. In partnership with FDEP Coral Reef Conservation Program and with grants from NOAA and FWC Florida Boater Improvement Program, Miami-Dade is installing 20 mooring buoys located at natural reef sites. Figure 6.1 shows the Mooring Buoy sites for Miami-Dade County.

Figure 6.1. Mooring Buoy Sites in Miami-Dade County (MDDERM, 2009).

6.3.2. Broward County

6.3.2.1. Broward County Boating Laws

Unlike Miami-Dade County, Broward County does not have a comprehensive boating and waterways regulation or ordinance including anchoring and mooring regulations. However, there are several County Codes which are relevant to the operation of boats in the county.

Ch 25 ½, Art I, Section 25 ½, paragraph 4(b) of the Broward County Code prohibits operation of any boat, yacht, cruiser, canoe, raft or other watercraft (except toys) on any park waters unless except on those which are designated for such use or purpose. In addition, no boats shall be launched into, or removed from, any park waters except at designated locations.

The operation of boats in a reckless manner which can unjustifiably or unnecessarily endanger the occupants of any other boat is prohibited. All motorboats must be kept out of the way of sailboats, rowboats, canoes, pedal-boats, sailboards or other non-motorized vessels. Boat operators must provide emergency assistance if required by other boats in difficulties.

6.3.2.2. Broward County's Mooring Buoy Program

The Broward County Mooring Buoy Program was established to allow boaters to moor on the reefs without dropping an anchor and damaging the reefs. The mooring buoys of the county were installed through the collaborative efforts of and funding from Broward County Natural Resources Planning and Management Division (NRPMD), Ocean Watch Foundation, Florida Boating Improvement Program, NOAA, National Fish and Wildlife Foundation, and the local dive operators and volunteers. The buoys are maintained by NRPMD. Figure 6.2 shows the locations of buoys.

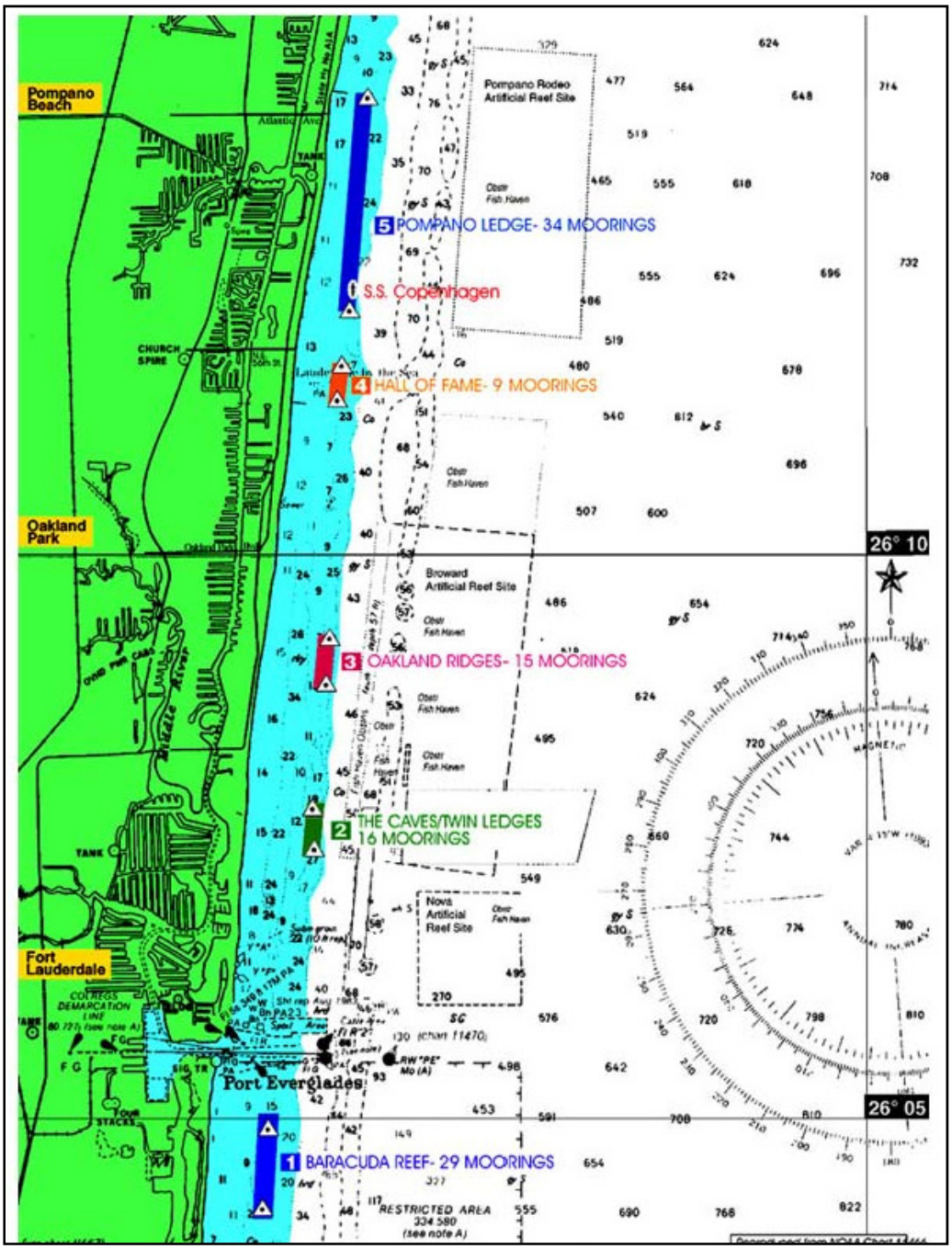


Figure 6.2. Mooring Buoys in Broward County (Broward County Biological Resources Division, 2009a).

6.3.3. Palm Beach County

6.3.3.1. Palm Beach County Boating Laws

Chapter 11 of Article II, Appendix G of the Palm Beach County Ordinance designates the Board of County Commissioners as the Palm Beach County Environmental Control Board with the authority to provide and maintain county standards that will protect and preserve the environment within the jurisdiction of Palm Beach. Article XI of the Palm Beach County Code of Ordinance contains provisions for the management of all natural areas that are managed, maintained, and operated by the Palm Beach County Department of Environmental Resource Management (PBCDERM).

Sec. 11-260 of Article XI states that all provision of the Florida Vessel Safety Law will apply to all county managed natural resources except in areas designated by the board of county commissioner or the county administrator. This section also prohibits the launching or operation of any watercraft within a natural area except in places designated for such use by the board of county commissioner or county administrator. Sections 11-265 and 11-266 prohibit the discharge and dumping of litter or any substance that can potentially result in the pollution of waters within Palm Beach County.

The county adopted Chapter 6, also known as Boats, Docks, Waterways Ordinance. Chapter 6 contains additional provisions for the operation of vessels in the waters of Palm Beach County. Chapter 6 makes it unlawful to operate a vessel within a distance of 500ft from any fishing pier except in emergency situations.

Article II of Chapter 21, also known as Palm Beach County Parks and Recreation Ordinance, vests the duties and authorities relating to the operation of county parks and recreation system in the director of parks and recreation. Sections 21-25 of the Article set forth regulations pertaining to the operation of vessels on waters within the park property. The section prohibits the launch and operation of any vessel in any park property except in locations designated for such use by the county commissioners or park director. Operation of vessels within the waters of the park will abide by the rules and regulations adopted by the Park and Recreation Department. The department has the authority to establish regulations and speed limits within the park property as long as they do not conflict with state rules.

6.3.3.2. Palm Beach County Anchoring and Mooring Regulations

Unlike Miami-Dade County, Palm Beach County has not adopted a specific mooring code that will apply to the mooring and anchoring of vessels within the waters of Palm Beach County. However, there are provisions for mooring and anchoring contained within Environmental Code of Ordinances (put something here). Section 11-260(c) states that "No person shall operate, moor, or anchor any watercraft within the waters of any natural area in a manner that results in damage or harm to the vegetation, wildlife or shoreline." Section 13-6 (f) also states that vessels cannot dock or anchor for the purpose of diving and swimming in designated manatee sanctuary areas.

Section 21-25(2) of the Ordinance prohibits mooring, anchoring or tying up of vessel to any structure on the bank in waters within park property or it is for temporary recreational activities or a written permission has been obtained from the director. The department is authorized to establish rules and regulations for use of the county's permanent boat slips for dockage of vessels, managed mooring fields and other marine facilities by the public.

6.3.3.3. Palm Beach Mooring Buoy Program

The Palm Beach Mooring Buoy Program was established through a partnership with PBCDERM, FWC and the WFF. These agencies agreed to establish and maintain a network of mooring buoys to protect the shallow reefs of Palm Beach county. The first mooring buoys were installed in Breaker's Reef. The reef is in 20 to 30ft of water and has highly diverse biotic communities. There are 12 stainless steel u-shaped anchor pins installed in 24 inch deep by two inch deep holes in depths ranging from 12ft to 20ft. The WFF has created an endowment fund for the maintenance of the buoys (Wildlife Foundation of Florida, 2009). Figure 6.3 shows the location of mooring pins in Breaker's reef.

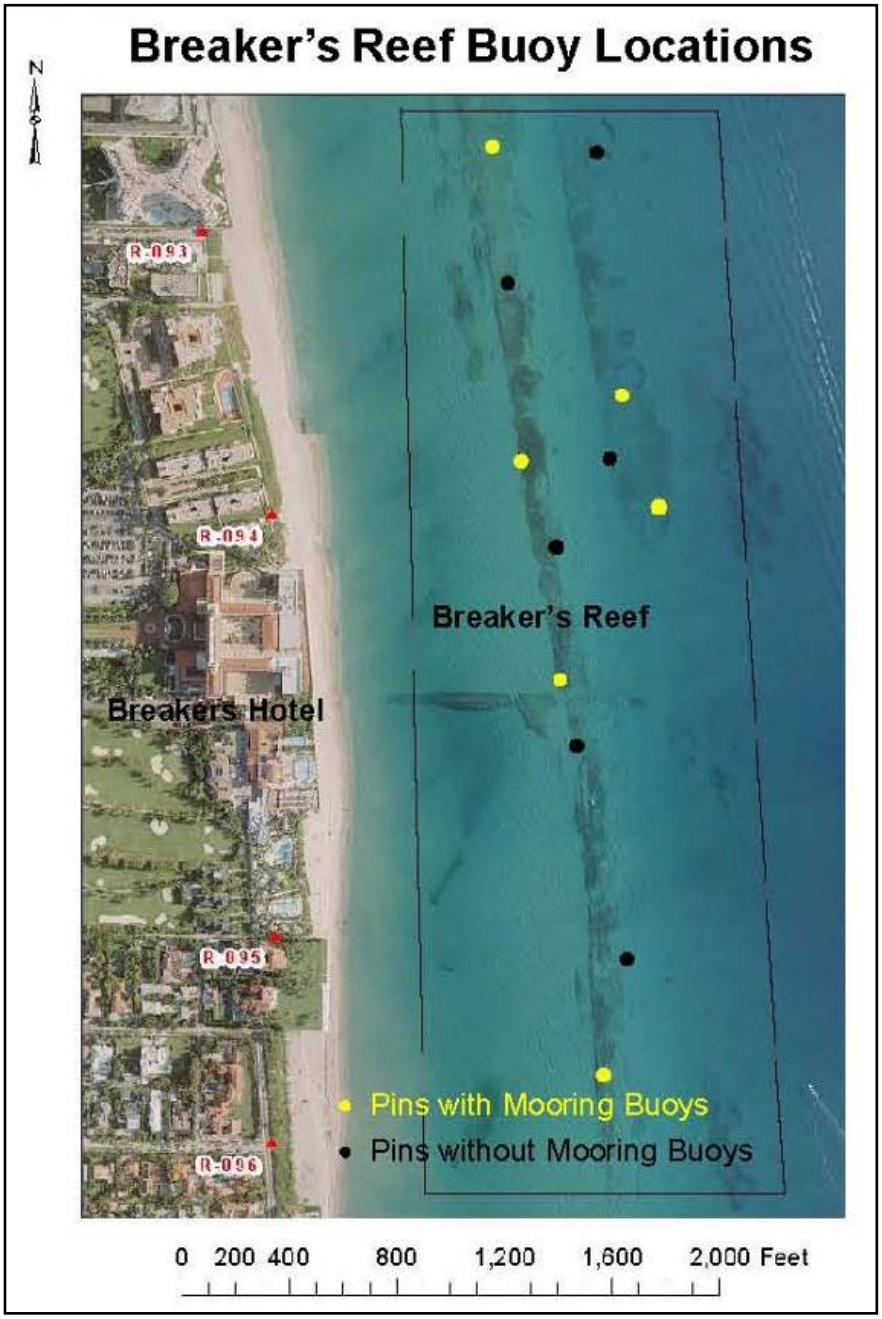


Figure 6.3. Mooring Buoys at Breaker's Reef in Palm Beach County (FWC, 2009d).

6.3.4. Martin County

6.3.4.1. Martin County Boating Laws

Regulations for the operation of recreational boating in Martin County are provided in Chapter 67 Article VIII, also known as Vessel Control, Water Safety, and Manatee Protection Ordinance. Under the ordinance, the authority to adopt boating rules and regulations and to establish and administer conservation and navigation program is vested in the Board of County Commissioners of Martin County. The purpose of the ordinance is to promote safe boating, water sports, swimming, diving and other water-related activities in Martin County. Section 67 of the ordinance states that it is unlawful to operate a vessel in a manner that will endanger manatees or the life, limb, or property, of any person. Failure to operate a vessel in a careful and prudent manner is a violation of the article and the vessel operator can be subject to penalties and fines.

Section 67.238 designates restricted zones outside of the Atlantic Intracoastal Waterway and the St. Lucie/Okeechobee Waterway, but within the waters of Martin County. Additional water areas of concern in Martin County are within the Atlantic Intracoastal Waterway. Sec. 67.239. contains the county petition for additional authority to establish speed and/or wake limit zones in Florida Intracoastal Waterway. The petition was approved and Rule 68D-24.011, F.A.C. was amended to reflect this new speed limits and wake limit zones.

Section 67.242 provides for public education on the operation of recreational vessels in Martin County. The section requires all marinas, public boat ramps and anchorages to post a copy of the ordinance or a county approved map of restricted zones in conspicuous public view. All marina and anchorage operators are required to notify all non-Martin County resident boaters leaving their facilities of the posting. In addition, a summary of the provisions of the article and a map of the restricted zones in leaflet form, will be included with each boat registration or renewal issued by the Martin County Tax Collector.

Chapter 67, Article II, also known as the Martin County Environmental Control Act, designates the Board of County Commissioners of Martin County as the Martin County Environmental Control Board, with the authority to provide and maintain county standards that will ensure sanitary practice that will help maintain a clean and safe environment. Section 67.1(a) of the Act specifically states that "No person, firm, company, corporation or association in Martin County, Florida, nor the managing agent of any person, firm, company, corporation or association in said County, shall deposit or shall permit or allow

any person or persons in their employ or under their control, management or direction to deposit in any of the waters of the lakes, rivers, harbors, streams, ditches and canals in such County any rubbish, filth or poisonous or deleterious substance or substances, in such quantity as is liable to affect the health of persons, fish or livestock, or any substance, material or thing in such quantity that the water is thereby rendered unfit for one or more of the beneficial uses for which such water was fit or suitable prior to the introduction of such substance, material or thing, or which renders unsanitary or unclean any bathing beach, or to place or deposit any such substance, material or thing in any place where the same may be washed or infiltered [*sic*] into any of the waters herein named."

Chapter 159 Article 2, of the Martin County Water District Act, makes it unlawful for any vessel operator to discharge any untreated sewage, garbage, trash or other untreated waste material, into the waters of Martin County. Section 159.7 of the Act requires all fuel pumps which service boats, while those boats are in the water, to have an operating automatic shut-off device at the nozzle to avoid spilling marine fuel into the water.

6.3.4.2. Martin County Anchoring and Mooring Regulations

Section 159.4 of the Martin County Water District Act provides for mooring restrictions in Manatee Pocket in the county. Manatee Pocket "shall include that body of water in Martin County generally known as the Manatee Pocket, bounded by Port Salerno to the west, Rocky Point to the east and Sand Sprit Park to the north, and starting at the first channel marker established by the USCG and the USACE at the mouth of said body of water, as designated on the U.S. Geological Survey Map of St. Lucie Inlet Quadrangle, Florida, Number N2707.5-W8007.5/7.5 as revised in 1970" (Section 159.4 Martin County Code of Ordinance). Section 159.4(a) prohibits any person to live-aboard any boat in the waters of Martin County for more than 72 hours within any 30 day period unless such boat has an approved discharge device or is moored at a marina that provides an approved sewage disposal system to which all live-aboard boats can connect to, to discharge their sewage. Section159.4.b prohibits any boat or other floating structure to moor to the bottomlands of the Manatee Pocket for more than 72 hours within any 30 day period unless it has an extension permit issued by Martin County.

Martin County does not have a mooring program but has a mooring field in Southpoint Anchorage since 2001. The Anchorage currently has 80 mooring buoys that are used by recreational boaters. The City of Stuart manages the

mooring field. In addition, new mooring buoys are now installed at the St. Lucie Inlet State Park. The mooring buoys were installed to protect its half mile of coral reefs. Figure 6.4 shows the moorings at St Lucie Inlet State Park.

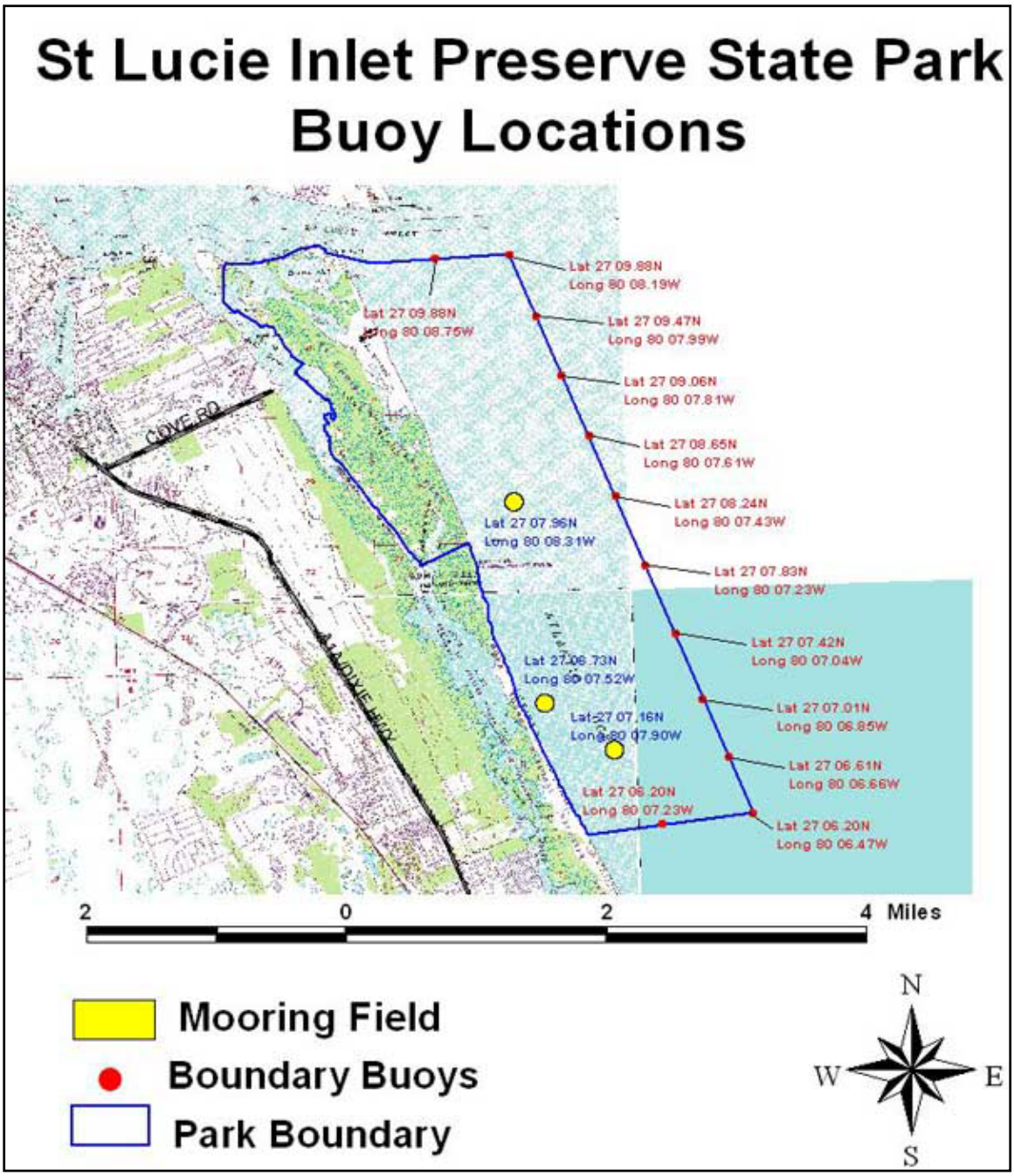


Figure 6.4. New Mooring Buoys at the St. Lucie Inlet State Park (Florida State Park, (n.d.)

6.3.5. Municipalities

In accordance with provisions of § 327.22, F.S. several municipalities within the southeast Florida counties have also established rules and regulations for vessel safety and operations within their city or municipality limits. Table 6.2 enumerates some of these cities or municipalities and the type of boating regulations that they have adopted.

6.4. Manatee Protection Plans

The FMSA (§ 379.2, F.S.) mandated 13 coastal counties, including the four southeast Florida counties, to submit their Manatee Protection Plans to FWC. By 2007, all of the southeast Florida counties have submitted their plans (FWC, 2009e). FWC establishes the criteria for approval of manatee protection plans. The plans must include the following elements: education about manatees and manatee habitat; boater education; an assessment of the need for new or revised manatee protection speed zones; local law enforcement; and a boat facility siting plan to address expansion of existing and the development of new marinas, boat ramps, and other multi-slip boating facilities.

Furthermore, the counties are also required to incorporate the boating facility siting element of the plans within their respective comprehensive plans.

Table 6.2. Boating Regulations of cities and municipalities in southeast Florida.

Municipality	Code of Ordinance	Boating Safety and Navigation	Environmental Boating Laws	Anchoring and Mooring
Boca Raton	Chapters 9, 11, 22	Sec 11-84, 22-59		Sec 9-50 to 53
Coral Gables	Chapter 86	Sec 8-25 to 27, 85 to 86	Sec 86-1, 3	Sec 86-58 to 61
Deerfield Beach	Chapter 74	Sec 74-31 to 33, 74-46 to 48		
Delray Beach	Chapters 92, 101	Sec 92.02, 92.03	Sec 101.17	Sec 92.10, 92.19, 92.20
Ft Lauderdale	Chapter 8	Sec 8-136 to 140, 148, 149,166	Sec 8-118,119, 151,152,156	Sec 8-91,107,108,145, 153,154,166,169,171
Highland Beach	Chapter 5	Sec 5-1	Sec 5-8	Sec 5-9
Jupiter	Chapter 6		Sec 6-1	Sec 6-31 to 33, Sec 6-56 to 60
Key Biscayne	Chapter 4	Sec 4-31 to 34		
Lauderdale by the Sea	Chapter 5	Sec 5-6,5,52,5, 58 to 60	Sec 5-55	Sec 5-53, 54
Lauderhill	Chapter 5	Sec 5-1		
Miami	Chapter 50	Sec 50-5,7, 36,37	Sec 50-116 to 122	Sec 50-2 to 4, Sec 50-151 to 158, 186,187

Miami Beach	Chapters 66, 46	Sec 151, 152, 154, 221-225	Sec 46-92, 66-5,6	Sec 66-8
Miami Springs	Chapter 91	Sec 91-01, 02, 08	Sec 91-06, 07	Sec 91-03 to 05
North Bay	Chapter 150	Sec 150-15, 20, 21	Sec 150.19	Sec 150.16 to .21
Stuart	Chapter 40	Sec 86-27, 43 to 46	Sec 86-40 to 41	Sec 86-31 to 40
Wilton Manors	Chapter 11	Sec 11-1 to 11-5, 11-12, 11-13	Sec 11-17	Sec 11-6, 11-8 to 11-11

The Act also authorizes the FWC to adopt rules regulating the operation and speed of motorboat traffic in areas where manatee sightings are frequent and which manatees inhabit on a regular basis. These areas include:

"a. In Palm Beach County: the discharges of the Florida Power and Light Riviera Beach power plant and connecting waters within 1 ½ miles thereof.

b. In Broward County: the discharge canal of the Florida Power and Light Port Everglades power plant and connecting waters within 1½ miles thereof and the discharge canal of the Florida Power and Light Fort Lauderdale power plant and connecting waters within two miles thereof. For purposes of ensuring the physical safety of boaters in a sometimes turbulent area, the area from the easternmost edge of the authorized navigation project of the intracoastal waterway east through the Port Everglades Inlet is excluded from this regulatory zone

c. In Miami-Dade County: those portions of Black Creek lying south and east of the water control dam, including all boat basins and connecting canals within 1 mile of the dam."

6.5. Enforcement and Compliance Monitoring

6.5.1. State Enforcement

The enforcement of Florida boating laws and regulations is a function of the FWCDLE, its officers, county sheriffs and their deputies, and any other authorized law enforcement officer. By law, these law enforcement officers have the right to stop any vessel to inspect for compliance with federal and state laws. The officers have the power to investigate, report, and arrests violators of the provisions of Chapters 327, for vessel safety, and 328, for vessel title certifications, liens, and registrations.

The FWCDLE mission is to protect Florida's natural resources and people through proactive and responsive law enforcement services (FWCDLE Strategic Vision and Framework FY 2006-21010). The FWCDLE is made up of 722 officers charged with the protection and enforcement of laws related to all wild animals and aquatic resources of the state (FWC, 2009f). Water services officers are responsible for patrolling 8,246 miles of tidal coastline, 12,000 miles of rivers and streams, 3,000,000 acres of lakes and ponds, and 11,000 miles of canals. They also enforce the state's boating laws and work with Federal enforcement agencies in enforcing federal boating and navigation laws.

The § 327.27 to 327.731, F.S. state the penalties for violating provisions of § 327 and 328, F.S.. Violations range from fines for non-criminal infractions to arrests for more serious violations. The law requires mandatory education for those convicted of any criminal boating violation and for those convicted of two non-criminal infractions that resulted in an accident.

Penalties for violations of the provisions of the FMSA are specified in § 370.12, F.S.

Violation of a manatee speed zone is a civil infraction and is charged as a uniform boating citation. Violation of the "no-entry" or "motorboats-prohibited" zones is comparable to a second degree misdemeanor for a first offense and comparable to a first degree misdemeanor for a subsequent offense. Actions that constitute harassment of manatee are comparable to a second degree misdemeanor for a first offense and comparable to a first degree misdemeanor for a second offense.

The § 327.74, F.S. also known as the Uniform Boating Citations Rule, authorizes FWC to prepare and supply a boating citation form to any law enforcement agencies in the state which enforce the laws regulating the operation of vessels. Every enforcement officer who issues a boating citation for a violation must deposit the original and one copy of such boating citation with a court which has jurisdiction over the alleged offense or with its traffic violations bureau within five days after issuance.

6.5.2. Local (County and Municipalities) Enforcement

In addition to FWCDLE, each of the four counties within the southeast Florida region has a marine patrol or marine unit division within its law enforcement agency. In Miami-Dade County, the Special Patrol Bureau under the Miami-Dade Police Department is charged with conducting routine sea patrol. Its Marine Patrol Unit enforces state, and county boating, environmental, marine fishing laws, and maritime laws in the coastal and inland waterways of the county. It also inspects vessels, conducts search and rescue operations, and assists with illegal alien and drug smuggling interdiction within its jurisdiction (Special Patrol Bureau). The unit has 27 officers who patrols 84 miles of the county's shoreline (Miami-Dade County MAST Presentation, n.d.). Other municipalities within Miami-Dade have marine units and officers who patrol their respective areas as shown in Table 6.3 below. It is estimated that Miami-Dade has 84 miles of oceanfront coastline, 22 miles of beaches, 67 miles of inland waterways, and 5.5 miles of the Miami River commercial waterway (Miami-Dade County Fire Rescue Department, 2009).

In Broward County, the Marine unit consists of the Marine Patrol and Dive Rescue Team under the Broward Sheriff's Office (BSO) (Marine Patrol and Dive Team). This unit is charged with law enforcement and emergency operations in Broward County. It enforces all State laws and City ordinances as they relate to marine safety and operations. The Fort Lauderdale Police Marine Unit patrols over two thirds of Broward's waterways. With 11 officers, the Marine Unit patrols over 100 miles of navigable waterways including the Atlantic Ocean. (City of Fort Lauderdale Police Department, 2009). The City of Hollywood Marine Unit consists of two Officers assigned to patrol 52 miles of waterways including eight miles of Atlantic Ocean as well as the Intracoastal Waterway (from Port Everglades to the Hallandale Beach Boulevard Bridge) and the C-10 canal system. (City of Hollywood Police Department, Marine Unit, 2009)). All marine officers in various agencies in Broward County are responsible in patrolling 23 miles of Atlantic Ocean coastline and more than 300 miles of navigable waterways. Table 6.4 below shows the number of on-water personnel among different agencies and municipalities within Broward County.

In Palm Beach County, the enforcement of boating laws and ordinances lies with the Marine Enforcement Unit/Underwater Search and Recovery Team. The team has 1 sergeant and 10 enforcement officers who patrol the 50 miles of the Atlantic Ocean, 43 miles the Intracoastal Waterway, including its intersecting canals, and about 123 miles of inland waterways in the county (PBCSO, 2003). In addition three FWC officers and several officers from other municipalities in Palm Beach County also patrol the waterways. Table 6.5 shows the number of on-water personnel in Palm Beach County. The data is taken from the 2007 Palm Beach County Manatee Protection Plan.

In Martin County, members of the Sheriff's Marine Unit patrol the 165 miles of waterways from Lake Okeechobee to the Atlantic Ocean and the 23 miles of coastline. They enforce the state and county boating regulations including recreational boating accidents, vessel inspections and rescue operations (Martin County Sheriff's Office, 2009). All county and FWS Law enforcement officers also work closely with a number of agencies including U.S. Customs, Drug Enforcement Agency, and the USCG. Table 6.6 below shows the number of on-water personnel among different agencies and municipalities in Martin County.

Table 6.3. Number of On-Water Staff in Miami-Dade County. (Source: Miami-Dade County MAST Presentation, n.d.).

Agency		***Total No. Staffed On-Water Officers***	
Miami-Dade County P.D.		27	1 Lieutenant, 5 Sergeants, 21 Officers
City of Miami P.D.		9	1 Sergeant, 8 Officers
FWC		9	9 Officers
Biscayne National Park		8	1 Chief, 5 Officers, 1 Supporting Officer, 1 Court Liaison
Coral Gables P.D.		5	1 Sergeant, 4 Officers
Sunny Isles P.D.		1	1 Sergeant
Indian Creek Village P.D.	*	15	All officers certified for on-water enforcement
Miami Beach P.D.		5	1 Sergeant, 4 Officers
North Miami Beach P.D.	*	8	All officers certified for on-water enforcement
North Miami P.D.		2	2 Officers
Key Biscayne P.D.		2	2 Officers
Bay Harbor P.D.		2	1 Full time Officer, 1 Part time Officer
Golden Beach P.D.		1	1 Officer
Surfside P.D.		0	No Marine Unit
Miami Shores P.D.		0	No Marine Unit
North bay Village P.D.		0	No Marine Unit
Bal Harbour Village P.D.		2	2 Officers
Aventura Marine P.D.		1	1 Officer
TOTAL		**97**	
* Number of officers trained but not exclusively dedicated to full time on water law enforcement			

Table 6.4. Number of On-Water personnel for Broward County (Broward County Biological Resources Division, 2009b).

Agency	Total Number of On-Water Staff
FWC	11
BSO	10
Lighthouse Point	1
Wilton Manors	1 (Part time)
Ft. Lauderdale	10 (current data is 13)
Hollywood	3 (current data is 2)
Hallandale Beach	1
Total	37

Table 6.5. Number of On-Water Staff in Palm Beach County. (Source: Palm Beach County, 2009).

Agency	Total Number of On-Water Staff	Average number of hours spent on water each week (all officers combined)
USCG	5	No Data
FWC	3	No Data
PBSO	13	No Data
Boca Raton Police Department	2	24-40
Boynton Beach Police Department	2	24-40
Jupiter Police Department	1	24-40
Lantana Marine Safety	5	8-24
Palm Beach Police Department	2	>40

Palm Beach Shores Police Department	2	8-24
Riviera Police Department	2	8-24
West Palm Beach Police Department	2	No Data
Total	39	1-8

Table 6.6. Number of On-Water Staff in Martin County. (Source: Martin County, 2009).

Agency	Total Number of On-Water Staff	Average number of hours spent on water after each week (all officers combined)
Martin County Sheriff Marine Unit	5	>40
FWC	2	No Data
USCG	8 (shared with St Lucie and Palm Beach Counties)	No Data
Town of Jupiter Island	2	24-40
Total	17	Insufficient Data

6.6. State and Local Compliance Monitoring

6.6.1. Recreational Boating

6.6.1.2. Boating Statistics

The § 328.40, F.S. mandates the DHSMV to keep electronic records of vessel registration and titling. The § 327.804, F.S. mandates FWC to compile statistics on boating accidents and boating violations. The FWC generates summary statistics of these records and makes them available to the public through the agency's website (FWC Boating Safety).

Table 6.7 shows summary statistics of boating registration and boating accidents for the southeast Florida region for the years 1998 to 2006. Miami-Dade, Broward, and Palm Beach Counties continuously rank in the top five counties in Florida for having the highest number of registered boats (FWC, 2008b).

The data show that, on average, from 1999 to 2006, the southeast Florida region accounts for about 17% of the total boat registrations in the state, but contributes to more than 25% of boating accidents in the state. Additionally, the data also show that, for all of Florida (1999 - 2006), the average percentage of all accidents in state waters occurring within restricted areas was about 35%.

6.6.1.3. Arrest Net

All boating citations issued by Florida law enforcement officers are entered into a database called ArrestNet which is not publicly available. FWC uses the ArrestNet database as a search tool. However, ArrestNet can also be used to look at trends in boating arrest citations. Data on arrest citations for the southeast Florida region were extracted from the ArrestNet database for the years 1997 to 2006. Analysis of these data reveals trends in boating citations as shown in Table 6.8.

Restricted areas include manatee zones which are regulated by FWC through the powers vested upon it by the FMSA. The FMSA authorizes FWC to regulate the operation and speed of motorboat traffic "only where manatee sightings are frequent" and where the best available scientific and other relevant information, including observations, "supports the conclusions that manatees inhabit these areas on a regular basis. FS 379.2431(2)(h)cite" The FMSA identifies areas where FWC can regulate the operation and speed of motorboats and gives FWC the power to designate manatee speed zones and create limited areas as safe havens

for manatees. These areas are regulated not only to protect manatees but also to protect their habitat (e.g., seagrass beds).

The manatee synoptic survey is one of the tools being used to estimate the size of the current Florida manatee population. These two day aerial surveys are conducted up to three times annually, during the winter months (December to March). Manatee sightings, telemetry data, and manatee mortality reports are also compiled and made available to the public. Table 6.9 shows trends in manatee mortality yearly results of the synoptic surveys for the southeast Florida region.

Table 6.7. Recreational boating registrations and number of boating accidents in southeast Florida counties.

Recreational Boating Registration in southeast Florida Counties (Number of boats)									
County	2006	2005	2004	2003	2002	2001	2000	1999	1998
Miami-Dade	58,133	56,306	54,699	55,309	55,262	54,991	53,381	53,290	53,330
Broward	46,287	48,949	47,255	46,839	46,726	45,603	40,076	45,041	44,144
Palm Beach	43,504	43,863	43,095	42,878	42,059	40,700	38,684	35,024	34,109
Martin County	16,456	16,755	16,711	16,516	15,816	15,379	12,719	15,338	14,487
Total southeast Florida Counties	164,380	165,873	161,760	161,542	159,863	156,673	144,860	148,693	146,070
Florida	988,652	973,859	946,072	939,968	922,527	902,964	840,684	829,971	809,160
Pct. of Registration	16.63%	17.03%	17.10%	17.19%	17.33%	17.35%	17.23%	17.92%	18.05%

Number of Boating Accidents (and Rank based on all counties) in southeast Florida Counties									
County	2006	2005	2004	2003	2002	2001	2000	1999	1998
Miami-Dade	42 (3)	46 (3)	54 (5)	68 (5)	79 (4)	73 (4)	80 (4)	88 (4)	77 (4)
Broward	29 (6)	39 (4)	59 (4)	101 (2)	122 (2)	106 (2)	147 (1)	149 (2)	120 (2)
Palm Beach	65 (2)	51 (2)	65(2)	79 (3)	96 (3)	104 (3)	95 (3)	100 (3)	107 (3)
Martin County	14 (17)	13 (16)	20 (11)	11 (12)	28 (13)	30 (12)	19 (18)	30 (14)	34 (13)
Total southeast Florida Counties	150	149	139	259	319	341	367	338	
Total Florida	671	666	743	1005	1159	1093	1194	1292	1282
Pct of Accidents	22.35%	22.37%	18.71%	25.77%	27.52%	31.20%	30.74%	26.16%	
Total registered	988,652	973,859	946,072	939,968	922,527	902,964	840,684	829,971	809,160
Boating Accidents	671	666	743	1005	1159	1093	1194	1292	1282
Percent of Accidents in Restricted Areas	32.60%	36.90%	37.10%	38.50%	35.90%	3160.00%	31.40%	29.50%	28.00%
Boating Cards Issued	22,094	20,353	18,823	21096	20,827	19,194	56,771	45,426	34,444

*1998 and 1999 includes all vessels

The data compiled and reported by the Division of Motor Vehicles and the FWC reveals that Florida has many recreational boaters who operate their vessels in the tidal waters, lakes, and canals within the boundaries of state and that approximately 17% of all these boats are operated in the southeast Florida region. FWC has 725 law enforcements officers who patrols "5,983 sq. miles of water, more than 34 million acres of public and private land including 5.8 million acres of wildlife management areas , 2,276 miles of tidal shoreline or 8,426 "detailed" miles, about 1,700 named rivers, streams and creeks travelling 10,550 miles, approximately 12,000 miles of fishable rivers, streams and canals and an overall total of 51,858 miles of flowing water, including minor tributaries, creeks and ditches (20,000 of which consistently have water)." (FWC, 2009g).

With Florida's extensive coastline, and numerous lakes and canals, it is impossible for law enforcement officers assigned to marine units to patrol all of the state's waterways and respond to every dangerous situation, accident or threat to natural resources and wildlife. It is in this context that there should be caution in the use of ArrestNet data and boating statistics data as a basis for measuring the rate of compliance to the states boating rules and regulations. FWC acknowledges this limitation. In its Long Range Program Plan for the fiscal year period 2008-2009 to 2012-2013, FWC observes:

"While the data collection method is reliable, the actual extrapolation of a compliance rate from this information is not. Compliance rates are difficult to calculate and express because several variables of information is not available. For example, the number of violations observed or detected may be known, but the total number of violations that actually occur is not known. Additionally, the number of persons checked or licensed may be known, but the number of persons who utilize resources illegally is not known. Therefore, compliance can only be relative based on the limited statistics available for a particular activity. Based on this observation, compliance rates are a poor measure to indicate performance" (FWC, 2007).

Although the use of ArrestNet for compliance measurement is limited, the database offers a glimpse of boating activities and violations that occurs in Florida waters in general, and in the southeast Florida region in particular, if used in conjunction with vessel registration and boating statistics. The number of state registered recreational boats in Florida increased by 22% from 809,160 in 1998 to 988,652 in 2006. Miami-Dade, Broward, and Palm Beach counties are at the top 10 ranking in boat registration in Florida since 1998. About 17% of all boats are registered in the four southeast Florida counties and on average, approximately 25% of all reported boating accidents occur in the region (FWC, 2008).

The ArrestNet data show that for the southeast Florida region more than 40% of all citations/arrests are due to vessel use violations. The most commonly broken is F.S. 328 which requires proper documentation and registration of boats operated in the region. This constitutes 7% of all arrests and citations and 15% of all boating related arrests and citations in the region. This suggests that there is an unknown number of boat operators illegally using the waterways in the southeast Florida region. This prohibits use of the data to accurately estimate the compliance of boaters with Florida vessel laws. More than 50% of the arrests and citations are for careless operation of the vessel and safety violations. In particular, § 327.33, F.S., a statute on posted speed and wake restrictions, has been broken the most.

Boating in restricted areas, § 327.46, F.S. also ranks high among boating violations in southeast Florida. For the years 1997 to 2006, violations of this statute represented about 7% of the total arrests and citations and 15% of the vessel violations. About 1% of all arrests and citations are due to boating under the influence, and these comprise approximately 3% of all vessel violations in the region.

Table 6.8. Number of Recreational Vessel Violations in the southeast Florida Region.

Violations		2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
1. Vessels											
1.1 Registration	§ 328.46 (327.10), 328.48 (327.11), 328.72 (327.25), F.S.	2461	2876	2724	2614	2498	2662	3558	4372	5237	3798
1.2 Careless operation	§ 327.33, F.S.	1163	1742	1843	1743	2155	2013	2929	2811	2991	2692
1.3 Drunk boating	§ 327.35, F.S.	381	446	525	461	391	293	478	286	27	57
1.4 Boating in restricted areas	§ 327.46, Ch. 68D-24, F.A.C.	2463	3118	3145	3168	3540	3713	5072	3907	2801	2801
1.5 Safety violations	§ 327.395, 327.50, 33 *CFR* 175	6816	8215	8299	7250	7182	6242	7891	5964	3327	3904
1.6 Diving	§ 327.37, § 861.065, F.S.	229	292	281	259	370	173	275	233	7	0
1.7 Water skis, Aquaplanes, PWC	§ 327.37, § 327.39, F.S.	1054	1138	1301	1251	1437	1334	1568	1391	1334	1187
1.8 Other vessel violations		1100	749	866	900	1380	1036	1540	1271	3029	1409
	Subtotal	15,667	18,576	18,984	17,646	18,953	17,466	23,311	20,235	18,753	15,848
2. Marine Fisheries											
2.1 saltwater fisheries exc manatees	§ 370, F.S.	1190	1365	627	657	2850	3722	5271	3673	2728	2090
2.2 No recreational license	§ 372.57, F.S.	6318	7980	8993	9001	6362	3160	4006	5082	4321	4823
2.3 coral reef fisheries	Title 68B, F.A.C.										
2.3.1 reef fish	Ch. 68B-14, F.A.C.	763	1146	1469	1517	1336	998	997	646	373	249
2.3.2 Spiny Lobster	Ch. 68B-24, F.A.C.	354	429	430	401	531	346	510	722	477	513
2.3.3 marine life	Ch. 68B-42, F.A.C.	21	24	27	0	29	28	22	23	22	16
2.4 other marine fish	Title 68B, F.A.C., § 372, F.S.	1401	2057	2039	2189	1791	1469	1821	1646	1412	1171
2.5 Manatees	§ 370.12, F.S., Title 68C, F.A.C., Ch. 16-N22, F.A.C.	2660	5296	5749	4872	5207	4475	5612	2352	1743	1749
	Subtotal	12,707	18,297	19,334	18,637	18,106	14,198	18,239	14,144	11,076	10,611

3. Other violations											
3.1 Freshwater fisheries/ Wildlife	Title 68A, and 39, F.A.C.	2117	3190	3446	2818	2612	2437	2738	1157	1703	1823
3.2 National Marine Sanctuary	15 *CFR* 922	151	267	321	310	365	258	321	219	86	27
3.3 Motor Vehicles	§ 316, § 320, § 322, § 324, F.S.	1091	2575	2926	2290	3413	2836	2665	4060	4462	2156
3.4 Civil Society	§ 777 TO 941, F.S.	1895	2310	2465	2287	1700	1525	1793	1664	1452	1514
3.5.Others		1340	2688	2551	1970	1952	1788	2744	4591	2968	2929
	subtotal	6594	11030	11709	9675	10,042	88,44	10,261	11,691	10,671	8449
	TOTAL	34,968	47,903	50,027	45,958	47,101	40,508	51,811	46,070	40,500	34,908

Table 6.9. Synoptic Survey Count and Manatee Mortality in the Southeast Florida Region.

				Mortality					
	Manatee Count			Florida			SE Florida Counties		
Year	Florida	SE Florida	% in SE Florida	All Causes	Water Craft	% Water Craft	All Causes	Water Craft	% Water Craft
1991	2745	592	21.57	174	53	30.46	25	5	20
1992	1844	563	30.53	163	38	23.31	30	7	23.33
1995	3279	1217	37.11	201	42	20.9	31	5	16.13
1996	4907	1432	29.18	415	61	14.7	26	6	23.08
1997	3956	590	14.91	242	54	22.31	29	9	31.03
1998	2018	423	20.96	232	66	28.45	29	7	24.14
1999	6248	642	10.28	269	82	30.48	43	10	23.26
2000	3869	1064	27.5	272	78	28.68	27	8	29.63
2001	3300	877	26.58	325	81	24.92	35	13	37.14
2002	1758	240	13.65	305	95	31.15	42	12	28.57
2003	8986	3106	34.56	380	73	19.21	35	13	37.14
2004	2505	237	9.46	276	69	25	27	7	25.93
2005	3143	836	26.6	396	80	20.2	31	14	45.16
2006	3113	1016	32.64	417	92	22.06	46	9	19.57
2007	2817	298	10.58	318	73	22.96	27	5	18.52

The data on boating accidents show that there is a significant decrease in the number of accidents over time, beginning in 2004. However, the 2006 Florida Boating Accident Statistics explained this decline as due to the increase in the minimum dollar requirements for reportable accidents from $500 to $2000 (FWC, 2008). Data on boating accidents only includes accidents that are reported. There is currently no publicly accessible data to determine how many are not reported. However, a recent FWC survey of boaters revealed that among the survey respondents, only half of the boating incidents that the respondents mentioned in the survey were reported (FWC 2006 Recreational Boating Survey). Thus, caution must be used when interpreting historical trends using boating accidents statistics.

However, there are some significant statistics derived from the statewide data, which appear to be the same each year. These are:

a. Three southeast Florida counties - Miami-Dade, Broward, and Palm Beach rank among the highest in the number of boating accidents compared to the rest of the state;

b. A majority of boating accidents occur between the months of May and June and between noon and four pm;

c. More than 30% of boating accidents occur in restricted areas, including manatee zones;

d. More than 50% of boating accidents are categorized as collision, flooding (swamping), falling overboard, and grounding;

e. More than 50% of the vessels involved were engaged in recreational cruising at the time of the reported incidents;

f. More than 60% of the vessels involved are less than 27ft in length;

g. More than 50% of the accidents are caused by improper lookout, careless operation of the vessel, excessive speed, and operator inexperience;

h. More than 50% of the operators involved in the accidents are aged 36 and older;

i. About 4% of the accidents involve fatalities with an average of 68 fatalities per year;

j. More than 50% of operators involved in fatal accidents are aged 36 and older.

The statistics cited above for the entire state of Florida are very similar for the counties of southeast Florida. For example, the primary types of accidents in Miami-Dade, Broward, and Palm Beach counties are collisions, flooding (swamping), falling overboard, and grounding. The primary causes of accidents in these counties are improper lookout, careless operation of the vessel, excessive speed, and operator's inexperience.

The manatee data also shows that watercraft collision is a major cause of manatee mortality in Florida and in the southeast Florida region. This appears to correlate with the ArrestNet and Boating Accident data which indicate that a significant percentage of violations and accidents occur in restricted areas.

An understanding of boating trends and boating violations in southeast Florida is very important in developing strategies for managing the coral reefs. The coral reefs in southeast Florida are parts of a larger ecosystem that supports a highly diverse community of stony corals, octocorals, macroalgae, sponges, and fishes. The reefs provide protection against coastal erosion. They absorb the force of the wave energy caused by storms and hurricanes. They provide food, shelter, and protection for many commercial fisheries. They offer on-water recreational opportunities and are preferred sites for snorkeling and diving activities.

The coral reefs in southeast Florida are also located in shallow waters within 1.5 miles of highly populated areas. These shallow waters are favorite destinations of boaters. Studies conducted by the University of Miami Boating Research Center in 1991 revealed that the most popular boating destinations in Miami-Dade County are offshore and southern part of Biscayne Bay (University of Miami Boating Research Center, 1991). A similar study conducted in Broward also revealed that more than 50% of the boats are between 16 to 40ft and offshore is the most popular destination for boaters with boats less than 41ft in size (Baker, Villanueva, Minton, & DeAmicis, 1992). The studies also revealed that among the most popular boating activities are fishing, cruising, and diving. It is very likely then that the corals within shallow offshore waters will be susceptible to marine litter, water turbidity, and vessel groundings brought about by recreational fishing, diving, and cruising.

The sheer volume of registered vessels and the statistics on boating accidents and violations suggest that current law enforcement and self-policing strategies are not enough to ensure boating safety and marine environmental protection. The high volume of boat traffic in the state's waterways has the potential to increase

harmful impacts to its marine and estuarine resources. Particular concerns which can affect the balance and function of the coral reef system in the area are threats of increased water pollution and marine debris due to the density of vessels in the waterways, erosion and increased water turbidity due to speeding boats, and physical damage to the reef due to vessel groundings and anchoring.

It is worthy to note that, based on available data, reported marine litter violations appear insignificant. Investigation of ArrestNet data shows that from 2000 to 2006, the average marine litter violation is less than 0.5% of total violations. Compliance monitoring for this type of violation is very important in managing coral reefs. Marine litter violations are difficult to monitor because the act of dumping litter or sewage to the waterways has to be observed, properly documented, and reported.

Several studies have been done to determine the impact of boat wakes on shoreline erosion, sedimentation, and water turbidity (Asplund, 2000). Although a number of these studies were done in river systems, channels, and lakes, these studies have documented potential adverse impacts of increased boat speeds to the marine environment. Waves or wake generated by boat action can cause shoreline erosion.

Waves and wakes generated by boats are influenced by factors including the speed of the craft, the size of the craft, and craft displacement. There are also several variables that influence the magnitude of the impact of boat generated waves or wake. These factors include the type of sediment, the orientation of the shoreline, and the profile of the shore (UK CEED, 2000). One study suggested that a significant contribution to erosion from boat induced wakes is likely only when there is a high frequency of boat passages close to the shore (Ozaba, n.d.). This last study is particularly important to southeast Florida because of the huge number of boats traveling along and close to its shorelines, rivers, lakes, canals, and inlets.

Boats can also cause propeller-induced turbidity. This type of turbidity can be affected by the depth of the water column, speed the boat is traveling, the type and characteristics of the boat, the extent and duration of the boating activity and the type of underwater sediments. Boats in shallower waters generally create more turbidity than those in deeper water because downward pressure of water created by the craft reaches the sediment with greater energy (UK CEED, 2000). Water turbidity is a major concern in the viability of underwater flora and fauna. The amount and penetration of light in the water column is related to the amount of suspended sediments that cause turbidity. The suspension of bottom sediments may also reintroduce toxic substances in the water column that can

affect aquatic plants and animals. In southeast Florida, propeller-induced turbidity is a major concern because of the volume of recreational boaters using the waters of the region.

Turbidity is not the only concern for boaters who intentionally or accidentally end up in shallow waters. Grounding or the "running aground of a vessel, striking or pounding on rocks, reefs, or shoals" ranks high among accidents in Florida (FWC, 2008b). There is however a paucity of data on groundings by small boats or watercraft. Similar to marine litter violation, groundings are difficult to monitor because they have to be observed, properly documented, and reported. Most of the damages caused by groundings are probably unreported especially if the boats that cause the damage can leave the grounding site on their own power. A 1996 to 1997 study of geographic distribution of physical damage caused by small boat groundings at 49 reef sites along the Florida reef track in Florida Keys revealed that 57.1% of the shallow-water reef sites surveyed showed signs of damage. About 60% of the damages were found at Bache Shoal and Mosquito Bank. Both sites are adjacent to a major channel. In addition, Mosquito bank is directly in line of boat traffic (Lutz, 2006).

The viability of the CRPA of 2009 comes into question as it pertains to damages caused by small boat groundings. The intent of the law is to provide more protection to the coral reef through timely and efficient assessment and recovery of damages to coral reefs resulting from vessel groundings and anchoring. But this law is very dependent on the responsible boater reporting the grounding incident. Unless the grounding is properly reported, the processes and procedures for damage recovery and coral reef restoration cannot be implemented. Physical damage caused by a large vessel is clearly substantial compared to that caused by a small vessel. However, the sheer volume of small vessels in southeast Florida creates potential damages much higher than those of larger vessel. Enhancement to current boater education programs and law enforcement activities should be considered for the successful implementation of the CRPA. The mechanism to supplement law enforcement activities and boater education programs from the Ecosystem Management and Restoration Trust Fund should be explored.

In addition to causing direct impacts to hardbottom, coral reef, and seagrass habitats from contact by the vessel hull, vessel traffic in shallow waters increases the potential of boat propeller scarring in seagrass beds.

Seagrasses, or submerged aquatic vegetation (SAV), are crucial to the function and structure of Florida's coastal ecosystems. They act as a nursery habitat for economically and recreationally important fishery species and improve water

quality (Heck and Valentine, 2007). They provide an essential habitat and support for thousands of fish, millions of invertebrates, and marine animals including the manatees. Because of their sensitivity to changes in some water quality parameters, seagrass is considered one of the primary indicator species for the overall functional levels of coastal ecosystems. Florida has 2.7 million acres of seagrass of which 173,000 acres are reportedly scarred. Table 6.10 shows data for the southeast Florida region. The data is extracted from the results of a 1995 FWC seagrass scarring study (Sargent, 1995)

Although the relative percentage of prop scarring in the four southeast Florida counties appears to be very small, the major concern is that the greatest acreage of moderate and severe scarring occurred in areas with a dense human population and boating activity. In areas like Broward, Palm Beach, and Martin counties, where there are comparatively small acreages of seagrass habitat, any scarring, whether light, moderate, or severe will have critical impact on habitat functions (Sargent, 1995). Seagrass scarring can be caused by many anthropogenic activities. However, widespread seagrass scarring is known to result from smaller boats operating in shallow waters. A technical report on assessing suggested that scarring of seagrasses could result when one or more of the following situations occur: (Sargent, 1995).

1) When boaters misjudge water depth and accidentally scar seagrass beds;

2) When boaters who lack navigational charts or the skill to use them stray from poorly-marked channels and accidentally scar seagrass beds;

3) When boaters intentionally leave marked channels to take shortcuts through shallow seagrass beds, knowing that seagrass beds may be scarred;

4) When boaters carelessly navigate in shallow seagrass beds because they believe scars heal quickly;

5) When inexperienced boaters engage in recreational and commercial fishing over shallow seagrass flats, thinking that their boat's designed draft is not deep enough to scar seagrasses or that the design will prevent damage to their boat;

6) When boaters overload their vessels, causing deeper drafts than the boaters realize when boaters anchor over shallow seagrass beds, where their boats swing at anchor and scar seagrasses;

7) When boaters intentionally prop-dredge to create a channel;

8) When inexperienced boaters, ignorant of what seagrasses are and the benefits they provide, accept as the behavioral norm local boating customs that disregard the environment.

Table 6.10.a. Scarred Seagrass in Southeast Florida (acres).

	Acreage of scarred seagrasses (to nearest ten acres)					
	Total Seagrass Area	Light Scarring	Medium Scarring	Severe Scarring	Severe and Medium Scarring	Total Scarring
Broward	Broward county has less than 1 acre of seagrass					
Miami-Dade	145650	2740	3970	4500	8480	11220
Palm Beach	2510	50	20	0	20	70
Martin	2310	20	10	0	10	30
Florida	2,658,290	109,870	48,630	15,470	64,100	173,960

Legend:

Light scarring is defined as the presence of scars in less than 5% of the delineated polygon.

Moderate scarring is defined as the presence of scars in 5-20% of the delineated polygon.

Severe scarring is defined as the presence of scars in more than 20% of the delineated polygon.

Table 6.10.b. Scarred Seagrass in Southeast Florida (relative intensity).

	Relative Percentages of Scarred Seagrass By Intensity Level*					
Broward	0.00	0.00	0.00	0.00	0.00	0.00
Miami-Dade	5.48	2.49	8.16	29.09	13.23	6.45
Palm Beach	0.09	0.05	0.04	0.00	0.03	0.04
Martin	0.09	0.02	0.02	0.00	0.02	0.02
* Relative percentage = (the scarring in the county / scarring for the state multiplied)*100.						

Uprooted submerged aquatic vegetation cannot support associated ecosystems. Replacing uprooted or damaged aquatic vegetation like seagrass is difficult and, if successful, may take a long time before the restored habitat provides comparable ecological services. Many resource management recommendations have been offered to avoid seagrass scarring by boat users. These management recommendations include establishing no wake zones, motorized craft restrictions, sign and buoy placement, and boater education. Most of these measures have already been incorporated into state and county laws and regulations. However, absent from the law are specific penalties for propeller scarring and boat grounding on seagrass. The § 376.121, F.S. provides for liability for damage to natural resources including seagrass. This rule specifies monetary compensation for the destruction of natural resources but does not address specific penalties and seagrass scarring. In 2008, a proposal to establish penalties for sea grass damage within Florida Aquatic Preserves did not pass. The proposal would create a penalty system for damaging sea grasses due to propeller scarring and vessel grounding (Boating and Waterways Section Progress Report). Even with management recommendations adopted by the state and local government to protect seagrass from adverse impact of boat traffic, the statistics show that boating speed and careless operations are still prominent among boating violations and contribute to seagrass injuries.

6.7. Evaluation

6.7.1. Recreational Boating

6.7.1.1. Boater Education

Evaluation of FWC data shows that most, if not all, of the primary violations and causes of accidents are preventable. The state, counties, and municipalities acknowledge this by recognizing the need for boaters to know and understand boating rules and practice safe boating practices. The agencies within the state, counties, and local municipalities provide venues, mostly through websites, where boating information is disseminated to, and accessible by, boaters. However, recreational boating violations and accidents have not declined.

Boating education is not required for Florida boaters, except for persons who are 21 years of age, or younger, and operating a boat powered by a 10 horsepower or larger motor. Persons who are convicted of a criminal violation of the Florida Vessel Safety Act, or convicted of a noncriminal infraction if the infraction resulted in a reportable boating accident, and individuals convicted of two noncriminal infractions within a 12 month period, are also required to successfully complete a boating safety course. It should be noted, however, that the majority of boating accidents are caused by operators who are 36 years of age and older, many of whom did not have any boating education and have more than 100 hours of boating experience. These boating accident statistics, along with the support of the National Boating Safety Advisory Council (NBSAC) for a federal education requirement of recreational boat operators, may have led to the FWC proposal to increase the age requirement for Florida boating safety education on its list of potential policy changes in its 2007 Long Range Program Plan (FWC, 2007). The FWC 2008 Legislative Boating Safety Education proposal states:

"This proposal would modify Florida's mandatory boating safety education requirement for persons 21 years of age and younger operating a motorboat powered by 10 horsepower or more. Beginning January 1, 2010, it would establish an eleven-year phase-in period for every vessel operator to pass a boating safety course by increasing the age requirement by 5 years of age, every year (i.e., in 2010, everyone 25 years old and younger, in 2011, everyone 30 years old and younger, etc.). As the phase-in period progresses, the boating safety education will reach a critical target audience (those 36 years of age and older) involved in almost two-thirds of Florida's boating accidents. The Boating Advisory Council recommends this proposal" (FWC, 2007).

In the FWC LRPP section on Justification Of Revised Or Proposed New Programs And / Or Services, FWC states that "FWC will continue to move towards providing more material on-line as opposed to printing the material. We expect an increase in the number of informational materials to be offset by a reduction in educational materials" (FWC, 2007).

In the last several years, FWC, counties and local agencies involved with boating regulations have increasingly used their websites to provide information to boaters and the public. However, every effort must be made to identify the information that the boaters need and the best medium for its distribution. A 2006 study of recreational boaters to assess the existing knowledge and values that they place on the coral reef ecosystem showed that, in Miami-Dade County, most (68.8%) favored media (TV, radio) as their preferred source of information, followed by the internet (41.3%), publications (35.7%), and community events (28.9%). Of the boaters who stated that they had heard of the State of Florida's fisheries regulations, 37.1% said that the most common source of information on regulations was a mixture of "other sources", which include license renewal forms, magazines, and other diverse sources, followed by the internet (19.7%), word of mouth (14.9%), mail (14%), and 4.2% from attending meetings. In Broward County, the preferred source of information was the media (81.8%), the internet (52.9%), publications (45.6%), and community events (36.5%). Of boaters who stated that they had heard of the State of Florida's fisheries regulations in Broward County, most common sources of information were word of mouth (31.3%), followed by the internet (30.5%), and "other sources" (19.7%) (Shivlani, 2006).

An interesting result of the Shivlani study is the significance of "word of mouth" as a source of information. This may signal the importance of membership in boating organizations where dissemination of information of common interests can be done mostly by word of mouth. Results of the 2006 FWC Boating survey show that more than half (57%) of the survey respondents are not members of any boating related association.

6.7.1.2. Law Enforcement Strategies

A summary table of on-water staff for each country and the distances they patrol along with the number of registered boaters in each county is shown below (6.12). The combined total number of all on-water staff in southeast Florida is 190; of those 25 are FWC officers. Note (from section 6.8) that the average number of hours spent on-water each week (all officers combined) for most of the municipalities and the county marine units are less than 40 hours. These officers have other duties aside from patrolling the waters within their

jurisdictions. It becomes apparent that there are not enough law enforcement officers patrolling the waters of the southeast Florida region, responding to dangerous situations, investigating boating accidents, or addressing threats to natural resources. Current self-policing is not sufficient to abate preventable boating violations, accidents and natural resource damages. New law enforcement strategies need to be developed and implemented to reduce boating violations, accidents and impact to natural resources such as coral reefs, seagrasses and manatees.

Table 6.11. Summary Table of On-Water Staff in Southeast Florida.

County	Number of On-Water Staff	Number of FWC Officers	Coastline and Inland Waters	Registered Boaters
Miami-Dade County	97	9	178.5	58,133
Broward County	37	11	323	46,287
Palm Beach	39	3	216	43,504
Martin County	17	2	188	16,456
Total	190	25	905.5	164,380

One recommended strategy is to improve the efficiency of resources allocated to meet enforcement needs of the southeast Florida region. Data on where and when accidents have happened previously can identify "hotspots" for law enforcement to strategically target limited resources. Currently, boating accident report forms already allow such information to be reported. The ArrestNet database, if improved, has the potential to clearly define these hotspots. Although the description of the location of boating violations has been collected in the past, it is only since 2005 that exact GPS location of the violation has been incorporated in the database. This data should be properly encoded in the ArrestNet database to ensure that it can be of use in identifying enforcement hotspots.

Benthic habitat and seagrass maps are very important to overlay with enforcement hotspots. Most benthic habitat and seagrass maps, and aerial photos taken during habitat studies, are old and have not been updated. For example, the most comprehensive aerial photos of seagrass scarring and the resulting seagrass scarring maps were captured and analyzed in 1995. If there were additional seagrass monitoring and studies after 1995, most of these studies are geographic limited and not readily available in an accessible and usable format. The FWC should allocate funding for regular, periodic surveys and mapping of the seagrass and other benthic habitats (FWC, n.d).

Appropriate signage and placement of buoys and markers are necessary to successfully enforce boating laws and protect benthic habitats. However, Chapter 327.41 prohibits counties and municipalities from installing markers in state waters without the permission of FWC.

An emerging tool that has been proposed and used by several agencies to aid in enforcing laws is the use of environmental hotlines. Environmental hotlines are used to provide information, report environmental violations, and emergency situations. FDEP Southeast District has a program called the Statewide Warning Point. This program responds to any incident or situation that represents an imminent hazard or threat to public health, human safety, or to the environment (FDEP, 2007a). MDDERM has an environmental hotline for complaints and emergencies. Incidents that could be reported on this hotline include dredging or filling in or along Biscayne Bay, fish kills, chemical spills, or dumping incidents, sewage dumping or overflow, turbid water in any waterway, canal, or Biscayne Bay that may be due to construction or may be discharged through a pipe or from a storm drain (Miami-Dade County, 2007).

6.7.2. Anchoring and Mooring

There are very few local, state, or federal laws, which deal directly with anchoring and mooring activities in the state of Florida. Federal rules address the establishment of anchorage areas in navigable waters of the United States and prohibit the construction of permanent moorings without the consent of the USACE. State rules prohibit anchoring if it constitutes a navigational hazard or interferes with other vessels and regulate anchoring and mooring in aquatic preserves, state parks, and restricted areas. However, § 327.60, F.S. allows local government to regulate mooring or anchoring of floating structures or live-aboard vessels within their jurisdictions or of any vessels within permitted mooring fields.

Several counties and municipalities in Florida have adopted rules and ordinances to address anchoring and mooring in waters within their jurisdictions. The intent of these local ordinances is to mitigate the adverse impact (i.e., seagrass scarring and destruction of coral reefs) of unregulated anchored or moored vessels. Although most of the ordinances echo the provisions of the state rules on anchoring and mooring, some are seen as conflicting with state and federal rules. The city of Miami Beach in particular has approved an ordinance that prohibits boaters from anchoring for more than seven days. Specifically, Section 66-8(5)(6) of the city ordinance states that "(5) The city has determined that vessels anchored or moored within the jurisdictional waters of the city on which persons are residing as their primary

residence or for more than seven consecutive or cumulative days within a 30 day period constitutes a legal residence for purposes of this section, and such vessels are "live-aboards" within the jurisdiction of the city to regulate. (6) The city has determined that evidence that vessels anchored or moored within the jurisdictional waters of the city for more than seven consecutive or cumulative days within a 30 day period constitutes prima facie evidence that such vessels are no longer exercising rights of navigation, and within the jurisdiction of the city to regulate."

In July 2006, an amendment for § 327.60, F.S. was passed in the Florida Senate. The changes are shown below:

"Nothing contained in the provisions of this section shall be construed to prohibit local governmental authorities from the enactment or enforcement of regulations which prohibit or restrict the mooring or anchoring of floating structures or live-aboard vessels within their jurisdictions or of any vessels within the marked boundaries of mooring fields permitted as provided in s. 327.40. However, local governmental authorities are prohibited from regulating the anchoring outside of such mooring fields (changed from "anchorage") of non-live-aboard vessels (changed from "engaged in the exercise of rights of") in navigation."

This amendment states that counties and municipalities cannot restrict anchoring rights of non live-aboard boaters outside established mooring fields. However, this amendment does not settle the issue of state's preemption of local regulation of anchoring and mooring. Ankersen and Hamann (1999), in their analysis of government regulation and the rights of Navigation in Florida states that:

1. Thus with reference to live-aboard vessels, non-live aboards, not in navigation, or any vessel in a legally marked mooring field, the Act has no effect on local government authority to regulate anchoring and mooring. Local governments would thus be free to use existing regulatory authorities.

2. The anchoring of "non-live-aboard vessels in navigation" cannot be regulated by local government.

3. The 2006 Legislature amended § 327.60(2), F.S. to substitute the term "in navigation" for "engaged in exercise of rights of navigation." The staff reports on the proposed legislation do not explain the change in terminology and are inconsistent in their explanation of the effect of the amendments. One interpretation is that it was intended to incorporate into Florida law certain

jurisdictional concepts from admiralty and maritime law. Admiralty jurisdiction extends to "vessels" that are "in navigation."

For purposes of admiralty and maritime law, a vessel must be "used or capable of being used as a means of transportation on water." That use must be a "practical possibility" rather than "merely a theoretical one." A vessel that has sat idle for an extended period of time and lacks the proper equipment or integrity to serve as a means of transportation on water may be deemed to be a "dead ship" or "withdrawn from navigation." Whether the Legislature intended for this body of law to be used in interpreting the extent of local government jurisdiction is debatable. Without better evidence of legislative intent, a specialized field of law used for determining the rights of injured maritime workers or the applicability of a particular type of lien seems unsuited for determining the scope of local government regulatory authority. "…. Until the courts rule or the Legislature clarifies its intent, local government authority to regulate anchoring outside of established mooring fields is questionable." (Ankersen & Hamann, 1999).

In addressing this continuing controversy over the local government's authority to restrict anchoring, the FWC is now working on a 2009 Legislative proposal to review BMPs for state and local government to regulate vessel operations including mooring and anchoring. Legislative options being considered include developing a model anchoring ordinance, lifting restrictions on local governments to give them more authority to regulate anchored vessels, remove restrictions on local authority by amending 327.60 F.S. so that local governments can regulate anchoring outside the mooring field.

The § 253, F.S. gave the Board of Trustees, made up of the sitting governor and cabinet, the authority to regulate anchoring and manage anchorages. According to Ankersen and Hamman (1999), this authority has yet to be exercised. FDEP started the rule-making process in 1994 but it was held in abeyance "pending implementation of an administrative effort in Southwest Florida to develop a non-regulatory solution to anchorage management; 126 this regulatory effort has not been resumed" (Ankersen &Hamann, 1999).

6.8. Recommendations

1. To aid in its law enforcement activities, the state should:

a. Allocate funding for periodic survey and mapping of the benthic habitats. These surveys should be spatially and temporally comprehensive and consistent for baseline comparison of the functions and of the extent of benthic habitats.

b. Identify boating violation hot spots that include shallow areas with live bottom cover (corals, seagrasses). Temporally, these can include areas of high boating concentration (e.g., open lobster fishing events). The hot spots can help both citizens and law enforcement officers to appropriately deploy manpower for documenting and apprehending boating violations with high ecological impact.

c. Invest in an efficient design of a database of violations, citations, and boating accident reports so that it can be used not only for data search but as a source of spatial and temporal data on compliance monitoring.

d. Establish an environmental hotline that can provide boating information anytime and allow for citizen reporting of environmental violations and emergency incidents. Personnel who will man the hotline should be trained on how to effectively guide the caller to offer the right information, efficiently gather and store the information, and instruct the caller on what to do in emergency situations. This hotline should be supplemented with an online boating accident and grounding reporting.

2. Most marine units cannot provide more than 40 hours of on-water time. All law enforcement agencies should coordinate their on-water staffing schedule to provide the coverage in a larger area and full coverage in restricted or zoned areas.

3. The state should pursue a change in boater education requirements. Currently, the state mandatory boater education law applies only to 21 years and younger. However, FWC data on boating accidents clearly shows that majority of the boaters involved in a boating accidents are 36 years old and over. A mechanism to phase in a change in age requirement to a higher age should be developed to reach the actual boaters involved in a boating accident.

4. To assist in its boating education and outreach program, the state should conduct comprehensive boating studies that will identify the characteristics of Florida boaters, assess the boating knowledge of the boating population, understand the values that they place on their boating experiences, and determine their boating trends and patterns. In addition, the survey should include variables that could be used to assess the boater's knowledge and perceptions of the state's marine resources. The results of this survey will aid in the development of an educational program targeted to and provided in a medium that will successfully reach the boating community.

5. To properly regulate and implement laws pertaining to recreational boating, the state needs to address the inconsistency issues on who has the authority to regulate anchoring and mooring in the counties and municipalities. The state must also provide guidance in developing BMPs in establishing anchorages and mooring fields within the jurisdiction of the local government. This will provide for consistent guidelines regarding anchoring and mooring among all counties in Florida.

6. There should be allocation for enhancement of boater education and supplementing law enforcement from monetary damages collected through violations of the CRPA. This would allow the addition of marine officers who can patrol and enforce the rules established by the Act and expand the boater education programs.

7. Beach Nourishment

Beaches are economically important to the state of Florida. The 825 miles of the state's sandy beaches attract out-of-state tourists. It is estimated that in 2002, out-of-state beach tourists spent $19.3B, paid about $600M in state sales taxes and created more than 500,000 jobs (Alpert, 2005). Additionally, in 1995, 60% of the state's population lived within five miles of the coast. More than $25B, about 25% of Florida's coastal real estate, could be credited to beaches (Catanese Center, 2005).

For years, erosion has been threatening the state's beaches. Of the 825 miles of Florida's sandy shoreline, 391.4 miles (47%) are designated as critically eroded (FDEP, 2007b). The state has passed laws and regulations and adopted programs to protect and restore the state's beaches. An activity commonly used to restore eroded beaches is beach restoration and nourishment. Although many believe that beach nourishment has the least adverse impacts on the environment, its adoption as a beach erosion control in southeast Florida has raised concerns in its impact to the region's coral reef communities.

Coral reefs are important natural resources. They support fisheries and provide food, shelter, and critical habitat for numerous species, including commercially important fisheries. (Buddemeier et al., 2004). The reefs also provide natural breakwaters, which protect the shorelines and coastal development from erosion due to waves and hurricanes. They also generate white sand for many beaches. In southeast Florida tourists and local residents use the reefs for scuba diving, snorkeling, and fishing. It is estimated that a total of $2.3B in sales and $1.1B in income were generated annually from natural reef related expenditures, while supporting more than 36,000 jobs in the region (Collier et al., 2005).

7.1. Oversight: Lead Institutions and their mandates

7.1.1. Federal: The U.S. Army Corps of Engineers

The USACE is the lead agency for federally authorized beach nourishment projects. The USACE is an executive branch under the Department of Defense. As mandated by Congress through the Water Resources Development Act (WRDA), the USACE undertakes water resources development projects, including beach nourishment, within its Civil Works program.

USACE is a federal agency with military and civilian responsibilities. Through its civil works program, the USACE plans, builds, operates, and maintains a wide range of water resources facilities including flood control, navigation, recreation, and infrastructure and environmental stewardship. Although USACE's traditional civil responsibilities are creating and maintaining navigable channels and controlling floods, the agency currently has responsibilities in the areas of ecosystem restoration, environmental protection, environmental infrastructure, disaster relief, and other nontraditional activities.

USACE's civil works functions are performed under the direction of the Assistant Secretary of the Army (Civil Works). These functions include responsibility for all Corps of Engineers activities that use civil works resources. USACE is responsible for planning, engineering and design, operations and maintenance, research and development, and the supervision and direction of construction required for water-resources development. It also administers certain laws in the US to protect and preserve the navigable waters and related resources, such as wetlands.

The US Congress strongly influences the direction of the USACE's civil works program through WRDA. The WRDA is a biennial comprehensive water resources law enacted by Congress that authorizes the Secretary of the Army to construct various projects for improvements to rivers and harbors of the United

States, and for other purposes. It authorizes studies and projects within the USACE mission areas and changes to policies guiding the Corps civil works program, such as the split of project costs between the federal government and the nonfederal project sponsors (Carter, 2005). In 1986, the WRDA was enacted which was considered the first major project authorization for the USACE and addressed issues to improve the environment. It authorized more over 270 Corps projects for study or construction, 33 generic studies, 72 project modifications, 72 miscellaneous projects, deauthorized 290 projects and authorized over $500M in fish and wildlife mitigation/enhancement features (WRDA, 1986). The 1986 WRDA also changed cost-sharing requirements by increasing the share of local governments in project costs. Subsequent WRDAs increased the environmental mission of the USACE. WRDA 1990 expanded the USACE mission to include environmental protection and increased the agency's responsibility for contamination cleanup, dredged material disposal, and hazardous waste management. WRDA 1992 gave USACE the authority to use the "spoils" from dredging in implementing projects for protecting, restoring, and creating aquatic and ecologically related habitats, including wetlands; WRDA 1996 authorized the development of aquatic ecosystem restoration projects; WRDA 2000 approved a program for the Florida Everglades that represented the agency's first multi-year, multi-billion dollar effort in ecosystem restoration (Carter, 2005).

The civil works program includes four levels of authority, from the Assistant Secretary of the Army for Civil Works ASA (CW) and the Chief of Engineers in Washington, DC, to the local district offices (See Figure 7.1). The ASA (CW) is responsible for all civil work activities and works cooperatively with the Chief of Engineers through its annual legislative programs, which include the authorizations to conduct studies and construct civil work projects. The ASA (CW) also provides policy to and interprets policy guidance for the USACE projects and programs. The Chief Engineer is in operational command of the Headquarters of the USACE (HQUSACE). The Deputy Director of Civil Works is delegated with responsibility for the civil work program. Under the HQUSACE are eight civil work divisions headed by Division Engineers. The divisions are responsible for the supervision and management of district level activities. Two divisions are divided further into two regional offices due to the size and complexity of the divisions' geographic areas. There are 38 district offices headed by District Engineers. They are responsible for conducting and completing the assigned civil work projects within their areas of jurisdiction. Within each district are Project Delivery teams who conduct planning studies, designs civil work projects, supervise construction contractors, and manages completed USACE facilities. The team performs the day-to-day operation of the USACE (USACE, 2001).

Water resources projects are usually planned in the district offices and approved at the division offices and headquarters. The Department of the Army regulations (33 *CFR* 320-331) provides the district engineer the policy guidance to administer day-to-day operation of the program. It also authorizes the division and district engineers to issue conditioned permits (Part 325.4) and to modify, suspend, or revoke them (Part 325.7). The district engineer has the authority under Part 325.8 to make a final decision on a permit application. Currently, there is no formal administrative appeal for decisions made in accordance with the regulatory procedures and authorities.

The administration and management of the USACE regulatory program is at the district level. The regulatory authorities of the USACE originated with the Rivers and Harbors Act (RHA) of 1890 and 1899 (33 United States Code (U.S.C.) 401, et seq.). The Act authorized the USACE to establish permit requirements to prevent unauthorized obstruction or alteration of any navigable water of the United States. The section of the Act most relevant to beach nourishment is Section 10 (33 U.S.C. 403) which covers construction, excavation, or deposition of materials in, over, or under such waters, or any work which would affect the course, location, condition, or capacity of those (e.g., navigable) waters.

Common beach management practices include large dredge and fill projects, otherwise known as beach restorations or nourishments. The terms beach restoration or nourishment refers to the original placement of sand on the shoreline; renourishment refers to all subsequent sand placement projects.

Section 404 of the Federal Water Pollution Control Act, commonly called the CWA, expanded the permitting authority of the USACE. The Act authorizes the USACE to issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material into waters of the United States at specified disposal sites. The Marine Protection, Research, and Sanctuaries Act of 1972 gave the USACE the authority to issue permits for the transportation of dredged material to be dumped in the ocean. The United States Environmental Protection Agency (EPA), in consultation with the USACE, develops the criteria and guidelines for the selection of disposal sites.

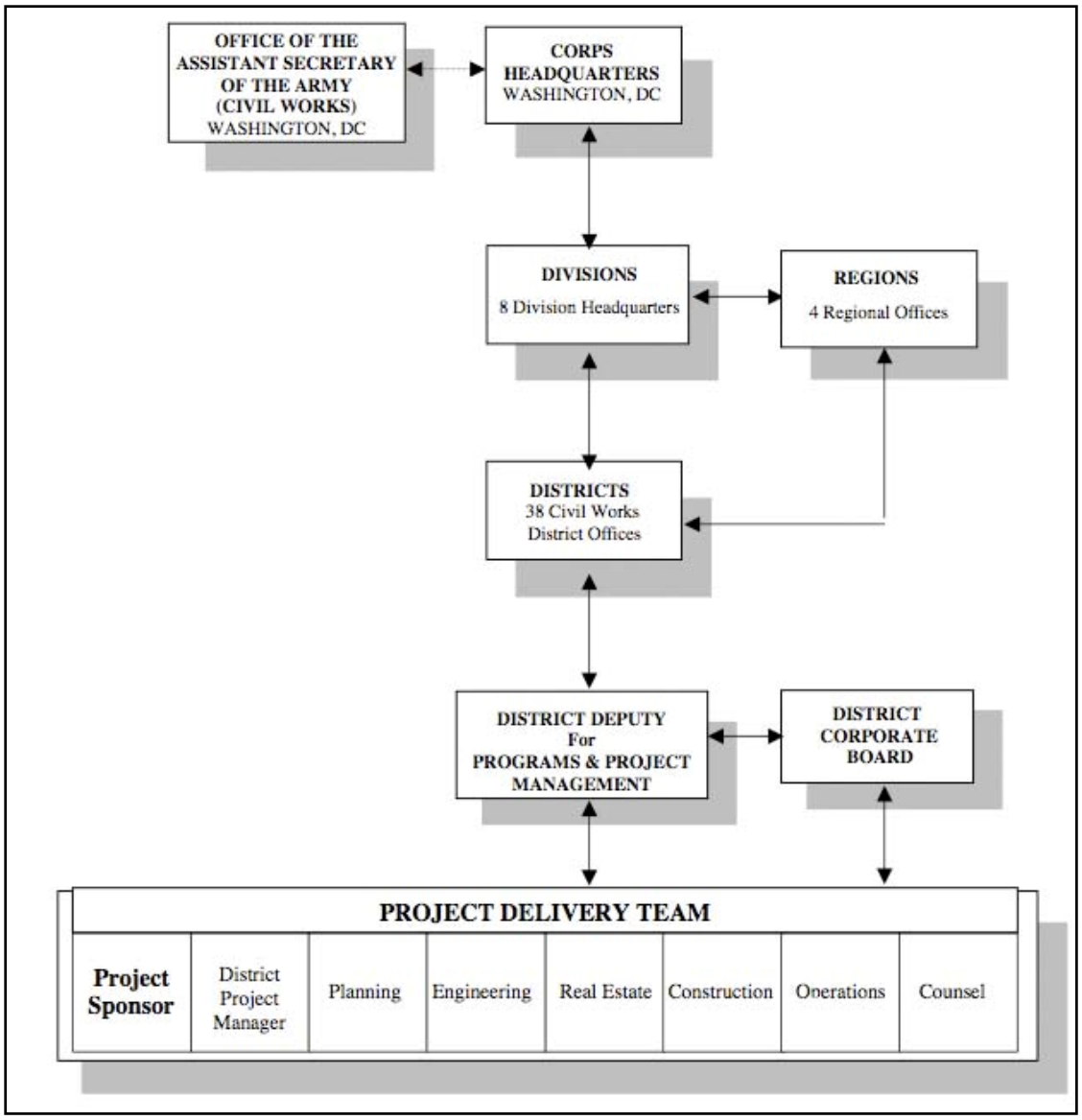


Figure 7.1. USACE Organizational Chart. Source: USACE, 2001.

As the lead federal agency for beach nourishment projects, the USACE is required to implement the 1969 NEPA process along with the Section 404 CWA permitting process. Pursuant to Part 230, Chapter II of Title 33 *CFR,* the USACE has developed its own six step Water Resources Planning process under the Water Resources Planning Act. This process is integrated with the NEPA compliance process and the Section 404 CWA permit process.

NEPA is the primary law that governs environmental review of a major construction project like beach nourishment. It's integration with the Section 404 CWA permitting process also initiates regulatory compliance with 60 other federal environmental laws including the CWA, the Endangered Species Act (ESA), the National Historic Preservation Act, the Wild and Scenic Rivers Act, the Wilderness Act, the Coastal Barrier Resource Act (COBRA), the Farmland Protection Act, and Executive Order 11990, Wetlands Protection. Section 102 of the NEPA states that every recommendation or report on proposals for legislation and other federal actions that could significantly affect the human environment should submit a "detailed statement of (i) The environmental impact of the proposed action, (ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented, (iii) Alternatives to the proposed action, (iv) The relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity, and (v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented."

The primary federal review agencies that comment on NEPA-required documents (i.e., mainly the Environmental Assessments (EA) and Environmental Impact Statements (EIS), include the U.S. Fish and Wildlife Service (USFWS), (NOAA) NMFS, and the U.S. EPA (NOAA CSC, 2007). The goal behind agency consultation on NEPA documents is for the relevant agencies to help shape the selection of the least environmentally damaging alternative (NOAA CSC, 2007). The Council for Environmental Quality (CEQ), through its regulations for implementing NEPA, requires the evaluation of potential cumulative impacts of a project in the context of increasing impacts to coastal ecosystems from multiple other human activities. The CEQ was established by Congress within the Executive Office of the President as part of the NEPA. The CEQ's primary responsibility is to ensure that all federal agencies' decisions and actions consider the effects on the environment and meet the provisions of NEPA.

In 1998, President Clinton signed Executive Order 13089 (E.O. 13089) on Coral Reef Protection to ensure that federal agencies are implementing their authorities to protect coral reefs. All federal agencies, including the EPA and USACE, whose mandate may affect U.S. coral reef ecosystems, to identify their actions that may affect U.S. coral reef ecosystems, use their programs and authorities to protect and enhance the conditions of such ecosystems and, to the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade the conditions of such ecosystems. E.O. 13089 also created the USCRTF that oversees the implementation of the policy and federal agency responsibilities mandated by the order.

7.1.2. State: The Florida Department of Environmental Protection

At the state level, the FDEP works with the five state regional Water Management Districts as the lead agencies for environmental management and stewardship. The FDEP was created in 1993, when the Florida legislature enacted Ch. 93-213, Laws of Florida (L.O.F.), which combined the Department of Environmental Regulation and the Department of Natural Resources into one agency. The goal of the merger was to eliminate overlapping regulatory programs to better serve the public. FDEP's mandate is to protect, conserve, and manage Florida's natural resources and to enforce the state's environmental laws. The § 161, F.S. authorizes FDEP to regulate construction on, or seaward of, the state's beaches, including beach nourishment.

The § 161, Parts I and II, F.S., are entitled the Beach and Shore Preservation Act. Part I includes the following sections for regulation at the state level. The § 161.088, F.S. declares the statewide policy regarding beach erosion control and beach restoration and nourishment projects. This sets the premise for state funding of beach nourishment projects in shoreline areas that are critically eroded and provide public access, in accordance with the Florida's Strategic Beach Management Plan. The § 161.041, F.S. requires a permit for coastal construction seaward of the Mean High Water Line (MHWL) or, if established, the Erosion Control Line (ECL). This addresses beach restoration and nourishment. Section 161.053 requires a separate permit for shorefront structures built seaward of the Coastal Construction Control line (CCCL) that do not already require a permit under § 161.041, F.S. This encompasses dune nourishment and vegetation, usually on a much smaller scale than a beach nourishment project.

Part II of § 161, F.S., includes the following sections for beach regulation at the local level. The § 161.25, F.S. designates a county's board of commissioners as the beach and shore preservation authorities for their county. The § 161.35, F.S. and § 161.36, F.S. grant supervisory and regulatory powers to the county commissioners for coastal construction along the shoreline, as long as the county's actions do not conflict with the state's authority under Part I, described above. In this manner, the county often acts as the sponsor for a beach nourishment project. Alternatively, the county may require an additional permit for beach projects if a subordinate taxing district or municipal government is the applicant.

The FDEP is authorized to adopt rules to execute the provisions contained in Chapter 161, F.S. The beach and dune nourishment policies contained in Chapter 161 are primarily implemented under Chapters 62B-33, 62B-36, 62B-41, and 62B-

49, F.A.C. The FDEP Bureau of Beaches and Coastal Systems Program (BBCS) enact these rules.

The FDEP BBCS manages activities such as restoration and maintenance of critically eroded beaches, safeguarding the beach and dune systems from imprudent development, and determining shoreline conditions and trends. The BBCS develops beach program rules and policy guidance. The FDEPBBCS also coordinates with and provides technical assistance to local governments and the USACE (FDEP, 2007c).

The FDEP BBCS is composed of the following five sections, serving the 25 coastal counties of Florida:

1. The Beach Erosion Control Program (BECP) Section develops and implements a long term, proactive, regional beach management program for the state of Florida. The BECP Section has been a primary source for funding to local governments for beach erosion control and preservation activities. Under Chapter 62B-36, F.A.C., beach restoration and nourishment activities consistent with the adopted Strategic Beach Management Plan are eligible for state funding. The Strategic Beach Management Plan is a "multiyear repair and maintenance strategy to carry out the proper state responsibilities of a comprehensive, long range, statewide program of beach erosion control; beach preservation, restoration, and nourishment and storm and hurricane protection." BECP Section project managers review work proposals and arrange contracts for coastal projects eligible for funding by the state, in partnership with local governments and the USACE (FDEP, 2007c).

2. The Coastal Construction Control Line Permitting (CCCL) Section implements Chapter 62B-33, F.A.C, for construction seaward of the Coastal Construction Control Line. This code states the requirements that must be met to obtain a coastal construction control line permit. The approval of a permit application is based upon a review of the potential impacts to the beach dune system, adjacent properties, native salt resistant vegetation, and marine turtles (FDEP, 2007c). CCCL permit managers review permit applications, issue permits, ensure compliance, and consult with permit applicants. CCCL field representatives conduct monitoring activities such as compliance and enforcement inspections, issue field permits, and consult with permit applicants.

3. The Coastal Data Acquisition (CDA) Section annually surveys and monitors the state's beaches. The data collected by the program are used

by the FDEPBBCS to establish, re-examine, and administer permits related to the coastal construction control lines. The CDA Section also provides a technical basis for permit review by monitoring shoreline changes. This helps the FDEPBBCS assess the need for beach restoration, renourishment, revegetation, and other beach erosion control projects.

4. The Coastal Engineering Section, in partnerships with Florida State University's Beaches and Shores Resource Center and University of Florida's Department of Civil and Coastal Engineering, provides technical expertise and assistance to the FDEPBBCS's programs by evaluating the physical characteristics and behavior of the natural and nourished beaches and inlets. The Coastal Engineering Section also determines, monitors, and reports critical and noncritical erosion areas of Florida's shoreline.

5. The Environmental Permitting Section enacts the Joint Coastal Permit (JCP) Program, which involves the concurrent processing of applications for coastal construction permits, Environmental Resource Permits (ERP), Wetland Resource (dredge and fill) permits (WRP), and Sovereign Submerged Lands (SSL) authorizations. Chapters 62B-49 and 62B-41, F.A.C., provide the guidelines for the JCP review and concurrent processing of proprietary authorizations. The FDEPBBCS Environmental Permitting Section also issues individual ERPs for select beach, inlet, or deepwater port dredge or fill projects that do not meet the JCP criteria.

7.1.3. Local

7.1.3.1. Miami-Dade County

Chapter 24 of the Miami-Dade County Code, also known as the Miami-Dade County Environmental Protection Ordinance, authorizes the establishment of countywide water control, coastal engineering, and wetlands management programs. The Director of the MDDERM is charged with the administration of these programs. The ordinance requires permits for excavating, filling, and performing work in coastal areas and wetland areas of Miami-Dade County, including beach and shoreline alteration and beach nourishment. The ordinance also adopts the state rules and any amendments to the rules of Chapters 62-160, 62-550, 62-713, 62-761, 62-770, 62-777, 62-782, 62-785, F.A.C., provisions of § 373, § 403, and § 253, F.S., and all the regulations set by the EPA as provided in 40 *CFR* 403.

7.1.3.2. Broward County

Article 3 of Chapter 30 of the Broward County Code of Ordinance, also known as the Broward County Erosion District Act, provides a means to alleviate beach erosion and restore eroded beaches. The Board of County Commissioners is the ex-officio governing body of the district. The Biological Resources Division of the Broward County Environmental Protection and Growth Management Department implements the beach restoration activities and dredge and fill regulation within the boundaries of the county.

7.1.3.3. Palm Beach County

Article III, Chapter 17, of the Palm Beach County Code of Ordinance, also known as the Tourist Development Ordinance of Palm Beach County, and mandates that the tourist development tax revenues shall be used to fund the Palm Beach County Tourist Development Plan. One category of use of this fund is to provide for beach improvement, maintenance, renourishment, restoration, and erosion control with an emphasis on dune restoration. The tax is levied and imposed on rentals and leases on any living quarters or accommodations in any hotel, apartment hotel, motel, resort motel, apartment, apartment motel, rooming house, mobile home park, recreational vehicle park, or condominium for a term of six months or less unless exempt as to the provisions of § 212, F.S., also known as Florida Revenue Act. The Tourist Development tax is in addition to other taxes levied by the state of Florida through the Florida Revenue Act.

7.1.3.4. Martin County

Article 4 Chapter 17 of the Martin County Code of Ordinance, also known as the Beach Nourishment Ordinance was adopted to "make available a means whereby property owners may cooperate with one another and the County for the purpose of beach nourishment projects to provide storm protection for property owners as well as to protect and enhance the local economy and public recreational opportunities" (Section 17.91). The Ordinance addresses payment for beach nourishment and related projects and assessments against the property that benefitted because of completed projects.

Article 6 Chapter 67, Beach Erosion, authorizes the Martin County Board of County Commissioners to prevent beach erosion. Chapter 67 specifically deals with funding the cost of beach erosion prevention projects.

The Coastal Engineering Department of Martin County supervises the implementation of federal beach renourishment and sand bypassing projects throughout the county.

7.2. Federal Beach Nourishment Process

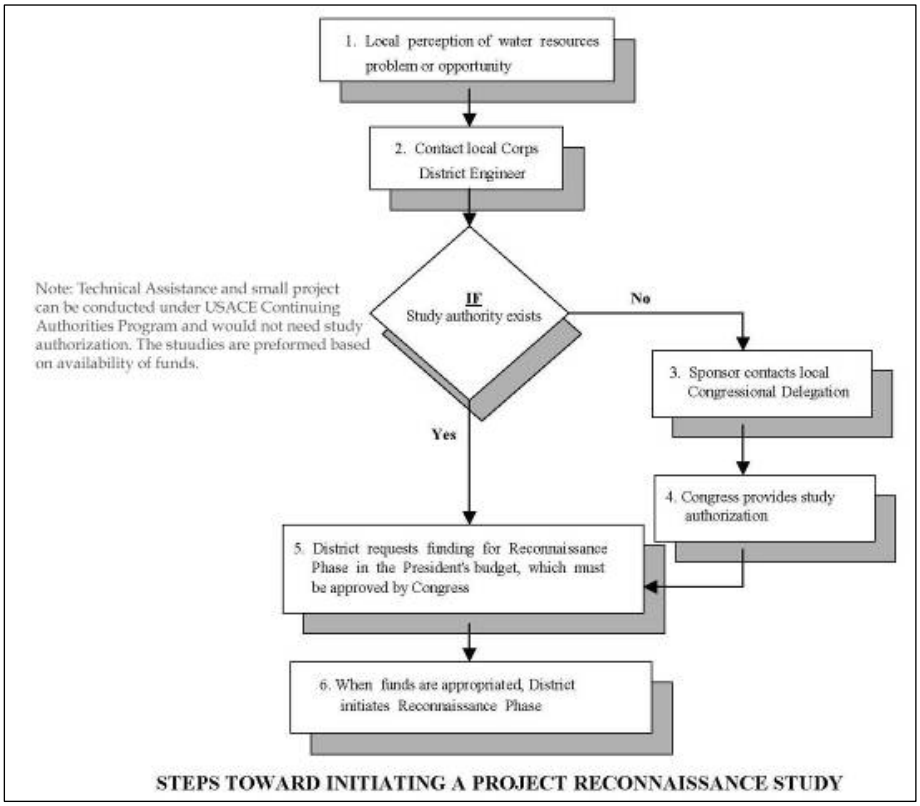
The development of the USACE water resource projects is guided by the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies or simply called Principles and Guidelines (P&G) prepared by the Water Resources Council (WRC) in 1983. The Water Resources Council was established in accordance to 1965 Water Resources Planning Act (42 U.S.C. 1962-b2). The Council is composed of the Secretary of the Interior, the Secretary of Agriculture, the Secretary of the Army, the Secretary of Commerce, the Secretary of Housing and Urban Development, the Secretary of Transportation, the Administrator of the Environmental Protection Agency, and the Secretary of Energy. The Chairman of the Council is be designated by the President. The Chairman has to request the heads of other Federal agencies to participate with the Council when matters affecting their responsibilities are being considered. Due to lack of funding the WRC is currently inactive.

Figure 7.2 shows the federal process for civil works project including beach nourishment. To initiate a project, the USACE requires two congressional authorizations – the study authorization and the appropriation of funds. For a project to be considered for study and appropriation authorizations, the beach must be accessible to the public. The project goes through three phases before construction begins: the reconnaissance study, the feasibility study, and the negotiation and execution a Feasibility Cost-sharing Agreement. These three studies are conducted under a single congressional study authorization. If the study obtains congressional authorization, it is then assigned to one of the USACE district offices.

Usually, a local entity requests federal assistance from Congress to implement a water resource project. The main purpose of the reconnaissance study is to determine if the water resource problem warrants federal participation in the feasibility study. The other goals of the study are to define federal interest, complete a reconnaissance report analysis (also known as 905(b) analysis), prepare a Project Management Plan, assess the level of support from non-federal entities, and negotiate and execute a Feasibility Cost-sharing Agreement. The cost-sharing agreement usually calls for periodic re-nourishment, often over a period of 50 years (Greene, 2002). The (reconnaissance) study, if approved, is 100% federally funded. Congressional authorization, then it is assigned to one of the USACE district offices.

During the reconnaissance phase, if the Corps recommends proceeding and a

nonfederal sponsorship is secured, then the Feasibility Study phase begins. The purpose of the feasibility study phase is to fully define problems and opportunities, and describe and evaluate alternative plans and fully describe a recommended project (USACE, 2001). Feasibility phase planning is guided by the requirements of the P&G. Several project alternatives will be explored during the feasibility study phase. The feasibility study must identify the alternative with the greatest net economic benefit, called the National Economic Development (NED) Plan. In the event that the alternative chosen is not an NED but a locally preferred plan, the selection of this plan must be fully documented.



STEPS TOWARD INITIATING A PROJECT RECONNAISSANCE STUDY

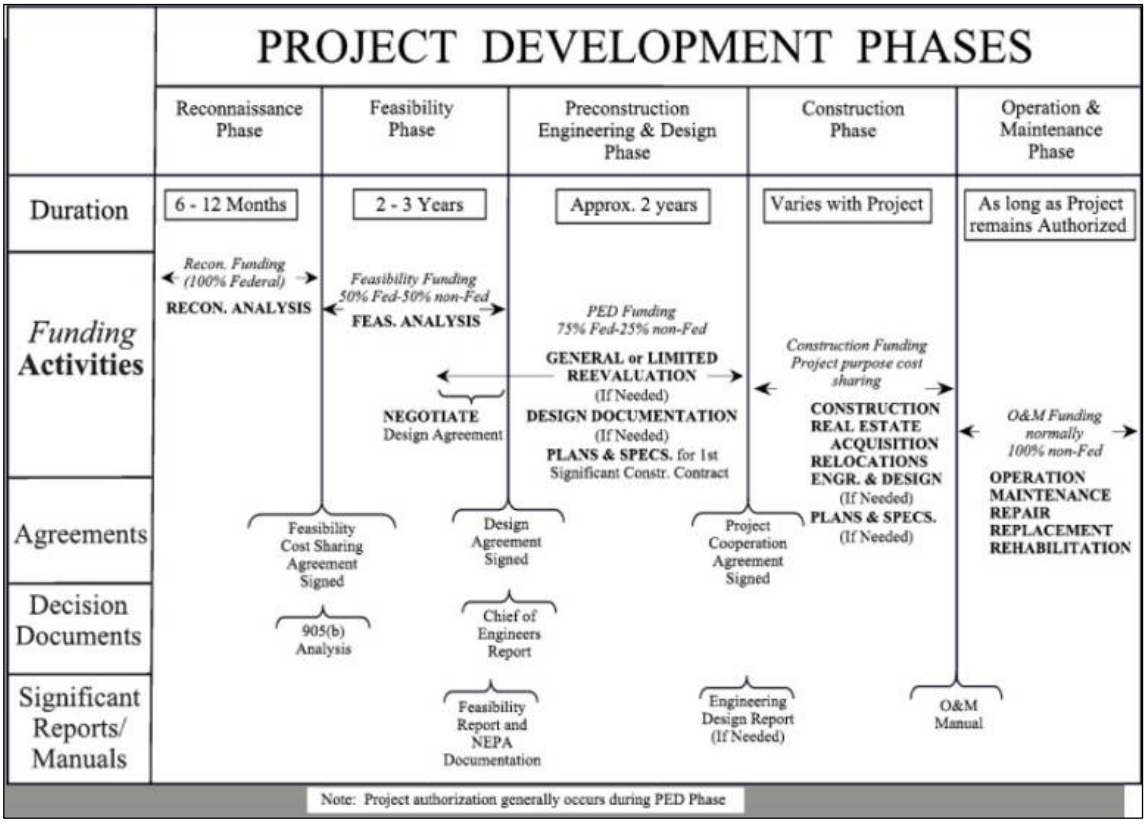


Figure 7.2. Federal Beach Nourishment Process. Source: USACE, 2001.

The P&G follows a six step process:

Step 1 – Identifying problems and opportunities

Step 2 – Inventorying and forecasting conditions

Step 3 – Formulating alternative plans

Step 4 – Evaluating alternative plans

Step 5 – Comparing alternative plans

Step 6 – Selecting a plan

All six steps must adhere to the NEPA that states that all federal agencies involved in water resource projects must initiate a public scoping process. Section 102 of NEPA requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. NEPA requires all federal agencies to include an environmental impact statement in every recommendation or report on proposals for legislation and other major federal actions that significantly affect the quality of the environment. Section 102 also requires federal agencies to lend appropriate support to initiatives and programs designed to anticipate and prevent a decline in the quality of the environment. NEPA triggers participation of local, state, and federal agencies that develop and enforce environmental standards. These agencies review proposed beach nourishment projects and provide comments on the affected natural resources, the cumulative impacts associated with the proposed project, and recommendations to avoid and minimize environmental impacts. The two most important documents that the agencies review are the draft EA and EIS. The EA is a brief document that determines if the proposed project could produce significant adverse impacts. Usually, only small beach nourishment projects would qualify for an EA. If significant adverse environmental impact is predicted for the proposed project, then an EIS is required. An EIS is a lengthy (1-3 years) process involving: (1) a full development of sharply defined alternatives through public scoping: (2) an assessment of the impacts of each alternative on the existing environment; and (3) development of measures to mitigate these impacts (NOAA CSC policy).

Federal agencies that may be required to review and publicly comment on the environmental impacts of beach nourishment project are the USFWS, EPA, and NOAANMFS. Under Section 309 of the Clean Air Act, the EPA is required to review and publicly comment on the environmental impacts of major federal

actions including actions that are the subject of EISs. As part of the Essential Fish Habitat (EFH) requirements under the MSRA, federal agencies are required to consult with the NOAANMFS regarding any activity, or proposed activity, authorized, funded, or undertaken by the agency that may adversely affect EFH [16 USC 305(b)(2)]. It must be noted that for beach nourishment projects, it is up to the USACE to notify NOAANMFS that an action may adversely affect EFH and whether or not to initiate a consultation. If NMFS becomes aware of a federal action that will adversely affect EFH and the USACE has not initiated an EFH consultation, NMFS may request a consultation or they can provide EFH Conservation Recommendations [67 *CFR* 600.925 (b)]. The USACE is required to respond to recommendations made by NMFS and the Regional Fishery Management Councils (RFMC) within 30 days. In the case where their actions are inconsistent with NMFS recommendations, the USACE must respond to NMFS and the RFMCs at least 10 days prior to final approval of action [305(b)(4)(B)]. The recommendations are advisory in nature and the USACE and its actions may be inconsistent with the recommendations of NMFS.

The USACE District Office in Jacksonville, Florida is delegated with the regulatory authority over beach nourishment projects in the southeast Florida region. Beach nourishment projects occurring within this area are posted on the USACE Jacksonville District Public Notice web page. The Jacksonville District Office consults with the federal agencies identified above (i.e., EPA, NOAANMFS, and USFWS), the FDEP district office, and other local, state, and federal stakeholders in the project area.

Section 7 of the ESA directs every federal agency to ensure that the actions it authorizes, funds, or carries out do not jeopardize the continued existence of any listed species and that any federal action should not adversely impact the critical habitat of any threatened or endangered species. This regulation mandates the USFWS to address the impact of beach nourishment for terrestrial and freshwater species, while the NMFS must consider impacts to marine and anadromous species.

The 1983 P&G study clearly defines the federal objective of a USACE civil works project. The objective states that "water and related land resources planning is to contribute to national economic development (NED) consistent with protecting the Nation's environment, in accordance with national environmental statutes, applicable executive orders, and other federal planning requirements." This objective acknowledges the weight of net economic benefits in the final selection of any erosion control plan.

To estimate the net economic benefits of a beach nourishment project, the feasibility study requires a cost-benefit model or analysis. Cost-benefit analysis must have all relevant beach nourishment project benefits and costs. Benefits include the estimated storm damage reduction, recreational benefits, and ecological benefits and costs. Figure 7.3 shows the beach cost schematic with benefits and costs related to beach nourishment.

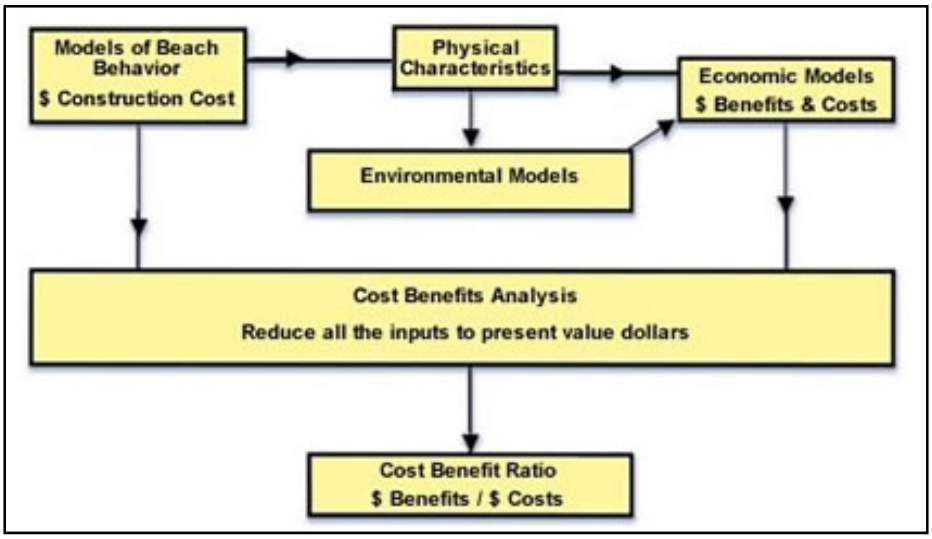


Figure 7.3. Beach Cost Schematic (USACE, 2008).

7.3. State Beach Nourishment Permitting Process

Figure 7.4 illustrates the state beach nourishment permitting process. Chapter 161.055, F.S., calls for concurrent processing of applications for several different types of permits: coastal construction, environmental resource, wetland resource (dredge and fill), and sovereign submerged lands authorizations. Review of the application for a consolidated permit, called a Joint Coastal Permit (JCP) is assigned to the FDEPBBCS, in Tallahassee. When filed, the FDEPBBCS forwards a copy of the JCP application to the USACE regulatory division for processing of the federal dredge and fill permit. A JCP is required for activities that meet all of the following criteria (FDEP, 2007c):

- Located on Florida's natural sandy beaches facing the Atlantic Ocean, the
- Gulf of Mexico, the Straits of Florida, or associated inlets;
- Activities that extend seaward of the mean high water line;

- Activities that extend into sovereign submerged lands; and
- Activities that are likely to affect the distribution of sand along the beach.

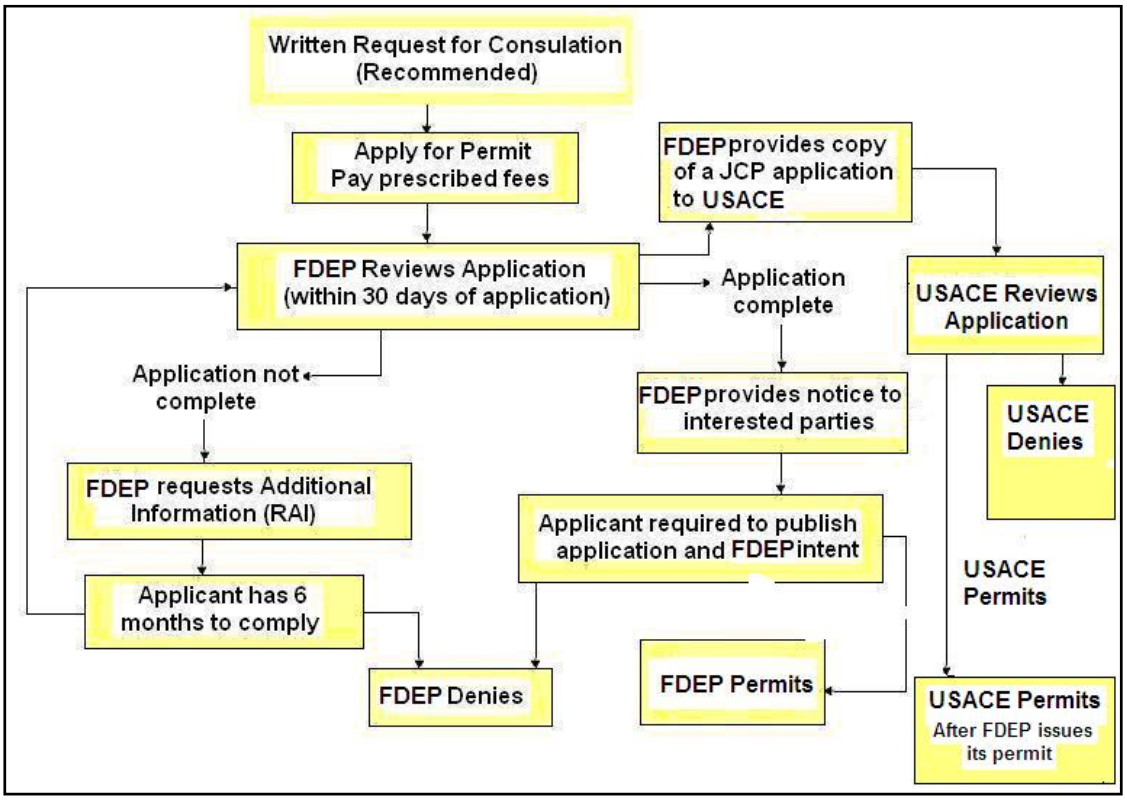


Figure 7.4. Florida State Beach Nourishment Permitting Process (USACE,2008).

Examples of activities that meet these criteria include beach nourishment, construction of erosion control structures and public fishing piers, maintenance of inlets, and dredging navigation channels that include disposal of dredged material onto the beach or in nearshore areas (FDEP, 2007c). The FDEPBBCS must consult with the FWC for impacted species and habitat issues, the FDEP Division of State Lands for sovereign submerged lands issues, and the Florida Department of State's Division of Historical Resources for marine cultural resource issues.

The FDEP issues state permits for beach nourishment projects before the USACE issues the required federal permits because of their authority under Section 401 of the CWA and the CZMA (Studt, 2007). The § 401, also known as the State Water Quality Certification, is required for a federal license or permit to conduct

an activity that may result in any discharge into navigable waters. Applicants for the federal permit must obtain a certification from the State in which the discharge originates (USEPA, 2009).

Section 401 of the CWA grants a state control of water quality over a wide range of activities for which they would otherwise lack authority, and is thus a potential tool for states to use to protect the integrity of their waters (Adler et al., 1993). State water quality certification under Section 401 provides states with the ability to veto projects or impose water quality based requirements (Adler et al., 1993). Thus, the state has a key role to play in approving nourishment projects by certifying that state water quality standards under Section 401 of the CWA will not be violated by the activity conducted under the USACE permit, which is issued under section 404 of the CWA.

7.4. Enforcement, Compliance and Monitoring

Enforcement of beach nourishment rules and regulations is the responsibility of the permitting agencies, mainly at the state and federal levels.

Figure 7.5 presents an overview of the USACE beach nourishment compliance process. Integrated in the compliance process are the permit application process and the NEPA analysis. All beach nourishment projects, whether public or private, federally or non-federally funded, are required to obtain a CWA Section 404 permit from the USACE prior to construction. Section 404 requires applicants to prove that they have selected the "least environmentally damaging practicable alternative" in order for the project to be approved. NEPA compliance is required to obtain a Section 404 permit. Compliance with NEPA triggers over 60 federal environmental laws. Among these laws are the ESA, the National Historic Preservation Act, the Archaeological and Historic Preservation Act, and the CZMA. The main purpose of NEPA is to assist the USACE in selecting a preferred alternative that “avoids and minimizes potential adverse environmental impacts.” Thus the preferred alternative is “the least environmentally damaging practicable alternative.” The selection of preferred alternatives includes: (1) obtaining input from the public and the agencies on their issues and concerns (a process called scoping); (2) using the information obtained in public scoping to develop a range of feasible alternatives; (3) assessing existing conditions in the study area; (4) assessing the impacts of the alternatives; (5) selecting a preferred alternative; and (6) identifying measures to avoid, reduce and/or minimize impacts associated with the preferred alternative (mitigation measures) (NOAA CSC, n.d.).

The permitting process at both the state and federal levels requires the development of an acceptable monitoring plan. Monitoring is primarily done by the permittee and monitoring reports are submitted to the permitting agencies. The Beaches and Shores Resource Center (BSRC) at Florida State University, through a grant from FDEP, initiated a comprehensive review and evaluation of beach nourishment performances based largely on physical monitoring reports.

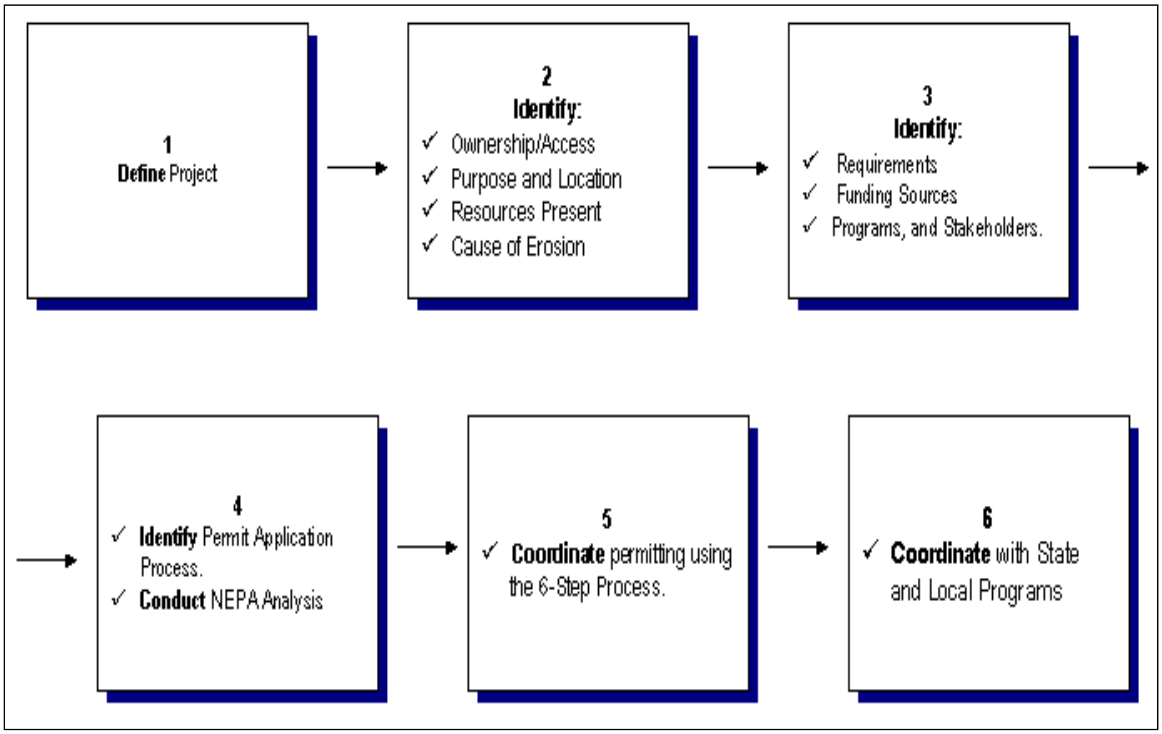


Figure 7.5. Overview of Beach Nourishment Project Compliance Process (USACE, 2008).

7.5. Funding Beach Nourishment Projects

Beach nourishment is an expensive method of restoring a beach. Figure 7.6 shows the estimated cost of beach nourishment in Florida. Projects are usually funded through a combination of local, state, federal, or private sources. At both state and levels, there are legislative provisions to fund the projects, especially if they are deemed to benefit the public.

Chapter 161.101, F.S., authorizes the state to pay up to 75% of the actual cost for nourishment of a critically eroded beach if it provides adequate public access, protects natural resources, and provides protection for endangered and threatened species. It also authorizes up to 100% funding of approved beach erosion control projects when the construction and maintenance are on lands for which the state is the upland riparian owner. The state cost-share is calculated based on oceanfront footage that is accessible to the public and a minimum number of parking spaces. The length of shoreline eligible for cost-sharing is equal to the width of the public access plus one half mile in each direction alongshore from the access (NOAA CSC, 2006).

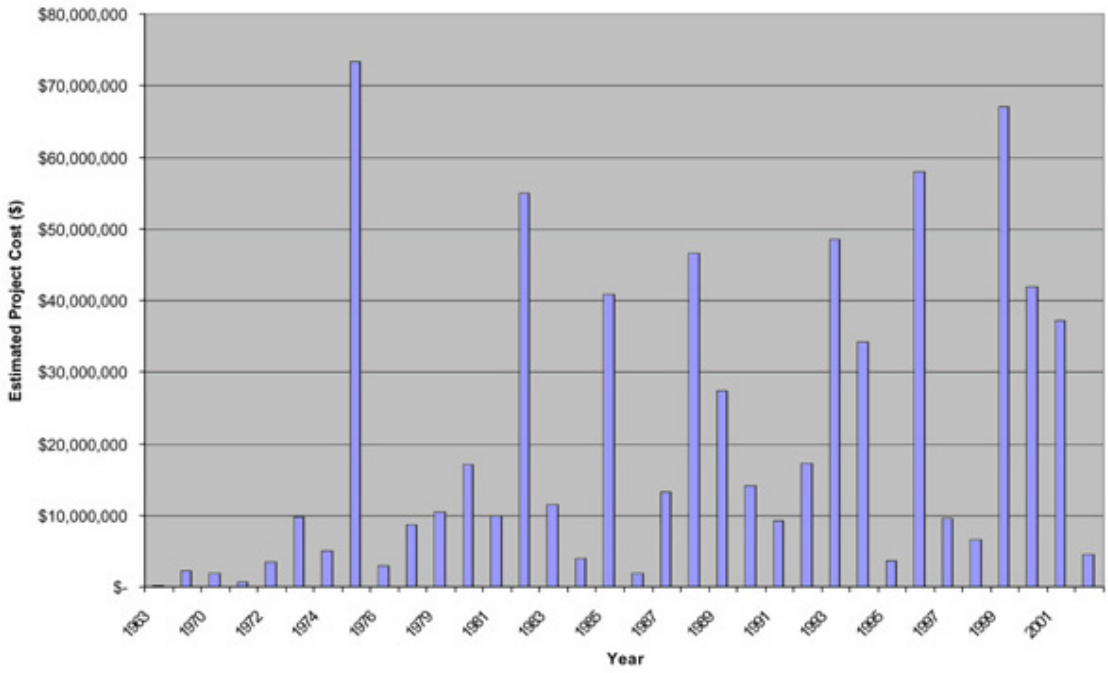


Figure 7.6. Total Beach Nourishment cost in Florida (1963-2001). (NOAA CSC, 2006).

Beach nourishment projects that provide only recreational benefits will not be funded by the state. Chapter 62B-36, F.A.C., implements the Beach Management Funding Assistance Program. The state will fund up to 50% of non-federal share for eligible activities. State funding for beach nourishment comes from the Ecosystem Management and Restoration Trust Fund (EMRTF). The EMRTF was created by action of Chapter 96-176, L.O.F. The State of Florida Legislature dedicated recurring funding of approximately $30M annually deposited into the EMRTF for state participation in beach erosion control projects, statewide.

State funding for a project may be used for feasibility studies to develop an appropriate project, design of a project based on a completed feasibility study, construction of a project based on an approved design, and physical and biological monitoring of an approved project. Chapter 161.101, F.S., also states the ranking process used to prioritize proposed projects before submission to the Legislature.

The state's annual funding priorities (§ 161.101.14 a-j, F.S.) are based on the following criteria:

1. The severity of erosion conditions, the threat to existing upland development, and recreational and other economic benefits;

2. The availability of federal matching dollars;

3. The extent of local government sponsor financial and administrative commitment to the project, including a long term financial plan with a designated funding source or sources for initial construction and periodic maintenance;

4. Previous state commitment and involvement in the project;

5. The anticipated physical performance of the proposed project, including the frequency of periodic planned nourishment;

6. The extent to which the proposed project mitigates the adverse impact of improved, modified, or altered inlets on adjacent beaches;

7. Innovative, cost-effective, and environmentally sensitive applications to reduce erosion;

8. Projects that provide enhanced habitat within or adjacent to designated refuges of nesting sea turtles;

9. The extent to which local or regional sponsors of beach erosion control projects agree to coordinate the planning, design, and construction of their projects to take advantage of identifiable cost savings;

10. The degree to which the project addresses the state's most significant beach erosion problems.

Beach nourishment projects with beaches on which there is sufficient public access may qualify for federal cost participation. Projects with federal costs exceeding $3M have to go through the federal beach nourishment process for WRDA study authorization and appropriations. If the study receives Congressional authorization and funding, then it qualifies for a maximum federal cost-share of 65 percent for initial project construction and 50 percent for subsequent beach maintenance. Table 7.1 shows the cost-share scheme for the five project areas that can be used for beach nourishment (Carter, 2005). Cost-sharing for reconnaissance and feasibility studies and PED is shown in Table 7.1.

Technical assistance and small beach nourishment can be exempted from the lengthy WRDA process under the USACE Continuing Authorities Program (CAP). Section 103 of Public Law (P.L.) 87-874 (1962) delegated to the USACE general authority to study, approve and construct certain water resources development projects. Section 103 authorizes the Secretary of the Army, to plan and construct small beach erosion control projects within certain limits.

Table 7.1. Cost-share scheme for the five project areas that can be used for beach Nourishment. Source: Carter and Cody 2005.

Purpose	**Non-Federal Share**	
Navigation - Harbors	20%	Depth < 20 ft
	35%	Depth 21-45ft
	60%	Depth > 45 ft
Navigation - Inland	50%	
Flood Damage Reduction	35%	
Recreation	50%	
Hurricane and Storm Damage Reduction	35%	
Ecosystem Restoration	35%	

Funding of the project under this provision is based on USACE discretion and availability of funds. The use and use restrictions of the small beach nourishment project in this authorization are:

"*Corps of Engineers designs and constructs the project. Each project selected must be engineering feasible, complete within itself, and economically justified. The nonfederal sponsoring agency must agree to: (1) Share equally in cash and in-kind services for feasibility studies; (2) share in the cost of the project, including a cash contribution, providing the necessary lands, easements, right-of-way, and relocations required for the project; (3) assume full responsibility for all project costs in excess of the Federal cost limit of $2,000,000; (4) hold and save the United States free from damages; (5) assure that water pollution that would affect the health of bathers will not be permitted; (6) assure continued public ownership or public use of the beach, and its administration for public use; (7) provide project maintenance; and (8) provide and maintain necessary access roads, parking areas and other public use facilities open and available to all on equal terms*" (United States General Services Administration (see Agency Websites in Reference Section).

Another funding alternative for a federally authorized beach nourishment project is through Section 215 of P.L. 90-483. Under Section 215 USACE can enter into agreements providing for reimbursement to states or political subdivisions

for work to be performed by them at authorized federal projects. This would allow the non-federal sponsor to become responsible for project planning and design, engineering, and construction administration with subsequent federal cost reimbursement. The maximum federal cost reimbursement under this provision is $10M (NOAA CSC, 2006).

Federal funding for beach nourishment for has increased from $79M in 1995 to $135M in 2002 (NOAA CSC, 2006). Beach nourishment appropriations from 1995 to 2002 totaled $787M. The federal government does not participate in beach nourishment projects when coastal property is privately owned with no public access, public use, and public parking (NRC, 1995). It also does not participate in the cost of projects that protect private undeveloped lands.

7.6. Beach Nourishment in the Southeast Florida - Status and Trends

7.6.1. Beach Nourishment Projects

Florida has 825 miles of sandy beaches, which provide recreational benefits, flood protection, and perform an essential ecological function to the coastal ecosystem- 111.5 of those miles are within the southeast Florida region (Clark, 1995**).** Since 1944, there have been 112 beach nourishment projects along the southeast Florida coast, which cost more than $326M dollars, placed more than 84 million cubic yards of sand, and cumulatively restored or renourished 146 miles of beaches. Project costs range from a low $3,677 in 1963 to a high of $55M dollars in 1982 (See Appendix 7.1). All four counties in the southeast Florida region have had beach nourishment projects that were funded by a combination of local, state, federal, and private dollars.

7.6.2. Trends in Local, State, and Federal Funding

Appendices 7.2 and 7.3 show the local (county), state (FDEP), and federal (USACE) spending of beach nourishment in the southeast Florida region. State appropriations for beach nourishment have increased over the years. The appropriation for 1998-1999 was $10M, for 1999-2000, $20M, and $30M annually onwards. The federal government has borne the majority of the funding for beach nourishment projects in the southeast Florida region. However, in recent years, the federal government has pushed for more local participation in the maintenance of beach nourishment projects.

7.6.3. Critically Eroded Beaches

Under § 161.101 and § 161.161, F.S., the FDEPBBCS is charged with the responsibility to identify those beaches of the state, which are critically eroding, and to develop and maintain a comprehensive long term management plan for their restoration (FDEP, 2008). The first critically eroded beach list, created in 1989, included 217.6 miles of critical erosion and another 114.8 miles of noncritical erosion statewide. The list of critically eroded areas (beaches) changed over time due primarily to erosion caused during hurricane seasons. However, in 1998, the definition of critically eroded beach areas was changed. Earlier listings include only those problem areas where the threat existed to development or recreational interests. As stated in the 2007 FDEP report titled "*Critically Eroded Beaches in Florida*," the following definition has been adopted by the FDEPBBCS (FDEP, 2007b) to identify critically eroded beach areas:

A "critically eroded area is a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded areas may also include peripheral segments or gaps between identified critically eroded areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects."

Critics of the definition of critically eroded areas explain that the presence of development or engineering structures along the coast should be used to establish BMPs to address coastal erosion, rather than serving as the leading factor in defining erosion problem areas (Bush et al., 2004). The result of defining eroded areas on the basis of development is that the number of critically eroded areas is expanding as uninhabited beaches become developed (Bush et al., 2004). As previously stated, the designation of "critically eroded" sets the stage for erosion mitigation initiatives such as beach nourishment, which have demonstrated environmental impacts.

As an illustration of this expansion of critically eroded areas, Bush, et al. (2004) reported that 218 miles of Florida beaches were listed as critically eroded in 1989. By 1999, this figure increased over 66%; the FDEPBBCS classified 328 miles of Florida beaches as critically eroded (Bush et al., 2004). While some states have created legislative efforts attempting to preserve beaches despite development, Bush, et al. (2004) note that beach nourishment in Florida appears to be targeting building preservation rather than beaches as a result of loopholes, variances, and the influence of local developers.

Currently, of the 825 miles of Florida's sandy shoreline, 391.4 miles or 47% are designated as critically eroded (FDEP, 2008); 87.6 miles of the southeast Florida region beaches are considered to be critically eroded.

Figure 7.7 shows the critically eroded beaches in the four southeast Florida counties as of June 2009.

7.6.4. Coastal population

In the last four decades there has been a significant increase in coastal population in the United States. Statistics have shown that in 1960, an average of 204 people were living on each sq. mile of coastal land in the counties bordering the Atlantic and Gulf coastlines. By 2000, this density increased to 296 (US Census Bureau). This is in contrast to the national average population of 80 persons per sq. mile (NOAA CSC, 2006).

Population in the southeast Florida region increased by 399, 764 from July 2000 to July 2008, an increase of about 7.75% or an average of about 1% a year (See Table 7.2). Based on the 2000 census, the population density per sq. mile of land in Miami-Dade is 1,157.9; for Broward County, 1,346.5; for Martin, 228.1; and for Palm Beach, 573. The average for all 4 counties is 745 people per sq. mile, which is above the population density for counties bordering the Atlantic and Gulf coastlines. US Census population projections also reveal that Florida's population will grow from 18,976,457 in 2000 to 28,685,769 in 2030, a population growth of 79.5%. Florida will rank third in percent change in population (US Census Bureau, 2008).

Increase in population usually leads to changes in land use. Figure 7.8 shows the change in land cover in southeast Florida from 1992 to 2001 (USGS, 2008).

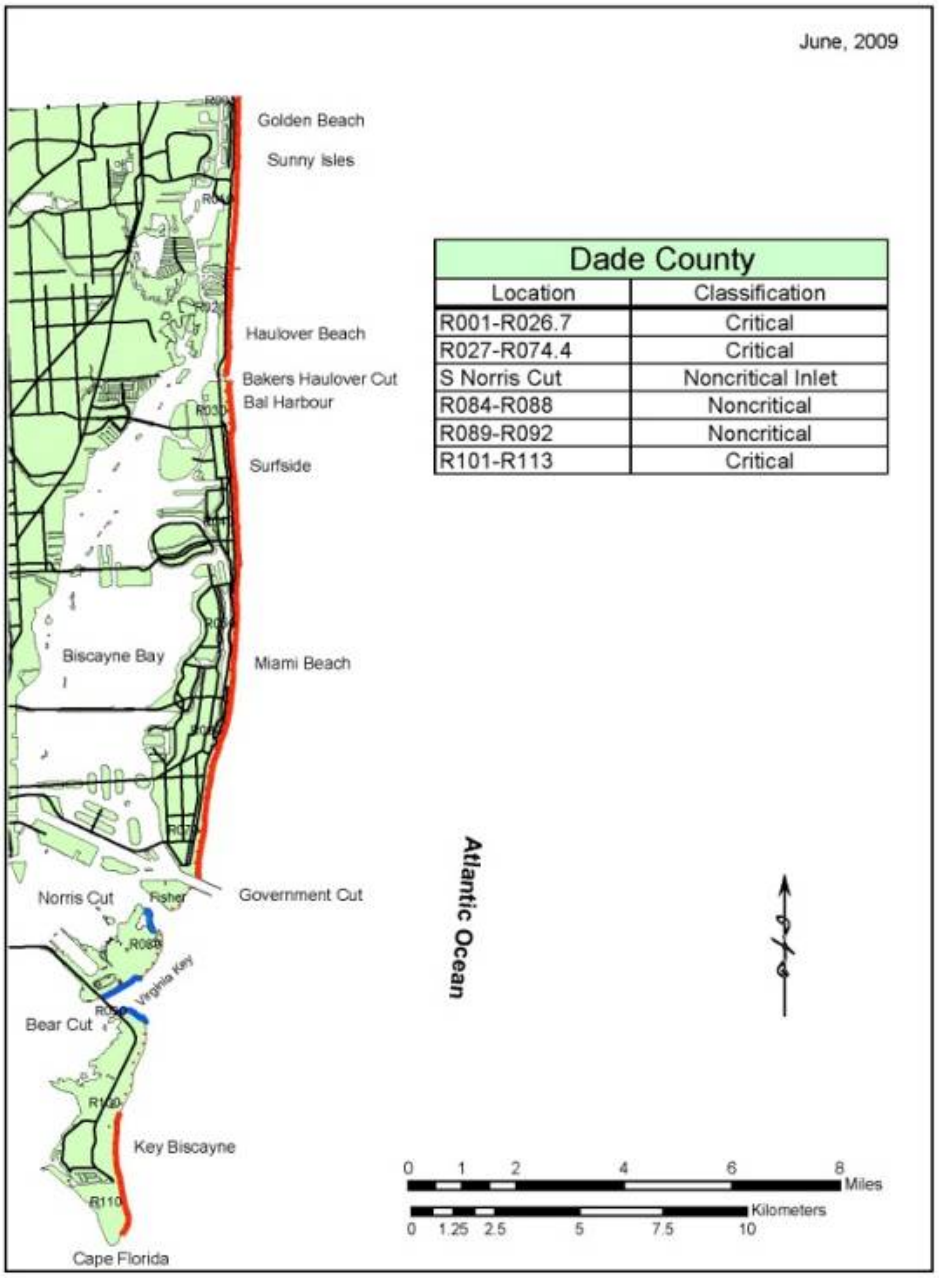


Figure 7.7.a. Map of critically eroded beach areas in southeast Florida. Dade County. Source: *Critically Eroded Beaches in Florida*, 2007 as cited in FDEP June 2009.

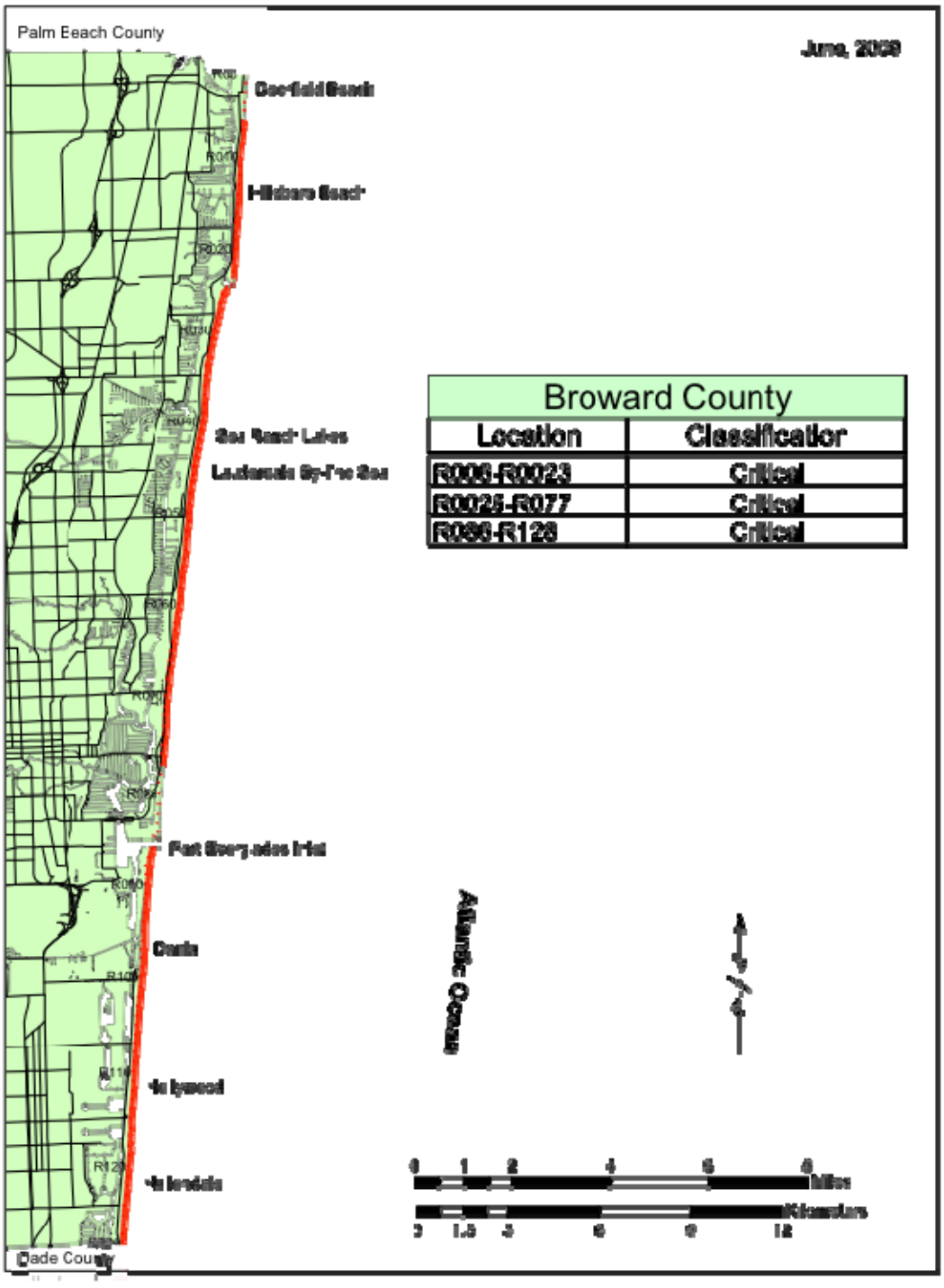


Figure 7.7.b. Map of critically eroded beach areas in southeast Florida. Broward County. Source: *Critically Eroded Beaches in Florida*, 2007 as cited in FDEP June 2009.

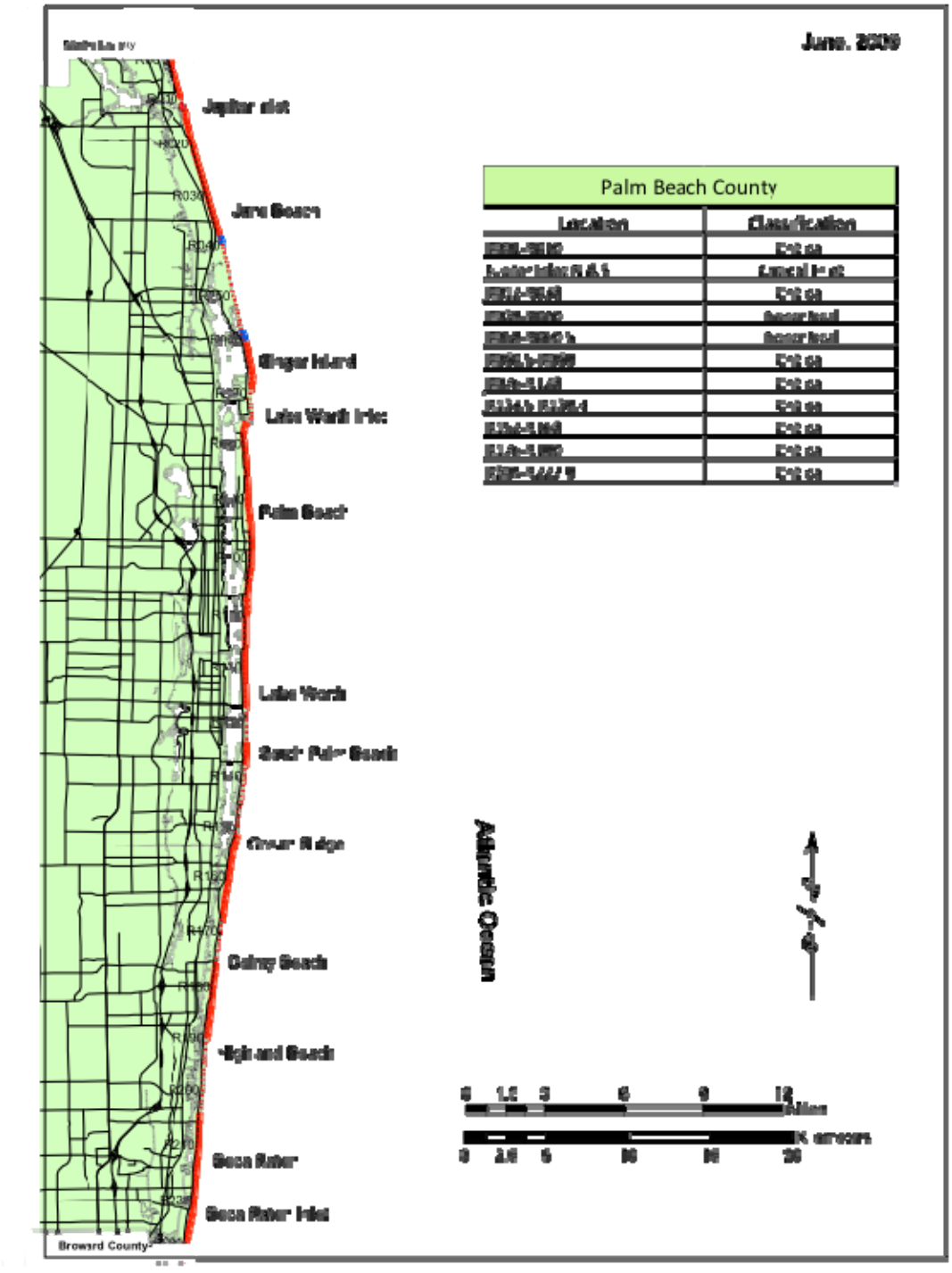


Figure 7.7.c. Map of critically eroded beach areas in southeast Florida. Palm Beach County. Source: *Critically Eroded Beaches in Florida*, 2007 as cited in FDEP June 2009.

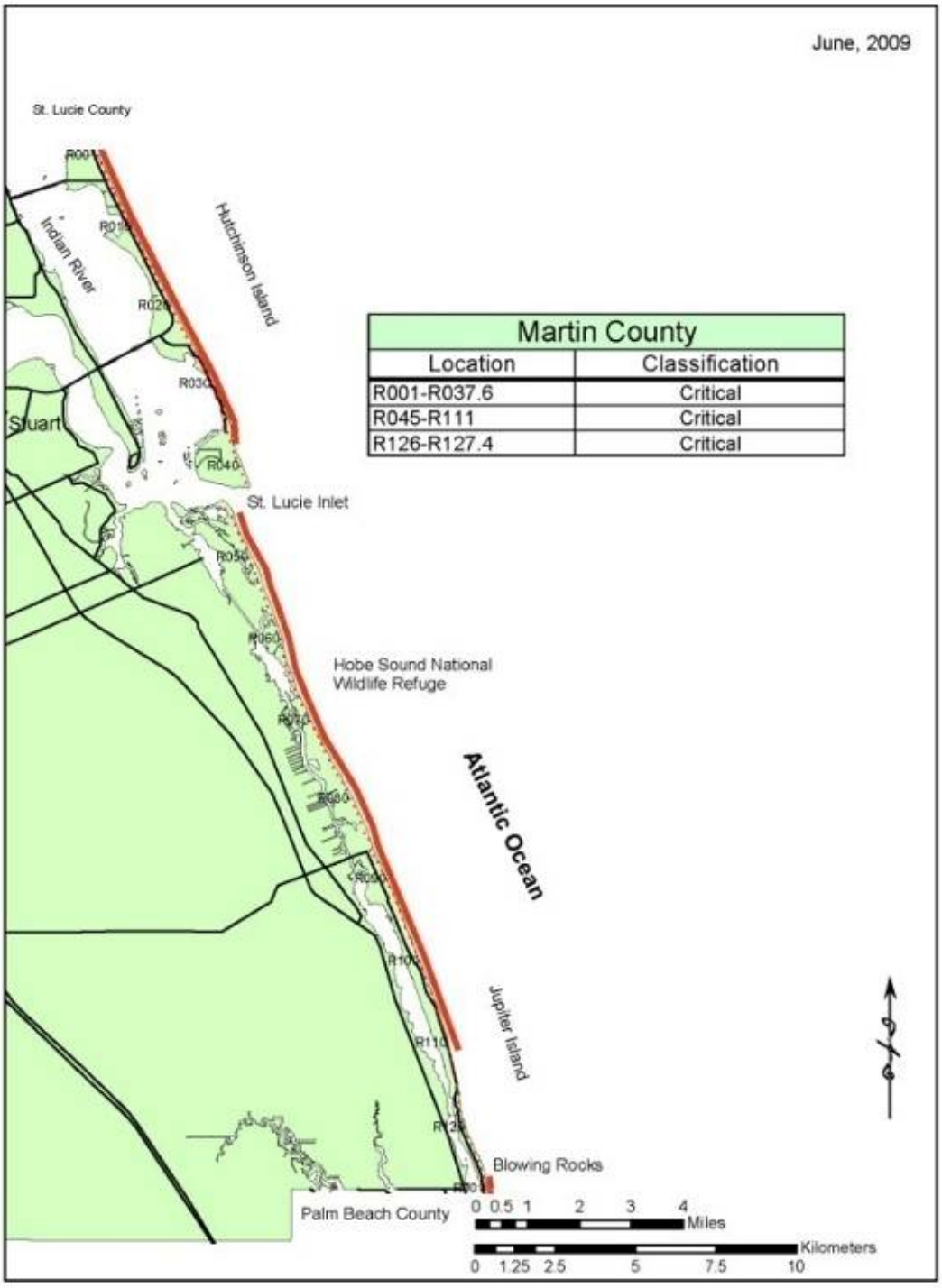


Figure 7.7.d. Map of critically eroded beach areas in southeast Florida. Martin County. Source: *Critically Eroded Beaches in Florida,* 2007 as cited in FDEP June 2009.

The map also shows that the increase in population resulted to additional urban development in the east coast and an increase in the number of high density areas near the coast. *Florida 2060*, a study sponsored by 1000 Friends of Florida, explored the state's population distribution by 2060 (Zwick & Carr, 2006). The study built upon the US Census population projection for 2030 and used GIS sustainability analysis to estimate the population distribution within the state. The study revealed that the state population would grow from 17,872,295 in 2005 to 35,814,574 in 2060. This means that 6,953,265 acres of land is needed to accommodate the 17,942,279 more people in the state. The study also revealed that this amount of needed land can be allocated from 3.5 million acres of existing agricultural and 2.7 million acres of native habitat (See Figure 7.9).

Table 7.2. Population estimates for southeast Florida: Source: Population Division, US Census Bureau. Release Date: March 19, 2009.

Geographic Area	Population Estimates				
	July 1, 2008	July 1, 2007	July 1, 2006	July 1, 2005	July 1, 2004
Florida	**18,328,340**	**18,199,526**	**18,019,093**	**17,702,476**	**17,313,811**
Broward County	1,751,234	1,748,771	1,764,533	1,763,706	1,739,670
Miami-Dade County	2,398,245	2,382,961	2,376,421	2,356,697	2,337,381
Palm Beach County	1,265,293	1,260,386	1,261,380	1,255,007	1,234,204
Martin County	138,660	138,790	138,035	138,230	136,827

Geographic Area	Population Estimates			
	July 1, 2003	July 1, 2002	July 1, 2001	July 1, 2000
Florida	**16,937,337**	**16,652,679**	**16,340,734**	**16,047,246**
Broward County	1,718,271	1,698,537	1,668,165	1,631,983
Miami-Dade County	2,320,649	2,307,071	2,283,934	2,259,111
Palm Beach County	1,204,827	1,183,123	1,156,485	1,135,424
.Martin County	134,416	131,519	129,104	127,150

Geographic Area	April 1, 2000	
	Estimates Base	Census
Florida	**15,982,813**	**15,982,378**
Broward County	1,623,016	1,623,018
Miami-Dade County	2,253,786	2,253,362
Palm Beach County	1,131,190	1,131,184
Martin County	126,731	126,731

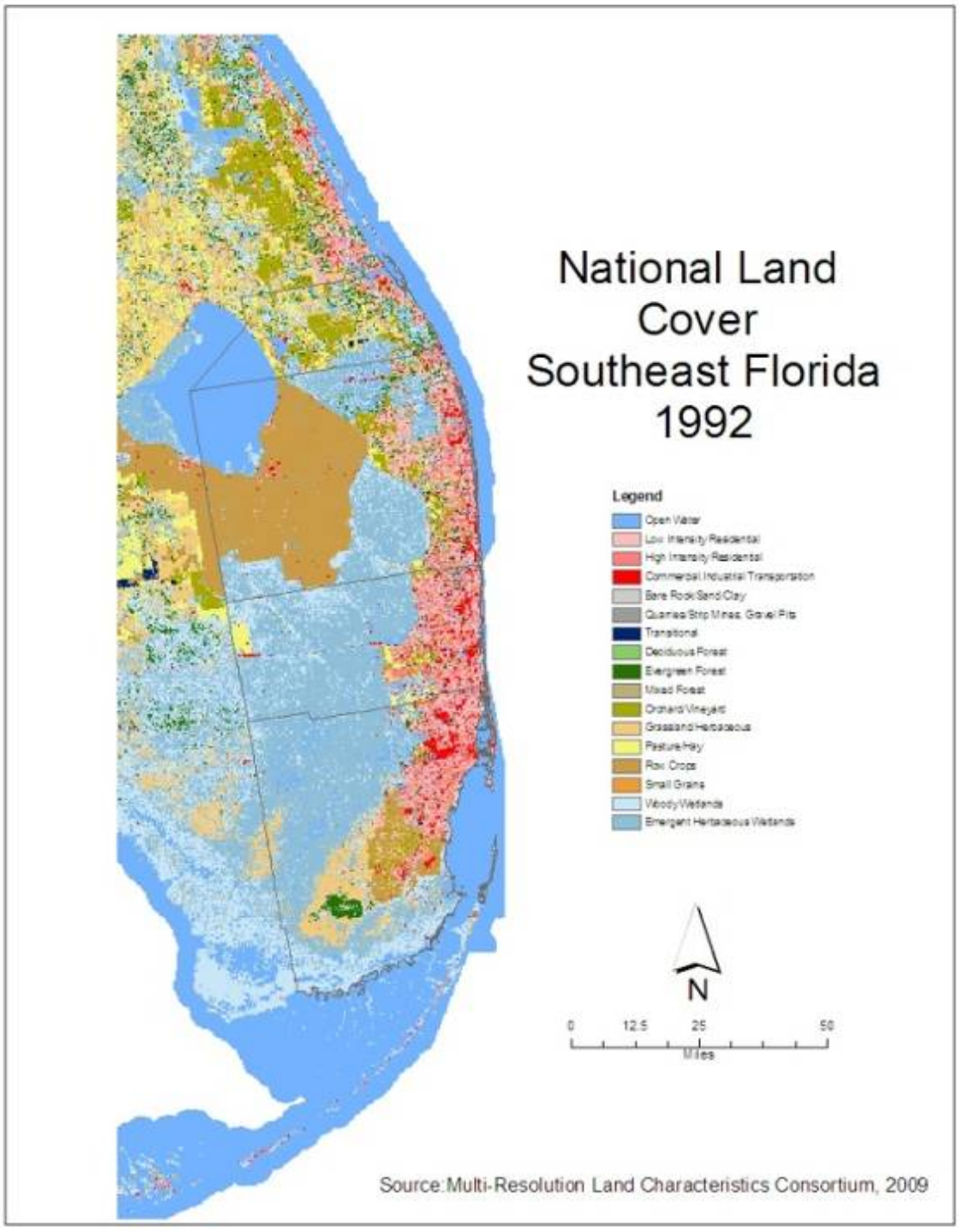


Figure 7.8.a. Southeast Florida Land Cover Change 1992. Compare to Figure 7.8.b.

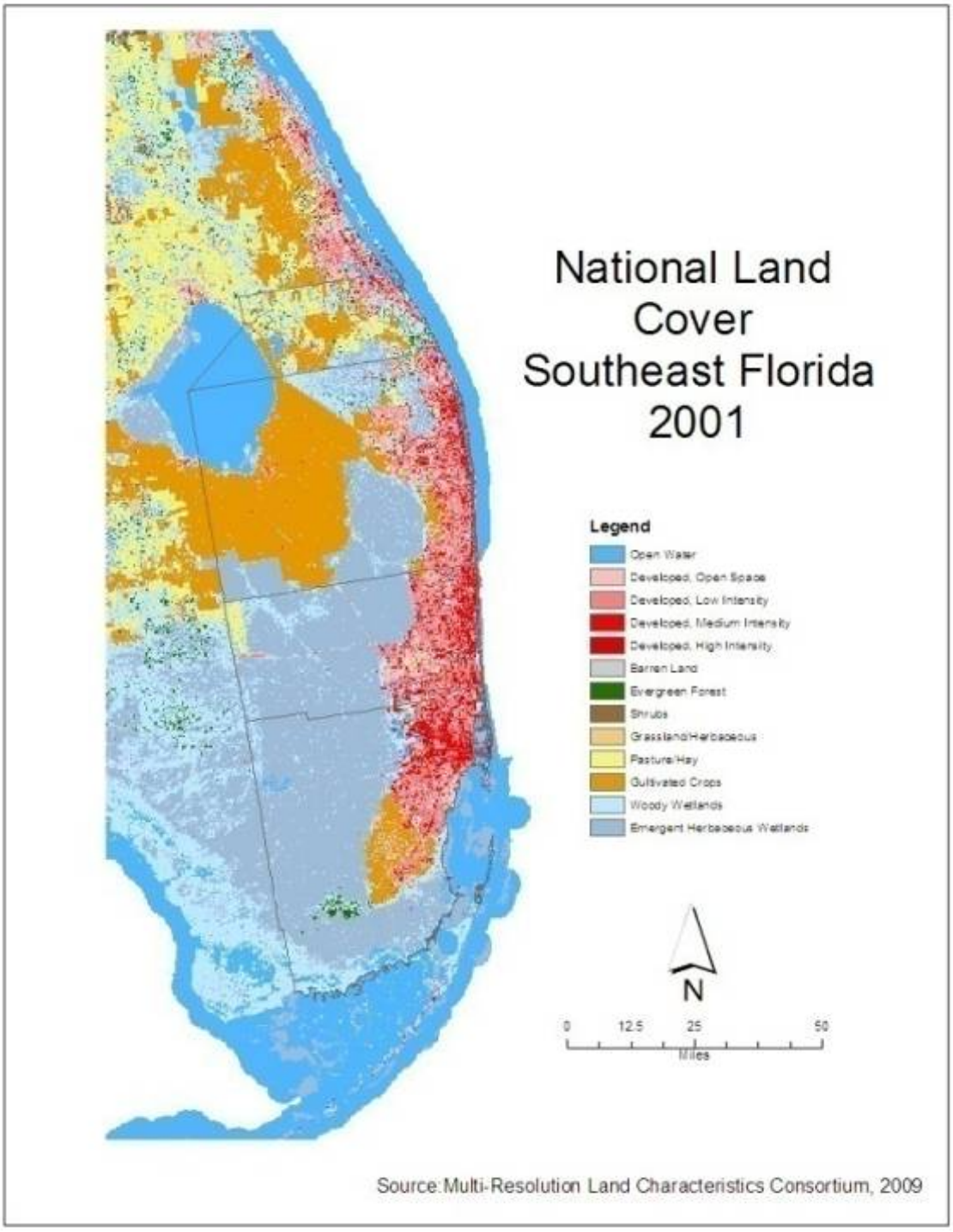


Figure 7.8.b. Southeast Florida Land Cover Change 2001. Compare to Figure 7.8.a.

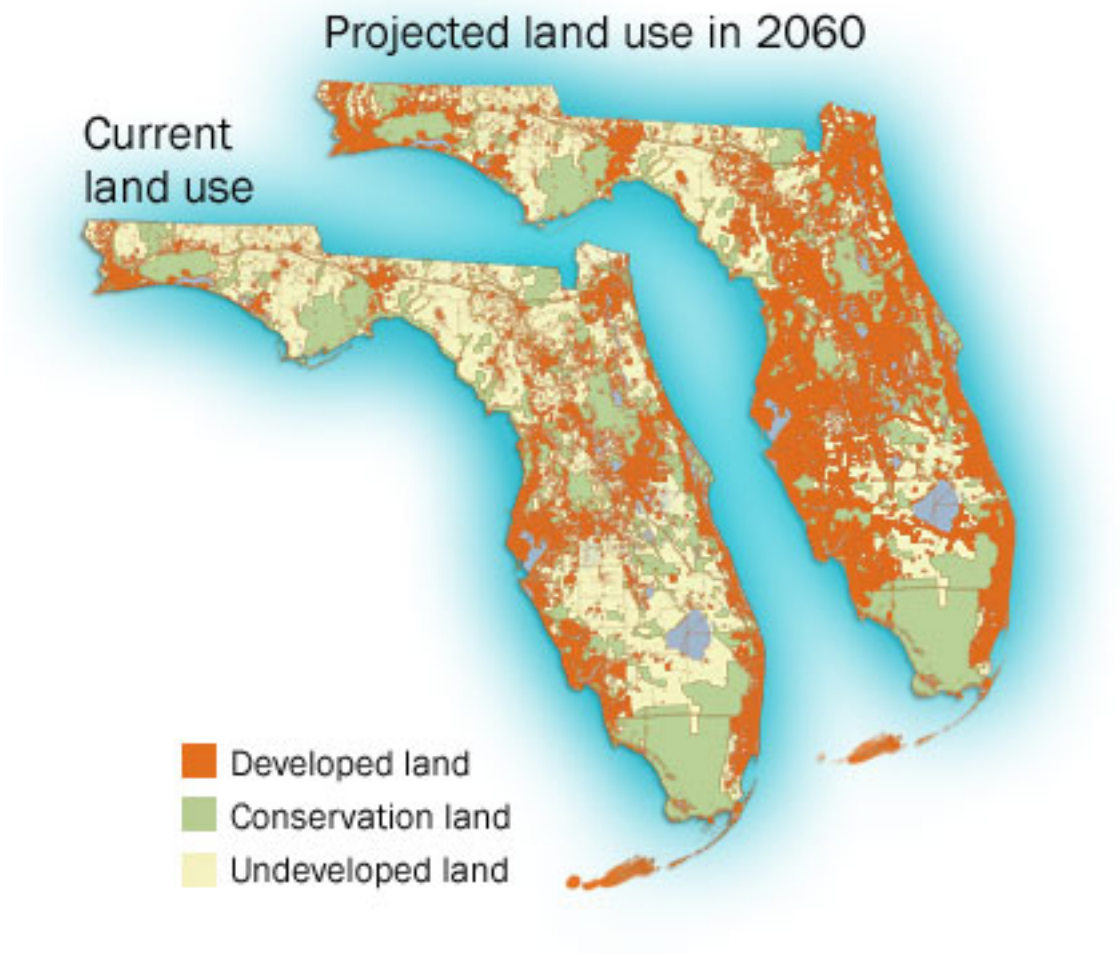


Figure 7.9. Current and Projected land use of Florida in 2060. Source: Florida 2060: Population Distribution Scenario for the State of Florida.

Taking the study further, the Florida Fish and Wildlife published a report called Wildlife 2060: What is at stake for Florida (FWC, 2009) to aid in understanding the changes that may occur in Florida's fish and wildlife and the residents' lifestyles if the state's population doubles. The report suggests that the change will not only result to habitat loss of many already endangered and threatened species but will also result to more development within the state's mostly developed coastline. It is estimated that the number of Florida residents who live and work in coastal areas will increase from 12.3 million to 26 million by 2060. This will add to challenges that policy makers face in protecting Florida's coastlines in general and coral reefs in particular. The FWC's Coral Monitoring Team estimates that the Florida Keys reefs have declined from 12% to 6 % from 1996. Based on the Coral Reef Report on 2000, more of these reefs will die if

current levels of pollution and other stressors continue to be unabated (Coral Reef Task Force, 2000).

7.6.5. Global Climate Change

Florida's coastlines are not only vulnerable to demographic changes and natural events but also face adverse impacts to global climate change. In its 2009 report called *Global Climate Change Impacts in the United,* the US Global Change Research Program stated that climate changes are already observed in the United States and its coastal waters and are projected to grow, that coastal areas are at increasing risk from sea level rise and storm surge. Sea level rise, and the likely increase in hurricane intensity and associated storm surge, will be among the most serious consequences of climate change. Sea level rise and storm surge place many U.S. coastal areas at increasing risk of erosion and flooding, especially along the Atlantic and Gulf Coasts (US Global Change Research Program, 2009). Although there have been many predictions on the amount of sea level rise, there is a widespread consensus that the sea level rise is already happening. Dr. Hal Wanless (2008), Chair of the Scientists on the Miami-Dade Climate Change Task Force, in his presentation for the Florida's *Wildlife: On the Frontline of Climate Change Symposium* in October 2008 stated that the task force estimates a likely sea level rise of 1.5ft in 50 years and at least 3 to 5ft by the end of the century or possibly more.

Coral reefs are dependent on light and desired ocean temperature for growth and reproduction. Sea level rise can result in depths where light cannot penetrate to sustain the biological functions of corals. Rising sea temperature can induce coral bleaching. NOAA global sea surface temperature data has shown that every major mass coral reef bleaching event since 1983 followed a warm season +1 degree Celsius anomaly (Goreau & Hayes, 1995). These consequences of global climate change create additional stressors to coral communities that are already subjected to human-induced and natural stressors.

7.7. Discussion and Evaluation

In Florida, beach nourishment is the most commonly used tool in mitigating the impacts of coastal erosion and storm hazards. The beach renourishment process entails the placing of sand on an eroded beach to either provide a protective buffer against storm damage or to increase the recreational value of a beach (NOAA CSC, 2006). The sand is usually borrowed from inshore or offshore locations and transported by truck, by split-hull hopper dredge, or by hydraulic pipeline to an eroding beach. In many cases, renourishment of the beach is needed to keep beaches from retreating. In recent years, more and more

mathematical models have been developed and used to determine how much sand is needed and where it should be placed. The models also estimate when renourishment is required. Beach renourishment operations result in massive displacement of the substrate, changes in the topography or bathymetry of the borrow and replenishment areas, and destruction of non-motile benthic communities (USACE, 1987). Dredging the bottom to collect fill material for the nourishment creates turbidity in the water column, which can lead to sedimentation on coral polyps and other benthic reef organisms. According to the International Coral Reef Initiative (2005), sediment deposition from dredging near coral reefs can affect corals in four ways: direct physical impact (damage/removal), smothering by sediments, low light penetration due to increased turbidity, and release of nutrients and pollutants from the dredged material. Damage to corals can also occur from dragging of anchors and cables during dredging operations and from erosion at the base of the corals in the dredged area.

These negative impacts are of particular concern in southeast Florida. Nearshore hardbottom habitats are the primary natural reef structure within depths of 0-4 meters in this region (Lindeman & Snyder, 1999). These reefs are home to a diverse vertebrate and invertebrate community that finds food and shelter in the assemblages of octocorals, algae, sponges, and hardy stony coral species abundant in this region (Jaap, 1984). As of 1999, 192 species of fish had been recorded in association with mainland southeast Florida nearshore hardbottom habitats (Lindeman & Snyder, 1999). These habitats serve as nursery areas for many coastal fish species; over 80% of individuals recorded in Lindeman and Snyder's census surveys were early life stages (Lindeman & Snyder, 1999). Nearshore hardbottom reefs are positioned within current and tide patterns that can support considerable larval abundances, despite their shallow depth (Lindeman & Snyder, 1999). These habitats may serve a primary nursery role for incoming early life stages that would otherwise undergo increased predation without the shelter provided by the nearshore hardbottom community (Lindeman & Snyder, 1999).

In addition to shelter, juvenile fish are likely afforded higher food availability in these structure-rich environments (Lindeman & Snyder, 1999). The above attributes suggest that nearshore hardbottom habitats represent EFH for many different species; the habitat found in southeast Florida mainland is estimated to have nursery value for 34 species (Lindeman & Snyder, 1999). Excessive sedimentation can adversely affect the structure and function of a coral reef ecosystem by altering both physical and biological processes (Rogers, 1990). Burial of inshore rock outcrops would reduce the food supply available for juvenile and adult fishes (Nelson, 1989). Thus, the smothering of hardbottom

communities devastates not only the sessile species living there, but also alters the biological services provided by those species.

Nelson (1989) explains, "The loss of hardbottom habitat must be evaluated in terms of its value in regards to ecological productivity." The majority of individual species displaced by hardbottom burial are early stages of ecologically and economically valuable species (Lindeman & Snyder, 1999). Direct burial by sand placed on beaches for nourishment is terminal for many hardbottom species, because unlike those which live on sandy bottoms, many hard substrate organisms have no ability to burrow up through deposited sediments (Nelson, 1989). Additionally, while many species are technically mobile and could potentially avoid burial, many smaller animals associated with hardbottom habitats live on the attached macroalgae and would have difficulty surviving if their algal substrate were lost (Nelson, 1989).

In recent years, beach nourishment has come to the forefront of coastal resource policy issues. In a 2006 survey conducted by NOAA Coastal Services Center (CSC), within the Ocean and Great Lake Planning topic, 42.7% indicated shoreline change management as a priority area, in Coastal Conservation Planning topic, 39.6% indicated erosion and beach nourishment as a high priority area, and in the Coastal Hazards topic, 42.9% indicated erosion as a high priority area (NOAA CSC, 2006).

In southeast Florida, the concern on the use of beach nourishment or renourishment was articulated by several scientists in a 2002 letter to the Jacksonville District of the USACE. The letter states that "Despite mounting evidence of both direct and indirect environmental effects on fishes, invertebrates, and turtles in several marine communities across the shelf, over 100 acres of nearshore reefs are now proposed for burial by four beach dredging projects in east Florida"(NOAA CSC, 2006). The extent of adverse impacts of beach nourishment in Florida was also shown in a USFWS (2004) study to determine the impacts and subsequent compensatory mitigation to coral reef habitat from Corps' civil work projects or regulatory actions. The study showed that filling, sedimentation, and dredging for beach nourishment and port expansion caused the most impacts in completed projects in South Florida.

The adequacy of regulations pertaining to beach nourishment is difficult to assess in the absence of well defined metrics that can be used as a basis for assessment. At the federal level, there is no specific regulatory program focused on beach and shore protection. The USACE became the lead agency for permitting of beach nourishment projects due to the scope and range of mandate and provisions of the RHA and the CWA. The RHA was enacted in 1899

primarily to prohibit the dumping of refuse into navigable waters or the creation of any navigational obstruction, at a time when coral reefs were treated as obstructions to navigation. Richmond, et al. (2007) has argued that the laws and regulations to manage adverse impacts on coral reefs are old and ineffective. USACE, as the lead agency with permitting authority through RHA, was particularly criticized for allowing projects that impacts coral reefs. Richmond et al. (2007) stated that "*While the exceptional ecological, economic, and cultural value of reefs has been increasingly recognized, the Corps can still approve permits for activities damaging to reefs over the objections of more biologically oriented agencies, including the US Fish and Wildlife Service, the National Marine Fisheries Service, and the Environmental Protection Agency. With this authority, the Corps continues to carry out stream channelization projects that result in extensive watershed impacts to coastal marine resources*".

In addition, since the USACE is a federal agency, it must comply with NEPA requirements to integrate environmental values into their decision-making processes by considering the environmental impacts of the proposed and alternative actions.

In approving the P&G study and appropriation authorizations from Congress, a major consideration is the NED benefit. The federal objective in beach nourishment is to maximize the net benefits to the nation that result from these projects (NOAA CSC, 2006). In determining the cost-sharing role of the federal government on beach nourishment projects, the major consideration is the NED benefits that the nation will receive from the project to justify the federal cost participation. The P&G study describes three other benefits to be assessed from beach nourishment: 1) Hurricane and Storm Damage Reduction (HSDR) benefits, 2) recreational benefits, and 3) other benefits (i.e., Regional Economic Development). This benefit and cost analysis is used by the USACE in authorizing federal participation aggregates all costs and all the benefits of the project.

For years, there have been mounting criticisms of P&G in general and the cost-benefit analysis that is used in the feasibility studies. In WRDA 2000 requested that the National Academies conduct a study to reviewing the Corps' planning studies and "methods of analysis" used in Corps water resources planning. In response to this request, the Water Science and Technology Board of the National Academies' National Research Council (NRC), in collaboration with the NRC's Ocean Studies Board conducted the review and recommended that "*The Principles and Guidelines should be revised to better reflect contemporary management paradigms, analytical methods, legislative directives, and social, economic, and political realities. The new planning guidance should apply to water resources implementation studies and similar evaluations carried out by all federal agencies. A revised version of*

the P&G document should be periodically and formally reviewed and updated" (National Academy of Sciences, 2004).

In 2005, the USACE Institute of Water Resources conducted a study to "examine the presumption--underlying calls for guidance revisions--that perceived problems in planning could be largely addressed by changes in planning guidance" (Scodari, 2005). Some major criticisms of the P&G and the Planning Guide relevant to beach nourishment project planning and evaluations that were revealed by the study include:

1. The NED federal objective and plan selection rule elevate economic development over environmental and social considerations, and do not recognize the potential for civil works activities to advance environmental and social goals;

2. Project evaluations fail to account for the full range of project effects that people care about, including environmental and social effects (of which some may be measurable in NED terms) as well as non-NED economic effects ;

3. Project planning makes no attempt to estimate the value of environmental improvements or damages in monetary (NED) terms (Scodari, 2005).

These major criticisms supports claims that the value of natural resources is often ignored or downplayed in the USACE cost-benefit analyses. It should be noted though that there is still a paucity of methods to put a monetary value to environmental variables that could be used in cost-benefit analysis. More research on these methodologies should be funded and every effort should be made to consider non-monetary variables in the cost-benefit analysis. In WRDA 2007 Congress instructed the Secretary of the Army to develop a new Principles and Guidelines for the USACE.

Except for E.O. 13089 of 1998, Coral Reef Protection, all federal laws that govern the regulatory powers of USACE are tangential to coral reef protection and beach nourishment. USACE mission has gone through several phases over the years, from navigation in the late 1800s, to flood control in the 1900s to ecosystem restoration in the early 2000s. But its mission to carry out the federal interest as directed by Congress has always remained (National Academy of Sciences, 2004). Over the years, new environmental laws have been enacted and federal agencies created which resulted to complex and confusing relationships with these agencies and criticisms from all levels of governance. E.O. 13089 does not articulate a mandate that it is unlawful to harm coral reefs. Its intent is to ensure

that federal agencies whose actions affect U.S. coral reef ecosystems, provide for implementation of measures needed to research, monitor, manage, and restore affected ecosystems.

In contrast, the state of Florida has a dedicated beach nourishment program. The § 161.088, F.S., states the state legislature's intent to make provisions for beach restoration and nourishment. As stated in § 161.053 (1)(a), F.S.:

> "The Legislature finds and declares that the beaches in this state and the coastal barrier dunes adjacent to such beaches, by their nature, are subject to frequent and severe fluctuations and represent one of the most valuable natural resources of Florida and that it is in the public interest to preserve and protect them from imprudent construction which can jeopardize the stability of the beach-dune system, accelerate erosion, provide inadequate protection to upland structures, endanger adjacent properties, or interfere with public beach access."

The state prefers beach nourishment in protecting and preserving its shoreline "because it provides a significant level of storm protection benefits for upland properties and is the least impacting to the coastal system" (FDEP, 2009). Aside from storm protection, the state lists economic, recreational, and environmental benefits as values of beach renourishment to Florida (FDEP, 2009).

The success and benefits of beach renourishment have been touted at local, state, and federal levels. According to the USACE, a beach renourishment project is considered successful if damages from waves, inundation, and erosion have been prevented or reduced significantly, and development and ecosystems behind the dunes are still intact (USACE Shore Protection Assessment, 2006). The provisions of federal laws related to beach renourishment allowed the permitting, funding, and construction of beach renourishment projects.

In Florida, the mandate and provisions of the Florida Beach and Shore Protection Act have allowed the propagation of beach renourishment as an erosion control method. The § 161, F.S., provides funding and allows permitting of beach nourishments in the state primarily for storm protection, economic, and recreational benefits. This is in recognition to the huge benefits of beaches to Florida's economy.

Integral to beach renourishment benefits is the issue of whether the laws are adequate to protect the state's environmental resources including nearshore hardbottom communities. The absence of historical data such as estimated loss of hardbottom and reef communities within the southeast Florida area due to beach

nourishment and renourishment projects makes it difficult to accurately assess the provisions of the laws to protect the state's environmental resources. The extent of burial of hardbottom communities could be significant. For example, the Broward County Beach Restoration Project which plans to place 2.5 million cubic yards (cy) of sand on approximately 11.8 miles of shoreline is expected to bury about 13.5 acres of nearshore hardbottom during equilibrium of the beach fill (Blankenship & Sasso, n.d.).

Although the beach renourishment laws are created for the main purpose of providing beach and shore protection, they also mandate that the methods for protection should be "the least environmentally damaging practicable alternative." This term implies that there are other factors, such as economic and logistical factors, that should be considered, and the selected alternative may not be the least environmentally damaging.

Critics of beach nourishment programs claim that the current state and federal laws have allowed and encouraged more development along the shores and beaches. Federal laws pertaining to beach nourishment and § 161, F.S., do not prohibit construction on the state's beaches. Rather the laws authorize the regulation of construction on or seaward of the state's beaches by requiring permits for such activities. The statutes themselves have provisions to waive permit requirements. The § 161.0522 (2), F.S., specifically states the circumstances for a waiver or variance of the setback requirements that may be authorized by the FDEP. As an example, there is a *30 year erosion projection line* that requires buildings to be set back landward of the line and development should be prohibited on the ocean side of this line. Single-family homes on lots platted before 1985 are exempt. The law also allows new building on the ocean side of the 30 year erosion line up to "the established line of construction." If there is already a row of "grandfathered" beachfront development seaward of the 30 year erosion line, new buildings may be located in similar proximity to the beach (Hauserman, 2006). Table 7.3 shows the number of coastal construction permits processed by the FDEPBBCS for the fiscal years 2001-2007.

Table 7.3. Number of coastal construction permits processed by the FDEPBBCS for five and a half fiscal years. Source: Statement of Estimated Regulatory Cost Chapter 62B-33, F.A.C., February 2007.

Fiscal Year	Number of Permits
2001-2002	1,491
2002-2003	1,520
2003-2004	1,347
2004-2005	1,717
2005-2006	1,985
2006-2007 (1st and 2nd quarters)	634

The maps showing critically eroded beaches renourished and the change in land use along with the increase in beach renourishment funding in the region seem to support the claim that laws have allowed more development along the coastline.

Although beach renourishment activities have been constructed for decades, there are still many uncertainties as to the short and long term environmental impacts of dredge and fill activities. There are very few scientific studies dealing with biological impacts of beach renourishment activities to hardbottom communities. A 2005 study which reviewed 46 beach monitoring studies revealed that "(a) only 11 percent of the studies controlled for both natural spatial and temporal variation in their analyses, (b) 56% reached conclusions that were not adequately supported, and (c) 49% failed to meet publication standards for citation and synthesis of related work." The study also revealed that monitoring is usually carried out by "project promoters, with no independent peer review, and the permitting agencies exhibit inadequate expertise to review bio-statistical designs" (Peterson & Bishop, 2005).

The integration of the NEPA and the CWA Section 404 process is supposed to streamline the permitting of beach nourishment projects while assuring the protection of environmental resources. Although it usually takes more than a year to complete the requirements of the process, agencies triggered by the

NEPA process only have 30 days to give their comments and recommendations. Projects occurring within the southeast Florida area are posted on the USACE Jacksonville District Public Notice web page and once a public notice is posted, NOAANMFS staff has 30 calendar days in which to give their comments and recommendations on minimizing impact to fishery resources. NOAA's involvement in the process seems late for its recommendations to realistically be taken into account. Typically, at the time NOAA learns of the project, a great deal of time and financial resources have already been invested in the project and permitting process so that substantial changes intended to avoid or minimize impact would be difficult to implement and easier to ignore and bypass.

The federal environmental agencies' role in the permitting process is only consultative. The USACE makes the final decision on whether a permit is approved or not. There are concerns that beach nourishment is an example of a type of project permitted by the USACE where conflicting mandates may preclude full implementation of EFH conservation recommendations. The NOAA NMFS is working with the USACE to better integrate the best available science into permitting decisions, in particular with regards to the compensatory mitigation actions associated with beach nourishment projects. It should also be noted that the USACE seeks to balance the favorable impacts against the detrimental impacts, thus considering the "full public interest" when reviewing permit applications (33 *CFR* Part 320). This "public interest review" reflects the national concerns for both protection and use of important resources (33 *CFR* Part 320). Thus, the USACE considers the resource use as well as protection, whereas environmental agencies are more concerned with resource protection.

The most important challenge in meeting the obligations of NEPA is evaluating the potential cumulative impacts of a project in the context of increasing impacts to coastal ecosystems from multiple other human threats (Peterson & Bishop, 2005). The evaluation of accumulation of actions in the past, present, and future would be an ideal method in selecting alternatives for beach protection. However, there are still difficulties in using this method. Foremost are the lack of adequate data to make determinations of the impact and the lack of scientific understanding on synergy of different development actions and its effect on the environment. Although NEPA requires cumulative impact analyses, often only project-specific impacts are discussed (Greene, 2002).

As a regulatory agency for permitting beach nourishment projects, FDEP has increased its efforts to improve its permitting process, seek innovative technologies to minimize adverse impacts, and improve the monitoring of beach nourishment projects. In 1989 a Florida law, § 161.082, F.S., was enacted that permits FDEP to encourage the development of new and innovative methods for

dealing with the coastal erosion problems along the state's shorelines. With this law FDEP can authorize the construction of pilot projects using alternative erosion control methods. Since 1989 FDEP has been involved with innovative projects including net groins and reef structures. In February 2006, FDEP hosted a workshop on innovative shore protection technologies in Tallahassee. The workshop presented designers and vendors new and innovative shore protection technologies an opportunity to showcase their ideas and products (FDEP, 2006). In May 2006, FDEP SEFCRI sponsored a workshop to identify innovative technologies, construction practices and procedures that minimize or eliminate coral reef impacts. In attendance were representatives from local, state, and federal agencies, environmental, and construction firms, which are involved with, beach nourishment. In 2009, FDEP Coral Reef Conservation Program (CRCP) developed the BMPs manual for coastal construction. It was also the sixth consecutive year that CRCP has conducted biological monitoring of the southeast coral reefs.

In recent years, concerns for impacts of global climate change to coastal communities have increased the independent studies exploring the issues of beach nourishment and its impact to coral reefs. There is a general consensus that climate change will magnify the pressures on already stressed coastal environment (Sale et al., 2008). Specifically for coral reefs, global climate change combined with localized stresses will further degrade coral reef ecosystems (Buddenmeier et al., 2004). Global warming is thought to bring an increase in sea surface temperatures, rising sea levels, and more frequent and severe storm events that may have adverse impacts on coral reefs (International Coral Reef Action Network (ICRAN), 2005). These studies also acknowledge that coastal development including coastal modification and armoring can have direct and acute impacts by destroying coral reef habitats and its nearby habitats (Buddemeir et al., 2004) and that the current effort to manage coastal resources are ineffective and endangers coastal economies and ecosystems (Sale et al., 2008). Sale et al. (2008) made recommendations from their study that is pertinent to beach nourishment process. First is assigning value to coastal environments and including non-monetary valuation techniques towards full economic valuation. This is especially crucial in applying the cost-benefit analysis to meet NEPA requirements in determining alternatives to beach nourishment. Second, improve the statutory and administrative frameworks of governance by improving the interactions between science and policy. And third, draw on independent experts to review decisions made by management agencies. As stated by Sale et al. (2008), "*Review of EIAs by regulatory agencies themselves can suffer if political factors are pushing the outcome in a given direction, and mandatory independent and external review by appropriately qualified scientists can improve the process.*"

A published report specific to Florida is the Florida's Coastal and Ocean Future: a Blueprint for Economic and Environmental Leadership from the Natural Resources Defense Council (Hauserman, 2008). It recognizes that global climate change is already changing Florida and for the east coast, the biggest issues are probably considerable beach erosion and inundation of dry land. The report calls for the state to address sea level rise and increased storm frequency and intensity in its coastal management policies. Specifically, the report recommends the following measures that are relevant to beach nourishment and coral reef protection:

1. Development of science-based regional ocean and coastal governance plans to protect, maintain, and restore ecosystems**,**

2. Curb the unwise coastal development and protect valuable coastal habitats,

3. Reduce subsidies that encourage growth in high risk areas or in sensitive coastal systems.

4. Explore a policy of "strategic retreat" to encourage moving development away from eroding shorelines.

5. The Florida legislature should reevaluate the Coastal Construction Control Line (CCCL) program (Hauserman, 2008).

7.8. Recommendations

- Conduct a rigorous assessment of beach renourishment activities in the southeast Florida area. Standardize the monitoring and assessment of renourishment projects, especially the target beach, borrow site, and the adjacent communities, to determine both the short and long term impacts of beach renourishment projects to hardbottom communities. The monitoring should be able to assess if the project meets the design requirements and determine its cumulative impacts;

- Use the data from monitoring and assessment of renourishment projects to determine research initiatives needed to demonstrate the scientific and economic feasibilities of alternative methods for beach renourishment. The data should be able to help quantify the economic benefits of the project;

- A database of monitoring information from all beach projects should be created to aid in estimating the loss of hardbottom and reef communities

within the southeast Florida area due to beach nourishment and renourishment projects;

- Conduct interdisciplinary studies of beach projects and expand the scientific, technological, and socio-economic investigations to include spatial and temporal scales including the impact of global climate change;

- The state regulatory program should initiate a permitting system where cumulative impacts, of beach renourishment projects in a geographic area are assessed;

- To improve measurement of cumulative impacts, beach renourishment programs should use an ecosystem approach in assessing impacts of beach nourishment projects;

- Increase and improve the coordination among state and federal agencies involved in beach nourishment projects. Specifically, revisit the current methodology on consultation to ensure that appropriate environmental agencies become aware of potential beach renourishment projects in its early permitting stages and that enough time is given to the agencies to comment on the project; and

- Revisit rules and regulations of regulatory programs on CCCL permitting to minimize any type of development in the shoreline. The state should ensure that the original goal of CCCL, which is to protect Florida's beaches and dunes from irresponsible construction that puts the beach or dune system at risk, is being met.

- On the federal level, update the P&G to equally reflect the national economic, environmental, and social benefits of water resource project selection. The revised P&G should include monetary and non-monetary benefits in its cost-benefit analysis. Since its establishment in 1983, P&G has not considered innovative methods in economic valuation. To this end, local, state, and federal agencies should allocate funds to encourage more research in environmental valuation to better capture the benefits and costs associated with water resource development projects.

8. Port Development, Commercial Anchorages and Large Vessel Injuries to Coral Reef Resources

8.1. Introduction

8.1.1. Chapter Objectives

This chapter discusses how laws, policies, and practices that regulate port development and commercial anchorages can impact the effectiveness of coral reef protection in the southeast Florida region. Throughout this section, it is critical to keep in mind that port development subsumes a variety of development projects. Each of these projects requires examination of an overlapping suite of laws and agencies. To make the discussion tractable, current port development projects associated with the ongoing negotiations for the expansion of Port Everglades (PE) are used as case studies. In each case, the processes of project design, permit applications, as well as inter-agency and public consultations, are examined for two reasons. One is to evaluate the efficacy of the current system of regulations and the prevailing mechanisms for interagency collaboration in determining decision outcomes. The second is to determine areas of improvement in the regulatory framework and interagency collaboration so that the overall goal of coral reef protection may be achieved. It is anticipated that the projects discussed here are representative of port expansion projects in the three deepwater ports of southeast Florida.

8.1.2. Economic Impacts of Florida's Seaports

Three of Florida's 14 public deepwater seaports are located in the southeast Florida region: POM in Miami-Dade County, PE in Broward County, and POPB in Palm Beach County (Figure 8.1). Together, they accounted for 30% of total tonnage, 65% of total container movements, and 64% of total cruise passenger embarkations statewide for FY 2009/2010 (Table 8.1). The POM and PE are gateways for strategic Florida commodities and are classified as Deep Draft Florida Cargo Hubs. Miami-Dade's seaport specializes in container cargo and is the 9th busiest container port in the country. PE, ranked 12th among U.S. container ports, concentrates on petroleum (Cambridge Systematics, 2007). The POPB is a Regional Cargo Port receiving niche commodities and provides transshipment services for cargo received from large container ships that are then transported to small ports in the Caribbean and Central America (Florida Seaport Transportation and Economic Development Council [FSTEDC], 2007).

Seaports are major economic engines. In 2008, Florida's 14 ports contributed $66B in gross economic output, accounting for 550,000 jobs, and $23.3B in combined labor and capital income for the state (Martin Associates, 2009) (Table 8.2). The three seaports in the southeast Florida region contribute significantly to the

Figure 8.1. Florida's deepwater seaports (Source: Florida Ports Council website).

Table 8.1. Activity measured in waterborne tonnage, container movements (in TEU) and number of revenue generating cruise passengers in FY 09/10 for select Florida seaports, including those located in southeast Florida. (Data Source: Florida Ports Council website).

SEAPORT	WATERBORNE TONNAGE	CONTAINER MOVEMENTS (TEU)	CRUISE PASSENGERS
Canaveral	3,218,144	659	2,802,951
Everglades	21,640,144	793,227	3,674,226
Jacksonville	23,209,832	826,580	173,568
Key West	NA	NA	808,845
Miami	7,389,165	847,249	4,145,043
Palm Beach	2,548,346	213,286	284,884
Tampa	37,148,407	44,827	802,775
STATE TOTAL	**106,361,422**	**2,844,224**	**12,692,292**

economies of their respective counties as measured by their total economic outputs and employment. The POM provided an estimated $12B of total economic output and 81,800 jobs in 2005 (Washington Economics Group, 2006). PE generated $18B in total economic output and employed 29,260 in 2007 (PE, 2007) and the POPB contributed $261M and supported 2,400 jobs in 2006 (POPB, 2006). As such, the imperative to improve and expand seaport operations and infrastructure is obvious. Florida seaports must remain on the cutting edge of global trade among their competitors in other states and foreign ports. At the same time, expansion of these seaports has to be weighed in alongside the environmental impacts these impose on adjacent coral reefs that are unique ecosystems for continental USA.

8.1.3 Port Expansion and Risks of Environmental Impacts

Transporting goods and people is a globally connected activity with international shipping accounting for 90% of world trade (Figure 8.2). Economic demand drives the shipping industry to use technology that will make the transfer more efficient through building larger cargo vessels and cruise ships. Upon the expected completion of the expanded Panama Canal in 2014, new standards in vessel size would be set (FSTEDC, 2007). This new class of vessels, the Post-Panamax cargo vessels, holds 12,000 Twenty-foot Equivalent Units (TEU) containers (or 2.5 times larger than the current largest Panamax ships) (Panama Canal Authority, 2006). They are 370m long, with a beam width of 32m and have a draft of at least 15m (Figure 8.3). Royal Caribbean's cruise ships of the Genesis line was launched in 2009 as the world's largest cruise ship costing $1.2B each, with a passenger capacity of 6,400 (Figure 8.4) (Wise, 2007). To accommodate this trend in increasing vessel size, ports have to widen and deepen their channels and turning basins, lengthen and strengthen ship berths, improve off-loading, uploading, and holding facilities, upgrade intermodal linkages (air, land, and rail) and enhance the efficiency of transfer operations, among others. Indeed, global competitiveness drives port expansion. On the downside, increases in vessel size and vessel traffic also escalate the risk for large vessel injuries on coral reefs and associated biota.

The pressure on the marine and coastal environment associated with port operation and expansion is enormous and presents challenges to integrated port development planning. In Florida, where 80% of the nation's (includes US states, island territories and the Pacific Freely Associated States) coral reefs live (Rohmann, Hayes, Newhall, Monaco, & Grigg, 2005), the need to address coral reef protection while pursuing port expansion creates opportunities for innovative development planning at local, state, and federal levels. The southeast Florida region represents the northernmost location of coral reefs along the western Atlantic seaboard and contains a significant area of recently designated critical habitat for elkhorn and staghorn corals that are federally listed as threatened under the US ESA (NMFS, 2006). The presence of coral reefs including those coral species listed as endangered or threatened, seagrass and migratory species that are protected by law requires certain standards in resource assessment and monitoring, and inter-agency consultations that can become contentious and often entail high financial and transaction costs. A delicate balancing act to support economic growth as well as maintain coastal and marine ecosystems motivates a continuing search for innovative environmental governance of seaports. This chapter examines the dynamics

involved in striving for socially acceptable, economically sound, and ecologically optimal decisions on port development and expansion in the southeast Florida region.

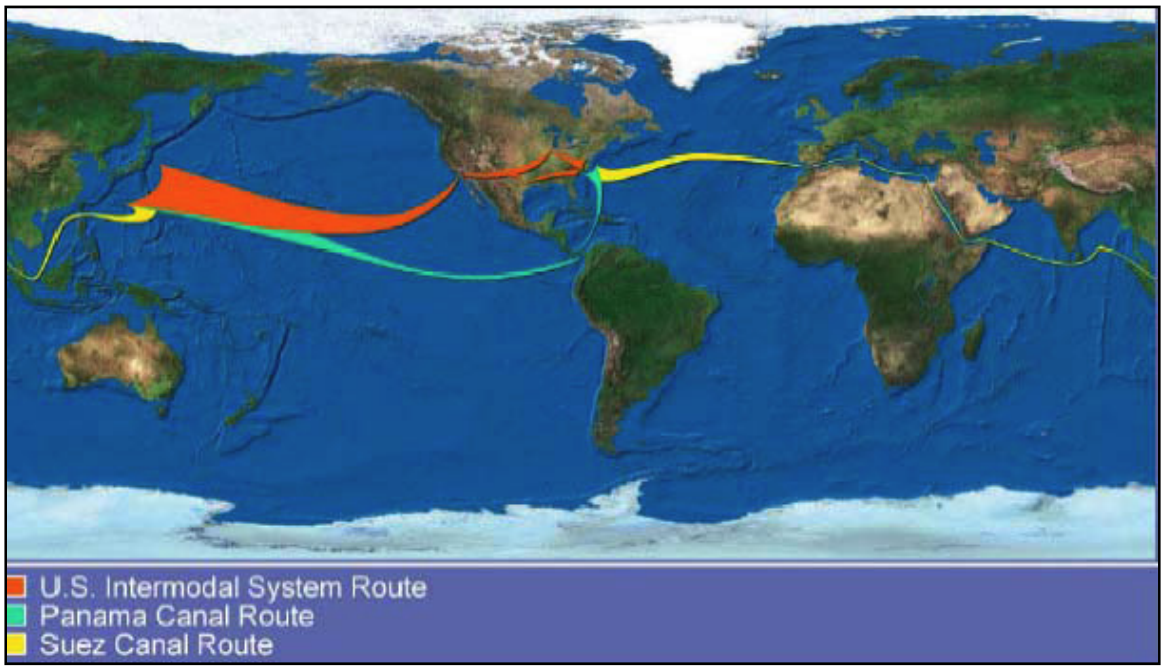


Figure 8.2. The flow of global trade (Florida Seaport Transportation and Economic Development Council, 2008).

Table 8.2. Economic impact generated by marine cargo handled at Florida's seaports in 2008 (Martin Associates, 2009).

IMPACT CATEGORY	STATEWIDE IMPACTS
Jobs	
Port Sector Jobs	99,913
User Jobs	454,434
TOTAL JOBS	**554,347**
Personal Income ($1000s)	
Port Sector Income & Local Consumption	$7,602,269
User Income	$15,680.487
TOTAL INCOME & CONSUMPTION	**$23,282,757**
Value of Economic Output ($1000s)	
Port Sector Revenue	$6,613,310
User Revenue	$59,717,225
TOTAL ECONOMIC VALUE	**$66,330,535**
State and Local Taxes ($1000s)	
Port Sector Taxes	$562,568
User State and Local Taxes	$1,160,356
TOTAL STATE AND LOCAL TAXES	**$1,722,924**

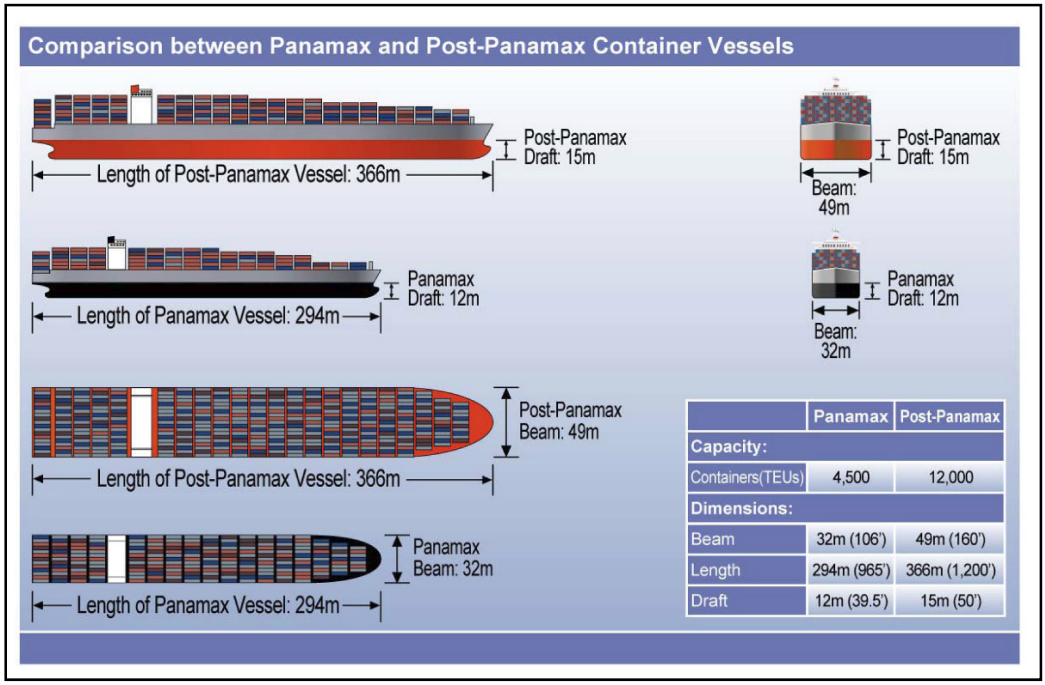


Figure 8.3. Comparison between biggest Panamax and Post-Panamax vessel at 12,000 TEU container capacity, 2.5X that of the Panamax vessel (Panama Canal Authority, 2006).

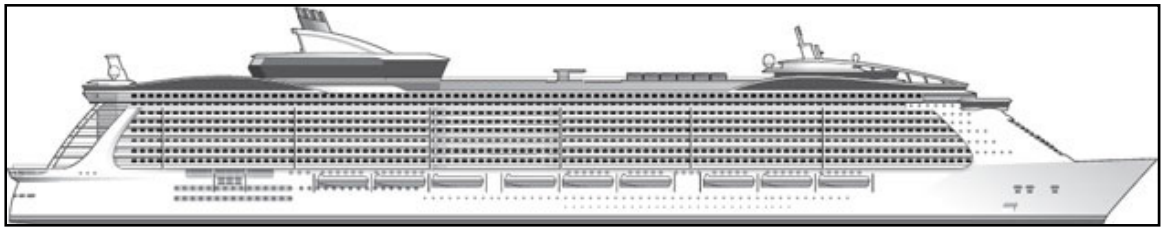


Figure 8.4. World's largest cruise ship: Genesis (Royal Caribbean). Cost: $1.2B; Completion date: 2009; Total length: 1180ft (360m); Passengers: 6,400; Displacement: 220,000 tons (Source: Wise, 2007).

8.2. Port Governance

Port governance in the US in general presents unique features and which stem from the country's governance structure, which is that of a federal republic. The US has no federal or state port authority. Instead, port authority is shared in a complex manner among all three levels of government – local, state, and federal and may have unique features from port to port (Sherman, 2002). Certain aspects of commerce (interstate and foreign), navigation (through federal waters) and security are directly under federal control, while development planning must conform to and be approved by mandated state and local planning processes.

Port authorities are established by enactments of the state legislature so that the US Congress or any federal agency has no power or right to appoint or dismiss port employees or to modify a port authority charter (Sherman, 2002). Specific physical and governance features of the three seaports in the southeast Florida region are summarized in Table 8.3 and discussed below.

8.2.1. Local Agencies

8.2.1.1. Port Everglades

PE is located within the three cities of Fort Lauderdale, Hollywood, and Dania Beach, and within unincorporated Broward County. It is about 23 miles north of Miami and 48 miles south of West Palm Beach. PE's jurisdiction includes 1742 acres of upland and 448 acres of submerged land.

In 1911, the Florida Board of Trade approved a resolution to establish a deepwater port to transport agricultural products to the north and west of the State (PE website). The Fort Lauderdale Harbor Company was created in 1913 to lead in the dredging of the Lake Mabel Cut and establish a connection between New River and the sea. The channel could accommodate small boats and the need for more land and infrastructure to build a deepwater seaport became a priority for elected leaders as well as the voting public. In 1924, Joseph Young, founding mayor of the city of Hollywood purchased 1440 acres of lakeside property and set up the Hollywood Harbor Development Company. Two years later, Young obtained a $2M harbor improvement bond measure with overwhelming support by his constituents and voters in the adjacent city of Fort Lauderdale. The Florida State Legislature established the Broward County Port Authority as a deepwater port through a special act in 1927 (Figure 8.5). Its charge is to operate a deepwater port to create and promote commerce and industry. In 1965, it was renamed Port Everglades (PE) and in 1994, PE became a department of the Broward County government.

Table 8.3. Governance of seaports located in southeast Florida (see text for data sources).

Port	Establishment Of current port authority	Governance	Local Comprehensive Plan Jurisdiction	Area (mi^2) and location
Miami	1960 by County Administrative Order No. 60-5	As a Department of Miami-Dade County	Miami-Dade County Gov't.	1.0 (640 acres) on spoil banks called Dodge & Lummus islands
Ever-glades	1927/ 1994 by Florida Legislature through a new port charter	As a Department of Broward County	Broward County Gov't.	3.42 (2190 acres) within cities of Ft. Lauderdale, Hollywood & Dania Beach & unincorporated areas of Broward County
Palm Beach	1915 by Laws of Florida, Acts of 1915, Chapter 708	As an Independent Landlord (property-owning) District	Palm Beach County Gov't.	971 (621,440 acres) within City of Riviera Beach and unincorporated areas of Palm Beach

The Broward County Board of County Commissioners governs the PE Department. The County Commission appoints a County Administrator who is responsible for administrative and fiscal control of all County Departments including PE. Given the critical role of both aviation and port activities in generating revenues for the County, Aviation and PE are two departments directly under the control of the County Administrator. The 2007 annual report of Broward County identifies the Fort Lauderdale-Hollywood International Airport, PE, and tourism as the major engines driving the County's economy.

A Port Director responsible for proper administration of all seaport functions leads the PE. The PE collaborates with the Public Works Department Seaport Engineering and Construction Division, which is responsible for facilities planning, architectural and engineering design, harbor maintenance and dredging, construction administration, surveys, engineering records, zoning, building code conformance, land development, and a full range of environmental programs including mitigation, wildlife protection, biological monitoring, and environmental permits. The Seaport Engineering and Construction Division, through its in-house Environmental Project Manager, addresses all environment-related concerns associated with port activities.

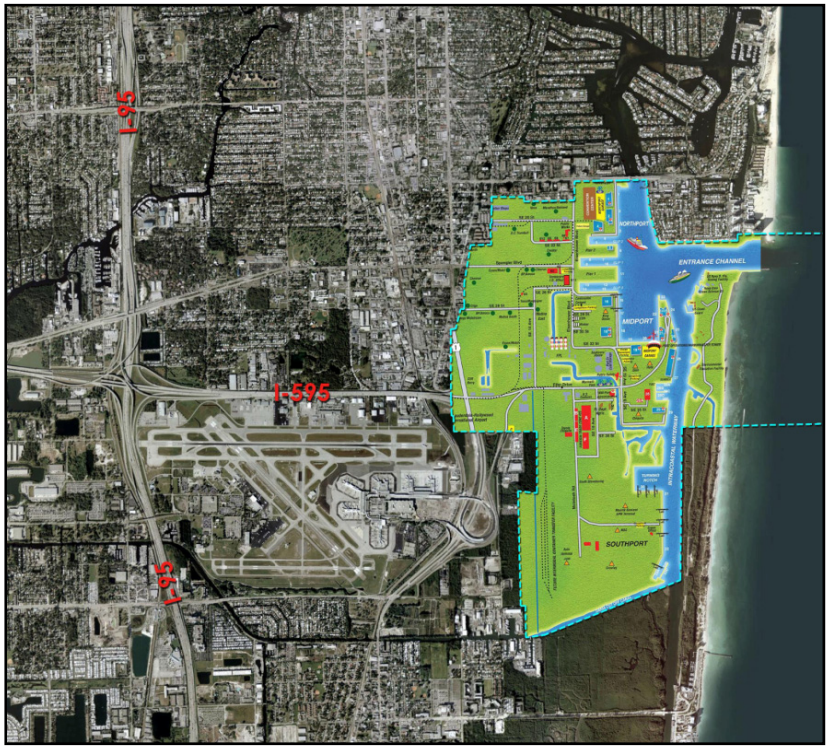


Figure 8.5. Location map of PE, Broward County (Port Everglades, 2006)

PE operates as a self-supporting Enterprise Fund of the Broward County government. It subsists on user charges and tariff fees as major income streams, and on revenues from the lease of facilities and vehicle parking (First Southwest Company, 2008). Its diversified portfolio of containerized cargo, dry and liquid cargoes, bulk commodities, cruise line passengers, real estate, and the Foreign Trade Zone No. 25, has sustained the continued growth of PED into one of the country's leaders in container shipment and cruise industry. Martin Associates (2008) report that in fiscal year 2007, PE generated $15.8B from cargo activity (including petroleum), and $2.2B from cruise passenger transport, which overall contributed $625M in state and local taxes.

8.2.1.2. Local Comprehensive Planning Process

Although PE is unique among Broward County Departments in its fiscal independence from county government coffers to finance its operations, the county government must approve its planning process for development and expansion. The landmark state legislation known as the Growth Management Act of 1985, also known as the Local Government Comprehensive Planning and Land Development Regulation Act (§ 163.3164, F.S.) requires each level of government (state, regional, and local) to develop and adopt a comprehensive plan and to implement it with consistent goals, objectives, and policies. The § 187, F.S. embodies the State Comprehensive Plan, which provides long term policy guidance for the overall growth of the state, and is reviewed biennially by the Legislature. The State Comprehensive Plan sets the broad standards for which regional and local plans are evaluated for consistency.

For coastal local governments with seaports, the elements of their comprehensive plans must include: a) administration; b) future unincorporated area land use; c) transportation; d) potable water; e) sanitary sewer; f) solid waste element; g) drainage and natural groundwater aquifer recharge; h) housing; i) recreation and open space; j) coastal management (natural disaster and deepwater port components); k) conservation; l) capital improvements; m) intergovernmental coordination; and n) public school facilities. The coastal management element aims to plan for and minimize development where this may damage coastal resources, and safeguard human life and limit public expenditures in areas prone to natural disaster (Rule 9J-5.012, F.A.C.). Coastal management provisions stipulate that each deepwater port submit a master plan which examines existing infrastructure and proposed expansions to the appropriate local government for incorporation into the latter's coastal management element of the local comprehensive plan. Ports secure building and development permits from the local governments to implement the master plans. In addition, state and federal

permits, as appropriate, are required to implement expansion projects spelled out in the Port Master Plan.

The Growth Management Act authorizes the Florida DCA, Division of Community Planning, to evaluate local comprehensive plans and plan amendments for compliance with the Act. Other agencies including regional planning councils, water management districts, the Departments of State, Transportation, Environmental Protection, and Agriculture and Consumer Services, and the FWC provide their reviews and objections to the DCA. Local governments may amend their comprehensive plans twice per year and which are posted in their respective websites. The County Comprehensive Plan was adopted on November 13, 2008.

8.2.1.3. Port Everglades Master Plan

In 2001, PE completed a 2020 Vision Master Plan, the implementation of which was overtaken by the events of September 11th, 2001. The Port management presented the 2001 Master Plan to the Broward County Board of County Commissioners (Board) but did not recommend plan approval because of security concerns and changes within Port management. In 2006, the Broward County Board retained the D.M.J.M. Harris Consultant Team to prepare a 2006 Port Everglades Master Plan Update "that will maximize market share and revenue through a realistic 5-year facility development program within a framework of 10- and 20-year vision plans" (PE, 2006). Upon approval of the Master Plan update by the Board, the Consultant Team would update the Deepwater Component of the Broward County Comprehensive Plan as directed by § 163, F.S.

The mission of PE "*is to manage the County's Port-related assets to maximize the economic benefits to the citizens and businesses of Broward County and of the State of Florida. The Port will manage the County's assets in a financially responsible, environmentally sound manner, consistent with local, state and federal rules and regulations which govern international and domestic trade, transportation and the Port industry*" (PE, 2006). In keeping with this mission, the plan development involved consultations with all stakeholder groups at local, state, and federal levels, including port user and tenant groups, citizen groups, government agencies, and NGOs.

Over a period of 20 years, PE aims to provide for seven million cruise passengers and to move 2.7 million TEUs of cargo per year. The main components of the 2006 Master Plan Update in articulating this 20 year expansion program addressed berth capacity as the underpinning factor limiting the growth of the

Port. Thus, landside infrastructure would include expansion of ship berths for cargo and petroleum vessels of Maersk S-Class vessel (1,180 foot overall length) and the Genesis line of cruise ships with a length of 1,300ft. A new facility for accommodating crushed rock import for manufacturing cement, a critical material for road and building construction, is also proposed. In-water works would potentially include deepening and widening of channels, turning basins, and the turning notch as well as waterways that would allow safe movement of these vessels. The USACE dredging program subsumes the in-water components of the port expansion. Proposed projects at the time of Master Plan development such as the Suez Calypso Liquefied Natural Gas (LNG) deepwater port and pipeline were also evaluated to ascertain that space and infrastructure requirements were consistent. The Broward County Board of Commissioners approved the 2006 Port Master Plan Update on December 4, 2007.

The following in-water infrastructure directly and indirectly associated with the expansion of PE is discussed in detail in Section 8.5 to examine their overall impacts on coral reef protection and management, from a decision-making perspective:

- USACE Channel Expansion Program – Turning Notch and Outer Entrance Channel (OEC)

- Suez Calypso LNG Deepwater Port and Pipeline Proposal

8.2.1.4. Port of Miami

Although preceded by dredging activities that dates back at the turn of the 20th century, the current authority for the POM (Miami Seaport) was established in 1960 when Metropolitan Dade County and the City of Miami forged a joint agreement to operate what was then known as the Dodge Island Seaport (Chapman, 1993) (Figure 8.6). An Administrative Order (No. 60-5) from the County Manager established a Seaport Department to operate the seaport and coordinate construction of the new port facilities. The POM, like PE, is accountable to the local governing agency, the Miami-Dade County Board of County Commissioners. The organizational chart of POM indicates an internally integrated Department, in contrast with PE, where a separate unit in the Department of Public Works subsumes the PE planning functions through its Seaport Engineering and Construction Division.

The Miami Seaport operates as an enterprise of Miami-Dade County, just like PE. Situated on 640 acres of land created on spoil banks, that were originally Dodge and Lummus Islands, the Seaport is a major economic growth engine for the County. It holds the distinction of being the largest cruise homeport in the world, and ranks 12th in the movement of container cargo among US deepwater seaports. In 2007, an estimated 3.8M passengers came through the Seaport and about 7.8 M tons (900,000 TEUs) of cargo were processed (POM, 2007). POM contributed $12.2B in total economic output and supported 81,800 jobs for the County in 2005 (Washington Economics Group, 2006). The Seaport is estimated to have generated about $5.4B on County residents' personal income in the same year.

Figure 8.6. Aerial of the Port of Miami (Source: Google Earth). The Port of Miami is located north of the port facilities.

The planning for port development and expansion follows similar procedural standards as stipulated in the Local Government Comprehensive Planning and Land Development Regulation Act (§ 163, F.S.), as in the case of PE. For Miami-

Dade County, the port subcomponent is within the Transportation element of the Comprehensive Development Master Plan of the County, not in the Coastal Management element as in the case of PE. Regardless of how the port subcomponent is addressed in planning, it remains clear that the local government of Miami-Dade acknowledges that the POM is one of its most significant instruments for continued economic growth through international maritime trade.

As of 2006, when the most current version of the County's Comprehensive Development Master Plan was drafted, the cruise and cargo facilities of the Miami Seaport were assessed to be operating almost at full capacity. To achieve growth, its facilities needed to expand to accommodate 5-8 M cruise passengers and 14-36 M tons of cargo, the targeted goals of expansion by 2015 (Miami-Dade County, 2006). To reach these goals, the major expansion projects proposed include: 1) development of an off-island expansion site; new deepening of its channels, Government Cut and the South Shipping Channel to -52' and -50', respectively, to accommodate Post-Panamax cargo vessels, and 3) a proposed tunnel to connect the Seaport with the interstate system. These proposed development projects all have the potential to impact the surrounding marine environment.

8.2.1.5. Port of Palm Beach

Unlike PE and the POM, the POPB is a landlord (property owning) seaport with on-dock rail capabilities (Figure 8.7). In 1915, the Florida Legislature created the Lake Worth Inlet District (LWID) to formally recognize the efforts of the Lake Worth Community in building and maintaining the Lake Worth Inlet (Laws of Florida, Acts of 1915, Chapter 7081). In 1935, the federal government assumed the responsibility of maintaining the inlet and its associated channels as part of the Lake Worth Inlet/Palm Beach Harbor Project. The LWID took charge of port operations as a local partner of the federal government. Currently, the USACE operates, maintains, and leads in improving the harbor area. The POPB District provides the local cost-share in areas of federal navigational interest, and is responsible for those outside of federal purview including berthing areas, bulkheads, and state portions of the channel (POPB, 2006).

The POPB District operates as an independent special taxing district as a subdivision of the State of Florida. It covers a land area of 971 sq. miles, or about 50% of the land area of Palm Beach County. The Port District boundaries lie within the municipal boundaries of the City of Riviera Beach, while Peanut Island and its submerged lands are located within the unincorporated area of Palm Beach County. It is governed by a Board of Commissioners elected at-large

by the voters within the District. An Executive Director and professional staff administer the POPB District. Like PE and the POM, the POPB District is managed as an enterprise fund whereby revenues are invested only in Port District-owned properties. The Port is a landlord port, maintaining piers, turning basins, docks, dredging and improvements to District owned properties. All shipping and passenger services are provided through private entities with long term agreements with the Port District. The Port also operates an internal railroad under contract, a feature unique among southeast Florida seaports (POPB, 2006).

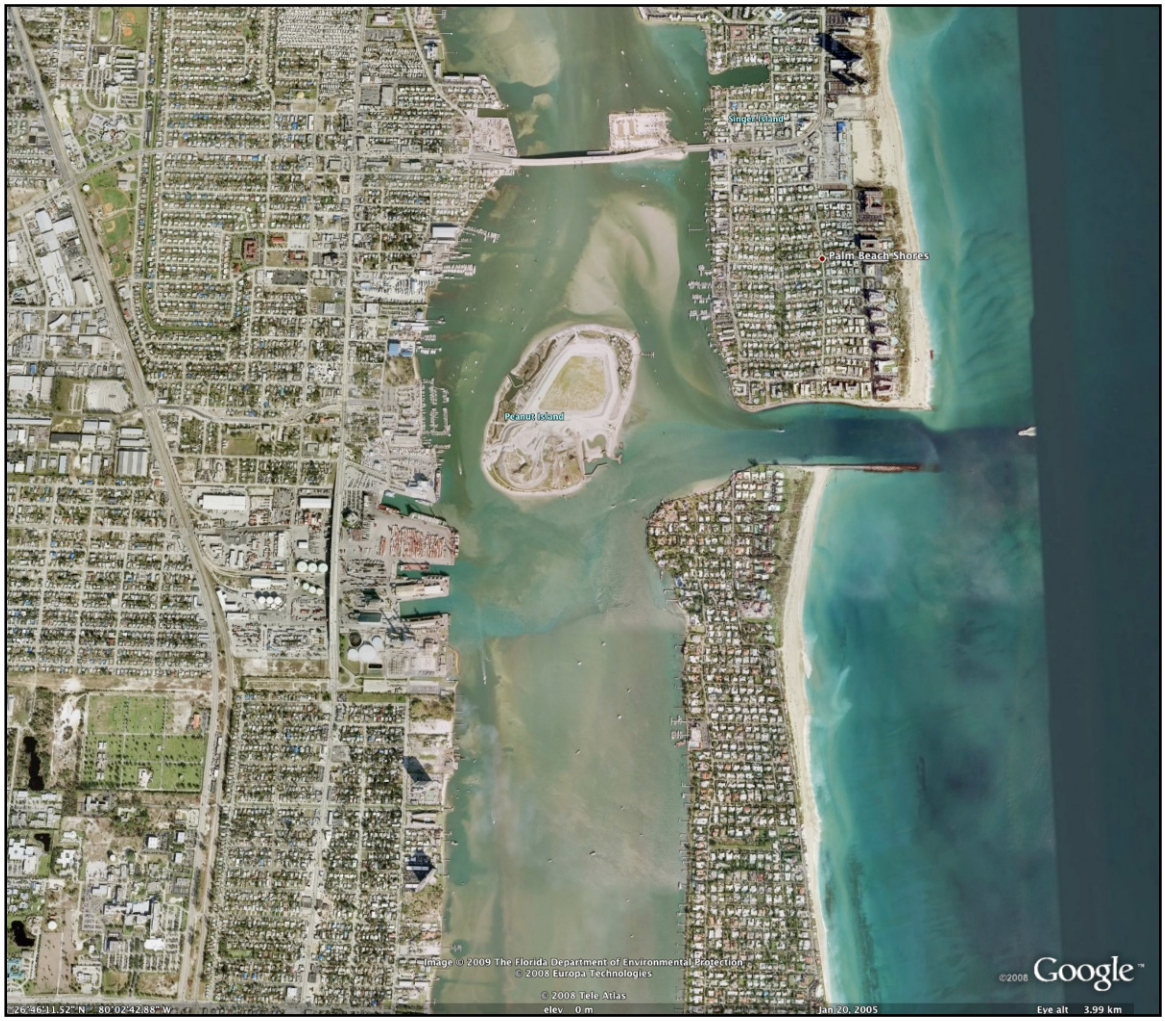


Figure 8.7. Aerial of the Port of Palm Beach (Source: Google Earth).

As a designated deepwater port (§ 311.091, F.S.), the POPB is required to develop and adopt a Port Master Plan as stipulated in § 163, F.S. The implementing

portions of the Port Master Plan (i.e., Goals, Objectives, and Policies), and the Capital Improvement Plan, must be adopted by the County Government to become integral components of the Palm Beach County Comprehensive Plan (§ 163.3178(k), F.S.). Upon adoption at the county level, the Goals, Objectives, and Policies must be supported by appropriate local regulations on the development of lands and waters where the Port properties are located. In the case of the POPB, it conducts significant intergovernmental coordination with Palm Beach County and the City of Riviera Beach to ensure that such consistency exists. As provided by § 163.3178(5), F.S., the dispute resolution process provided under § 186.509, F.S., must be used to reconcile inconsistencies between the Ports Master Plan and the County's Master Plan. The Port and the City of Riviera Beach executed an Inter-Local Agreement to address certain implementation features in the 2006 Port Master Plan. Port expansion and development may require additional coordination should the Port acquire properties within the jurisdiction of the City of West Palm Beach.

The POPB is the 4th busiest container port in Florida and the 18th ranking among U.S. seaports. With the Florida East Coast Railway Company servicing the port through three miles of track, the POPB provides intermodal transfers and handling so that bulk shipment from large vessels as well as agricultural commodities from central Florida, can be moved to smaller vessels bound for smaller ports within the State, the U.S., Caribbean, and South American ports. It served about half a million day-cruise passengers in 2004 (POPB website). As such, the POPB supports about 1,470 direct jobs and 960 induced and indirect jobs. It generates $261M annually in total economic output of which about $12M contributes to local and state tax revenues.

In planning for expansion to maintain its competitive edge, especially in transshipment of goods, the POPB has many challenges. Its currently limited waterfront, abutment to highly urbanized coastal communities competing for shorefront space, and maintenance and conservation of sensitive coastal ecosystems and marine species; and requirements for consistency with, and regulatory support from, local and municipal governments whose jurisdictions contain port property, all require judicious planning with long term visions and strategic policy making. Expansion and development projects with potential environmental impacts include: 1) dredged material management and) harbor and channel modifications.

8.2.2. State Agencies

Agencies at the state level involved in port operations and expansion, the laws that established these and their legislated mandates are summarized in Table 4.

8.2.2.1 Florida Port Council

As a non-profit organization, the Florida Port Council (FPC) acts as a professional association for seaports and their management. The Council's Board of Directors is comprised of the Directors of Florida's fourteen deepwater seaports. It provides leadership and information on seaport-related issues before the legislative and executive branches of state and federal government and extends administrative support services on matters related to the Florida Seaport Transportation and Economic Development (FSTED) Council and the FSTED Program (§ 311.09(12) F.S.).

8.2.2.2. Florida Seaport Transportation and Economic Development Council

The FSTEDC is a public entity created by § 311, F.S. within the Florida Department of Transportation (FDOT). It is made up of the 14 Port Directors and representatives from FDOT, DCA and the Governor's Office of Tourism, Trade, and Economic Development. It implements the State's economic development mission by facilitating the implementation of seaport capital improvement projects at the local level with a 50-50 finance partnership between the state and a seaport. Project development is initiated at the local level. At the state level, project review is accomplished by the three state agencies that are full voting members of the FSTED Council.

8.2.2.3. Florida Ports Financing Commission

The Floirda Ports Financing Commission (FPFC) was created by inter-local agreement pursuant to § 163.01(17)(d), F.S. to provide efficient fiscal transaction mechanisms for implementing port-related public works projects. The Commission accepts the list of projects approved by the FSTED Council and implements a bond-funding program pursuant to the provisions of § 320.20(3) and § 320.20(4), F.S.

8.2.2.4. Florida Department of Transportation

The FDOT is an executive agency whose primary functions are defined in § 332, 334, 335, 338, 339, 341 and 479, F.S. FDOT is responsible for coordinating and planning the state's transportation system and focusing statewide and interregional priorities on the Strategic Intermodal System (SIS), which includes the 14 deepwater seaports.

The FDOT Seaport Office of the Division of Public Transportation and Modal Administration assists in the development of the 14 deepwater seaports through coordination of various planning activities and funds with the FSTED Council and the FPC. It is responsible for seaport program planning, project management, and SIS implementation.

Table 8.4. State agencies involved in the operation and development of deepwater seaports in Florida, highlighting some of the major laws and functions relevant to seaports.

Agency	Law	Mandate/Function
FPC	§ 311.09(12), F.S.	-Provides leadership and information on seaport-related issues to the Legislative and Executive Branches of State and Federal Government -Provides administrative support services on matters related to the FSTED Council and the FSTED Program -It extends similar support services to the FPFC
FSTED	§ 311, F.S.	- Manages the FSTED Program to finance seaport projects on a 50-50 match with any of the 14 Florida designated seaports including dredging of channels, harbors and turning basins. - Prepares a 5-year Florida Seaport Mission Plan which defines the goals and objectives of the seaports - Reviews project applications and recommends which projects should be forwarded to OTTED, FDOT and DCA for further review and funding with state funds

Florida Ports Financing Commission (FPFC)	§ 163, F.S. and § 320.20, F.S.	- Helps fund capital projects in the 5-year Florida Seaport Mission Plan by issuing debt for seaport and intermodal projects
Florida Department of Transportation (FDOT)	§ 311.09(7) , F.S. § 311.14, F.S. § 320.20(4) , F.S. § 311.07, F.S.	- Consistency review of projects - Work with FSTED to develop freight-mobility and trade-corridor plans - Mutually approve projects with FSTED to receive state funds - Audit oversight
Governor's Office of Tourism, Trade and Economic Development (OTTED)	§ 311.08, F.S. § 311.11, F.S.	-Review for consistency with Seaport Mission Plan and for economic benefit - Oversight over Seaport Training and Employment Program
DCA [Abolished in October 2011 and its functions have been transferred to the Division of Community Development within the Department of Economic Opportunity]	§ 163.3178(2)(k) , F.S. § 163, Part II, F.S. § 311.09(6) , F.S.	-Review of Port Master Plans - Review of Local Government Comprehensive Plans - Consistency review with local comprehensive plans and port master plans
Department of Environmental Protection	§ 311.105, F.S. § 403, F.S.	- Works with FSTED Environmental Management Committee on seaport environmental issues - Permit review/ authorization of projects as applicable
FWC	-Revision #5 to the State Constitution in the Nov. 1998 General election § chapter 327, F.S. § 370.06, F.S. § 372.83, F.S.	-Manages Florida's freshwater aquatic life, marine life, and wild animal life. -Regulate recreational boating -Regulates commercial harvest of saltwater products -Enforces hunting law -Develops and implements environmental education grant program

8.2.2.5. Florida Department of Community Affairs

[Note: This agency has been abolished and its functions were subsumed by the Florida Department of Economic Opportunity (DEO) in October 2011. Its functions remain pertinent to current port expansion projects which are approved as part of Comprehensive Land Use Plans at the local level.]

DCA is the State's land planning and community development agency. The DCA Division of Community Planning administers Florida's growth management programs and related initiatives. It provides specialized assistance to local planning staffs to improve coordination on land use and transportation planning. The Division helps local governments address the transportation impacts of proposed land use changes through its review of comprehensive plan amendments, Evaluation and Appraisal Reports, and Developments of Regional Impact. The Division reviews transportation facilities work programs development by Metropolitan Planning Organizations and the FDOT for consistency with local comprehensive plans. It represents the DCA as a voting member of the FSTED Council.

As of October 2011, FDCA's functions have been subsumed by DEO's Division of Community Development, the designated State Land Planning Agency.

8.2.2.6. Florida Department of Environmental Protection

The FDEP is the lead agency in state government for environment management and stewardship. Its structure focuses on three elements: 1) regulatory programs, 2) land and recreation, and 3) policy and planning. Environmental oversight of port operations within local and state jurisdictions is provided through FDEP's various programs and offices such as those focused on water and air quality. The Coral Reef Conservation Program (FDEP CRCP), under FDEP's Office of Coastal and Aquatic Managed Areas, participates in interagency task forces that discuss development impacts on and conservation strategies for coral reef habitats associated with port maintenance and expansion in southeast Florida. The CRCP heads the implementation of the SEFCRI and contributes to the National Action Plan to conserve coral reefs. It is also tasked to coordinate the response to vessel and anchor injuries to coral and hardbottom habitat, and to develop strategies for their prevention.

The FDEP is the lead coastal agency for the state and coordinates the federally approved Florida Coastal Management Program (FCMP), which consists of 24 Florida Statutes that are administered by nine state agencies and five water management districts. The FCMP that was approved by NOAA in 1981 allows

the state to consider coastal resource protection while planning and permitting development activities in its coastal zone as stipulated by the federal CZMA of 1972. The latter confers authority to coastal states with federally approved coastal management programs to review certain federal activities that would impact its coastal resources for consistency with state coastal management programs. This authority is called "federal consistency". Federal consistency reviews are incorporated into other review processes conducted by the state depending on the nature of federal proposals. The Florida State Clearing House of the FDEP Office of Intergovernmental Programs, serves as the primary contact for receiving consistency evaluations from federal agencies and coordinates the state's review of proposed federal activities and applications for federal permits other than those issued under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. The permits for the latter are processed and issued by the FDEP or the water management districts through the Environmental Resource Permitting process.

8.2.2.7. Florida Fish and Wildlife Conservation Commission

The FWC provides comments on the environmental impact assessment process initiated by the USACE for port expansion proposals. Such comments are focused on evaluating the veracity of stated impacts on marine fisheries and listed marine species such as turtles, manatees and acroporid corals, as well as assessing the mitigation plans where impacts on these may occur. The FWC maintains and updates the state listing of imperiled species in coordination with state (FDEP) and federal (USFWS, NMFS) agencies.

8.2.3. Federal Agencies

Table 5 summarizes the federal agencies, their authorities, and their mandates, all of which provide oversight to port operations and expansion at the federal level.

8.2.3.1. U.S. Army Corps of Engineers

The USACE is a federal agency and a major U.S. Army command consisting of 34,600 civilian and 650 military personnel; its mission is to provide military and public works services to the U.S. through its engineering services and capabilities, as a public service, across the full spectrum of operations – from peace to war - in support of national interests. Its operations in dredging America's waterways to support maritime commerce and recreation, and those which affect coastal wetlands, make the USACE a critical partner in coastal and marine conservation.

The USACE Jacksonville District specializes in the planning, engineering, construction, and management of projects in Florida and the Antilles. It covers beach erosion control and hurricane protection, emergency response and recovery, environmental restoration, flood control, navigation, and regulatory permitting, among others. Two divisions that are critical to coral reef conservation and management are the Planning and Regulatory Divisions. In particular, the Environmental Branch of the Planning Division provides the overall leadership for all environmental and ecosystems initiatives, management and policy, and is responsible for protecting, restoring and managing natural resources within the District. The Regulatory Division of the District administers the largest regulatory permitting program in the USACE, including federally delineated wetlands and navigable waters, impacts from navigation and flood control projects, and the discharge of dredge and fill materials to areas within its jurisdiction. The USACE is the lead agency in the implementation of approved port expansion projects related to navigation and maritime transportation.

Table 8.5. Federal agencies involved in the operation and development of deepwater seaports in Florida, highlighting some of the major laws and functions relevant to port operations and expansion.

Agency	Law	Mandate/Function
USACE	-Water Resources Development Act - Rivers and Harbors Act	-Authorizes non-federal interests to undertake feasibility studies of proposed harbor projects - Lead implementing agency in port dredging projects
Coast Guard, Dept. of Homeland Security	Waterways Safety Act or 1978	Charges the Coast Guard with environmental protection of waterways in federal waters and federal jurisdictions
Federal Energy Regulatory Commission (FERC), Dept. of Energy	Federal Power Act	Authorizes FERC to issue licenses for projects to develop & improve navigation and to develop and use power
Maritime Administration, Dept. of Transportation	Merchant Marine Act of 1936, Reorganization Plan No. 21 (1950)	Administers financial programs to develop, promote and operate the U.S. Merchant Marine; determines services and routes necessary to develop and maintain American foreign commerce and requirements of ships necessary to provide adequate service on such routes; conducts research and development activities in the maritime field, among others,
NOAA	- Endangered and Threatened Species; Critical Habitat for Threatened Elkhorn and Staghorn Corals (50 *CFR* Parts 223 and 226) -s. 7(a)2, ESA (16 USC § 1533(b)(2)	- Designated four critical habitats for elkhorn and staghorn corals including Florida area with 1329 mi^2 effective Dec. 26, 2008 (following Section 4(b)(2) of the ESA - Requires each Federal agency to consult with NMFS or FWS, as applicable, to insure that any action they authorize, fund or carry out will not likely jeopardize the continued existence of listed species or destroy or adversely modify the designated critical habitat of listed species. If a proposed action is deemed to potentially affect listed species or designated critical habitat, NMFS may recommend that the agency implement a reasonable and prudent alternative (RPA) to the proposed action.
US Fish and Wildlife Service, Dept. of Interior	Fish and Wildlife Coordination Act of 1934	- Management of fish, wildlife and natural habitats. - Jointly implements the ESA with NOAA-NMFS

8.2.3.2. U.S. Department of Homeland Security, U.S. Coast Guard

The USCG is a military, multi-mission, maritime service within the U.S. Department of Homeland Security and is one of the nation's five Armed Services. Its mission is to protect the public, the environment, and the U.S. economic interests in the nation's ports and waterways, along the coast, on international waters, or in any maritime region, as required to support national security.

The USCG provides unique benefits to the nation because of its distinctive blend of military, humanitarian, and civilian law enforcement capabilities. It assumes five fundamental roles: 1) maritime safety, 2) maritime security, 3) maritime mobility, 4) national defense, and 5) protection of natural resources. The USCG District 7, Sector Miami, recently modified the large vessel anchorage area near PE, amending the current anchorage area by eliminating a portion of the anchorage closest to the sensitive coral reef areas, expanding another portion that poses less risk to these areas, and limiting the amount of time a vessel may remain in the anchorage area (see section 8.4) (33 *CFR* 110).

8.2.3.3. U.S. DOT, Maritime Administration

As an agency within the U.S. DOT, the MARAD deals with waterborne transportation. Its programs promote the use of waterborne transportation and its seamless integration with other segments of the transportation systems, and the viability of the U.S. merchant marine.

Programs of the Maritime Administration promote the development and maintenance of an adequate, well balanced U.S. merchant marine, sufficient to carry the nation's domestic waterborne commerce and a substantial portion of its waterborne foreign commerce, and capable of service as a naval and military auxiliary in time of war or national emergency.

When Suez Calypso submitted their proposal for a deepwater LNG port for PE, it was submitted to both the USCG and MARAD, which is the agency charged with the licensing of offshore LNG and oil receiving port facilities.

8.2.3.4. U.S. Department of Energy, Federal Energy Regulatory Commission

FERC is an independent government agency, officially organized as part of the U.S. Department of Energy. The President of the United States appoints the five commissioners of FERC with the advice and consent of the U.S. Senate.

The purpose of FERC is to protect the public and energy customers ensuring that regulated energy companies are acting within the law. It is responsible for regulating the interstate transmission of natural gas, oil, and electricity. It approves the construction of interstate natural gas pipelines, storage facilities, and LNG terminals. Port construction that involves energy infrastructure is subject to FERC oversight.

8.2.3.5. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service

NOAA NMFS is the division of the U.S. Department of Commerce responsible for the stewardship of the nation's living marine resources and their habitat. The NMFS is responsible for the management, conservation, and protection of living marine resources within the US EEZ (extending 3 to 200 miles off the east coast). It works to promote sustainable fisheries and to prevent lost economic potential associated with overfishing, declining species, and degraded habitats. It strives to balance competing public needs. It implements the U.S. ESA, together with the U.S. Fish and Wildlife Service, by providing biological opinions for ESA consultations and currently has 68 marine species (including two stony corals) listed within its jurisdiction.

The Southeast Fisheries Service Center and the Southeast Regional Office, including the Caribbean Field Office and Habitat Conservation Division's West Palm Beach Field Office, implement the NOAA NMFS Southeast Region's coral reef ecosystem conservation activities in Florida, Puerto Rico, U.S. Virgin Islands, and Navassa Island.

8.2.3.6. U.S. Department of Interior, U.S. Fish and Wildlife Service

The USFWS is a bureau within the U.S. Department of the Interior. Its mission is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

The USFWS assists in the development and application of an environmental stewardship ethic for society, based on ecological principles, scientific knowledge of fish and wildlife, and a sense of moral responsibility. It guides the conservation, development, and management of the nation's fish and wildlife resources. It administers a national program to provide the public opportunities to understand, appreciate, and wisely use fish and wildlife resources.

Both the NMFS and the USFWS jointly implement the ESA, and provide biological opinions for ESA consultations with respect to their species listings. The USFWS has oversight for more than 1,800 terrestrial and freshwater listed species and one marine species, the West Indian manatee.

8.3 Regulations on Port Development

This section focuses on regulations at local, state and federal levels that provide oversight and management of port development in Florida. A separate section, Section 4.0, discusses regulations of commercial vessel anchorages and proposed protocol for dealing with large vessel injuries and their impacts on coral reefs and associated benthic communities.

Because of the multiplicity of activities and projects that make up port operations, a discussion of all pertinent regulations that provide oversight of these can become cumbersome. This study has identified major legislation that have the most impact on marine environmental management as well as the planning and financing of port maintenance and development projects. Each is briefly discussed noting its role in the overall conservation of coral reefs and associated ecosystems within the vicinity of deepwater ports in the southeast Florida region.

8.3.1. Local Regulations

8.3.1.1. Local Government Comprehensive Planning and Land Development Regulation Act and deepwater ports (§ 163.3178 (2)(k) and (7), F.S.)

This Act, also known as the Growth Management Act, mandates local governments with deepwater ports to integrate a deepwater port master plan, as a critical component of the coastal management element in their comprehensive plans. The participation in and approval by local governments of port master plans ensure that stakeholder groups at the local level have a voice in the planning process. In addition, the vetting process at the state level allows for a broad consensus to develop among involved state agencies as facilitated by the Florida DCA. Ports obtain building and development permits from the local governments as well as state and federal permits for expansion programs, where appropriate.

8.3.2. State Regulations

8.3.2.1. Identification of deepwater ports for commercial navigation and the overall policy of the state to support safe navigation of deepwater shipping commerce (§ 403.021 (9)(a) and (9)(b), F.S.)

The § 403, F.S. covers environmental control of the state's air and water quality in safeguarding public health. The § 403.021 (9)(a) and (9)(b) articulate the state's policy to maintain authorized water depths in all navigational waterways of deepwater ports through the permitting and enforcement of dredging, dredged material management and other related activities in accordance with the port master plans as implemented according to Section 163.3178 (2)(k).

The deepwater ports of the state identified in this section are the ports of Jacksonville, Tampa, Port Everglades, Miami, Port Canaveral, Ft. Pierce, Palm Beach, Port Manatee, Port St. Joe, Panama City, St. Petersburg, Pensacola, Fernandina, and Key West. Port Everglades, Port of Miami, and Port of Palm Beach are located in the southeast Florida region.

8.3.2.2. Financing port projects (§ 311.07, F.S.)

The Florida Seaport Transportation and Economic Development (FSTED) Program within the Department of Transportation finances port transportation or port facilities projects, with a minimum funding of $8M per year from the State Transportation Trust Fund. Funding is provided on a 50-50 matching basis with any of the deepwater ports identified in Section 403.021 (9) (b). Eligible projects include: (1) transportation facilities within port jurisdiction; (2) dredging or deepening of channels, turning basin or harbors; (3) construction or rehabilitation of wharves, docks, jetties, piers, storage facilities, cruise terminals, automated people mover systems, and other facilities to promote efficient transfer of goods and passengers; (4) vessel tracking systems, container cranes and other mechanized equipment for international shipping commerce; (5) land acquisition for port purposes.

8.3.2.3. Oversight of planning for deepwater port development projects (§ 311.09, F.S.)

This section created the FSTEDC within the Department of Transportation. The Council consists of 17 members: port directors of the 14 deepwater ports identified in Section 403.021 (9) (b) or their designees, the secretary of the Department of Transportation or his/her designee; the director of the Office of

Tourism, Trade and Economic Development or his/her designee; and the secretary of the DCA or his/her designee. The Council prepares a five year Florida Seaport Mission Plan that specifies recommendations for the construction of transportation or port facilities that enhance international shipping commerce including cruise passengers and cargo. The council reviews and approves or disapproves each project for funding under the FSTED Program. The plan is updated annually.

The approved list of port projects is reviewed by the three state agencies represented in the FSTED Council. The DCA reviews these for consistency with the Local Government Comprehensive Plans of the host local jurisdictions. The FDOT examines the lost for consistency with the Florida Transportation Plan. Finally, the Office of Tourism, Trade and Economic Development in consultation with Enterprise Florida, Inc., studies the approved project list to determine that it is in line with the Florida Seaport Mission Plan and that the projects confer economic benefits to the state.

The Florida Ports Council (FPC), a professional non-profit corporation administratively supports the FSTED Council. A Board of Directors composed of the 14 deepwater port directors heads the FPC.

8.3.2.4. Florida Seaport Environmental Management Committee (§ 311.105, F.S.)

Within the FSTED Council, is the Florida Seaport Environmental Management Committee, which consists of the Secretary of Environmental Protection (or his/her designee, non-voting member); a designee from the USACE (ex-officio non-voting member), the Secretary of Community Affairs (or his/her designee as ex officio nonvoting member, a designee of the Florida Inland Navigation District (ex officio nonvoting member), and five or more port directors as voting members. The FESTED Council chair appoints the voting members, and designates one of the latter as Committee Chair. The Committee provides a forum for discussing environmental issues including maintenance dredging and dredged material management; environmental mitigation, air and water quality permitting, as well as the maintenance of navigation channels, port harbors, turning basins, harbor berths, and associated facilities.

The Florida Seaport Environmental Management Committee works with the FDEP, the USACE, and the deepwater ports in ensuring the quality of dredged material to be used for and in implementing cost-efficient beach nourishment in a manner that is compliant with state and federal permitting agencies.

8.3.2.5. Memorandum of Agreement between FDEP and FPC (§ 403.061 (37) and (38), F.S.)

The Florida Statutes grant powers to FDEP to enter into a memorandum of agreement with the FPC that would provide for a supplemental permitting process through which a joint coastal permit or an environmental resource permit to a designated deepwater port for maintenance dredging (§ 403.061 (37), F.S.). The same memorandum would provide for the issuance of a conceptual joint coastal permit or conceptual environmental resource permit for dredging and related activities necessary for port development and expansion (§ 403.051 (38), F.S.).

Such Memorandum of Agreement (MOA) was drawn on Feb. 6, 1997. The MOA provides for a pre-application consultation process intended to reduce permitting conflicts and allow for an expeditious review of permit applications by a deepwater port. It also encourages an informal dispute resolution of permitting issues. Should an impasse be reached over permit issuance, the FDEP and deepwater port applicant may agree to refer the dispute to the Florida Seaport Environmental Management Committee, during which the permittee waives the applicable deadlines required under the Florida Administrative Procedures Act. The MOA recognizes the deepwater ports designated by § 403.021 (9)(b) and the USACE as the only authorized applicants for dredging permits.

8.3.2.6. Sovereign Submerged Lands Management (§ 253.77, F.S.; Chapter 18-21, F.A.C.)

Port development activities and construction of facilities such as telecommunications cable systems or energy pipelines may require the use of sovereign submerged lands (SSL). The latter are public trust lands that the United States Congress transferred to the state of Florida when it was granted statehood on March 3, 1845. Out of an estimated 7.7 million acres of SSL, about 2.4 million acres are subsumed within the 42 designated aquatic preserves. The State Governor and Cabinet, as the Board of Trustees (BOT) of the Internal Improvement Trust Fund of the State of Florida, are designated by the state legislature as the Trustees of SSL. The FDEP acts as staff to the BOT in the review of proposed uses of SSL.

Following § 253.77, F.S., public and private entities must obtain permission to conduct activities on SSL. Commonly requested uses include the construction of docking facilities, marinas and dredging. Such entities may not commence any activity involving the use of sovereign or other lands of the state, the title to

which is vested in the BOT, until these have received the required lease, license, easement or other form of consent authorizing the proposed use.

Two features of Chapter 18-21, F.A.C. help to streamline the process of obtaining a regulatory and a proprietary authorization through an integrated review and action process by one agency. The first feature, known as the Linkage Rule (Rule 18-21.00401, F.A.C.), links the review and action of a proprietary authorization to use SSL with the review and action of a regulatory permit, through the use of a simple application form and following a single time line. The second feature, called the Delegation Rule, grants interim delegation of decision-making authority of the BOT for certain uses of the SSL to FDEP and to the Water Management Districts.

In laying out conduits for telecommunication lines for example, Chapter 18-21, F.A.C. states that "these shall be directionally drilled under nearshore benthic resources, including the first reef and any other more inshore reefs off southeast Florida, to the maximum extent practicable and shall punch out in a location that avoids or minimizes impacts to benthic resources such as seagrasses and live bottom communities including corals and sponges." Locations of reef gaps have been identified in the southeast Florida region and have been designated for use by telecommunication lines.

Easements or Consent of Use are required for activities that are often associated with deepwater ports. These include groins, breakwaters and other shoreline protection structures; oil, gas and other pipelines or cables; dredged spoil disposal sites; public navigation project channels; and dredged areas or channels.

In the case of commercial vessel groundings, injuries to associated benthic communities are considered unauthorized use of SSL. This is further discussed in Section 5.0 together with regulations establishing anchorage areas associated with the three SEFCRI deepwater ports.

8.3.2.7. Endangered and threatened (listed) Marine Species (§ 99-245, L.O.F.; § 370.025, F.S.; § 372.072, (1997), F.S.; § 379.2291, F.S.; Rule 68-1.008, F.A.C.; Chapter 68A-27, F.A.C.)

Laws regulating listed marine species in Florida, and which currently include three coral species, define the roles of the FWC and the FDEP, the processes of listing and delisting, the levels of protection provided to these species, and the management of the habitats they inhabit. The FWC has constitutional authority over the fisheries aspects of marine life in general, except for listed marine species, for which FWC's rule-making authority is derived from Florida statutes.

Statutory rule-making for listed marine organisms by FWC is subject to an appeals procedure.

Chapter 99-245, LOF, define the powers and responsibilities of FWC, the FDEP and other state agencies with respect the state's wildlife. It articulates that rule-making authority of FWC for listed marine species are derived from § 372.072(3), F.S.

Chapter 68A-27, F.A.C. details the procedures for listing, delisting, and reclassifying, endangered, threatened, and species of special concern. The process is guided and facilitated by the FWC. In addition, the FWC conducts and maintains the state listing of all imperiled species in Florida. Additional protected marine species in Florida are federally listed, and which include the elkhorn and staghorn corals, the small tooth sawfish, and the Caribbean monk seal. Whales, turtles and manatee are listed as federally protected species. Critical habitats for federally protected species and management plans for Florida listed species are required actions under the state and federal ESAs, resp.

Port maintenance and expansion projects that impact protected marine species trigger consultations among federal agencies as well as among state agencies. Perceived and known environmental impacts on listed marine species significantly influence the way projects are assessed for denial or approval and permit conditions that must be met during project implementation.

8.3.2.8. Florida Coastal Management Act of 1978 (§ 380.205 to 380.27, F.S.)

The state legislature adopted the Florida Coastal Management Act in 1978 in response to the Federal Coastal Management Act of 1972. The state coastal management act authorized the development of a state coastal management program that was approved by NOAA in 1981. The Florida Coastal Management Program (FCMP) consists of a network of 23 Florida Statutes administered by eight state agencies (DCA, FDEP, Department of Health, Division of Historical Resources of the Department of State, FWC, FDOT, Division of Forestry of the Department of Agriculture and Consumer Services, and the Governor's Office of Planning and Budgeting) and five water management districts. Each FCMP state agency must ascertain that federal activities conducted within the state comply with specific FCMP statutes and authorities within its jurisdiction (i.e., federal consistency or compliance with FCMP). The Florida State Clearinghouse housed in FDEP since 2002, provides a coordinated review for federal consistency by FCMP agencies for all federal assistance applications. In addition to FCMP agencies, regional planning councils and participating local governments may

provide the Clearinghouse with comments regarding consistency with local comprehensive and regional policy plans.

Table 8.6. Listed Endangered (E) and Threatened (T) marine species in the state of Florida. Source: USFWS.

Common Name	Scientific Name	Status
Reptiles		
loggerhead sea turtle	*Caretta caretta*	T
green sea turtle	*Cheloni amydas*	E
leatherback sea turtle	*Dermochelys coriacea*	E
hawksbill sea turtle	*Eretmochelys imbricata*	E
Kemp's Ridley sea turtle	*Lepidochely skempii*	E
Mammals		
Sei whale	*Balaenoptera borealis*	E
Fin whale	*Balaenoptera physalus*	E
North Atlantic right whale	*Eubalaena glacialis*	E
Humpback whale	*Megaptera novaeangliae*	E
Sperm whale	*Physeter macrocephalus*	E
Florida manatee	*Trichechus manatus latirostris*	E
Corals		
Elkhorn coral	*Acropora palmata*	T
Staghorn coral	*Acropora cervicornis*	T

8.3.2.9. Florida Coral Reef Protection Act of 2009 (Section 403.93345, F. S.)

This section aims to explicitly define the powers and authority of FDEP to protect coral reefs off the coasts of Broward, Martin, Miami-Dade, Monroe, and Palm Beach counties through "timely and efficient recovery of monetary damages resulting from vessel groundings and anchoring-related injuries" (§ 403.93345 (4), F.S.). The act further highlights the role of the FDEP as the state's lead trustee for coral reef resources of the state unless preempted by federal law. The Act is specific to remediation of coral reef injuries in the submerged lands of southeast Florida.

8.3.3. Federal Regulations

Deepwater ports are inextricably linked to broad national policies on maritime commerce. The major federal laws and regulations that underpin the growth and management of maritime trade provide the national context this paper uses in examining how deepwater port projects are conceptualized, evaluated and permitted. Many of the federal laws briefly discussed below govern the operations of the USACE in collaboration with other state and federal agencies with respect to the Army Corps' role in maintaining and developing navigable waters associated with deepwater ports. Regulations for anchorage grounds are discussed in Section 5.

8.3.3.1. Rivers and Harbors Act of 1899

Section 10 (33 U.S.C. 403) of the Rivers and Harbors Act of 1899 provides the most frequently exercised statutory authority granted to the Secretary of the Army in overseeing construction, excavation, or deposition of materials, in, over, or under navigable waters of the United States. All works must have prior authorization by Congress and the recommendation of the Chief of Engineers. Other permit authorities include Section 9 (33 U.S.C. 401) for bridges, dams, dikes, or causeways. Army Corps civil works projects do not need Section 10 permit, but must fulfill the requirements of the CWA Section 404 guidelines. Section 10 of the Rivers and Harbors Act, and Section 404 of the CWA are within the authority of the USACE. The USACE collaborates with the EPA for implementing Section 404 guidelines (see section 8.3.3.3 CWA).

8.3.3.2. National Environmental Policy Act of 1969

The NEPA is a procedural statute that explicitly declared environmental protection as a national policy. It requires federal agencies to: (1) examine the environmental impacts of their proposed actions and (2) inform the public that environmental concerns are assessed as part of the decision-making process by federal agencies. The overall procedure outlined in NEPA is to be placed in the context of each federal agency that has proposed actions with potential environmental impacts. The NEPA created a Council on Environmental Quality (CEQ) in the Office of the President. CEQ regulations categorize federal actions into three categories: (1) categorical exclusions are actions categorically excluded from the requirement to prepare an environmental impact statement (EIS) or environmental assessment (EA) if they are of types or in categories known to have no significant environmental impacts; (2) those requiring EAs when the significance of environmental impacts is uncertain and must be determined; (3)

those requiring EISs when federal actions significantly affect the human environment. If a project's impacts are determined to be significant during the preparation of the EA, EIS preparation should begin. If the impacts are evaluated not to be significant, the lead agency (that which is responsible for NEPA documentation) must prepare a finding of no significant impact (FONSI), which serves as the agency's administrative record of its decision regarding environmental impacts, and which must be made public. In the case of the assessment resulting in Findings of Significant Impacts (FOSI), the assessment moves to the EIS process.

The EIS process is initiated with the lead agency publishing a Notice of Intent (NOI) in the Federal Register to serve as a public announcement of the project that will undergo an environmental impact assessment. This is followed by a scoping phase during which the lead agency invites all stakeholder groups and affected agencies at local, state, and federal levels, determines issues to be analyzed, distributes assignments to participating agencies, and identifies all other requirements required by NEPA in the conduct of an EIS. The EIS document is developed in two stages: a draft and a final version, with the latter incorporating all comments from participating agencies and stakeholder groups to the draft version. Upon approval of the final EIS, the lead agency prepares a public Record of Decision (ROD), which must include a statement of final decision, all alternatives evaluated by the agency in making its final choice, and an explanation to show that the selected alternative poses the least environmental harm.

For the USACE, the aim of conducting authorized studies is to provide sufficient bases for a decision on whether a Corps project should be authorized for construction. Once an EIS is approved, the Chief of Engineers sign a final recommendation on the project and is called the Chief's Report. By practice, Congress uses a favorable Chief's Report as basis for authorizing projects for funding through annual Energy and Water Development Appropriation bills.

Legal annotations of the NEPA are derived from Baldwin (2000) and from Luther (2008).

8.3.3.3. Clean Water Act

This CWA, also known as the Federal Water Pollution Control Act of 1972 as amended) is the principal law regulating the discharge of pollutants into the nation's waters from freshwater to oceanic water bodies. It was originally enacted in 1948 and underwent total revision in 1972, and which gave the law its current form. The CWA consists of two main parts: regulatory provisions that

stipulate for a statutory goal of zero discharge of pollutants, and provisions that authorize federal financial support for the construction of municipal wastewater treatment construction. The Environmental Protection Agency (EPA) is the main administrator of CWA programs while state and local governments provide day-to-day oversight for implementing CWA provisions.

In 1972, amendments to the CWA added Section 404 (33 U.S.C. 1344), which granted the Secretary of the Army, acting through the Chief of Engineers, authority to issue permits, after notice and opportunity of public hearings, for the discharge of dredged or fill material into waters of the United States at specified disposal sites. The dumping sites are selected following the guidelines (Section 404(b)(1) Guidelines) provided by the Environmental Protection Agency (EPA) in collaboration with the Secretary of the Army. Section 402 of the Act regulates the discharge of all other pollutants into US waters. Section-404 jurisdiction includes Section 10 (Rivers and Harbors Act) (i.e., navigable) waters and their tributaries including adjacent wetlands and isolated waters where the use or degradation of these could affect interstate or foreign commerce.

8.3.3.4. Ocean Dumping Act (Marine Protection Research and Sanctuaries Act of 1972)

The Ocean Dumping Act prohibits the dumping of material into the ocean that would unreasonably degrade or endanger human health or the marine environment. Dumping cannot occur unless a permit is issued under Section 103 by the USACE, using EPA's criteria and explicit concurrence. The jurisdictional overlap between the EPA and the USACE in waters seaward of the low water line is resolved by an interagency agreement between both agencies.

8.3.3.5. Water Resources Development Acts (1986 and others) and Energy and Water Development Appropriations

The civil works program of the USACE includes creating and maintaining navigable channels, implementing flood control and coastal protection projects, as among the oldest functions of the agency. During the last decade, Congress has expanded the civilian responsibilities of USACE to include ecosystem restoration, environmental protection, and disaster relief, among others.

A request for assistance from a community, or a local or state government agency with a water resource need (navigation, flood or storm protection, ecosystem restoration), often initiates a Corps project. To pursue a project, the USACE needs two kinds of congressional authority: study authorization, followed by appropriations. With a study authority, the Corps examines the

problem and determines if it warrants federal interest. The Corps also evaluates the level of interest and extent of sponsorship by non-federal groups. Authorized studies, except for those categorized as exclusions because they have no known significant environmental impacts, undergo environmental assessments as prescribed by NEPA. In geographic areas with previous Corps studies, a study authority can come in the form of a survey resolution as authorized by the House Transportation and Infrastructure Committee, or by the Senate Environment and Public Works Committee. In jurisdictions with no previous Corps studies, a study authorization is made as an act of Congress, usually through the WRDA. Upon authorization, the USACE seeks funding through the annual Energy and Water Development Appropriations Acts.

The US Congress has issued Water Resources Development Acts in 1986, 1988, 1990, 1992, 1996, 1999, 2000 and 2007, to date. Over this period, Congress continues to highlight the Corps' environmental mission, and to increase the role and responsibilities of local stakeholder groups in shaping Corp's projects. WRDA 1986 established new cost-share formulations that placed expanded financial and decision-making roles to local project sponsors. In addition, the 1986 authorization gave the Corps authority to modify existing infrastructure or operations to improve overall environmental quality. WRDA 1990 spelled out an expanded environmental mission for the Corps to include contamination cleanup, dredged material disposal, and hazardous waste management. WRDA 1992 mandated the Corps to use dredging spoils for protecting, restoring and creating aquatic habitats, including wetlands. WRDA 1996 authorized the Corps to undertake restoration of aquatic ecosystems. WRDA 2000 approved the Corps' first multi-year and multi-billion Comprehensive Everglades Restoration Project. After a seven year period of contentious deliberations and policy changes, Congress passed WRDA 2007 by overriding a presidential veto. It remains to be seen whether a WRDA will be appropriated in 2009.

Legal notes on WRDAs were summarized based on Carter and Cody (2005) and from Carter, Hughes, Sheikh, and Zinn (2007).

8.3.3.6. Coastal Zone Management Act of 1972 (as amended)

Congress passed the CZMA of 1972 to establish a federal grant program within the Department of Commerce through which coastal states are encouraged to develop and implement coastal zone management programs voluntarily. The Act stipulates that federal actions that affect the coastal zone must be consistent with federally approved state programs such as the Florida Coastal Management Program (FCMP, see section 3.2.8). The "effects" test is used to determine if an activity is subject to federal consistency provisions: will the activity directly,

indirectly, or cumulatively affect any natural resources, land uses, or water uses in the coastal zone? An affirmative answer makes the federal activity subject to federal consistency. The consistency requirement authorizes coastal states to review the following activities for consistency with their respective coastal management programs: (1) activities conducted by or on behalf of a federal agency; (2) activities which require a federal license or permit; (3) activities implemented according to the Outer Continental Shelf Lands Act exploration plan or lease; and (4) federally funded activities. The Act also established the National Estuarine Reserve System.

8.3.3.7. Endangered Species Act of 1973 (as amended)

The ESA aims to conserve endangered and threatened species and the ecosystems on which they depend as integral elements of America's birthright. The identification of species to be listed and facilitation of the listing process are authorities granted by ESA to the USFWS for terrestrial and freshwater species and a few marine species, and to the NMFS for most marine organisms. Once listed, species and their habitats are accorded protection from adverse impacts of federal activities (through consultations under section 7 of the ESA). Both USFWS and NMFS must develop and implement recovery plans as well as designate critical habitats to aid in the recovery of listed species. In addition, restrictions on the taking, transporting and selling of listed species apply. The ESA also authorizes the purchase of important habitats for listed species and provides federal aid to state and commonwealth wildlife agencies that have cooperative agreements with the Services to implement appropriate levels of protection and actions.

For federally funded projects implemented, or those permitted by the USACE, the US Bureau of Reclamation, and the Federal Energy Regulatory Commission (FERC), ongoing operations, relicensing and reauthorizations for water projects that predate the ESA are subject to consultations if these agencies retain any role in continuing project operations. New water or power production projects funded with federal monies require section 7 consultation.

In port development projects in the southeast Florida region, coordination between USFWS and NMFS for formal and informal consultations is required where these have joint jurisdiction over some listed species that include sea turtles. For the recently listed coral species, *Acropora palmata* (elkhorn coral), and *Acropora cervicornis* (staghorn coral), NMFS would be the responsible agency for consultation.

An informal consultation process may precede the formal phase of a "section 7" consultation. Informal consultation is optional and is meant to help the action agency or applicant formulate project designs with minimal impact to listed species and their designated critical habitats, and eliminate the need for formal consultations. A proponent federal agency contacts the local Service office to determine the presence of listed or species or of a designated critical habitat in the action site. The Service responds to the request by providing a list of species known to occur or may occur in the vicinity and designated critical habitats located in the area. If the Service provides a negative response, no further consultation is required unless the project proposal is altered or new information regarding potential impacts on listed species becomes available.

If listed species are present or designated critical habitats are located within the proposed project site, the proponent federal agency must determine if the action may affect listed species. A "may affect" determination includes both non-adverse and adverse impacts. If the proponent federal agency determines that the proposed action is not likely to have adverse impacts on listed species or their designated critical habitats, and the Service agrees with the determination, the Service provides a written concurrence, and no further consultation is required.

Formal consultation with the Services become necessary when (1) a proponent agency requests consultation after determining a proposed action may affect listed species or designated critical habitat, or (2) the Services, through informal consultation, do not concur with the proponent agency's finding that the proposed action will not have adverse effects on the listed species or critical habitat. For proposed actions that may jeopardize proposed species or proposed critical habitats, a proponent agency shall confer with the Services to help determine the likely impacts of the proposed action and identify any alternatives to avoid negative impacts.

Formal consultations or conferences result in the issuance of a biological opinion by the appropriate Service. For a no-jeopardy or no adverse habitat modification finding, the proponent agency may proceed with the proposed action, provided that no incidental take is anticipated. If incidental take is foreseen, the proponent must comply with the Service's incidental take statement to avoid liability.

If a jeopardy or adverse modification determination is made in the biological opinion issued by a Service, the proponent agency has the following options: (1) adopt one of the reasonable and prudent alternatives for eliminating the adverse impacts on species and habitat in the opinion; (2) decide not to grant the permit, fund the project or undertake proposed action; (3) request an exemption from the

Endangered Species Committee; (4) reinitiate the consultation by proposing modification of the proposed action not previously considered. The proponent agency must notify the Services of its final decision on any proposal that receives a jeopardy or adverse modification biological opinion.

As part of the consultation program, both the USFWS and the NMFS coordinate with state agencies that are responsible for fish and wildlife management in state jurisdictions such as FWC and FDEP in Florida. The Services inform state agencies of any federal action that is likely to adversely affect listed or proposed species and their critical habitats, and request relevant information from them as inputs to the analyses of the effects of the action as well as cumulative effects. They may request information updates from the state agencies before finalizing biological opinions to ensure that the latter are based on the best scientific and commercial data on hand. In addition, they provide state agencies with copies of the final biological opinion, unless such information is classified for national security reasons or is confidential business information, the release of which follows the proponent agency's procedures.

Legal annotations of the ESA were based on the Final ESA Section 7 Consultation Handbook (USFWS & NMFS, 1998), Baldwin (2005) and USFWS (2011).

8.3.3.8. Coral Reef Conservation Act of 2000

The Coral Reef Conservation Act passed by Congress in 2000 aims to preserve coral reef ecosystems and advance prudent management. The Act established four major programs: the National Coral Reef Action Strategy, the Coral Reef Conservation Program, the Coral Reef Conservation fund, and the National Program. The goals for coral research, monitoring and conservation were spelled out in the National Strategy published in 2002. This document builds on the National Action Plan to Conserve Coral Reefs developed by the U.S. Coral Reef Task Force in 2000 through extensive broad-based consultations from many stakeholder groups. The Action Plan identified key threats to coral reefs, set thirteen major goals to address these threats, and spelled out objectives and major actions to achieve each goal.

Other components of the Coral Reef Conservation Act such as the Conservation Program and the Conservation Fund provide funding for coral reef projects. The National Program provides for the assessments of reef monitoring and restoration, and promotes public environmental education programs.

A bill has been introduced at the House of Representatives in February 2009 to reauthorize the Coral Reef Conservation Act. Among the major amendments

include authorizing actions to minimize injury to a coral reef or loss of ecosystem functions from vessel impacts, derelict fishing gear, vessel anchors, and anchor chains; and expansion of the definitions of "wildlife" and "wildlife resources" to include coral reef ecosystems in congressional acts such as the Fish and Wildlife Act of 1956, and the Fish and Wildlife Improvement Act of 1978, among others. The US Congress House of Representatives has passed an amended version of the bill in September 22, 2009. Senate action is pending.

8.4. Federally Designated Anchorage Grounds and Large Vessel Injuries to Coral Reefs

Ports in the southeast Florida region are major nodes in foreign and interstate maritime commerce. To help ensure safe navigation, commercial anchorages are designated by the USCG in waters within the vicinity of deepwater ports. Because of generally heavy boat traffic with cruise ships, merchant vessels as well as recreational boaters passing through waters in the vicinity of ports, there exists a significant probability for vessel groundings, anchor, or anchor chain drags to occur and injure bottom communities including coral reefs. When such accidents occur, damages to fragile biological communities including threatened coral species can be extensive and difficult to remedy. This section addresses the relevant regulations, the current state of anchorage configurations, and the state of knowledge about large vessel injuries to coral reefs in the southeast Florida region, as well as the status of draft regulations and response protocol that aim to address these.

8.4.1. Current regulations

8.4.1.1. Rivers and Harbors Act of 1915 (33 U. S. Code 471)

Section 7 of the Rivers and Harbors Act provides for the establishment of anchorage grounds for vessels in navigable waters where these are needed by maritime or commercial interests of the US to help promote safe navigation. It also authorizes the adoption of appropriate rules and regulations associated with the designation and use of these facilities, for enforcement by the Coast Guard. The Act vests the Secretary of Homeland Security with the authority of this statute (Coast Guard and Maritime Transportation Act of 2006). Such authority has been delegated to the Commandant of the USCG (Department of Homeland Security Delegation No. 0170.1) and who in turn, has delegated the authority to each Coast Guard District Commander (33 *CFR* 1.05). The District Commanders are asked to solicit the view of the District and Division Engineer, USACE and other representatives of other interested departments in considering matters related to the anchorage of vessels.

A notice of public hearing on changes to anchorage regulations are issued by each District Commander and mailed to all interested parties. The District Commander issues these changes, or in certain cases, provides recommendations regarding regulatory changes to the Commandant. Once changes have been published in the Federal Register, the District Commander publishes these amendments in the Local Notice to Mariners.

8.4.1.2. Ports and Waterways Safety Act of 1972 (33 U.S. Code 1221 et seq.)

Section 1221 articulates the guiding policy of the Ports and Waterways Safety Act:

> "The Congress finds and declares that –
>
> (a) navigation and vessel safety, *protection of the marine environment*, and safety and security of United States ports and waterways are matters of major national importance;
> (b) increased vessel traffic in the Nation's ports and waters creates substantial hazard to life, property, and *the marine environment*;
> (c) increased supervision of vessel and ports operations is necessary in order to-
> (1) reduce the possibility of vessel or cargo loss, or damage to life, property, or *the marine environment*;
> (2) prevent damage to structures in, on, or immediately adjacent to the navigable waters of the United States or *the resources within such waters*;
> (3) insure that vessels operating in the navigable waters of the United States shall comply with all applicable standards and requirements for vessel construction, equipment, manning, and operational procedures; and
> (4) insure that the handling of dangerous articles and substances on the structures in, on, or immediately adjacent to the navigable waters of the United States is conducted in accordance with established standards and requirements; and
> (d) advanced planning is critical in determining proper and adequate protective measures for the Nation's ports and waterways and *the marine environment,* with continuing consultation with other Federal agencies, State representatives, affected users, and the general public, in the development and implementation of such measures."

The centrality of protecting the marine environment is explicit in the statement of policy of the Act. By 1972, safe navigation was oriented not just to protecting

vessels engaged in domestic and global maritime commerce, but also to protecting the marine environment and the natural resources this nurtures.

Section 4(a) and (b) of the Ports and Waterways Safety Act authorizes the Commandant of the USCG to determine the times of vessel movements within ports and harbors, restrict vessel operations in hazardous areas and under hazardous conditions, and provide guidelines for the anchoring of vessels. Anchorages are regulated under this Act through 33 U.S. Code 1221 and following sections.

8.4.1.3. Designations of Anchorage grounds (33 U. S. Code Section 110.130 – 110.255)

Each anchorage ground is designated and described in 33 USC Section 110.130 – 110.255. Designations for SEFCRI anchorage grounds are discussed in Section 5.2 below. The anchorage ground for Port of Miami was officially established by rule in 1967; those for PE in 1993, and for Port of Palm Beach in 1986.

8.4.1.4. Florida Coral Reef Protection Act of 2009 (§ 403.93345, F.S.)

The Act authorizes FDEP to enhance the conservation of coral reefs off the coasts of Southeast Florida through a number of key actions including: 1) collection of compensatory damages and civil penalties for injuries to coral reefs to be held in the EMRTF to be dedicated to the rehabilitation and preservation of coral reefs; 2) development of a complete response and remediation protocol with the Responsible Party (RP), local, state, and federal government agencies in the reporting, primary and compensatory rehabilitation and monitoring of injured reefs; 3) design of a habitat equivalency analysis (HEA) as a systematic and consistent method to calculate damages; and 4) delegation of enforcement authority to other state agencies or coastal counties with coral reefs within their jurisdictions.

The Act stipulates that a party responsible for reef injury event must notify the FDEP within 24 hours of the injury occurrence, and must remove the grounded or anchored vessel within 72 hours after the event, unless weather or other marine hazards prevent safe removal. The removal of the vessel from the injury site must be done in consultation with FDEP and without causing further injury. Punitive fees that a RP has to pay include both compensatory damages, to compensate for what the state lost in terms of resource and function resulting from the reef injury, and civil penalties which are payments for wrongdoing. Fee schedules for both civil penalties and compensatory damages are included in the bill. The total fees levied will not exceed $250,000 per occurrence. All funds shall

be deposited in the Ecosystem Management and Restoration Trust Fund in the FDEP for the latter to disburse for the repair and monitoring of injured reefs including administrative costs to implement these.

The Act provides for unequivocal authorization by the state to FDEP to seriously address reef destruction by large as well as recreational vessels. Later amendments to the Act may be necessary to make it consistent with the substance and language of the proposed reauthorization of the federal Coral Reef Conservation Act. Coral reefs must be conserved not just as networks of resources but as ecosystems, regardless of their locations (in a national park or sanctuary and without) within US waters.

8.4.2. Federally Designated Anchorage Grounds in the SEFCRI Region

The three deepwater ports in the southeast Florida region each have a designated anchorage ground. The USCG Miami District recently led the reconfiguration of the PE anchorage ground to minimize the destruction of coral reef communities during normal vessel operations including turning and anchorage. The reconfigured site was finalized in 2008 with collaboration from state agencies, academia and NGOs. A similar process is envisioned in a possible redesign of the anchorage grounds for the Ports of Miami and of Palm Beach.

8.4.2.1. Port Everglades

8.4.2.1.1. Pre 2008 anchorage designation and regulations

33 USC Section 110.186 provides the bearings for PE Anchorages A and B when they were established in July 1993 following notice of proposed rule-making published in 1992 (Figure 8.8). Anchorage A was between the 2nd and 3rd Reef Tract while Anchorage B was located outside of the 3rd Reef Tract. Among the specific regulations stipulated for the two anchorage grounds were: (1) all vessels within the anchorage area shall maintain a 24 hour bridge watch by an English speaking deck officer monitoring VHF-FM channel 16, and who shall perform frequent checks of the vessel's position to ensure the vessel is not dragging anchor; (2) vessels experiencing malfunction or those planning to perform engine repairs or maintenance, shall immediately notify the Coast Guard Captain of the Port via the Coast Guard Group Miami on VHF-FM Channel 16; and (3) commercial vessels anchoring under emergency circumstances outside the anchorage area shall shift to new positions within the anchorage area immediately after the emergency ceases. None of the regulations provided for a rapid response protocol in the event of vessel grounding or anchor drag,

including damage assessment, interagency consultations, and payments for damaged biological resources.

8.4.2.1.2. Documented groundings

Over a 16 year period, 11 documented large vessel groundings and 5 anchor or chain drags have occurred in the vicinity of PE, resulting in at least an aggregate area of 11 acres of damaged bottom communities. Because there is no existing legislated protocol to mandatorily report and determine cumulative impacts of large vessel groundings and incidents of anchor and chain drags, it is difficult to determine with reasonable certainty the extent and longevity of such impacts and the resilience of biological communities to accommodate these impacts, with and without restoration efforts. In addition, there is no extant database to date that keeps track of large vessel accidents and resulting natural resource injuries.

In 1999, the USCG amended the anchorage regulations for PE directed at strengthening existing anchoring requirements and guidelines to avoid grounding or beaching during adverse weather conditions. The new regulations enforced since May 26, 1999, require vessels to notify the Captain of the Port when entering the anchorage grounds and when any malfunction or repair affects an anchoring vessel's main propulsion or steering equipment. An English-speaking licensed deck officer is required to be present to monitor Channel 16 VHF at all times while vessel is within the anchorage area, and must frequently monitor the vessel's position to ensure that it is not dragging anchor.

Since the 1999 amendments, 13 more grounding and anchor drag events occurred in PE waters (Table 8.7). In October 2007, the USCG issued a notice of proposed rule-making to reconfigure the anchorage ground by removing the portion in close proximity to the coralline areas, and to expand sections that are away from sensitive habitats and in deeper waters. Amendments also included restricting the amount of time vessels may remain in the anchorage grounds to minimize vessel crowding and reduce vessel numbers to those awaiting berth inside PE.

8.4.2.1.2.1. Impacts from large vessel groundings

Few studies have examined medium to long term impacts of large vessel groundings. Rogers and Garrison (2001) document the recovery of a coral reef in the US Virgin Islands National Park (island of St. John), which was damaged with a 128m x 3m scar from a cruise ship anchor drag in 1988. Surveys conducted in 1992, 1993, 1994, 1995 and 1998 indicated that live coral cover in the scarred area remained low at only a third of that in the adjacent undamaged reef area,

even after a decade after the injury. A study by Ebersole (2001) examined the ability of reef fish assemblages to recover from ship groundings in the FKNMS. He showed that regardless of the initial topographic complexity of grounding sites, reef fish recovery after 6 years to 16 years resembled fish assemblages in sites where groundings occurred 100 to 200 years previous. Impact sites, with or without benefit of remediation, and without complex bottom relief are colonized by algae and sponges, and attract small mouthed opportunistic fish that prey on small invertebrates. This was in contrast to well developed spur-and-groove reefs that provide excellent habitat for heavy fish grazers such as parrotfish. Ebersole (2001) added that unless restoration efforts included replacement of flattened topographic features, recruitment to enhance fish species diversity in impact sites seemed unsuccessful. In addition to these evidence of sub-par long term recovery of both coral and fish species, Jones (2007) stresses that local contamination of surficial sediments by chemicals from anti-fouling paint scraped from grounded ship hulls has been overlooked in damage assessment. The release of copper and zinc at initially elevated levels, with some deposited in sediments with the potential to be redistributed by disturbances like hurricanes, are sufficient to affect larval recruitment and settlement, despite remediation efforts. Given such long term impacts of groundings including contamination by larval settlement-suppressing chemicals, it is critical that southeast Florida ports and their associated anchorage areas that have been previously designated in relative proximity to the three reef tracts, be evaluated to minimize further reef injuries.

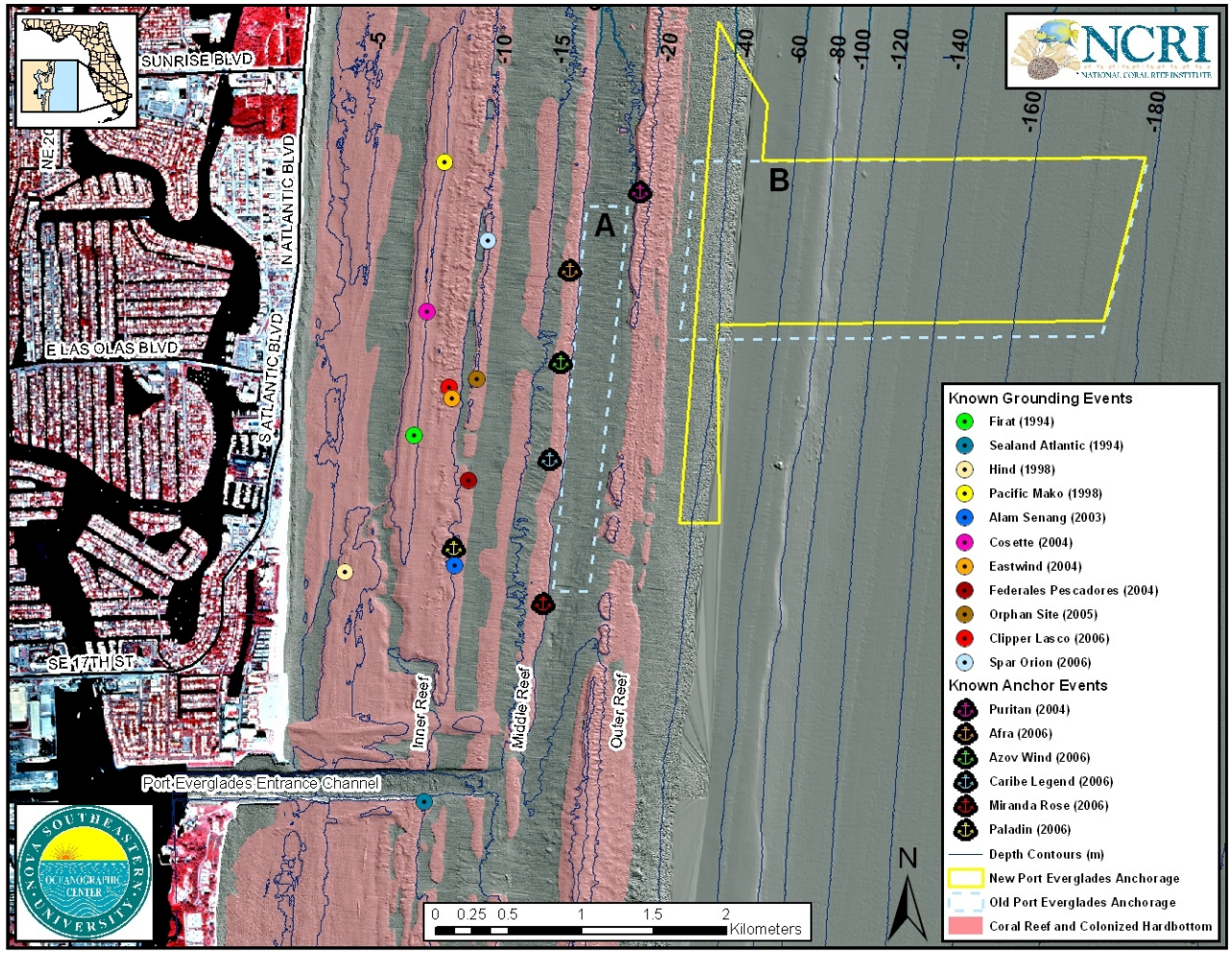


Figure 8.8. Pre 2008 and current anchorage ground for PE and documented grounding and anchor events over the period 1994 to 2006 (Collier, et al., 2008).

Table 8.7. Vessel groundings and anchor/chain drags in the vicinity of PE Anchorage grounds (Data from Frankovic, 2007; Walker, 2010).

Vessel	Year	Event type	Area of impact (m^2)
Firat	1994	Grounding	1,000
Pacific Mako	1998	Grounding	1,971
Hind	1998	Grounding	4,516
Alam Senang	2003	Grounding	216
Puritan	2004	Anchor/Chain drag	100
Eastwind	2004	Grounding	10,995
Federales Pescadores	2004	Grounding	23,399
Cosette	2004	Grounding	30
Orphan Site	2005	Grounding	300
Spar Orion	2006	Grounding	546
Clipper Lasco	2006	Grounding	558
Afra	2006	Anchor/Chain drag	350
Caribe Legend	2006	Anchor/Chain drag	190
Paladin	2006	Anchor/Chain drag	Unknown
Miranda Rose	2006	Anchor/Chain drag	None Found
Rio Magdalena	2007	Grounding	Unknown
Total (m^2)			44,171
Total (acres)			10.91

8.4.2.1.3. Reconfiguration of the PE anchorage grounds

In response to the numerous groundings and anchor drags that have destroyed about 11 acres of coralline and hard-bottom communities, the USCG Sector Miami as the lead federal agency in charge of port anchorages, initiated the process of anchorage reconfiguration. Interacting with USCG Sector Miami was the PE Harbor Safety Committee, particularly the Committee's Anchorage Working Group. Harbor Safety Committees are "local committees that address issues that may include the safety, security, mobility and environmental protection of a port or waterway. Membership is typically comprised of representatives of governmental agencies, maritime labor, industry organizations, and public interest groups. These members work closely together for the mutual benefit of all port users," (USCG, 2006). Harbor Safety Committees (HSCs) are "specifically called on to serve as local committees able to pursue safety and environmental concerns related to the Marine Transportation System and develop and execute collective actions…" (USCG, 2000).

The PE HSC is chaired by USCG (Sector Miami), and includes representatives from NOAA, PE, PE Pilots Association, FDEP, FWC, Suez Energy North America, MIASF, and Nova Southeastern University (NSU), among others. With technical expertise and advice from its Anchorage Working Group, the PE HSC used the state-of-the-art mapping technology to discriminate underwater habitats and measure bathymetry. Integrated with detailed habitat maps and bathymetric data were locations of artificial reefs, fish havens, an EPA permitted dumpsite, and a boundary buffer of 500ft. The PE HSC assessed various anchorage configurations, including swing circles that were possible to minimize, if not prevent groundings and anchor drags that decimate precious biological communities. Figure 8.8 shows the final configuration of the proposed anchorage ground, relative to the previous locations, the benthic habitats and known grounding and anchor or chain drag events.

The USCG, in addition, conducted a Section 7 Consultation under the ESA with the Services, NMFS and USFWS. Both concurred with the proposed reconfiguration as not likely to affect listed species including the West Indian Manatee, Johnson's seagrass, the Smalltooth sawfish, and all local turtle species. In addition, the NMFS highlighted the likely benefits of the proposed anchorage ground redesign to listed coral species such as the elkhorn and staghorn corals.

On October 22, 2007, the USCG published a Notice of proposed rule-making, explaining the proposed amendments of the anchorage location as well as rules

of its use by commercial vessels. The proposed modification included the elimination of Anchorage A because of its proximity to the Middle and Outer Reef Tracts and the extension of Anchorage B eastward away from the Outer Reef Tract to make up for the eliminated area (Figure 8.8). Proposed regulations stated that vessels would be allowed to stay in the anchorage ground for up to 72 hours, beyond which prior approval of the Captain of the Port would be required. All vessels anchored in the anchorage area must ensure that anchorage equipment would not be causing any injury to reefs and bottom communities.

The USCG received ten letters in response to the Notice of proposed rule-making, all of which were in favor of the spirit of the proposed amendments. Some comments provided alternate locations, which were considered in the deliberations of the PE HSC, and were deemed not feasible or safe. Other comments suggested the installation of a mooring buoy system, a measure that was deemed by the PE HSC to be not currently viable, and may be revisited when practicable. The Final Rule was published in the Federal Register on February 5, 2008 and to take into effect by March 6, 2008.

8.4.2.1.4. Challenges in enforcing PE anchorage regulations[1]

The redesign of the PE Anchorage Ground and modification of anchorage rules from inception to publication of the final rule represented a community effort to address the issue of large vessel groundings. However, this is but one major component of a larger preventive action program that includes promoting and monitoring compliance among large commercial vessels to achieve the overarching goal of preventing and remediating coral reef injuries.

For monitoring vessel movement in waters within the vicinity of PE, the USCG has a HawkEye camera system and radar that can track the Automatic Identification System (AIS) and anchorage ground 24/7, but USCG personnel to do so is limited. In theory, the anchorage ground is monitored by PE HSC member agencies, although no single agency has been identified as "anchorage watchstander." Most vessels are anchored for approximately eight hours, and the Harbormaster's office is supposed to receive notification prior to vessel anchorage. Although the USCG is the law enforcement agency mandated by rule, it needs reinforcement from state and local government bodies to effectively enforce current regulations.

[1] Annotations for section 8.4.2.1.4 were based on the minutes of the PE HSC dated April 2, 2008 and July 16, 2008.

In addition to the lack of monitoring personnel, the existing penalty schedule for anchoring outside of designated areas is too minimal to deter non-compliance. The fees for anchoring outside of designated anchorage grounds are: $50 for first offense, $75 for second offense, $100 for third offense, and $110 for each subsequent offense. The USCG acknowledges that these penalty fees are inconsequential for commercial vessels carrying goods or assets worth millions to elicit compliance and is depending on the state or county to impose higher penalty fees. For a situation when a vessel does not heed a Captain of the Port Order to change position within the anchorage, the USCG can levy a penalty fee of up to $32,500, though this scenario is much less infrequent than the former.

Aside from monitoring issues and inappropriately low penalty fees, the lack of a response protocol to address bottom substrate injury events is a major point of weakness in an overall program of natural resource protection. This is further discussed in section 8.4.3 below.

8.4.2.2. Analysis of anchorage grounds for the Port of Miami and Port of Palm Beach

Following the collective experience in the reconfiguration of PE, a similar analyses of bathymetric and habitat data using a geographic information system has been implemented by Dr. Brian Walker of the NSU Oceanographic Center for the anchorage grounds in POM and PPB (Figures 8.9 and 8.10) (Walker, 2010). Preliminary assessment indicates that the PPB anchorages do not surround coralline areas except a few near the edges and potential modification may include increasing the buffer zones between coralline areas and the anchorage (Walker, 2010).

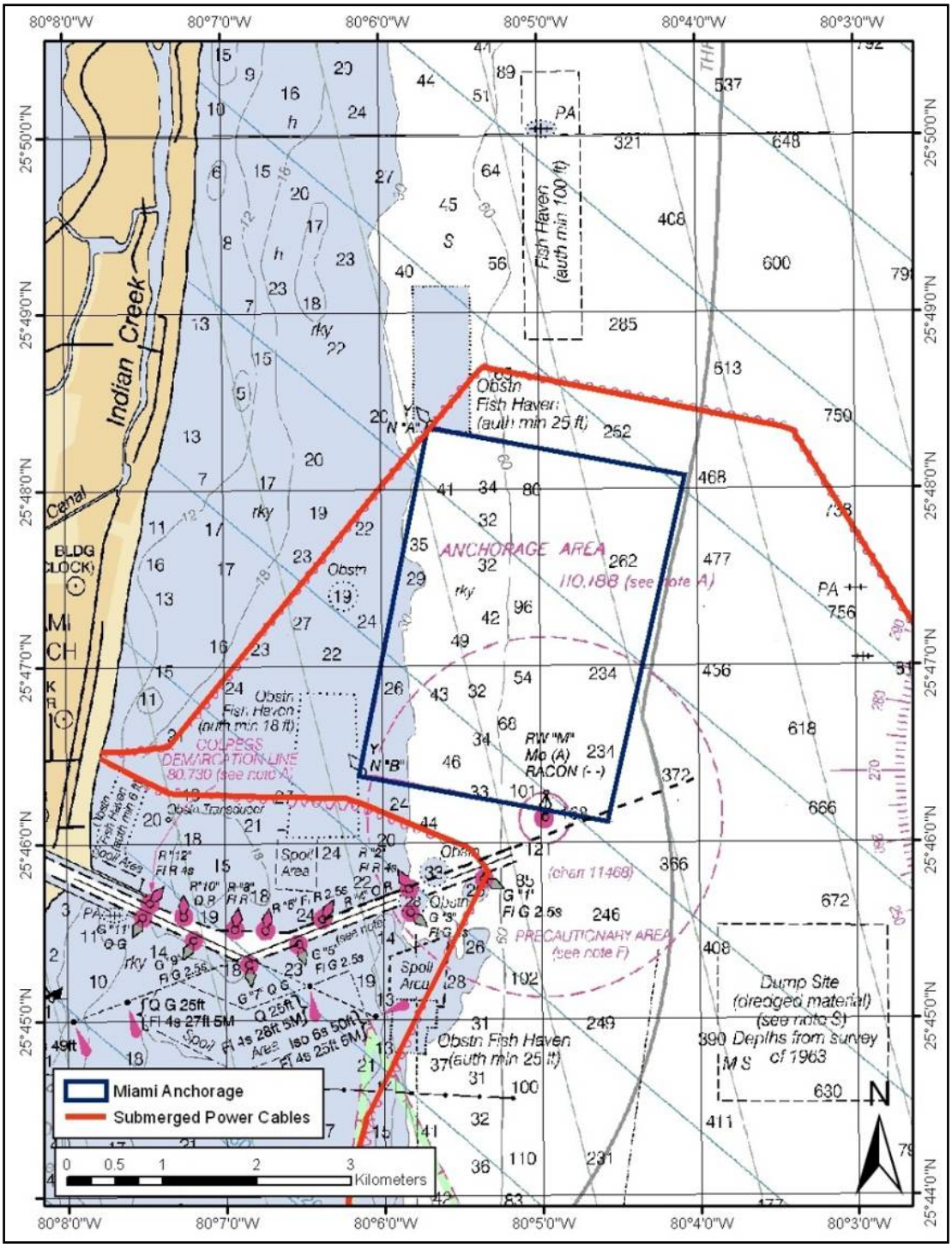


Figure 8.9.a. Location map for the anchorage ground of Port of Miami (Walker, 2010).

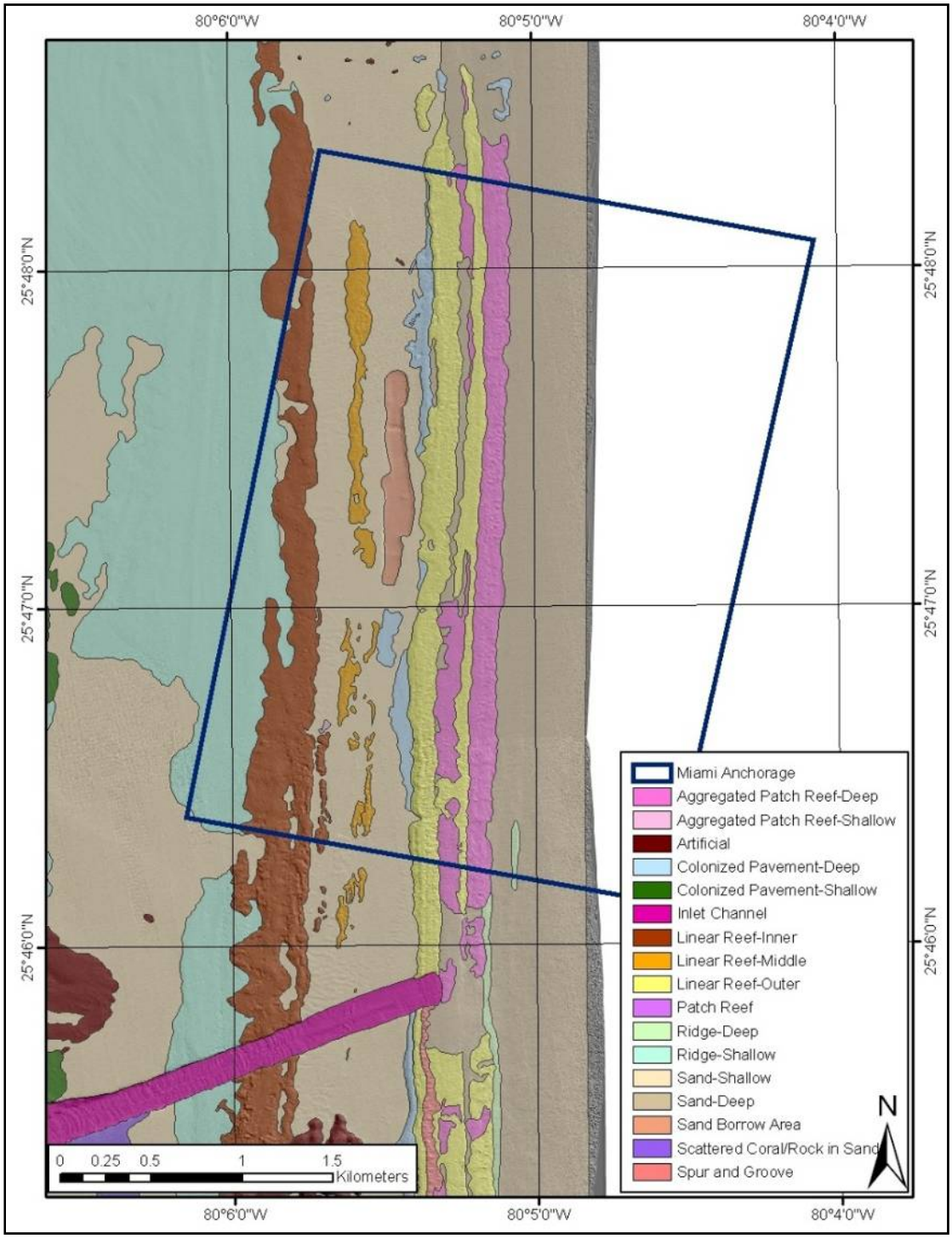


Figure 8.9.b. Habitat map for the anchorage ground of Port of Miami indicating the highly vulnerable living reefs right inside the anchorage area (Walker, 2010).

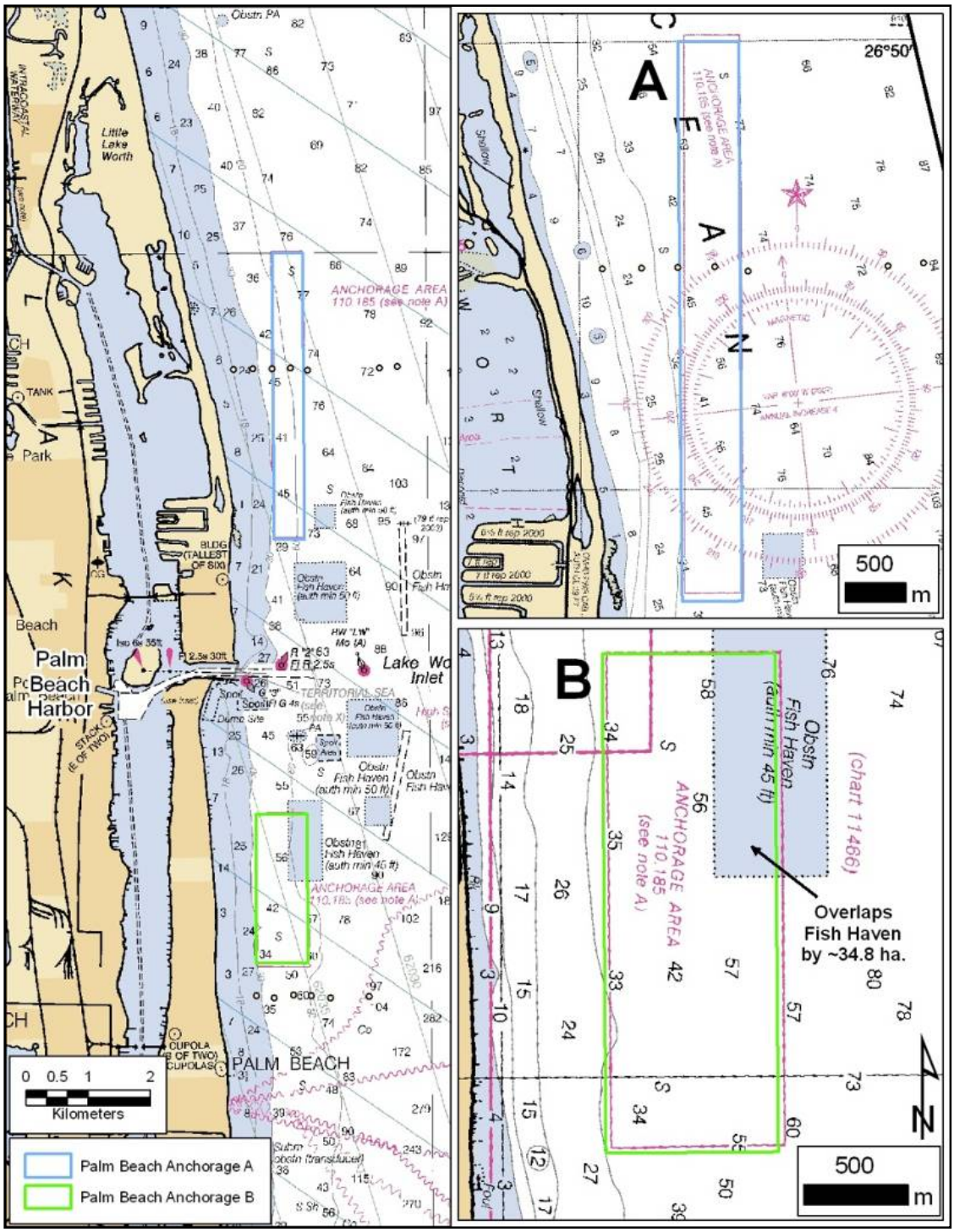


Figure 8.10.a. The current anchorage grounds for the Port of Palm Beach.

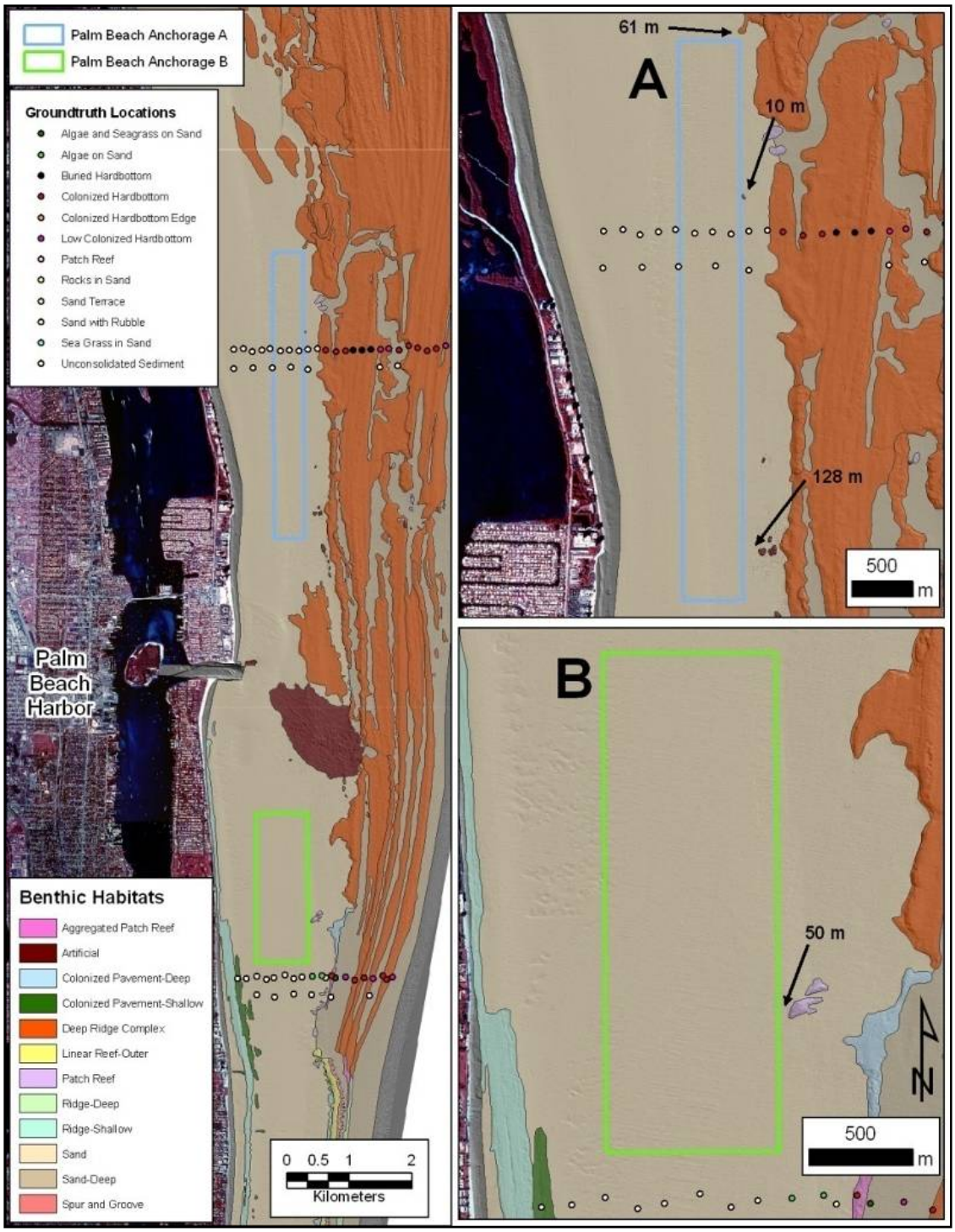


Figure 8.10.b. The habitat within the current anchorage grounds for the Port of Palm Beach.

In the case of POM anchorage, it straddles all three linear reefs, making the latter highly vulnerable to grounding and anchor drags, and the anchorage reconfiguration an urgent step to take. The current anchorage boundaries enclose about 644 acres of coralline habitat, much of which has also been designated by NOAA as a critical habitat for the currently threatened staghorn and elkhorn corals (NOAA, 2008, Walker, 2010). The Port of Miami Harbor Safety Committee Anchorage Working Group, made up of representatives from the POM, the USCG, Miami Pilots, Miami-Dade Environmental Resource Management, USACE, FDEP Coral Reef Conservation Program, the National Coral Reef Institute, NOAA and the FWC, met in November 2008, to plot its course of action. Formal deliberations will commence when habitat maps are completed in early 2009.

8.4.3. Proposed legislation

Current federal regulations treat vessel-inflicted coral injuries solely within the context of maritime commerce, and by implication, places the lead responsibility for coordination of monitoring and remediation activities on the USCG. As is evident from the foregoing discussion, coral reef conservation, including prevention and mitigation of coral reef injuries, requires a broader view of human activities that impact coral reefs. It calls for an appropriately expanded authority to design coordinated action programs, mobilize appropriate federal as well as state and local agencies and provide financial support, all through unequivocal legislation. The proposed federal legislation discussed below provide an expanded framework and authority for federal and state agencies (as stipulated for by the newly passed Florida CRPA) to serve as core group within an expanded network to directly address coral reef destruction resulting from a multitude of human activities.

US House Resolution (H.R.) 860 entitled "Coral Reef Conservation Act Reauthorization and Enhancement Amendments of 2009" amends the Coral Reef Conservation Act of 2000 to include the provisions below, a number of which have direct import to the issue of large vessel groundings. Notations are quoted from the Congressional Research Service Summary.

1. "Extend the award of remaining coral reef conservation program grant funds to appropriate projects, including monitoring and assessment, research, pollution reduction, education, and technical support.
2. "Authorizes actions to minimize injury to a coral reef or loss of an ecosystem function from vessel impacts, derelict fishing gear, vessel anchors and anchors chains, and unforeseen or disaster-related circumstances as a result

of human activities and to stabilize, repair, or restore the reef, including vessel removal and emergency stabilization of the vessel or reef.

3. "Deems specified terms (such as "sanctuary resources" and 'national marine sanctuary") to include any coral reef that is subject to the jurisdiction of the United States or (subject to state consent) any state, regardless of whether the reef is in a national marine sanctuary.
4. "Modifies the Act's purposes, the goals and objectives of the national coral reef action strategy, and the Act's authorized activities. Directs the Secretary of Commerce to provide for the long term stewardship of environmental data.
5. "Allows the Coral Reef Conservation Fund to be used to address emergency response actions.
6. "Authorizes the Administrator to: (1) make community-based planning grants for increased protection of high priority reefs; (2) maintain an inventory of all vessel grounding incidents involving coral reefs; and (3) identify all coral reefs with a high incidence of vessel impacts and measures to reduce such impacts.
7. "Establishes the International Coral Reef Conservation Program for ecosystems outside U.S. jurisdiction and establishes an international coral reef ecosystem partnership program.
8. "Establishes the U.S. Coral Reef Task Force to coordinate federal actions regarding such ecosystems.
9. "Amends the Fish and Wildlife Coordination Act to include such ecosystems in the definition of "wildlife" and "wildlife resources".
10. "Requires, regarding authorities under the Fish and Wildlife Act of 1956 and the Fish and Wildlife Improvement Act of 1978, that references to "wildlife" and "fish and wildlife" be construed to include such ecosystems.
11. "Authorizes the Secretary of the Interior, subject to appropriations, to provide financial assistance to coastal states."

The bill was introduced to the 111th Congress on February 4, 2009 and referred to the House Committee on Natural Resources, which revised the bill text, and to the House Subcommittee on Insular Affairs, Oceans and Wildlife, which has held hearings. On April 22, 2009, the House Committee on Natural Resources recommended that the full House consider the bill. The House of Representatives passed an amended version of the bill on Sept. 22, 2009 and awaits action of the Senate.

Should H.R. 860 be finally enacted, the reauthorized Coral Reef Conservation Act shall provide unprecedented legal basis for ecosystem-based protection and management of coral reefs within US waters, regardless of whether these are found inside or outside federal sanctuaries or parks. It authorizes federal and

strongly encourages and supports state actions to minimize injury and loss of coral reef functions stemming from anthropogenic sources, through the integrated use of liability provisions, and preventive as well as remediation measures. It puts to task the U.S. Coral Reef Task Force to coordinate federal actions, the Secretary of Commerce to provide for long term data stewardship, and the Secretary of the Interior to provide financial support to coastal states with statewide coral reef conservation programs, among others.

8.4.4. Draft response protocol for large vessel injuries

Preventive mechanisms such as anchorages strategically located away from coral reefs, and effective monitoring and compliance-enhancing measures are qualitatively superior in conserving the natural complexity and biodiversity of structure and functioning of extant SEFCRI coral reefs. However, in the event that unpermitted coral reef injury occurs, it is critical that a response protocol be established and grounded on unambiguous legislation. The underpinning legal authority of FDEP to be the lead department in coral reef protection and in the recovery of monetary damages resulting from large vessel and anchor injuries is established in the Florida CRPA. A response protocol has been drafted (Collier, Dodge, Gilliam, Gracie, Gregg, Jaap, Mastry, & Poulos, 2007), and is summarized in this section and its main features highlighted to determine remaining legal, institutional and environmental issues that should be addressed prior to protocol codification through the department's rule-making authority.

The draft response protocol identifies the FDEP as the primary Trustee with delegated authority from the Board of Trustees of the Internal Improvement Trust Fund to protect submerged state lands and its resources, and the RP as that which inflicts injury to the reefs through unpermitted activities such as vessel groundings and anchor drags. The roles of both, including those of cooperating agencies with jurisdictions over some activities in the protocol are indicated at each step of the process that is divided into three chronologically sequenced stages: 1) initial response; 2) response; and 3) post-response actions.

8.4.1.1. Initial response

The initial response to events of coral reef injuries include incident reporting by any individual with knowledge of an injury event via a proposed 24/7 hotline that is best integrated with FDEP's Bureau of Emergency Response (BER) State Warning Point (SWP) hotline. The initial communication must be disseminated to the following agencies:

- USCG Miami Sector;
- FWCDLE;
- FDEPBER to contact the Coral Reef Conservation Program and the FDEP Office of General Counsel
- NMFS Damage Assessment and Restoration Program; and
- County environmental and law enforcement officials

A public environmental education through FDEP and with support from FWC should be conducted to inform, promote, and encourage citizen reporting.

For the initial sighting report, the draft protocol provides guide questions to obtain as much initial data as possible including:

- Cause of reef injury (ship strike, anchor drag)
- Location of the incident
- Approximate size of the injured area
- Involvement of a vessel (vessel name, registration number, vessel type, make, model, color, size)
- Associated environmental impacts (discharges of petroleum or other substances)
- Behavior of vessel crew (corrective actions, attempt to dislodge vessel, escape)
- Presence of agency personnel in the scene
- Optional contact details of reporting party
- Visual documentation of the incident (photo or video)

Upon receipt of the initial sighting report, agencies can respond in a coordinated fashion. FDEP BER, who maintains the SWP hotline, shall notify the Coral Reef Conservation Program who is proposed to develop and maintain a password protected website where the initial incident report shall be uploaded. This information will be complemented with the RP's contact details (if known), the contact information of participating agencies and those of potential contractors to implement various activities called for by the response protocol. For incidents with the involvement of vessels, the USCG is in charge and has established protocols to initiate interagency coordination.

8.4.4.2. Response

8.4.4.2.1. Duties of the FDEP as Primary Trustee

The response process can take a number of scenarios accommodating the presence or absence of a RP the immediate availability of funding, and the identification of a primary enforcement agency in cases where overlapping jurisdictions exist, as is mostly the case when maritime accidents happen. Table 8.8 summarizes the obligations of the FDEP as Primary Trustee in the response stage of the protocol. The critical actions of FDEP are violation notification and an accredited collection of evidence to underpin subsequent litigation. After an initial site assessment, and if primary restoration is required, FDEP provides the RP a copy of the initial assessment report.

Table 8.8. Obligations of the FDEP as Primary Trustee (Collier, et al., 2007).

Duty	**Remarks**
Identification of the cause of injury	Human inflicted coral reef injury features scarring and localized structural reef damage, along with paint excoriation and hull debris and in certain cases, discharge of petroleum and other ship-borne substances.
Identification of the RP	RPs may be known at the time the incident occurs, or discovered in the course of investigation. Alternatively, an RP may remain unknown making the injury location an orphan site.
Vessel salvage	In cases of a vessel strike, the USCG is the lead agency for salvage operations, which if done carelessly can lead to further reef damage. A reconnaissance survey to plot the least harmful approach in releasing the vessel, including offloading cargo and the use of buoyed towlines.
Enforcement action	Previous enforcement practice by the Board of Trustees used its proprietary authority to obtain compensatory damages. The proposed protocol strongly recommends the complementary use of the Trustee's regulatory authority to notify the erring party through a noncompliance letter, a warning letter, or a Notice of

	Violation. This sets the stage for ensuing legal proceedings through which the FDEP shall impose civil penalties and demand compensatory damages, to be disbursed solely for remediating reef injury and restoring reef structure and function to the fullest extent possible.
Evidence collection	A state or federal law enforcement accreditation commission shall need to accredit the collection of reef injury evidence and the quality of injury data for these to be admissible in court litigation. Responsible agencies include FWC, FDEP and local governments.
Initial site assessment	Upon the completion of evidence collection, and the site declared safe for subsequent inspection, the Trustees conduct an initial site assessment through which injury types are identified, the extent of damaged measured and documented. The data is used to develop a primary restoration plan if needed, and which FDEP transmits to the RP as an enforcement action.
Biological triage	This step aims to save injured organisms and is done usually in conjunction with the initial site assessment, but must not interfere with evidence collection.

8.4.4.2.2. Duties of the Responsible Party

Table 8.9 summarizes the actions required of the RP during the response stage. Obtaining authorizations from multiple agencies can be the most time consuming step. An integrated process must be developed by FDEP and other agencies with jurisdictions to authorize the RP to use sovereign submerged lands, conduct work with biological resources, and to set up temporary mooring as appropriate. The RP submits a detailed site assessment to FDEP for review and approval before it proceeds with primary restoration (Table 8.10).

Table 8.9. Obligations of the RP (Collier, et al., 2007). All actions of the RP are carried out with the approval of and under the supervision of the Trustees.

Duty	Remarks
Contractor selection	The RP may wish to hire a contractor to undertake the stipulated activities in the Primary Restoration Plan, with guidance and approval from the FDEP and based on a certification or qualification basis to evaluate contractor competence. The FWC is identified as the responsible agency to lead this step.
Obtaining authorizations	The RP is responsible for obtaining all authorization to undertake all activities required in the Primary Restoration Plan.
• Agency authorization	These can include FDEP authorization for impacts on sovereign submerged lands, a Special Activity License (SAL) from FWC. Both agencies can enter into a Memorandum of Understanding to develop a streamlined and integrated authorization process to make for an efficient and rapid response. FDEP and FWC will collaborate on these.
• Rubble disposal	Rubble may be used for remediation. Left over rubble, however, must be properly disposed of, including appropriate testing for contaminants which can further damage remaining reefs in the vicinity.
• Temporary mooring	Currently, setting up temporary mooring requires review and authorization by FWC, FDEP, ACOE, USCG and NMFS. There is a need to streamline this to allow for an efficient and rapid response. USCG is identified to lead this process with support from the other agencies.
• Paint removal and disposal	Paint from ship hull chips released or excoriated during grounding contains antifouling agents such as tributyltin, zinc or copper, which can inflict further damage to planktonic larvae. Proper removal and disposal are necessary. If the paint contains listed hazardous compounds, they must be disposed of in a licensed hazardous waste facility.
• ESA consultation	With the listing of the elkhorn and staghorn corals as threatened species, and the establishment of critical habitats for these, an ESA consultation will be needed should either the species or their habitats are affected by the injury or by the restoration activities.
Detailed site assessment	This study is conducted by the RP and shall consist of a site map, a detailed description of the injury by species, location, status of organisms in terms of the injury, and quantification by area and number of impacted organisms. A biological triage to rescue, stabilize and maintain rescued organisms for subsequent restoration is also conducted. Detailed visual and mapping documentation should be provided in GIS format as well as a comprehensive description of assessment methods used. Hard and digital formats of the report should be submitted to FDEP in compliance with the protocol.
Primary Restoration Plan	The RP develops this following the detailed site assessment and submits it to FDEP for approval. See Table 8.10 for details of the restoration plan.

8.4.4.2.3. Implementing the Primary Restoration Plan

The detailed site assessment becomes the basis for the RP to develop the Primary Restoration Plan, for review and approval by the FDEP. The RP implements the plan using its own resources. When the RP is unknown, FDEP and cooperating agencies may undertake primary restoration activities as financial resources allow. Thus, it is critical that civil penalties and compensatory damages are collected when possible and deposited in the Ecosystem Management and Restoration Trust Fund.

To facilitate the collection of penalties and damages, a penalty schedule has been included in the Florida CRPA. In addition, spending authority to pay for immediate action and restoration needs is incorporated in the statutory language of the Act. Furthermore, the statutory nature of the penalty fee allows other agencies with jurisdictions over reef resources to use the same assessment schedule for consistency.

Table 8.10 lists the components of a Primary Restoration Plan. The proposed protocol suggests the development of a database to track the status of restoration and the recovery of injured areas under the lead of FWC. This would allow agencies to prioritize unrestored areas when resources become available.

Table 8.10. Components of a Primary Restoration Plan (Collier, et al., 2007). The Plan is developed and implemented by the RP or by FDEP and cooperating agencies for orphan sites as financial resources allow.

Component	Details
Background information	Summarizes the information provided by the incident report, and those submitted by law enforcement agencies.
Site assessment	Results from the RP's detailed site assessment report
Biological triage	Proposed methods and schedule for conducting triage on affected organisms
Debris removal	Proposed methods for debris removal and disposal including potentially hazardous chemicals from hull paint
Reef framework repair	Proposed methods for repairing injury to substrate
Rubble stabilization	Proposed methods for on-site rubble stabilization
Rubble disposal	Proposed methods for rubble removal and disposal
Organism reattachment	Proposed methods for attaching benthos by category
Mapping of reattached organisms	Proposed plan for mapping reattached benthos
Authorization	Enumerates authorizations necessary to implement restoration activities and status of procurement
Schedule	Proposed schedule of restoration to completion
Reporting	Proposed schedule of report delivery to FDEP highlighting progress and problems encountered that may delay restoration

8.4.2.2.4. Post-response

The post-response phase is focused on the determination of compensatory damages following the completion of primary restoration. The assessment examines the loss of ecological services from the time of injury to the anticipated time of natural recovery to baseline conditions, given that the primary restoration is highly insufficient to return damaged reefs to pre-injury conditions.

The daft protocol recommends the use of the HEA to replace the Uniform Mitigation Assessment Method (UMAM) that is currently the codified approach and to modify the UMAM to make it a more relevant method by removing scoring biases. The Florida CRPA identifies the HEAA as an assessment method that may be used to calculate compensatory damages with options to use other appropriate methods.

Compensatory damages are intended to allow the Trustees to pursue compensatory mitigation, with compensatory restoration being the preferred mitigation action by the Trustees. These require long term (decadal) monitoring and the design of appropriate projects to achieve baseline reef conditions to the extent possible.

To conclude this section on large vessel groundings, the signing into law of the Florida CRPA on May 31, 2009 shall greatly enhance the ability of the state and collaborating federal agencies to mitigate human-induced reef damage. If the federal bill reauthorizing the Coral Reef Conservation Act of 2000 is realized, then reef conservation at all levels may just be able to minimize further degradation of remaining reefs because of large vessel-caused injuries in the nation, and in the SEFRCI region in particular. However, this protocol does not mitigate the current shortage of personnel monitoring the port anchorages. Until a mechanism is designed to optimize on the collaboration between state and federal agencies as well as civil groups in implementing a vigilant monitoring program, a functional response protocol will mitigate coral reef injuries but the preferred scenario of preventing such injuries will remain handicapped.

8.5. Case Studies: Port Everglades Expansion Project Proposals

Three project proposals are discussed in this section to evaluate if current regulations and the processes to engage civil groups are sufficient in steering port development towards ecological sustainability, specifically through the protection of coral reefs and associated coastal ecosystems. Two of the proposed projects, the Turning Notch Project and the Outer Channel Expansion Dredging, are subsumed within the PE Development and Expansion Program. A third proposal, the Suez Calypso Liquefied Natural Gas (LNG) Deepwater Port and Pipeline Project, is an associated energy project that would use onshore port facilities to distribute LNG to users.

8.5.1. USACE Port Everglades Development Program

On December 4, 2007, the Broward County Board of County Commissioners approved the PE Master/Vision Plan, which included a five year Capital Improvement Plan and a 10- and 20-year Vision Plans. Major components include the following:

- Deepening and widening of waterways
- Reconfigured berth layout to accommodate state-of-the-art cruise, cargo and petroleum ships
- An intermodal container transfer facility to establish links with the existing Florida rail system and reduce on-road cargo/container truck traffic
- Aggregate facility to receive crushed rock
- Replacement of majority of the bulkhead infrastructure over a 20 year timeframe
- Expanded cruise terminals to accommodate mega-cruise ships
- Maintenance of the migrating manatee population that overwinters in PE
- Improvement of the mangroves, seagrass and wetlands of Westlake Park as an offsite mitigation area
- Implementation of a "Green Port Program"

To accommodate bigger vessels for cargo and cruise passengers, the waterways of the port would need to be expanded in width and in depth. The two port expansion projects discussed below feature how the existing regulatory mechanisms and vetting process examined the merits of the proposed projects, and their status or resolution to date. Table 8.11 details the chronology of the PE Expansion Project for the period 2001 to 2009.

Table 8.11. History of the USACE PE Expansion Plans. This expansion program includes the proposed deepening and widening of the Turning Notch and PE OEC (Jordan, 2007, PE, 2010).

Date	Milestone
March 5, 2001	Federal Registry Notice (66 FR 16191) announced Notice of Intent to prepare EIS
March 28, 2001	Public Scoping Meeting held
February 2002	Project Coordinating Meeting
June 2002	Creation of Port Everglades Reef Group (PERG) which met in June, August, November 2002 and in April 2003
November 2002	Draft Feasibility Report with EIS prepared – not released
November 2004	Second Draft Report Feasibility Report with EIS Prepared
February 2005	Stakeholders meeting at PE to update on project status
May 2005	First Draft PERG Recommendations Document given to PERG members for review
May 2005	Alternative Formulation Briefing
June 2005	Reef Assessment Coordination Meeting
June 2005	Meeting to prepare UMAM assessment of seagrass and mangrove impacts
July 2006	Draft Reef Assessment Report provided to the resource agencies for review and comment
October 2006	Final Reef Assessment Report – no significant revisions
October 2006	Discussions with resource agencies and academics concerning the use of UMAM to evaluate reef resources
October 2006	Final PERG report provided to the resource agencies
November 2006	Meeting to develop an HEA for the reef resource impacts for PE OEC
March 2007	OEC Alignment Alternatives Meeting
May 2007	Pilots Perspective Meeting
September 2007	HEA Parameter Development Meeting for PE OEC
October 2007	USACE invited NMFS, FWC, FDEP, BCEPD to be Cooperating Agencies
November 2007	HEA Parameter Development Meeting #2
April 2008	ESA Consultation – Status, review and future plans
April 2008	Disapproval of the removal of mangroves from Conservation Easement for the expansion of the Turning Notch Element by Broward County Commission
2009	Updates on the 2006 PE Master Plan; Pursue the Conservation Easement Issue between USACE, PE and FDEP; Finalize the Draft Report and EIS
2011	Feasibility Study and Draft EIS not yet released

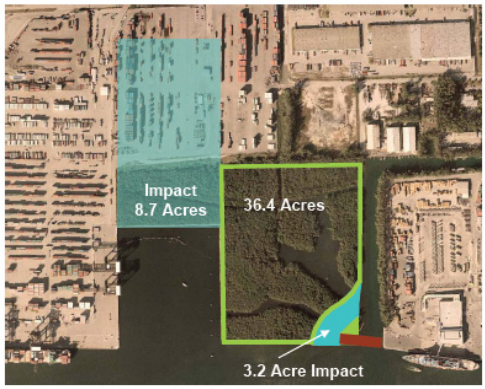
8.5.1.1. Turning Notch Project and Conservation Easement Conflict

The March 6, 2007 version of the PE Master/Vision Plan identified increasing vessel size as the most critical factor limiting growth in port operations. This said it is major driver in reconfiguring berth sizes and overall berth layout, as well as in expanding channels and turning notches in both width and depth. Current berth lengths vary from 800 to 992ft. To accommodate a Maersk S-Class vessel that is 1,180ft in length (Length Over All, LOA), berth length has to increase to almost 1,400ft. For ships of this size to maneuver, the Turning Notch would have to expand as well to obtain maximum socioeconomic benefits and maintain competitive edge in international maritime commerce.

The existing Turning Notch was created by removing 18 acres of mangroves based on a 1987 permit granted to PE in its execution of the 1984-2000 Master Plan. A $3.2M mitigation project consisted of creating 23 acres of new wetlands at John U. Lloyd Park, the construction of an environmental education center at John U. Lloyd Park and creating five acres of new wetlands in West Lake Park. In 1988, PE granted a 48.27 acre Mangrove Conservation Easement, the area north and west of the current Turning Notch, to Broward County. Easements are conservation areas declared in perpetuity and are used to protect sizable tracts of natural features such as mangroves in this case from further reduction in area (Figure. 8.11A).

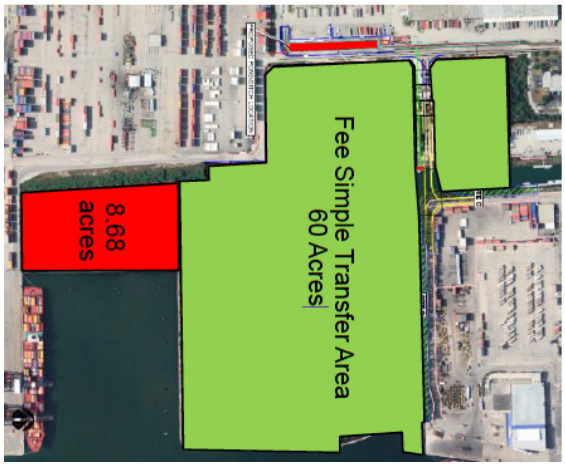
In 1997, a Cost-Sharing Agreement between the Port and the ACOE was signed to conduct a Harbor Expansion Feasibility Study including the expansion of the Turning Notch. The study identified the construction of additional berth within the Turning Notch and which would require removal of 8.7 acres of the Conservation Easement to the west of the Turning Notch. By 2001, the Port initiated negotiations with FDEP to release the needed acreage. The FDEP in 2002 agreed to swap the 19.4 acre Pavilion parcel in Dania Beach for 8.7 acres of the Conservation Easement. The swap did not push through with a developer acquiring the Dania Beach parcel in 2003. Another area in Deerfield Island was indicated by FDEP in 2005 to be a viable land swap, so that the Port engaged appraisers to assess the Deerfield Island. In 2008, the Port conducted a biological assessment of the 8.7 acres and the additional 3.2 acres at the northeast corner of the Easement that needed to be removed for the expansion of Berth #29. Both clearances would amount to removing a total of 11.9 acres of the Conservation Easement (Figure 8.11B). The Port proposed to conduct mitigation offsite at West Lake Park for 20 credits, 5.4 credits of which would be required for the Turning Notch expansion.

A. Existing turning notch & conservation easement (48.3 acres).



B. Impacted mangrove areas (11.9 acres).

C. Upland enhancement of 16.5 ac.



D. Release of conservation easement - transfer area of 60 ac.

E. Turning notch expansion at current depth of 42ft (Project 1).

F. Turning notch deepening to 50ft (Project 2).

Figure 8.11. Previous page. Port Everglades Turning Notch Issue and Resolution. (from Port Everglades, 2008, 2010).

In April 2008, the Broward County Commission disapproved the removal of 8.7 acres of mangrove trees in the Conservation Easement. The pressure came from environmental groups that reminded the Commission that the conservation easement was established to ensure that further port expansion would not jeopardize all the wetlands adjacent to the port. One such group is the Audubon of Florida and which wrote to the Broward County Mayor and Commissioners on April 7, 2008. Audubon reminded the Broward County leadership that the easement requirement was solicited because of the serious concern about the cumulative impacts of future destruction of the remaining mangroves when the existing turning notch was constructed in the 1980's. The group stated in this letter that the Port's proposal to remove 11.8 acres of natural mangrove stand "trivializes the importance of the conservation easement" and that "there is absolutely no guarantee that the Port will not again seek to vacate the remaining conservation easement (or portions thereof)…In fact, the manner in which the Port proposes to trade-off the conservation easement simply because the UMAM's requirements are being met at West Lake Park serves as a virtual invitation to such future conversions."

Considering that the Southport Turning Notch expansion is essential to increasing berthing capacity in the port, PE developed a habitat enhancement proposal designed to create 17 acres of mangrove wetlands out of existing Port land adjacent to the Conservation Easement (Figure 8.11C). The proposal was presented to FDEP, to which the latter indicated 10 critical points that should be addressed before it makes a final determination. These included (FDEP May 13, 2008):

- The type of soil and level of soil contamination of the upland areas that are proposed for conversion to mangrove wetland;
- The storm water drainage plans for contributing areas around the proposed conservation area;
- The possibility of reconfiguring, removing or limiting the use of the proposed bridge over the discharge canal;
- The possibility of reconfiguring the proposed roadway west of the proposed canal bridge and the associated parking area in order to establish a connection between the wetland creation parcels;
- A proposed site plan for areas that would be restored to wetland mangrove communities, including surface elevations and planting layout.
- Evaluation of the ecological functions of the portion of the Conservation Easement to be released (adjacent to the Southport Turning Notch) in comparison to the functions of the proposed conservation area based on the design of the mangrove wetlands to be constructed. Use of the

UMAM is preferred by the FDEP.

- Effect of the proposed alterations on the existing portion of the Conservation Easement that would not be altered;
- The possibility of granting the State of Florida ownership of some or all of the existing and proposed Conservation Easement areas so that they could manage wetland swaps more efficiently;
- Long term plans for the area around the proposed conservation site not reflected in the current draft of the PE 20 year Master Plan.

PE contracted CH2M Hill to conduct the preliminary design and technical studies that would address the concerns of FDEP. The contractor provided a UMAM, hydrodynamic, and storm water drainage assessments in a January 2009 comprehensive report entitled "Port Everglades Feasibility and Technical Study for the Creation of Mangrove Wetlands" (CH2M Hill, 2009a). The UMAM assessment indicated that release of mangrove from the Conservation Easement would result in a functional loss of 5.38 units, and the creation of new wetlands would produce a total functional gain of 6.20 units. To provide hydrologic regimes favorable to mangrove functioning, improvements in the channels and the installation of an east-west ditch as well as an east-west culvert would enhance ebb tide drainage of the created wetland. PE submitted a letter to FDEP dated February 3, 2009 including the text of the full study. In the letter, PE noted that a contaminant assessment would be conducted only after FDEP "agrees that the results of the work completed thus far continues to support the approval of an ongoing Port enhancement to offset the removal of a portion of the existing Conservation Easement" (CH2M Hill, 2009a).

FDEP sent a response to the study above in its letter dated March 13, 2009, stating that it could not yet determine if the mangrove creation proposal would confer greater benefits than that provided by the conservation area that has been requested for release. Additional information is needed to fully evaluate risks associated with the proposed mangrove area creation.

In September 2009, CH2M Hill completed a follow-up study entitled "Environmental Investigation for Proposed Mangrove Creation Area at Port Everglades" (CH2M Hill, 2009b) and which directly responded to FDEP's concerns regarding potential contamination of soil, groundwater, and sediments in areas that would be excavated and in locations for mangrove creation. Figure 8.11C shows the proposed areas where new mangrove stands would be planted. The conclusions indicate that soil to be excavated in the indicated areas did not show contaminant content to exceed any of the FDEP criteria. Soil in planting locations did not exceed criteria except for three exceptions. For groundwater, samples did not exceed FDEP criteria except in five instances. The sediments

sampled exceeded threshold effect levels for certain contaminants, but were below probable effect levels, and were not expected to be harmful to benthic invertebrates, according to the report. Based on these results, CH2M Hill (2009b) recommended the following:

- Overburden that would be excavated in Area B next to a closed landfill would need to be screened in order to recover reusable material and to determine appropriate disposal of the non-reusable portion.

- Mangroves should be planted following a FDEP approved mangrove cultivation plan.

- Soil sampling in areas where cadmium exceeded FDEP probable effects level should be conducted prior to mangrove planting. If cadmium concentrations are shown to be higher, remediation of contaminated soils should be considered.

The interplay between PE, civil society, the Broward County Commission and FDEP indicates how development can and must be steered towards serious consideration of environmental impacts and mitigation for these. The economic imperative for PE to expand so it can accommodate increasing vessel size of cargo and cruise ships is understandable. Yet the heightened environmental consciousness among citizen groups unequivocally indicates that conservation easements symbolize a deeply shared commitment to conserve environmental patrimony. Each party must be held to this commitment, a principle that the Broward County Government honored with its initial disapproval of the Turning Notch Expansion as owner of the Conservation Easement. It is critical to note that without public pressure, PE would not have drafted an alternative habitat enhancement proposal, which allows for on-site swapping, leading to net gain in mangrove acreage, in addition to proposed mitigation in West Lake Park.

The issue of releasing and reconfiguring wetland conservation easements because of economic exigency remains. Are natural wetlands dispensable and substitutable with man-made wetlands? While mangrove acreage and growth are easy to monitor, the altered biogeochemistry during removal of natural mangrove stands and construction of man-made wetlands remain significant scientific and operational gaps that must be filled to appropriately inform the decision making process. As indicated in the process above, the high cost of contaminant assessment, or biogeochemical assessment leads to a bet-hedging request on the part of the proponent that such would only be conducted if the State indicates and concurs that all prior steps are favorable to approving the Turning Notch Expansion Proposal. Significant adverse findings of contaminants

and toxicity resulting from major wetland sediment disturbance should not preclude outright disapproval of the proposal.

In February 2010, the Broward County Commission granted approval of the Mangrove Creation Proposal and ordered the PE Director to begin drafting an agreement with FDEP for the release of 8.68 acres from the 48.27 acre mangrove conservation easement in favor of the creation of about 16.5 acres of mangrove, thus paving the way for the extension of the Turning Notch. The South Florida Audubon Society and the Port Everglades Association also endorsed the Mangrove Creation Proposal. The Broward County Commission approved the agreement with FDEP for the release of the Conservation Easement on August 10, 2010, officially launching the implementation of the Turning Notch Expansion at existing water depth (PE, 2010) (Figure 8.11D, 8.11E). Subsequent expansion includes deepening of the Turning Notch waters to 50ft (Figure 8.11F). With the transfer of land holding to fee simple ownership, the mangroves may be appropriated in subsequent development.

8.5.1.2. Expansion dredging of PE Outer Entrance Channel

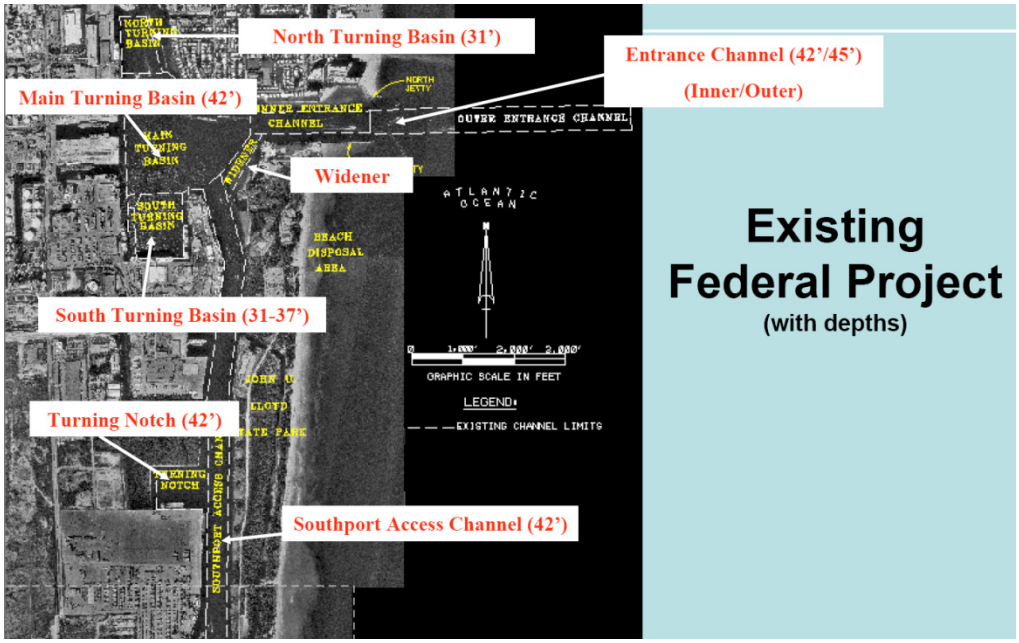
The proposed expansion (widening and deepening) of the outer entrance channel of PE, like the turning notch expansion, is one of several federal navigation improvements under consideration by the PE Harbor feasibility study. The latter was authorized by a resolution of the US Congressional House Committee on Transportation dated May 9, 1996. The proposed outer entrance channel expansion would entail considerable impacts on hard coral resources and associated benthos in the area; hence its detailed discussion in this section.

The OEC was last expanded from 300 to 500ft wide and deepened from 40 to 45ft, from 1980 to 1981 through a construction project authorized by the US Congress in 1973 (Figure 8.12a). The impetus behind this expansion was primarily to accommodate shipment of petroleum through tankers that needed deeper drafts. At 45ft deep, the OEC depth made PE the deepest port in the state of Florida.

The current proposal to expand the waterways of PE is premised on accommodating the increasing vessel size and vessel number to transport cruise passengers, container and non-container cargo, as well as petroleum to eastern United States. None of the eastern ports of the country are configured for post-Panamax cargo and passenger vessels to date. The economic imperative to reconfigure PE as an internationally competitive port is significant at national, state and local scales.

The 2009 iteration of the PE Master Plan cites the ACOE Draft Tentatively Selected Plan that includes the deepening and widening of the OEC from an existing 45 ft project depth over a 500 ft channel width to 57ft by 800ft for a flared extension and extending 2,200ft seaward (Figure 8.12B). The Inner Entrance Channel, Main Turning Basin and Turning Notches will all be deepened to 50ft.

Because the Draft EIS has not been released, the details of studies and minutes of interagency collaboration in determining impacts and their mitigation are not available. Those obtained from reports and presentations in the public domain are discussed below. The main references for the discussion of the OEC expansion are PowerPoint presentations on the Port Everglades Feasibility Study (Jordan, 2007), and on the Proposed Port Everglades Expansion Project (Collier, 2007).



A. Existing depths of PE waterways by section. (Jordan, 2007).

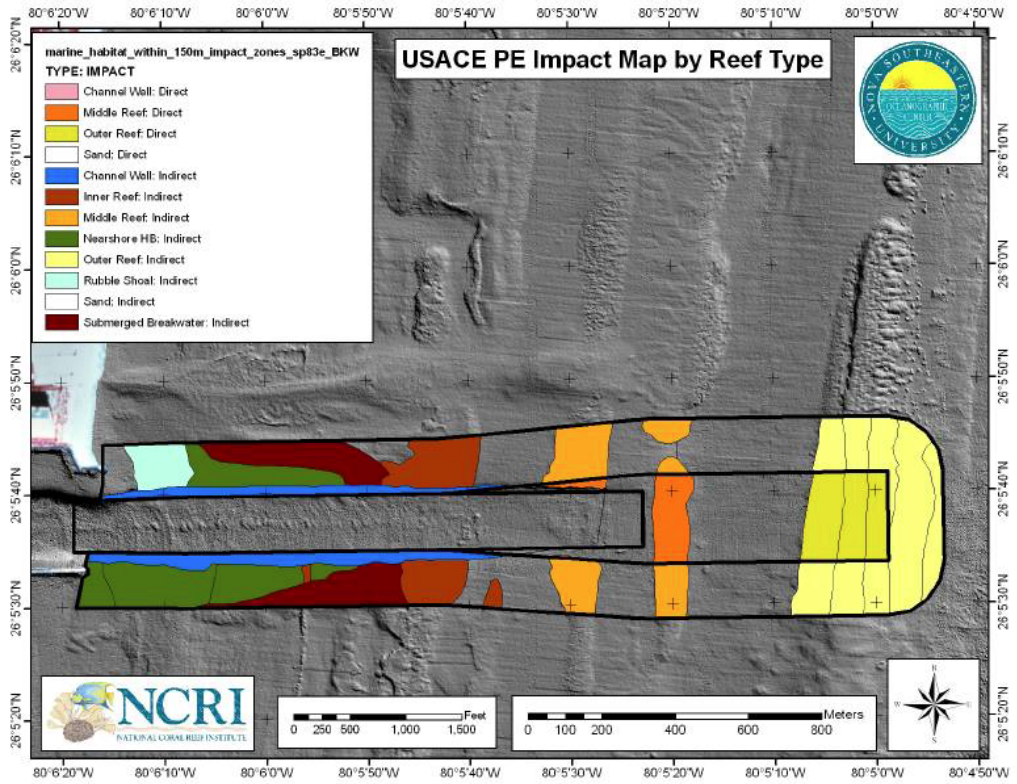
B. PE OEC proposed widening and deepening (PE, 2010).

Figure 8.12. Existing (A) and proposed (B) expansion of PE OEC.

8.5.1.3. Environmental Impacts

The SEFCRI, citing a USACE study, provides one estimate of potential impacts. It indicates that about 20 acres of coral reef and colonized hard bottom would be removed (direct impacts) by dredging; and another 86 acres of this habitat type adjacent to the directly impacted area would suffer from indirect impacts such as sediment suspension and deposition, increased turbidity, and displacement of biota during dredging. Figure 8.13 details both direct and indirect impacts by habitat type. Dredging is anticipated to remove biota and destroy topographic relief over 103 acres across habitat types, and to impact another 179 acres through sediment mobilization and increased turbidity of the water column during and following channel expansion. Additional direct impacts may result from anchor/ cable chain drag by vessels that move the cutterhead dredge. This anchor-impacted area is estimated to be 12-17 acres (Figure 8.13).

It is worth noting here that previous scenarios to load petroleum offshore unto smaller cargo vessels or through pipelines were considered in prior PE planning exercises and were deemed unacceptable because of increased risks for oil spills. Providing the capital improvement to allow transport of petroleum to shore by fully loaded oil tankers, among other vessels, is the current preference of the proposed port expansion program.



Direct Impacts

HABITAT	TYPE	MODIFIER1	AREA (ft²)	ACRES	TYPE ac
Coral Reef and Colonized Hardbottom	Outer Reef	Aggregated Patch Reef	602	0.01	13.55
		Spur and Groove	154971	3.56	
		Linear Reef-Outer	180259	4.14	
		Colonized Pavement-Deep	254450	5.84	
	Middle Reef	Linear Reef-Middle	296089	6.80	6.80
Inlet Channel Floor	Inlet Channel Floor	Inlet Channel Floor	2341644	53.76	53.76
Unconsolidated Sediments	Sand	Sand	1245485	28.59	28.59
**Channel Wall	Channel Wall	Channel Wall	6938.75	0.16	0.16

**Not included in USACE analysis

Indirect Impacts

HABITAT	TYPE	MODIFIER1	AREA (ft²)	ACRES	TYPE ac
Coral Reef and Colonized Hardbottom	Outer Reef	Ridge-Deep	178647	4.10	34.18
		Aggregated Patch Reef	515616	11.84	
		Spur and Groove	265158	6.09	
		Linear Reef-Outer	245716	5.64	
		Colonized Pavement-Deep	283893	6.52	
	Middle Reef	Linear Reef-Middle	692024	15.89	15.89
	Inner Reef	Linear Reef-Inner	589069	13.52	13.52
	Nearshore HB	Colonized Pavement-Shallow	639856	14.69	22.67
		Ridge-Shallow	347739	7.98	
Rubble Shoal	Rubble Shoal	Rubble Shoal	208071	4.78	4.78
Submerged Breakwater	Submerged Breakwater	Submerged Breakwater	748786	17.19	17.19
Inlet Channel Wall	Inlet Channel Wall	Inlet Channel Wall	661113	15.18	15.18
Unconsolidated Sediments	Sand	Sand	2413861	55.41	55.41

Figure 8.13. Estimated impacts of PE OEC expansion: Top; Impact footprint of the proposed OEC Expansion (Collier, 2007). Bottom; Estimated impacts of OEC expansion following color-coded habitat types of map above (Collier, 2007).

8.5.1.4. Mitigation of Environmental Impacts

The OEC expansion has significant unavoidable impacts to the benthos and associated nekton that would require significant mitigation. In order to obtain a comprehensive list of options and methods for assessing impacts and the mitigation actions needed to make up for these impacts, USACE and PE enlisted the participation of agencies and experts through the formation of two groups, the Port Everglades Reef Group (PERG), and the HEA Core Group. The USACE also contracted a mapping study to determine new areas of impact as differentiated from those that have been impacted during previous channel expansion and maintenance dredging.

8.5.1.5. Port Everglades Reef Group (2002-2005)

The USACE constituted PERG in June 2002 to obtain guidance and advice on scientific methods to mitigate impacts on reefs and hard bottom communities as a result of the waterways improvements associated with the expansion of PE. The membership included the Broward County Department of Environmental Protection and Growth Management, Broward County Port Everglades, Dial Cordy & Associates, FDEP, FWC, NMFS, NSU, USACE, USFWS, and the US Navy. The group was to suggest various means of compensatory mitigation that the USACE may consider. PERG met in June, August and November 2002 and in April 2003, and a final report of their recommendations was published in May 2005, at which time PERG formally suspended its activity. Dial, Cordy & Associates facilitated all PERG meetings. The documentation of the PERG deliberations may be released as part of the Draft EIS.

8.5.1.6. Habitat Equivalency Analysis Core Group

The HEA Core Group was formed on November 28, 2006 to assist USACE in using HEA to quantify mitigation efforts required by the PE navigation improvements. The HEA Core Group was a panel of eight experts identified by the USACE. The Core Group Members had research experience and had authored publications on reef mapping in southeast Florida and in using HEA for coral reef-based applications. The core group in addition to other participants, met in November 2006, and in September and November 2007. The HEA approach focuses on the services provided by habitats on the basis of their current structure and functioning. If quantified, the compensatory mitigation needed to replace these habitats when accidentally injured as in vessel groundings or willfully removed as in the PE expansion, can be quantified and justified. Because the Draft EIS is in progress and has not been released to the

public, no details of the HEA Core Group Analysis could be included in this report.

8.5.1.7. Reef Mapping of the Outer Entrance Channel

In June 2005, a month after PERG was formally dissolved, USACE convened a Reef Assessment coordination Meeting at NSU with representatives from FWC, NSU, FDEP, and the Broward County Department of Environmental Protection. Over the period July to November 2005, the goals and methods of the reef mapping study was vetted. The study aimed "to determine new impacts to the reef that would be created by deepening and extending the channel seaward" (Jordan, 2007).

In December 2005, the scope of reef assessment contract was finalized in coordination with FDEP, and the contract was awarded to Dial-Cordy & Associates Inc. The mapping study was conducted in February to March 2006. The draft report of the study was circulated to resource agencies in July 2006 and a final version was released in October 2006. The HEA Team was formed a month later.

Just like the analyses of the HEA Core Group, the results of the reef mapping study of Dial-Cordy & Associates could not be incorporated in this report as the Draft EIS has not been released to the public to date..

The reef mapping and assessment study covered 13 reef zones with a total of 41 sampling stations along Reef 2 and Reef 3 (middle and outer reef, respectively) tracts (Dial-Cordy & Associates Inc., 2009). Based on the results of the mapping survey, dredging Reef 2 tract to expand the OEC would cause the removal of 174 m^2 of scleractinian cover, 5 m^2 of hydrocoral cover, 463 m^2 of octocoral cover, 1263 m^2 of sponge cover, 5 m^2 of zoanthid cover, 21782 m^2 of algal turf cover, and 3369 m^2 of macroalgal cover. About 25,546 of scleractinian colonies, mostly under 10 cm in diameter, and an estimated 24,100 octocoral colonies, mostly less than 25 cm high, would be removed.

Dredging impacts on Reef 3 tract are not available, but are more likely to be higher because coral cover is 2.5X more extensive, and coral density (colonies/m^2) almost 4X greater than that documented for Reef 2 tract, among others (Dial-Cordy-& Associates Inc., 2009).

The survey of reef zones and associated benthos of Reef Tracts 2 and 3 subsumed within the boundaries of the proposed OEC yielded no records of acroporid corals, which were not listed species at the time the study was designed in 2005.

Acropora cervicornis (staghorn coral) and *A. palmata* (elkhorn coral) were designated by NMFS as threatened species in May 2006. To mitigate the status of threatened species, the USACE "…commits to survey for and relocate any corals larger than 12 inches in size prior to dredging the entrance channel extension. Should acroporid individuals be found during the relocation effort, the Corps commits to relocating any *A. palmata* and *A. cervicornis* identified during the relocation surveys, even if they are less than 12 inches in size and reinitiating consultation with NMFS under Section 7 of the ESA" (Jordan, 2007).

On April 27 2010, the USACE transmitted the preliminary findings of the Feasibility Study for navigation improvements, specifically the National Economic Development (NED) Plan which requires an "Outer Entrance Channel 57ft deep from the sea buoy to the jetties then transitioning to an Inner Entrance Channel at 50ft deep. The channel depth of 50ft continues into the Middle Turning Basin, Widener, South Access Channel, and Turning Notch." (USACE, 2010)

The April 2010 letter from USACE further estimates the NED plan to cost $255M with $155M as federal share and $100M as the non-federal allocation. The estimated Benefit to Cost Ratio is 2.0. The NED estimates that about 6M cubic yards of dredged materials would be produced, a small portion of which may be used in onshore mitigation, and the significant portion to be disposed off in an EPA designated Offshore Dredged Material Disposal Site.

The Draft Feasibility Report is anticipated for release in 2012 and will be finalized by the end of the same year. As such the content and interagency interactions in vetting this could not be evaluated at this time. There is evidence that major stakeholder groups are closely examining the economic and ecological costs and benefits of the navigation improvements planned for the Port's expansion, and that the institutional venues and mechanisms are sufficient to allow for proper vetting and informed decision-making to take place. The higher standards of ecological protection imposed by the WRDA of 2007 than previous WRDAs may lead to better ecologically sustainable engineering designs of port expansion.

8.5.2. Suez Calypso Liquified Natural Gas Deepwater Port and Pipeline – Proponent withdrew proposal following Gov. Crist's statement of non-support

8.5.2.1. Demand for Energy

As the population of south Florida continues to increase so do the forecasted energy needs. The Florida Public Service Commission predicted a 25 percent increase in the state's electricity demand by 2009 (Suez Energy International, 2004). In order to meet (and capitalize) on the increasing energy demands of the region, several private companies have proposed pipelines to transport natural gas from the Bahamas or marine staging ports to the southeast Florida coast. One of these applicants, Calypso U.S. Pipeline, LLC has proposed to run a LNG pipeline from a deepwater staging port into PE, where the gas can connect to a pipeline already permitted by FERC but still to be constructed, and then travel to an existing Florida Gas Transmission System pipeline at the Florida Power and Light (FP&L) power plant in Broward County (Figure 8.14A, 8.14B). Designed to satisfy 40% of Florida's projected increase in electric generation capacity over the next 10 years, the proposed pipeline will transport approximately 832 million cubic ft. of natural gas per day (Suez Energy International, 2004). To supply the pipeline with natural gas, tankers will bring gas to a deepwater port that will have the facilities to prepare the gas for transport in the pipeline.

8.5.2.2. Projected Pipeline

The Maritime Transportation and Security Act of 2002 amended the Deepwater Port Act of 1974 to include natural gas ports (USCG, n.d.). This amendment allowed construction and operation of offshore facilities to import and process natural gas and supply it to the nation's existing pipeline infrastructure (USCG, n.d.). With federal approval of such facilities occurring only eight years ago, there are relatively few existing facilities by which to review their construction impacts on benthic communities. Certainly, there have been no similar projects in the vicinity of coral reefs.

But with the demand for energy in south Florida soaring, combined with the state's current dependence on natural gas from the Gulf of Mexico (a supply easily disrupted by hurricanes), it is unrealistic to think that the east coast of Florida could escape the opportunistic energy corporations. With no legislation specifically prohibiting pipeline passage through coral reef habitat, natural resource managers must advocate for the technology projected to be the least damaging to Broward County's coral reefs.

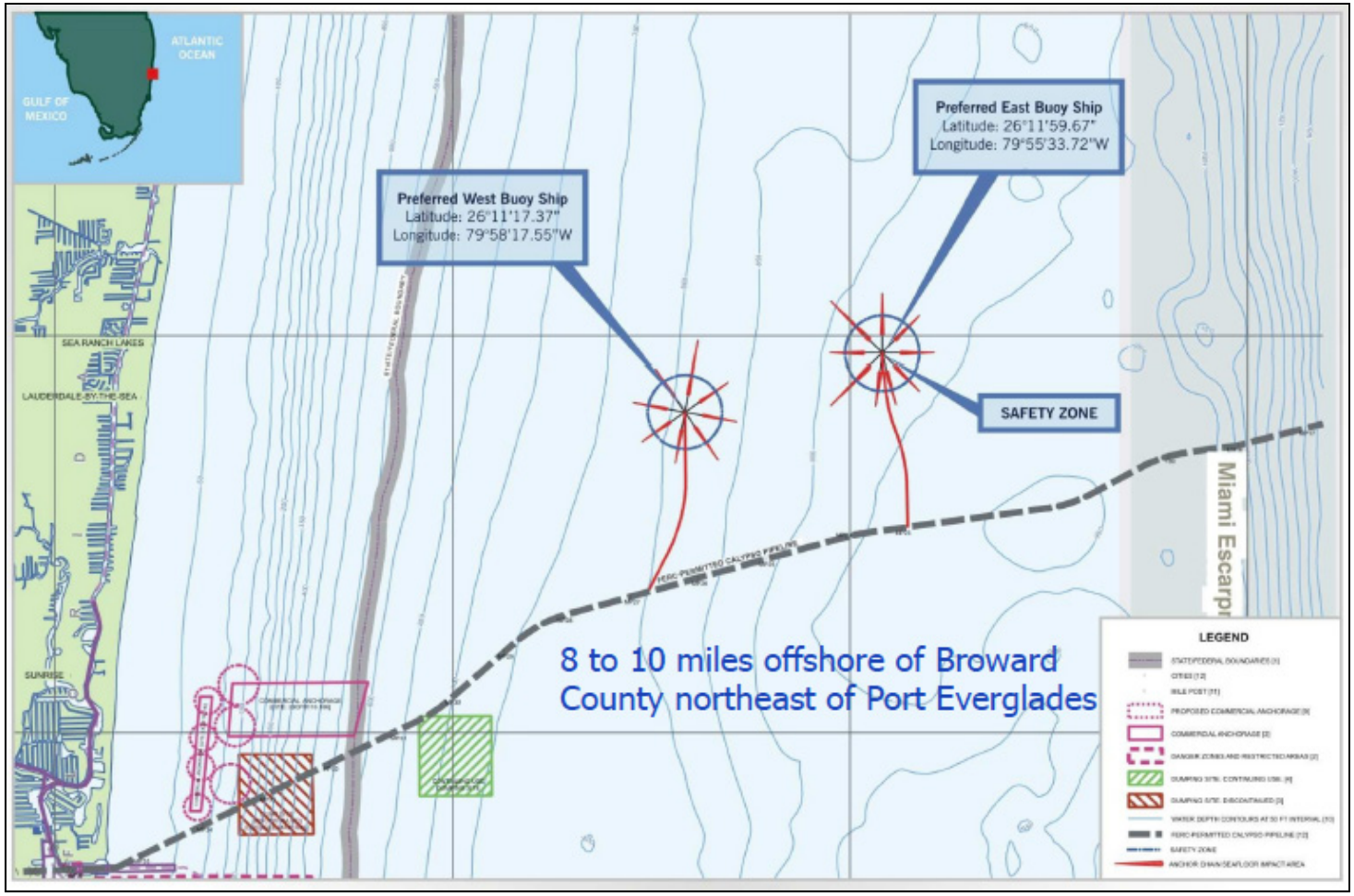


Figure 8.14.a. Proposed LNG pipeline connecting Florida Power & Light LNG plant to a proposed deepwater LNG processing port. (from Suez Energy International, 2008).

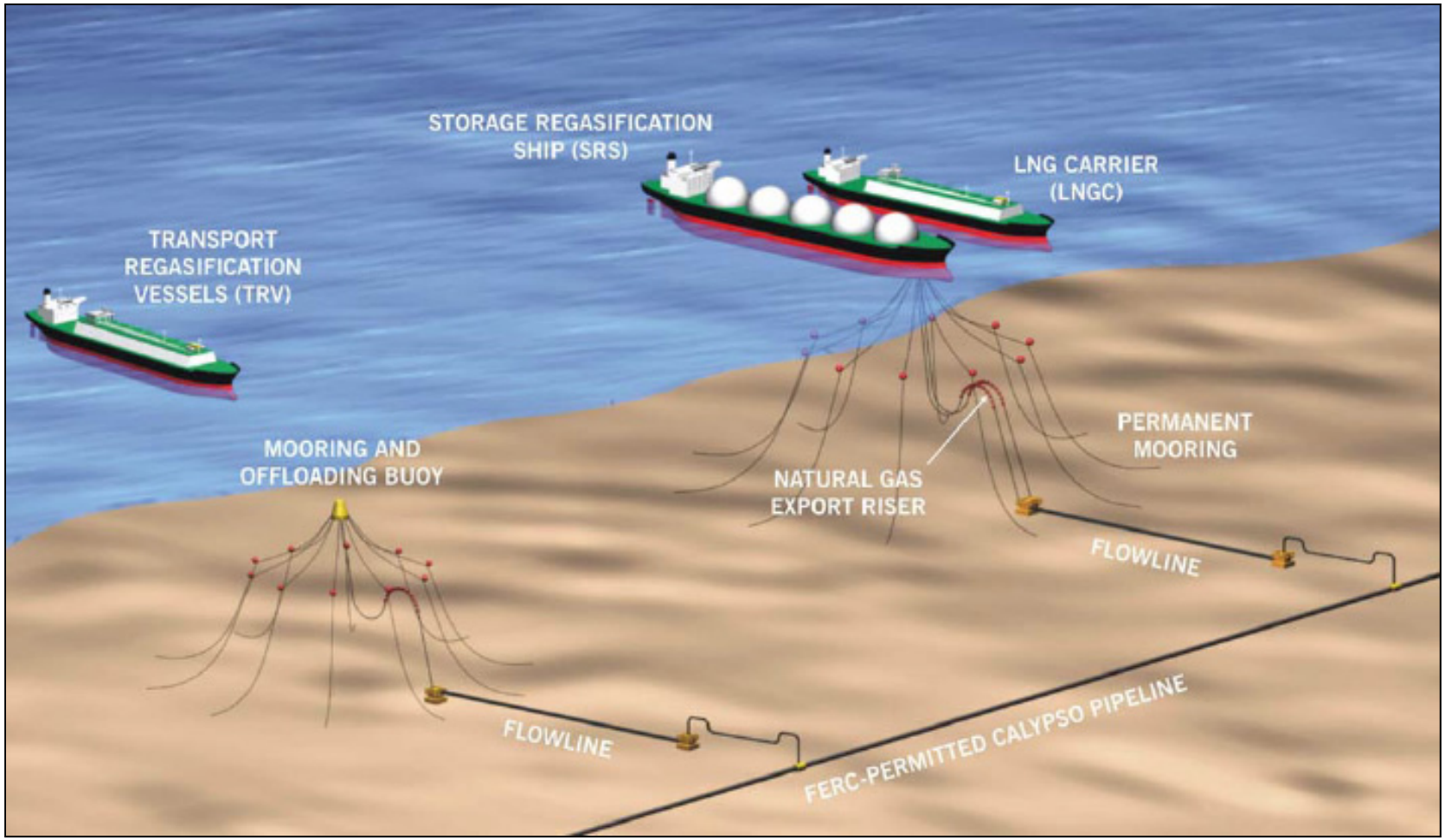


Figure 8.14.b. Conceptual diagram of the proposed Calypso deepwater port for processing LNG offshore and transported onshore through a permitted but yet to be constructed LNG pipeline (from Suez Energy International, 2008).

8.5.2.3. Minimizing Impact using advanced Technology

The examination of another permitted pipeline, proposed to travel into PE as the Calypso pipeline will, illustrates the application of a technology that should afford the coral reefs of the area greater protection from impacts. Originally, the company applying for the necessary permits, AES Ocean Express LLC, proposed to use Horizontal Directional Drilling (HDD) technology in order to run the pipeline through the reef tracks with as minimal damage as possible. HDD does not require a trench, thus allowing for underground pipeline installation with little surface disturbance (TetraTech, 2006). The drill head is lubricated with bentonite clay at high pressure, which causes the main disadvantage of the HDD technique: the risk of a release of the thick and dense material, which would smother surrounding benthic habitat (TetraTech, 2006). Burial of corals under fine drilling mud results in higher mortality than burial under coarse carbonate sands (Wesseling, Uychiaoco, Aliño, Aurin, & Vermaat, 1999).

Following consultations with state and federal agencies, AES changed their proposal to use a tunneling technology instead of HDD. Also a trench-free construction technique, a tunnel boring machine enables construction completely beneath the resource, rather than through it (TetraTech, 2006) (Figure 8.15). Additionally, tunneling would eliminate the need for offshore construction spaces within a dredge disposal site, and therefore minimize the risk of impacts in proximity of the reefs, such as anchor scrapes and work vessel passage over reefs (DOEFERC, 2006). The high operation cost of the tunneling technology may have prohibited AES from proposing it in the first place. The approval of the necessary permits incorporating tunneling has apparently set a precedent, as projects permitted after AES, such as Calypso, have applied for their permits with tunneling proposed initially (Livergood, (NOAA) 2007, pers. comm., 22 January.).

8.5.2.4. Stakeholder groups and application process

Calypso LNG LLC filed an application to own, construct and operate a liquefied natural gas (LNG) deepwater port under the Deepwater Port Act of 1974 to the USCG and the Maritime Administration (MARAD) on March 1 2006. USCG declared the application complete on September 25 2006. USCG and MARAD issued a Notice of Application in the Federal Register on November 6, 2006.

Prior to the March 2006 application for a deepwater port, the same company under the name Calypso Pipeline LLC filed an application with the Federal Energy Regulatory Commission (FERC) to build, construct and operate a pipeline and associated aboveground facilities that would extend 90 miles from an LNG import/export terminal proposed for construction near Freeport,

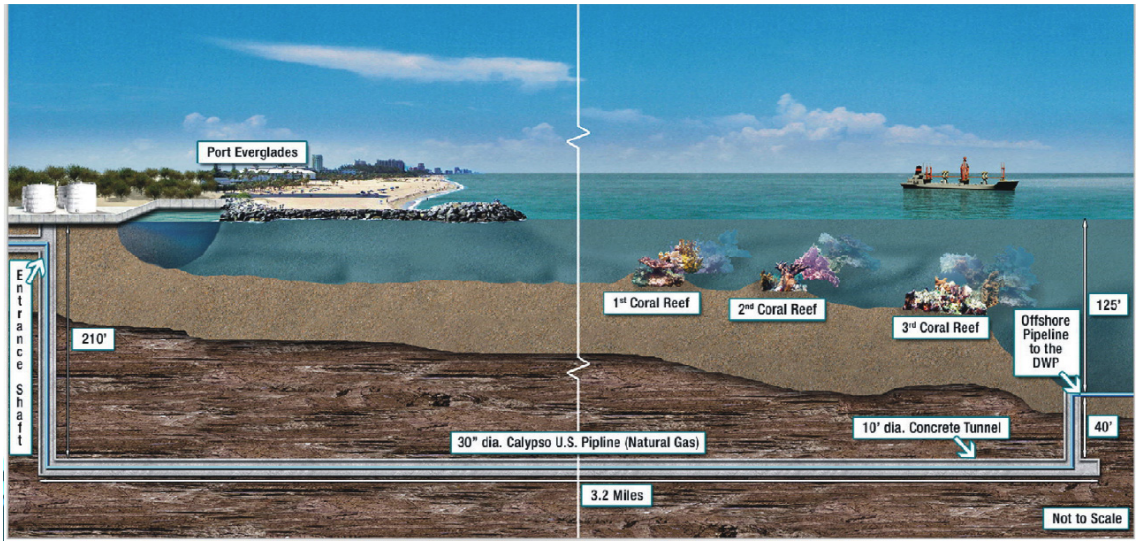


Figure 8.15. Conceptual diagram of using tunneling technology to construct liquefied natural gas pipeline from the proposed Calypso Deepwater Port to the Florida Power and Light LNG plant in PE (from Suez Energy International, 2008).

Bahamas to an onshore receiving facility near Fort Lauderdale, Florida. The Bahamas Environmental Science and Technology (BEST) Commission would be

the authorizing agency for the portion of the pipeline and associated facilities within the Bahamas EEZ. While BEST authorized the project, the Bahamian Prime Minister vetoed the project in 2005 after his Ministers of Environment and of Industry watched an anti-LNG documentary film "The Risks and Danger of LNG" by Tim and Hayden Riley.

In May 2006, Calypso submitted a modified pipeline construction plan to FERC, increasing the diameter of the proposed pipeline from 24 to 30 inches and to incorporate a 3.2 mile long, 10 ft inner diameter, concrete-lined onshore to offshore tunnel to reduce or minimize impacts to nearshore reef resources. FERC issued an amended Certification of Public Convenience and Necessity on May 4 2007 to allow the Calypso Pipeline to interconnect and receive gas from the proposed Calypso Deepwater Port.

The USCG and MARAD are the lead federal agencies responsible for the EIS for the deepwater port. The USCG and MARAD initiated the public scoping process in November 2006. An informational open house and public meeting in Fort Lauderdale was convened with about 68 people in attendance. Written scoping comments were received fro the US Environmental Protection Agency, the Minerals Management Service, NMFS, FWC, FDEP Office of Intergovernmental Programs. The DEIS was issued on November 2007 and the FEIS was announced in the Federal Register on July 16, 2008.

Despite the proposal's seemingly compelling motivation to provide clean energy source to the increasing demand in the region, equally compelling issues of public and environmental safety became powerful battle cries among civil groups. The No Calypso! Coalition consisting of residents within the vicinity of PE including those of Galt Ocean Mile, Lauderdale-by-the-Sea, central Beach, Pompano Beach, Oakland Park, Lauderdale Beach, Coral Ridge and Fort Lauderdale loudly opposed the proposal. In a 35 page white paper published in 2008, the Coalition detailed potential catastrophic consequences of building the deepwater port close on human and marine life, including increasing vulnerability of the area to terrorist attacks and untold adverse impacts on the area's tourism industry. More importantly, opposing groups communicated their position to elected officials, including Governor Crist who had veto power over the project according to the federal Deepwater Port Act of 1974 as leader of the adjacent state (relative to the proposed deepwater LNG port).

On February 18, 2009, Governor Crist formally announced his opposition to the proposed Calypso pipeline while conducting a town hall meeting along the Galt Ocean Mile in Fort Lauderdale. A week later on February 25, 2009, Calypso LNG, LLC informed the USCG and MARAD that it was fully withdrawing its application from consideration and will not seek the required permits from the MARAD or the state to license the proposed offshore facility.

8.6. Port development and the regulatory system

Port development and the capital improvements associated with port expansion as shown in the foregoing examples, are complex issues with serious impacts on the social, economic and ecological environment at multiple scales. Because of the proximity of this development to coastal ecosystems in southeast Florida – nearshore hardbottom communities, mangroves, seagrasses and coral reefs – regulation of port expansion projects are of paramount interest for all sectors of society. In this section, the efficacy of current regulation at local, state, and federal levels are examined to determine their strengths and weaknesses in

promoting ecological protection of coastal ecosystems, particularly of coral reefs, in the region.

8.6.1. Local regulatory system

As discussed in Section 8.2.1, the Growth Management Act of 1985 aims to provide a planning process through which citizens can influence "the timing, location and design of new development in their communities" (Gluckman, Gluckman, & Young, 2004). A local comprehensive plan should underpin growth with the adequate provision of public services, and must aim to minimize negative environmental, social and economic impacts within a participatory management mechanism. The local comprehensive plans and the associated future land use maps are the major binding policy instruments intended by the Act to guide development. For coastal counties of the state, the comprehensive plans include port development master plans integrated within the plans' coastal management element as in the cases of PE and POPB, or within the transportation element in the case of POM. For the three counties of southeast Florida with deepwater seaports, a fair question to ask at this time 25 years after the Act's passage is whether the local comprehensive planning process has adequately addressed coastal ecosystem protection, within the specific context of port development.

Deepwater seaports in southeast Florida are legacy facilities that continue to contribute very significantly to national maritime commerce and to state and local economies. The interest to maintain and expand these as engines of economic growth prevails across all scales of governance. Planning for their expansion entails citizen participation, which, as the previous examples have shown, plays a critical role in determining the conservation of coastal ecosystems. For the current expansion of PE facilities, the PE modified its proposal to mitigate mangrove destruction associated with the widening of the turning notch from one of offsite mitigation to the creation of mangrove habitat onsite supplemented by offsite mitigation, because environmental advocates succeeded in pressuring the Broward County Commission to disapprove the original proposal. Without such citizen pressure, it is highly unlikely that the County Commission would have disapproved the PE expansion proposals or would have demanded more ecologically appropriate but more costly mitigation with the initial submission. Under more ideal circumstances, the PE and the County Commission have the wherewithal to uphold more stringent environmental standards in matters where coastal ecosystems have to be destroyed to make way for port expansion. Local government can be the environment's strongest advocate, by choice and strength of vision. Yet this position remains tenuous in the face of economic challenges.

By providing for extensive participation of citizens in planning, the Growth Management Act seeks to balance development with the protection of public goods and space, including natural resources. Increasingly it seems that the latter task is borne by citizen groups who need to remain vigilant to keep their voices loud, participating meaningfully with a clear goal to conserve coastal ecosystems, in order to seek such balance. Thus the extensive provisions for participatory planning remain the most critical feature of the Growth Management Act in minimizing adverse environmental impacts of development, including port expansion. Enhancing these provisions rather than undermining them should be a collective goal of citizenship in Florida.

The Growth Management Act mandates the FDCA as the state land planning and community development agency. The Act authorizes the FDCA to facilitate the comprehensive planning and amendment protocols, as well as to evaluate the local comprehensive plans for compliance with the Act. Thus it is the State's watchdog for land use and development at local and state levels. As of May 2010, the State Legislature has not reauthorized the FDCA, as it should, following a mandatory Sunset Review in 2008. In June 2011, Gov. Rick Scott dismantled the FDCA, repealing the Growth Management Act, and merging some of FDCA's functions with several other agencies, to form a new state agency, the Department of Economic Opportunity. Along with the passage of Senate Bill 2156, the former FDCA's power to supervise development decisions, will now be exercised at the local level, and the major function of the new agency is focused on incentivizing businesses to set up shop in Florida. Comprehensive land-use planning and its concomitant environmental impacts, has now shifted to local governments without a central overseer. Depending on the seriousness with which local agencies and their constituents take on this major function, and their ability to conserve environmental assets in the face of greatly encouraged economic growth, it remains to be seen how these agencies would be able to maintain quality of life and environment.

8.6.2. State regulatory system

8.6.2.1. Memorandum of Agreement between FDEP and the FDCA

The state's environmental permitting system through the FDEP plays a major role in the way port development projects are vetted and implemented. Section 8.3.2 of this chapter examined state regulations relevant to port expansion activities. The § 403.061 (37), F.S. and § 403.051 (38), F.S. authorizes the FDEP to enter into a memorandum of agreement with the Florida Ports Council (FPC), and which spells out a supplemental permitting process for maintenance and development dredging associated with port maintenance and expansion. FDEP

and FPC entered into an agreement on February 6, 1997. The resulting Memorandum of Agreement provides for a pre-application consultation process to resolve conflicts and expedite review of permit applications for port related maintenance and expansion activities. FDEP is authorized to give a joint coastal or environmental resource permit to deepwater ports for maintenance dredging and management of dredged material this generates. It can issue conceptual joint coastal or environmental resource permit for port expansion-related dredging. It also includes an informal procedure for dispute resolution over permitting issues with the Florida Seaport Environmental Management Committee acting as referee. In addition, the agreement acknowledges the role of the FDCA in determining consistency among federal activities that are subject to permit, the port master plan and the local government comprehensive plan.

The Memorandum of Agreement stipulates the procedure for the conduct of a pre-application consultation process. The deepwater seaport initiates a request to FDEP to schedule a pre-application conference to be held at the port where feasible, with the port providing preliminary information to FDEP at least 30 days prior to the meeting. FDEP circulates the information to the USACE, the USFWS, and the FDCA and other regulatory agencies. Within 30 days following the consultation conference, FDEP provides the authorized applicants, the ports and/or USACE, with pertinent information including potential concerns about compliance of the proposed activity with major state statutes such as § 161, F.S. (Beach and Shore Preservation), § 253, F.S. (State Lands), and § 373, F.S. (Part IV-Management and Storage of Surface Waters), among others.

Because of the complexity of port expansion project proposals, and the multiple government entities involved from local, state, and federal levels, it is unclear from currently available documentation to what extent project proponents use the pre-permit application consultation process. Because of the federal interest in navigation projects that dominate port development, the USACE facilitates the conduct of feasibility studies for these, as in the case of the PE Turning Notch and OEC Proposals. The USACE convenes multiagency working groups that provide guidance on these projects and the FDEP and FWC are among the mainstay state agencies in addition to federal ones such as the NMFS and the USFWS. An example of such multiagency group is the PE Reef Group (PERG) whose role is to provide guidance and advice on scientific methods to mitigate impacts on reefs and hard bottom communities resulting from port development. There did not seem to be a similar working group for the Turning Notch expansion.

Although the Memorandum of Agreement provides a mechanism for identifying and addressing concerns towards permit approval, it has two drawbacks. First it

is a reactive to rather than anticipatory of project proposals. Second, it focuses on permit-specific features. Indeed the only way that coastal ecosystems can be discussed for integrated conservation and mitigation measures would be in the realm of planning. As yet, there is no mechanism to do this by statute or by practice, in anticipation of development projects and to supplement the local comprehensive and land use planning. One can argue that the State CZMA stipulates for a broad coastal zone-specific mandate to safeguard wetlands, nearshore hardbottom communities, seagrasses and coral reefs. However, such practice has not been exercised. In the case of ports, their expansion almost always necessitates the appropriation of natural ecosystems for built up or modified surfaces. As such, it is critical that the State sets state-of-the science standards in minimizing environmental impacts and exacting the optimal strategies through avoidance as is only possible through prudent planning; or through smart anticipatory mechanisms of impact minimization and compensatory mitigation. This must be done through a proactive, science-based process emanating from statute. Considering that port expansion leads to increased revenues as required by cost-benefit analyses, it is not unreasonable to reinvest a significant portion of these to ensuring that coastal ecosystems continue to function with uncompromised integrity, in light of the ecological goods and services they provide in perpetuity if protected.

8.6.2.2. Florida Coastal Zone Management Act

Standardized mapping and monitoring procedures to guide planning and permitting processes, determination of habitat equivalence as the principal basis of compensatory mitigation, and updated mitigation and habitat restoration practices should be established. Addressing these as necessary elements of coastal zone management planning should be required, so that all development proposals and permit applications recognize these as baseline information that are integral to the latter's evaluation. Is there an existing statutory authority to implement ecosystem conservation as part of coastal zone management planning, and that is broad in scope and sufficiently in depth to provide the context for the permitting process? Planning provides the context for avoidance and protection while permitting uses mechanisms to minimize and mitigate for environmental impacts. Development planning requires comprehensive evaluations that address incompatible land uses and avoidance of environmentally sensitive areas. Permitting identifies site-specific constraints and has limited capacity if at all to determine the optimal location of development. Given that the location of deepwater seaports are a matter of legacy, prior determination of the environmental impacts of expansion and the state of the science mitigation needed to minimize these, should be processed by all stakeholder groups using the planning mechanism previously provided by

the Growth Management Act, and which has been transferred to local governments in June 2011, and reinforced by the principles of coastal ecosystem conservation enunciated in the Florida CZMA.

The legislative intent of the Florida CZMA is threefold. First, it aims to enable coastal states to bring together existing state regulatory and statutory authority to implement a federally approved coastal management program, for which the designated point state agency (FDEP) may receive funds under the federal CZMA. Second, the state coastal management program provides the platform for evaluating federally licensed, federally permitted and federally funded projects requiring state permits/ licenses for consistency with a federally approved state coastal zone management program. Third and most important, "the participation by citizens of the state is an important factor in developing, adopting, amending, and implementing a program for management of the coastal zone, and management of the state's coastal zone requires a highly coordinated effort among states, regional and local officials and agencies" (§ 380.21 (3)(a), F.S.).

The federally approved Florida Coastal Zone Management Program is an amalgam of 24 existing statutes that "protect and enhance the state's natural, cultural and economic resources" (The Florida Senate Issue Brief, 2009) (Table 12). Among these 24 statutory elements, the Local Government Comprehensive Planning and Land Development Act provides the broadest scope for ecosystem conservation through prudent and long term planning. The crucial role the local government planning plays in land use planning and in direct coastal development activities such as port expansion cannot be anymore underscored in this chapter. What is critical to highlight in this subsection is that the planning and permitting mechanisms for port development needs to be placed in the context of the entire state coastal management act, and which envisions to safeguard natural resources while wisely conceptualizing and implementing development. Specifically, the state coastal management act must provide for ecosystem-level of protection beyond coastal ecosystems as sources of fishery resources or as state submerged property that can be unlawfully taken. Wetlands, estuaries, seagrass and coral reef ecosystems provide critical ecological services such as the cycling of nutrients, filtration of sediments, and dampening of wave action, among others, that are fundamental to their ability to produce biomass that man harvests and to maintain biodiversity. While separate state agencies manage different ecosystem functions and components – FWC taking charge of the marine fisheries as mandated by Chapter 379, F. S. and FDEP acting as State Trustee for the State's submerged lands as charged by Chapter 253, F. S. – the decline in the state and productivity of entire coastal ecosystems of the State continue, making innovative changes in coastal governance imperative. Hauserman (2006) recommend that FWC and FDEP integrate their functions to

manage the complexity of coastal ecosystems by conceptualizing and implementing "place-based multi-species management, not simply the outdated single species methods that ignore many biological connections among management decisions". The authors of this chapter further recommend that such integration in function be required by statute.

Table 8.12. The 24 statutes in the table arose or were modified by the passage of the Florida Coastal Management Act. Annotations from FDEP website updated with contents of 2009 Florida Statutes.

Statute	Title	FDEP Annotations
§ 161	Beach and Shore Preservation	The coastal construction permit program established by this chapter is to regulation construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.
§ 163, Part II	Local Govt. Comp. Planning & Land Development	These chapters establish the Local Comprehensive Plans, and the State Comprehensive Plan (SCP). The SCP sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals and policies that provide decision-makers directions for the future and provide long range guidance for an orderly social, economic and physical growth.
§ 186	State Comprehensive Planning	
§ 252	Emergency Management	This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.
§ 258	State Parks and Preserves	This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

§ 253	State Lands	The § 253 governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs. The § 253, 259, 260 and 375, F.S. with sections dealing with land acquisition authorize the state to acquire land to protect environmentally sensitive areas.
§ 259	Land Acquisitions for Conservation or Recreation	
§ 260	Recreational Trails System	
§ 375	Outdoor Recreation and Conservation Lands	
§ 267	Historical Resources	This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.
§ 288	Commercial Development and Capital Improvements	This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.
§ 334	Transportation Administration	These chapters authorize the planning and development of a safe balanced and efficient transportation system.
§ 339	Transportation Finance and Planning	
§ 373	Water Resources	This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.
§ 376	Pollutant Discharge, Prevention and Removal	This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.
§ 377	Energy Resources	Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.
§ 379	Fish and Wildlife Conservation	This chapter provides a framework for management and protection of the state of Florida's fish and wildlife resources. It authorizes the FWC to manage and protect the state's marine life, freshwater aquatic life, and wild animal life. It is the policy of the state to conserve and wisely manage these resources.

§ 380	Land and Water Management	This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large scale development. This chapter also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.
Sections 381.001, 381.0011, 381.0012, 381.006, 381.0061, 381.0065, 381.0066, 381.0067	Public Health; General Provisions	The § 381, F.S. (selected subsections on on-site sewage treatment and disposal systems) and 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.
§ 388	Mosquito Control	
§ 403	Environmental Control	This chapter authorizes the regulation of pollution of the air and waters of the state by the FDEP). As of 2009, this chapter also includes the Florida CRPA, which provides for the FDEP to remediate coral reef injuries occurring in Martin, Palm Beach, Broward, Miami-Dade and Monroe Counties.
§ 553, Part IV	Building Construction Standards	Known as the Florida Building Codes Act, this statute addresses building construction standards and provides for a unified Florida Building Code.
§ 582	Salt and Water Conservation	This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture.
§ 597	Aquaculture	This chapter, also known as the Florida Aquaculture Policy Act, establishes public policy concerning the culture of aquatic organisms in the state with the Department of Agriculture and Consumer Services as the primary state agency responsible for regulating this sector.

8.6.2.3. The Southeast Florida Coral Reef Initiative

In the case of coral reef ecosystems, the FDEP CAMA serves as host institution for implementing the Coral Reef Conservation Program (CRCP), which coordinates research and monitoring, develops management strategies, and promotes partnerships to protect the coral reefs, hardbottom communities, and associated reef resources of southeast Florida. The CRCP implements the SEFCRI, the charter for which was jointly developed with the FWC. The Local Action Strategy (LAS) of the SEFCRI serves as the template for developing the component actions of the CRCP. The Local Action Strategy has four focus themes and four corresponding focus teams that reflect the multi-stakeholder group partnerships that underpin the implementation of the LAS: AA; Fishing, Diving and Other Uses; LBSP and Water Quality; and MICCI. The SEFCRI is the State's contribution to the implementation of the National Action Plan of the U.S. Coral Reef Task Force, with a focus on the coral reefs of southeast Florida, in addition to the implementation of the federally managed FKNMS.

Through SEFCRI, major mapping of anchorage grounds of the Ports of Palm Beach, Port Everglades and Ports of Miami have been implemented and finalized. The drafting and passage of the Florida CRPA to address coral reef injuries by vessel groundings and anchorage drags occurring in the coral reefs of southeast Florida is a legal milestone for SEFCRI. The active participation of both the FDEP and the FWC in interagency functions to ensure the protection of southeast Florida coral reefs and associated ecosystems in project development hearings and consultations are testament to agency commitments within the broad framework of ecosystem conservation. Currently, the LAS is embarking on establishing numeric nutrient standard for the regional waters of the state including Florida Bay, the Florida Keys, Biscayne Bay, and off southeast Florida (Craig, 2010). Numerous project reports addressing the four focus themes have standing recommendations to amend existing regulatory system for coastal ecosystems and improve agency and inter-agency functions in an effort to tighten coordination and make coral reef and other coastal ecosystems management effective in southeast Florida.

A reauthorization of the US Coral Reef Conservation Act of 2000 would profoundly influence the SEFCRI. Currently, US House Resolution 860 calls for such reauthorization as approved by the House on Sept. 23, 2009. It awaits US Senate approval (see next section). In the meantime, coastal ecosystem management at the state level needs to be tightly placed in the context of local and state planning, as the only prudent approach to deal with the cumulative impacts of coastal development. This iterates the strong recommendation made by the Florida Legislature's Office of Program Policy Analysis and Government

Accountability (OPPAGA) regarding the futility of cumulative impact mitigation for wetlands through the State's environmental resource permitting process (OPPAGA, 2001). This Office recommends that cumulative impacts to surface waters and wetlands "would be addressed proactively as part of an integrated land use planning approach". Applied to coastal ecosystems in general, land use planning currently conducted at the local government scale, would be best tapped to enunciate the protection of coastal ecosystems. Regulatory changes to make these goals consistent across local, regional, state, and federal levels would need to occur to provide unequivocal underpinnings of coordinated protection of coastal ecosystems.

8.6.3. Federal regulatory system

The USACE is the prime federal agency in charge of carrying out federal interest in the use and development of the nation's water resources including port development and the maintenance and expansion of the nation's navigable waters. In partnership and sometimes in conflict, with other federal agencies such as NOAA and the EPA as well as state and local partners, it has carried out its missions over its 235 year history within changing social, economic and political regimes at multiple jurisdictions. The Corps leaves a continuing legacy of a significantly altered ecology for the country's aquatic ecosystems.

Over the last decade, numerous studies have pointed out major flaws and shortfalls in the Corps' conduct of its missions and have strongly called for major reforms (National Research Council, 2004a, National Research Council, 2004b, National Research Council, 2004c, and Kostenbader, K., Ellis, S., Conrad, D., 2004). In this brief section, the legislated regulatory reforms are highlighted. To the extent possible and using publicly available materials, comments on the changes in the Corps' civil works planning and implementation process with respect to port development, and in response to the recent regulatory changes, are included.

8.6.3.1. Water Resources Development Act of 2007

The Water Resources Development Act (WRDA) of 2007 and which became law on Nov. 8 2007, underscores major programmatic reforms of the Corps' planning process, notably the need for independent peer review and mitigation reforms.

8.6.3.1.1. Independent Review

Section 2034 of WRDA 2007 (33 U.S.C. 2343) stipulates that independent peer review of civil works projects worth more than $45M and other controversial

projects be conducted. The same section gives detailed criteria and guidance for these reviews, including ways to ensure independence of review panels. For each project requiring independent peer review, the law requires the Corps to: "…(a) identify the entity responsible for conducting the independent review; (b) provide a list of the reviewers and their credentials; (c) describe whether the reviewers have taken any public testimony or otherwise obtained public input; (d) provide any final independent review panel reports and state whether and how the report has been made available to the public; (e) describe any changes made to the project in response to the independent panel findings; and (f) identify the amount of money spent to date on carrying out the independent peer review…" (33 U.S.C. 2343).

Section 2034 also retroactively includes project studies that were initiated two years prior to the enactment of WRDA 2007 and for which alternative designs have not been identified.

8.6.3.1.2. Mitigation

Section 2036 of WRDA 2007 (33 U.S.C. 2283(d) sets new mitigation requirements for all civil works feasibility studies, re-evaluation, reports and environmental reviews ongoing as of Nov. 8, 2007 and initiated after that date. It enumerates the necessary elements of mitigation plans, mitigation monitoring, mitigation success and consultation. Section 2036 (b) (33 U.S.C. 2283(a) requires the Corps to submit a yearly status report on civil works mitigation, as concurrent submission with the President's budget proposal to Congress.

Among the key mitigation features of the WRDA of 2007 include:

1. A ratio of more than two acres of mitigation for every acre of permitted impacts to wetland is the minimum amount of mitigation required for civil works programs. This mitigation measure should apply to the impacted mangroves associated with the Turning Basin Expansion discussed in section 8.5.1.1.
2. The Corps should mitigate for the same or greater ecosystem values than those lost to the project.
3. Each mitigation plan must include:
    a. the type, amount and characteristics of the habitat being restored, a description of the physical actions to be taken to carry out the restoration, and the functions and values that will be achieved;
    b. the ecological success criteria based on replacement of lost functions and values, that will be evaluated and used to determine mitigation success;

c. a description of the lands and interest in lands to be acquired for mitigation, and the basis for determining that those lands will be available;
d. a mitigation monitoring plan that includes the cost and duration of monitoring, and identifies the entities responsible for monitoring if it is practicable to do so (if the responsible entity is not identified in the monitoring plan it must be identified in the project partnership agreement that is required for all Corps project); and
e. a contingency plan for taking corrective action in cases where monitoring shows that mitigation is not achieving ecological success as defined in the plan.

4. The Corps (or a delegated entity) must continue monitoring mitigation until the monitoring demonstrates that the ecological success criteria established in the mitigation plan have been met. The Corps must consult annually on each project with appropriate federal agencies and the states on the status of mitigation efforts. The consultation must evaluate ecological success, the likelihood that the ecological success criteria would be met, the timeline for achieving these, and recommendations to improve the likelihood of success.

Given that the feasibility study for the PE OEC Expansion as of November 2007, these provisions apply to this specific project.

8.6.3.2. Proposed National Objectives, Principles and Standards for Water and Related Resources Implementation Studies" by the Council On Environmental Quality

Section 2031 of the WRDA of 2007 directed the Secretary of the Army to revise the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, a federal document that provided major guidance for water resources project planning and implementation by the Corps of Engineers, the Bureau of Reclamation, the Tennessee Valley Authority, and the Soil Conservation Service. The Water Resources Council wrote the document and issued it in 1983 when large dam construction was a major federal initiative. Referred to as the "Principles and Guidance" document (P&G for short), it was the major reference document for construction-oriented federal agencies and was unrevised for 25 years. The Army Corps published a draft P&G in the Federal Register dated Sept. 12, 2008.

During the process of revising the P&G, the current Administration transferred the lead responsibility of revising the P&G to the Council for Environmental Quality (CEQ) because it wants to expand the reach of the document to include all federal agencies that undertake water resource projects. The CEQ (2009) released a draft in late 2009 and the National Research Council (NRC) provided its review of the draft the following year in December 2010 (unavailable). A revised draft has not been released (NRC, 2010).

The CEQ website highlights the major differences between the proposed and 1983 versions of the P&G:

1. Achieving co-equal goals of environmental protection and restoration as well as economic wellbeing. The 1983 P&G focused solely on economic development.
2. Considering monetary and non-monetary benefits to justify and select development projects with the greatest net benefits. The previous guidelines relied mostly on monetized values.
3. Avoiding the unwise use of floodplains by serious consideration of non-structural approaches.
4. Increasing transparency through the use of best science and peer review to inform authorizations and appropriations for projects.

The National Academy of Sciences (NAS) recommended clarity of language and highlighted a major challenge of providing a general policy document that would have far-ranging applications to about 20 federal agencies that plan and implemented water resource-related projects. To address the latter concern, NAS recommended an approach similar to that taken for the implementation of the National Environmental Protection Act – that is to request each water agency to report on how it will implement national water principles and priorities. Until the P&G is revised, the full implementation of the reforms legislated through WRDA 2007 will be functionally constrained.

8.6.3.3. Army Corps Implementation of WRDA 2007

The House Committee on Transportation and Infrastructure conducted a hearing in March 2010 to determine the progress of the Army Corps in implementing the WRDA 2007, 28 months after passage of the Act. The hearing examined progress on three elements of reform, among others – mitigation, independent review and revision of the P&G for developing project recommendations (US House Committee on Transportation and Infrastructure Oversight and Investigations Majority Staff , 2010).

8.6.3.3.1. Progress on mitigation

WRDA 2007 required the Army Corps to issue revised principles and guidelines for conducting independent reviews and strengthening the mitigation program no later than November 8, 2009. The guidance on implementing reforms to the mitigation program was issued on August 21, 2009, 21 months following enactment. The Committee report noted "in addition to being tardy, the Assistant Secretary and the Corps have no mechanisms in place to determine compliance ". The Act, in addition, required a mitigation status report that would inform Congress of those projects that required mitigation, whether under construction or completed, and the status of mitigation. The Committee report stated that no report was submitted in 2008, and the report provided in 2009 was not compliant. An improved report was submitted in 2010, but the methods for calculating percentage of mitigation completed continues to be inconsistent.

More importantly, the Committee report underscored that the implementation guidance for mitigation issued by the Army Corps was totally non-compliant with statutory provisions "because it continues the policy that mitigation efforts are to be incrementally justified…that is not only inconsistent with WRDA 1986 as originally written, it is contrary to the intent of the amendments …contained in section 2036 of WRDA 2007."

Amended section 906 (of WRDA 1986, currently section 2036 of WRDA 2007) stipulates that "any proposal for authorization of a water resources project must contain a specific plan to mitigate fish and wildlife losses created by such project, or a determination that the project will have negligible adverse impact on fish and wildlife…Instead, the Corps conducts mitigation 'to the extent incrementally justified', or sufficient such that 'only negligible adverse impacts remain'". "In the implementation guidance mitigation planning statement, the Corps states that it will use the mitigation planning process to "compensate for non-negligible impacts to aquatic and terrestrial resources to the extent incrementally justified and to ensure that the recommended project will not have more than negligible adverse impacts on ecological resources".

The Committee Report explains: "Section 906 does not require mitigation such that only non-negligible impacts remain. Section 906 requires that every water resources project contain either (a) a recommendation with a specific plan to mitigate fish and wildlife losses created by such a project, or (b) a determination by the Secretary that such project will have negligible adverse impact on fish and wildlife…Impacts are mitigated, or the impacts are negligible."

The Committee Report quoted the Assistant Secretary of the Army on the use of incremental cost analysis in mitigation – "this method enables the Corps to assess whether the benefits gained by the increasingly expensive measures are a reasonable investment (e.g., is attaining the last 2 percent of needed mitigation reasonable if the unit costs increase by 350 percent?)"

The Committee report analyzed the incremental mitigation approach as follows: "First, the Corps acknowledged that the additional mitigation is needed and describes it as such. Therefore this mitigation should be implemented to meet the requirements of Section 906. Yet, the Corps acknowledges that this needed mitigation will not be conducted because of cost considerations, not environmental considerations. If the Corps is acknowledging that certain impacts remain unmitigated because of cost, then the Corps is not complying with the requirements of Section 906.

"Second, if mitigation is needed as the Corps describes, and the incremental costs of implementing the mitigation are significant such that the mitigation is not included in the alternative plans considered by the Corps, there is no indication that the Corps adequately considers these unmitigated costs in performing its cost-benefit analysis in the selection of the recommended plan. This flawed analysis can distort the selection of the best plan using cost-benefit analysis…Describing this error another way, the project alternatives do not reflect environmental costs that remain unmitigated. The result is that by failing to meet the requirements of Section 906, the Corps' ordering of alternatives by cost-benefit analysis may be incorrect, and the Corps may select the wrong plan.

"If the costs were considered in the recommended plan, then the costs would be reflected in the recommended plan and therefore would be justified. The Corps' concept of mitigation costs not being incrementally justified means the Corps is both ignoring the adverse effects on the environment and failing to recognize the costs in its analysis."

8.6.3.3.2. On conduct of independent reviews

Section 2034 of WRDA 2007 requires independent reviews for "projects expected to exceed $45M, if the governor of an affected state requests a review, and if the Chief of Engineers determines that a project is controversial". A project may also be subject to independent review "if the head of a federal or state resource agency determines that the project is likely to have a significant impact on environmental, cultural, or other resources under the agency's jurisdiction".

The House Committee requested for a list of projects subject to independent review through a letter sent to the Assistant Secretary of the Army in April 2009, five months after WRDA 2007 passed. The Committee report noted that the data submitted to the Committee indicated that the Corps did not know which projects were subject to independent review.

The Committee report states "To date, the Corps has shown a tendency to have independent review occur for draft feasibility reports. However, restricting reviews to decision documents – such as draft or final feasibility reports – can perpetuate deficiencies in the planning process that the independent review process was intended to ameliorate".

Section 2034 allows the Chief of Engineers to make a determination to conduct an independent review at three specific times during the study – (1) when the without project conditions are identified (status quo); (2) when the array of alternatives to be considered is identified (options the Corps will explore); and (3) when the preferred alternative is identified (the likely recommended project). The Committee report notes, "The implementing guidance for Section 2034 does not include these references. The result can be that review comes too late in the process and results in wasted time and money".

Section 2034 allows for one exception to the mandatory review requirement for projects exceeding $45M – high cost expenditures involving only the rehabilitation or replacement of existing hydropower turbines, lock structures, or flood control gates within the same footprint. "The expenditures must also be for an activity for which there is ample experience within the Corps and industry to treat the activity as routine, and there must be minimal life safety risk". The implementing guidance for Section 2034 describes two exceptions – one for the stated purpose, and another for ample experience – contrary to the "conjunctive" nature of the language.

Conclusion. The Committee report concludes, "…rather than swiftly and enthusiastically embracing the reforms of WRDA 2007, the Corps has been slow in its implementation, and has often modified its implementation to fit its intended results at the expense of the language of the statute and Congressional intent."

8.7. Recommendations

1. The principal goal in port development should be a net zero habitat loss for wetlands and marine benthic habitats while accommodating expansion to remain competitive in maritime commerce. To achieve this goal, coastal and

benthic mapping of habitats contiguous and coincident with main channels, turning basins and anchorages, should be a pro forma requirement for port master plans so that impact avoidance, minimization or mitigation are proactively planned at the level of the ports and county governments. FDEP, FWC and the USACE and NMFS, among others, should provide the necessary concurrence at state and federal levels in explicit terms, so that the process is not necessarily lengthened, incurring undue economic costs, when proposals attempt to skimp on taking the necessary environmental steps to minimize and mitigate environmental impacts. Currently, without the tenacity and prodding of civil groups and environmental NGOs, mangroves and coral reefs and other benthic communities are appropriated without commensurate measures to achieve at least a zero net loss.

2. There should be a permanent interagency working group to provide unfettered exchange of expert judgment among local, state and federal agencies. Such permanent interagency working group functions to determine the optimum steps to achieve the minimum goal of zero net loss of wetlands and benthic habitats. Currently, in the case of the PE Expansion, the PERG and Habitat Equivalence Groups are separate groups, though memberships overlap. As such, there can be continuity of institutional representation in shaping the expansions of Port of Miami, Port Everglades and Port of Palm Beach. Such continuity can provide for documented, accessible and sustained institutional memory that can facilitate learning and adaption of relevant environmental measures for these ports and nine others in the state.
3. At county, state, and federal levels, monitoring and review of the effectiveness of minimization and mitigation steps should be undertaken to bear out best practices. These information should be made available as part of the public domain through the port websites. As such, environmental monitoring and review becomes part of the greening of port development, maintenance and operations.
4. The USACE should incorporate the environmental requirements laid down in WRDA of 2007 into routine operations. Because port projects incur costs greater than $45M, triggers for independent review and examination of mitigation plans exist and must be carried out judiciously and with full transparency. Environmental restoration of impacted mangroves and dredged coral reefs must be fully accounted for in the cost-benefit analysis and their mitigation, appropriately examined for cost, ecological success criteria, and time to restoration to pre-impact states.
5. The expansion of ports in southeast Florida must be guided by a regional economic development plan that examines optimization of economic benefits and maximization of environmental protection and restoration for the region's wetlands and coastal ecosystems. "Deeper and wider" may not always be the optimal solution for all three ports, though this seems to be the

mantra for both Port Everglades and Port of Miami who are vying for increased flow-through of maritime commerce with the projected operation of the expanded Panama Canal by 2015.

6. Mitigation monitoring of impacted ecosystems associated with port development in southeast Florida may be best delegated to a joint monitoring team led by FDEP and FWC and with full participation by local environmental management agencies as core members. Documentation for such monitoring should follow process and success criteria established by WRDA 2007.

9. Small residential docks

The continued increase in populations in coastal communities has resulted in the increase in the construction and development of private small docks and piers. This has lead to concerns over the potential harm that construction of small docks can do to the benthic communities interconnected with coral reefs. Among these concerns are impacts on vegetation, impacts from contaminants brought about by leaching from preservatives applied to pilings, and impacts from boats or vessels using the docks, (NOAA, 2005). These concerns are exacerbated by the increasing number of permit applications for dock construction. [A dock authorization is the most frequently sought permit among coastal construction permit applications.

9.1. Federal Level

9.1.1. Oversight

The US Army Corps of Engineer (USACE) is the lead federal agency charged with the implementation of rules and regulations regarding residential dock construction, maintenance, and repair. USACE issues general permits for dock construction. The issuance of permit is based on applicant's adherence to specifications set forth by the law. The evaluation process in the issuance of permits should adhere to the provisions of the NEPA. The USACE and the NMFS created guidelines for dock construction with the intent to protect the biological habitat of all navigable waters and guarantee public access and safe navigation in these waters.

9.1.2. Federal Regulations and Activities

The USACE is charged with oversight of the country's navigable waters. Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the CWA (33 U.S.C. 1344) permit the construction of residential docks and piers. Section 10 of the Rivers and Harbors Act gives USACE the authority to establish permit requirements to prevent unauthorized obstruction or alteration of US navigable waters. This law covers "the construction, excavation, or deposition of materials in, over, or under such waters or any work which could affect the course, location, condition, or capacity of those waters." Activities which require USACE permit include construction of docks, piers, jetties, wharfs, breakwater and bulkheads, dredging and disposal of dredge material, and other modifications to the navigable waters.

Section 404 of the CWA established a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States which require permitting under this program include fill for development, water resource projects (e.g., dams), infrastructure development (e.g., highways and airports) and mining projects. The act gives the USACE the authority to make permit decisions, develop policy and guidance, and enforce its regulatory provisions. The Act also charges the US Environmental Protection Agency (EPA) to develop and interpret policy, guidance and environmental criteria for evaluating permit applications.

Proposed activities under these acts are regulated through the USACE permitting process. There are different types of permits under the administration of USACE. These are the Standard Permit, General Permits, Letters of Permission, and Individual Permits. The construction, repair, and maintenance of residential docks and piers fall under General Permits. The General Permits are issued on a regional or nationwide basis for a category of activities that entail minor work and minimal impact on the environment. The main purpose of the General Permits is to limit the delay in the issuance of the permits while adhering to the provisions of the laws and regulations which govern the program. Regional permits authorize a category of activities of regions based on regional needs while nationwide permits authorize a category of activities throughout the United States, Puerto Rico, and the U.S. Virgin Islands. Nationwide Permits (NWP) are valid for an individual project only if the conditions of the appropriate permit type are met. NWPs are only authorized for a five year period. After five years they are re-evaluated for their impacts on the aquatic environment. Currently, there are 50 NWPs which became effective on March 19, 2007 (USACENWP). USACE Regional districts are authorized to add regional conditions specific to the needs and/or requirements of their region.

There are several NWPs which are associated with residential docks, boat ramps, and piers. These are:

1. NWP 3: Maintenance. The repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure, or fill, or of any currently serviceable structure or fill previously authorized, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. It also allows temporary structures, fills, and work needed for the maintenance activity.

2. NWP 11: Temporary Recreational Structures. Temporary buoys, markers, small floating docks, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use, provided that such structures are removed within 30 days after use has been discontinued. At USACE reservoirs, the reservoir manager must approve each buoy or marker individually.

3. NWP 13: Bank Stabilization. Bank stabilization activities necessary for erosion prevention, provided the activity meets specific criteria including the activity is no more than 500ft in length along the bank and the activity does not involve discharges of dredged or fill material into special aquatic sites, unless both these criteria are waived in writing by the district engineer;

4. NWP 18: Minor Discharges. Minor discharges of dredged or fill material into all waters of the United States, provided the activity meets specific criteria including: the quantity of discharged material and the volume of area excavated do not exceed 25 cubic yards below the plane of the ordinary high water mark or the high tide line and that the discharge will not cause the loss of more than 1/10 acre of waters.

5. NWP 19: Minor Dredging. Dredging of no more than 25 cubic yards below the plane of the ordinary high water mark or the mean high water mark from navigable waters of the United States.

6. NWP 35: Maintenance Dredging of Existing Basins. Excavation and removal of accumulated sediment for maintenance of existing marina basins, access channels to marinas or boat slips, and boat slips to previously authorized depths or controlling depths for ingress/egress, whichever is less, provided the dredged material is deposited at an upland site and proper siltation controls are used.

7. NWP 46: Discharges in Ditches. Discharges of dredged or fill material into non-tidal ditches that are (1) constructed in uplands, (2) receive water from an

area determined to be a water of the United States prior to the construction of the ditch, (3) divert water to an area determined to be a water of the United States prior to the construction of the ditch, and (4) are determined to be waters of the United States. The discharge must not cause the loss of greater than one acre of waters of the United States.

In all of the above NWPs, the permittee is required to submit a pre-construction notification (PCN) to the district engineer prior to commencing the activity.

The USACE Jacksonville District has the responsibility for residential dock permitting activities in the southeast Florida region. The Jacksonville District has issued a State Programmatic General Permit (SPGP IV). This authorizes the FDEP to administer the permitting of USACE for a category of activities which are currently authorized by nationwide and regional permits. The SPGP will eliminate the need for separate approval from the USACE for minor work located in waters of the United States, including navigable waters, when that work is authorized by the FDEP. This would essentially decrease or eliminate the duplication of permitting effort between the USACE and FDEP.

On July 12, 2007, the USACE Jacksonville District submitted and published its additional conditions to Nationwide Permits. Several of these conditions relate to residential docking facilities. For NWP 11, the following regional conditions were added:

1. In Florida, prior to the initiation of any construction, projects qualifying for this nationwide permit must be authorized by the applicable permit required under Part IV of § 373, F.S., by the FDEP, a water management district under s. 373.069, F.S., or a local government with delegated authority under § 373.441, F.S., and receive Water Quality Certification (WQC) and applicable Coastal Zone Consistency Concurrence (CZCC) or waiver thereto, as well as any authorizations required for the use of state-owned submerged lands under § 253, F.S., and, as applicable, § 258, F.S. (WQC/CZM-FL)

2. In Florida, Pre Construction Notification (PCN) required for projects in waters accessible to manatees.

3. For projects in Waters Of The United States (WOTUS) accessible to sea turtles, Smalltooth sawfish, Gulf sturgeon, or Shortnose sturgeon, the permittee will follow the "Sea Turtle and Smalltooth Sawfish Construction Conditions" and or requirements, as appropriate for the proposed activity).

Currently, USACE Jacksonville has 19 Regional General Permits, one of which is relevant to residential dock permitting activities. This is SAJ 18, Private Single-Family Boat Slips in Upland Cuts in Florida. This regional permit will expire in November 2011. Additionally, the Jacksonville District has also issued Programmatic General Permits. These permits authorize other entities to administer on behalf of the USACE. Four of these permits are pertinent to the southeast Florida region. These are SAJ-42, Miami-Dade DERM, 05/01/02 - 05/01/07 Various Activities in Miami-Dade County , SAJ-67, CESAJ-CO, 02/07/07 - 02/07/11 Minor Activities in the Okeechobee Waterway , SAJ-75, Royal Palm Beach Subdivision, 03/09/04 - 02/09/09 Fill for residential Lots in Royal Palm Beach Subdivision SAJ-77, Florida FDEP, 06/19/07 - 06/19/12 Residential Fill for Jupiter Farms, Palm Beach County, SAJ-87, City of Plantation, 05/10/05 - 05/10/10 Residential, Commercial & Institutional Fill in Plantation Acres.

The ESA also requires the USACE determine for each permit application whether a proposed dock construction or activity will affect the manatee or its habitat. If the USACE determines that the activity may affect the manatee (without concluding it is not likely to adversely affect) it will consult with either the NMFS or the USFWS for a Biological Opinion. The USACE is guided by a document called the Manatee Key in determining whether the dock activity may affect the manatee. The Key has been in use since 2001 and was revised in July 2005.

Throughout the country, USACE conducts permit guideline workshops with marine contractors. These workshops help the marine contractors understand the legal and design requirements of the law.

9.2. State Level

9.2.1. Oversight

The FDEP is the lead agency in state government for environmental management and stewardship. FDEP is also charged with both regulatory and proprietary authority in permitting residential dock construction, repair, and maintenance. These authorities are granted through the Florida Water Resources Act (§ 373, F.S.) and the Florida State Lands Act (§ 253, F.S.).

9.2.2. State Laws and Regulations

Part IV of chapter 373 of the Florida Statutes governs the environmental resource permit program. The Florida Water Resources Act of 1972 brought all waters of the state under regulatory control. The Florida Water Resources gave FDEP the

responsibility for the administration of Chapter 373 at the state level. Ch 373.026 states that "The department, or its successor agency, shall be responsible for the administration of this chapter at the state level. However, it is the policy of the state that, to the greatest extent possible, the department may enter into interagency or inter-local agreements with any other state agency, any water management district, or any local government conducting programs related to or materially affecting the water resources of the state." The Act created five water management districts (WMDs) with responsibilities for regional water resource management and environmental protection. It divided the permitting authority and responsibilities for residential dock construction between FDEP and WMD. The delegation of authority between these two agencies is based on several operating agreements authorized by the state. For the southeast Florida region, the agreement is between FDEP and the South Florida Water Management District (SFWMD). These agreements include:

1. State Water Quality Certification Under the CWA, Dated February 2, 1998.

2. Operating Agreement Concerning Regulation Under Part IV, § 373, F.S., and Aquaculture General Permits Under § 403.814, F.S. between South Florida Water Management District and FDEP.

3. Authority to Certify Water Quality Standards Under Federal CWA.

4. Authorization to SFWMD to Administer, Enforce and Defend Part IV of Chapter 373, Florida Statutes (as Amended in 1989).

5. Operating Agreement Concerning Regulation Under Part IV, § 373, F.S., between South Florida Water Management District and FDEP.

State Lands Law (§ 253, F.S.) grants authority to FDEP and WMD to permit the use of state-owned lands for private purposes. According to the law, The Department of Environmental Protection shall perform all staff duties and functions related to the acquisition, administration, and disposition of state lands, title to which is or will be vested in the Board of Trustees of the Internal Improvement Trust Fund. However, upon the effective date of rules adopted pursuant to § 373.427, F.S., a water management district created under § 373.069, F.S. shall perform the staff duties and functions related to the review of any application for authorization to use board of trustees-owned submerged lands necessary for an activity regulated under part IV of 373, F.S. for which the water management district has permitting responsibility as set forth in an operating agreement adopted pursuant to § 373.046, F.S.

The State Lands law requires authorization for any construction on or use of submerged lands owned by the State. Activities covered under this law include dredging and filling and construction of docks, piers, and seawalls on sovereign submerged lands.

Part II of the State Parks and Preserves Law (§ 258, F.S.), also known as the Florida Aquatic Preserve Act of 1975 designates and establishes aquatic preserves in the state of Florida. It also regulates the use and activities, including dock construction, in designated aquatic preserves. Any proposed activity within the boundaries of aquatic preserves requires authorization from FDEP or SFWMD. Issues such as riparian rights, impacts to submerged land resources, and preemption of other uses of the water by the public are all considered in the process of authorizing a proposed activity. Authorizations for use of aquatic preserves are in the form of consents of use, easements, and leases.

Chapter 18-21, F.A.C. governs authorizations to use submerged lands. Two amendments were made to this code with the intent to lessen the time and delay in obtaining both regulatory and proprietary authorization for activities governed by § 373, F.S. and § 253, F.S. These amendments are the Linkage Rule and the Delegation Rule.

Rule 18-21.00401, F.A.C., known as the Linkage Rule, allows a single application for both regulatory authorization and proprietary authorization. It streamlines the process of reviewing and issuing or denying a proprietary authorization to use sovereign submerged lands with reviewing and issuing the regulatory authorization (processing of an environmental resource permit, a wetland resource permit, or a joint coastal permit).A single application would be used by people seeking both regulatory authorization and proprietary authorization.

The second amendment, Rule 18-21.0051, F.A.C., also known as the Delegation Rule gives FDEP and the WMDs the decision making authority of the Board of Trustees, for certain activities or use of sovereign submerged lands. However, this authority would still remain for the following projects:

a. Docking facilities with more than 50 slips & modifications consisting of the addition of more than 10% of the number of existing slips where the total of the existing and proposed number of slips is more than 50;

b. Docking facilities having a preempted area of more than 50,000 sq. ft. & modifications consisting of the addition of more than 10% of the existing preempted area where the total of the existing and preempted area is more than 50,000 sq. ft.;

c. Private easements of more than five ac.;

d. The establishment of a mitigation bank; or

e. Any project found to be of concern to one or more Board member.

Table 9.1. State rules pertaining to residential docks in southeast Florida.

Environmental Resource Permitting		
General Environmental Resource Permitting Program Rules		
Chapter or Rule F.A.C.	**Title**	**Effective Date**
62-4	Permits	10/31/07
62-113	Delegations	07/16/01
62-301	Surface Waters of the State	01/08/96
62-302	Surface Water Quality Standards - (Table 62-302.530 - Surface Water Quality Standards)	04/04/02
62-330	Environmental Resource Permitting	12/05/05
62-340	Delineation of the Landward Extent of Wetlands and Surface Waters	05/09/00
62-341	Noticed General Environmental Resource Permits	08/04/05
62-342	Mitigation Banks	05/21/01
62-343	Environmental Resource Permit Procedures	02/19/03
62-343.900(1)	ERP Joint Application Booklet	10/03/95
62-344	Delegation of the Environmental Resource Program to Local Governments	05/09/00
62-345	Uniform Wetland Mitigation Assessment Method	04/27/05
62B-49	Joint Coastal Permits and Concurrent Processing of Proprietary Authorizations	02/19/98
Sovereign Submerged Lands		
Chapter	**Title**	**Effective Date**
18-14	Administrative Fines for Damaging State Lands or Products Thereof	07/07/85
18-18	Biscayne Bay Aquatic Preserve	06/05/96
18-20	Florida Aquatic Preserves	08/01/01
18-21	Sovereign Submerged Lands Management (Forms)	01/01/06
For Projects Located Within The South Florida Water Management District		
40E-1	General and Procedural	10/03/95
40E-4	Surface Water Management	10/03/95
40E-40	General Surface Water Management Permits	10/03/95
40E-41	Surface Water Management Basin and Related Criteria	10/03/95

The FDEP's Submerged Lands and Environmental Resources Program (SLER) through its Environmental Resource Permitting Program (ERP) and Submerged Lands Rules reviews applications for proposed works, including dock construction, in wetlands and other surface waters, as well as works in uplands that can potentially impact water quality. The ERP is a regulatory permit program that ensures compliance to provisions of Chapter 373. An environmental resource permit (ERP) program regulates all works in tidal and freshwater wetlands and other surface waters (including isolated wetlands) and uplands. The ERP addresses dredging and filling for any purpose in wetlands and other surface waters. In addition, activities that are located on submerged lands that are owned by the state of Florida also require a proprietary authorization for such use under chapter 253. If such lands are located within Aquatic Preserves, the authorization also must meet the requirements of chapter 258. In the southeast Florida region, the ERP program and submerged lands lease are implemented jointly by the FDEP and the SFWMD according to the operating agreement that recognizes agencies' division of responsibilities. The issuance of ERP also constitutes a state water quality certification or waiver of the certification under section 401 of the CWA (33 U.S.C. 1341)

When a corresponding federal dredge and fill permit is required, it is issued independently by the USACE after the state issues or waive the state water quality certification. For the southeast Florida region, the state has a joint permit application program, wherein applicants for a federal dredge and fill permit apply directly to the either the FDEP or SFWMD using the same form that is used for the state. FDEP or SFWMD then forwards the application to USACE for a concurrent federal permit.

9.3. Local Government

Section 373.441 of the Florida Water Resources Act grants authority to FDEP and WMD to delegate all or a portion of the ERP to local governments. Chapter 62-344. F.A.C. sets forth guidelines to local governments in the application process, including procedures and delegations of all or part of the environmental resource permit process, and the criteria that will be used to approve or deny a delegation request. Currently, only Miami-Dade and Broward Counties, among the southeast Florida region counties, have delegation agreements with the state.

9.3.1. Miami-Dade County

Agreement No**.** MA-13-114 is the Memorandum of Understanding (MOU) between FDEP and Miami-Dade County. The agreement became effective on April 5, 1996. The MOU delegates to Metropolitan Dade County the authority to

act as agent of the Board of Trustees to review, authorize, or deny specific project types except for those projects where Metropolitan Dade County is the applicant or projects that are located contiguous to unbridged, undeveloped coastal islands as defined by subsections 18-21.003(12), (13), (52),(53), and paragraph 18-21.004(1)(h), F.A.C. Project types covered under this agreement are the following:

1. Installation and repair of private residential single-family docks that meet the requirements of § 403.813(2)(b), F.S.

2. Installation and repair of private residential single-family boat ramps that meet the requirements of § 403.813(2)(c), F.S.

3. Repair or replacement of existing docks that meet the requirements of § 403.813(2)(d), F.S.

4. Repair or replacement of existing seawalls, revetments, or bulkheads that meet the requirements of § 403.813(2)(e), F.S.

5. Maintenance dredging projects that meet the requirements of § 403.813(2)(f), F.S., where the dredged material will be used for public purposes on public land or has no economic value as determined by paragraph 18-21.011(3)(c), F.A.C.

6. Repair or replacement of existing functional pipes or culverts, the purpose of which is the discharge of stormwater, that meet the requirements of § 403.813(2)(h), F.S.

7. Installation of aids to navigation and associated buoys that meet the requirements of § 403.813(2)(k), F.S.

The MDDERM is the lead agency in regulating, implementing and enforcing the rules and regulations on residential docks in the county. Sections 24-48 of the Code of Miami-Dade County requires a Class I permit for all work in, on, over, or upon the tidal waters or coastal wetlands of Miami-Dade County, including those areas within municipalities. For most of the submerged lands in Biscayne and Dumbfounding Bays, the Miami River, Little River, Oleta River and Arch Creek, a proprietary approval from FDEP is also required. Through the delegation agreement between MDDERM and FDEP, MDDERM has been delegated by FDEP the authority to grant consent of use for these submerged lands if certain conditions are met. The primary purpose of Class I permit applications is to assess the environmental, aesthetic, and navigational impacts

of the above named coastal construction activities to Miami-Dade water resources.

Residential dock projects that are exempt from the Class I permit include:

1. The repair or replacement of decking or handrails on an existing dock or pier (excluding support structures such as joists and stringers), limited to their original dimensions.

2. The removal of old unused, rotted or dilapidated docks, piers and mooring or fender piles.

3. Any work involving marine hardware necessary to protect, secure or access vessels including fenders, cleats, chocks mooring whips, bits and ladders. This does not apply to work involving fender piles, provided such work is not prohibited by a MDDERM permit or a restrictive covenant.

4. Any work involving permanent uncovered benches, tables or storage boxes (not exceeding 36 inches in height) on docks and piers.

5. The placement of concrete jackets or other forms of protection on existing dock (excluding structural repairs), mooring or fender piles. (Source: Miami-Dade Land Development Code)

Generally, the construction, repair or replacement of fixed or floating docks and associated tie-up facilities requires a short form permit application. MDDERM, upon review of the application, may require the standard form if some conditions are not met. The short form application requires a biological assessment, structural review, performance and/or mitigation bond, approved mitigation plan, and permit fee. The standard form, in addition to those criteria required for the short form, also requires the Professional Engineer (P.E.) Certification letter, sketch of proposed work, and a public hearing by county commission.

9.3.2. Broward County

A delegation agreement among the Florida FDEP, SFWMD, and Broward County commenced on May 2001. The agreement delegates the implementation and enforcement responsibilities of the Environmental Resource (ERP), Wetland Resource Management (WRM) and the Management and Storage of Surface Water (MSSW) permitting programs to the Department of Planning and

Environmental Protection of Broward County. Compared to the FDEP's MOU with Miami-Dade County, the delegation of proprietary authority over submerged lands in Broward County is very limited. Under the delegation agreement, program activities where authority is retained by FDEP or SFWMD include those which require the Joint Coastal Permit under § 161.041 and F.S. Chapter 373 and uses and activities on sovereign submerged lands.

Most construction activities in or around the waters of Broward County, including residential dock construction, are regulated by the Broward County Environmental Protection & Growth Management Department (BCEPGMD). Section 27 Article XI of the Broward County Code, also known as the Aquatic and Wetland Resources, deals with the development, implementation, and enforcement of rules and regulations specific to residential dock construction. Sec. 27-331, Declaration of intent specifically states that "(4) Dredging and filling or aquatic resource alteration projects include, without limitation, construction or replacement of seawalls, bulkheads, docks and piers, the filling of any existing regulated water body, the creation of new canals or lakes within upland areas, maintenance dredging of existing canals, ditches or waterways, installation of pilings, buoys or aids to navigation, the installation of subaqueous utility crossings or lines, the construction or replacement of bridges, the removal or alteration of any mangroves as defined within § 373, pt. IV, F.S. (§ 373.403, F.S. et seq.), and § 403, F.S., as amended, and any other work done in, on or under the waters of Broward County, except for those activities specifically exempted by this article."

Section 27-336 of the Broward County Code allows for a General Environmental Resource License to be issued for certain projects. Projects eligible to receive the General Environmental License include:

1. The repair or replacement of existing docks, provided that no additional water ward fill is used and the new or repaired dock is not enlarged beyond a total of five hundred (500) sq. ft. over-water surface area for the new and existing structure;

2. The installation of private, noncommercial docks of five hundred (500) sq. ft. or less of over-water surface area, where no dredging or filling is required except to install the pilings;

3. Projects which are within isolated wetlands or lakes and/or otherwise, in the opinion of BCEPD, will not significantly degrade the environment.

According to the Broward Environmental Review Approval Guide, all construction activities and projects in Broward County must receive an Environmental Review Approval at the Development Management Division's Environmental Review Desk. This office verifies that all required environmental licenses and pending environmental enforcement issues related to the *County's Natural Resource Protection Code* (the Code) have been resolved.

9.3.3. Martin County

Permitting activities for docking facilities within Martin County are currently not handled by the Environmental Division of the Martin County's Growth Management Department. Environmental resource permits and submerged land leases are obtained from FDEP and USACE through the Joint Coastal Permit. Chapter 21 Article 7 Section 21 of the Martin Municipal code requires permits from the Martin County Building Department for any construction. In addition to assessing the design and adherence to building codes, the Building Department also verifies that proper state and federal authorizations have been granted for the project.

9.4. Enforcement and Compliance Monitoring

Enforcement and compliance monitoring for residential docks is the function of the permitting agencies. As discussed in the previous section, docks are permitted on the basis of regulations overseeing the use of and impacts on submerged lands (and the ownership thereof), water resources, as well as the living resources and ecosystems contained therein. In general, activities on submerged lands are regulated by FDEP, and those affecting water resources are permitted by WMDs. The Environmental Resource Permitting (ERP) Program has divided the permitting responsibility by activity between FDEP and the WMDs (except for the North Florida WMD). Delegation agreements between state agencies and counties allow for devolving delegation of permitting responsibilities to counties within defined legal boundaries. FWC and corresponding local authorities clear the application for impacts on biological resources before permits are granted.

Activities that affect navigable waters are independently regulated by the USACE. State agencies and the latter have a joint coastal permit application, which is submitted to either FDEP or a state WMD in accordance with an activity-based division of responsibilities. Upon receipt of an application, a copy is sent to USACE for independent processing. Beginning 2004, USACE has delegated permitting for dredge and fill activities associated with residential docks to FDEP under a State Programmatic General Permit to streamline the

permitting process. Clearances from USFWS for federally protected species and from FWC for Florida Outstanding Waters are required prior to permit approval.

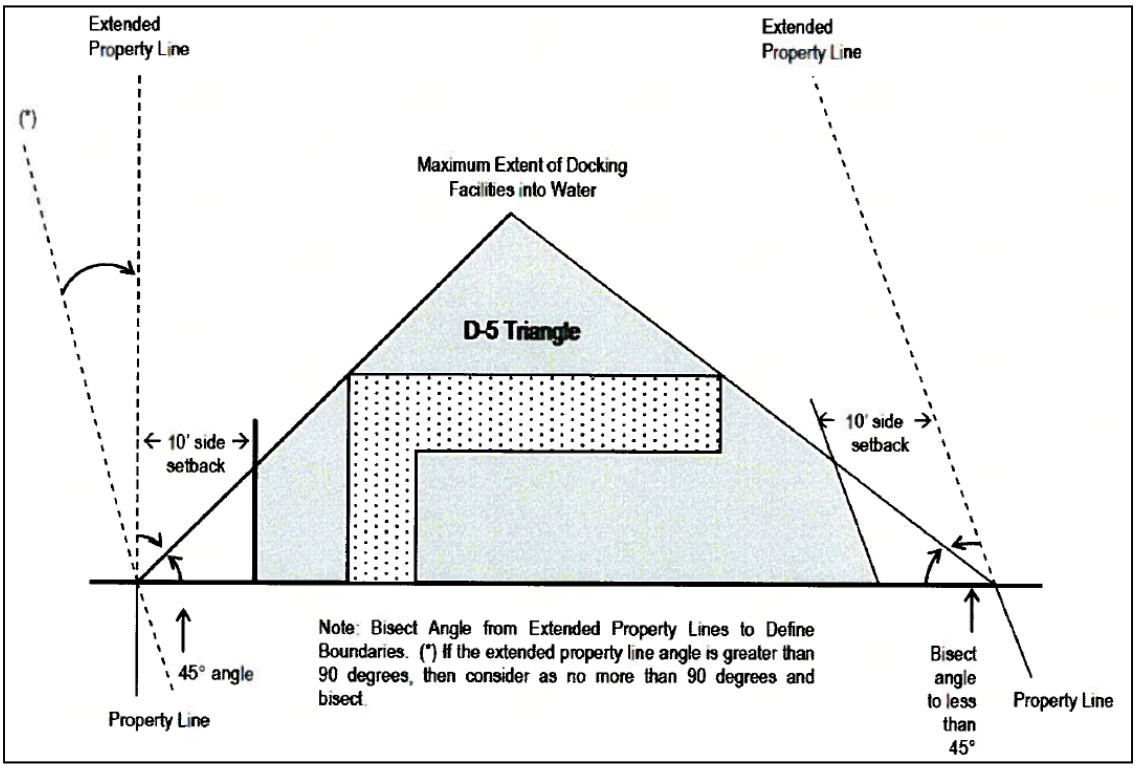
The extent to which counties participate in regulating residential docks depends on whether they have delegation agreements with FDEP under the ERP Program and on the oversight contained in their respective County Ordinances. Delegation agreements specify which aspects of the environmental permitting functions of the state agencies (FDEP and WMD) are given to the County. An ERP delegation agreement was approved for Broward County in 2001, and another is being negotiated with Miami-Dade County with a 2007 draft already posted (to supersede a limited delegation approved in 1996). A third agreement with Palm Beach is under discussion. The nuanced regulatory practices for residential docks by the SEFCRI counties are detailed below.

The issue of illegal construction of both small and large docks needs documentation that does not exist in public records as of this writing. A recommendation is that a database of illegal dock construction and legal actions taken to resolve such be created to inform subsequent compliance monitoring actions at local government level.

9.4.1. Miami-Dade County

In the case of Miami-Dade County, a delegation agreement was signed between the Board of Trustees of the Internal Improvement Trust Fund of the FDEP and the county on April 15, 1996 to cover specific project types in the county and which are not contiguous to an un-bridged, undeveloped coastal island. These include the installation and repair of private residential single-family docks that meet the requirements of § 403.813(2)(b), F.S., and which are exempted from FDEP permitting. Under the County's environmental permitting system, however, only the removal of old unused, rotted or dilapidated docks, piers and mooring or fender piles are exempt as far as dock construction is concerned. Single- and multiple-family residential dock construction is permitted using the County's Class 1 Permit. Single-family docks must be contained within the dimensions of a D-5 triangle, a theoretical demarcation westward of a property, the intent for which is to protect the visual and physical access of neighboring properties (Figure 9.1). To minimize conflicts among neighbors, a Class 1 Permit stipulates for applications to provide a location map indicating the applicant's and neighboring properties (Figure 9.2). Where the construction design exceeds the D-5 triangle boundaries and not exceeding the dimensions exempted by FDEP, notarized letters of consent from adjoining riparian property owner(s) are required (Miami-Dade, 2009). Miami-Dade County Class 1 Permit demonstrates more stringent requirements than those imposed by the State for the construction

of small residential docks, and provides a mechanism for considering environmental and property ownership concerns before allowing coastal construction. The County's Department of Environmental Resources Management (DERM) has an aggressive enforcement program to ensure compliance with environmental regulatory provisions of Chapter 24 (Miami-Dade County Environmental Protection Ordinance) of its County Code, and its



Enforcement Division pursues civil and criminal charges against errant parties.

Figure 9.1. Guidelines for the construction of single family dock under Miami-Dade County's Class 1 Permit (Miami-Dade, 2009)

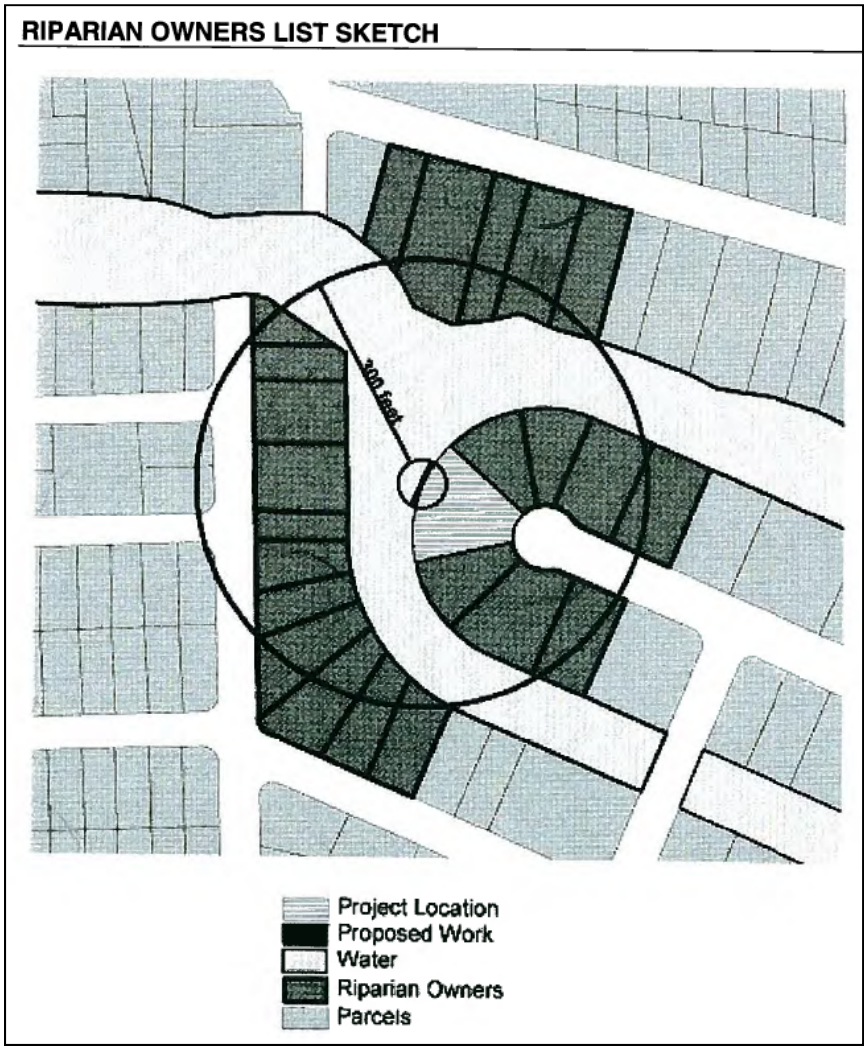


Figure 9.2. Required location map of applicant's and neighboring properties required by Miami-Dade County Class 1 Permit (Miami-Dade, 2009).

9.4.2. Broward County

For Broward County, the 2001 delegation agreement between the FDEP, the South Florida Water Management District and the County did not devolve permitting, compliance and enforcement authority for construction of structures including residential docks on sovereign submerged lands. It states that retention of such prerogatives to state agencies such as FDEP and SFWMD shall not prevent the Broward County Department of Planning and Environmental Protection (DPEP) from reviewing and taking action on applications for development landward of waters over sovereign submerged lands. For residential docks that are exempt from FDEP permits, Broward County requires an environmental review approval followed by issuance of a general environmental resource license. When existing docks are repaired or replaced with no additional water ward fill used, or a new or repaired dock is not enlarged beyond a total of 500 sq. ft. over-water surface area, the latter license is granted after it receives prior license from the Biological Resources Division of the Broward County Environmental Protection and Growth Management Department (BCEPD) to ascertain proposals or activities are compliant with regulations protecting wetland biota and habitats (BCEPD, n.d.).

Although the coverage of the delegation agreements contracted by Broward County differ from that agreed to by Miami-Dade County with FDEP as the principal State Agency, both counties provide more stringent measures to oversee the construction, maintenance and repair of residential docks in general and to ensure highest levels of compliance. Both maintain hotlines for anonymous complaints, and online searchable databases of complaints and agency actions. The latter take the form of warning notices, both verbal and written, citations, notices of violation, notices of intent to file suit, and criminal and civil complaints as appropriate. In Broward County, the DPEP Environmental Inquiry and Resource System (ENVIROS) enables the public and applicants to search for complaints thematically. Over the period 2001 to 2007, about 26 complaints regarding docks have been compiled in the database.

9.4.3. Palm Beach County

Palm Beach has yet to receive delegation for environmental resource permitting from the State Agencies, a status that remains under discussion. The County permits the construction of docks in unincorporated areas. Ten of twenty-five waterfront and incorporated municipalities provide dock permits with appropriate state and federal clearances; while the remaining 15 rely totally on county and/or state, and federal oversight (Palm Beach County Manatee

Protection Plan, 2007) (Table 9.2). Thus, within the County, there is no uniformity in the permitting enforcement and compliance for residential docks.

Table 9.2. Dock permitting authority in 25 waterfront municipalities, Palm Beach County (modified from Palm Beach County Manatee Protection Plan, 2007).

Municipality	Municipal Permitting Authority		Non-Municipal Permitting Authority
	YES	NO	
City of Belle Glade		X	USACE.
City of Boca Raton		X	No information provided.
City of Boynton Beach	X		State Agency/ USACE must give approval before City issues dock permit.
City of Delray Beach	X		City permits all work for docks, ramps, mooring buoys in conjunction with a structure, but have no authority over dredging.
City of Lake Worth			No information provided.
City of Pahokee		X	USACE.
City of Palm Beach Gardens	X		Permits installation or replacement of docks, mooring facilities for private or commercial water craft, groins, sea walls, jetties, revetments or similar structures.
City of Riviera Beach		X	No information provided.
City of West Palm Beach	X		State Agency/ USACE must give approval before City issues dock permit.
Town of Briny Breezes		X	Permits facilities along canals but not along Intracoastal waters which State Agency/ USACE permit.
Town of Gulf Stream		X	Permits facilities along canals but not along Intracoastal waters which State Agency/ USACE permit.
Town of Highland	X		Issues dock permits.

Beach			
Town of Hypoluxo		X	No information provided.
Town of Juno Beach		X	County/SFWMD issue permits.
Town of Jupiter	X		State Agency/ USACE must give approval before Town issues dock permit.
Town of Jupiter Inlet Colony		X	No information provided.
Town of Lake Park		X	County/SFWMD issue permits.
Town of Lantana	X		Town issues permits with USACE and FDEP approval; Police and Marine Safety Dept. issue mooring permits for vessels.
Town of Manalapan		X	No information provided.
Town of Ocean Ridge		X	No information provided.
Town of Palm Beach		X	No information provided.
Town of Palm Beach Shores	X		State Agency/ USACE must give approval before Town issues dock permit.
Town of South Palm Beach		X	No information provided.
Village of North Palm Beach	X		Village permitting authority depends on project and waterway location and must get approval from State Agency/ USACE first.
Village of Tequesta	X		Approval from FDEP/ SFWMD before issuing dock permit.

9.4.4. Martin County

The County Building Department accepts applications for state and federal permits for docking facilities as well as validates that such are permitted before proposed projects begin implementation. Oversight and enforcement for dock construction, repair and maintenance, are completely the jurisdiction of FDEP, SFWMD and USACE.

9.5. Permit violations

Permit violations are most often discovered when community members report nearby construction or when docks requiring leases are inspected. Delegated counties or state agencies provide verbal or written notices to erring property owners, after which these are given a number of chances to respond. Informal meetings are set between permitting staff and violators with the intent of reaching an agreement on how compliance may be achieved. Once an agreement is reached, a consent order is issued which contains specific actions including modifications to be made on the structure, mitigation requirements, permit fees and any fines to be paid. If no agreement is made with the erring parties, the county or State agency, as appropriate, can initiate a proceeding in a circuit court as a last resort. FDEP may impose administrative penalty fees of up to $10,000 per day per violation without going through the courts under the Environmental Legislation Reform Act (Patterson, 2003).

The permitting process and enforcement authorities for residential docks differ from county to county within the southeast Florida region. Furthermore, there are also differences among municipalities within a county. For example, in Palm Beach County, these are non-uniform among incorporated and incorporated municipalities. For the most part, the agency issuing the dock permit is responsible for monitoring subsequent compliance and enforcement. In 2003 for the entire State, it was estimated that only 62 FDEP staff, 86 WMD personnel, and 15 delegated Broward County staff had compliance and enforcement duties under the State Environmental Resource Permitting and Wetland Resource Permitting Programs (Patterson, 2003).

9.6. Evaluation of the regulatory system

Two emergent issues provide the context for evaluating the regulation of residential docks: (a) the environmental impacts of an increasing number of private docks; and (b) public access to waterfront facilities and waterways. In this section, the data on boat slip densities, and existing evidence of adverse environmental impacts on Submerged Aquatic Vegetation (SAV) and of metals leaching from construction materials were examined. Current steps to mitigate these issues by local, state, and federal agencies were examined, and recommendations to address remaining gaps are provided.

9.6.1. Number and density of private docks

Data for residential docks or leases on sovereign submerged lands as proxy are not readily available statewide despite the documentation required by the permitting and enforcement process described in previous sections. For the entire state, FDEP estimated about 113,110 residential docks on sovereign submerged lands that were lease-fee exempt and between 100,000 to 200,000 more that were not exempt in 2002 (Florida Legislative Committee on Intergovernmental Relations, 2007). Thus, residential docks built on state-owned submerged lands roughly total anywhere from 200,000 to 300,000. A tracking database is needed to document residential docks as part of a detailed inventory of all waterfront facilities in the State. Exemptions from permits or leases do not justify the current lack of mechanisms to track the numbers and status of these docks given the environmental and socio-economic impacts they have on coastal ecosystems and public access.

In the southeast Florida region, the County Manatee Protection Plans (MPP) provide inventories of boat storage and docking facilities. Broward and Palm Beach County MPPs provide detailed inventories. Specifically, they indicate that current docking facilities have a density of about 2 dock facilities per 100ft of shoreline in both counties. Broward County hopes to maintain this density as a strategic approach to minimize conflicts between boaters and manatees, among others. In its analysis of existing data of boating facilities, Broward County's 2007 MPP states that its waterways shoreline appears to be approaching build-out relative to wet mooring capacity. Boat registration growth over the last five years is about 1%, the lowest of all 13 key counties critical for manatee protection. Inventories in 2007 show private docks at 63% outnumber public facilities almost 2 to 1 (Table 9.3).

In the case of Palm Beach County, the MPP articulates a tiered approach in setting boat slip densities from zero new slips in exclusionary areas where manatees aggregate to unlimited increases in boat slip densities in unrestricted areas where no sightings of manatees have been recorded. It is unclear whether this approach sets a maximum limit to an overall dock build out. A 2005 count indicates that private slips account for 55% of all shorefront facilities.

For Miami-Dade County which drafted its MPP a decade ago in 1995, the maximum powerboat build-out was set high at five powerboat slips per 100ft of contiguous shoreline. This is more than double the current boat slip densities in Broward or in Palm Beach Counties. Given the paucity of accessible data for Miami-Dade County, it is not possible to determine whether this upper limit has

been reached to date, although references to limited boat slip expansion is evident in current amendments of its Comprehensive Plan.

Table 9.3. Residential docks and other boating facilities in the southeast Florida region.

County (Date of information)	Single Family wet slips (number of docks)	Multi-Family wet slips (number of docks)	Marina wet and dry slips (number of facilities)	Boat Ramps trailer capacity (number of ramps)	Existing Dock Density (boat slips per 100 ft shoreline)
Broward (2007)	15,756	3,349 (208)	10,629 (100)	508 (14)	1.43
Palm Beach (2005)	8,772 (6590)	3,420 (136)	9,059 (182)	805(19)	1.56
Miami-Dade (1996)	No data	No data	13,387 (226)	(19)	No data
Martin (2002)	(<3,268)	No data	(49)	(9)	No data
Martin public facilities (2008)	No data	No data	3819 (21)	(15)	No data
Florida (1998)	Not Calculated	Not Calculated	96,874 (registered)	Not Calculated	Not Calculated
Florida (2004)	Not Calculated	Not Calculated	98,862 (registered)	Not Calculated	Not Calculated

Table 9.4. Palm Beach County recommendations for multi-slip boat facility siting policy (PBC County MPP, 2005).

Boat Faciity Siting Category [1]	**Boat Slip Density [2]**	**Exceptions and Comments**
Unrestricted	Unrestricted	No limits on slips or boat ramp parking spaces.
Preferred	10:100	Public boat ramps may be allowed an unrestricted number of parking spaces.
Conditional	6:1	
Non-Preferred	1:100	Non-fee public facilities, such as municipal boat ramps and transitory slips at public parks, located in non-preferred areas shall be limited to 10 transitory slips, regardless of shoreline length owned by the applicant.
Exclusionary	Non-motorized only	Transitory slips within the basin proposed for the FIND property surrounded by the JDNA.

[1] Boundaries determined by GIS shapefile used to create maps in this plan.

[2] Maximum slip numbers in all categories apply only to new slips. Existing slips are not to be included in the total. Ratios refer to the number of slips per linear foot of shoreline owned by the applicant. Slip densities are only allowable if there are no significant impacts to habitat (i.e., seagrass, hardbottom, etc.).

Note: Criteria do not apply to individual single-family docks or transitory slips.

9.6.2. Impacts on environment and public access

The generally small dimensions of residential docks have been assumed to have little environmental impact. The prescribed sizes and design of individual residential docks ranging from those that are exempt to those allowed by local ordinances and state rules have been deemed innocuous based on best judgment of the permitting authorities. In coastal states where the demand for recreational boating has increased, the collective impacts of these small structures may not be as benign as previously assumed. Small docks and piers and associated boating activities have negative environmental impacts on submerged aquatic biota, surface water quality, sediments and substrate (NOAA, 2005). Chronic shading of SAV have demonstrated impacts on their growth rates, which has implications on their ability to sustain dependent biota up the food chain (Figure 9.3). Leaching of chemicals from treated wood used in dock construction in addition to contaminants from associated boating activity (boat fuels and oils) degrade surface water quality and impact benthos given the location of docks at the land-water interface (Figure 9.4). Scarring from suspended sediments and propeller wash are non-quantified short term and often ignored occurrences the long term impacts from which are unknown (Figure 9.5).

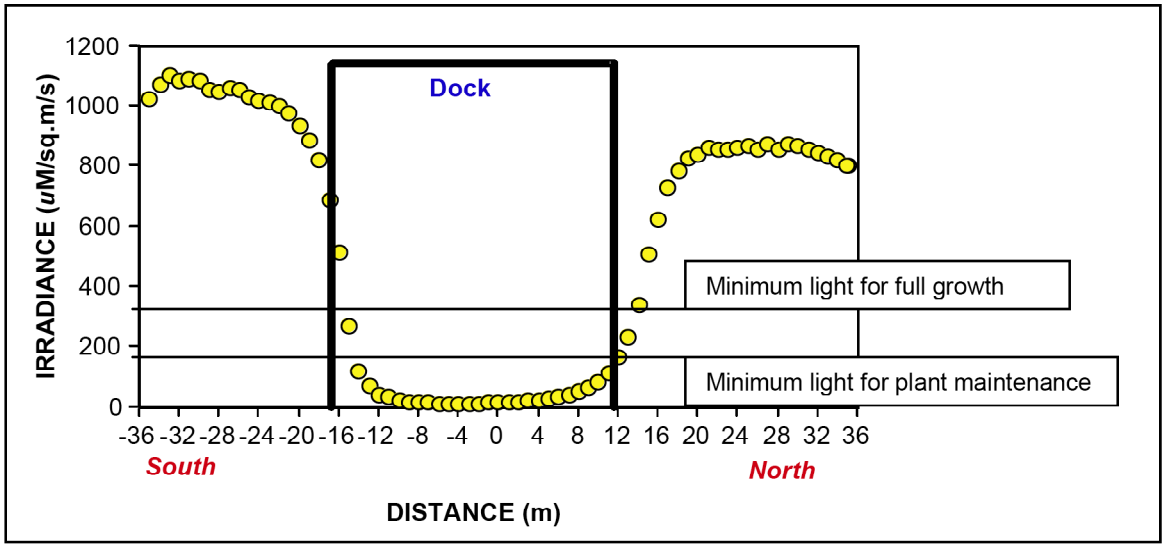


Figure 9.3. Light profile under an east-west oriented dock in Washington state (Nightengale & Simestad, 2001 in NOAA NCOS, 2003). Light levels underneath the dock are insufficient for even minimum light plant maintenance (first horizontal line), and much more so for full plant growth (minimum light for full growth). Unless the shading is mitigated, submerged aquatic vegetation will die beneath dock structures.

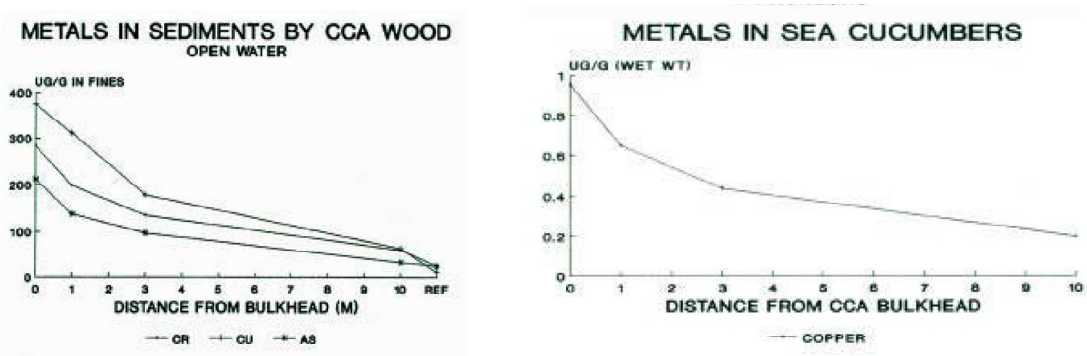


Figure 9.4. Contaminant metals in sediments (left) and in detritus feeders near CCA treated woods (Weis & Weis, 1994; Kelty & Bliven, 2003).

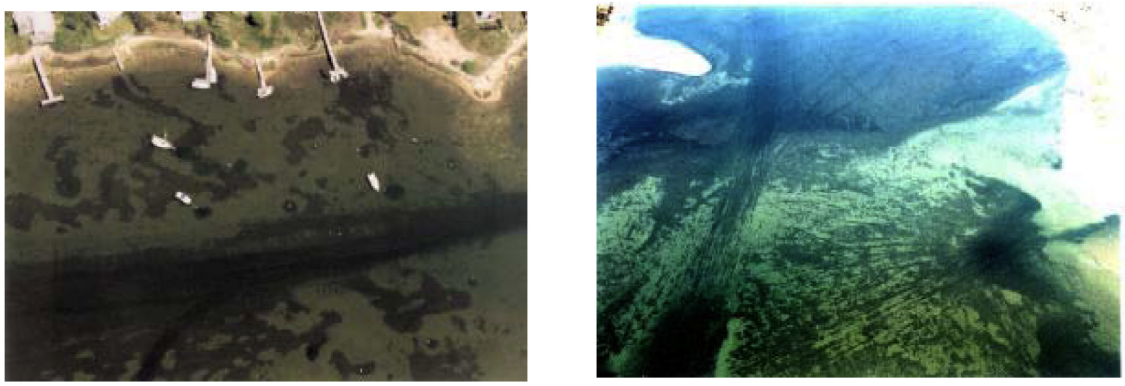


Figure 9.5. Propeller and mooring chain scour marks in proximity of docks (left) and propeller wash scour marks in Waquoit Bay, MA (right) (Photo: R. Crawford) (Kelty & Bliven, 2003).

Residential docks affect public access to coastal and marine waters. Extensions into navigable waters or into designated mooring fields or anchorage areas impede boat traffic. In addition, the gentrification of commercial and recreational waterfronts and their conversion to residential property have reduced the number of publicly accessible waterfront facilities. The latter, a consequence of economically driven shoreline development, conflicts with the Public Trust doctrine that upholds public access to natural resources such as the shore and adjacent waters as preeminent, an entitlement that governance at all levels should protect.

As previously stated, neither FDEP nor county governments keep track of residential docks, unless they are non-exempt and are permitted, thus paying submerged lands fees. There is also no known database to document the conversion of commercial waterfront to residential properties. Using publicly available data, there is no significant increase in the number of public boat facilities for the period 1987 to 2004 (Table 9.5). During this time, registered recreational vessels increased by 63%, and were consistently an order of magnitude greater than the number of public boating facilities. Though there is no annual data (and only one 2002 estimate) for residential docks, the number of boats that these small docks can accommodate is at least 3X that which can be accommodated by public facilities in 2004.

In a survey of all counties and municipalities regarding trends in waterfront land use in their respective jurisdictions, the Florida DCA found commercial fishing working waterfronts in 10 counties and 10 municipalities were being bought by private entities for conversion to public or private marinas and dry docks in the last five years (FDCA, 2004). With regards to recreational working waterfronts, 13 counties and 23 municipalities reported that these were being acquired by developers for conversion to private marinas or dry docks or to residential uses in their respective jurisdictions.

Table 9.5. Public boat facilities in Florida: 1987-2004 (Florida Senate, 2004; 1987 and 1992 vessel registration.

Public shorefront facilities	1987	1992	1998	2004
Salt water marina slips (marinas)	49,499 (1,201)	45,436 (1,073)	45,839 (1,123)	50,585 (1,066)
Salt water dry storage	33,476	31,052	33,791	31,856
Salt water ramp lanes	1,232	1,256	1,328	1,373
Total public boat facilities	84,207	77,744	80,958	83,814
Total residential docks	No data	No data	No data	263,107 (on state submerged lands in 2002)
Registered recreational vessels	602,409	669,941	809,160	982,907

Moreover, respondents from the recreating boating sector of these 13 counties reported that about 57 marinas or boat yards were being converted to condominiums, which are a more short term profitable venture than publicly accessible facilities. Despite the lack of systematic data collection to further validate these changes, the responses obtained by the study imply increasing inaccessibility of the coast to the boating public.

9.6.3. Current policy regime

9.6.3.1. Public access

To slow the accelerating trajectory toward waterfront privatization, the State Legislature passed the Working Waterfronts Legislation in 2005 to: 1) protect environmental and cultural resources; 2) provide public access; 3) prevent losses from disasters; and 4) enhance the waterfront economy (§ 342.201, F.S., Chapter 2005-157, L.O.F., and Chapter 2006-220, L.O.F.). To achieve these, the comprehensive planning role of coastal counties must encourage the preservation of recreational and commercial working waterfronts, and to so articulate it through the Future Land Use, Recreational and Open Space and Coastal Management Elements of their respective Comprehensive Plans (§ 163.3177 and § 163.3178, F.S.).

At the local level and almost in parallel with the legislative steps taken at the state level, Martin County amended its Comprehensive Plan to incorporate a "no net loss" policy for marinas in 2005. Through its Comprehensive Plan, the Martin County Commission defined Marine Service Areas where marina owners selling their property to residential developers have to build comparable facilities sites designated according to land development regulations of the county. While the policy does not preclude conversions to facilities like "dockominiums" (exclusive residential dockage facilities), the intent is to not lose current levels of public access (Carver, Sargent, Sidman, & Swett, 2007a) (Appendix 9.1).

Palm Beach County is considering a no-net loss policy for public access to its waterways and is considering implementing a study to evaluate requirements for public access of its waterfront facilities as well as the funding mechanisms to finance their construction, repair and upkeep (Sheldone, 2006). Voters approved a $50M bond issue in 2005 to buy development rights to marinas and boat ramps. Relevant policies from the County's Manatee Protection Plan and Comprehensive Plan are indicated in Appendix 9.3.

In the incorporated areas of Palm Beach County, facilities that provide public access include municipal anchorages and mooring fields as in the cases of Fort Myers (Lee County), Stuart (Martin County), and Vero Beach (Indian River County) (Hatfield, Ruppert, Ankersen, & Hamann, 2005). In Fort Myers, an Anchorage Advisory Committee provides guidance to the Town Council on issues associated with mooring and anchoring and the appointment of a Harbormaster whose functions may include enforcement, permitting, fee collection and documentation of the use and management of its mooring fields.

Broward County's Comprehensive Plan adopted on December 2006 articulates a "blueways" system plan which among others "identify public sites where docking facilities and small boat houses can be established" (Broward County Comprehensive Plan, 2006). Additional relevant policies are shown in Appendix 9.2.

Miami-Dade County was the first County in the southeast Florida region to have an approved Manatee Protection Plan that was passed in 1995. It is in the process of updating the plan and a draft Marine Facility Inventory has just been circulated for review and discussion. In the County's 2006 update of its Comprehensive Plan, it articulates maximizing public access of waterfront facilities as a major policy of the Recreation and Open Space Element of the Plan (See Appendix 9.4).

9.6.3.2. Environmental impacts

FDEP has set construction standards for single-family docks that will not require permits, but if constructed on state submerged lands, will require FDEP's letter of consent. The design assumes minimizing shading impacts on submerged vegetation. However, there is no mention about the need to orient structures north-south in order to ensure sunlight along the east-west axis. Also, the construction guidelines do not indicate the type of materials that must be avoided such as preservative-treated wood. Recommendations from Kelty and Bliven (2003) indicate that alternatives to CCA (chromated copper arsenate) treated lumber should be considered in areas of low flushing. The use of grated material as decking, light tunnels, or reflective deck bottoms to increase illumination must be indicated in the construction guidelines.

The proliferation of residential docks can conflict with the movement of manatees, in addition to the increase in boating activity between home docks and destination sites in water. Minimizing the number of docks and pooling the number of boat slips into community dock boat slips is a prudent choice to make when waterway space is getting tighter for boaters and manatees.

9.7. Recommendations

A common goal regarding residential docks must be articulated among state, county and municipal agencies. Given the issues of environmental impacts and public access, the logical choice would be one of limiting private coastal structures. Across governance levels, policies should be reinforcing one another.

9.7.1. For existing structures

1. An FDEP spatial dockage database that can track residential dock density and monitor conformity to structural standards should be created. On a regional scale, environmental impacts (cumulative and non-cumulative) could be simulated and assessed, and periodic inspections to ground truth these scenarios would provide much needed empirical documentation of impacts to natural resources.

2. Owners should submit a self-assessment of compliance checklist of structural and design standards annually on-line as a mechanism to update the spatial dockage database.

3. County governments could use the data on regional environmental impacts in zoning to locate community docks that will have smaller ecological footprints. A vigorous educational campaign showing impacts and ways to mitigate these with communal docking facilities may be strategic in changing collective behavior. Educational tools and resources have been compiled by NOAA's NOS and are available for use.

4. Reassess lease fees for the use of state submerged lands. The current lease fee exemption of residential docks with square footage of 1,000 or less. As a result, 99% of all residential docks became exempt (Florida LCIR, 2007). Subsection 18-21.001(5), F.A.C. states "to ensure that all public and private activities on sovereignty lands which generate revenue or exclude traditional public uses provide just compensation for such privileges." Since private docks are not for public use, the state should be duly compensated for the use of its submerged lands.

The Florida Legislative Committee on Intergovernmental Relations (FLCIR) has reviewed lease fees and present potential revenues from three possible lease fee structures (Table 9.6). The lease rates are based on the median fee ($75) charged for submerged lands in 19 states, the most common fee ($100) these states charge, and using the annual per footage dock lease fee in Florida at $0.138 (or $138 for 1000 m^2 docks).

Whatever the fee to be levied would be, the Florida LCIR recommends a flat fee for residential docks for ease of implementation.

Table 9.6. Lease fee assessment from residential docks on state submerged lands (FLCIR, 2007).

Lease Rate ($)	Estimated number of 1000 m² docks not paying lease fee	Potential dock annual lease collection ($)
75.00	263,107	19,733,025
100.00	263,107	26,310,700
125.00	263,107	32,888,375

9.7.2. For new structures

1. Encourage community dockage using the NOAA NCOS tools.

2. Provide incentives to homeowners who will elect to use communal facilities instead of building their own. Reduced submerged lands fees may be achieved by dividing dock-based lease fees by the number of boat slips a dock has in order to derive boat slip-based fees.

3. The location of communal docking facilities may be determined using several criteria already taken into account by existing planning mechanisms including:

    a. The boating facility siting plans incorporated in the Manatee Protection Plans;

    b. The Future Land Use, Coastal Management, and Recreation and Open Space Elements of the County Comprehensive Plans;

    c. Municipal ordinances and development plans.

    For locations where there is general agreement in location, a streamlined permitting process using the county agency with environmental permitting authority should be used as the clearinghouse. The latter should be delegated authority by state and federal permitting agencies to check compliance with their

requirements prior to proceeding with county and municipal level approvals. Permits by rule, using set criteria and construction standards can expedite the permitting process for communal docks and will greatly encourage the use of this option.

4. The state, county, or municipality can opt to acquire land from sellers or donors or through their powers of eminent domain (Office of Ocean and Coastal Resource Management, 2005).

5. Where a single-family dock application can demonstrate conditions of extreme hardship or same historical use (Georgia Vince as quoted in Havens, 2007) the application may be considered only if the need cannot be met by communal docking facilities.

6. Working vessels (pile drivers, dredges, construction barges) must display name of company and phone number to receive permits for dock and dredging work in the SEFCRI area. All working vessels must display name and phone number when working on site.

7. When a USACE permit is needed along with a county permit, the county should submit a copy of the permit directly to the USACOE to ensure all agency approval is met. County and municipal level approvals should not be given until state and federal approval is given if needed.

8. More staff needed not just to handle the permit process but to look at non-compliance activities.

References

Categories:

1. Cited References
2. Sources for data, figures, and tables
3. Agency Websites
4. Agency Plans

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Table 6.6 - Source: Martin County, 2009

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APPENDICES

Appendices are numbered to match the parent section of the main report.

Appendix 3.1

List of resource persons interviewed (January 16 – April 15, 2007)

1. County level

1.1. Martin County –
Growth Management Department

Ms. Kathy Fitzpatrick, Coastal Engineering
Phone: 772-288-5429
Email: kfitzpat@martin.fl.us

Mr. Gary Roderick, Chief, Office of Water Quality

1.2. Palm Beach County –
Department of Environmental Resources Management
Ms. Janet Phipps (unable to schedule interview)

1.3. Broward County---
Environmental Protection Department:

115 S. Andrews Avenue, Room A-240
Fort Lauderdale, FL 33301
Phone: 954-519-1200

Ms. Linda Sunderland, Natural Resource Specialist III, Wetlands Resources Section
Mr. Kenneth Banks, Environmental Scientist

Port Everglades:
Port Everglades Administration Building

1850 Eller Drive

Mr. Allen Sosnow, Environmental Projects Manager
Phone: 954-523-3404

1.4. Miami-Dade County –
Department of Environmental Resources Management:
33 SW 2nd Ave., Suite 1000, Miami, FL 33130

Mr. Lee Hefty, Environmental Resources Regulation Division Supervisor
Mr. Joe Stillwell, Enforcement Division Supervisor
Mr. Steve Blair, Restoration and Enhancement Section Supervisor

2. State level

Florida Fish and Wildlife Conservation Commission

Lisa Gregg
Division of Marine Fisheries Management
620 S. Meridian Street
Tallahassee, FL 32399-1600
Phone: 850 488-6058 ext. 210
Email: lisa.gregg@myfwc.com
Website: http://myfwc.com/marine/recreational/sal.htm

Lt. Colonel Jim Brown
Division of Law Enforcement-Boating, Waterways, and Field Services
Farris Bryant Building
620 South Meridian Street
Tallahassee, FL 32399-1600
Phone: 850 488-5600
Email: jim.brown@MyFWC.com
Website: http://myfwc.com/law/council/index.html

Aquatic Habitat Conservation and Restoration

Erin McDevitt
Habitat and Species Conservation
Southeast Regional Office
8535 Northlake Blvd
West Palm Beach, 33412
Phone: 561 625 5122 x 130

Email: erin.mcdevitt@myfwc.com

Jeff Beal
Email: jeff.beal@myfwc.com

Department of Environmental Protection

Office of General Counsel

Kelly Samek
Room Number: 6063
3900 Commonwealth Boulevard
Tallahassee, FL 32399
Phone: 850 245 2242
Email: kelly.samek@dep.state.fl.us

Bureau of Beaches & Coastal Systems

Physical Address:
5050 W. Tennessee Building B
Tallahassee, FL

Mailing Address:
3900 Commonwealth Boulevard
Mail State 300
Tallahassee, FL 32399
Website: http://www.dep.state.fl.us/southeast/erp/erpmain.htm

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Environmental Specialist III
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Martin Seeling
Environmental Administrator
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Email: martin.seeling@dep.state.fl.us

Vladimir Kosmynin
Phone: 850 414-7817
Email: Vladimir.Kosmynin@dep.state.fl.us

Bobby Halbert
Environmental Specialist I
Compliance Enforcement
Division of Water Resource Management
Phone: 850 414-7716
Email: Robert.halbert@dep.state.fl.us

Donna Kendall
Email: donna.kendall@dep.state.fl.us

Southeast District

Submerged Lands and Environmental Resources Program
400 N. Congress Avenue Suite 200
West Palm Beach, FL 33401
Phone: (561) 681-6600
Website: http://www.dep.state.fl.us/southeast/erp/erpmain.htm

Georgia Vince
Environmental Administrator—Program Administrator
Phone: (561) 681-6642
Fax: (561) 681-6780
Email: Georgia.vince@dep.state.fl.us

Jennifer K. Smith
Environmental Manager—Permitting Manager
Phone: (561) 681-6638
Fax: (561) 681-6780
Email: Jennifer.k.smith@dep.state.fl.us

Florida Park Service

Website: www.floridastateparks.org

John R. Griner
Park Manager
St. Lucie Inlet & Seabranch Preserve State Park
Division of Recreation and Parks
4810 S.E. Cove Rd.
Stuart, FL 34997
Phone: (772) 219-1880

Fax: (772) 219-1879

Office of Coastal & Aquatic Managed Areas

Southeast Florida Aquatic Preserves Field Office
3300 Lewis Street
Ft. Pierce, FL 34981
Website: http://www.dep.state.fl.us/coastal/programs/aquatic.htm

Laura Herren
Environmental Specialist II
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3. Federal level

In-person:

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Habitat Restoration Specialist
NOAA , Endangered Resources
Kendall Summit Executive Center
11420 N. Kendall Dr.
Suite 103
Miami, FL 33176

Jocelyn Karazsia
Fishery Biologist
NOAA, Habitat Conservation Division
400 N. Congress Ave.
Suite 120
West Palm Beach, FL 33401

Paul Kruger
Team Leader
ACOE
South Permits Section Office
11420 North Kendall Drive
Suite 104
Miami, FL 33176

John Studt
South Permits Branch
ACOE
4400 PGA Boulevard, Suite 500
Palm Beach Gardens, FL 33410

By Telephone:

Carolyn Sramek
Supervisory Fishery Administrator
Constituency Services Branch
NOAA
St. Petersburg, FL
727-824-532

Appendix 3.2.

A detailed description of the structure of the database.

The row headings are comprised of seven major broad categories. Each broad category also consists of multiple primary key words that can be used to search the Database. The major row categories include:

- Organisms
- Human activities
- Man-made structures
- Physical resources/ processes
- Ecological processes
- Habitats/ Ecosystems (e.g., coral reefs, wetlands, beaches)
- Geographic regions (e.g., St. Lucie River, Biscayne Bay National Park)

Each section of legislation was categorized by the nature of its provisions as indicated by the column headings below:

- Definitions
- Enforcement entity
- Mandate
- Jurisdiction
- Permitting authority
- Non-permitting authority
- Allowances
- Fines
- Funding
- Disposition of monetary penalties
- Incentives
- Disincentives
- Cross references with other laws

The environmental issue, species, habitat or geographic focus of each section, where this was specified, was included in the tabulation. The laws as evaluated

above represent the theoretical basis for regulation and protection of coral reefs in the southeast Florida region. The manner by which these are actually implemented by mandated agencies at the tiered levels of the local, state, and federal governments, take the form of a variety of activities (Column A, Table 3.2). An outline to gather information about these activity types was prepared (Column B, Table 3.2). In addition, an idealized template to organize data on permit or license issuances, the fee schedules associated with these, how monetary penalties are spent, and the disposition of cases in violation of such permits was also created (Table 3.3).

The information obtained through the examination of three tiered laws, the permitting and licensing mechanisms, and the interviews about activities implemented by various agencies, were used in providing a preliminary evaluation of the scope and efficacy of oversight the existing regulatory systems currently provide. Specifically, the evaluation was done in two parts. Part one focuses on regulation of six FDOU and MICCI major environmental issues. The second examines how to develop legal and institutional mechanisms that can more tightly couple the protection of habitats and living resources in coral reef ecosystems towards a more ecosystem-based management.

Table A3.2.1. Relevant local, state, and federal, laws analyzed in this report.

TYPE	FEDERAL ACTS	FLORIDA STATUTES	COUNTY ORDINANCES
FDOU	1. Coral Reef Conservation Act 2. Endangered species Act 3. MSRA, Title I & III 4. Marine Mammal Protection Act	1. Saltwater Fisheries Regulations (FS Chapter 370) 2. Wildlife (FS Chapter 372) 3. Florida Aquaculture Policy Act (FS Chapter 597) 4. Florida Fish & Wildlife Commission regulations (F.A.C. Title 68)	
MICCI	1. Abandoned Shipwreck Act	1. Ports and Harbors (FS Chapter 309)	

	2. CWA 3. Coastal Barrier Resources Act 4. Water Resources Development Act	2. Beach and Shore Preservation Act (FS Chapter 161, Parts 1 & 2) 3. Coastal Zone Protection Act (Florida Statutes Chapter 161 Parts 3 & 4) 4. Florida Environmental Land and Water Management Act (Florida Statutes Chapter 380, Part 1) 5. Florida Coastal Management Act (Florida Statue Chapter 380, Part 2) 6. FDEP Regulations (Title 62, F.A.C.) 7. Navigation Districts; Waterway Development (§ 374, Parts 1 & 2, F.S.) 8. Vessel Safety (Florida Statutes Chapter 327) 9. Public Lands and Property (Florida Statutes Chapter 253)	
BOTH FDOU AND MICCI		1. State Parks (Florida Statutes Chapter 258, Part 1) 2. Florida Aquatic Preserve Act (Florida Statutes Chapter 258, Part 2) 3. Board of Trustees of Internal Improvement Trust Fund Chapter 18-18:13; 18-	1. Code of Martin County 2. Code of Palm Beach County 3. Code of Broward

		20:10; 18-21:43, F.A.C.	County 4. Code of Miami-Dade County
TOTAL TABLES	**120**	**1,006**	**375**

Table A3.2.2. Types of activities (A) and components (B) by activity.

A. TYPES OF ACTIVITY	**B. COMPONENT OF EACH ACTIVITY**
Awareness/ Appreciation	Title
Compliance Assistance	Goals
Mitigation/ Restoration/ Rescue	Timetable/ Core
Scientific Monitoring	Target Location
Research	Target Audience
Policy Formulation	Deliverables
Fee/ Fine collection	Resources
Permit/ License Issuances	Partners (county, state, federal, civil groups)
Grant Provision	Oversight
Law Enforcement	Activity website ; Comments/ Narrative

Table A3.2.3. Data for the Permitting template.

SECTION	SECTION DETAILS
DESCRIPTORS OF LICENSES/ FEES (STATISTICS FOR 2001 AND 2005)	Average frequency of collection/ month
	Highest frequency of collection in a quarter
	Average total revenue/ month
	Highest total revenue in a quarter
	Average frequency of violations/ month
	Highest frequency of violations in a quarter
HOW LICENSE REVENUES & MONETARY PENALTIES ARE SPENT	Permit issuance/ fee collection
	Law enforcement
	Marine fisheries research
	Stock enhancement
	Artificial reef
	Public workshops
	Education
	Compliance Assistance Programs
	Aggregated Allocations
DISPOSITION OF CASES FOR PERIOD 2000-2005	Resolved by case type

In the course of implementing the project and after the interviews with agency personnel were conducted, it was evident that the majority of the fields identified in both the activity and permitting templates would not be filled. Data have not been collected, or if available, were not currently systematized for release. A number of agency databases were in progress. The data collected on activities and permits, where available, were used in the analysis. However, the

tabulated forms using the activity and permit templates were excluded from the database because a majority of the fields were empty. Thus, the database included the legislative tabulations only.

The legislative database for this study was built on the excel spreadsheets of tabulated laws and agency regulations at the local, state, and federal levels. All filled rows of targets of regulation, and their components in the tables, were extracted to a main database for local, state, and federal levels. The main database was used to summarize the extent of legislation that pertained to specific targets (environmental issue, species, habitat, or geographic location). In addition, the database was also used to determine the number of laws or regulations pertinent to specific target types.

The main database is linked to the original worksheet that was tabulated for the specific target. For example, if one clicks on any filled cell, a target of regulation cell or a filled column cell, the original workbook or worksheet of the specific legislation would be displayed. If one clicks on the identifier field of the original legislation worksheet, it will bring you to the actual web page which contains the complete text of legislation.

Table 3.2.4. Summary of Federal Legislation by Target of Regulation.

Target	Frequency
Agriculture	1
Air	1
Animals	7
Aquaculture	2
Atlantic Ocean	1
Beach modification	1
Biological Communities	1
Boating	6
Corals	3
Crustaceans	1
Coastal Construction	31
Commercial Fishing	12

Conservation	17
Coral reefs	8
Discharging/ Dumping	4
Diving	6
Environmental Protection	8
Estuaries	6
Fish	7
Gulf of Mexico	1
Habitat or Ecosystem	3
Land Development	12
Mammals	32
Mining	1
Natural Resources	19
Plants	8
Pollution	7
Ports and harbors	1
Recreational Fishing	10
Shellfish	2
Saltwater	2
Species	9
Terrestrial/land	3
Treasure hunting	3
Water works	2
Wetlands	9
Wildlife	13
Basin	1
Beaches/ dunes	11
Continental shelf	5
Erosion	2

Freshwater flow	1
Islands	5
Saltwater intrusion	2
Underground water / groundwater	1
Water	4
Waters	12

The analyses for this study, as indicated as chapter headings following this section, included: 1) coral reef fisheries, 2) derelict fishing gear and marine debris, 3) recreational boating and mooring fields – for FDOU; 4) beach nourishment, 5) ports and large vessel anchorages, and 6) small docks - for MICCI. Each of these topics was examined for:

- Institutional oversight
- Effectiveness of regulations at local, state, and federal levels
- Enforcement and compliance

Appendix 4.1.

A subsample of penalties for violations of commercial fishing laws relevant to commercial harvest of reef organisms (§ 379.406, F.S.)

Violation	Penalties
-§ 379, F.S. (Fish and Wildlife Conservation) - Rules of the FWC on conservation of marine resources (Title 68B, F.A.C.)	Base penalties: - 1st conviction – imprisonment of not more than 60 days or a fine of not less than $100 nor more than $500 or both - 2nd conviction within 12 months of 1st – imprisonment for not more than 6 months or by a fine of not less than $250 nor more than $1,000 or by both
MAJOR VIOLATIONS – LEVEL 3 – 1ST DEGREE MISDEMEANOR	Suspension of licenses for: - 30 calendar days upon 1st conviction - up to 90 calendar days upon 2nd conviction within 12 months of 1st - up to 180 days upon 3rd conviction which occurs within 24 months of 1st -for a period of 6 mos to 3 years upon 4th conviction within 36 mos of 1st
- Violation involving more than 100 illegal spiny lobsters - Possession of more than 25 spiny lobster during the closed season or possession of more than 25 wrung spiny lobster tails or more than 25 egg-bearing or stripped spiny lobster - Trap molestation, trap robbing or pulling traps at night - Any combination of violations in any 3-consecutive year period wherein more than 75 illegal spiny lobster in the	- Base penalty plus additional penalty of $10 for each illegal spiny lobster or part thereof - Suspension of licenses depending on conviction rate

aggregate are involved	
- Any single violation involving the possession of more than 100 pounds of any illegal finfish - Any combination of violations in any 3-consecutive-year period wherein more than 200 lbs of illegal finfish in the aggregate are involved	- Based penalty plus additional $5 for each pound of illegal finfish -Suspension of licenses depending on conviction rate
For any violation involving the taking, harvesting, or possession of more than 1000 pounds of any illegal finfish	- Based penalty plus additional penalty equivalent to the wholesale value of the illegal finfish -Suspension of licenses depending on conviction rate
- Violation involving the taking or harvesting of any marine life species the harvest of which is prohibited, or the taking or harvesting of such a species out of season, or with an illegal gear or chemical - Any violation involving the possession of 25 or more individual specimens of marine life species, or any combination of violations in any 3-year period involving more than 70 such specimens in the aggregate	Suspension or revocation of the license holder's marine life endorsement
Saltwater products; unlicensed sellers; illegally harvested products	- 1st violation, civil penalty of up to $2500 and may suspend the wholesale or retail dealer's license privileges for up to 90 days - 2nd violation with 12 months of 1st, civil penalty of up to $5,000 and may suspend license privileges for up to 24 mos
Unlicensed sale, purchase or harvest	- 1st conviction – up to $500 fine and/or up to 60 days in jail – misdemeanor of the 2nd deg - 2nd conviction within 3 yrs of the first – increased to a 1st degree misdemeanor, with a fine of up to $2500 and suspension of all license privileges for a period not

	exceeding 90 days -3 rd conviction increased to a 1st degree misdemeanor with mandatory minimum jail term of 6 mos and may be assessed a civil penalty of $5,000 and suspension of all license privileges for a period not exceeding 6 mos -3rd h conviction within 1 year after 2nd violation is a felony of the 3rd deg, punishable with a mandatory jail term of 1 year, a civil penalty of $5,000 and all license privileges permanently revoked -4 th or subsequent violation – 3rd deg felony – mandatory minimum jail term of 1 yr, civil penalty of $5,000 and all licenses permanently revoked - Any person with licenses permanently revoked and who thereafter sells or purchases or who attempts to sell or purchase any saltwater product commits 3rd deg felony, with minimum mandatory jail term of 1 year, civil penalty of $5,000 and all property involved in the offense forfeited
Unlicensed sale, purchase, harvest – Any commercial harvester or wholesale or retail dealer whose license privileges are under suspension and who during the suspension sells or purchases or attempts to sell or purchase any saltwater product shall incur the following penalties	-1 st violation or a 2nd violation after more than 12 months after 1st – 1st degree misdemeanor – civil penalty of up to $2500 and an additional suspension of all license privileges for a period not exceeding 90 days -2 nd violation with 12 months of 1st – 3rd deg felony- mandatory minimum jail term of 1 year, civil penalty of up to $5,000, additional suspension of all license privileges not exceeding 180 days; forfeiture of all property involved in such offense -3rd violation with 24 mos of 2nd violation or subsequent violation – 3rd deg felony – mandatory minimum jail term

	of 1 yr, civil penalty of up to $5,000 and additional suspension of all license privileges for a period not exceeding 24 mos; forfeiture of all property involved in such offense
Unlicensed sale, purchase, harvest – Failure to purchase saltwater products license with the requisite endorsements	-1st violation – 2nd deg misdemeanor-– up to $500 fine and/or up to 60 days in jail – misdemeanor of the 2nd deg -2nd violation – 1st deg misdemeanor – up to $2500 fine; subject to suspension of all license privileges for a period not exceeding 90 days -3rd violation – 1st deg misdemeanor – mandatory minimum jail term of 6 mos, civil penalty up to $5,000, subject to suspension of all license privileges for up to 6 mos -3rd violation within 1 year after 2nd violation – 3rd deg felony – mandatory minimum jail term of 1 year, civil penalty $5,000, al license privileges completely revoked - 4th or subsequent violation – 3rd deg felony – mandatory minimum jail term of 1 yr, civil penalty of $5,000, all license privileges completely revoked

Appendix 4.2

Species Specific Regulations

Table A4.2.1. Examples of grouper-specific regulations showing rule changes from 1986 to 2009 (data from Schlesinger, 2009). Stock assessment data sources, where available are indicated. Fish images from FWC website.

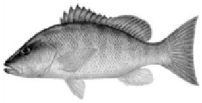
Taxonomic group/ Rule type	Chronology of rule provisions
Grouper, Black	
• Size limits	1985 - 18" minimum size limit (min); 1990 - 20" min; 1998 - 24" min; 2001 - 22" min for recreational fishers in Gulf of Mexico state waters; 2001 - 24" min for commercial Gulf Black Grouper
• Bag limits	1986 - 5 groupers aggregate/fisher/day excluding Rock Hind and Red Hind; 1998 - 2 per recreational fisher/day; 2007- 2/fisher/day in Atlantic and Monroe county and 5/fisher/day in gulf; included in the 5 aggregate grouper daily bag limit; In Gulf, zero bag limit for captains and crew of for-hire vessels; 2009 - gulf limit reduced to 4 fish/fisher daily bag limit; 2010 – decrease recreational aggregate bag limit to 3 in Atlantic state waters consistent with July 2009 federal rule.
• Fishing grounds/ season	1990 - commercial harvest ban in federal and state waters to coincide; 2009 - fisheries closed spawning season Feb 1 to March 31 for all shallow water groupers (Gag, Black,

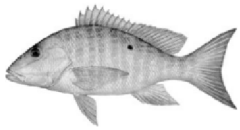
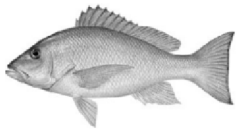
	Red, Yellowfin, Scamp, Yellowmouth, Red Hind and Rock Hind) in Gulf state waters except Monroe County; 2010 – January to April closed season to both recreational and commercial harvest of shallow-water groupers in Atlantic state waters and consistent with July 2009 federal rule.
• Level of protection	1990 - designates all grouper species as restricted species, thus requiring a restricted species endorsement to fish this species; 2010 - use of dehooking device to remove hooks from fish with minimal damage.
• Dominant fishing sector	For the period 1990 to 2000, the recreational sector overtook the commercial sector in 1997 and remained dominant the rest of the time (Johnson et al., 2007). No recent assessment available.
• Current status of fish stocks	Considered undergoing overfishing (Robson, 2009b, FWC 2009). Overfished in Florida Keys and Biscayne National Park 2000-2004 (Ault,, Smith, & Tilmant, 2008).
Grouper, Gag	
• Size limits	1985 - 18" min; 1990 - 20" minimum; 1998 - 24" min.; 2001 - 22" for recreational and 24" for commercial; 2007 - 24" min for Atlantic and Monroe and 22" Gulf.
• Bag limits	1986- 5 aggregate/fisher daily limit except Rock Hind and Red Hind; 1998 - 2 fish per fisher daily; 2009 - 2 max daily bag limit and included in Atlantic 5 aggregate grouper daily bag limit and in Gulf at 4 aggregate bag limit; in the Gulf - zero bag limit for captain and crew of for hire vessels; 2010 – decrease recreational aggregate bag limit to 3 in Atlantic state waters consistent with July 2009 federal rule.
• Fishing grounds/ season	1990 - commercial harvest ban in federal and state waters to coincide; 2009 - Gulf fisheries closed spawning season Feb 1 to March 31 for all shallow water groupers (Gag, Black, Red, Yellowfin, Scamp, Yellowmouth, Red Hind and Rock Hind) in Gulf state waters except Monroe

	County; 2010 – January to April closed season to both recreational and commercial harvest of shallow-water groupers in Atlantic state waters and consistent with July 2009 federal rule.
• Level of protection	1990 - designates all grouper species as restricted species, thus requiring a restricted species endorsement to fish this species; 2010 - use of dehooking device to remove hooks from fish with minimal damage.
• Dominant fishing sector	The recreational fishery accounted for 63% of total landings in the state in 2007, and landings were higher in Gulf state waters than in Atlantic state waters (FWC, 2008).
• Current status of fish stocks	SEDAR (2006a) reports that South Atlantic Gag Grouper is considered to be experiencing overfishing based on overfishing defined as a fishing mortality rate in excess of that corresponding to 30% static SPR.
Grouper, red	
• Size limits	1985-18" min; 1990 - 20" min; 2005- 20" min; 2009 - reduces commercial minimum size of Gulf Red Grouper and for all imported and sold red Grouper from 20" min to 18" min total length to minimize bycatch; 2010 – decrease recreational aggregate bag limit to 3 in Atlantic state waters consistent with July 2009 federal rule
• Bag limits	1986- 5 groupers bag limit except Rock Hind and Red Hind; 2005, gulf bag limit reduced to 2 Red Groupers; included in 5 groupers aggregate bag limit; 2006 - in Gulf, reduced to 1 Red Grouper bag limit; 2007 - zero bag limit for captain and crew of charter and headboats; 2009 - increases daily bag limit back to 2 Red Groupers within the 5 aggregate grouper bag limit.
• Fishing grounds/ season	1990 - commercial harvest ban in federal and state waters to coincide; 2001 - establishes a Feb 15 to Mar 15 closed season for the commercial harvest of gulf Gag, Black, and

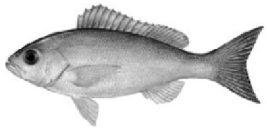
	Red Grouper; 2009 - fisheries closed spawning season Feb 1 to March 31 for all shallow water groupers (Gag, Black, Red, Yellowfin, Scamp, Yellowmouth, Red Hind and Rock Hind) in Gulf state waters except Monroe County; 2010 – January to April closed season to both recreational and commercial harvest of shallow-water groupers in Atlantic state waters and consistent with July 2009 federal rule.
• Level of protection	1990 - designates all grouper species as restricted species, thus requiring a restricted species endorsement to fish this species; 2010 - use of dehooking device to remove hooks from fish with minimal damage.
• Dominant fishing sector	In 2007, 81% of total state landings came from the commercial fishery of which 99% originated from the Gulf state waters. (FWC 2006).
• Current status of fish stocks	The Atlantic Red Grouper is undergoing overfishing (FWC 2009). Overfished in Florida Keys and Biscayne National Park 2000-2004 (Ault,, Smith, & Tilmant, 2008). Current stock exploitation status – Overfishing; Current stock biomass status – Unknown (SEDAR, 2010).

Table 4.2.2. Examples of snapper-specific regulations to show rule changes from 1986 to 2009 (data from Schlesinger, 2009) and stock status. Fish images from FWC website.

Taxonomic Group/ Rule Type	Chronology of rule provisions
Snapper, gray	
• Size limits	1990 - 10" minimum (min) (the sale of these species of total length less than 12" prohibited)
• Bag limits	1986 - daily bag limit of 10 aggregate snappers excluding lane, Vermillion and Yelloweye; 1990 - 10 aggregate bag limit to contain no more than 5 gray and no more than 2 Red Snappers.
• Fishing grounds/ season	1990 - all commercial harvest of any species of snapper, grouper and sea bass is prohibited in state waters whenever harvest of that species is prohibited in adjacent federal waters.
• Level of protection	1990 - all snapper and grouper as restricted species.
• Dominant fishing sector in state waters	Recreational fishery caught 90% of statewide landings, of which 60% were landed on the Gulf coast. Highest commercial landings were made in Monroe County (FWC 2008).
• Current status of fish stocks	No SEDAR in the last 10 years; overfished in Florida Keys and Biscayne National Park 2000-2004 (Ault, Smith, & Tilmant, 2008).

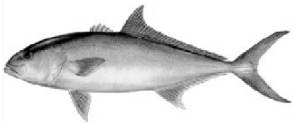
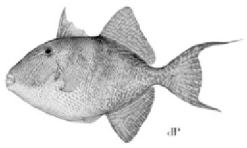
Snapper, Mutton	
• Size limits	1985 - 12" min; 1994- 16" min.
• Bag limits	1986 - daily bag limit of 10 aggregate snappers excluding lane, Vermillion and Yelloweye; 1990 - 10 aggregate bag limit to contain no more than 5 gray and no more than 2 Red Snappers.
• Fishing grounds/ season	1990 - all commercial harvest of any species of snapper, grouper and sea bass is prohibited in state waters whenever harvest of that species is prohibited in adjacent federal waters; 1992 - restricts all harvest of Mutton Snapper in May and June to the bag limit for this species.
• Level of protection	1990 - all snapper and grouper as restricted species.
• Dominant fishing sector in state waters	Recreational fishery lands most of the Mutton Snapper (SEDAR, 2008b).
• Current status of fish stocks	SEDAR (2008b) determined that the South Atlantic and Gulf of Mexico Mutton Snapper was not undergoing overfishing nor was it overfished in 2006. However, there was moderate probability that the stock could be overfished, and the increase in fishing mortality rate enhances this concern (SEDAR, 2008). Overfished in Florida Keys and Biscayne National Park 2000-2004 (Ault, Smith, & Tilmant, 2008).
Snapper, Red	
• Size limits	1985 - 12" min; 1990 - 13" min; 1992 - 20" min on state Atlantic coast; 1994 - Gulf Red Snapper 14" min and then 15" effective Jan 1 1996 and 16" effective Jan 1 1998; 2003 - 15" min for Gulf Red Snapper.

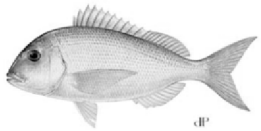
• Bag limits	1986 - daily bag limit of 10 aggregate snappers excluding lane, Vermillion and Yelloweye; 1990 - 10 aggregate bag limit to contain no more than 5 gray and no more than 2 Red Snappers; 1996 - 5 Red Snapper daily bag limit for all Gulf harvesters; 1998 - reduction Red Snapper daily bag limit from 5 to 4 including captain and crew on for-hire vessels; 1999 - From Aug 29 to October 31 1999, daily bag limit is set to 2 Red Snappers no less than 16" during this period in the Gulf state waters; 2008 - reduces the Gulf recreational and commercial daily bag limit for Red Snapper from 4 to 2 fish per person and establishes a zero Gulf Red Snapper daily bag limit for captains and crew of for-hire vessels.
• Fishing grounds/ season	1990 - all commercial harvest of any species of snapper, grouper and sea bass is prohibited in state waters whenever harvest of that species is prohibited in adjacent federal waters; 1996 - prohibits the sale of Red Snapper when federal sale closures occur in Gulf waters; 1998 - automatic closure of state waters to Gulf recreational Red Snapper harvest when federal waters are closed to such harvest effective Nov 1 1998; 1999 - allows the Gulf recreational Red Snapper fishery to remain open in Florida waters from August 29 to October 31, 1999; Dec 1999 - establishes the period April 15 to October 31 as open season for the recreational harvest of Gulf Red Snapper; changes the recreational open harvest season for Gulf Red Snapper from June 1 to Sept 30 effective March 13 2009; changes the recreational harvest season for Red Snapper

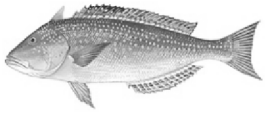
	in Gulf state waters from June 1 to September 30 to June 1 to August 14 (shortened season) effective August 7 2009; Effective Jan 4 2010 to June 2 2010 – no recreational and commercial harvest for 180 days in Atlantic federal waters and applies to federal permit holders operating in federal and state waters (no state consistency ruling to date).
• Level of protection	1990 - all snapper and grouper as restricted species; designates Red Snapper as protected species; 2003 - delists Red Snapper as protected species effective Jan 1, 2003.
• Dominant fishing sector in state waters	Recreational landings contributed 71% of statewide landings, with 90% of this made on the Gulf coast, in 2007 (FWC, 2008).
• Current status of fish stocks	Red Snapper in the Gulf of Mexico was grossly overfished through 2003. Along the South Atlantic Coast, the spawning biomass of Red Snapper was well below the spawning stock at MSY in 2003.
Snapper, Vermilion	
• Size limits	1990 - 8" min; 1992 - 10" min for recreational fishermen and 12" min for commercial fishermen on state Atlantic coast; 1998 - 10" min in all state waters to conform with federal rules; 2005 -raises statewide recreational minimum size limit to 11"min effective Sept 16 2005; increases the commercial minimum size limit from 10 to 11" total length in Gulf state waters; 2007 - increases the recreational minimum size limit for Atlantic Vermillion Snapper from 11 to 12" total length; decreases Gulf commercial and recreational minimum size limit from 11" to 10".
• Bag limits	1986 - daily bag limit of 10 aggregate snappers excluding lane, Vermillion and Yelloweye; 1990 - 10 aggregate bag limit to contain no more than 5 gray and no more than 2 Red Snappers; 1994 - establishes a daily bag limit of 10 Vermillion Snapper harvested from the Atlantic Ocean per

	recreational fisherman, and not count these fish in the aggregate bag limit for other snappers; 2005 - recreational daily bag limit of 10 fish per person in Gulf state waters; 2009 - reduces the daily recreational bag limit in Atlantic state waters from 10 fish to 5 fish per person; prohibits the captain and crew on for-hire vessels in the Atlantic from keeping this species.
• Fishing grounds/ season	1990 - all commercial harvest of any species of snapper, grouper and sea bass is prohibited in state waters whenever harvest of that species is prohibited in adjacent federal waters; 2005 - closed season to the commercial harvest of this species in Gulf state waters is established during the period April 22 to May 31; 2007 - eliminates the April 22 to May 31 closed season for Gulf commercial harvest; 2009 - establishes a Nov 1 to March 31 closed season to all harvest in Atlantic state waters.
• Level of protection	1990 - all snapper and grouper as restricted species.
• Dominant fishing sector	In state waters, recreational fishery dominates. In federal waters of the South Atlantic, it is primarily a commercial fishery (Robson, 2009a).
• Current status of fish stocks	SEDAR concluded that the South Atlantic stock is not overfished, but is subject to overfishing, although the latter is highly uncertain (SEDAR , 2008c).

Table 4.2.3. Regulations for other reef fish and their status.

Amberjack, Greater	
• Size limits	1990 - 28" minimum size limit fork length.
• Bag limits	1990 - 3 daily per person; 1992 - restricts all harvest of amberjack in April and May to the bag limit; 1998 - reduced to 1 fish per person statewide; 2001 - establishes a 1000 lb commercial daily vessel limit from Atlantic state waters.
• Seasonal/ Spatial closure	1996 - prohibits the sale of all amberjack species during the April-May closed commercial season; 2009 - recreational quota closure in the federal Gulf of Mexico because quota has been met; closure from Oct 24 to Dec 31 2009; state GOM waters remain open to recreational harvest.
• Level of protection	1990 - designated as a restricted species.
• Dominant fishing sector	Recreational in Southeast Florida (Johnson et al., 2007).
• Current status of fish stocks	SEDAR (2008b) - In atlantic federal waters, exploitation status is not overfishing and the stock is not overfished.
Triggerfish, Gray	

• Size limits	1994 - establishes minimum size limit of 12" effective Jan 1 1995; 2006 - changes legal measurement from total length to fork length; 2009 - increases the commercial and recreational minimum size limit for Gulf Gray Triggerfish from 12 to 14" fork length effective Jan 1 2009; 2010 – Atlantic Gray Triggerfish is 1`2" minimum size limit.
• Bag limits	
• Seasonal/ Spatial closure	
• Level of protection	
• Dominant fishing sector	Recreational sector in Southeast Florida and statewide (Johnson et al., 2007; FWRI 2008).
• Current status of fish stocks	SEDAR (2006b) indicated that the fish stocks in federal Gulf of Mexico waters was overfished and experiencing overfishing. It would take a 40-50% reduction in fishing mortality to rebuild the species.
Porgy, Red	
• Size limits	1994 - 12" minimum size limit; 1998 - increased to 14".
• Bag limits	1998 - recreational bag limit of 1 fish/person/day and 50 lbs/commercial vessel/day; 1999 – 5 fish bag limit; Beginning Aug 29 2000 – 1 fish bag limit and 50 lb commercial bycatch allowance from May – December; 2007 - increases the daily recreational bag limit from 1 to 3 fish per person in Atlantic.
• Seasonal/ Spatial closure	1999 – commercial closure during March and April; all harvest was prohibited from Sept 8, 1999 to Aug 28, 2000; beginning Aug 29, 2000, commercial closure from January to April.

• Level of protection	
• Dominant fishing sector	Recreational in Southeast Florida state waters (Johnson, D.R., Harper, D.E. , Kellison, G.T., & Bohnsack, J.A., 2007); Commercial fishing dominates in Atlantic federal waters (Amendment 15 B 2008).
• Current status of fish stocks	SEDAR (2002) - In Atlantic federal waters, the stock is overfished but not undergoing overfishing; SEDAR Update #2 (SEDAR, 2002) concluded that the stock was below its biomass limit, but is not undergoing overfishing.
Hogfish	
• Size limits	1994 - 12" minimum size limit; 2010 – Spanish Hogfish: 2-8 " slot limit; Cuban Hogfish: 3-8" slot limit.
• Bag limits	1994 - 5 fish per person daily bag limit.
• Seasonal/ Spatial closure	
• Level of protection	1994 - designates hogfish as restricted species.
• Dominant fishing sector	Recreational in Southeast Florida (Johnson, et al., 2007; Ault, et al., 2005b).
• Current status of fish stocks	Amendment 11 (1998) - overfished; SEDAR and SAFMC 2004 - severely overfished (both growth and recruitment) for the last two decades in Florida waters; Overfished in Florida Keys and Biscayne National Park 2000-2004 (Ault, Smith, & Tilmant, 2008).
Golden Tilefish	

• Size limits	1994 - 12" minimum size limit.
• Bag limits	2007 - allows the Atlantic recreational harvest of one Golden Tilefish and one snowy Grouper within the five fish daily aggregate grouper bag limit effective July 1, 2007.
• Seasonal/ Spatial closure	Commercial fishery in federal Atlantic waters from Oct. 3 to Dec. 31, 2007 because commercial quota of 295,000 lbs has been reached; Commercial fishery closed July 15 to Dec. 31 2009 because commercial quota of 295,000 lbs has been reached.
• Level of protection	2007 - designates the species as restricted species effective July 1, 2007.
• Dominant fishing sector	Recreational in Southeast Florida (Johnson, et al., 2007).
• Current status of fish stocks	Amendment 11 (1998) - overfished but could not estimate static SPR; Amendment 15B (2008) concludes that the stock is on the border between overfished and not overfished.

Table 4.2.4. Sizes of major grouper and snapper species at first reproduction, and at first capture for Florida reef fish (data from Ault, J.S., Smith, S.G. & Bohnsack, J.A., 2005a). The minimum size limits are current for July -December 2009 recreational fishing (FWC, 2009b).

Species	*Size at maturity (inches)*	*Size at first capture (inches)*	*Recreational minimum size limit (2009)(total length inches)*	*Commercial minimum size limit (2009) (total length inches)*
Groupers (Serranidae)				
Rock hind	13.2	7.9	No limit	No limit
Graysby	7.8	7.9	No limit	No limit
Red hind	9.9	7.1	No limit	No limit
Goliath Grouper	38.5	23.6	Harvest prohibited	Harvest prohibited
Red Grouper	17.2	19.7	20″ Atlantic federal & state;	20″ Atlantic federal & state; 18″ Gulf
Nassau Grouper	18.9	23.6	Harvest prohibited	Harvest prohibited
Black Grouper	23.5	23.6	24″ Atlantic & Monroe; 22″ Gulf	24″ state and all federal waters
Scamp	19.3	19.7	20″ Atlantic & Monroe; 16″ Gulf	20″ Atlantic state & federal inc Monroe; 16 Gulf state & federal
Yellowfin Grouper	20.7	19.7	20″	20″ all waters
Snappers (Lutjanidae)				
Mutton Snapper	10.0	15.7	16″	16″ all waters
Schoolmaster	5.8	9.8	10″	10″ state; 12″ all federal
Gray Snapper	9.2	9.8	10″	12″ all waters
Dog Snapper	11.8	11.8	12″	12″ all waters
Lane Snapper	8.1	7.9	8″	8″ all waters

Yellowtail Snapper	7.8	9.8	12″	12″ all waters
Wrasses (Labridae)				
Hogfish	6.5	11.8	12″ fork	12″ state

Appendix 4.3.

Main provisions of § 379.401, F.S. imposing stringent penalties for violating Florida's recreational fishing laws. Fishing violations related to reef organisms are indicated.

Level of violation	Provisions violated	Penalties	Legal process
Level 1 – Non criminal: § 379.401(1)(a), F.S.	- Rules or orders of the commission relating to the filing of reports or other documents required to be filed by persons who hold recreational licenses and permits issued by the commission - Rules relating to daily use permits, watercraft speeds within FWC fish management areas § 379.355, F.S. on special recreational spiny lobster licenses § 379.354 (1)-(15), F.S. on recreational licenses to fish	- 1st conviction – civil penalty $50 fine plus court costs; in the case of a "NO LICENSE" violation, payment of the cost of license - 2nd conviction and subsequent offense within 36 months of the first – civil penalty $100 plus the cost of the license or permit	- A person cited for a Level One violation shall sign and accept a citation to appear before the county court. The issuing officer may indicate on the citation the time and location of the scheduled hearing and shall indicate the applicable civil penalty. - Payment of civil penalty by mail or in person within 30 days of citation receipt - Nonpayment or failure to appear before a county court commits a misdemeanor of the 2nd degree (see level 2 penalties) - A person who elects to appear before the county court is deemed to have waived the limitations on civil penalties; A level one violation carries a penalty of at least $50 for first time violation, and not more than $500 for subsequent violations. Appeals possible in a circuit court - A person cited for violating the requirements of § 379.354, F.S. may not be convicted if the person produces the required license or permit for verification by the hearing officer or the court clerk, and which should be valid at the time the time the person was cited. The clerk or hearing officer may assess a $10 fee for costs

Level 2 – Criminal violation -2nd Degree Misdemeanor: § 379.401(2a), F.S.	- Rules relating to seasonal closures, bag, possession or size limits, gear restrictions - Rules on feeding, landing requirement of saltwater fish § 379.33, F.S. prohibiting the violation of or noncompliance with commission rules § 379.407(6), F.S. prohibiting the sale, purchase, harvest, or attempted harvest of any saltwater product with intent to sell § 379.2421, F.S. prohibiting the obstruction of waterways with net gear § 379.413, F.S. prohibiting the unlawful taking of bonefish § 379.365(2)(a) and (b) , F.S. prohibiting the possession or use of stone crab traps without trap tags and theft of trap contents or gear § 379.366(4)(b) , F.S. prohibiting the theft of blue crab trap contents or trap gear § 379.3671(2)(c) , F.S. prohibiting the possession or use of spiny lobster traps without trap tags or certificates and theft of trap contents or trap gear § 379.357, F.S. prohibiting the possession of tarpon without purchasing a tarpon tag	- 1st conviction – imprisonment not exceeding 60 days, or a fine not to exceed $500 - 2nd conviction within 3 yrs of the first – increased to a 1st degree misdemeanor, with a minimum mandatory fine of $250 up to $1000or imprisonment not to exceed 1 year - 3rd conviction within 5 years of the 1st – increased to a 1st degree misdemeanor with a minimum mandatory fine of $500 up to $1,000 or imprisonment not to exceed 1 year, and all fishing recreational license privileges suspended for 1 yr - 4th conviction within 10 years of the 1st – increased to a 1st deg misdemeanor with a minimum fine of $750 up to $1,000 or imprisonment not to exceed I year plus license suspension for 3 yrs	Conviction means any judicial disposition other than acquittal or dismissal

Level 3 – Criminal violation – 1st degree misdemeanor: § 379.401(3)(a) , F.S.	- Rules prohibiting the sale of saltwater fish - Rules or orders of the commission prohibiting the illegal importation or possession of exotic marine plants or animals § 379.407(2) , F.S. establishing major violations. § 379.407(4) , F.S. prohibiting the possession of certain finfish in excess of recreational daily bag limits. § 379.231, F.S. prohibiting the importation of non-indigenous species of the animal kingdom without a permit issued by the commission. § 379.354(17) , F.S. prohibiting the taking of game, freshwater fish, or saltwater fish while a required license is suspended or revoked.	- 1st conviction – up to $1,000 fine or up to 1 year imprisonment - 2nd and subsequent convictions within 10 years of the first – a mandatory minimum fine of $750 or up to 1 year imprisonment and all fishing recreational licenses privileges shall be suspended for 3 years for 3 years - Hunting or fishing with a suspended or revoked license carries a $1,000 fine and a 5-year ban on acquiring a recreational fishing license	Conviction
Level 4 – Criminal Violation – 3rd degree felony: § 379.401(4)(a) , F.S.	§ 379.365(2)(c) , F.S. prohibiting criminal activities relating to the taking of stone crabs. § 379.366(4)(c) , F.S. prohibiting criminal activities relating to the taking and harvesting of blue crabs. § 379.367(4) , F.S. prohibiting the willful molestation of spiny lobster	- up to $5,000 fine and/or up to 5 years in jail	Conviction

	gear. § 379.3671(2)(c)5, F.S. prohibiting the unlawful reproduction, possession, sale, trade, or barter of spiny lobster trap tags or certificates. § 379.354(16) , F.S. prohibiting the making, forging, counterfeiting, or reproduction of a recreational license or possession of same without authorization from the commission.		
Wildlife Violator Compact § (379.2255) , F.S.	§ 379.2255, F.S. – an interstate agreement to protect fish and wildlife forged among the ff states – Arizona, California, Colorado, Florida, Georgia, Idaho, Indiana, Iowa, Missouri, Kansas, Maryland, Michigan, Minnesota, Montana, Oregon, S. Dakota, Tennessee, Nevada, Utah, New Mexico, Washington, New York, Wyoming, and North Dakota	- Persons who have had their hunting, fishing or trapping privileges revoked or suspended in their home states will be prohibited from engaging in those activities in Florida. - Florida residents who have had their hunting, fishing or trapping privileges revoked or suspended in Florida will be prohibited from engaging in those activities in other member states. -A Florida resident who commits a wildlife or fisheries violation in another member state is treated in the same manner as a resident of that state	

Appendix 4.4.

Trust Funds that have been appropriated by the Florida State Legislature to finance FWC operations (Florida Senate Committee on Environmental Preservation and Conservation 2008).

Trust Fund (Acronym)	Revenue Source	Purpose
Administrative Trust Fund (ATF)	Indirect cost reimbursements from grantors, administrative assessments against trust funds, interest earnings and other appropriate administrative fees	Central administrative activities
Conservation and Recreational Lands Program Trust Fund (CARLTF)	Documentary stamp taxes and interest earnings	Management of conservation and recreation lands
Dedicated License Trust Fund (DLTF)	Five-year recreational hunting and fishing license fees, and replacement license fees	Holding trust for future portions of five-year license sales. Each year, 1/5 of proceeds and all interest is transferred to an operating trust fund for appropriation
Federal Grants Trust Fund (FGTF)	Grants and funding from the Federal Government, cash advances from other trust funds, and interest earnings	Depository for federal grant funds to be used for allowable grant activities within all FWC programs
Florida Forever Program Trust Fund (FFTF)	Florida Forever land acquisition bonds	Provides funding for acquisition of inholdings and additions to lands managed by the Commission
Florida Panther Research & Management Trust Fund (FPRMTF)	85% of panther specialty license plate fees and interest earnings	Funding to manage an protect Florida panthers, to educate the public on necessity of panther management, to reestablish Florida panthers into suitable habitat and to promote and market the panther specialty license plate
Grants and Donations Trust Fund (GDTF)	Grants and funding from private and public non-federal sources, cash advances from other trust funds and interest earnings	Depository for non-federal grant funds to be used for allowable grant activities within all FWC programs
Land Acquisition Trust Fund (LATF)	Habitat and species loss mitigation revenues and interest earnings	Acquisition and management of fish and wildlife mitigation park land. A portion of the mitigation revenue is held as interest-generating principle. The interest earnings are used to fund perpetual land management.
Lifetime Fish and Wildlife	Lifetime recreational hunting and fishing license	Lifetime license proceeds are held in perpetual trust for the

Trust Fund (LFWTF)	fees and interest earnings	purpose of generating interest earnings to support fish and wildlife conservation programs. Interest is transferred to other trust funds for appropriation.
Marine Resources Conservation Trust Fund (MRCTF)	Recreational and commercial saltwater fishing licenses, permits, fees and fines; vessel registration fees; marina fuel taxes; marine turtle specialty license plate fees; boating fines, fees and penalties; judgments and forfeitures; documentary stamp proceeds for marine mammal care; transfers from other agencies, contracts and interest earnings	Funding for marine-related activities such as research, fisheries management and enhancement, artificial reefs, saltwater fish hatcheries, marine turtle protection, law enforcement, boating and waterways support and infrastructure, aquatic education, educational, recreational and commercial licensing, information and education activities, and marine mammal care
Non-Game Wildlife Trust Fund (NGTF)	Speeding fines, vehicle title fees, voluntary contributions, contracts and interest earnings	Provides funding for the management and conservation efforts for non-game wildlife species, conservation stewardship, documentation of non-game wildlife populations trends, and assessment of wildlife habitat
Save the Manatee Trust Fund (STMTF)	Manatee specialty license plate fees, state vessel registration fees, contributions and donations, contract revenues and interest earnings	Funding for manatee and marine mammal research, management, protection and recovery
State Game Trust Fund (SGTF)	Fees from hunting and freshwater fishing licenses, permits, stamps and tags; documentary stamp taxes; Wildlife Management Area access fees; Largemouth Bass specialty license plate revenues; motor fuel taxes; land management revenues; contract revenues; donations and interest earnings	Funding for various wildlife and freshwater fisheries activities such as research, freshwater fisheries and wildlife management, freshwater fish hatcheries, and law enforcement; fees and penalties; judgments and forfeitures; recreational and commercial licensing programs for hunting and freshwater fishing activities; education; and the Florida Wildlife magazine

Appendix 7.1

List of Beach Nourishment Projects In southeast Florida, 1944-2000.

Beach Location	Date	Primary Funding Source	Funding Type	Volume (cy)	Length (ft)	Actual Cost
Lake Worth Inlet (South Beach)	1944			280,000		$80,972
Palm Beach	1944	Local/State		300,000		$105,000
Lake Worth Inlet (South Beach)	1948			2,335,300		$1,043,476
Palm Beach	1948	Local/State		2,335,930		$478,659
Lake Worth Inlet (South Beach)	1949			480,000		$220,386
Palm Beach	1949	Local/State		480,000		$220,386
Lake Worth Inlet (South Beach)	1953			463,000		$409,011
Palm Beach	1953			463,000		$267,321
Jupiter Island	1957	Local/State		250,000		$173,853
Bal Harbour	1960	Local/State		86,000		$67,930
Haulover Park	1960	Local/State		180,000		$142,180
Bal Harbour	1961	Local/State		25,000		$20,292
Jupiter Island	1961	Federal	Navigation	366,000		$297,078
Boynton Inlet	1961-1973			1,366,229		$1,399,825
Jupiter Island	1963			64,644	2,112	$55,824
Bal Harbour	1963-1973	Local/State		305,000		$335,903
Jupiter Island	1964			118,312		$106,014

Pompano Beach/Lauderdale by the Sea	1964	Local/State		Unknown		$3,677
Jupiter Island	1967			60,000		$30,000
Virginia Key-Key Biscayne	1969	Federal	Storm and Erosion	373,000	13,200	$450,483
Pompano Beach/Lauderdale by the Sea	1970	Federal	Storm and Erosion	1,076,000	16,896	$1,873,437
Hallandale	1971	Federal	Storm and Erosion	370,000	4,224	$779,977
Hillsboro Beach	1972	Federal	Storm and Erosion	500,000	5,280	$827,815
Jupiter Island	1972	Federal	Navigation	280,000		$419,162
Lake Worth Inlet (South Beach)	1972			131,538		$217,778
Delray Beach	1973	Federal	Storm and Erosion	1,634,513	14,256	$3,015,383
Lake Worth Inlet (South Beach)	1973			145,498		$259,818
Palm Beach	1973	Federal		1,630,000	14,256	$5,664,682
Jupiter Island	1974	Local/Private		3,488,759	25,872	$4,046,960
Bal Harbour	1975	Federal	Storm and Erosion	1,700,000	4,224	$5,047,000
Lake Worth Inlet (South Beach)	1975			68,090		$146,746
Palm Beach	1975	Local/State			6,336	Unknown
Palm Beach	1976			100,000		$224,215
John U Lloyd State Park	1977	Federal	Storm and Erosion	1,090,000	7,920	$2,945,262
Palm Beach	1977	Unknown		86,000		$205,742

Delray Beach	1978	Federal	Storm and Erosion	701,266	8,976	$1,660,584
Haulover Park	1978	Federal	Storm and Erosion	300,000		$773,196
Jupiter Island	1978	Local/Private		1,327,289	26,400	$2,736,678
Lake Worth Inlet (South Beach)	1978			43,559		$112,265
Palm Beach	1978	Federal		701,000	10,296	
Hollywood/Hallandale	1979	Federal	Storm and Erosion	1,980,000	27,984	$7,743,376
Haulover Park	1980	Federal	Navigation	80,000		$238,095
St Lucie Inlet	1980					
Indialantic/Melbourne Beach	1981	Federal	Storm and Erosion	540,000	11,088	$3,582,000
Miami Beach	1982	Federal	Storm and Erosion	12,000,000	55,440	$55,000,000
Jupiter Island	1983	Local/Private		1,000,000	26,400	$2,400,000
Pompano Beach/Lauderdale by the Sea	1983	Federal	Storm and Erosion	1,909,000	27,456	$7,070,370
Delray Beach	1984	Federal	Storm and Erosion	821,551	13,728	$3,949,117
Lake Worth Inlet (South Beach)	1984			110,799		$416,538
Palm Beach	1984	Federal		1,300,000	14,256	
Boca Raton South	1985	Local/State		297,000	3,200	$1,125,000
Indialantic/Melbourne Beach	1985			180,000		$681,818
Lake Worth Inlet (South Beach)	1985			130,803		$495,466
St Lucie Inlet	1985					

Haulover Park	1987			235,000		$932,540
Jupiter Island	1987	Local/Private		2,230,000	17,500	$3,500,000
Key Biscayne	1987			360,000	12,672	$1,428,571
Lake Worth Inlet (South Beach)	1987	Federal	Navigation	191,000		$757,937
Miami Beach	1987	Federal	Storm and Erosion	350,000		$5,000,000
Palm Beach	1987			34,000		$134,921
Boca Raton North	1988	Federal	Storm and Erosion	1,102,000	8,500	$3,547,000
Sunny Isles	1988	Federal	Storm and Erosion	1,500,000		$15,600,000
John U Lloyd State Park	1989	Federal	Storm and Erosion	603,000	7,920	$2,945,262
Lake Worth Inlet (South Beach)	1989	Federal	Navigation	105,756		$440,650
St Lucie Inlet	1989					
Bal Harbour	1990	Federal	Storm and Erosion	230,000	4,488	$4,600,000
Lake Worth Inlet (South Beach)	1990	Federal	Navigation	75,351		$319,284
Sunny Isles	1990			30,000		$127,119
Fisher Island	1991			30,263	2,060	$131,578
Hollywood/Hallandale	1991	Federal	Storm and Erosion	1,050,000	27,456	$9,186,444
Jupiter Island	1991			414,812		$1,803,530
Lake Worth Inlet (South Beach)	1991	Federal	Navigation	87,335	Unknown	$379,717
Delray Beach	1992	Federal	Storm and Erosion	1,196,500	8,976	$4,862,000
Palm Beach	1992	Federal		1,200,000	10,296	$3,993,528

Jupiter Island	1993			203,736		$934,569
Lake Worth Inlet (South Beach)	1994	Federal	Navigation	178,000		$839,623
Palm Beach	1994	Federal		800,000	5,400	$2,274,400
Jupiter/Carlin Beach	1995	Federal	Storm and Erosion	603,000	5,702	$2,274,400
Palm Beach	1995			880,000	5,030	
Boca Raton South	1996	Local/State		252,000	4,170	$1,260,000
Delray Beach	1996	Federal	Storm and Erosion	1,020,000	14,260	$5,100,000
Hutchinson Island	1996	Federal	Storm and Erosion	1,340,000	21,648	$11,168,529
Juno Beach	1996	Federal	Navigation	135,000	30,096	$1,455,000
Jupiter Island	1996	Local/Private		1,800,000	17,600	$7,200,000
Martin County	1996	Local/Private		1,269,000	19,800	$8,625,000
Midtown Beach	1996	Local/Private		800,000	5,400	$3,200,000
St Lucie Inlet	1997			335,000		
St Lucie Inlet	1997			290,000		
Sunny Isles/ Miami Beach	1997	Federal		716,052	9,000	$12,687,000
Sunny Isles/ Miami Beach	1997			80,100	3,000	$4,371,301
Boca Raton	1998	Federal		600,000	7,656	$2,750,000
Hillsboro Beach	1998			555,000	6,120	
Lake Worth Inlet (South Beach)	1998	Federal	Navigation	900,000		
Surfside/ South Miami Beach	1999	Federal		839,175	7,000	$13,385,000
Juno Beach	2001	Local/State		1,000,000	12,672	$11,100,000
Martin County	2001	Local/Private		1,100,000	19,800	$7,935,000

Sunny Isles/ Miami Beach	2001	Federal		835,000	15,700	$18,212,000
Boca Raton South	2002	Local/State		342,000	4,752	
Delray Beach	2002	Local/State		1,150,000	8,976	$3,882,210
Jupiter Carlin	2002	Local/State		600,000	5,808	$884,700
Jupiter Island	2002	Local/State		3,000,000	31,152	$1,561,023
Jupiter/Carlin Beach/Palm Beach	2002	Federal		634,000	5,580	$4,600,000
Key Biscayne	2002	Local/State		300,000	6,336	$1,097,500
Martin County	2002	Local/State		125,576	3,010	$300,000
South Boca Raton Beach	2002	Local/State		300,000	5,808	$791,257
Mid-town Beach- Palm Beach County	2003			1,200,000	12,672	
Palm Beach	2003	Local/State		1,200,000	13,200	$4,400,000
Boca Raton Central	2004	Local/State		747,000	7,920	
Broward County Segment III	2005	Federal	Emergency			$3,000,000
Delray Beach	2005	Federal	Emergency			$4,000,000
Martin County	2005	Federal	Emergency	800,000	21,120	$8,000,000
				84,008,736		$326,545,343

Source: Program for the Study of Developed Shorelines Western Carolina University
PSDS Database Downloaded from:
Site: http://www.wcu.edu/1038.asp

A primary funding type or category (where available) is listed for each nourishment episode (e.g., local or federal). For federally funded, congressionally authorized projects, this indicates that the funding source was the largest contributor, although local or other sources likely provided funding in a minority share.

Explanation of Cost Figures:
Actual Cost (where available) refers to actual dollars spent in the year the episode was completed. When no documented cost could be obtained for individual episodes, an average cost figure may be used. These average cost figures were calculated as an average (per cubic yard of fill) of all other nourishment episodes within the same funding category and/or geographical region.

Appendix 7.2

Source: NOAA, CSC. Beach Nourishment: A Guide for Local Government Officials.

Project Name	Year(s)	Miles Covered	Total	Federal	Non-Federal
Palm Beach Co.-Delray Beach	1992	1.95	$3,993,528.00	$2,249,554.00	$1,743,973.00
Palm Beach Co.-Jupiter/Carlin	1995	1.10	$2,274,400	$1,244,324	$1,030,075
Martin Co. Shore Protection Project	1996	3.75	$8,625,000	$4,018,387	$4,606,612
Miami-Dade Co. - Gov't Cut to Haulover Beach	1997	1.02	$4,371,301.00	$2,294,933.00	$2,076,367.00
Miami-Dade Co.-Sunny Isles Segment	1997	0.00	$4,371,301.00	$2,235,920.00	$2,135,386.00
Palm Beach Co.-Boca Raton	1998	1.45	$2,144,100.00	$1,087,701.00	$1,056,398.00
Palm Beach Co.-Ocean Ridge	1998	1.40	$4,428,068	$2,665,696	$1,762,371
Miami-Dade Co. - Gov't Cut to Haulover Beach	1999	1.32	$8,315,837.00	$4,141,062.00	$4,174,550.00
Miami-Dade Co.-Sunny Isles Segment	2001	2.90	$18,212,000.00	$9,315,438.00	$8,896,562.00
Martin Co.	2001	3.75	$7,935,000.00	$3,696,916.00	$4,238,083.00
Total		**35**	**$86,880,743**	**$44,927,931**	**$41,952,585**

Appendix 7.3

FDEP Beach Nourishment and Restoration, 1992-2002. Source: NOAA, CSC. Beach Nourishment: A Guide for Local Government Officials.

Project Name	FY Spent	State Spent	State Funded Total	Local Spent	Local Funded Total
Boca Raton Beach Nourishment	2002	$711,982	$764,819	$671,210	$0
Boca Raton Beach Nourishment	2002	$186,627	$752,247	$141,507	
Broward Co. Shore Protection Project	2002	$219,606		$1,811,472	$0
Miami-Dade Co. Beach Erosion Control	2002	$1,323,212		$1,372,657	$0
Miami-Dade Co. Beach Erosion Control	2002	$31,509		$178,166	$0
Deerfield Beach Restoration	2002	$13,665		$68,691	$0
Ft. Pierce Beach Restoration	2002	$86,307		$86,307	$0
Hutchinson Island Beach Nourishment	2002	$1,305,256		$1,567,227	$2,457,556
Juno Beach Restoration Project	2002	$1,924,007	$1,999,920	$1,999,920	$5,544,606
Juno Beach Restoration Project	2002	$3,190,217	$3,583,139	$3,544,686	$0
Juno Beach Restoration Project	2002	$0	$799,193	$0	$0
Jupiter Island Beach Nourishment	2002	$0	$1,504,856	$2,277,922	$0
Jupiter/Carlin Beach Nourishment	2002	$158,946		$158,946	$0
Jupiter/Carlin Beach Nourishment	2002	$84,794		$84,794	$0
Jupiter/Carlin	2002	$219,672	$487,112	$219,672	$0

Beach Nourishment					
Key Biscayne Beach Nourishment	2002	$100,687		$33,192	$0
Martin Co./4-Mile Beach Restoration	2002	$30,629		$36,518	$0
Broward Co. Shore Protection Project	2001	$195,958	$4,998,710	$172,830	$0
Miami-Dade Co. Beach Erosion Control	2001	$537,235		$537,235	$0
Miami-Dade Co. Beach Erosion Control	2001	$3,142,996		$3,301,593	$0
Miami-Dade Co. Beach Erosion Control	2001	$157,889	$171,889	$31,889	$0
Deerfield Beach Restoration	2001	$40,451		$0	$0
Delray Beach Nourishment	2001	$67,038	$67,039	$57,472	$57,472
Delray Beach Nourishment	2001	$59,417	$1,306,235	$2,315	$2,315
Hollywood/ Hallendale Beach Nourishment	2001	$94,624		$0	$0
Hutchinson Island Beach Nourishment	2001	$632,050	$632,050	$758,275	$0
Hutchinson Island Beach Nourishment	2001	$109,457	$1,731,320	$132,054	$0
Jupiter/Carlin Beach Nourishment	2001	$12,229		$37,249	$0
Key Biscayne Beach Nourishment	2001	$172,849		$192,054	$0
Martin Co./4-Mile Beach Restoration	2001	$351,834		$89,144	$0
Martin Co./4-Mile Beach Restoration	2001	$461,861	$461,861	$229,560	$0
Martin Co./4-Mile	2001	$99,516	$419,945	$64,841	$0

Beach Restoration					
Broward Co. Shore Protection Project	2000	$83,215	$83,215	$269,345	$2,253,647
Miami-Dade Co. Beach Rehab Monitoring	2000	$39,531		$13,177	$0
Miami-Dade Co. Beach Rehab Monitoring	2000	$111,087		$37,029	$0
Miami-Dade Co. Beach Erosion Control	2000	$668,275	$1,205,511	$2,315,732	$8,579,812
Miami-Dade Co. Beach Erosion Control	2000	$1,621,192	$10,508,550	$842,540	$0
Deerfield Beach Restoration	2000	$736,500	$1,431,500	$2,124,758	$2,193,449
Delray Beach Nourishment	2000	$73,045		$42,020	$0
Ft. Pierce Beach Restoration	2000	$108,535		$108,535	$0
Ft. Pierce Beach Restoration	2000	$0	$115,880	$0	$0
Jupiter/Carlin Beach Nourishment	2000	$150,794	$340,501	$167,965	$673,850
Jupiter/Carlin Beach Nourishment	2000	$5,224	$90,600	$5,224	$0
Key Biscayne Beach Nourishment	2000	$152,312	$1,189,218	$169,235	$394,481
Key Biscayne Beach Nourishment	2000	$0	$70,000	$0	$0
Martin Co./4-Mile Beach Restoration	2000	$10,913		$6,542	$0
Martin Co./4-Mile Beach Restoration	2000	$100,548		$0	$0
Boca Raton Beach Nourishment	1999	$1,005,500	$1,005,500	$335,028	$1,147,745
Broward County Shore Protection	1999	$0	$313,293	$0	$0

Project					
Miami-Dade Co. Beach Rehab Monitoring	1999	$25,073		$8,358	$0
Miami-Dade Co. Beach Rehab Monitoring	1999	$7,869		$2,623	$0
Ft. Pierce Beach Restoration	1999	$2,073,091	$3,930,750	$2,073,091	$2,267,933
Hollywood/ Hallendale Beach Nourishment	1999	$112,500		$37,500	$0
Jupiter Island Beach Nourishment	1999	$0	$132,922	$687,078	$2,965,000
Ocean Ridge Beach Nourishment	1999	$1,424,915		$485,277	$0
Ocean Ridge Beach Nourishment	1999	$0	$98,400	$29,505	$0
Miami-Dade Co. Beach Rehab Monitoring	1998	$152,005		$50,669	$0
Miami-Dade Co. Beach Rehab Monitoring	1998	$13,163	$132,121	$4,388	$0
Delray Beach Nourishment	1998	$52,007		$29,769	$0
Hollywood/ Hallendale Beach Nourishment	1998	$382,500		$136,651	$0
Martin Co./4-Mile Beach Restoration	1998	$106,637		$63,643	$0
Ocean Ridge Beach Nourishment	1998	$0	$150,000	$48,549	$0
Miami-Dade Co. Beach Rehab Monitoring	1997	$60,798		$21,136	$0
Key Biscayne Dune Restoration	1997	$55,200	$70,000	$23,657	$23,657

Martin Co./4-Mile Beach Restoration	1997	$110,615		$66,017	$0
Miami-Dade Co. Beach Rehab Monitoring	1996	$32,072	$309,485	$10,691	$148,071
Delray Beach Nourishment	1996	$24,627		$14,097	$0
Hollywood/ Hallendale Beach Nourishment	1996	$176,287		$0	$0
Juno Beach	1996	$74,850		$0	$0
Juno Beach	1996	$84,900		$0	$0
Martin Co./4-Mile Beach Restoration	1996	$113,066		$66,632	$0
Martin Co./4-Mile Beach Restoration	1996	$3,152,207	$3,604,589	$0	$420,063
Ocean Ridge Beach Nourishment	1996	$80,783	$1,875,000	$36,500	$599,831
Coral Cove Shore Protection	1995	$22,648		$7,550	$0
Delray Beach Nourishment	1995	$25,941		$14,849	$0
Jupiter Carlin Beach Restoration	1995	$589,629		$63,508	$0
Jupiter Carlin Beach Restoration	1995	$126,000	$126,000	$238,540	$0
Martin Co./4-Mile Beach Restoration	1995	$73,000	$421,500	$44,416	$247,250
Coral Cove Shore Protection	1994	$204,529		$68,176	$99,752
Hollywood/ Hallendale Beach Nourishment	1994	$94,501		$31,500	$0
Jupiter Carlin Beach Restoration	1994	$179,710		$8,416	$0
Boca Raton Sand Transfer	1993	$40,000		$7,373	$0
Delray Beach	1993	$1,126,449		$1,168,189	$0

Nourishment					
Hollywood/ Hallendale Beach Nourishment	1993	$139,653		$46,401	$0
Jupiter Carlin Beach Restoration	1993	$24,996		$0	$0
Boca Raton Sand Transfer	1992	$92,500	$132,400	$34,303	$41,676
Delray Beach Nourishment	1992	$343,348	$2,007,236	$64,115	$1,333,039
Hollywood/ Hallendale Beach Nourishment	1992	$3,506,315	$4,800,000	$1,318,838	$1,570,890
Jupiter Carlin Beach Restoration	1992	$6,292	$872,437	$2,118	$335,810
TOTAL		**$35,499,867**	**$54,696,943**	**$33,310,651**	**$33,357,905**

Appendix 9.1

Martin County Policies.

Reference	County Plan Policies and Initiatives
County Ordinance 687 (2005)	While Marine Waterfront Commercial areas allow for a variety of uses, Marine Service Areas shall not be developed or converted to permanent residential uses other than accessory dwelling units (e.g., watchman's quarters). At a minimum, the following shall be considered Marine Service Areas: (i) Parcels zoned Waterfront General Commercial (WGC) including areas zoned WGC after the effective date of this Marine Service Area provision, and (ii) Parcels or portions of parcels used as marinas or marine repair facilities, including all related boat storage and repair areas, but not including vacant areas or portions of the parcel devoted to uses other than marinas or marine repair. This restriction on permanent residential use within Marine *Service* Areas shall take effect upon the effective date of this ordinance. However, Land Development Regulations shall also be adopted to allow landowners to petition for amendments to the Marine Service Area map under certain circumstances.
County Boat Facility Siting Plan of Manatee Protection Plan (2002)	**Single family locations**. For single-family residential lots with existing water frontage, a limit of one dock per lot or easement or right-of-way to the water is the recommended threshold. This applied to the entire coastal waterway, regardless of the location of the site. Whether or not a dock may actually be constructed is to be determined by the rules and regulations of the local government with jurisdiction and the state and federal permitting agencies. **Density Thresholds.** Along with the location of a facility, the number of slips or dry racks that are maintained at a particular site is an important consideration. The number of trips generated from a

	facility is a function of the number of boats docked or stored at the location. In Martin County, new boat facilities will result from redevelopment in the preferred locations and expansion of existing facilities at conditional locations. Because of limited opportunities for new development at these locations, thresholds should not be a primary constraint on commercial docking or storage facilities. Each facility will be limited by site plan constraints, including local, state, and federal requirements to avoid and minimize impacts to natural resources. In the case of private multi-family residential docks designed to accommodate the boats of more than one residence, if the site is located in a preferred or conditional location, then the total number of slips shall be determined by the site plan design, physical space limitation, environmental permitting criteria, and approval by the local government and permitting agencies. At sites that are located in non-preferred locations and do not have an existing facility, then the construction of new multi-family residential docking facilities shall only be considered when such facility, by means of conservation easements or otherwise, will result in a few boat docks than might otherwise be installed.

Appendix 9.2.

Broward County Plan Policies and initiatives.

Reference	Plan Policies Relevant to Residential Docking Facilities
County Boat Facility Siting Plan (2007 MPP)	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). Waterway Zone or Area of Special Concern (*) — Existing dock density — Proposed dock density North — 1.55 : 100ft. — 1.93 : 100ft. Center — 1.20 : 100ft. — 1.32 : 100ft. South — 1.37 : 100ft. — 1.51 : 100ft. Port Everglades* — 0.00 : 100ft. — 0.00 : 100ft. South Fork New River* — 1.80 : 100ft. — 2.02 : 100ft. Dania Cutoff Canal Middle/C-10* — 2.23 : 100ft. — 2.76 : 100ft. Dania Cutoff Canal West* — 0.87 : 100ft. — 1.08 : 100ft. 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.
Comprehensive Plan –	**Policy 9.1.8.** Broward County shall, in coordination with other appropriate entities, develop and implement a blueways system plan that uses existing navigable waterways as a means of

Recreation and Open Space Element (2006)	establishing accessibility to, and interconnectivity between and among, parks. The blueways system plan shall: 1. identify and map existing and proposed County parks, such as Secret Woods Park and the proposed Boaters Park; 2. explore the potential for new pocket parks; 3. explore the potential for including municipal parks within the system; 4. identify public sites where docking facilities and small boat houses can be established; and 5. identify those areas where the blueways system can be linked to the greenways system.
Comprehensive Plan – Conservation Element (2006)	**Objective 13-A.3.** 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. **Policy 13-A.3.3.** Marinas, docking facilities or boat ramps shall be located so as to require minimal or no dredging and have good tidal flushing. In instances where dredging is required, both initial and maintenance dredging shall be minimized. **Policy 13-A.3.4.** Utilize construction standards for all docks, mooring pilings or other structures which do not entrap or injure manatees; and reduce or eliminate their impact on manatees and the resources on which manatees depend.

Appendix 9.3.

Palm Beach County Policies.

Reference	County Plan Policies and Initiatives
Manatee Protection Plan (2007)	One of the most critical and controversial components of the MPP is the Boat Facility Siting Plan (BFSP). The BFSP provides five categories defining Unrestricted, Preferred, Conditional, Nonpreferred, and Exclusionary locations for new boat facilities with five or more slips. Facilities within each category will be required to meet certain criteria to minimize impacts to manatees. Restrictions will be greatest in areas of highest risk to manatees (Non-preferred and Exclusionary locations) and least in areas of lowest risk (Unrestricted and Preferred locations). The MPP does not affect single-family docks with fewer than five slips or existing multi-slip facilities unless they are expanding. It should be noted that the requirement for a Boat Facility Siting Plan only applies to unincorporated areas of Palm Beach County. The State statute does not require BFSPs for municipalities. While the MPP will only apply to those unincorporated areas of the County when the County is authorizing a project, the MPP will apply countywide when implemented by the State and Federal governments. The BFSP also does not apply to single-family docks or facility construction or expansion of fewer than five wet or dry slips. The 25 municipalities in the County that have jurisdiction over waterfront lands have three options with respect to this MPP: • Elect to take no action (permits may be subject to more stringent review) • Prepare their own Manatee Protection Plan and adopt it as an amendment to their Comprehensive Land Use Plan

	• Adopt the Palm Beach County Manatee Protection Plan by amending their Comprehensive Land Use Plan to incorporate the Manatee Protection Plan **Coordination with Local Municipalities** – The County will work closely with local municipalities to explain the programs and policies contained in the MPP and to encourage adoption of BFSP siting policies. This may be accomplished through one-on-one staff level interactions and through the League of Cities. The County will provide local governments with points of contact for addressing MPP issues.
Comprehensive Plan – Future Land Use Element (2007)	Marine Waterfront Commercial (MWC) areas are designated on the Future Land Use Atlas to reflect existing and future commercial working waterfronts uses, as defined in s. 342.07, F.S., and to implement part of the County strategy to preserve and provide regulatory incentives and criteria to encourage the preservation of working recreational and commercial waterfronts. The strategy is described in Policy 1.5-a of the Coastal Management Element. **Policy 2.2.13-a:** The following land uses shall be allowed in areas designated Marine Waterfront Commercial on the Future Land Use Atlas where permitted by the terms of the Unified Land Development Code: wet and dry marinas, docks, wharfs, lifts, boat ramps, boat hauling and repair facilities, commercial fishing facilities, commercial fishing facilities, and other water related services and accessory facilities; and activities that are an integral part and supportive of the main commercial marine uses. **Policy 2.2.13-b:** Parcels with a Marine Waterfront Commercial designation shall not be developed or converted to permanent residential uses. Landowners shall be allowed to petition the Board of County Commissioners to be exempt from this condition under certain circumstances. At a minimum, the petition shall demonstrate one of the following criteria: · That lands equally or more suitable for use as Marine Waterfront Commercial can be re-designated in the unincorporated area to ensure that there is no loss of the total working commercial waterfront lands in the County. · That the existing Marine Waterfront Commercial uses on the site proposed for conversion to residential uses can be replaced by developing similar land uses

	on the same parcel or on a different parcel not already designated as Marine Waterfront Commercial, including combinations of on-site and off-site improvements. · That a particular parcel of land designated as Marine Waterfront Commercial has limited development or redevelopment potential for Marine Commercial Waterfront uses due to changes in the surrounding area or government regulations related to marine waterfront commercial uses. **Policy 2.2.13-c:** By December of 2007, the Planning Division shall establish and maintain an inventory of all commercial working waterfronts that have been designated as Marine Waterfront Commercial in order to establish and track a no net loss of working commercial waterfronts to residential waterfront development or redevelopment.
Comprehensive Plan – Coastal Management Element (2006)	**OBJECTIVE 1.5: Protection of Commercial and Recreational Marine Waterfronts** Palm Beach County shall implement a strategy that provides regulatory incentives and criteria to encourage the preservation of recreational and commercial working waterfronts. **Policy 1.5-a:** The strategy to protect working commercial and recreational private and public waterfronts shall include but not be limited to the following actions: 12. Using of "canal spillways" connected to the Intra-coastal Waterway to create working waterfronts in coordination with SFWMD and other special districts, including building of docks and other facilities;

Appendix 9.4.

Miami-Dade County Plan policies and initiatives (1995, 2006, 2008).

Reference	Plan Policies Relevant to Residential Docking Facilities
Miami-Dade Manatee Protection Plan (1995)	**5. Residential Docking Facilities** Residential docking facilities include docks and boat slips for use by residents of upland property adjacent to a water body. These are classified as single-family and multi-family docks. *Single family docks* Dockage for a maximum of two power boats per single family property may be permitted providing that certain zoning criteria are met and that adverse impacts to marine communities are negligible. Docks are designed to minimize shading impacts. New dredging is generally not permitted, although maintenance dredging may be approved in upland canals. Multifamily docks Currently, new powerboat slips are not permitted in multifamily boat docking facilities unless the permit applicant can demonstrate that the construction and use of such slips will not adversely affect the manatee.
Manatee Protection Plan Review Committee (Agenda for Feb. 29 2008 Meeting)	4. *Review Responses from FL Fish and Wildlife Conservation Commission on Miami-Dade MPP Updates 2:25 pm* (DERM staff and Chair Prieguez, 15 minutes) 5. *DERM Review of Status of Data Collection and Recommendations for MPP clarifications 2:40 pm* (DERM staff, 20 minutes) 6. *Committee Member Comments, Concerns Regarding MPP Revisions 3:00 pm* (individual committee members, 45 minutes) 7. *Distribute Draft Data on Marine Facility Inventory (1995 and 2007) 3:45 pm* (DERM staff, 15 minutes)
Miami-Dade Comprehensive Plan – Recreation and Open Space Element, Oct 2006 edition	ROS – 3D Through its park and recreation programs and all other available means, Miami-Dade County shall preserve and protect beaches and shores and maximize public ownership of these coastal resources. The County shall improve the maintenance of existing public park and recreation entrances and shall, where feasible, provide additional access points at waterfront and coastal locations.

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