



Charlotte Harbor Aquatic Preserves

Management Plan

Including Cape Haze, Gasparilla Sound-
Charlotte Harbor, Lemon Bay, Matlacha Pass,
and Pine Island Sound Aquatic Preserves



**Florida Department of Environmental Protection
Florida Coastal Office**

3900 Commonwealth Blvd., MS #235, Tallahassee, FL 32399
www.aquaticpreserves.org

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The views, statements, finding, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the State of Florida, National Oceanic and Atmospheric Administration, or any of its sub-agencies.

February 2017



A school of fish in a lush seagrass bed in Gasparilla Sound-Charlotte Harbor Aquatic Preserve.



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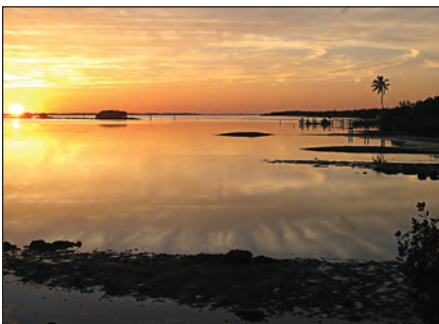
Turtle grass leading to the historic fish houses in Pine Island Sound Aquatic Preserve.

Mission Statement

The Florida Coastal Office's mission is to conserve and restore Florida's coastal and aquatic resources for the benefit of people and the environment.

The four long-term goals of the Florida Coastal Office's Aquatic Preserve Program are to:

1. protect and enhance the ecological integrity of the aquatic preserves;
2. restore areas to their natural condition;
3. encourage sustainable use and foster active stewardship by engaging local communities in the protection of aquatic preserves; and
4. improve management effectiveness through a process based on sound science, consistent evaluation, and continual reassessment.



Cover Photo: Sunset over the Pine Island Sound Aquatic Preserve oyster bar lined shoreline.

Executive Summary

Charlotte Harbor Aquatic Preserves Management Plan

Lead Agency:	Florida Department of Environmental Protection's (DEP) Florida Coastal Office (FCO)
Common Name of Property:	Charlotte Harbor Aquatic Preserves (Lemon Bay Aquatic Preserve, Cape Haze Aquatic Preserve, Gasparilla Sound-Charlotte Harbor Aquatic Preserve, Matlacha Pass Aquatic Preserve and Pine Island Sound Aquatic Preserve)
Location:	Sarasota, Charlotte, and Lee counties, Florida
Acreage Total:	177,471 acres
Lemon Bay Aquatic Preserve:	7,227 acres
Cape Haze Aquatic Preserve	12,716 acres
Gasparilla Sound-Charlotte Harbor Aquatic Preserve:	84,500 acres
Matlacha Pass Aquatic Preserve:	14,622 acres
Pine Island Sound Aquatic Preserve:	58,407 acres

Acreage Breakdown for FCO Management Units According to Florida Natural Areas Inventory (FNAI) Natural Community Types

FNAI Natural Communities	Acreage according to GIS					
	Lemon Bay AP	Cape Haze AP	Gasparilla Sound-Charlotte Harbor AP	Matlacha Pass AP	Pine Island Sound AP	Total CHAP
Mangrove Swamp:	378	1,467	1,669	1,880	3,594	8,988
Mollusk Reef:	17	30	47	8	44	146
Salt Marsh:	4	0	49	0	24	78
Seagrass Bed:	3,744	6,185	10,054	7,367	30,822	58,172
Unconsolidated Substrate:	123	1,323	2,602	1,525	1,861	7,435
Unclassified Submerged Land:	2,695	3,620	69,850	3,631	21,673	101,468
Unclassified Land:	266	91	230	210	388	1,185
Total Acreage:	7,227	12,716	84,500	14,622	58,407	177,471

Management Agency:	FDEP's Florida Coastal Office
Designation:	Aquatic Preserve
Unique Features:	The Charlotte Harbor Aquatic Preserves (CHAP), a network of five aquatic preserves, is located within the Charlotte Harbor estuarine complex, the second largest estuarine system in the state.
Archaeological/Historical Sites:	There are more than 180 archaeological sites recorded in the Florida Master Site File within or immediately adjacent (i.e. within 164 feet [50 meters]) to the Charlotte Harbor Aquatic Preserves, and more than 200 historical sites. These sites include Native American and European encampments and villages and shipwrecks, along with prehistoric shell kitchen middens.
Management Needs:	Improved public awareness of the resources. Prevent and mitigate shoreline alterations. Facilitate low-impact public access. Reduce boating impacts.
Ecosystem Science:	Continuation of partnering supports further scientific research and habitat restoration.
Resource Management:	CHAP staff will continue to work with partners to identify appropriate land acquisition projects, and land management tools throughout the Charlotte Harbor watershed to protect the ecological integrity of the estuaries. The review of permits for projects that have the potential to affect the aquatic preserves is also a critical role for staff.

Education & Outreach:	With the continual influx of new residents and tourists, education and outreach is a constant need. It is particularly important to raise awareness about what the aquatic preserve status means, to increase awareness about the role of CHAP, and to clarify how the Aquatic Preserve Program is differentiated from local environmental groups.
Public Use:	As population within the area continues to increase, the numbers of residents and tourists utilizing the estuaries will continue to rise. Consequently, the pressure on the estuaries' resources will escalate. CHAP staff will continue to work with regulatory agencies to identify and address potentially harmful public use, and will continue to work to educate the public on how to sustainably use the resources.
Public Involvement:	Public support is vital to the success of conservation programs. The goal is to foster understanding of the problems facing these fragile ecosystems and the steps needed to adequately manage this important habitat. CHAP staff held three public meetings (April 25-27, 2016) and an advisory committee meeting (April 28, 2016) at locations near the aquatic preserves to receive input on the draft management plan. An additional public meeting was held in Tallahassee February 17, 2017 when the Acquisition and Restoration Council reviewed the management plan.

Coastal Zone Management Issues

As tourism in Florida continues to increase along with the residential population, the demands on natural resources in Florida are increasing. The estuaries are affected both by the activities that occur within the watershed and those that are occurring on the waters and adjacent shorelines. The watershed that feeds the estuaries within CHAP encompasses a large area with diverse land uses, including increased development, agriculture, and mining. Coastal and watershed activities have the ability to affect water quality, submerged resources, and nesting birds in both positive and negative ways. Aquatic preserve staff work to encourage positive change and limit any activities that would be detrimental to the aquatic preserves. Long-term monitoring of water quality, seagrass beds, and nesting birds provides the data necessary for staff to evaluate the status and trends in the system. Public involvement in aquatic preserve management is encouraged through the Citizen Support Organization - the Friends of the Charlotte Harbor Aquatic Preserves - and through volunteer programs such as the Charlotte Harbor Volunteer Water Quality Monitoring Network. Through public involvement, outreach, and education staff are seeking to increase the general awareness of sustainable public use of the aquatic preserve resources. The public are encouraged to enjoy the natural resources that the aquatic preserves have to offer, while maintaining their condition for the benefit of future generations.

Goals

The management goals and associated strategies outlined in this document provide an action plan over the course of the next decade that will be used to address the challenges mentioned above. Due to limited resources and the overlap of jurisdictional boundaries, success will depend on partnerships formed with private, local, regional, state, and federal organizations and agencies. Partnerships will be formed to promote the maintenance or improvement of the quality of water reaching the aquatic preserve to meet the needs of the natural resources. Routine assessment of water quality status is required to document change over time. Resource management goals that will improve water quality include hydrologic restoration, BMAP implementation and creation of oyster reef habitat. Documentation of natural resource location and extent will allow managers to evaluate the success of large-scale watershed restoration projects. Maintenance of a safe environment for fish, wildlife, and user groups, and the promotion of low-impact recreational opportunities and good stewardship are also important goals that will be addressed by aquatic preserve staff. Prioritizing issues, objectives and strategies will lead to a cohesive management program and the long-term conservation of the natural system.

FCO/Trustees Approval

FCO approval date: Oct. 26, 2016 **ARC approval date:** Feb. 17, 2017 **Trustees approval date:** Apr. 11, 2017

Comments:

Acronym List

Abbreviation	Meaning	Abbreviation	Meaning
B.P.	Before Present	GIS	Geographic Information Systems
BMAP	Basin Management Action Plan	GPS	Global Positioning System
C	Celsius	HAB	Harmful Algal Bloom
C.F.R.	Code of Federal Regulations	km	kilometer
CHAP	Charlotte Harbor Aquatic Preserves	MFL	Minimum Flows and Levels
CHEVWQMN	Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network	MHWL	Mean High Water Line
CHNEP	Charlotte Harbor National Estuary Program	m	meter
CHPSP	Charlotte Harbor Preserve State Park	mph	miles per hour
CS	Career Service	NERR	National Estuarine Research Reserve
CSO	Citizen Support Organization	NICMZ	No Internal Combustion Motor Zone
cfs	cubic feet per second	NMFS	National Marine Fisheries Service
cm	centimeters	NOAA	National Oceanic and Atmospheric Administration
DACS	Florida Department of Agriculture and Consumer Services	NWR	National Wildlife Refuge
DEAR	Division of Environmental Assessment and Restoration	OFW	Outstanding Florida Water
DEP	Florida Department of Environmental Protection	OPS	Other Personal Services
DNR	Florida Department of Natural Resources	PWC	personal watercraft
DO	Dissolved Oxygen	QA/QC	Quality Assurance and Quality Control
EBAP	Estero Bay Aquatic Preserve	SCCF	Sanibel-Captiva Conservation Foundation
EPA	U.S. Environmental Protection Agency	SFWMD	South Florida Water Management District
ERP	Environmental Resource Permitting	SR	State Road
ES	Environmental Specialist	SSC	Species of Special Concern
F	Fahrenheit	STEM	Science, Technology, Engineering, and Math
F.A.C.	Florida Administrative Code	STORET	STOrage and RETrieval
F.S.	Florida Statutes	SWFWMD	Southwest Florida Water Management District
FCHAP	Friends of the Charlotte Harbor Aquatic Preserves	SWIM	Surface Water Improvement and Management
FCO	Florida Coastal Office	TMDL	Total Maximum Daily Loads
FGCU	Florida Gulf Coast University	TNC	The Nature Conservancy
FNAI	Florida Natural Areas Inventory	UF/IFAS	University of Florida/Institute of Food & Agricultural Sciences
FTE	Full-Time Equivalent	USCG	United States Coast Guard
FWC	Florida Fish and Wildlife Conservation Commission	USFWS	U.S. Fish and Wildlife Service
FWRI	Florida Wildlife Research Institute	WCIND	West Coast Inland Navigation District
GEMS	Gulf Ecological Management Sites		

Table of Contents

Part I / Basis for Management

- Chapter 1 / **Introduction** 1
 - 1.1 / Management Plan Purpose and Scope 2
 - 1.2 / Public Involvement 3
- Chapter 2 / **The Florida Department of Environmental Protection’s Florida Coastal Office** 5
 - 2.1 / Introduction 5
 - 2.2 / Management Authority 6
 - 2.3 / Statutory Authority 7
 - 2.4 / Administrative Rules 7
- Chapter 3 / **The Charlotte Harbor Aquatic Preserves** 9
 - 3.1 / Historical Background 9
 - 3.2 / General Description 12
 - 3.3 / Resource Description 21
 - 3.4 / Values 51
 - 3.5 / Citizen Support Organizations 53
 - 3.6 / Adjacent Public Lands and Designated Resources 56
 - 3.7 / Surrounding Land Use 59

Part II / Management Programs and Issues

- Chapter 4 / **Charlotte Harbor Aquatic Preserves’ Management Programs and Issues** 61
 - 4.1 / The Ecosystem Science Management Program 62
 - Status of Ecosystem Science at the Charlotte Harbor Aquatic Preserves 62
 - Ecosystem Science Issues 83
 - Issue One / Water Quality 83
 - Issue Two / Submerged Resources 85
 - Issue Three / Wading and Diving Colonial Nesting Birds 90
 - 4.2 / The Resource Management Program 91
 - Status of Resource Management at the Charlotte Harbor Aquatic Preserves 92
 - Resource Management Issue 101
 - Issue Four / Coastal and Watershed Activities 101
 - 4.3 / The Education and Outreach Management Program 103
 - Status of Education and Outreach at the Charlotte Harbor Aquatic Preserves 103
 - Education and Outreach Issue 107
 - Issue Five / Public Involvement 107
 - 4.4 / The Public Use Management Program 109
 - Status of Public Use at the Charlotte Harbor Aquatic Preserves 111
 - Public Use Issue 117
 - Issue Six / Public Use 117

Part III / Additional Plans

- Chapter 5 / **Administrative Plan** 125
- Chapter 6 / **Facilities Plan** 127

List of Maps

- Map 1 / Florida Coastal Office system 2
- Map 2 / Charlotte Harbor Aquatic Preserves 12
- Map 3 / Charlotte Harbor Aquatic Preserves surface water designations 13
- Map 4 / Lemon Bay Aquatic Preserve 16
- Map 5 / Gasparilla Sound-Charlotte Harbor Aquatic Preserve 17
- Map 6 / Cape Haze Aquatic Preserve 18
- Map 7 / Pine Island Sound Aquatic Preserve 19
- Map 8 / Matlacha Pass Aquatic Preserve 20
- Map 9 / Lemon Bay Aquatic Preserve bathymetry 22
- Map 10 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves bathymetry 23
- Map 11 / Pine Island Sound and Matlacha Pass aquatic preserves bathymetry 24

Map 12 / Charlotte Harbor Aquatic Preserves geomorphology.....	26
Map 13 / Charlotte Harbor Aquatic Preserves geologic features.....	27
Map 14 / Charlotte Harbor Aquatic Preserves soils.....	28
Map 15 / Charlotte Harbor Aquatic Preserves drainage basins.....	30
Map 16 / Charlotte Harbor Aquatic Preserves impaired waters.....	32
Map 17 / Lemon Bay Aquatic Preserves natural communities.....	38
Map 18 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves natural communities.....	39
Map 19 / Pine Island Sound and Matlacha Pass aquatic preserves natural communities.....	40
Map 20 / Lemon Bay Aquatic Preserve adjacent public lands.....	54
Map 21 / Cape Haze and Gasparilla Sound-Charlotte Harbor aquatic preserves adjacent public lands.....	55
Map 22 / Pine Island Sound and Matlacha Pass aquatic preserves adjacent public lands.....	56
Map 23 / 1988 land use surrounding the Charlotte Harbor Aquatic Preserves.....	57
Map 24 / 2008 land use surrounding the Charlotte Harbor Aquatic Preserves.....	58
Map 25 / Lemon Bay Aquatic Preserve water quality monitoring sites.....	64
Map 26 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves water quality monitoring sites.....	65
Map 27 / Pine Island Sound and Matlacha Pass aquatic preserves water quality monitoring sites.....	66
Map 28 / Lemon Bay Aquatic Preserve seagrass monitoring transects.....	70
Map 29 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves seagrass monitoring transects.....	71
Map 30 / Pine Island Sound and Matlacha Pass aquatic preserves seagrass monitoring transects.....	72
Map 31 / Green mussel locations within Charlotte Harbor Aquatic Preserves.....	73
Map 32 / Lemon Bay Aquatic Preserve oyster restoration suitability.....	75
Map 33 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves oyster restoration suitability.....	76
Map 34 / Pine Island Sound and Matlacha Pass aquatic preserves oyster restoration suitability.....	77
Map 35 / Lemon Bay Aquatic Preserve rookery monitoring islands.....	79
Map 36 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves rookery monitoring islands.....	80
Map 37 / Pine Island Sound and Matlacha Pass aquatic preserves rookery monitoring islands.....	81
Map 38 / Big Dog and Little Dog islands.....	94
Map 39 / Smalltooth Sawfish Critical Habitat and hotspots.....	95
Map 40 / No Internal Combustion Motor Zones within Charlotte Harbor Aquatic Preserves.....	96
Map 41 / Lemon Bay Aquatic Preserve Shellfish Harvesting Areas.....	97
Map 42 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves Shellfish Harvesting Areas.....	98
Map 43 / Pine Island Sound and Matlacha Pass aquatic preserves Shellfish Harvesting Areas.....	99
Map 44 / Lemon Bay Aquatic Preserve public use.....	108
Map 45 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves public use.....	109
Map 46 / Pine Island Sound and Matlacha Pass aquatic preserves public use.....	110
Map 47 / Charlotte Harbor Aquatic Preserves anchorages.....	112
Map 48 / Lemon Bay Aquatic Preserve seagrass scarring.....	118
Map 49 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves seagrass scarring.....	119
Map 50 / Pine Island Sound and Matlacha Pass aquatic preserves seagrass scarring.....	120
Map 51 / Charlotte Harbor Aquatic Preserves manatee mortality.....	121
Map 52 / Charlotte Harbor Aquatic Preserves Manatee Speed Zones.....	122

List of Tables

Table 1 / Population growth in Charlotte Harbor counties.....	21
Table 2 / Verified impaired waters in the Charlotte Harbor Aquatic Preserves area.....	33
Table 3 / Summary of natural communities in Charlotte Harbor Aquatic Preserves.....	41
Table 4 / Summary of natural communities in Lemon Bay Aquatic Preserve.....	41
Table 5 / Summary of natural communities in Gasparilla Sound-Charlotte Harbor Aquatic Preserve.....	41
Table 6 / Summary of natural communities in Cape Haze Aquatic Preserve.....	41
Table 7 / Summary of natural communities in Matlacha Pass Aquatic Preserve.....	41
Table 8 / Summary of natural communities in Pine Island Sound Aquatic Preserve.....	41

List of Figures

Figure 1 / State management structure.....	8
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List of Appendices

Appendix A / Legal Documents	131
A.1 / Aquatic Preserve Resolutions.....	132
A.2 / Florida Statutes	143
A.3 / Florida Administrative Code	143
A.4 / Management Agreements	144
Appendix B / Resource Data	178
B.1 / Glossary of Terms	178
B.2 / References.....	181
B.3 / Species Lists	187
Native Species	187
Listed Species.....	206
Invasive Non-native and/or Problem Species	207
B.4 / Florida Master Site File Archaeological and Historical Sites List.....	210
B.5 / Reports and Publications using Charlotte Harbor Aquatic Preserves' Data.....	219
B.6 / Arthropod Control Plans	221
Appendix C / Public Involvement	222
C.1 / Advisory Committee	222
List of Members and their Affiliations.....	222
Florida Administrative Register Posting	223
Meeting Summary	224
C.2 / Formal Public Meetings.....	231
Florida Administrative Register Postings	231
Advertisement Flyers	233
Newspaper Advertisements	234
Summaries of the Formal Public Meetings	236
Appendix D / Goals, Objectives, and Strategies	247
D.1 / Current Goals, Objectives, and Strategies Budget Table	247
D.2 / Budget Summary Table	253
D.3 / Major Accomplishments Since the Approval of the Previous Plan	253
D.4 / Gulf Priority Restoration Projects	255
D.5 / Additional Research Needs for the Charlotte Harbor Aquatic Preserves	261
Appendix E / Other Requirements	262
E.1 / Acquisition and Restoration Council Management Plan Compliance Checklist.....	262
E.2 / Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands	268
E.3 / Letters of Compliance with County Comprehensive Plans	269
E.4 / Division of State Lands Management Plan Approval Letter.....	273



A volunteer captures the sunrise at one of the CHEVWQMN sampling sites.

Part I

Basis for Management

Chapter One

Introduction

The Florida aquatic preserves are administered on behalf of the state by the Florida Department of Environmental Protection's (DEP) Florida Coastal Office (FCO) as part of a network that includes 41 aquatic preserves, 3 National Estuarine Research Reserves (NERRs), a National Marine Sanctuary, the Coral Reef Conservation Program, the Florida Coastal Management Program, the Outer Continental Shelf Program, and the Florida Oceans and Coastal Council. This provides for a system of significant protections to ensure that our most popular and ecologically important underwater ecosystems are cared for in perpetuity. Each of these special places is managed with strategies based on local resources, issues, and conditions.

Our expansive coastline and wealth of aquatic resources have defined Florida as a subtropical oasis, attracting millions of residents and visitors, and the businesses that serve them. Florida's submerged lands play important roles in maintaining good water quality, hosting a diversity of wildlife and habitats (including economically and ecologically valuable nursery areas), and supporting a treasured quality of life for all. In the 1960s, it became apparent that the ecosystems that had attracted so many people to Florida could not support rapid growth without science-based resource protection and management. To this end, state legislators provided extra protection for certain exceptional aquatic areas by designating them as aquatic preserves.

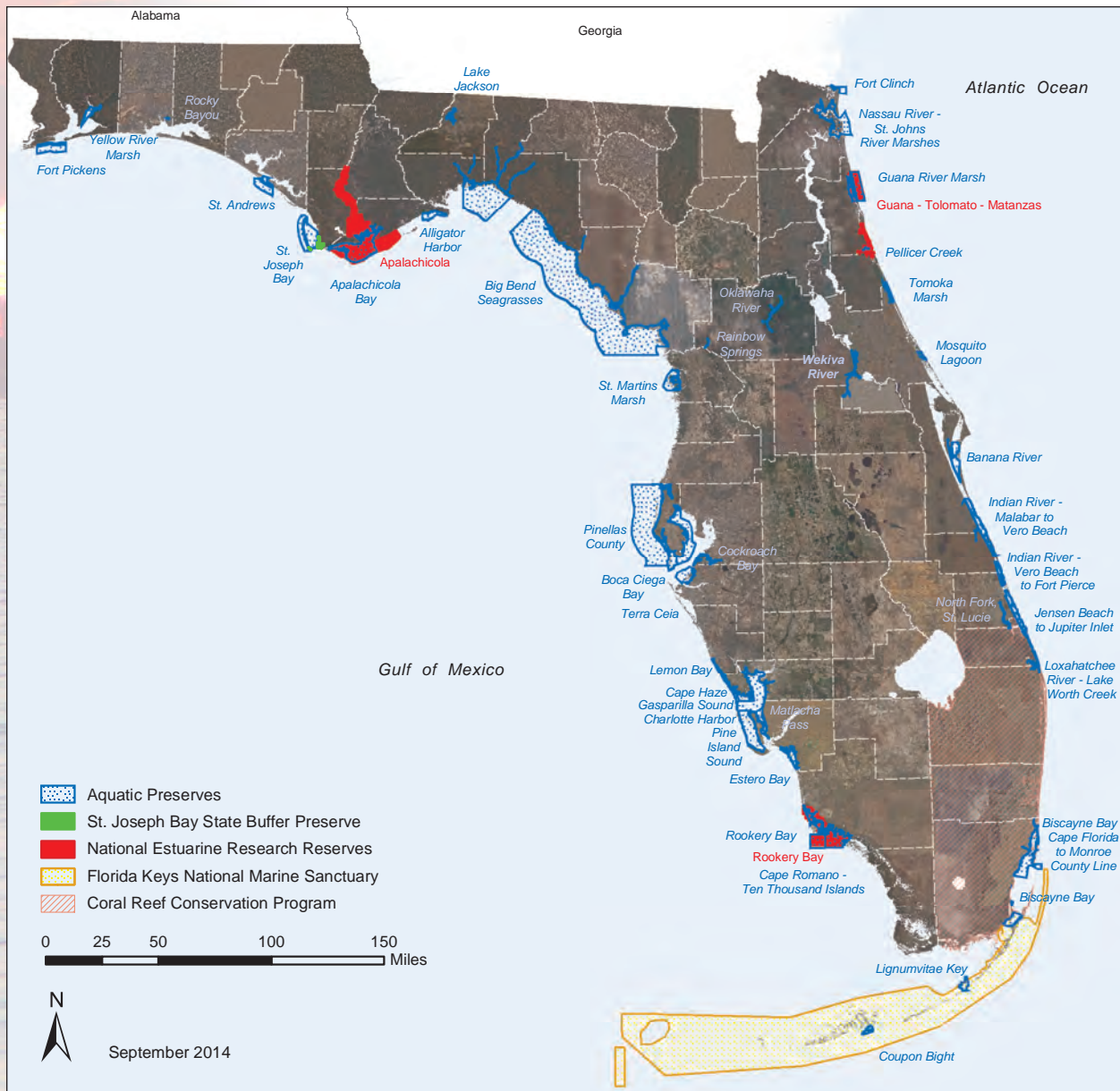
Title to submerged lands not conveyed to private landowners is held by the Board of Trustees of the Internal Improvement Trust Fund (the Trustees). The Governor and Cabinet, sitting as the Trustees, act as guardians for the people of the state of Florida (§253.03, Florida Statutes [F.S.]) and regulate the

use of these public lands. Through statute, the Trustees have the authority to adopt rules related to the management of sovereignty submerged lands (Florida Aquatic Preserve Act of 1975, §258.36, F.S.). A higher layer of protection is afforded to aquatic preserves including areas of sovereignty lands that have been “set aside forever as aquatic preserves or sanctuaries for the benefit of future generations” due to “exceptional biological, aesthetic, and scientific value” (Florida Aquatic Preserve Act of 1975, §258.36, F.S.).

This tradition of concern and protection of these exceptional areas continues, and now includes: the Rookery Bay NERR in Southwest Florida, designated in 1978; the Apalachicola NERR in Northwest Florida, designated in 1979; and the Guana Tolomato Matanzas NERR in Northeast Florida, designated in 1999. In addition, the Florida Oceans and Coastal Council was created in 2005 to develop Florida’s ocean and coastal research priorities, and establish a statewide ocean research plan. The group also coordinates public and private ocean research for more effective coastal management. This dedication to the conservation of coastal and ocean resources is an investment in Florida’s future.

1.1 / Management Plan Purpose and Scope

With increasing development, recreation, and economic pressures, our aquatic resources have the potential to be significantly impacted, either directly or indirectly. These potential impacts to resources can reduce the health and viability of the ecosystems that contain them, requiring active management to



ensure the long-term health of the entire network. Effective management plans for the aquatic preserves are essential to address this goal and each site's own set of unique challenges. The purpose of these plans is to incorporate, evaluate, and prioritize all relevant information about the site into a cohesive management strategy, allowing for appropriate access to the managed areas while protecting the long-term health of the ecosystems and their resources.

The mandate for developing aquatic preserve management plans is outlined in Section 18-20.013 and Subsection 18-18.013(2) of the Florida Administrative Code (F.A.C.). Management plan development and review begins with the collection of resource information from historical data, research and monitoring, and includes input from individual FCO managers and staff, area stakeholders, and members of the general public. The statistical data, public comment, and cooperating agency information is then used to identify management issues and threats affecting the present and future integrity of the site, its boundaries, and adjacent areas. This information is used in the development and review of the management plan, which is examined for consistency with the statutory authority and intent of the Aquatic Preserve Program. Each management plan is evaluated periodically and revised as necessary to allow for strategic improvements. Intended to be used by site managers and other agencies or private groups involved with maintaining the natural integrity of these resources, the plan includes scientific information about the existing conditions of the site and the management strategies developed to respond to those conditions.

To aid in the analysis and development of the management strategies for the site plans, four comprehensive management programs are identified. In each of these management programs, relevant information about the specific sites is described in an effort to create a comprehensive management plan. It is expected that the specific needs or issues are unique and vary at each location, but the four management programs will remain constant. These management programs are:

- Ecosystem Science
- Resource Management
- Education and Outreach
- Public Use

In addition, unique local and regional issues are identified, and goals, objectives, and strategies are established to address these issues. Finally, the program and facility needs required to meet these goals are identified. These components are all key elements in an effective coastal management program and for achieving the mission of the sites.

This management plan for the Charlotte Harbor Aquatic Preserves combines five aquatic preserves in the Charlotte Harbor region managed by the FCO. The five aquatic preserves are Lemon Bay Aquatic Preserve, Gasparilla Sound-Charlotte Harbor Aquatic Preserve, Cape Haze Aquatic Preserve, Pine Island Sound Aquatic Preserve, and Matlacha Pass Aquatic Preserve. This management plan combines and replaces two earlier plans, the Lemon Bay Aquatic Preserve Management Plan adopted in 1991 and the Charlotte Harbor Aquatic Preserves Management Plan adopted in 1983.

1.2 / Public Involvement

FCO recognizes the importance of stakeholder participation and encourages their involvement in the management plan development process. FCO is also committed to meeting the requirements of the Sunshine Law (§286.011, F.S.):

- meetings of public boards or commissions must be open to the public;
- reasonable notice of such meetings must be given; and
- minutes of the meetings must be recorded.

Several key steps are to be taken during management plan development. First, staff compose a draft plan after gathering information of current and historic uses and resource, cultural and historic sites, and other valuable information regarding the property and surrounding area. Staff then organize an advisory committee comprised of key stakeholders and conduct, in conjunction with the advisory committee, public meetings to engage the stakeholders for feedback on the draft plan and the development of the final draft of the management plan. An additional public meeting is held when the plan is reviewed by the Acquisition and Restoration Council for final approval. For additional information about the advisory committee and the public meetings refer to Appendix C - Public Involvement.



Black needle rush and mangrove wetlands surround Tippecanoe Bay in Gasparilla Sound-Charlotte Harbor Aquatic Preserve.

Chapter Two

The Florida Department of Environmental Protection's Florida Coastal Office

2.1 / Introduction

The Florida Department of Environmental Protection (DEP) protects, conserves and manages Florida's natural resources and enforces the state's environmental laws. The DEP is the lead agency in state government for environmental management and stewardship and commands one of the broadest charges of all the state agencies, protecting Florida's air, water, and land. The DEP is divided into three primary areas: Regulatory Programs, Land and Recreation, and Water Policy and Ecosystem Restoration. Florida's environmental priorities include restoring America's Everglades; improving air quality; restoring and protecting the water quality in our springs, lakes, rivers and coastal waters; conserving environmentally-sensitive lands; and providing citizens and visitors with recreational opportunities, now and in the future.

The Florida Coastal Office (FCO) is the unit within the DEP that manages more than four million acres of submerged lands and select coastal uplands. This includes 41 aquatic preserves, three National Estuarine Research Reserves (NERRs), the Florida Keys National Marine Sanctuary and the Coral Reef Conservation Program. The three NERRs, the Florida Keys National Marine Sanctuary, and the Coral Reef Conservation Program are managed in cooperation with the National Oceanic and Atmospheric Administration (NOAA).

FCO manages sites in Florida for the conservation and protection of natural and historical resources and resource-based public use that is compatible with the conservation and protection of these lands. FCO is a strong supporter of the NERR system and its approach to coastal ecosystem management. Florida has three designated NERR sites, each encompassing at least one aquatic preserve within its boundaries.

Rookery Bay NERR includes Rookery Bay Aquatic Preserve and Cape Romano - Ten Thousand Islands Aquatic Preserve; Apalachicola NERR includes Apalachicola Bay Aquatic Preserve; and Guana Tolomato Matanzas NERR includes Guana River Marsh Aquatic Preserve and Pellicer Creek Aquatic Preserve. These aquatic preserves provide discrete areas designated for additional protection beyond that of the surrounding NERR and may afford a foundation for additional protective zoning in the future.

Each of the Florida NERR managers serves as a regional manager overseeing multiple other aquatic preserves in their region. This management structure advances FCO's ability to manage its sites as part of the larger statewide system.

2.2 / **Management Authority**

Established by law, aquatic preserves are submerged lands of exceptional beauty that are to be maintained in their natural or existing conditions. The intent was to forever set aside submerged lands with exceptional biological, aesthetic, and scientific values as sanctuaries, called aquatic preserves, for the benefit of future generations.

The laws supporting aquatic preserve management are the direct result of the public's awareness of and interest in protecting Florida's aquatic environment. The extensive dredge and fill activities that occurred in the late 1960s spawned this widespread public concern. In 1966, the Board of Trustees of the Internal Improvement Trust Fund (Trustees) created the first aquatic preserve, Estero Bay, in Lee County.

In 1967, the Florida Legislature passed the Randall Act (Chapter 67-393, Laws of Florida), which established procedures regulating previously unrestricted dredge and fill activities on state-owned submerged lands. That same year, the Legislature provided the statutory authority (§253.03, Florida Statutes [F.S.]) for the Trustees to exercise proprietary control over state-owned lands. Also in 1967, government focus on protecting Florida's productive water bodies from degradation due to development led the Trustees to establish a moratorium on the sale of submerged lands to private interests. An Interagency Advisory Committee was created to develop strategies for the protection and management of state-owned submerged lands.

In 1968, the Florida Constitution was revised to declare in Article II, Section 7, the state's policy of conserving and protecting natural resources and areas of scenic beauty. That constitutional provision also established the authority for the Legislature to enact measures for the abatement of air and water pollution. Later that same year, the Interagency Advisory Committee issued a report recommending the establishment of 26 aquatic preserves.

The Trustees acted on this recommendation in 1969 by establishing 16 aquatic preserves and adopting a resolution for a statewide system of such preserves. In 1975 the state Legislature passed the Florida Aquatic Preserve Act of 1975 (Act) that was enacted as Chapter 75-172, Laws of Florida, and later became Chapter 258, Part II, F.S. This Act codified the already existing aquatic preserves and established standards and criteria for activities within those preserves. Additional aquatic preserves were individually adopted at subsequent times up through 1989.

In 1980, the Trustees adopted the first aquatic preserve rule, Chapter 18-18, Florida Administrative Code (F.A.C.), for the administration of the Biscayne Bay Aquatic Preserve. All other aquatic preserves are administered under Chapter 18-20, F.A.C., which was originally adopted in 1981. These rules apply standards and criteria for activities in the aquatic preserves, such as dredging, filling, building docks and other structures that are stricter than those of Chapter 18-21, F.A.C., which apply to all sovereignty lands in the state.

This plan is in compliance with the Conceptual State Lands Management Plan, adopted March 17, 1981 by the Board of Trustees of the Internal Improvement Trust Fund and represents balanced public utilization, specific agency statutory authority, and other legislative or executive constraints. The Conceptual State Lands Management Plan also provides essential guidance concerning the management of sovereignty lands and aquatic preserves and their important resources, including unique natural features, seagrasses, endangered species, and archaeological and historical resources.

Through delegation of authority from the Trustees, the DEP and FCO have proprietary authority to manage the sovereignty lands, the water column, spoil islands (which are merely deposits of sovereignty lands), and some of the natural islands and select coastal uplands to which the Trustees hold title.

Enforcement of state statutes and rules relating to criminal violations and non-criminal infractions rests with the Florida Fish and Wildlife Conservation Commission law enforcement and local law enforcement agencies. Enforcement of administrative remedies rests with FCO, the DEP Districts, and Water Management Districts.

2.3 / Statutory Authority

The fundamental laws providing management authority for the aquatic preserves are contained in Chapters 258 and 253, F.S. These statutes establish the proprietary role of the Governor and Cabinet, sitting as the Board of Trustees of the Internal Improvement Trust Fund, as Trustees over all sovereignty lands. In addition, these statutes empower the Trustees to adopt and enforce rules and regulations for managing all sovereignty lands, including aquatic preserves. The Florida Aquatic Preserve Act was enacted by the Florida Legislature in 1975 and is codified in Chapter 258, F.S.

The legislative intent for establishing aquatic preserves is stated in Section 258.36, F.S.: “It is the intent of the Legislature that the state-owned submerged lands in areas which have exceptional biological, aesthetic, and scientific value, as hereinafter described, be set aside forever as aquatic preserves or sanctuaries for the benefit of future generations.” This statement, along with the other applicable laws, provides a foundation for the management of aquatic preserves. Management will emphasize the preservation of natural conditions and will include lands that are specifically authorized for inclusion as part of an aquatic preserve.

Management responsibilities for aquatic preserves may be fulfilled directly by the Trustees or by staff of the DEP through delegation of authority. Other governmental bodies may also participate in the management of aquatic preserves under appropriate instruments of authority issued by the Trustees. FCO staff serves as the primary managers who implement provisions of the management plans and rules applicable to the aquatic preserves. FCO does not “regulate” the lands per se; rather, that is done primarily by the DEP Districts (in addition to the Water Management Districts) which grant regulatory permits. The Florida Department of Agriculture and Consumer Services through delegated authority from the Trustees, may issue proprietary authorizations for marine aquaculture within the aquatic preserves and regulates all aquaculture activities as authorized by Chapter 597, Florida Aquaculture Policy Act, F.S. Staff evaluates proposed uses or activities in the aquatic preserve and assesses the possible impacts on the natural resources. Project reviews are primarily evaluated in accordance with the criteria in the Act, Chapter 18-20, F.A.C., and this management plan.

FCO staff comments, along with comments of other agencies and the public are submitted to the appropriate permitting staff for consideration in their issuance of any delegated authorizations in aquatic preserves or in developing recommendations to be presented to the Trustees. This mechanism provides a basis for the Trustees to evaluate public interest and the merits of any project while also considering potential environmental impacts to the aquatic preserves. Any activity located on sovereignty lands requires a letter of consent, a lease, an easement, or other approval from the Trustees.

Many provisions of the Florida Statutes that empower non-FCO programs within DEP or other agencies may be important to the management of FCO sites. For example, Chapter 403, F.S., authorizes rules concerning the designation of “Outstanding Florida Waters” (OFWs), a program that provides aquatic preserves with additional regulatory protection. Chapter 379, F.S., regulates saltwater fisheries, and provides enforcement authority and powers for law enforcement officers. Additionally, it provides similar powers relating to wildlife conservation and management. The sheer number of statutes that affect aquatic preserve management prevents an exhaustive list of all such laws from being provided here.

2.4 / Administrative Rules

Chapters 18-18, 18-20 and 18-21, F.A.C., are the three administrative rules directly applicable to the uses allowed in aquatic preserves specifically and sovereignty lands generally. These rules are intended to be cumulative, meaning that Chapter 18-21, F.A.C., should be read together with Chapter 18-18, F.A.C., or Chapter 18-20, F.A.C., to determine what activities are permissible within an aquatic preserve. If Chapter 18-18, F.A.C., or Chapter 18-20, F.A.C., are silent on an issue, Chapter 18-21, F.A.C., will control; if a conflict is perceived between the rules, the stricter standards of Chapter 18-18, F.A.C., or Chapter 18-20, F.A.C., supersede those of Chapter 18-21, F.A.C. Because Chapter 18-21, F.A.C. concerns all sovereignty lands, it is logical to discuss its provisions first.

Originally codified in 1982, Chapter 18-21, F.A.C., is meant “to aid in fulfilling the trust and fiduciary responsibilities of the Board of Trustees of the Internal Improvement Trust Fund for the administration, management and disposition of sovereignty lands; to insure maximum benefit and use of sovereignty lands for all the citizens of Florida; to manage, protect and enhance sovereignty lands so that the public may continue to enjoy traditional uses including, but not limited to, navigation, fishing and swimming; to manage and provide maximum protection for all sovereignty lands, especially those important to public drinking water supply, shellfish harvesting, public recreation, and fish and wildlife propagation

and management; to insure that all public and private activities on sovereignty lands which generate revenues or exclude traditional public uses provide just compensation for such privileges; and to aid in the implementation of the State Lands Management Plan.”

To that end, Chapter 18-21, F.A.C., contains provisions on general management policies, forms of authorization for activities on sovereignty lands, and fees applicable for those activities. “Activity,” in the context of the rule, includes “construction of docks, piers, boat ramps, boardwalks, mooring pilings, dredging of channels, filling, removal of logs, sand, silt, clay, gravel or shell, and the removal or planting of vegetation” (Rule 18-21.003, F.A.C.). To be authorized on sovereignty lands, activities must be not contrary to the public interest (Rule 18-21.004, F.A.C.).

Chapter 18-21, F.A.C., also sets policies on aquaculture, geophysical testing (using gravity, shock wave and other geological techniques to obtain data on oil, gas or other mineral resources), and special

events related to boat shows and boat displays. Of particular importance to FCO site management, it additionally addresses spoil islands, preventing their development in most cases.

Chapters 18-18 and 18-20, F.A.C., apply standards and criteria for activities in the aquatic preserves that are stricter than those of Chapter 18-21, F.A.C. Chapter 18-18, F.A.C., is specific to the Biscayne Bay Aquatic Preserve and is more extensively described in that site’s management plan. Chapter 18-20, F.A.C., is applicable to all other aquatic preserves. It further restricts the type of activities for which authorizations may be granted for use of sovereignty lands and requires that structures that are authorized be limited to those necessary to conduct water dependent activities. Moreover, for certain activities to be authorized, “it must be demonstrated that no other reasonable alternative exists which would allow the proposed activity to be constructed or undertaken outside the preserve” (Paragraph 18-20.004(1)(g), F.A.C.).

Chapter 18-20, F.A.C., expands on the definition of “public interest” by outlining

a balancing test that is to be used to determine whether benefits exceed costs in the evaluation of requests for sale, lease, or transfer of interest of sovereignty lands within an aquatic preserve. The rule also provides for the analysis of the cumulative impacts of a request in the context of prior, existing, and pending uses within the aquatic preserve, including both direct and indirect effects.

Chapter 18-20, F.A.C., directs management plans and resource inventories to be developed for every aquatic preserve. Further, the rule provides provisions specific to certain aquatic preserves and indicates the means by which the Trustees can establish new or expand existing aquatic preserves.

As with statutes, aquatic preserve management relies on the application of many other DEP and outside agency rules. Perhaps most notably, Chapter 62-302, F.A.C., concerns the classification of surface waters, including criteria for OFW, a designation that provides for the state’s highest level of protection for water quality. All aquatic preserves contain OFW designations. No activity may be permitted within an OFW that degrades ambient water quality unless the activity is determined to be in the public interest. Once again, the list of other administrative rules that do not directly address FCO’s responsibilities but do affect FCO sites is so long as to be impractical to create within the context of this management plan.

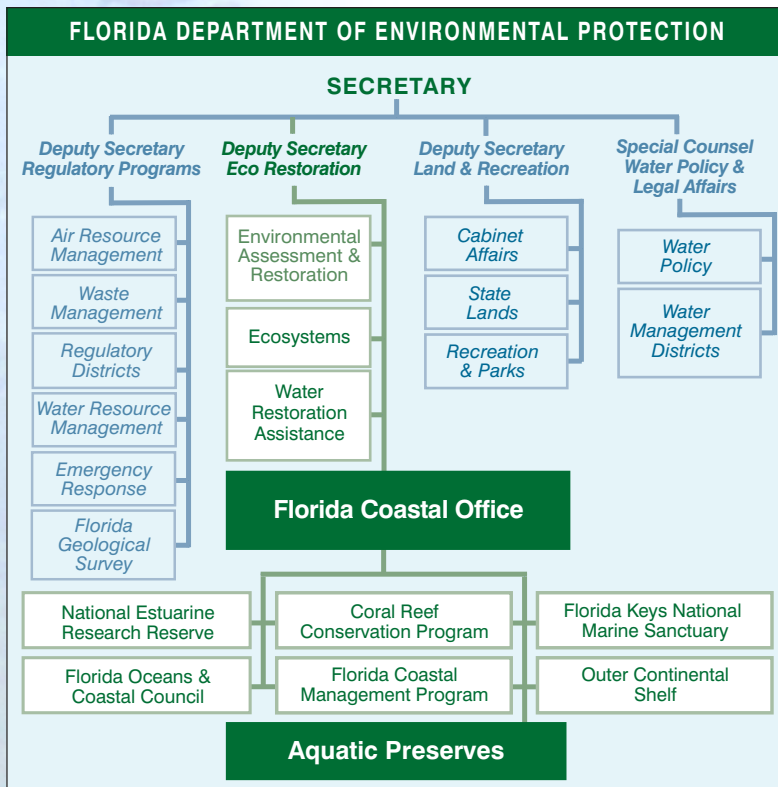


Figure 1 | State structure for managing Aquatic Preserves.



Snowy egrets are found among many of the Charlotte Harbor Aquatic Preserves rookery islands.

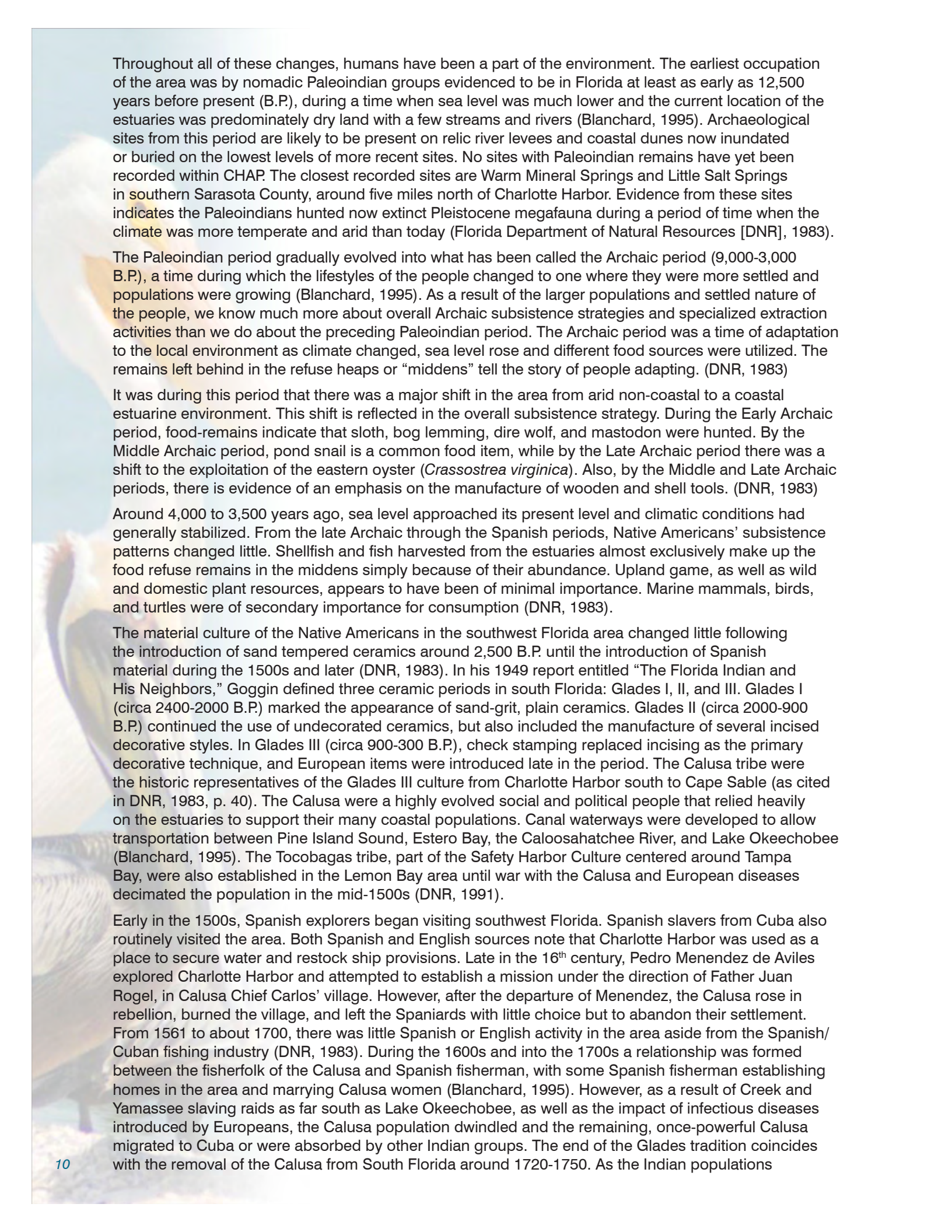
Chapter Three

Charlotte Harbor Aquatic Preserves

3.1 / Historical Background

Charlotte Harbor Aquatic Preserves (CHAP) cover the majority of what is commonly known as the Charlotte Harbor estuarine complex, a system of interconnected estuaries influenced by three major rivers: the Peace, Myakka, and Caloosahatchee. This complex system of estuarine waters, barrier islands, tidal wetlands, oyster reefs, and bird rookeries is home to a diverse array of flora and fauna, as well as a growing human population. Many animal species rely on estuaries for food, nesting, and breeding, much as human communities depend on these systems for food, jobs, and recreation. Estuaries are places of constant change as the shape and location of islands and passes fluctuate over time, and water quality varies dependent on tide, season, and climatic changes. Coastal development, anthropogenic alterations to water flow patterns, and harvest of seafood also contribute to the constant flux of estuarine systems.

The Charlotte Harbor estuarine complex began to form approximately 5,000 years ago when a rise in sea level flooded the mouths of the Myakka and Peace rivers. This flooding caused sediments to be deposited in a series of deltaic formations which began the infilling of the present estuary. This infilling process, along with the deposition of limestone and quartz materials carried from the north by longshore currents, resulted in the development of the barrier island chain from Manasota Key to Sanibel Island. As sediments were deposited, oyster bars were established, adding shell fragments to the quartz sands. As the bars reached the intertidal depths, mangroves began to colonize the areas and trap sediments, increasing the amount of peat in the deposits and the size of the islands (Hoffmeister, 1974). The seven major barrier islands of the present time (Manasota Key, Don Pedro, Gasparilla, Cayo Costa, North Captiva, Captiva, and Sanibel) have joined and separated into additional islands, changing shapes continuously since their beginning (Antonini, Fann, & Roat, 2002; Herwitz, 1977). Changes to the islands and passes continue to happen today, as some existing passes fill in over time with sediment deposition, such as Blind Pass and Stump Pass, while new passes open up following storm events. The most recent pass to open was Charley Pass on North Captiva as a result of Hurricane Charley in 2004; this pass has since filled back in.



Throughout all of these changes, humans have been a part of the environment. The earliest occupation of the area was by nomadic Paleoindian groups evidenced to be in Florida at least as early as 12,500 years before present (B.P.), during a time when sea level was much lower and the current location of the estuaries was predominately dry land with a few streams and rivers (Blanchard, 1995). Archaeological sites from this period are likely to be present on relic river levees and coastal dunes now inundated or buried on the lowest levels of more recent sites. No sites with Paleoindian remains have yet been recorded within CHAP. The closest recorded sites are Warm Mineral Springs and Little Salt Springs in southern Sarasota County, around five miles north of Charlotte Harbor. Evidence from these sites indicates the Paleoindians hunted now extinct Pleistocene megafauna during a period of time when the climate was more temperate and arid than today (Florida Department of Natural Resources [DNR], 1983).

The Paleoindian period gradually evolved into what has been called the Archaic period (9,000-3,000 B.P.), a time during which the lifestyles of the people changed to one where they were more settled and populations were growing (Blanchard, 1995). As a result of the larger populations and settled nature of the people, we know much more about overall Archaic subsistence strategies and specialized extraction activities than we do about the preceding Paleoindian period. The Archaic period was a time of adaptation to the local environment as climate changed, sea level rose and different food sources were utilized. The remains left behind in the refuse heaps or “middens” tell the story of people adapting. (DNR, 1983)

It was during this period that there was a major shift in the area from arid non-coastal to a coastal estuarine environment. This shift is reflected in the overall subsistence strategy. During the Early Archaic period, food-remains indicate that sloth, bog lemming, dire wolf, and mastodon were hunted. By the Middle Archaic period, pond snail is a common food item, while by the Late Archaic period there was a shift to the exploitation of the eastern oyster (*Crassostrea virginica*). Also, by the Middle and Late Archaic periods, there is evidence of an emphasis on the manufacture of wooden and shell tools. (DNR, 1983)

Around 4,000 to 3,500 years ago, sea level approached its present level and climatic conditions had generally stabilized. From the late Archaic through the Spanish periods, Native Americans' subsistence patterns changed little. Shellfish and fish harvested from the estuaries almost exclusively make up the food refuse remains in the middens simply because of their abundance. Upland game, as well as wild and domestic plant resources, appears to have been of minimal importance. Marine mammals, birds, and turtles were of secondary importance for consumption (DNR, 1983).

The material culture of the Native Americans in the southwest Florida area changed little following the introduction of sand tempered ceramics around 2,500 B.P. until the introduction of Spanish material during the 1500s and later (DNR, 1983). In his 1949 report entitled “The Florida Indian and His Neighbors,” Goggin defined three ceramic periods in south Florida: Glades I, II, and III. Glades I (circa 2400-2000 B.P.) marked the appearance of sand-grit, plain ceramics. Glades II (circa 2000-900 B.P.) continued the use of undecorated ceramics, but also included the manufacture of several incised decorative styles. In Glades III (circa 900-300 B.P.), check stamping replaced incising as the primary decorative technique, and European items were introduced late in the period. The Calusa tribe were the historic representatives of the Glades III culture from Charlotte Harbor south to Cape Sable (as cited in DNR, 1983, p. 40). The Calusa were a highly evolved social and political people that relied heavily on the estuaries to support their many coastal populations. Canal waterways were developed to allow transportation between Pine Island Sound, Estero Bay, the Caloosahatchee River, and Lake Okeechobee (Blanchard, 1995). The Tocobagas tribe, part of the Safety Harbor Culture centered around Tampa Bay, were also established in the Lemon Bay area until war with the Calusa and European diseases decimated the population in the mid-1500s (DNR, 1991).

Early in the 1500s, Spanish explorers began visiting southwest Florida. Spanish slavers from Cuba also routinely visited the area. Both Spanish and English sources note that Charlotte Harbor was used as a place to secure water and restock ship provisions. Late in the 16th century, Pedro Menendez de Aviles explored Charlotte Harbor and attempted to establish a mission under the direction of Father Juan Rogel, in Calusa Chief Carlos' village. However, after the departure of Menendez, the Calusa rose in rebellion, burned the village, and left the Spaniards with little choice but to abandon their settlement. From 1561 to about 1700, there was little Spanish or English activity in the area aside from the Spanish/Cuban fishing industry (DNR, 1983). During the 1600s and into the 1700s a relationship was formed between the fisherfolk of the Calusa and Spanish fisherman, with some Spanish fisherman establishing homes in the area and marrying Calusa women (Blanchard, 1995). However, as a result of Creek and Yamassee slaving raids as far south as Lake Okeechobee, as well as the impact of infectious diseases introduced by Europeans, the Calusa population dwindled and the remaining, once-powerful Calusa migrated to Cuba or were absorbed by other Indian groups. The end of the Glades tradition coincides with the removal of the Calusa from South Florida around 1720-1750. As the Indian populations

dwindled, Cuban settlers began utilizing the high grounds created by the Native American mounds as building sites (DNR, 1991).

At the conclusion of the second Spanish period (1821), there were no permanent settlements in southwest Florida. There were only a few Cuban fishermen, their families, and Native American employees living in isolated villages along the coast. Increasingly, from around the beginning of the 1800s, members of the Seminole tribe moved into the area to trade and eventually established encampments. By the 1820s and 1830s the Cuban fishermen had grown to depend on the Seminole as a major part of their work force and intermarriage occurred. Charlotte Harbor was a major focus of Spanish fishing efforts. Covington (1959) reports that by 1831, there were four major fishing “ranchos,” with their own sloops, transporting dried, salted mullet, manatee lard and probably other produce to Cuba. These four camps reportedly contained 130 men, half of whom were Native Americans, about 30 Native American women, and some 50-100 children (DNR, 1983).

Throughout the 1800s commercial fishing continued to grow as an economic force in the area and by the later years of the century permanent settlements were being established. With the development of these settlements came the interest in developing inland navigation routes and draining the predominately wetlands of southwest Florida for development and agriculture. Dredging of the Caloosahatchee River, the first major project of its type in southwest Florida, began in 1881. A series of dredging projects followed suit and by 1967, the Gulf Intracoastal Waterway had been completed, establishing a nine-foot-deep by 100-foot-wide channel from San Carlos Bay through Lemon Bay, connecting the Charlotte Harbor area to Sarasota and Tampa Bays (Antonini et al., 2002; Alperin, 1983).

In 1885 the Fort Myers News Press reported that Mr. W.H. Wood landed five tarpon averaging more than 100 pounds each on a rod and reel in Tarpon Bay. This report gained national publicity which began an international craze for tarpon fishing throughout southwest Florida. The rich and famous as well as everyday sport fishermen flocked to the area for the fish referred to as the “Silver King” (Woodward, 2010). By the mid-1900s, the population of the region was growing, and tourists continued to be drawn to the area for the excellent sport fishing. Tarpon fishing based tourism stayed strong through the 1940s, 1950s, and into the 1960s (Woodward, 2010). It was during this time that large sub-divisions, such as Punta Gorda Isles, Port Charlotte, and Cape Coral, were developed by dredging and filling land to create large canal systems and communities of waterfront lots. In addition to the pressures of coastal development, mining and agriculture became predominant land uses in the upper reaches of the watersheds.

By 1945, when the J.N. “Ding” Darling National Wildlife Refuge was established, the need for conservation and protection of the natural resources in the Charlotte Harbor area was already being recognized. In 1966, Estero Bay Aquatic Preserve, located immediately south of CHAP, was established as an Offshore Preserve and was Florida’s first aquatic preserve. The motivation for the creation of the aquatic preserve was a growing awareness that coastal development was destroying the natural areas needed to maintain healthy fisheries. For some people, this was primarily an aesthetic and/or environmental issue. Others were concerned about the detrimental effect this was having on the commercial and recreational fishing industries, as well as other industries reliant on tourism, then as now, a major economic engine of the region.

Just two hours north of Lee County, Boca Ciega Bay, in Pinellas County, had experienced a collapse of its fisheries not long before, due to extensive dredging and filling done to create finger canals and seawalls for condo development. As was noted at the time, dredge and fill operations created a twofold problem, the first being the obvious removal of the mangrove shoreline, used by many marine species in their younger stages to escape predation. But the second and less obvious result was the destruction of large areas of seagrass beds, rich feeding grounds for many species of commercial and sport fish.

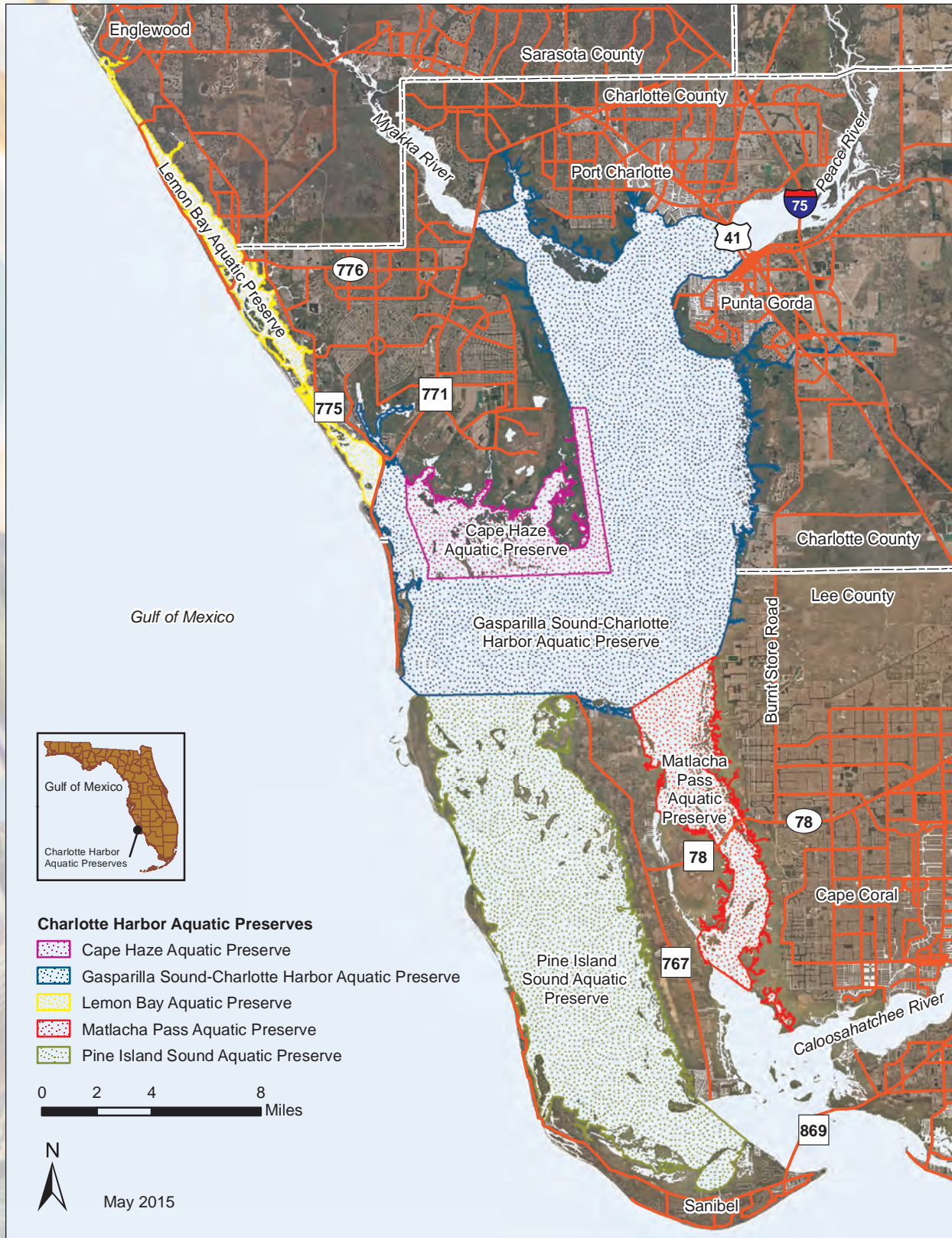
The five Charlotte Harbor Aquatic Preserves were designated separately from 1970 through 1986:

- Pine Island Sound Aquatic Preserve – 1970
- Matlacha Pass Aquatic Preserve – 1972
- Cape Haze Aquatic Preserve – 1978
- Gasparilla Sound-Charlotte Harbor Aquatic Preserve – 1979
- Lemon Bay Aquatic Preserve – 1986

Acquisition of state preserve lands surrounding the Charlotte Harbor estuaries, now known as Charlotte Harbor Preserve State Park (CHPSP) began in the 1970s. Several citizen organizations also formed around this time period to acquire and preserve lands, including Sanibel-Captiva Conservation Foundation (1967), Lemon Bay Conservancy (1971) and the Calusa Land Trust (1976). In 1995 the Charlotte Harbor estuarine complex, including Estero Bay, was designated an “estuary of national significance” through the Clean Water Act, and the Charlotte Harbor National Estuary Program (CHNEP) was established.

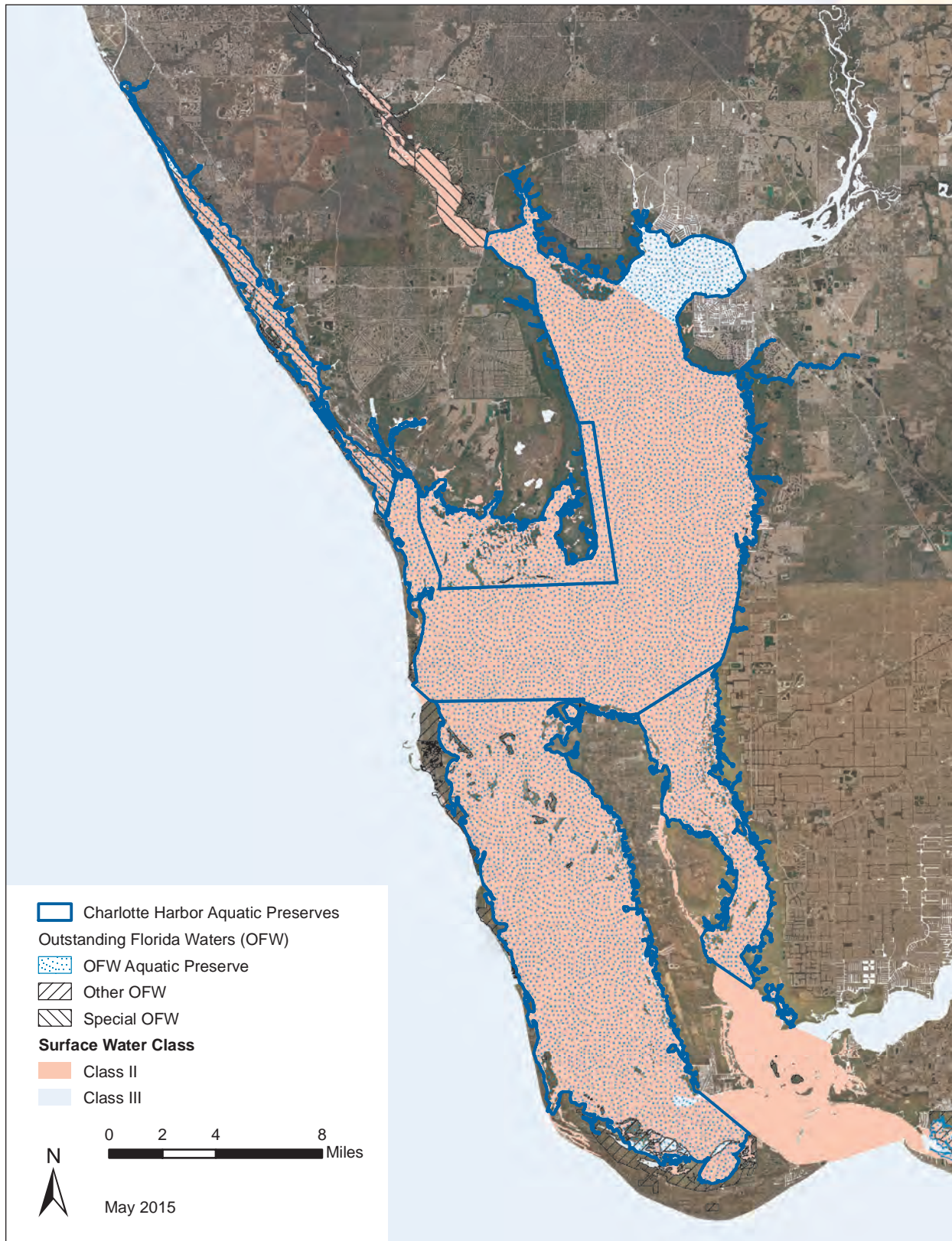
3.2 / General Description

There are five aquatic preserves that comprise what is referred to as CHAP: Lemon Bay, Cape Haze, Gasparilla Sound-Charlotte Harbor, Matlacha Pass and Pine Island Sound (see Map 2). These five aquatic preserves lie in southwest Florida in the Charlotte Harbor estuarine system about 80 miles southeast of Tampa Bay and 80 miles west of Lake Okeechobee. Charlotte Harbor is Florida's second-largest open water estuary with a surface area of approximately 270 square miles (Estevez, 1998). The entire estuarine complex extends from southwestern Sarasota County south through both Charlotte and Lee counties.

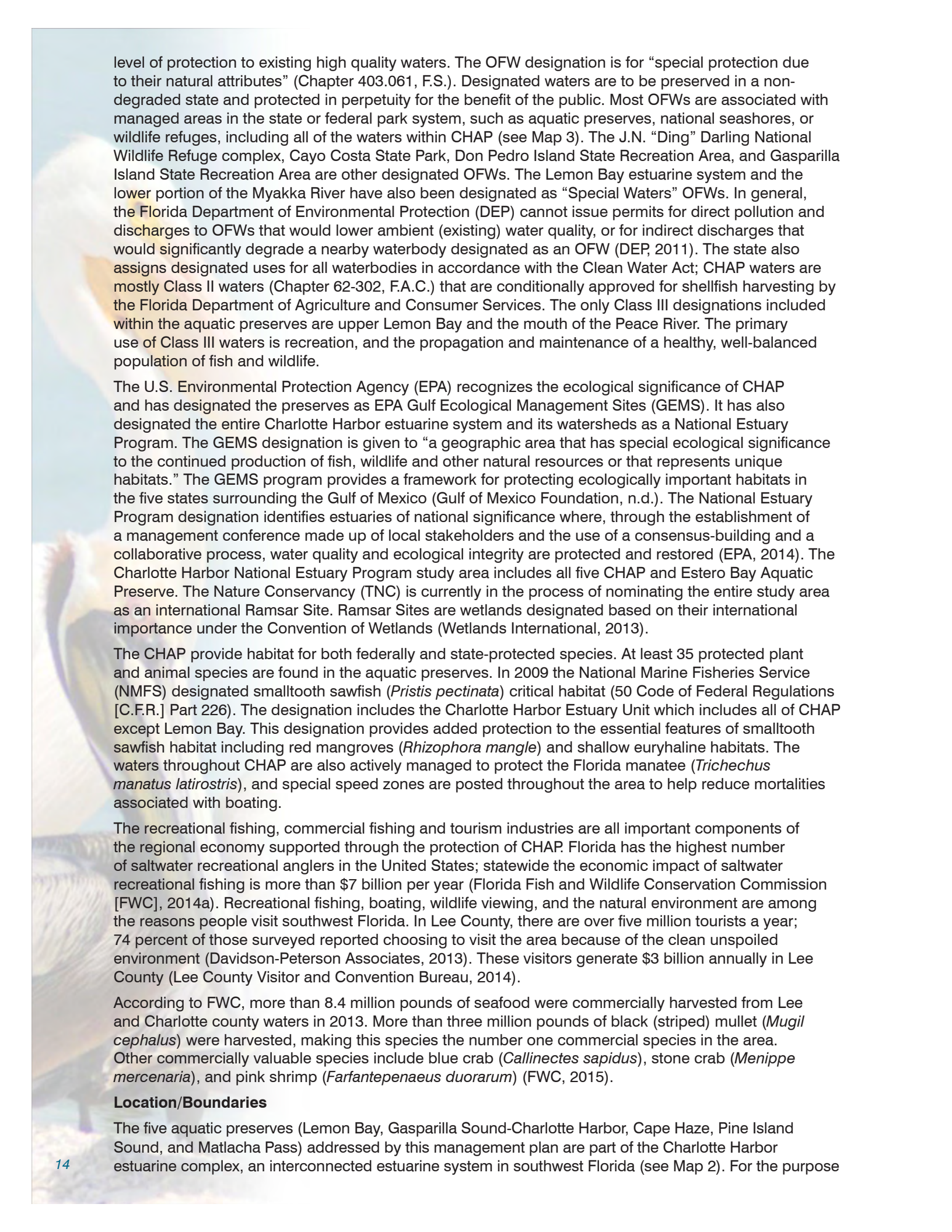


International/National/State/Regional Significance

The CHAP have state designations as Aquatic Preserves (Chapter 18-20, Florida Administrative Code [F.A.C.]) and Outstanding Florida Waters (OFW) (see Map 3). The OFW designation (pursuant to §403, Florida Statutes [F.S.] and Chapter 62-302, F.A.C) is given to waters found to be worthy of special protection because of their exceptional ecological or recreational significance. This is a state designation implementing a provision of the federal Clean Water Act, intended to afford the highest



Map 3 | Charlotte Harbor Aquatic Preserves surface water designations.

A background image showing a person in a boat fishing on a body of water. The person is wearing a white shirt and is holding a fishing rod. The water is calm, and the sky is clear.

level of protection to existing high quality waters. The OFW designation is for “special protection due to their natural attributes” (Chapter 403.061, F.S.). Designated waters are to be preserved in a non-degraded state and protected in perpetuity for the benefit of the public. Most OFWs are associated with managed areas in the state or federal park system, such as aquatic preserves, national seashores, or wildlife refuges, including all of the waters within CHAP (see Map 3). The J.N. “Ding” Darling National Wildlife Refuge complex, Cayo Costa State Park, Don Pedro Island State Recreation Area, and Gasparilla Island State Recreation Area are other designated OFWs. The Lemon Bay estuarine system and the lower portion of the Myakka River have also been designated as “Special Waters” OFWs. In general, the Florida Department of Environmental Protection (DEP) cannot issue permits for direct pollution and discharges to OFWs that would lower ambient (existing) water quality, or for indirect discharges that would significantly degrade a nearby waterbody designated as an OFW (DEP, 2011). The state also assigns designated uses for all waterbodies in accordance with the Clean Water Act; CHAP waters are mostly Class II waters (Chapter 62-302, F.A.C.) that are conditionally approved for shellfish harvesting by the Florida Department of Agriculture and Consumer Services. The only Class III designations included within the aquatic preserves are upper Lemon Bay and the mouth of the Peace River. The primary use of Class III waters is recreation, and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

The U.S. Environmental Protection Agency (EPA) recognizes the ecological significance of CHAP and has designated the preserves as EPA Gulf Ecological Management Sites (GEMS). It has also designated the entire Charlotte Harbor estuarine system and its watersheds as a National Estuary Program. The GEMS designation is given to “a geographic area that has special ecological significance to the continued production of fish, wildlife and other natural resources or that represents unique habitats.” The GEMS program provides a framework for protecting ecologically important habitats in the five states surrounding the Gulf of Mexico (Gulf of Mexico Foundation, n.d.). The National Estuary Program designation identifies estuaries of national significance where, through the establishment of a management conference made up of local stakeholders and the use of a consensus-building and a collaborative process, water quality and ecological integrity are protected and restored (EPA, 2014). The Charlotte Harbor National Estuary Program study area includes all five CHAP and Estero Bay Aquatic Preserve. The Nature Conservancy (TNC) is currently in the process of nominating the entire study area as an international Ramsar Site. Ramsar Sites are wetlands designated based on their international importance under the Convention of Wetlands (Wetlands International, 2013).

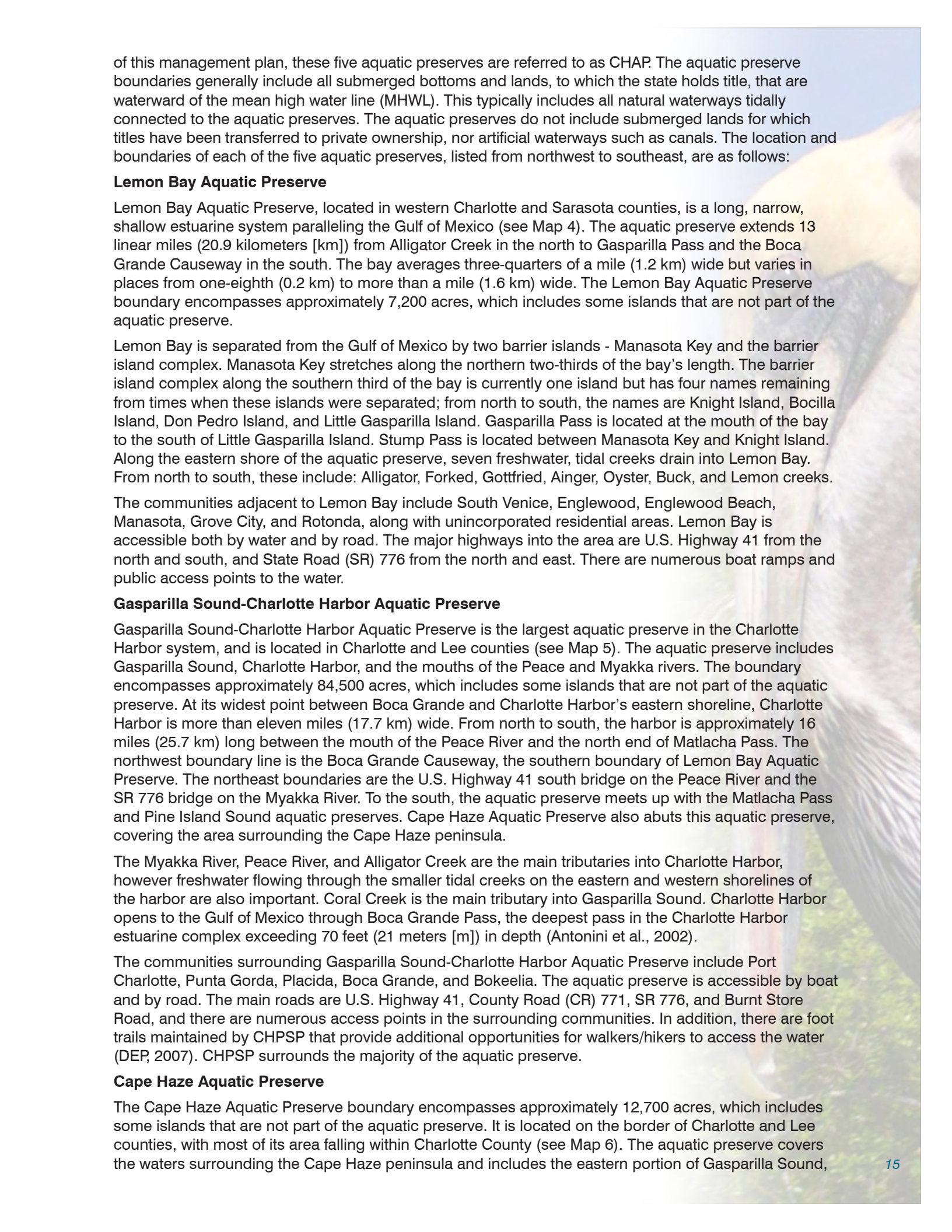
The CHAP provide habitat for both federally and state-protected species. At least 35 protected plant and animal species are found in the aquatic preserves. In 2009 the National Marine Fisheries Service (NMFS) designated smalltooth sawfish (*Pristis pectinata*) critical habitat (50 Code of Federal Regulations [C.F.R.] Part 226). The designation includes the Charlotte Harbor Estuary Unit which includes all of CHAP except Lemon Bay. This designation provides added protection to the essential features of smalltooth sawfish habitat including red mangroves (*Rhizophora mangle*) and shallow euryhaline habitats. The waters throughout CHAP are also actively managed to protect the Florida manatee (*Trichechus manatus latirostris*), and special speed zones are posted throughout the area to help reduce mortalities associated with boating.

The recreational fishing, commercial fishing and tourism industries are all important components of the regional economy supported through the protection of CHAP. Florida has the highest number of saltwater recreational anglers in the United States; statewide the economic impact of saltwater recreational fishing is more than \$7 billion per year (Florida Fish and Wildlife Conservation Commission [FWC], 2014a). Recreational fishing, boating, wildlife viewing, and the natural environment are among the reasons people visit southwest Florida. In Lee County, there are over five million tourists a year; 74 percent of those surveyed reported choosing to visit the area because of the clean unspoiled environment (Davidson-Peterson Associates, 2013). These visitors generate \$3 billion annually in Lee County (Lee County Visitor and Convention Bureau, 2014).

According to FWC, more than 8.4 million pounds of seafood were commercially harvested from Lee and Charlotte county waters in 2013. More than three million pounds of black (striped) mullet (*Mugil cephalus*) were harvested, making this species the number one commercial species in the area. Other commercially valuable species include blue crab (*Callinectes sapidus*), stone crab (*Menippe mercenaria*), and pink shrimp (*Farfantepenaeus duorarum*) (FWC, 2015).

Location/Boundaries

The five aquatic preserves (Lemon Bay, Gasparilla Sound-Charlotte Harbor, Cape Haze, Pine Island Sound, and Matlacha Pass) addressed by this management plan are part of the Charlotte Harbor estuarine complex, an interconnected estuarine system in southwest Florida (see Map 2). For the purpose



of this management plan, these five aquatic preserves are referred to as CHAP. The aquatic preserve boundaries generally include all submerged bottoms and lands, to which the state holds title, that are waterward of the mean high water line (MHWL). This typically includes all natural waterways tidally connected to the aquatic preserves. The aquatic preserves do not include submerged lands for which titles have been transferred to private ownership, nor artificial waterways such as canals. The location and boundaries of each of the five aquatic preserves, listed from northwest to southeast, are as follows:

Lemon Bay Aquatic Preserve

Lemon Bay Aquatic Preserve, located in western Charlotte and Sarasota counties, is a long, narrow, shallow estuarine system paralleling the Gulf of Mexico (see Map 4). The aquatic preserve extends 13 linear miles (20.9 kilometers [km]) from Alligator Creek in the north to Gasparilla Pass and the Boca Grande Causeway in the south. The bay averages three-quarters of a mile (1.2 km) wide but varies in places from one-eighth (0.2 km) to more than a mile (1.6 km) wide. The Lemon Bay Aquatic Preserve boundary encompasses approximately 7,200 acres, which includes some islands that are not part of the aquatic preserve.

Lemon Bay is separated from the Gulf of Mexico by two barrier islands - Manasota Key and the barrier island complex. Manasota Key stretches along the northern two-thirds of the bay's length. The barrier island complex along the southern third of the bay is currently one island but has four names remaining from times when these islands were separated; from north to south, the names are Knight Island, Bocilla Island, Don Pedro Island, and Little Gasparilla Island. Gasparilla Pass is located at the mouth of the bay to the south of Little Gasparilla Island. Stump Pass is located between Manasota Key and Knight Island. Along the eastern shore of the aquatic preserve, seven freshwater, tidal creeks drain into Lemon Bay. From north to south, these include: Alligator, Forked, Gottfried, Ainger, Oyster, Buck, and Lemon creeks.

The communities adjacent to Lemon Bay include South Venice, Englewood, Englewood Beach, Manasota, Grove City, and Rotonda, along with unincorporated residential areas. Lemon Bay is accessible both by water and by road. The major highways into the area are U.S. Highway 41 from the north and south, and State Road (SR) 776 from the north and east. There are numerous boat ramps and public access points to the water.

Gasparilla Sound-Charlotte Harbor Aquatic Preserve

Gasparilla Sound-Charlotte Harbor Aquatic Preserve is the largest aquatic preserve in the Charlotte Harbor system, and is located in Charlotte and Lee counties (see Map 5). The aquatic preserve includes Gasparilla Sound, Charlotte Harbor, and the mouths of the Peace and Myakka rivers. The boundary encompasses approximately 84,500 acres, which includes some islands that are not part of the aquatic preserve. At its widest point between Boca Grande and Charlotte Harbor's eastern shoreline, Charlotte Harbor is more than eleven miles (17.7 km) wide. From north to south, the harbor is approximately 16 miles (25.7 km) long between the mouth of the Peace River and the north end of Matlacha Pass. The northwest boundary line is the Boca Grande Causeway, the southern boundary of Lemon Bay Aquatic Preserve. The northeast boundaries are the U.S. Highway 41 south bridge on the Peace River and the SR 776 bridge on the Myakka River. To the south, the aquatic preserve meets up with the Matlacha Pass and Pine Island Sound aquatic preserves. Cape Haze Aquatic Preserve also abuts this aquatic preserve, covering the area surrounding the Cape Haze peninsula.

The Myakka River, Peace River, and Alligator Creek are the main tributaries into Charlotte Harbor, however freshwater flowing through the smaller tidal creeks on the eastern and western shorelines of the harbor are also important. Coral Creek is the main tributary into Gasparilla Sound. Charlotte Harbor opens to the Gulf of Mexico through Boca Grande Pass, the deepest pass in the Charlotte Harbor estuarine complex exceeding 70 feet (21 meters [m]) in depth (Antonini et al., 2002).

The communities surrounding Gasparilla Sound-Charlotte Harbor Aquatic Preserve include Port Charlotte, Punta Gorda, Placida, Boca Grande, and Bokeelia. The aquatic preserve is accessible by boat and by road. The main roads are U.S. Highway 41, County Road (CR) 771, SR 776, and Burnt Store Road, and there are numerous access points in the surrounding communities. In addition, there are foot trails maintained by CHPSP that provide additional opportunities for walkers/hikers to access the water (DEP, 2007). CHPSP surrounds the majority of the aquatic preserve.

Cape Haze Aquatic Preserve

The Cape Haze Aquatic Preserve boundary encompasses approximately 12,700 acres, which includes some islands that are not part of the aquatic preserve. It is located on the border of Charlotte and Lee counties, with most of its area falling within Charlotte County (see Map 6). The aquatic preserve covers the waters surrounding the Cape Haze peninsula and includes the eastern portion of Gasparilla Sound,

Bull Bay, Turtle Bay, and parts of Charlotte Harbor. The aquatic preserve is surrounded on the east, west, and south by Gasparilla Sound-Charlotte Harbor Aquatic Preserve. The public land to the north of the aquatic preserve is all part of CHPSP. There are two creeks within the aquatic preserve - Catfish and Whidden creeks.

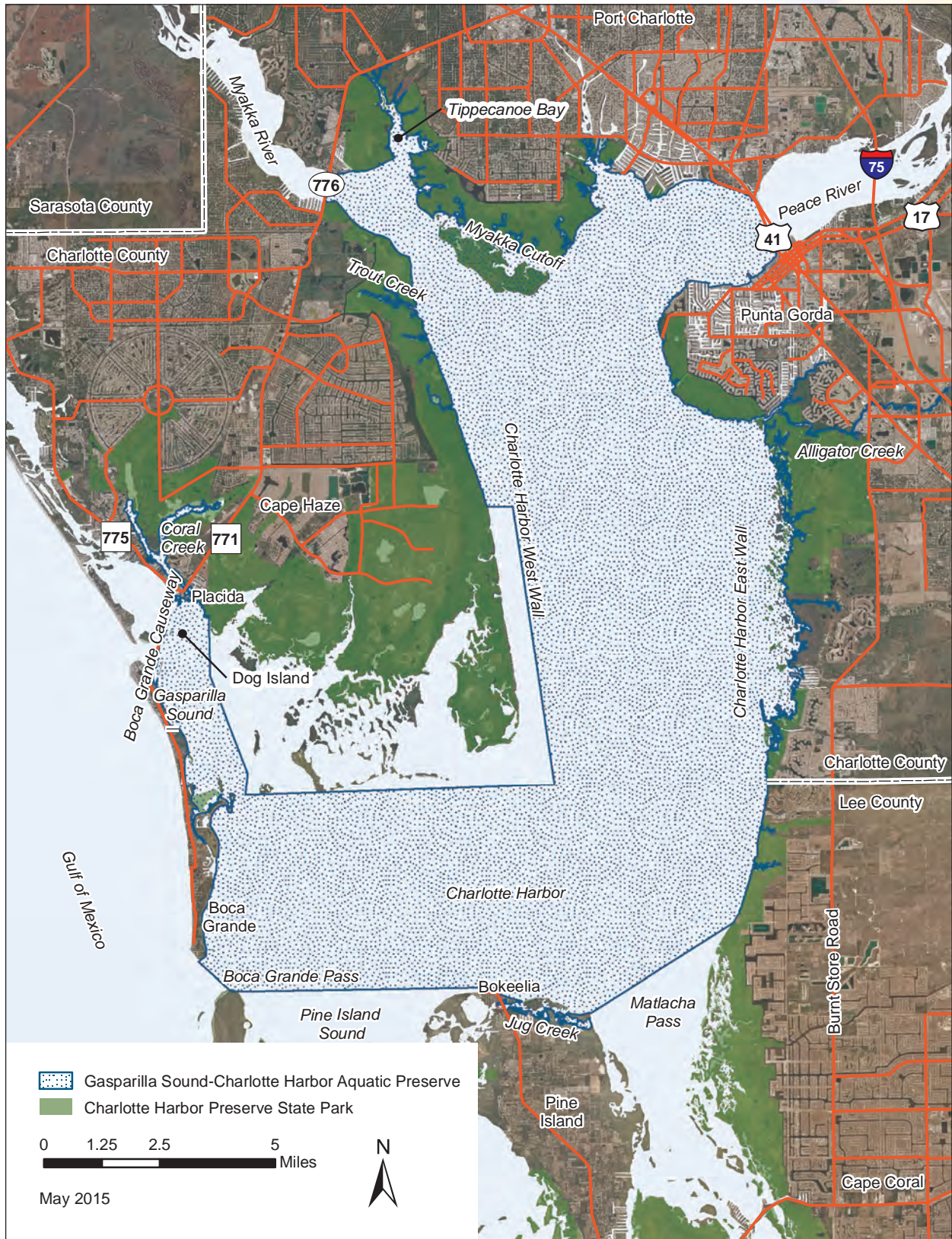
The communities closest to Cape Haze Aquatic Preserve are Cape Haze, Placida, South Gulf Cove, and Boca Grande. However, there are no developed areas immediately adjacent to the aquatic preserve.



Access to the aquatic preserve is primarily from the water, although access from land may be possible through CHPSP. The main roads in the area are CR 771 and CR 775. Boat ramps are available in the surrounding communities.

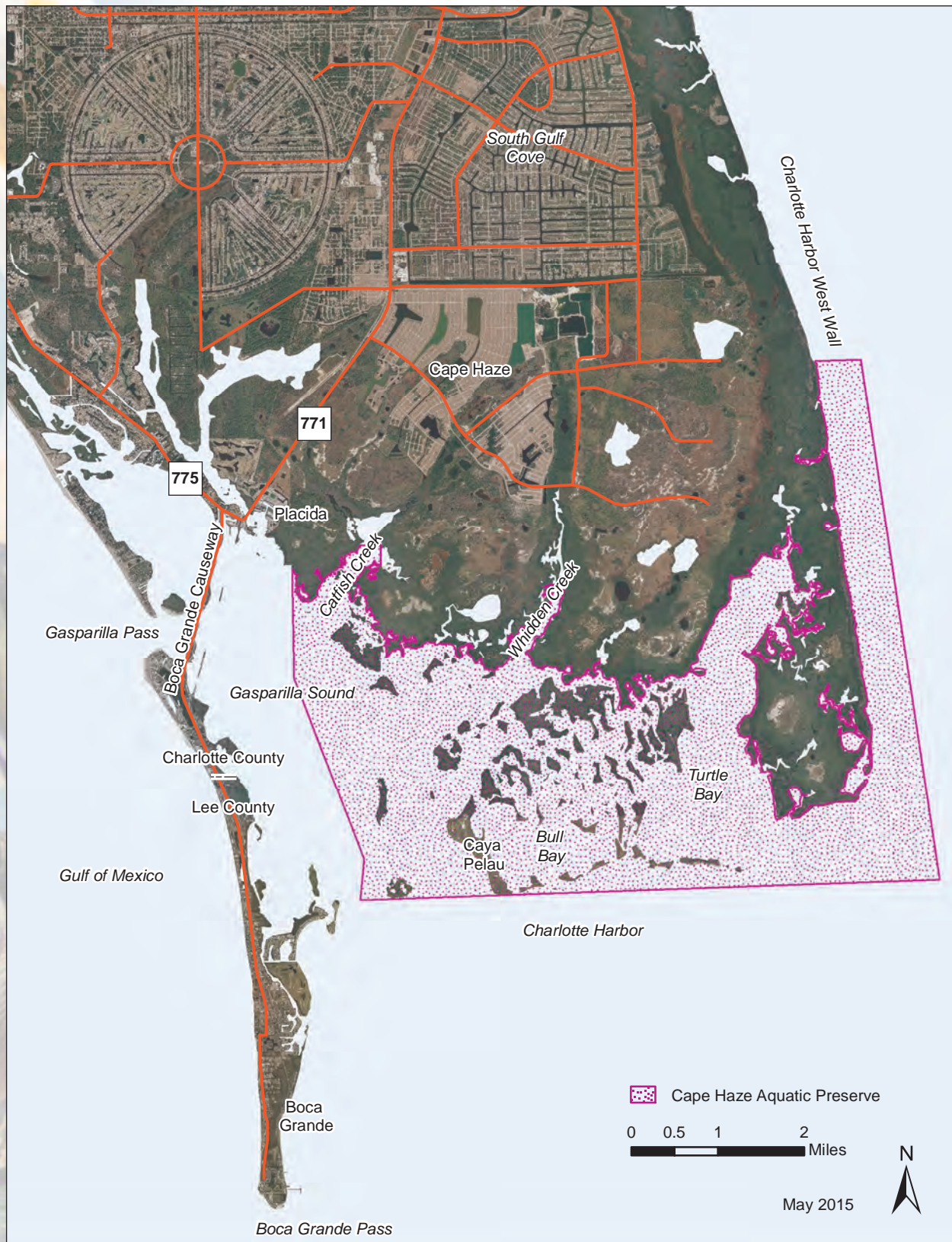
Pine Island Sound Aquatic Preserve

Pine Island Sound Aquatic Preserve, the first of the Charlotte Harbor Aquatic Preserves to be established, is located in Lee County between the chain of barrier islands and Pine Island (see Map 7). The area



Map 5 / Gasparilla Sound-Charlotte Harbor Aquatic Preserve.

within the aquatic preserve boundary includes approximately 58,400 acres, which includes some islands that are not part of the aquatic preserve. The aquatic preserve includes Pine Island Sound, the western portion of Jug Creek, Pelican Bay, and Tarpon Bay. Pine Island Sound is more than 18 miles (29 km) in length and is generally between four and five miles (6-8 km) wide, but is dotted with numerous islands. The northern boundary of the aquatic preserve abuts Gasparilla Sound-Charlotte Harbor Aquatic Preserve on the north sides of Cayo Costa and Pine Island. The southeastern boundary is between the southwest corner of St. James City on Pine Island and Woodring Point on Sanibel Island. To the west and south, the



aquatic preserve is bounded by four barrier islands, Cayo Costa, North Captiva, Captiva, and Sanibel. The islands, from north to south, are separated by three relatively small passes, Captiva Pass, Redfish Pass, and Blind Pass. Boca Grande Pass to the north and San Carlos Bay to the southeast of Pine Island Sound allow for greater water movement between the Gulf of Mexico and Pine Island Sound.

The southern portion of Pine Island Sound is heavily influenced by the freshwater flow from the Caloosahatchee River. Runoff from the surrounding islands is also an important source of freshwater to the estuary. The aquatic preserve is surrounded by and contains within it many island communities

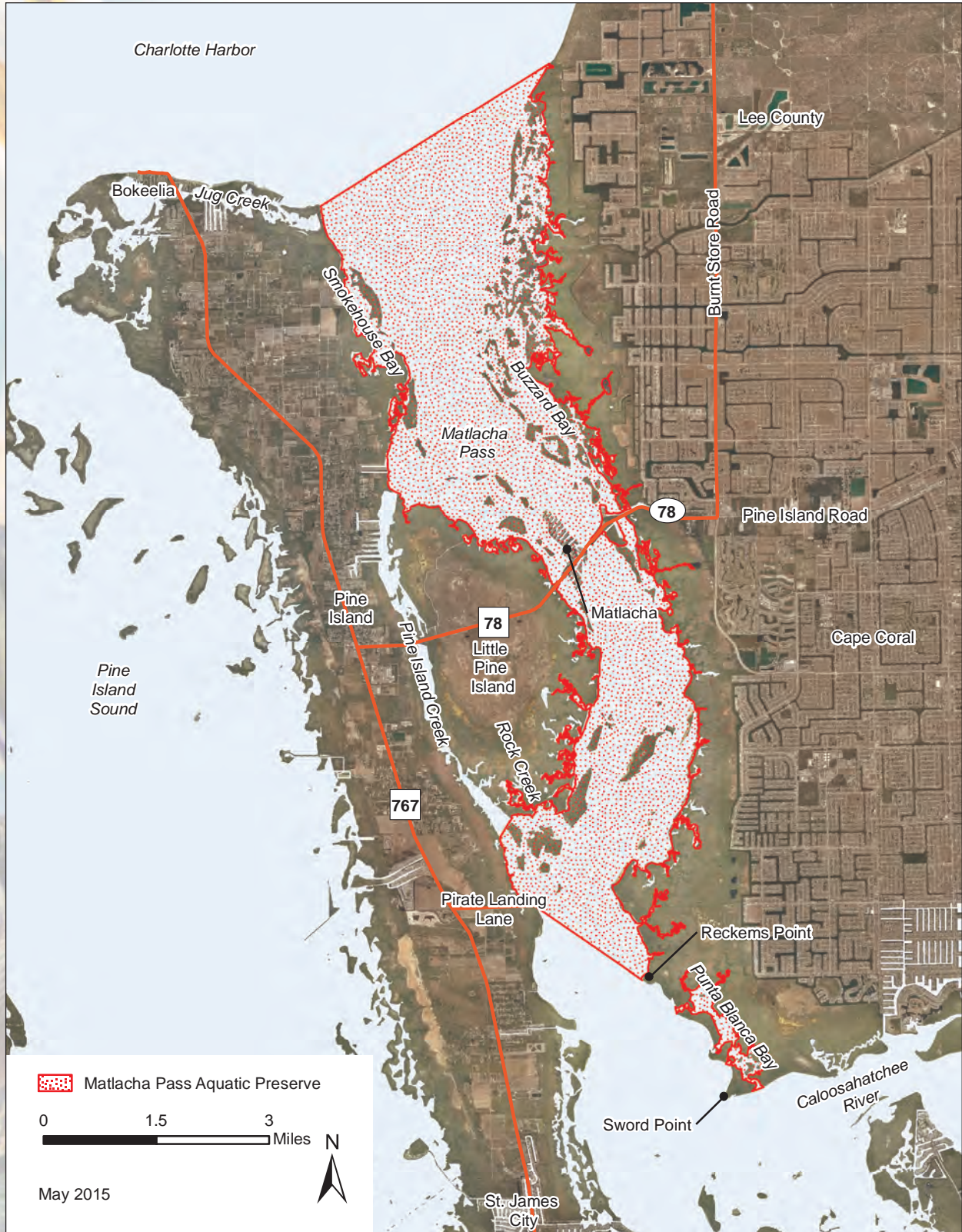


Map 7 / Pine Island Sound Aquatic Preserve.

including: Cayo Costa, Useppa, North Captiva, Captiva, Sanibel, St. James City, Pineland, and Bokeelia. The aquatic preserve can be accessed by car or boat and by some walking trails located on protected lands. The main roads leading out to the island communities are SR 78 and CR 869. Numerous boat ramps are publicly available in the area.

Matlacha Pass Aquatic Preserve

Matlacha Pass Aquatic Preserve is located in Lee County between Pine Island, Little Pine Island, and Cape Coral; the majority of the surrounding land is part of CHPSP (see Map 8). The aquatic preserve at



its widest point is slightly more than two miles (3.2 km) wide and at the narrowest is less than one mile (1.6 km) wide. The northern boundary of the aquatic preserve abuts Gasparilla Sound-Charlotte Harbor Aquatic Preserve, the southern boundary in Matlacha Pass is generally from Pirate Landing Lane on Pine Island to Reckems Point on the eastern side of the pass. The aquatic preserve also includes Punta Blanca Bay located to the south of Reckems Point. The Matlacha Pass Aquatic Preserve boundary encompasses approximately 14,600 acres, which includes some islands that are not part of the aquatic preserve.

The communities surrounding Matlacha Pass Aquatic Preserve include Bokeelia, Matlacha, and Cape Coral. Like Pine Island Sound Aquatic Preserve, the southern portion of Matlacha Pass Aquatic Preserve is heavily influenced by the freshwater flow from the Caloosahatchee River. The pass is also influenced by runoff from the surrounding land and by the canal system in northwest Cape Coral that drains into the area near the community of Matlacha. The aquatic preserve can be accessed by car or boat and by some walking trails located on protected lands and public parks. The main roads leading to the area are Burnt Store Road and SR 78. Numerous boat ramps are publicly available in the area.

3.3 / Resource Description

The information in this section describes the resources found in the aquatic preserves.

Surrounding Population Data and Future Projected Changes

Florida has one of the longest coastlines in the United States attracting many people to migrate to the state from other areas of the country. More than 75 percent of the state’s population resides in coastal communities. The state population is expected to continue to grow at a rate of approximately 1.3 percent annually, with about 90 percent of the growth rate likely to be from migration (Office of Economic and Demographic Research, 2013). The U.S. Census Bureau estimated that Florida became the nation’s third most populous state in December 2014 (U.S. Census Bureau, 2014). The CHAP are located within Charlotte, Lee, and Sarasota counties. The natural beauty, beaches, and fishing are among the many attractions for new residents and the area’s population is growing rapidly.

The fastest growing and most populous of the three counties is Lee County, home to Pine Island Sound Aquatic Preserve, Matlacha Pass Aquatic Preserve, part of Gasparilla Sound-Charlotte Harbor Aquatic Preserve and Cape Haze Aquatic Preserve. Data from the Office of Economic and Demographic Research (2014) shows that in 1972, the year Matlacha Pass Aquatic Preserve was designated, and two years after Pine Island Sound Aquatic Preserve was designated, the population of Lee County was 122,751. The estimated population in 2013 was 643,367, a 424 percent increase. The population is expected to continue to rise to 808,600 by 2022 (see Table 1). Charlotte County has grown 381 percent since 1972, when the population was only 34,063. The 2013 population was 163,679, and is expected to grow to 179,481 by 2022 (see Table 1). Gasparilla Sound-Charlotte Harbor Aquatic Preserve, Cape Haze Aquatic Preserve, and part of Lemon Bay Aquatic Preserve are all within Charlotte County. The remainder of Lemon Bay Aquatic Preserve is within Sarasota County. Sarasota County is the slowest growing of the three counties, but much of the county’s growth occurred prior to the designation of Lemon Bay Aquatic Preserve in 1986. Between 1972 and 1982, the county had grown by 60 percent from 134,293 to 215,443 residents. The 2013 population was 385,292; the population is projected to increase to 432,127 by 2022 (see Table 1).

The continued growth in the three-county region will place additional demands on the natural resources within CHAP. There will be continued pressure for shoreline development and dredging, added demands on the fisheries, and increased boating. The amount to which the increase in population affects the resources will depend largely on the management of CHAP, adjacent public lands, and water quality and quantity.

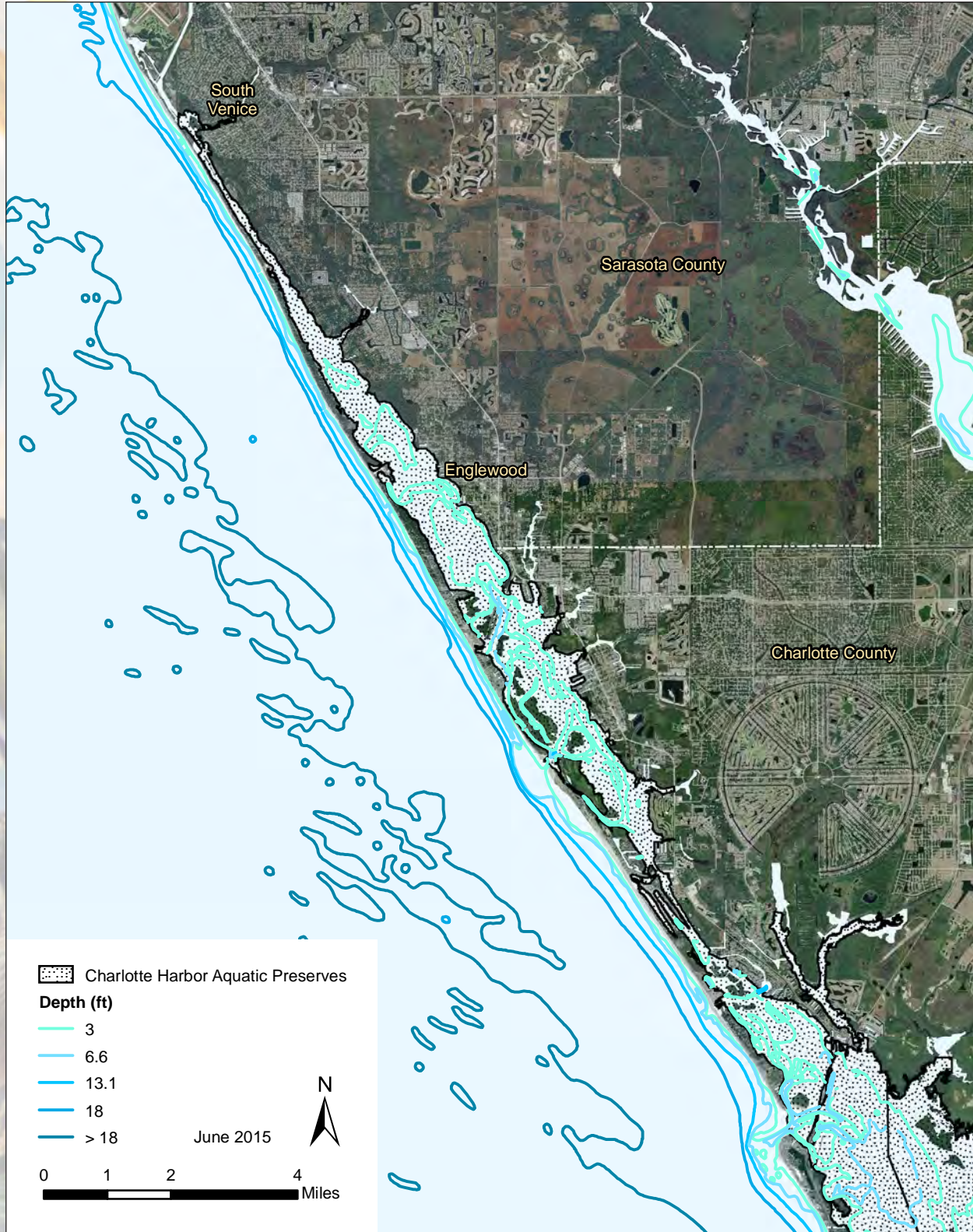
Topography and Geomorphology

Topography is the configuration of a surface including its relief and the position of its natural and man-made features. Bathymetry is essentially the topography of submerged lands. Topography and

County	1972	2013 (est.)	% increase	2022 (proj.)	% increase '72 - '22
Lee	122,751	643,367	424%	808,600	559%
Charlotte	34,063	163,679	381%	179,481	427%
Sarasota	134,293	385,292	187%	432,127	222%

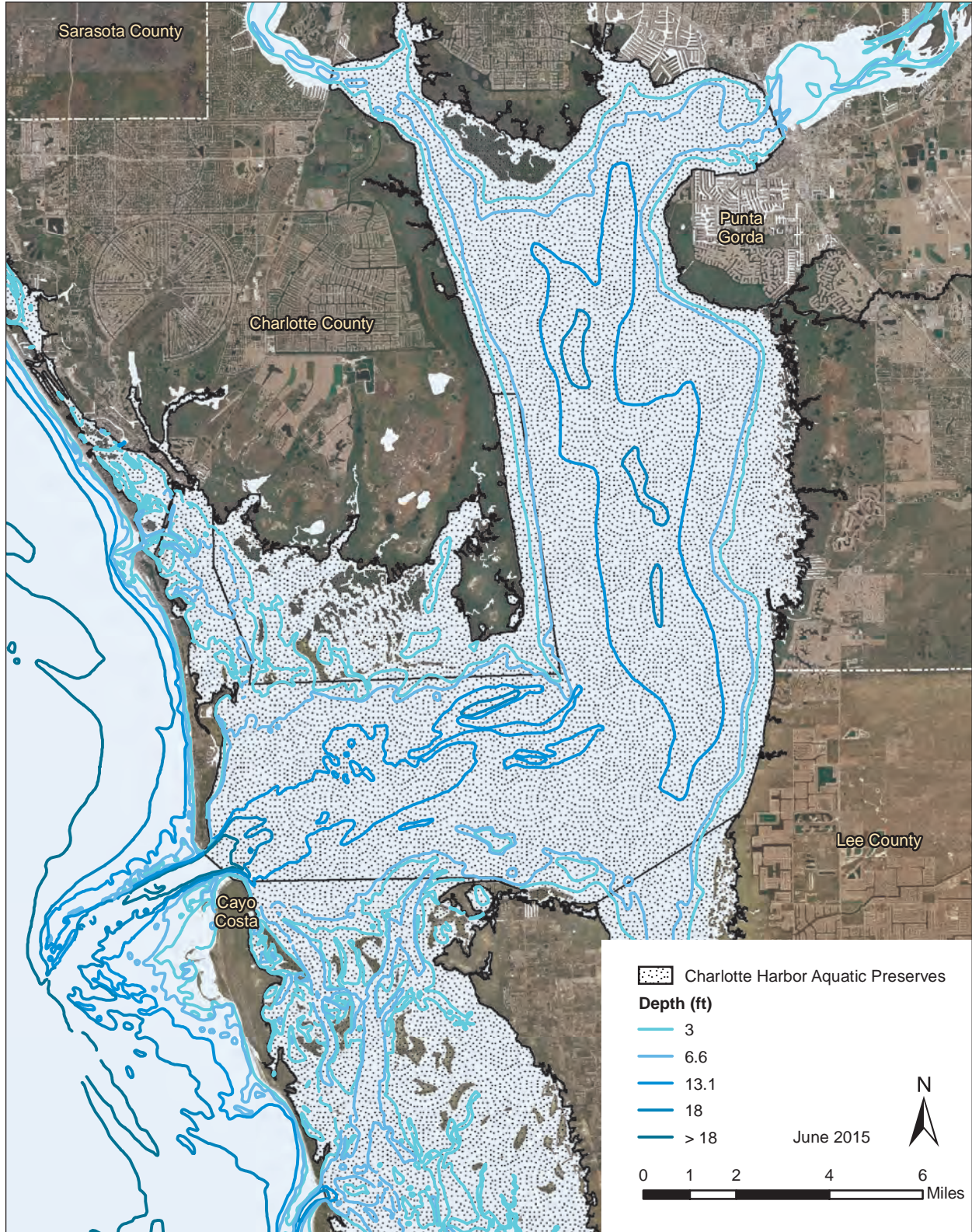
Table 1 / Population growth in Charlotte Harbor counties (Office of Economic & Demographic Research, 2014).

bathymetry are the result of natural forces acting upon regional geologic formations from ancient times until the present and includes any anthropogenic changes. Topography is an important aspect of a region's character and determines drainage patterns, flood limits, soil types, settlement history and potential, and vegetation and wildlife ranges. Topography in the CHAP area is quite flat, rarely exceeding 20 feet (6 m) above sea level within three to five miles (4.8 - 8 km) of the shoreline. Within a half mile of CHAP, the elevation rarely exceeds five feet (1.5 m). There are no points within a half mile of Pine Island Sound, Matlacha Pass, and Cape Haze aquatic preserves with an elevation that exceeds five feet. The only location within a half mile of Gasparilla Sound-Charlotte Harbor Aquatic Preserve with elevations



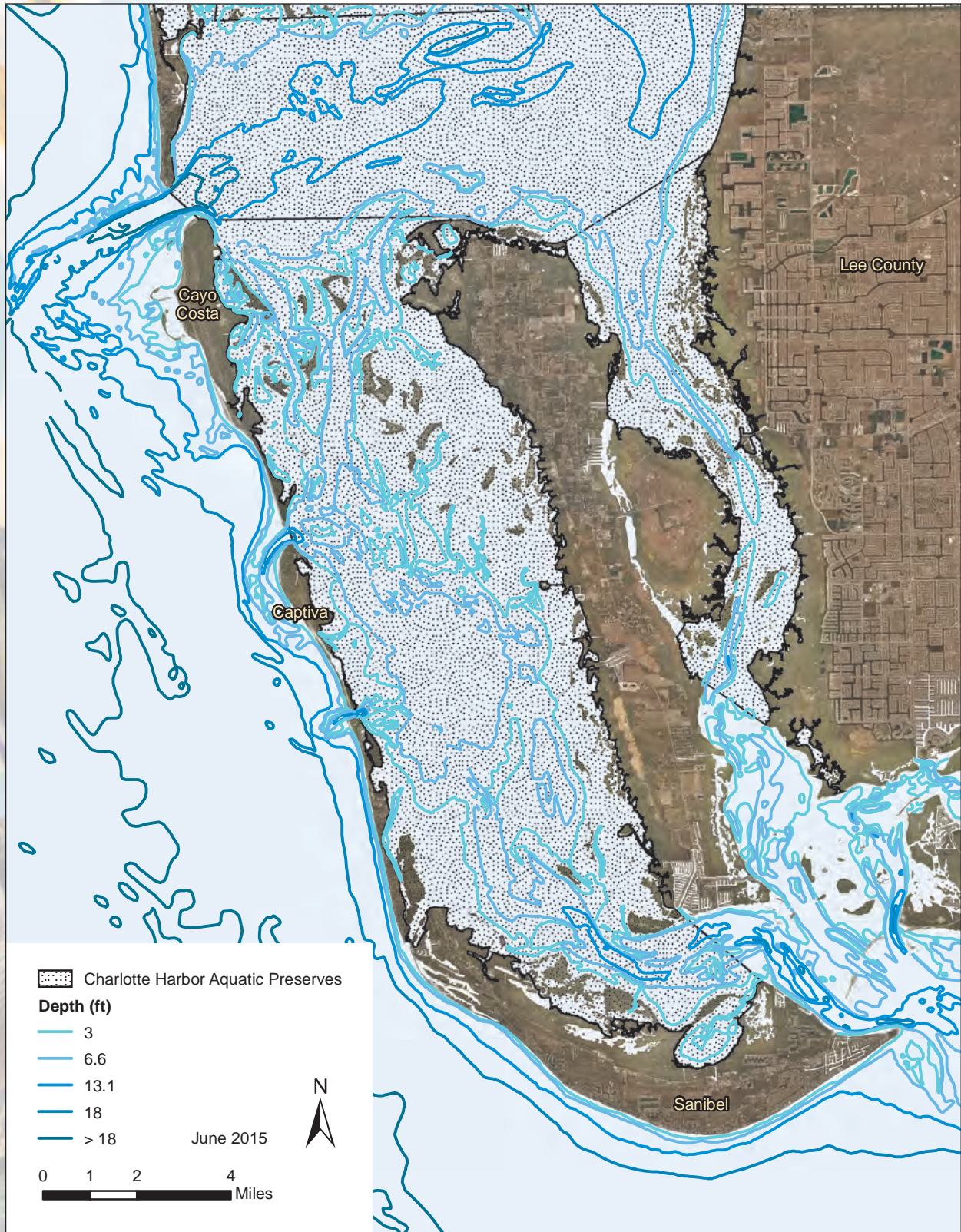
above five feet is the area surrounding Alligator Creek where elevations reach 16-20 feet (4.8 - 6 m). In the upper portion of Lemon Bay Aquatic Preserve near-coastal elevations rise to 11-15 feet (3.3 - 4.6 m). Anthropogenic changes to the local topography include ditches for mosquito control, filling of lands for development, and ditching to drain developed lands and prevent flooding. These changes have substantially changed drainage patterns in the areas surrounding CHAP.

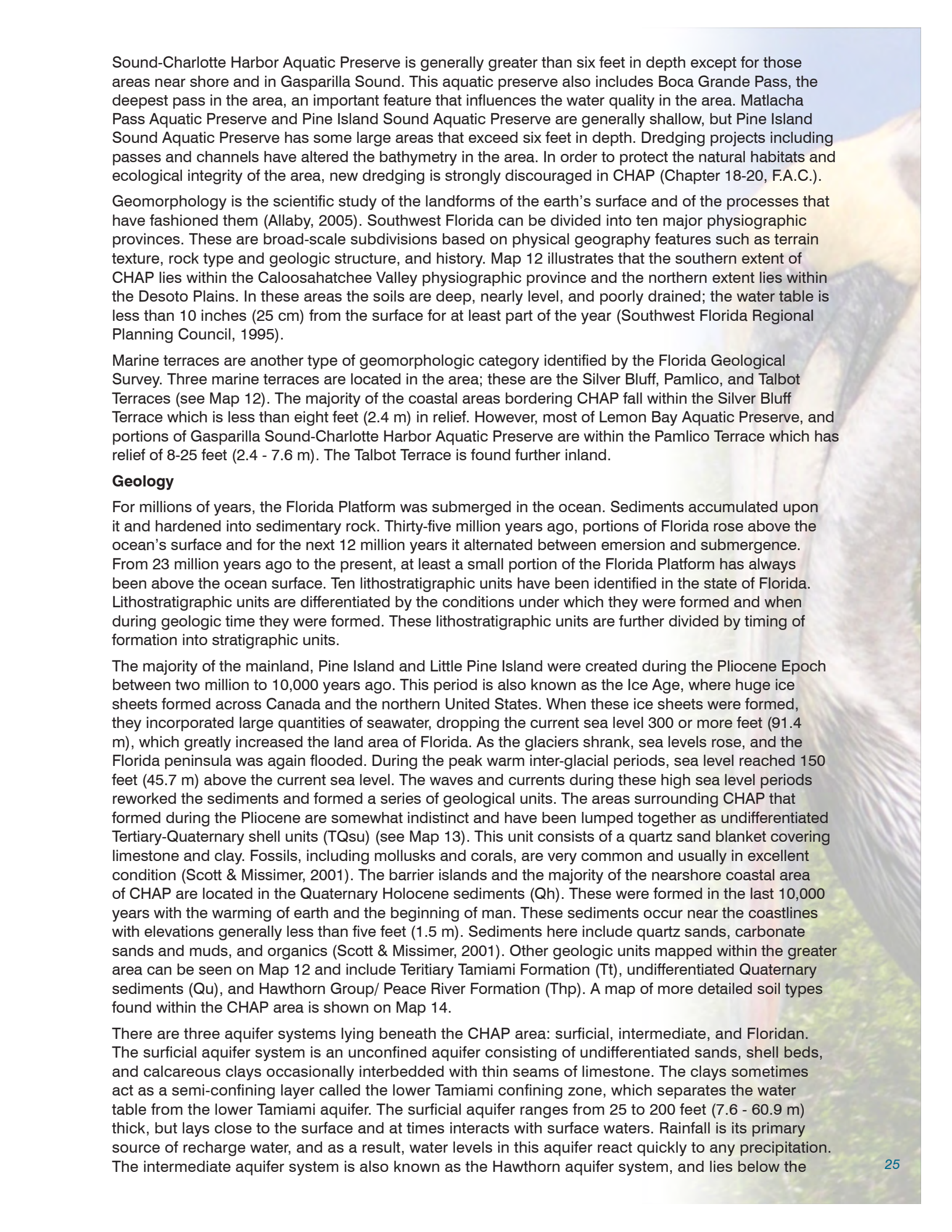
Bathymetry is an important characteristic of CHAP playing a large part in determining habitat types and water flow patterns. Although also dependent on water clarity, seagrasses are typically found in



Map 10 | Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves bathymetry.

areas less than six feet in depth, and are rarely found in deeper waters in this region (Brown, Leary, Langenberg, McMurray, & Stafford, 2013). Oysters are most commonly found in intertidal, shallow areas typically less than three feet (1 m) in depth (Boswell, Ott, & Birch, 2012). Mangroves and tidal flats are also important features found in the intertidal areas. Smalltooth sawfish critical habitat includes those areas within the Charlotte Harbor estuary unit that are less than three feet deep at mean lower low water. Maps 9, 10, and 11 show the bathymetry contours throughout CHAP. Lemon Bay Aquatic Preserve is characterized by shallow water rarely exceeding six feet (1.8 m) in depth. On the other hand, Gasparilla



A person wearing a wetsuit is holding a fishing net that contains a fish. The background is a bright, slightly blurred outdoor setting, possibly a beach or a boat deck.

Sound-Charlotte Harbor Aquatic Preserve is generally greater than six feet in depth except for those areas near shore and in Gasparilla Sound. This aquatic preserve also includes Boca Grande Pass, the deepest pass in the area, an important feature that influences the water quality in the area. Matlacha Pass Aquatic Preserve and Pine Island Sound Aquatic Preserve are generally shallow, but Pine Island Sound Aquatic Preserve has some large areas that exceed six feet in depth. Dredging projects including passes and channels have altered the bathymetry in the area. In order to protect the natural habitats and ecological integrity of the area, new dredging is strongly discouraged in CHAP (Chapter 18-20, F.A.C.).

Geomorphology is the scientific study of the landforms of the earth's surface and of the processes that have fashioned them (Allaby, 2005). Southwest Florida can be divided into ten major physiographic provinces. These are broad-scale subdivisions based on physical geography features such as terrain texture, rock type and geologic structure, and history. Map 12 illustrates that the southern extent of CHAP lies within the Caloosahatchee Valley physiographic province and the northern extent lies within the Desoto Plains. In these areas the soils are deep, nearly level, and poorly drained; the water table is less than 10 inches (25 cm) from the surface for at least part of the year (Southwest Florida Regional Planning Council, 1995).

Marine terraces are another type of geomorphologic category identified by the Florida Geological Survey. Three marine terraces are located in the area; these are the Silver Bluff, Pamlico, and Talbot Terraces (see Map 12). The majority of the coastal areas bordering CHAP fall within the Silver Bluff Terrace which is less than eight feet (2.4 m) in relief. However, most of Lemon Bay Aquatic Preserve, and portions of Gasparilla Sound-Charlotte Harbor Aquatic Preserve are within the Pamlico Terrace which has relief of 8-25 feet (2.4 - 7.6 m). The Talbot Terrace is found further inland.

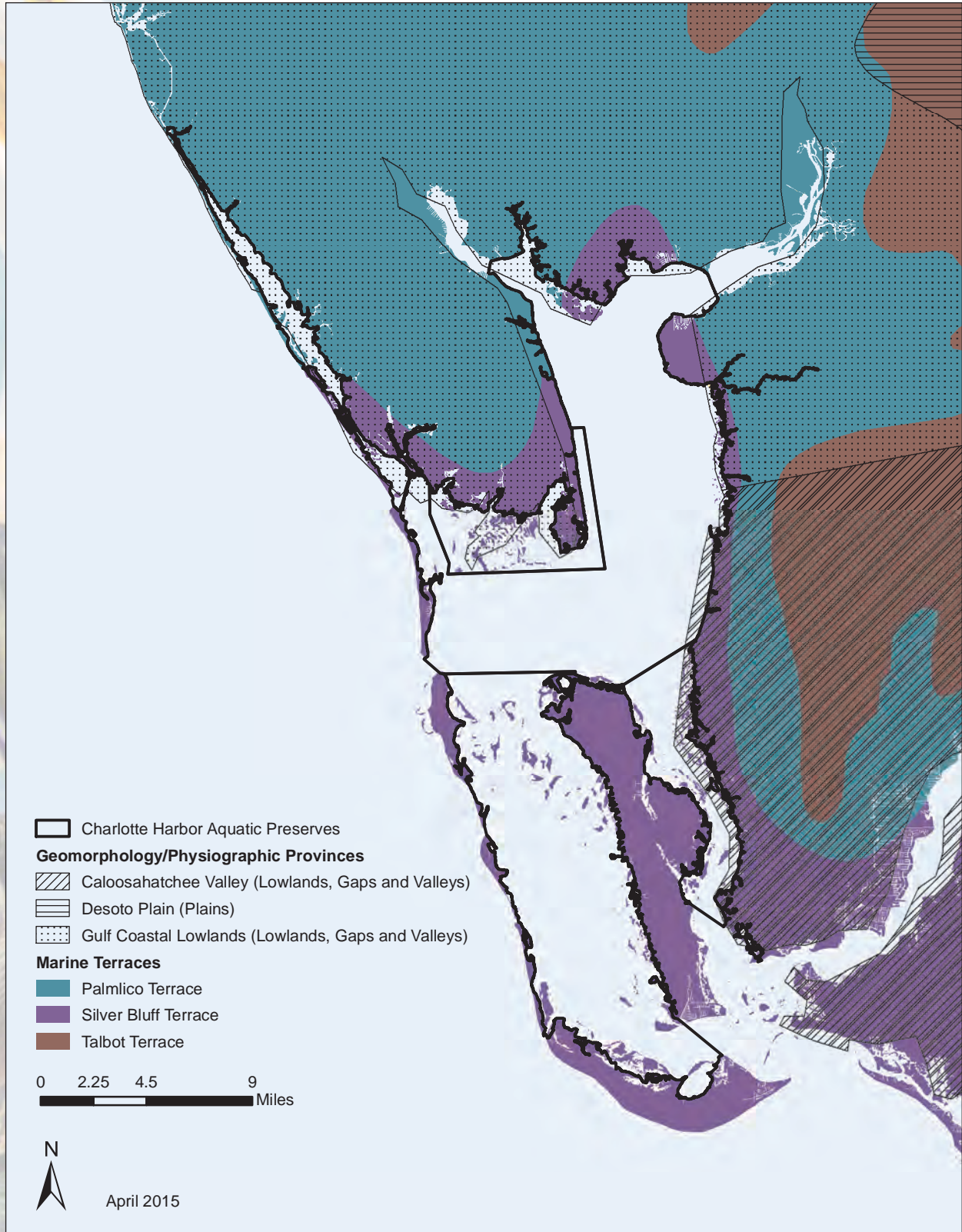
Geology

For millions of years, the Florida Platform was submerged in the ocean. Sediments accumulated upon it and hardened into sedimentary rock. Thirty-five million years ago, portions of Florida rose above the ocean's surface and for the next 12 million years it alternated between emersion and submergence. From 23 million years ago to the present, at least a small portion of the Florida Platform has always been above the ocean surface. Ten lithostratigraphic units have been identified in the state of Florida. Lithostratigraphic units are differentiated by the conditions under which they were formed and when during geologic time they were formed. These lithostratigraphic units are further divided by timing of formation into stratigraphic units.

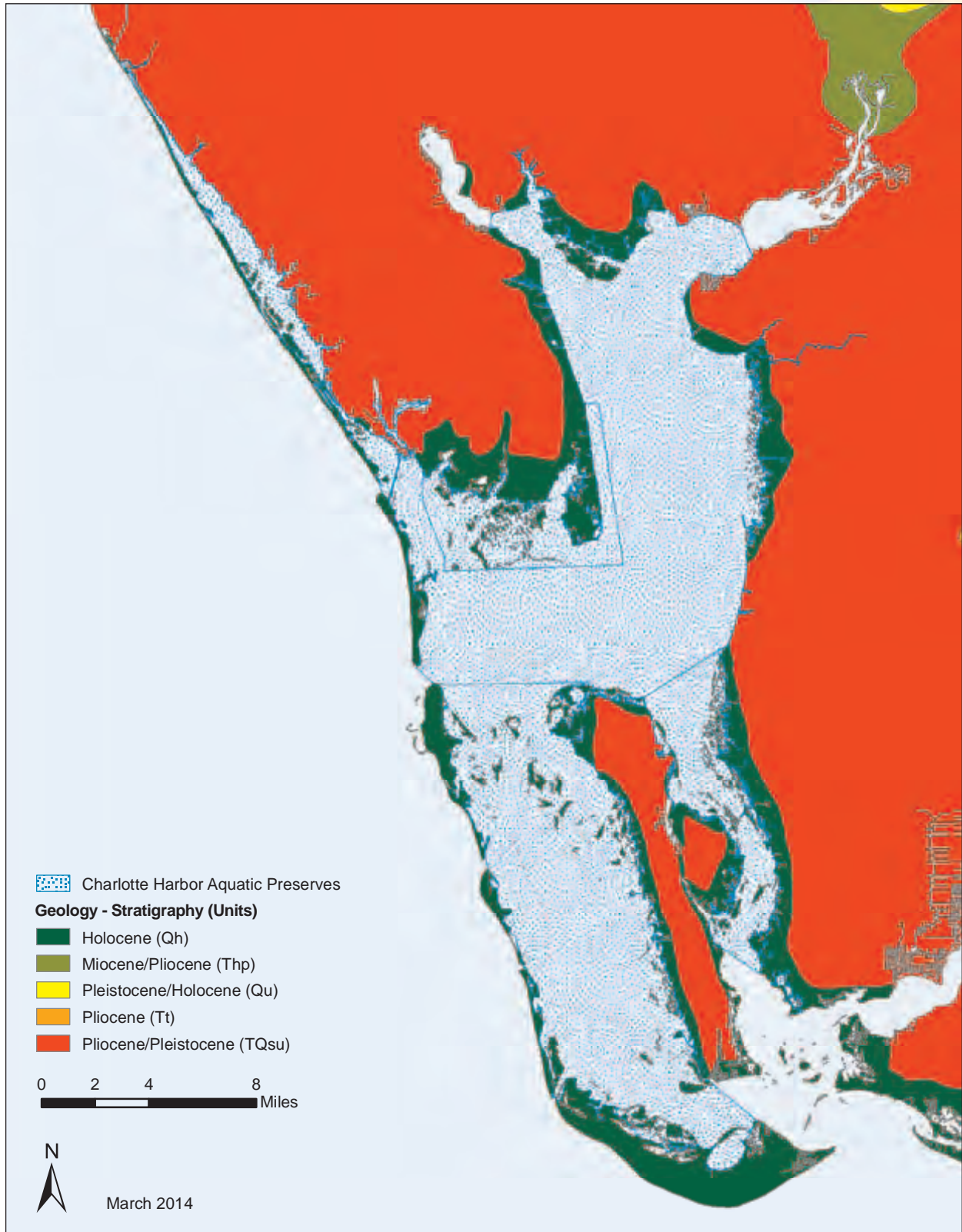
The majority of the mainland, Pine Island and Little Pine Island were created during the Pliocene Epoch between two million to 10,000 years ago. This period is also known as the Ice Age, where huge ice sheets formed across Canada and the northern United States. When these ice sheets were formed, they incorporated large quantities of seawater, dropping the current sea level 300 or more feet (91.4 m), which greatly increased the land area of Florida. As the glaciers shrank, sea levels rose, and the Florida peninsula was again flooded. During the peak warm inter-glacial periods, sea level reached 150 feet (45.7 m) above the current sea level. The waves and currents during these high sea level periods reworked the sediments and formed a series of geological units. The areas surrounding CHAP that formed during the Pliocene are somewhat indistinct and have been lumped together as undifferentiated Tertiary-Quaternary shell units (TQsu) (see Map 13). This unit consists of a quartz sand blanket covering limestone and clay. Fossils, including mollusks and corals, are very common and usually in excellent condition (Scott & Missimer, 2001). The barrier islands and the majority of the nearshore coastal area of CHAP are located in the Quaternary Holocene sediments (Qh). These were formed in the last 10,000 years with the warming of earth and the beginning of man. These sediments occur near the coastlines with elevations generally less than five feet (1.5 m). Sediments here include quartz sands, carbonate sands and muds, and organics (Scott & Missimer, 2001). Other geologic units mapped within the greater area can be seen on Map 12 and include Tertiary Tamiami Formation (Tt), undifferentiated Quaternary sediments (Qu), and Hawthorn Group/ Peace River Formation (Thp). A map of more detailed soil types found within the CHAP area is shown on Map 14.

There are three aquifer systems lying beneath the CHAP area: surficial, intermediate, and Floridan. The surficial aquifer system is an unconfined aquifer consisting of undifferentiated sands, shell beds, and calcareous clays occasionally interbedded with thin seams of limestone. The clays sometimes act as a semi-confining layer called the lower Tamiami confining zone, which separates the water table from the lower Tamiami aquifer. The surficial aquifer ranges from 25 to 200 feet (7.6 - 60.9 m) thick, but lays close to the surface and at times interacts with surface waters. Rainfall is its primary source of recharge water, and as a result, water levels in this aquifer react quickly to any precipitation. The intermediate aquifer system is also known as the Hawthorn aquifer system, and lies below the

surficial aquifer. It is comprised of five units: 1) upper Hawthorn confining zone, 2) sandstone aquifer, 3) mid-Hawthorn confining zone, 4) mid-Hawthorn aquifer, and 5) lower Hawthorn confining zone. The sandstone aquifer is comprised of sand, sandstones, sandy limestones, and calcareous sands, while the Mid-Hawthorn aquifer consists of primarily limestone, dolomite, and sandstone. The Floridan aquifer system is located below the intermediate aquifer system. The Floridan aquifer underlies all of Florida (Johnson Engineering, Inc., Agnoli, Barber & Brundage, Inc., & Boylan Environmental Consultants, Inc., 1999).



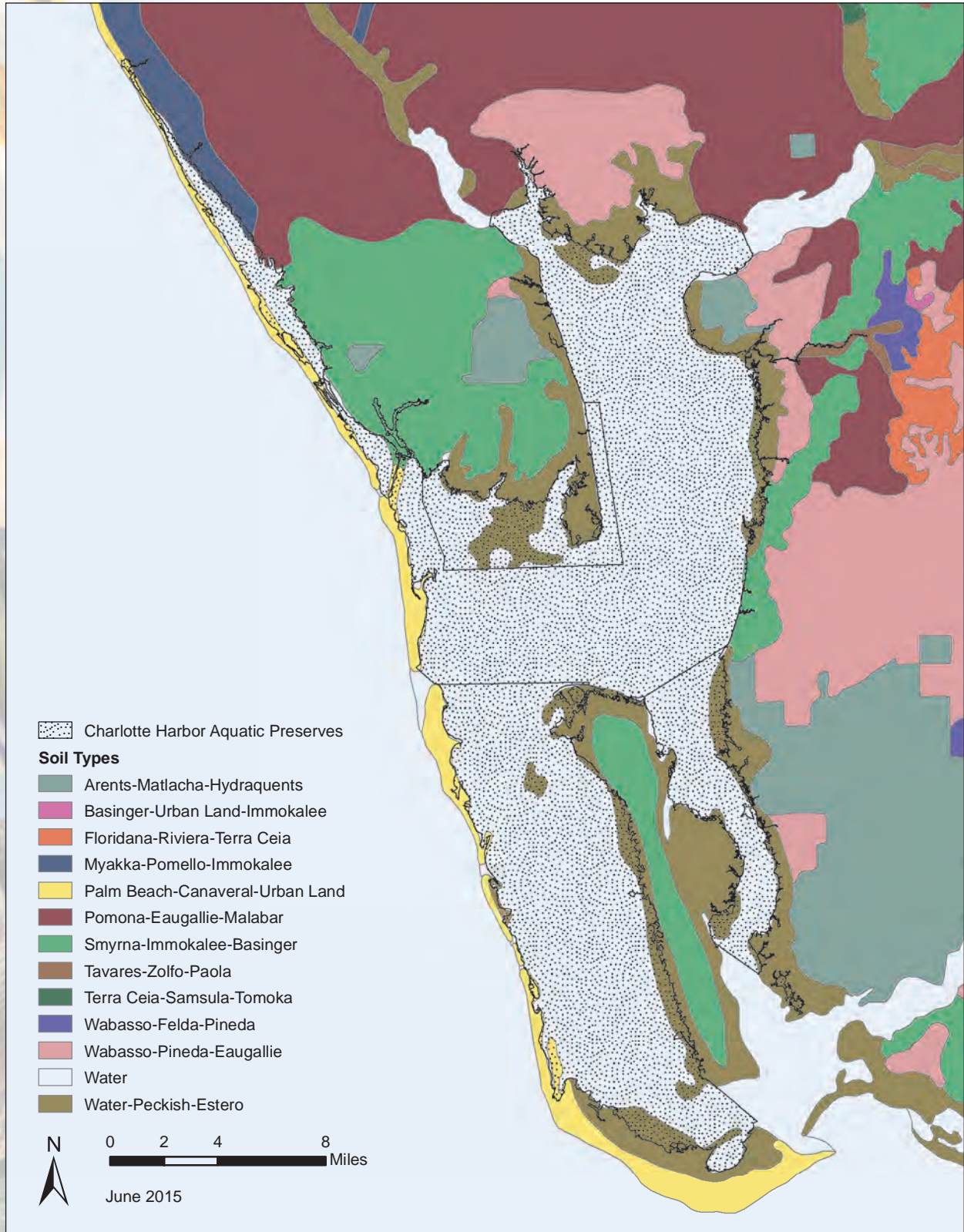
The Floridan aquifer system is a primary source of ground-water supply in the upstream sections of the Peace and Myakka river basins. Water from the Floridan aquifer system is highly mineralized near the coast and in much of the Caloosahatchee River basin. The surficial aquifer system and the intermediate aquifer system are the primary sources of ground-water supply in these areas. Throughout much of CHAP, the intermediate aquifer system and the deeper Floridan aquifer system are confined. Where confining beds are thin, absent, or breached by springs and uncased wells, water flows upward from the intermediate and Floridan aquifer systems into the surficial aquifer system and, subsequently, into the rivers and Charlotte Harbor.

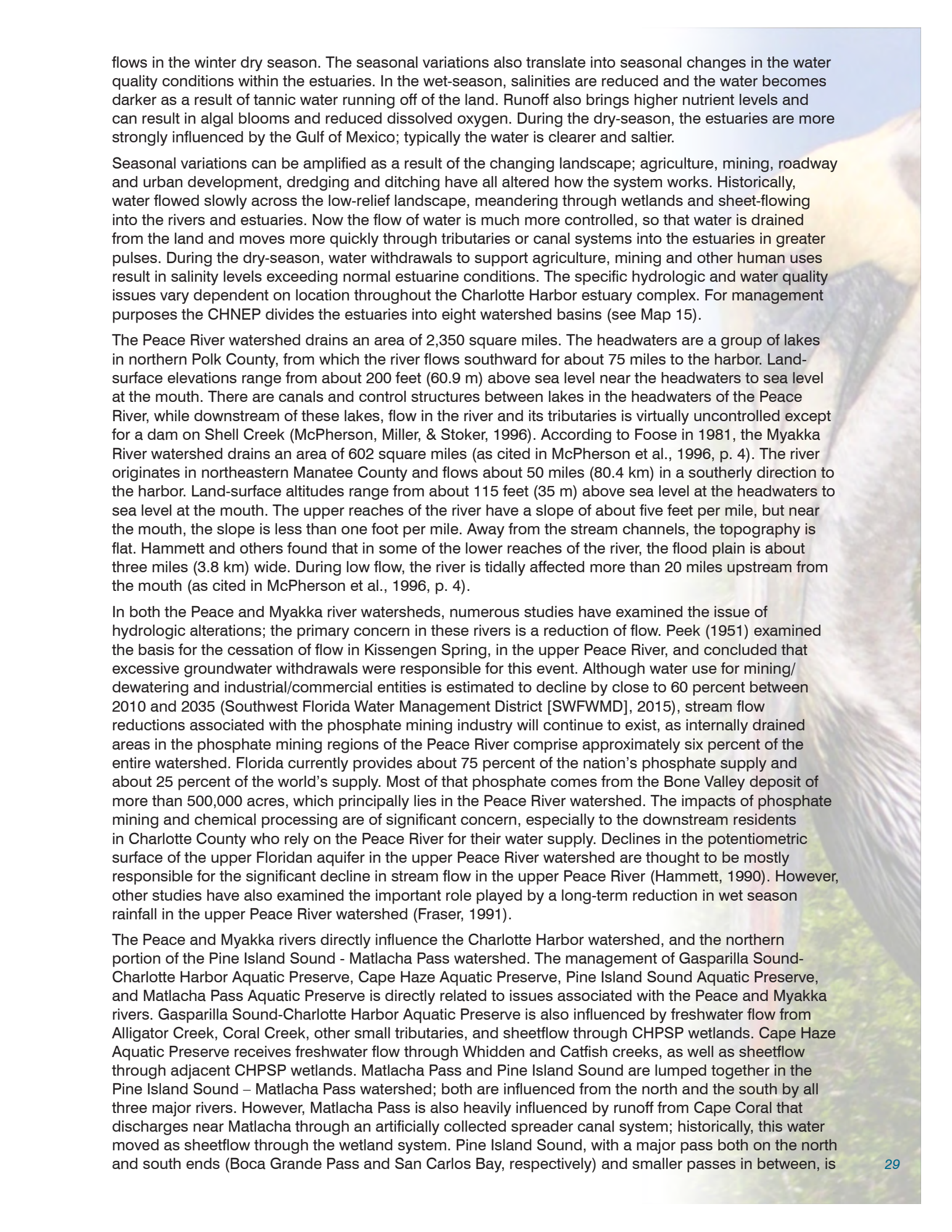


Map 13 | Charlotte Harbor Aquatic Preserves geologic features.

Hydrology and Watershed

The CHAP are part of the larger CHNEP study area, a 4,700 square-mile region defined by the watersheds of the Peace, Myakka and Caloosahatchee rivers and the estuaries that they drain into (CHNEP, 2013a). The major water bodies within the Charlotte Harbor estuarine complex are all interconnected, but are influenced to different degrees by the three major rivers, the Gulf of Mexico, and small tributaries. Freshwater flow into the estuaries is primarily from rainfall and subsequent stormwater runoff. The seasonality of rainfall in the area results in higher flows in the summer wet season and lower





flows in the winter dry season. The seasonal variations also translate into seasonal changes in the water quality conditions within the estuaries. In the wet-season, salinities are reduced and the water becomes darker as a result of tannic water running off of the land. Runoff also brings higher nutrient levels and can result in algal blooms and reduced dissolved oxygen. During the dry-season, the estuaries are more strongly influenced by the Gulf of Mexico; typically the water is clearer and saltier.

Seasonal variations can be amplified as a result of the changing landscape; agriculture, mining, roadway and urban development, dredging and ditching have all altered how the system works. Historically, water flowed slowly across the low-relief landscape, meandering through wetlands and sheet-flowing into the rivers and estuaries. Now the flow of water is much more controlled, so that water is drained from the land and moves more quickly through tributaries or canal systems into the estuaries in greater pulses. During the dry-season, water withdrawals to support agriculture, mining and other human uses result in salinity levels exceeding normal estuarine conditions. The specific hydrologic and water quality issues vary dependent on location throughout the Charlotte Harbor estuary complex. For management purposes the CHNEP divides the estuaries into eight watershed basins (see Map 15).

The Peace River watershed drains an area of 2,350 square miles. The headwaters are a group of lakes in northern Polk County, from which the river flows southward for about 75 miles to the harbor. Land-surface elevations range from about 200 feet (60.9 m) above sea level near the headwaters to sea level at the mouth. There are canals and control structures between lakes in the headwaters of the Peace River, while downstream of these lakes, flow in the river and its tributaries is virtually uncontrolled except for a dam on Shell Creek (McPherson, Miller, & Stoker, 1996). According to Foote in 1981, the Myakka River watershed drains an area of 602 square miles (as cited in McPherson et al., 1996, p. 4). The river originates in northeastern Manatee County and flows about 50 miles (80.4 km) in a southerly direction to the harbor. Land-surface altitudes range from about 115 feet (35 m) above sea level at the headwaters to sea level at the mouth. The upper reaches of the river have a slope of about five feet per mile, but near the mouth, the slope is less than one foot per mile. Away from the stream channels, the topography is flat. Hammett and others found that in some of the lower reaches of the river, the flood plain is about three miles (3.8 km) wide. During low flow, the river is tidally affected more than 20 miles upstream from the mouth (as cited in McPherson et al., 1996, p. 4).

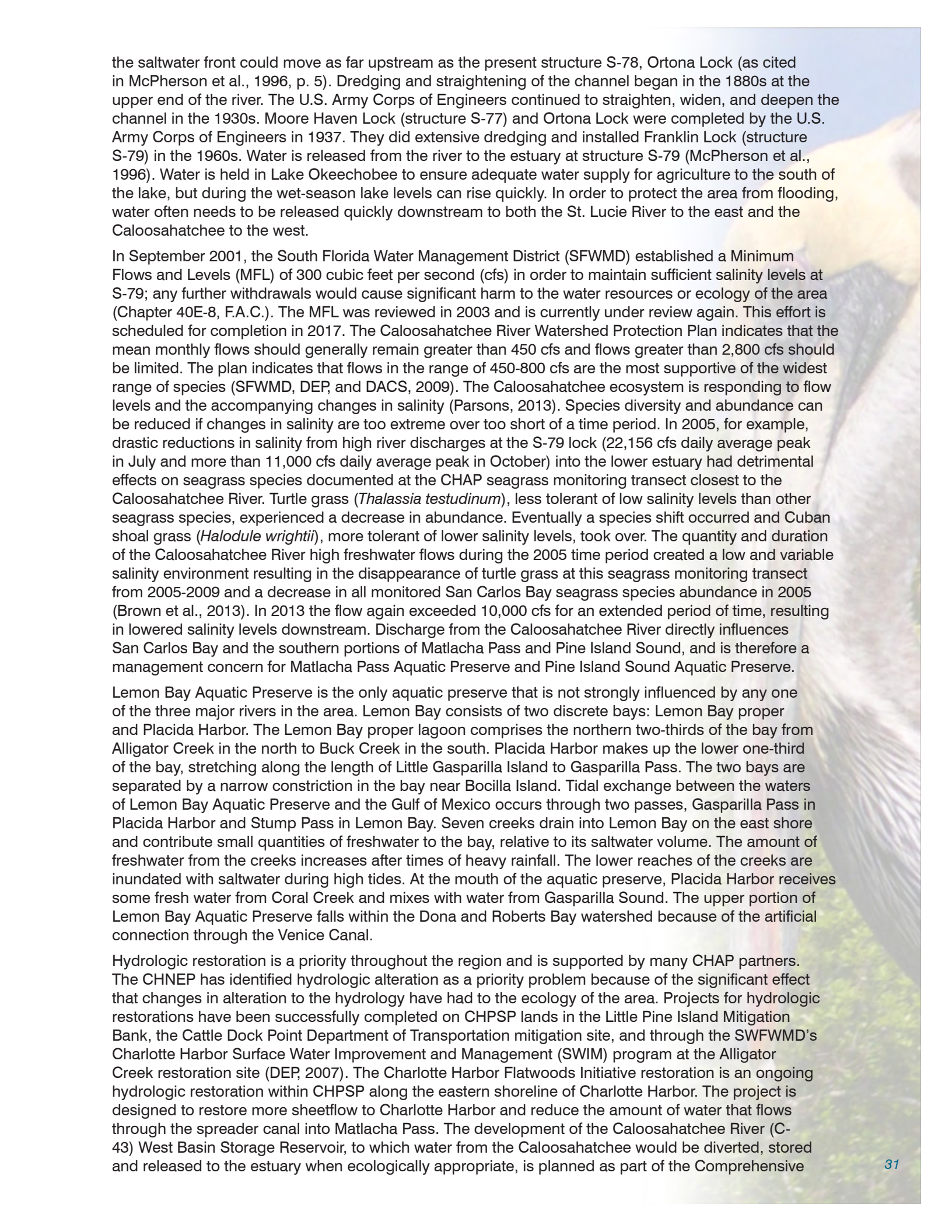
In both the Peace and Myakka river watersheds, numerous studies have examined the issue of hydrologic alterations; the primary concern in these rivers is a reduction of flow. Peek (1951) examined the basis for the cessation of flow in Kissengen Spring, in the upper Peace River, and concluded that excessive groundwater withdrawals were responsible for this event. Although water use for mining/dewatering and industrial/commercial entities is estimated to decline by close to 60 percent between 2010 and 2035 (Southwest Florida Water Management District [SWFWMD], 2015), stream flow reductions associated with the phosphate mining industry will continue to exist, as internally drained areas in the phosphate mining regions of the Peace River comprise approximately six percent of the entire watershed. Florida currently provides about 75 percent of the nation's phosphate supply and about 25 percent of the world's supply. Most of that phosphate comes from the Bone Valley deposit of more than 500,000 acres, which principally lies in the Peace River watershed. The impacts of phosphate mining and chemical processing are of significant concern, especially to the downstream residents in Charlotte County who rely on the Peace River for their water supply. Declines in the potentiometric surface of the upper Floridan aquifer in the upper Peace River watershed are thought to be mostly responsible for the significant decline in stream flow in the upper Peace River (Hammett, 1990). However, other studies have also examined the important role played by a long-term reduction in wet season rainfall in the upper Peace River watershed (Fraser, 1991).

The Peace and Myakka rivers directly influence the Charlotte Harbor watershed, and the northern portion of the Pine Island Sound - Matlacha Pass watershed. The management of Gasparilla Sound-Charlotte Harbor Aquatic Preserve, Cape Haze Aquatic Preserve, Pine Island Sound Aquatic Preserve, and Matlacha Pass Aquatic Preserve is directly related to issues associated with the Peace and Myakka rivers. Gasparilla Sound-Charlotte Harbor Aquatic Preserve is also influenced by freshwater flow from Alligator Creek, Coral Creek, other small tributaries, and sheetflow through CHPSP wetlands. Cape Haze Aquatic Preserve receives freshwater flow through Whidden and Catfish creeks, as well as sheetflow through adjacent CHPSP wetlands. Matlacha Pass and Pine Island Sound are lumped together in the Pine Island Sound - Matlacha Pass watershed; both are influenced from the north and the south by all three major rivers. However, Matlacha Pass is also heavily influenced by runoff from Cape Coral that discharges near Matlacha through an artificially collected spreader canal system; historically, this water moved as sheetflow through the wetland system. Pine Island Sound, with a major pass both on the north and south ends (Boca Grande Pass and San Carlos Bay, respectively) and smaller passes in between, is

more influenced by the Gulf of Mexico, although under high flow conditions, it can be greatly influenced by the Caloosahatchee River.

The Caloosahatchee River, which drains an area of 1,378 square miles, faces different management concerns. Because it is connected by a canal with Lake Okeechobee, it can be affected by activities in the drainage basin of the lake, which represents an additional 5,650 square miles. The Caloosahatchee River was originally a shallow, meandering stream having its headwaters near Lake Hicpochee. In 1983 Fan and Burgess found that, in its natural state, the river could go dry during the dry season, and





the saltwater front could move as far upstream as the present structure S-78, Ortona Lock (as cited in McPherson et al., 1996, p. 5). Dredging and straightening of the channel began in the 1880s at the upper end of the river. The U.S. Army Corps of Engineers continued to straighten, widen, and deepen the channel in the 1930s. Moore Haven Lock (structure S-77) and Ortona Lock were completed by the U.S. Army Corps of Engineers in 1937. They did extensive dredging and installed Franklin Lock (structure S-79) in the 1960s. Water is released from the river to the estuary at structure S-79 (McPherson et al., 1996). Water is held in Lake Okeechobee to ensure adequate water supply for agriculture to the south of the lake, but during the wet-season lake levels can rise quickly. In order to protect the area from flooding, water often needs to be released quickly downstream to both the St. Lucie River to the east and the Caloosahatchee to the west.

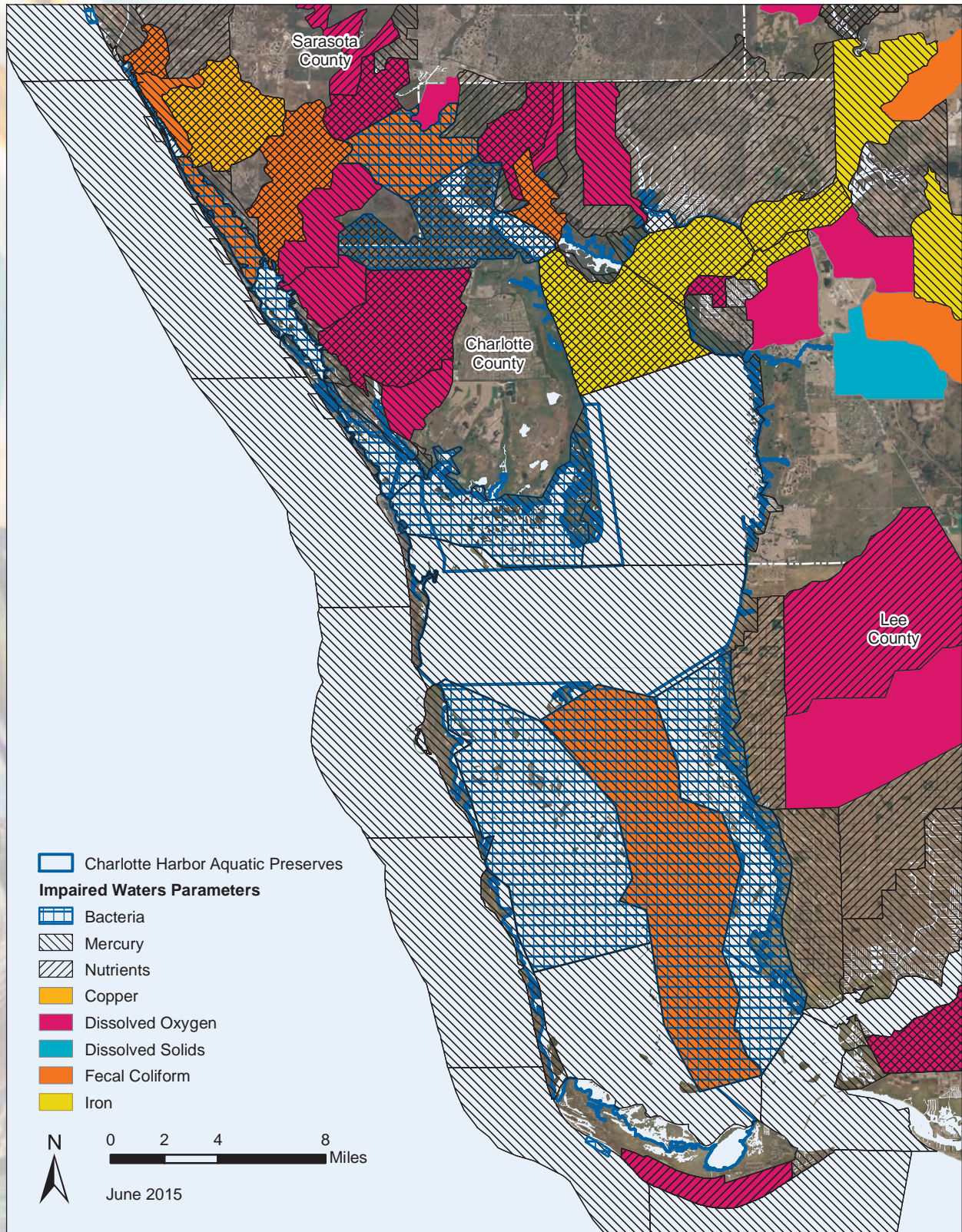
In September 2001, the South Florida Water Management District (SFWMD) established a Minimum Flows and Levels (MFL) of 300 cubic feet per second (cfs) in order to maintain sufficient salinity levels at S-79; any further withdrawals would cause significant harm to the water resources or ecology of the area (Chapter 40E-8, F.A.C.). The MFL was reviewed in 2003 and is currently under review again. This effort is scheduled for completion in 2017. The Caloosahatchee River Watershed Protection Plan indicates that the mean monthly flows should generally remain greater than 450 cfs and flows greater than 2,800 cfs should be limited. The plan indicates that flows in the range of 450-800 cfs are the most supportive of the widest range of species (SFWMD, DEP, and DACS, 2009). The Caloosahatchee ecosystem is responding to flow levels and the accompanying changes in salinity (Parsons, 2013). Species diversity and abundance can be reduced if changes in salinity are too extreme over too short of a time period. In 2005, for example, drastic reductions in salinity from high river discharges at the S-79 lock (22,156 cfs daily average peak in July and more than 11,000 cfs daily average peak in October) into the lower estuary had detrimental effects on seagrass species documented at the CHAP seagrass monitoring transect closest to the Caloosahatchee River. Turtle grass (*Thalassia testudinum*), less tolerant of low salinity levels than other seagrass species, experienced a decrease in abundance. Eventually a species shift occurred and Cuban shoal grass (*Halodule wrightii*), more tolerant of lower salinity levels, took over. The quantity and duration of the Caloosahatchee River high freshwater flows during the 2005 time period created a low and variable salinity environment resulting in the disappearance of turtle grass at this seagrass monitoring transect from 2005-2009 and a decrease in all monitored San Carlos Bay seagrass species abundance in 2005 (Brown et al., 2013). In 2013 the flow again exceeded 10,000 cfs for an extended period of time, resulting in lowered salinity levels downstream. Discharge from the Caloosahatchee River directly influences San Carlos Bay and the southern portions of Matlacha Pass and Pine Island Sound, and is therefore a management concern for Matlacha Pass Aquatic Preserve and Pine Island Sound Aquatic Preserve.

Lemon Bay Aquatic Preserve is the only aquatic preserve that is not strongly influenced by any one of the three major rivers in the area. Lemon Bay consists of two discrete bays: Lemon Bay proper and Placida Harbor. The Lemon Bay proper lagoon comprises the northern two-thirds of the bay from Alligator Creek in the north to Buck Creek in the south. Placida Harbor makes up the lower one-third of the bay, stretching along the length of Little Gasparilla Island to Gasparilla Pass. The two bays are separated by a narrow constriction in the bay near Bocilla Island. Tidal exchange between the waters of Lemon Bay Aquatic Preserve and the Gulf of Mexico occurs through two passes, Gasparilla Pass in Placida Harbor and Stump Pass in Lemon Bay. Seven creeks drain into Lemon Bay on the east shore and contribute small quantities of freshwater to the bay, relative to its saltwater volume. The amount of freshwater from the creeks increases after times of heavy rainfall. The lower reaches of the creeks are inundated with saltwater during high tides. At the mouth of the aquatic preserve, Placida Harbor receives some fresh water from Coral Creek and mixes with water from Gasparilla Sound. The upper portion of Lemon Bay Aquatic Preserve falls within the Dona and Roberts Bay watershed because of the artificial connection through the Venice Canal.

Hydrologic restoration is a priority throughout the region and is supported by many CHAP partners. The CHNEP has identified hydrologic alteration as a priority problem because of the significant effect that changes in alteration to the hydrology have had to the ecology of the area. Projects for hydrologic restorations have been successfully completed on CHPSP lands in the Little Pine Island Mitigation Bank, the Cattle Dock Point Department of Transportation mitigation site, and through the SFWMD's Charlotte Harbor Surface Water Improvement and Management (SWIM) program at the Alligator Creek restoration site (DEP, 2007). The Charlotte Harbor Flatwoods Initiative restoration is an ongoing hydrologic restoration within CHPSP along the eastern shoreline of Charlotte Harbor. The project is designed to restore more sheefflow to Charlotte Harbor and reduce the amount of water that flows through the spreader canal into Matlacha Pass. The development of the Caloosahatchee River (C-43) West Basin Storage Reservoir, to which water from the Caloosahatchee would be diverted, stored and released to the estuary when ecologically appropriate, is planned as part of the Comprehensive

Everglades Restoration Plan. MFLs have also been set by the water management districts for the three major rivers in the region (Peace, River, and Caloosahatchee) to help ensure that minimum base flows for ecological health are maintained even with increasing water use demands.

The surface waters of CHAP were designated as an OFW in 1979 (Chapter 62-302.700 (9) F.A.C.) and are shown in Map 3. As stipulated by the DEP (2011), no degradation of water quality, other than that allowed in Chapter 62-4.232 (2), F.A.C. is to be authorized. See the “International/National/State/Regional Significance” portion of Section 3.2 for more information.



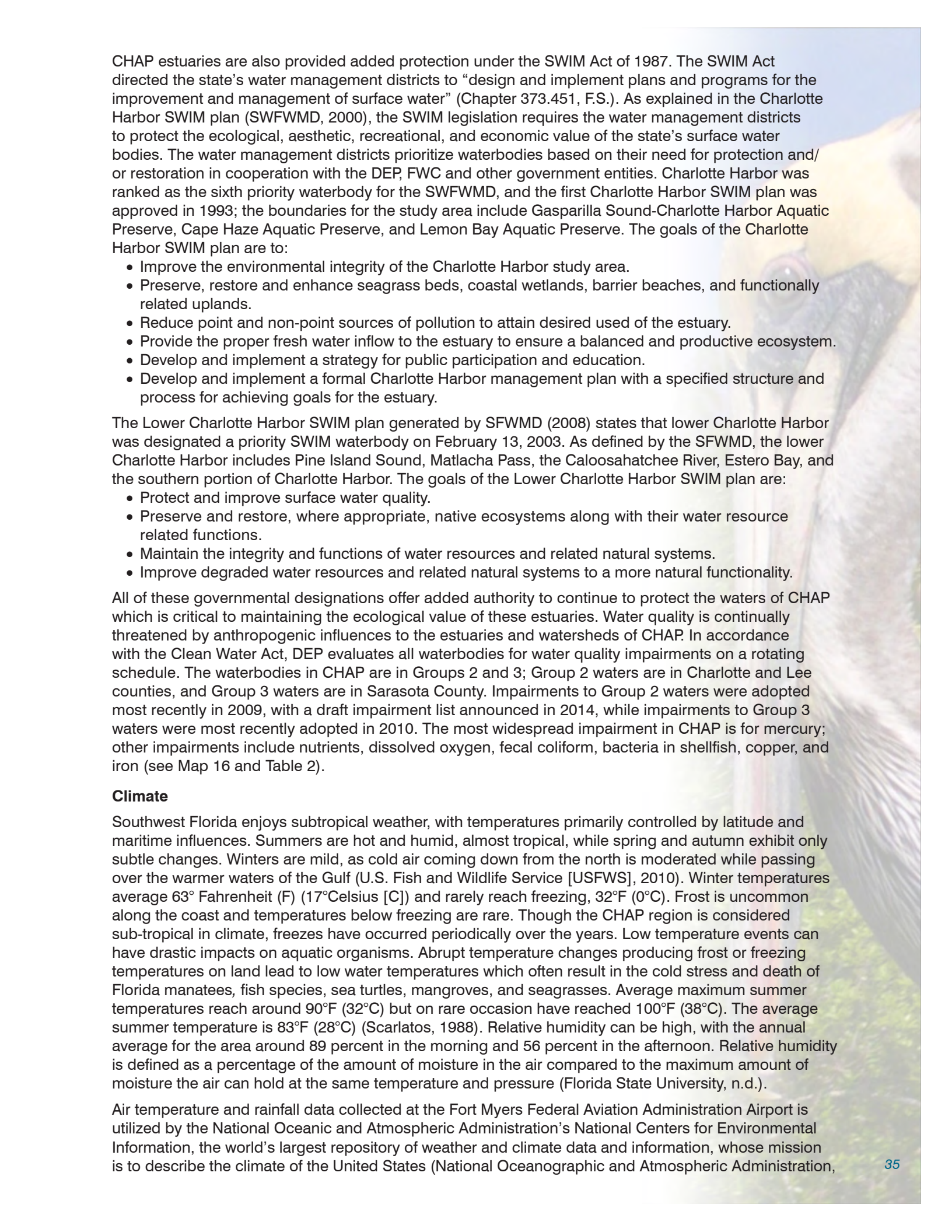
County	Water Body ID	Water Segment Name	Impaired Cycle 1* (2004/2005)	Impaired Cycle 2** (2009/2010)
Charlotte, Sarasota	1983A	Lemon Bay	Bacteria (shellfish)	Fecal Coliform, Mercury (in fish tissue)
Sarasota	1983A1	North Lemon Bay		Nutrients (Chlorophyll-a)
Charlotte	1983B	Lemon Bay	Bacteria (shellfish)	Mercury (in fish tissue)
Charlotte, Sarasota	1991A	Myakka River		Bacteria (in shellfish), Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Charlotte, Sarasota	1991B	Myakka River		Bacteria (in shellfish), Fecal Coliform, Mercury (in fish tissue)
Sarasota	1991C	Myakka River	Dissolved Oxygen, Nutrients (Historic Chlorophyll-a)	Mercury (in fish tissue)
Sarasota	1991E	Myakka River (Tidal Segment)		Dissolved Oxygen (nutrients), Nutrients (historic Chlorophyll-a; Chlorophyll-a)
Sarasota	2018	Roberts Bay Venice	Mercury (in fish tissue)	
Sarasota	2021	Direct Runoff to Bay		Mercury (in fish tissue)
Sarasota	2030	Alligator Creek	Dissolved Oxygen, Fecal Coliform	Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Sarasota	2039	Forked Creek		Copper, Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Sarasota	2042	Direct Runoff to Bay		Dissolved Oxygen, Fecal Coliform, Mercury (in fish tissue)
Charlotte	2046	Little Alligator Creek	Dissolved Oxygen	Mercury (in fish tissue)
Charlotte	2047	Manchester Way		Nutrients (Chlorophyll-a)
Charlotte	2048A	Sam Knight Creek		Dissolved Oxygen, Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Charlotte	2048B	Huckaby Creek		Dissolved Oxygen (nutrients), Nutrients (Chlorophyll-a)
Charlotte	2048C	Flopback Creek		Nutrients (Chlorophyll-a)
Sarasota	2049	Gottfried Creek	Dissolved Oxygen	Fecal Coliform, Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Charlotte, Sarasota	2051	Direct Runoff to Bay		Mercury (in fish tissue)
Charlotte, Sarasota	2052	Rock Creek	Dissolved Oxygen	Mercury (in fish tissue)
Charlotte	2053	Trailer Park Canal		Nutrients (Chlorophyll-a)
Charlotte	2055	Tippecanoe Bay		Fecal Coliform, Mercury (in fish tissue), Nutrients (Chlorophyll-a), Bacteria (in shellfish)
Charlotte	2056A	Peace River Estuary (Lower Segment)	Mercury (in fish tissue)	Iron, Nutrients (Chlorophyll-a)
Charlotte	2056D	Alligator Bay		Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Charlotte	2056DB	Port Charlotte Beach East	Bacteria (Beach Advisories)	
Charlotte	2056DC	Port Charlotte Beach West	Bacteria (Beach Advisories)	
Charlotte	2056E	Sunrise Waterways		Nutrients (Chlorophyll-a)
Charlotte	2060	Myakka Cutoff		Mercury (in fish tissue)
Charlotte	2061	Direct Runoff to Stream	Dissolved Oxygen (Nutrients); Nutrients (Chlorophyll-a)	Iron, Mercury (in fish tissue)
Charlotte	2063	Alligator Creek (North Fork)	Dissolved Oxygen	

Table 2 | Verified impaired waters in the Charlotte Harbor Aquatic Preserves area.

County	Water Body ID	Water Segment Name	Impaired Cycle 1* (2004/2005)	Impaired Cycle 2** (2009/2010)
Charlotte	2064	Direct Runoff to Bay		Mercury (in fish tissue)
Charlotte	2065A	Charlotte Harbor Upper		Iron, Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Charlotte	2065B	Charlotte Harbor Mid		Mercury (in fish tissue)
Charlotte	2065C	Charlotte Harbor Mid	Bacteria (shellfish)	Mercury (in fish tissue)
Lee	2065D	Charlotte Harbor Lower		Mercury (in fish tissue)
Lee	2065E	Pine Island Sound	Bacteria (shellfish)	Mercury (in fish tissue)
Lee	2065F	Matalacha Pass		Bacteria (in shellfish), Mercury (in fish tissue)
Lee	2065G	Pine Island Sound Lower		Mercury (in fish tissue)
Charlotte	2067	Oyster Creek	Dissolved Oxygen	Mercury (in fish tissue)
Charlotte	2068	Buck Creek		Dissolved Oxygen, Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Charlotte	2069	Punta Gorda Isles Canal	Dissolved Oxygen (Nutrients)	Mercury (in fish tissue), Nutrients (Chlorophyll-a)
Charlotte	2070	Punta Gorda Isles 2 Canal		Mercury (in fish tissue)
Charlotte	2072	Direct Runoff to Bay		Mercury (in fish tissue)
Charlotte	2073	Mangrove Point Canal	Dissolved Oxygen	Mercury (in fish tissue)
Charlotte	2074	Alligator Creek		Dissolved Oxygen (4d), Dissolved Solids
Charlotte	2075A	Manasota Key		Mercury (in fish tissue)
Charlotte	2075B	Barrier Island		Mercury (in fish tissue)
Charlotte, Sarasota	2075D	Barrier Island		Mercury (in fish tissue)
Charlotte	2076	Direct Runoff to Bay		Mercury (in fish tissue)
Charlotte	2078A	Coral Creek		Mercury (in fish tissue)
Charlotte	2078B	Coral Creek (East Branch)		Dissolved Oxygen, Mercury (in fish tissue)
Lee	2082C1	West Urban Cape Coral		Nutrients (historic Chlorophyll-a)
Charlotte	2087	Direct Runoff to Bay		Mercury (in fish tissue)
Charlotte	2090	Direct Runoff to Bay		Mercury (in fish tissue)
Lee	2092B	Gasparilla Island		Mercury (in fish tissue)
Lee	2092C	North Captiva Island		Mercury (in fish tissue)
Lee	2092D	Captiva Island		Mercury (in fish tissue); Dissolved Oxygen (4d)
Lee	2092E	Pine Island	Bacteria (shellfish)	Fecal Coliform (3), Mercury (in fish tissue)
Charlotte, Sarasota	8054	Gulf of Mexico (Charlotte County; Sarasota County)		Mercury (in fish tissue)
Charlotte, Lee	8055	Gulf of Mexico (Charlotte County; Charlotte Harbor)		Mercury (in fish tissue)
Lee	8056	Gulf of Mexico (Lee County; Captiva Island)		Mercury (in fish tissue)

* Cycle 1 impairments were adopted on May 27, 2004 for Group 2 waters (Charlotte and Lee counties) and on June 17, 2005 for Group 3 waters (Sarasota County)

** Cycle 2 impairments were adopted on May 19, 2009 for Group 2 waters (Charlotte and Lee counties) and on January 15, 2010 for Group 3 waters (Sarasota County)



CHAP estuaries are also provided added protection under the SWIM Act of 1987. The SWIM Act directed the state's water management districts to "design and implement plans and programs for the improvement and management of surface water" (Chapter 373.451, F.S.). As explained in the Charlotte Harbor SWIM plan (SWFWMD, 2000), the SWIM legislation requires the water management districts to protect the ecological, aesthetic, recreational, and economic value of the state's surface water bodies. The water management districts prioritize waterbodies based on their need for protection and/or restoration in cooperation with the DEP, FWC and other government entities. Charlotte Harbor was ranked as the sixth priority waterbody for the SWFWMD, and the first Charlotte Harbor SWIM plan was approved in 1993; the boundaries for the study area include Gasparilla Sound-Charlotte Harbor Aquatic Preserve, Cape Haze Aquatic Preserve, and Lemon Bay Aquatic Preserve. The goals of the Charlotte Harbor SWIM plan are to:

- Improve the environmental integrity of the Charlotte Harbor study area.
- Preserve, restore and enhance seagrass beds, coastal wetlands, barrier beaches, and functionally related uplands.
- Reduce point and non-point sources of pollution to attain desired use of the estuary.
- Provide the proper fresh water inflow to the estuary to ensure a balanced and productive ecosystem.
- Develop and implement a strategy for public participation and education.
- Develop and implement a formal Charlotte Harbor management plan with a specified structure and process for achieving goals for the estuary.

The Lower Charlotte Harbor SWIM plan generated by SFWMD (2008) states that lower Charlotte Harbor was designated a priority SWIM waterbody on February 13, 2003. As defined by the SFWMD, the lower Charlotte Harbor includes Pine Island Sound, Matlacha Pass, the Caloosahatchee River, Estero Bay, and the southern portion of Charlotte Harbor. The goals of the Lower Charlotte Harbor SWIM plan are:

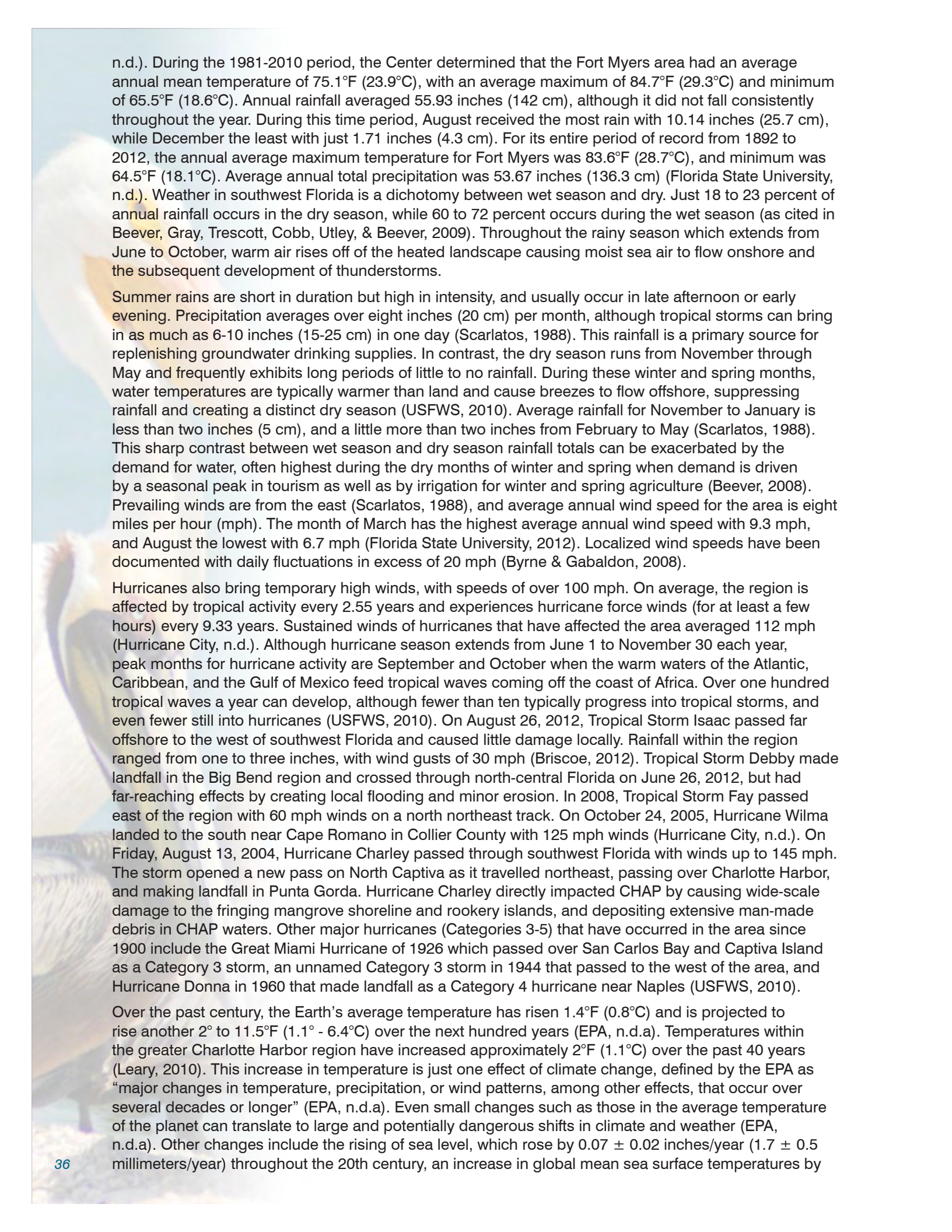
- Protect and improve surface water quality.
- Preserve and restore, where appropriate, native ecosystems along with their water resource related functions.
- Maintain the integrity and functions of water resources and related natural systems.
- Improve degraded water resources and related natural systems to a more natural functionality.

All of these governmental designations offer added authority to continue to protect the waters of CHAP which is critical to maintaining the ecological value of these estuaries. Water quality is continually threatened by anthropogenic influences to the estuaries and watersheds of CHAP. In accordance with the Clean Water Act, DEP evaluates all waterbodies for water quality impairments on a rotating schedule. The waterbodies in CHAP are in Groups 2 and 3; Group 2 waters are in Charlotte and Lee counties, and Group 3 waters are in Sarasota County. Impairments to Group 2 waters were adopted most recently in 2009, with a draft impairment list announced in 2014, while impairments to Group 3 waters were most recently adopted in 2010. The most widespread impairment in CHAP is for mercury; other impairments include nutrients, dissolved oxygen, fecal coliform, bacteria in shellfish, copper, and iron (see Map 16 and Table 2).

Climate

Southwest Florida enjoys subtropical weather, with temperatures primarily controlled by latitude and maritime influences. Summers are hot and humid, almost tropical, while spring and autumn exhibit only subtle changes. Winters are mild, as cold air coming down from the north is moderated while passing over the warmer waters of the Gulf (U.S. Fish and Wildlife Service [USFWS], 2010). Winter temperatures average 63° Fahrenheit (F) (17°Celsius [C]) and rarely reach freezing, 32°F (0°C). Frost is uncommon along the coast and temperatures below freezing are rare. Though the CHAP region is considered sub-tropical in climate, freezes have occurred periodically over the years. Low temperature events can have drastic impacts on aquatic organisms. Abrupt temperature changes producing frost or freezing temperatures on land lead to low water temperatures which often result in the cold stress and death of Florida manatees, fish species, sea turtles, mangroves, and seagrasses. Average maximum summer temperatures reach around 90°F (32°C) but on rare occasion have reached 100°F (38°C). The average summer temperature is 83°F (28°C) (Scarlatos, 1988). Relative humidity can be high, with the annual average for the area around 89 percent in the morning and 56 percent in the afternoon. Relative humidity is defined as a percentage of the amount of moisture in the air compared to the maximum amount of moisture the air can hold at the same temperature and pressure (Florida State University, n.d.).

Air temperature and rainfall data collected at the Fort Myers Federal Aviation Administration Airport is utilized by the National Oceanic and Atmospheric Administration's National Centers for Environmental Information, the world's largest repository of weather and climate data and information, whose mission is to describe the climate of the United States (National Oceanographic and Atmospheric Administration,

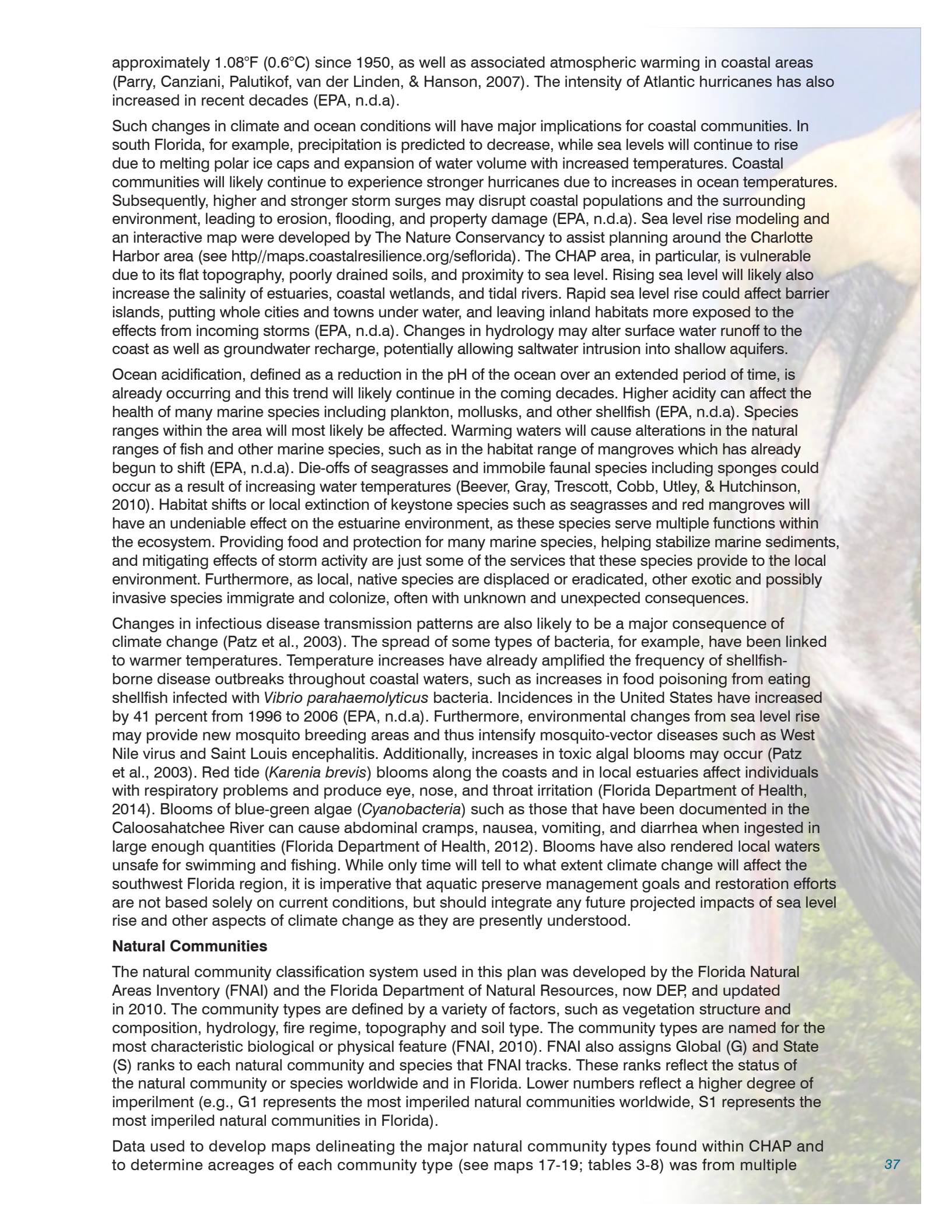


n.d.). During the 1981-2010 period, the Center determined that the Fort Myers area had an average annual mean temperature of 75.1°F (23.9°C), with an average maximum of 84.7°F (29.3°C) and minimum of 65.5°F (18.6°C). Annual rainfall averaged 55.93 inches (142 cm), although it did not fall consistently throughout the year. During this time period, August received the most rain with 10.14 inches (25.7 cm), while December the least with just 1.71 inches (4.3 cm). For its entire period of record from 1892 to 2012, the annual average maximum temperature for Fort Myers was 83.6°F (28.7°C), and minimum was 64.5°F (18.1°C). Average annual total precipitation was 53.67 inches (136.3 cm) (Florida State University, n.d.). Weather in southwest Florida is a dichotomy between wet season and dry. Just 18 to 23 percent of annual rainfall occurs in the dry season, while 60 to 72 percent occurs during the wet season (as cited in Beever, Gray, Trescott, Cobb, Utley, & Beever, 2009). Throughout the rainy season which extends from June to October, warm air rises off of the heated landscape causing moist sea air to flow onshore and the subsequent development of thunderstorms.

Summer rains are short in duration but high in intensity, and usually occur in late afternoon or early evening. Precipitation averages over eight inches (20 cm) per month, although tropical storms can bring in as much as 6-10 inches (15-25 cm) in one day (Scarlatos, 1988). This rainfall is a primary source for replenishing groundwater drinking supplies. In contrast, the dry season runs from November through May and frequently exhibits long periods of little to no rainfall. During these winter and spring months, water temperatures are typically warmer than land and cause breezes to flow offshore, suppressing rainfall and creating a distinct dry season (USFWS, 2010). Average rainfall for November to January is less than two inches (5 cm), and a little more than two inches from February to May (Scarlatos, 1988). This sharp contrast between wet season and dry season rainfall totals can be exacerbated by the demand for water, often highest during the dry months of winter and spring when demand is driven by a seasonal peak in tourism as well as by irrigation for winter and spring agriculture (Beever, 2008). Prevailing winds are from the east (Scarlatos, 1988), and average annual wind speed for the area is eight miles per hour (mph). The month of March has the highest average annual wind speed with 9.3 mph, and August the lowest with 6.7 mph (Florida State University, 2012). Localized wind speeds have been documented with daily fluctuations in excess of 20 mph (Byrne & Gabaldon, 2008).

Hurricanes also bring temporary high winds, with speeds of over 100 mph. On average, the region is affected by tropical activity every 2.55 years and experiences hurricane force winds (for at least a few hours) every 9.33 years. Sustained winds of hurricanes that have affected the area averaged 112 mph (Hurricane City, n.d.). Although hurricane season extends from June 1 to November 30 each year, peak months for hurricane activity are September and October when the warm waters of the Atlantic, Caribbean, and the Gulf of Mexico feed tropical waves coming off the coast of Africa. Over one hundred tropical waves a year can develop, although fewer than ten typically progress into tropical storms, and even fewer still into hurricanes (USFWS, 2010). On August 26, 2012, Tropical Storm Isaac passed far offshore to the west of southwest Florida and caused little damage locally. Rainfall within the region ranged from one to three inches, with wind gusts of 30 mph (Briscoe, 2012). Tropical Storm Debby made landfall in the Big Bend region and crossed through north-central Florida on June 26, 2012, but had far-reaching effects by creating local flooding and minor erosion. In 2008, Tropical Storm Fay passed east of the region with 60 mph winds on a north northeast track. On October 24, 2005, Hurricane Wilma landed to the south near Cape Romano in Collier County with 125 mph winds (Hurricane City, n.d.). On Friday, August 13, 2004, Hurricane Charley passed through southwest Florida with winds up to 145 mph. The storm opened a new pass on North Captiva as it travelled northeast, passing over Charlotte Harbor, and making landfall in Punta Gorda. Hurricane Charley directly impacted CHAP by causing wide-scale damage to the fringing mangrove shoreline and rookery islands, and depositing extensive man-made debris in CHAP waters. Other major hurricanes (Categories 3-5) that have occurred in the area since 1900 include the Great Miami Hurricane of 1926 which passed over San Carlos Bay and Captiva Island as a Category 3 storm, an unnamed Category 3 storm in 1944 that passed to the west of the area, and Hurricane Donna in 1960 that made landfall as a Category 4 hurricane near Naples (USFWS, 2010).

Over the past century, the Earth's average temperature has risen 1.4°F (0.8°C) and is projected to rise another 2° to 11.5°F (1.1° - 6.4°C) over the next hundred years (EPA, n.d.a). Temperatures within the greater Charlotte Harbor region have increased approximately 2°F (1.1°C) over the past 40 years (Leary, 2010). This increase in temperature is just one effect of climate change, defined by the EPA as "major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer" (EPA, n.d.a). Even small changes such as those in the average temperature of the planet can translate to large and potentially dangerous shifts in climate and weather (EPA, n.d.a). Other changes include the rising of sea level, which rose by 0.07 ± 0.02 inches/year (1.7 ± 0.5 millimeters/year) throughout the 20th century, an increase in global mean sea surface temperatures by



approximately 1.08°F (0.6°C) since 1950, as well as associated atmospheric warming in coastal areas (Parry, Canziani, Palutikof, van der Linden, & Hanson, 2007). The intensity of Atlantic hurricanes has also increased in recent decades (EPA, n.d.a).

Such changes in climate and ocean conditions will have major implications for coastal communities. In south Florida, for example, precipitation is predicted to decrease, while sea levels will continue to rise due to melting polar ice caps and expansion of water volume with increased temperatures. Coastal communities will likely continue to experience stronger hurricanes due to increases in ocean temperatures. Subsequently, higher and stronger storm surges may disrupt coastal populations and the surrounding environment, leading to erosion, flooding, and property damage (EPA, n.d.a). Sea level rise modeling and an interactive map were developed by The Nature Conservancy to assist planning around the Charlotte Harbor area (see <http://maps.coastalresilience.org/seflorida>). The CHAP area, in particular, is vulnerable due to its flat topography, poorly drained soils, and proximity to sea level. Rising sea level will likely also increase the salinity of estuaries, coastal wetlands, and tidal rivers. Rapid sea level rise could affect barrier islands, putting whole cities and towns under water, and leaving inland habitats more exposed to the effects from incoming storms (EPA, n.d.a). Changes in hydrology may alter surface water runoff to the coast as well as groundwater recharge, potentially allowing saltwater intrusion into shallow aquifers.

Ocean acidification, defined as a reduction in the pH of the ocean over an extended period of time, is already occurring and this trend will likely continue in the coming decades. Higher acidity can affect the health of many marine species including plankton, mollusks, and other shellfish (EPA, n.d.a). Species ranges within the area will most likely be affected. Warming waters will cause alterations in the natural ranges of fish and other marine species, such as in the habitat range of mangroves which has already begun to shift (EPA, n.d.a). Die-offs of seagrasses and immobile faunal species including sponges could occur as a result of increasing water temperatures (Beever, Gray, Trescott, Cobb, Utley, & Hutchinson, 2010). Habitat shifts or local extinction of keystone species such as seagrasses and red mangroves will have an undeniable effect on the estuarine environment, as these species serve multiple functions within the ecosystem. Providing food and protection for many marine species, helping stabilize marine sediments, and mitigating effects of storm activity are just some of the services that these species provide to the local environment. Furthermore, as local, native species are displaced or eradicated, other exotic and possibly invasive species immigrate and colonize, often with unknown and unexpected consequences.

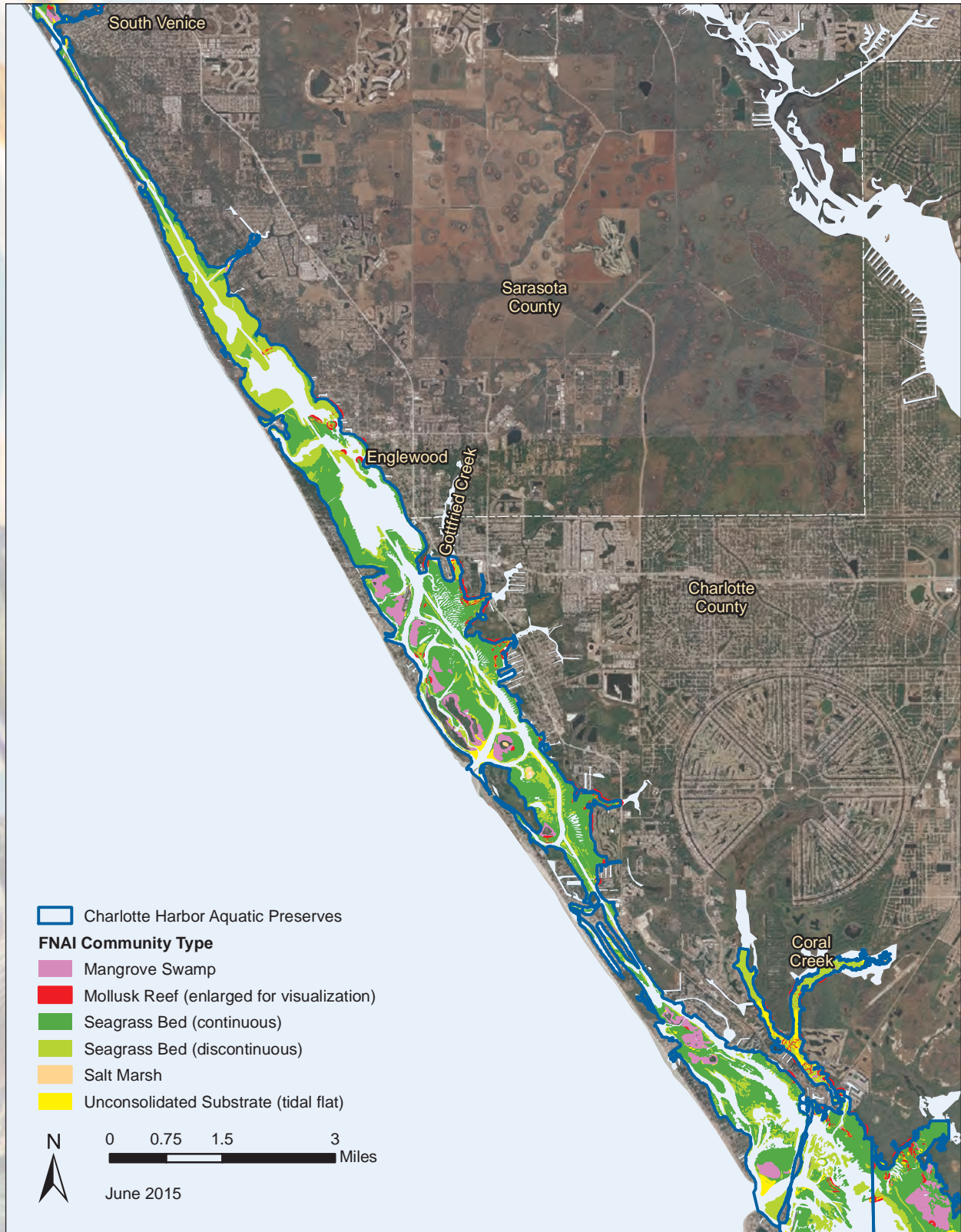
Changes in infectious disease transmission patterns are also likely to be a major consequence of climate change (Patz et al., 2003). The spread of some types of bacteria, for example, have been linked to warmer temperatures. Temperature increases have already amplified the frequency of shellfish-borne disease outbreaks throughout coastal waters, such as increases in food poisoning from eating shellfish infected with *Vibrio parahaemolyticus* bacteria. Incidences in the United States have increased by 41 percent from 1996 to 2006 (EPA, n.d.a). Furthermore, environmental changes from sea level rise may provide new mosquito breeding areas and thus intensify mosquito-vector diseases such as West Nile virus and Saint Louis encephalitis. Additionally, increases in toxic algal blooms may occur (Patz et al., 2003). Red tide (*Karenia brevis*) blooms along the coasts and in local estuaries affect individuals with respiratory problems and produce eye, nose, and throat irritation (Florida Department of Health, 2014). Blooms of blue-green algae (*Cyanobacteria*) such as those that have been documented in the Caloosahatchee River can cause abdominal cramps, nausea, vomiting, and diarrhea when ingested in large enough quantities (Florida Department of Health, 2012). Blooms have also rendered local waters unsafe for swimming and fishing. While only time will tell to what extent climate change will affect the southwest Florida region, it is imperative that aquatic preserve management goals and restoration efforts are not based solely on current conditions, but should integrate any future projected impacts of sea level rise and other aspects of climate change as they are presently understood.

Natural Communities

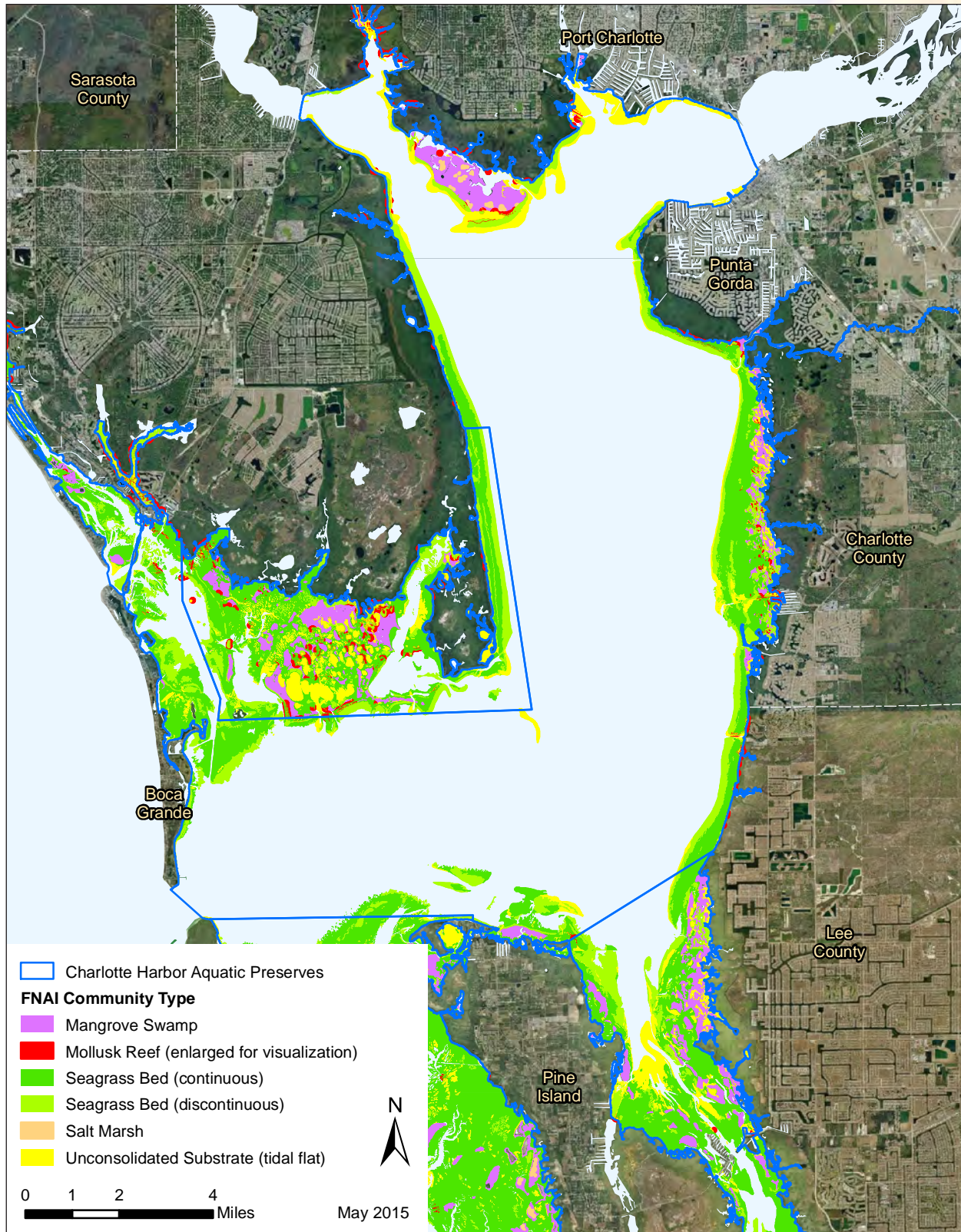
The natural community classification system used in this plan was developed by the Florida Natural Areas Inventory (FNAI) and the Florida Department of Natural Resources, now DEP, and updated in 2010. The community types are defined by a variety of factors, such as vegetation structure and composition, hydrology, fire regime, topography and soil type. The community types are named for the most characteristic biological or physical feature (FNAI, 2010). FNAI also assigns Global (G) and State (S) ranks to each natural community and species that FNAI tracks. These ranks reflect the status of the natural community or species worldwide and in Florida. Lower numbers reflect a higher degree of imperilment (e.g., G1 represents the most imperiled natural communities worldwide, S1 represents the most imperiled natural communities in Florida).

Data used to develop maps delineating the major natural community types found within CHAP and to determine acreages of each community type (see maps 17-19; tables 3-8) was from multiple

sources that include: SWFWMD seagrass mapping, 2012; FWC-Fish and Wildlife Research Institute (FWRI) seagrass mapping, 2011; FWC-FWRI salt marsh mapping, 2010; FWC-FWRI oyster habitat mapping, 2011; FWC-FWRI mangrove mapping (n.d.); FWC-FWRI tidal flat mapping (2009). These data are not always based on comprehensive or site-specific field surveys, and no additional fieldwork was conducted for purposes of producing these maps. The descriptions of the natural community types found in CHAP have been adapted from the Guide to the Natural Communities of Florida (FNAI, 2010).



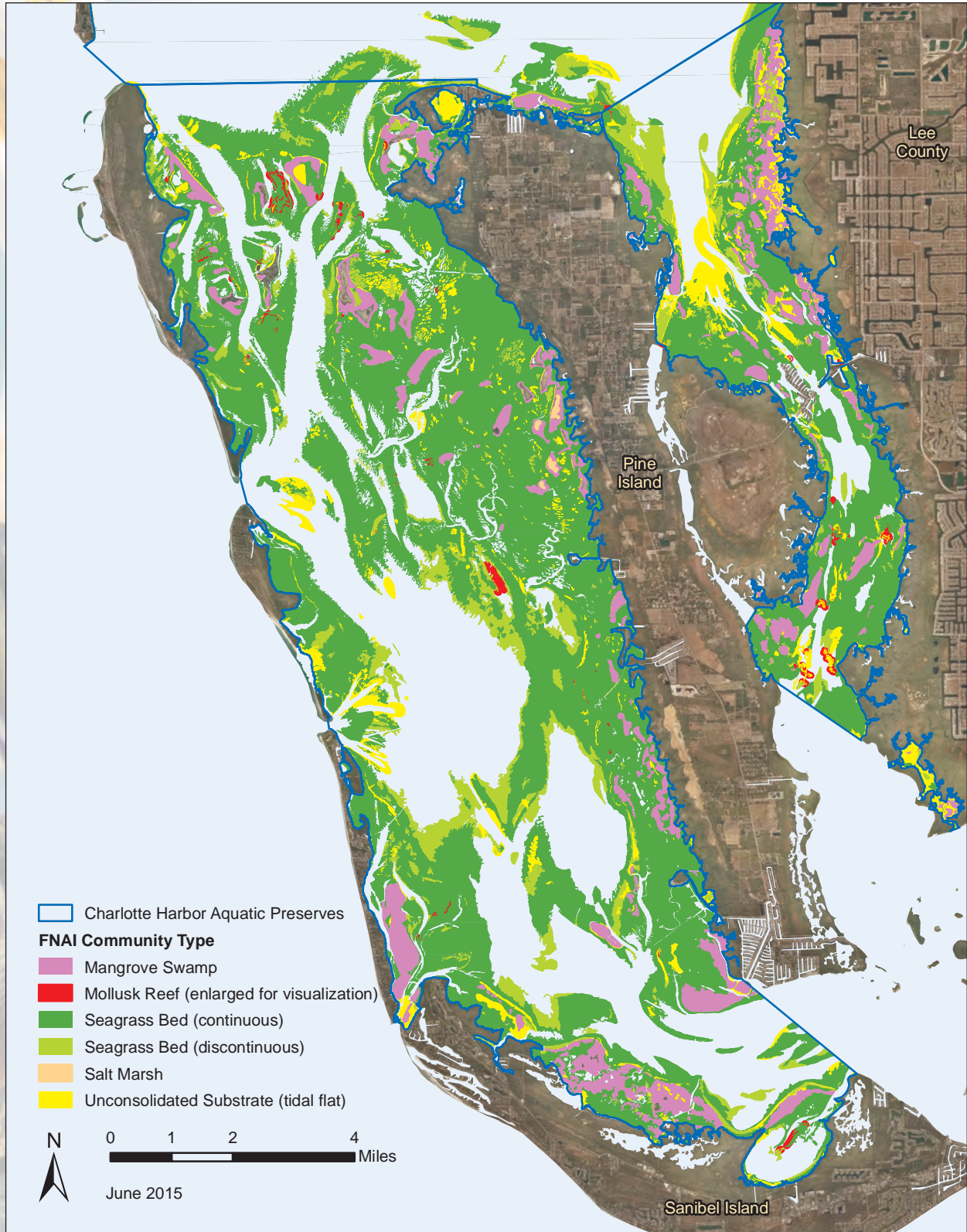
The CHAP fall within the subtropical biogeographic zone. The aquatic preserves are comprised of oligohaline (low salinity) and estuarine habitat types and are surrounded by a variety of wetland and upland communities. To date, seven natural communities have been identified within CHAP. Two communities, sponge bed and consolidated substrate, are not mapped but are known to occur in small patches. Of the seven natural communities found within CHAP, two communities (seagrass bed and sponge bed), are listed as S2, imperiled in Florida because of rarity. Most of the S2 communities have been affected by human activities attributed to intentional or unintentional consequences from pollution,



Map 18 | Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves natural communities.

turbidity, or prop scarring. Mollusk reef is ranked as S3, very rare or local throughout its range in Florida. The most common natural communities within CHAP are unconsolidated substrate (S5), seagrass bed and mangrove swamp (S4), depending on the location within the bay. All of the communities have documented levels of disturbances.

Mollusk reefs, perhaps the most impacted natural habitat type in CHAP, are characterized as expansive concentrations of sessile mollusks occurring in intertidal and subtidal zones to a depth of 40 feet. In Florida, the most developed mollusk reefs are generally restricted to estuarine areas and are dominated



40 Map 19 | Pine Island Sound and Matlacha Pass aquatic preserves natural communities.

FNAI Natural Community Type	# Acres	% Area	Global Rank	State Rank	Comments
Mangrove Swamp	8,988	5.1%	G5	S4	Stable with some changes over time as a result of hurricane damage, erosion and sea level changes.
Mollusk Reef	146	0.1%	G3	S3	Historically more abundant, restoration is needed.
Salt Marsh	78	0.04%	G4	S4	Relatively rare in southwest Florida due to competition with mangroves.
Seagrass Bed (continuous)	46,331	26.1%	G3	S2	Relatively stable in overall coverage, but seagrass scarring from boat propellers is degrading the habitat.
Seagrass Bed (discontinuous)	11,840	6.7%	G3	S2	
Unconsolidated Substrate	7,435	4.2%	G5	S5	The only mapped unconsolidated substrates are tidal flats, important for wading bird foraging.
Unclassified Submerged Lands	101,468	57.2%			May include other unmapped habitat types, such as sponge bed, unconsolidated substrate and consolidated substrate.
Unclassified Land	1,185	0.7%	n/a	n/a	Includes numerous developed and undeveloped islands as well as mixture of mangrove swamp. In Matlacha Pass Aquatic Preserve, primarily the community of Matlacha and some small islands.

Table 3 | Summary of natural communities in Charlotte Harbor Aquatic Preserves.

FNAI Natural Community Type	# Acres	% Area	Global Rank	State Rank
Mangrove Swamp	378	5.2	G5	S4
Mollusk Reef	17	0.2	G3	S3
Salt Marsh	4	0.1	G4	S4
Seagrass Bed (continuous)	2,559	35.4	G3	S2
Seagrass Bed (discontinuous)	1,185	16.4	G3	S2
Unconsolidated Substrate	123	1.7	G5	S5
Unclassified Submerged Lands	2,695	37.3		
Unclassified Land	266	3.7	n/a	n/a

Table 4 | Summary of natural communities in Lemon Bay Aquatic Preserve.

FNAI Natural Community Type	# Acres	% Area	Global Rank	State Rank
Mollusk Reef	47	0.1	G3	S3
Salt Marsh	49	0.1	G4	S4
Seagrass Bed (continuous)	5,759	6.8	G3	S2
Seagrass Bed (discontinuous)	4,295	5.1	G3	S2
Unconsolidated Substrate	2,602	3.1	G5	S5
Unclassified Submerged Lands	69,850	82.7		
Unclassified Land	230	0.3	n/a	n/a

Table 5 | Summary of natural communities in Gasparilla Sound-Charlotte Harbor Aquatic Preserve.

FNAI Natural Community Type	# Acres	% Area	Global Rank	State Rank
Mangrove Swamp	1,467	11.5	G5	S4
Mollusk Reef	30	0.2	G3	S3
Seagrass Bed (continuous)	4,399	34.6	G3	S2
Seagrass Bed (discontinuous)	1,785	14.0	G3	S2
Unconsolidated Substrate	1,323	10.4	G5	S5
Unclassified Submerged Lands	3,620	28.5		
Unclassified Land	91	0.7	n/a	n/a

Table 6 | Summary of natural communities in Cape Haze Aquatic Preserve.

FNAI Natural Community Type	# Acres	% Area	Global Rank	State Rank
Mangrove Swamp	1,880	12.9	G5	S4
Mollusk Reef	8	0.1	G3	S3
Seagrass Bed (continuous)	6,118	41.8	G3	S2
Seagrass Bed (discontinuous)	1,250	8.5	G3	S2
Unconsolidated Substrate	1,525	10.4	G5	S5
Unclassified Submerged Lands	3,631	24.8		
Unclassified Land	210	1.4	n/a	n/a

Table 7 | Summary of natural communities in Matlacha Pass Aquatic Preserve.

FNAI Natural Community Type	# Acres	% Area	Global Rank	State Rank
Mangrove Swamp	3,594	6.2	G5	S4
Mollusk Reef	44	0.1	G3	S3
Salt Marsh	24	0.0	G4	S4
Seagrass Bed (continuous)	27,496	47.1	G3	S2
Seagrass Bed (discontinuous)	3,326	5.7	G3	S2
Unconsolidated Substrate	1,861	3.2	G5	S5
Unclassified Submerged Lands	21,673	37.1		
Unclassified Land	388	0.7	n/a	n/a

Table 8 | Summary of natural communities in Pine Island Sound Aquatic Preserve.



White ibis feed in the shallow, sandy waters surrounding an oyster bar in Pine Island Sound Aquatic Preserve.

by the eastern oyster; they are typically referred to as oyster reefs or oyster beds. Oyster reef habitat provides numerous ecosystem services: they are essential fish habitat, bio-assimilate nutrients, filter water, reduce turbidity, and stabilize shorelines, among numerous other functions. Tolley, Volety, and Savarese (2005) studied the resident communities of oyster reefs in the Caloosahatchee estuary and identified 10 species of decapods and 16 species of fish living on the oyster reef. At least 90 percent of oyster reef habitat in the Charlotte Harbor region is estimated to have been lost as a result of dredging, mining for road beds, hydrologic changes, and harvest (Boswell et al., 2012). Natural predators impacting mollusk reefs within CHAP include stone crabs, blue crabs, oyster drills (*Stramonita haemastoma*), sheepshead (*Archosargus probatocephalus*), black drum (*Pogonias cromis*) and other fishes and invertebrates. The relative abundance (0.1 percent) of oyster reef is low throughout CHAP. Lemon Bay and Cape Haze aquatic preserves have a slightly higher percentage (0.2 percent) of oyster reefs than the other aquatic preserves.

Salt marshes are a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater, and are protected from large waves either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. The width of the intertidal zone depends on the slope of the shore and the tidal range. Salt marshes may have distinct zones of vegetation, each dominated by a single species of grass or rush. Flooding frequency and soil salinity are the two major environmental factors that influence salt marsh vegetation; saltgrass (*Distichlis spicata*), needle rush (*Juncus* spp.) and saltmarsh cordgrass (*Spartina alterniflora*) all tolerate a wide range of salinities. Cordgrass is found where the marsh is flooded almost daily, whereas needle rush and saltgrass are found where the marsh is flooded less frequently. A large number of rare animals are found in salt marshes. Several bird species nest in salt marshes and are dependent on them for their entire life cycle. In Charlotte Harbor, as in all of south Florida, salt marshes generally serve as a transitional zone between mangroves and freshwater marshes. Like seagrasses and mangroves, salt marshes provide a concentration of high quality food for estuarine animals in addition to a protected environment for early life stages. Salt marshes are also a fundamental part of nutrient cycles, long-term accumulators of pollution, and short-term pollution buffers. Animal production is high in salt marshes, again, providing a tremendous

food supply in the form of tiny organisms that are food for fisheries species. In 1982, salt marshes covered 3,547 acres, a 51 percent decrease from 1945 (Haddad & Hoffman, 1986). Salt marshes are present in CHAP, but this habitat type is the least common (0.04 percent) and is only found in Lemon Bay, Gasparilla Sound-Charlotte Harbor and Pine Island Sound aquatic preserves. Mangroves typically outcompete salt marsh vegetation in the estuaries of southwest Florida.

Mangrove swamps are characterized as dense, low forests occurring along relatively flat, intertidal and supratidal shorelines of low wave energy along southern Florida. Four species of trees are naturally found in mangrove swamps: red mangrove, white mangrove (*Laguncularia racemosa*), black mangrove (*Avicennia germinans*) and buttonwood (*Conocarpus erectus*). Birds utilize mangrove swamps as nesting habitat and fish use their roots as nursery grounds and as protection from predators. Mangroves also stabilize substrates and shorelines. More than five percent of CHAP is comprised of mangrove swamp, including the vast majority of the CHAP shoreline. Threats to mangrove habitat include wide-spread trimming and removal, conversion to hardened shorelines, exotic vegetation and sea-level rise. Coastal development including sea walls contributes to the loss of the mangrove shoreline and is most apparent in Lemon Bay Aquatic Preserve. Natural events such as hurricanes can also affect mangrove swamps, including Hurricane Charley which caused degradation of mangroves throughout CHAP in 2004. Although some mangrove islands were totally lost, most areas have recovered. Brazilian pepper (*Schinus terebinthifolius*), carrotwood (*Cupaniopsis anacardioides*) and seaside mahoe (*Thespesia populnea*) are three invasive exotic species that can be found within mangrove swamps. Red mangroves have been designated as an essential feature of sawfish critical habitat within the Charlotte Harbor Estuary Unit which will provide additional protection to this shoreline habitat (50 C.F.R. Part 226).

Seagrass beds, characterized as expansive stands of submerged vascular plants, are the most abundant vegetated habitat type in CHAP. Seagrasses are not true grasses, but are flowering plants (angiosperms) that live underwater. Like land plants, seagrasses produce oxygen and store carbon, which are two important functions. The depth at which seagrasses are found is limited by water clarity because they require sunlight; each species has specific light requirements allowing some to grow deeper than others. Seagrasses are a sensitive indicator of water quality and pollution in shallow coastal areas as they are vulnerable to various forms of anthropogenic stress. Thermal effluents, toxic agents, dredging, industrial discharges, cultural eutrophication, oil spills, commercial fishing, changes in hydrology, and changes in light transmission due to turbidity, color and algal blooms, have been associated with such reductions in seagrass. Seagrasses are also susceptible to scarring from boat propellers, anchors and trawls. While seagrasses will recolonize areas when water quality is good and disturbances are removed, re-vegetation of scarred areas may require many years. Reoccurring disturbances such as prop scarring and dredging can result in permanent seagrass loss. Construction of traditional wooden



Marsh grass and oyster shells stabilize the shorelines of Lemon Bay Aquatic Preserve.



A sea star clings to a blade of turtle grass in a shallow seagrass bed in Pine Island Sound Aquatic Preserve.

boat docks through seagrass areas may result in a “halo” effect (area devoid of seagrass) around the dock as the result of shading by the dock or boats moored at the dock. Newer technologies, such as light penetrating, grated materials have shown promise in reducing shading effects. Boat traffic to and from the dock may contribute to the halo effect as well. Seagrass beds make up around fifty percent of the natural communities in each of the aquatic preserves, except Gasparilla Sound-Charlotte Harbor Aquatic Preserve which is characterized by much deeper water. Eighty percent of the seagrass beds in CHAP are mapped as continuous, while the rest are discontinuous or patchy. Continuous seagrass beds are characterized by a uniform signature on aerial photos with only small sandy-bottom patches (less than one-quarter acre) within the bed; discontinuous or patchy seagrass beds are areas with isolated patches of seagrass interspersed with open bottom (Tomasko, Keenan, Alderson & Leverone, 2010).

Seagrass communities occur in subtidal (rarely intertidal) zones, in clear, coastal waters where wave energy is moderate. Aquatic preserve personnel monitor six seagrass species within CHAP: turtle grass, manatee grass (*Syringodium filiforme*), shoal grass, star grass (*Halophila engelmannii*), paddle grass (*Halophila decipiens*) and widgeon grass (*Ruppia maritima*); the salinity tolerance of the species varies and along with light availability dictates where each will be found. Listed species such as the state and federally endangered Florida manatee, Atlantic green turtle (*Chelonia mydas*), Atlantic hawksbill turtle (*Eretmochelys imbricata*), and the state and federally-listed threatened Atlantic loggerhead turtle (*Caretta caretta*) all rely on seagrass bed communities. Together, seagrasses and their epiphytes serve as important food sources and nursery areas to a myriad of species. Often, numerous species of epiphytic algae, egg casings and invertebrates attach to the seagrass leaf blades.

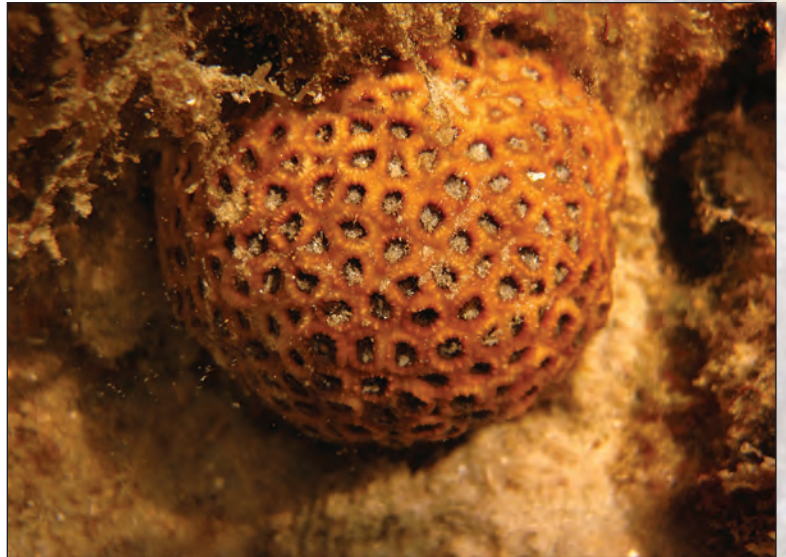
Sponge beds are characterized as dense populations of sessile invertebrates of the phylum Porifera, Class Demospongiae. Although concentrations of living sponges can occur in marine and estuarine intertidal zones, sponge beds are confined primarily to subtidal zones. There are no mapped sponge beds in CHAP; however, a small patch of sponge bed was present within Pine Island Sound Aquatic Preserve in the Flamingo Bay channel prior to being dredged in 2013. Individual sponges occur sporadically throughout CHAP and other sponge beds may be present.

Unconsolidated substrates are characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Unconsolidated substrates are unconsolidated material and include coralgall, marl, mud, mud/sand, sand or shell. This community may support a large population of infaunal organisms as well as a variety of transient planktonic and pelagic organisms. Furthermore, according to Schmid (2009), unvegetated bottom with colonies of sessile invertebrates such as tube worms, tunicates, bryozoans, and sponges (i.e., live bottom) has been identified as essential foraging habitat for the endangered Kemp's ridley turtle (*Lepidochelys kempii*) in the coastal waters of west Florida. This community is known to make up the majority of the unclassified submerged bottom areas within CHAP. It is found not only in deeper waters such as channels but also in some of the shallowest and intertidal portions of the bay, where seagrasses are not found. The only mapped areas of unconsolidated substrate are tidal flats, areas of sand or mud that are unvegetated and cycle between being submerged and exposed with the change in tides (FWC, 2009).

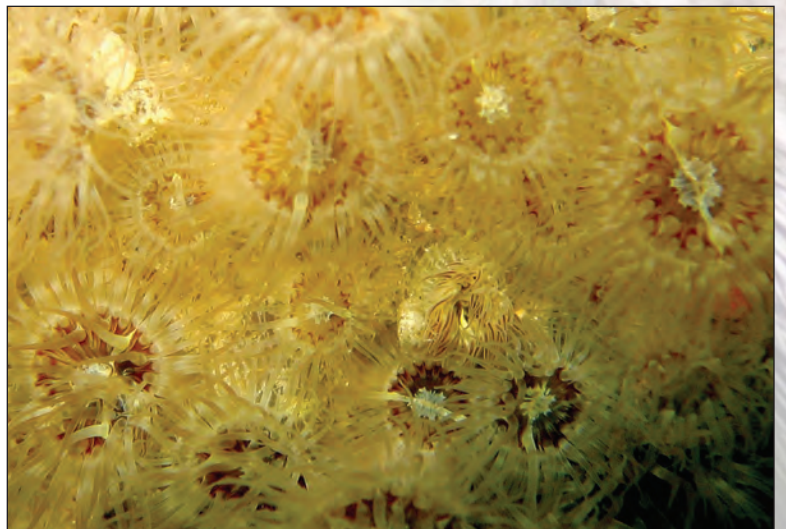
Tidal flats make up less than five percent of CHAP, but more than ten percent of Cape Haze and Matlacha Pass aquatic preserves. During daylight hours, tidal flats serve as a primary feeding ground for numerous species of shorebirds and wading birds. However during the night, fish, crabs and shrimp become the major consumers. Primary producers of mudflats include diatoms, dinoflagellates, filamentous green algae and blue-green algae. While these areas can appear relatively barren, the densities of infaunal organisms in subtidal zones can reach the tens of thousands per square meter, making these areas important feeding grounds for many bottom-feeding fish. Disturbances directly affecting unconsolidated substrates within CHAP may result from dredging, unmanaged anchorages, sunken/abandoned boats and prop scarring from boats in shallow waters. In addition, runoff from roads, stormwater discharges and leachate from septic tanks may all contribute to sediment contamination. Significant amounts of these compounds in the sediments may kill infaunal organisms, eliminating a major food source for a variety of fish, birds and other organisms.

Consolidated substrates are mineral-based natural communities generally characterized as expansive, relatively open areas of subtidal, intertidal and supratidal zones which lack dense populations of sessile plant and animal species. Consolidated substrates are solidified rock or shell conglomerates and include coquina, limerock or relic mollusk reef materials. These communities may be sparsely inhabited by sessile, planktonic, epifaunal and pelagic plants and animals but house few infaunal organisms (i.e., animals living within the substrate). Consolidated substrates are important in that they form the foundation for the development of other marine and estuarine natural communities when environmental conditions become appropriate. For example, CHAP staff have documented soft and hard corals occurring on hard substrate near the passes in Lemon Bay and Gasparilla Sound-Charlotte Harbor aquatic preserves.

Consolidated substrates are not mapped in CHAP, but small localized areas are known, and include areas along the eastern shoreline of Charlotte Harbor including Alligator Creek and Pirate Harbor. In



Although not a common sight, hard coral can be found near the passes of Charlotte Harbor Aquatic Preserves.



Anemones cover hard bottom habitat in Boca Grande Pass, Gasparilla Sound-Charlotte Harbor Aquatic Preserve.

2008, as part of a dredging permit application, there was the first documented evidence of live rock in CHAP. Its presence was confirmed and analyzed by R. Runnels, Ph.D, DEP, Tampa Bay Aquatic Preserves and the following is his assessment of the area known as Rock Area B:

“Based on on-site observations, the hardbottom community in the channel at Pirate Harbor is an unusual occurrence in the Charlotte Harbor area. Such sparsely distributed habitats serve as “habitat islands.” In addition to their inherent unique character, these isolated features may serve as ecological “stepping stones” for species that cannot exist in other habitats to persist and disperse in the local area. As I am not primarily a geologist, I cannot speak authoritatively about the exact origin of the rock outcrop that supports the community. Given the geological complexity of the area, I might guess that the age could be Miocene to Pleistocene.

The organisms themselves include species that are both uncommon to the area and important to water quality. On the rock surface, sessile epilithic species like sea squirts, algae and barnacles provide additional habitat rugosity for small, motile nestling species including amphipods, polychaetes and others. In places, there has been considerable bioerosion of the rock, itself, to support an endolithic community of rock-boring sponges, dodecacerid polychaetes and other cavity dwellers. Both the epilithic and endolithic communities provide considerable water filtration by filter feeders.

If new rock faces were exposed through dredging, they might be expected to be colonized by epilithic species, but the endolithic component would not develop readily because of the loss of the bioeroded surface.”

These areas were dredged in 2013 and the remnant outcrops of live rock are being monitored in accordance with permitting requirements.

Native Species

CHAP is a biologically diverse sub-tropical estuarine system with more than 1,000 plant and animal species, including more than 200 fish species and approximately 180 species of birds. Mangrove islands dot the coastline, providing the perfect spot for wading birds to build their rookeries, safe from most would-be predators. In addition, seagrass beds teem with life, helping to support rookeries but also sustaining a multitude of invertebrate and fish species, including many commercially and recreationally important fishes that migrate in from the Gulf of Mexico. Red mangroves provide shelter for a variety



Juvenile bay scallops of this size are typically found attached to the blades of seagrass.

of flora and fauna both under water and above. Among a mangrove's exposed roots and branches, animals can be found such as tree snails and mangrove tree crabs (*Aratus pisonii*). Under water, tree roots serve as a protected nursery area for fishes, crustaceans, and shellfish. The red mangrove is easily identified by its tangled, reddish roots called prop roots, and these roots have earned mangroves the title of “walking trees.” Red mangrove roots not only act as nursery areas, they also serve as physical traps that stabilize sediments, and serve as substrate for various marine organisms including filter-feeding oysters, sea squirts and tunicates (*Ecteinascidia turbinata*). These attached filter-feeding organisms carry water through their bodies and, in turn, help to trap and cycle nutrients. Mangroves provide foraging habitat for a variety of economically important marine species such as snook (*Centropomus undecimalis*), mangrove snapper (*Lutjanus griseus*), sheepshead and the federally endangered smalltooth sawfish. Their canopies serve as nesting areas for wading bird species such as herons, egrets, pelicans, double-crested cormorants (*Phalacrocorax auritus*) and anhingas (*Anhinga anhinga*).

The six species of seagrasses documented in CHAP are also vital to the health of the estuary. Like mangroves, these plants help to stabilize sediments by trapping particles and dissipating wave energy. They provide habitat and food for a variety of species such as bay anchovy (*Anchoa mitchilli*),



Dolphins are a common sight around Charlotte Harbor Aquatic Preserves.

striped burrfish (*Chilomycterus schoepfii*), ocellated flounder (*Ancylopsetta ommata*), spider crabs (*Libinia dubia*), pinfish (*Lagodon rhomboides*), lined seahorse (*Hippocampus erectus*), dwarf seahorse (*Hippocampus zosterae*), spotfin mojarra (*Eucinostomus argenteus*), snapping shrimp (*Alpheus spp.*), ragged sea hare (*Bursatella leachii pleii*) and horseshoe crab (*Limulus polyphemus*). In addition, the majority of commercial and recreationally important fish species including spotted seatrout (*Cynoscion nebulosus*), black (striped) mullet and mangrove snapper spend some part of their life cycle in a seagrass bed. Larger fauna including the Florida manatee and various species of sea turtles can also be found feeding on the grasses or on other species living within the grass beds. Furthermore, seagrasses provide protection and feeding grounds to numerous invertebrates, including the commercially harvested blue crab and the once abundant bay scallop (*Argopecten irradians*). Efforts to restore bay scallops within the Charlotte Harbor estuarine complex over the past ten years have resulted in an increasing population (Stephenson, Parker, & Geiger, 2014).

Oyster reefs, although much less abundant than historically, still serve as a biologically diverse habitat in CHAP. Like seagrass habitat, oyster reefs provide protection for smaller organisms like mud crabs (*Eurypanopeus depressus*) and porcelain crabs (*Petrolisthes armatus*), and foraging grounds for larger organisms such as stone crab, Florida crown conch (*Melongena corona*), wading birds, fish and raccoons (*Procyon lotor*). Red drum (*Sciaenops ocellatus*) are one of the most sought after recreational fish species associated with oyster reefs. Other sessile organisms (bryozoans, sponges, tunicates, tube worms) and epiphytic algae species make a home of the abundant hard surface area provided by oyster reefs.

Other animals of interest within the aquatic preserves include bottlenose dolphin (*Tursiops truncatus*), tarpon (*Megalops atlanticus*), rays such as the southern stingray (*Dasyatis americana*) and spotted eagle ray (*Aetobatus narinari*), and sharks such as bull sharks (*Carcharhinus leucas*) and blacktip sharks (*Carcharhinus limbatus*). River otters (*Lontra canadensis*) are not uncommon in the upper waters of CHAP tributaries, such as the Myakka River, and can even be found in the more saline areas such as Jug Creek on Pine Island.

See Appendix B.3 for a comprehensive list of species found within the aquatic preserves.

Listed Species

CHAP provides important habitat and foraging areas for many species listed as Endangered or Threatened by either the federal government or by FWC, as designated in Chapters 68A-27.003 and 68A-27.005, F.A.C. As of 2010, all federally-listed species that occur in Florida are now included on

Florida's list as Federally-designated Endangered or Federally-designated Threatened species. In addition, the state has a listing process to identify species that are not federally listed but at risk of extinction. These species are called State-designated Threatened (FWC, 2013). In total there are nearly 30 listed species of plants and animals that utilize CHAP.

Little blue heron (*Egretta caerulea*), reddish egret (*E. rufescens*), and tricolored heron (*E. tricolor*) are all listed by the state as threatened and rely on mangrove islands in the aquatic preserves as nesting colonies. The formerly state-listed brown pelican (*Pelecanus occidentalis*), snowy egret (*Egretta thula*), and white ibis (*Eudocimus albus*) can also be found within these nesting colonies. The American oystercatcher (*Haematopus palliatus*) is listed by the state as threatened and can be found nesting on the exposed substrate beneath the mangroves. In addition, the state-listed threatened black skimmer (*Rynchops niger*) and least tern (*Sternula antillarum*) rely on the estuary and its watershed for food, and the state-listed threatened roseate spoonbill (*Platalea ajaja*) can be seen feeding and nesting in

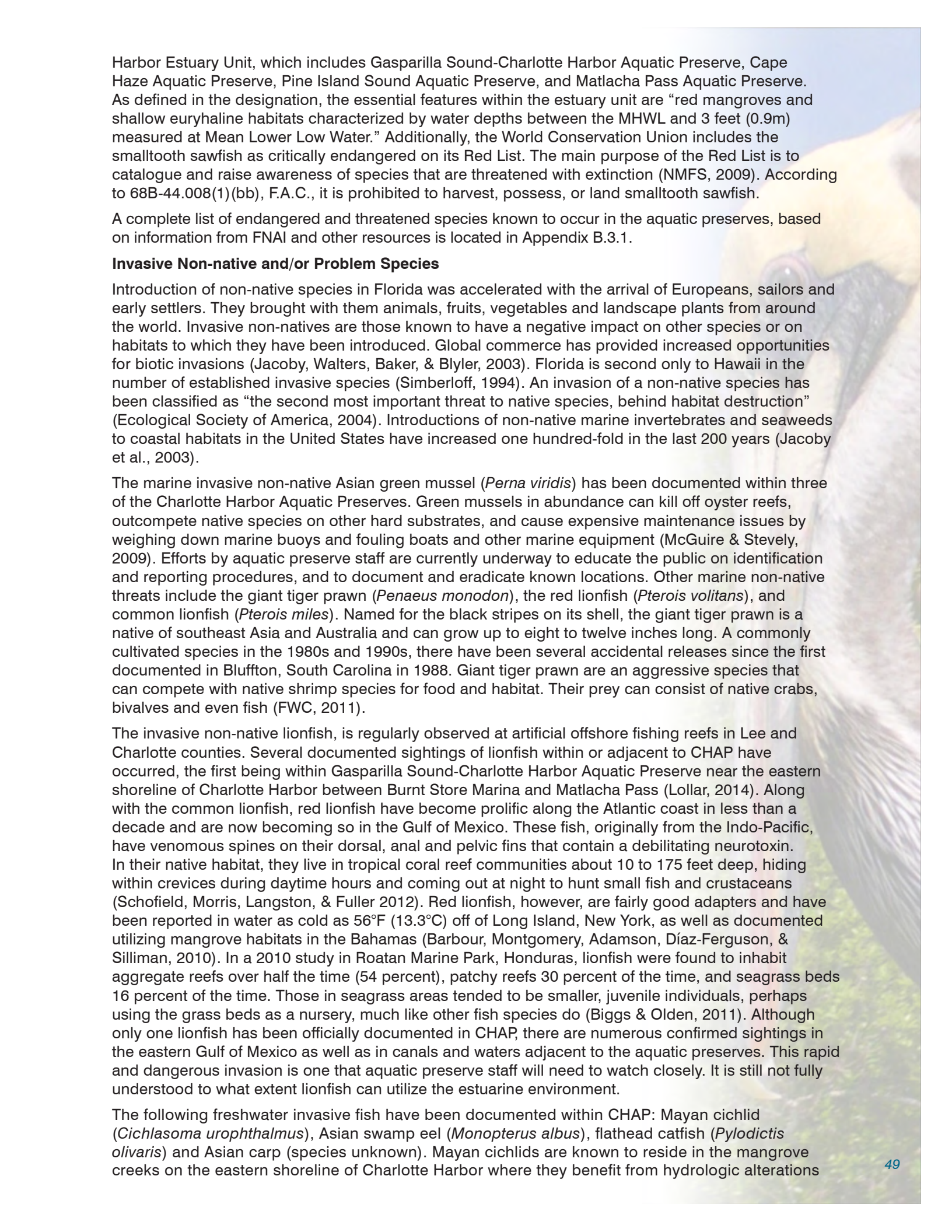
and around CHAP. Although mostly found on the beaches of the Gulf of Mexico, the state-listed threatened snowy plover (*Charadrius nivosus*) and the federally threatened piping plover (*C. melodus*) also benefit from CHAP, occasionally feeding on crustaceans, insects or bivalve mollusks along intertidal mud and sand flats. Similarly, the federally threatened wood stork (*Mycteria americana*) which typically inhabits freshwater wetlands can also be seen foraging within the estuaries.

In the seagrass beds, federally endangered Florida manatees and federally threatened Atlantic green turtles feed on grasses while federally threatened Atlantic loggerhead turtles search for mollusks and crustaceans. Federally endangered Kemp's ridley turtles are also known to utilize CHAP. Smalltooth sawfish, which are federally endangered, is the only listed fish species in CHAP, and benefits from the habitat provided by red mangrove prop roots. Goliath grouper (*Epinephelus itajara*), although not a listed species, also receives benefits from the mangrove prop roots, and is protected from harvest. A few American crocodiles (*Crocodylus acutus*) have found their way to Pine Island Sound Aquatic Preserve, the furthest north this federally threatened species is known to live. Alligators (*Alligator mississippiensis*), also federally threatened, are typically found in the upper reaches of the tributaries to CHAP, but are occasionally seen in the estuaries as well.



A banded brown pelican perches on a piling in Pine Island Sound Aquatic Preserve.

Thomas and Rumbold (2006) found through the Coastal Bays and Barrier Islands Conceptual Ecological Model that altered flows into the coastal bays may affect the federally endangered Florida manatee and smalltooth sawfish, as well as the federally threatened American crocodile and wood stork. The Florida manatee forages, calves, and rests in the bays as well as tributaries leading into the coastal bays. Hydrologic changes may alter freshwater flows and biological conditions in the bays, which in turn may affect manatees. Changes in hydrology affect the American crocodile's use of tributaries and may affect nesting habits and success. CHAP estuaries contain smalltooth sawfish habitat and excessive freshwater inflows or pulses could decrease the value of this habitat for sawfish. Smalltooth sawfish prefer water less than three feet (1m) deep and greater than 86°F (30°C), with moderate to high dissolved oxygen levels (> 6 milligrams/liter) (6 parts per million) and salinities between 18 and 30 parts per thousand (Poulakis et al., 2010). In 2003, the smalltooth sawfish was listed as endangered under the United States Endangered Species Act. NMFS designated smalltooth sawfish critical habitat in September 2009 (50 C.F.R. Part 226). The designation includes the Charlotte



Harbor Estuary Unit, which includes Gasparilla Sound-Charlotte Harbor Aquatic Preserve, Cape Haze Aquatic Preserve, Pine Island Sound Aquatic Preserve, and Matlacha Pass Aquatic Preserve. As defined in the designation, the essential features within the estuary unit are “red mangroves and shallow euryhaline habitats characterized by water depths between the MHWL and 3 feet (0.9m) measured at Mean Lower Low Water.” Additionally, the World Conservation Union includes the smalltooth sawfish as critically endangered on its Red List. The main purpose of the Red List is to catalogue and raise awareness of species that are threatened with extinction (NMFS, 2009). According to 68B-44.008(1)(bb), F.A.C., it is prohibited to harvest, possess, or land smalltooth sawfish.

A complete list of endangered and threatened species known to occur in the aquatic preserves, based on information from FNAI and other resources is located in Appendix B.3.1.

Invasive Non-native and/or Problem Species

Introduction of non-native species in Florida was accelerated with the arrival of Europeans, sailors and early settlers. They brought with them animals, fruits, vegetables and landscape plants from around the world. Invasive non-natives are those known to have a negative impact on other species or on habitats to which they have been introduced. Global commerce has provided increased opportunities for biotic invasions (Jacoby, Walters, Baker, & Blyler, 2003). Florida is second only to Hawaii in the number of established invasive species (Simberloff, 1994). An invasion of a non-native species has been classified as “the second most important threat to native species, behind habitat destruction” (Ecological Society of America, 2004). Introductions of non-native marine invertebrates and seaweeds to coastal habitats in the United States have increased one hundred-fold in the last 200 years (Jacoby et al., 2003).

The marine invasive non-native Asian green mussel (*Perna viridis*) has been documented within three of the Charlotte Harbor Aquatic Preserves. Green mussels in abundance can kill off oyster reefs, outcompete native species on other hard substrates, and cause expensive maintenance issues by weighing down marine buoys and fouling boats and other marine equipment (McGuire & Stevely, 2009). Efforts by aquatic preserve staff are currently underway to educate the public on identification and reporting procedures, and to document and eradicate known locations. Other marine non-native threats include the giant tiger prawn (*Penaeus monodon*), the red lionfish (*Pterois volitans*), and common lionfish (*Pterois miles*). Named for the black stripes on its shell, the giant tiger prawn is a native of southeast Asia and Australia and can grow up to eight to twelve inches long. A commonly cultivated species in the 1980s and 1990s, there have been several accidental releases since the first documented in Bluffton, South Carolina in 1988. Giant tiger prawn are an aggressive species that can compete with native shrimp species for food and habitat. Their prey can consist of native crabs, bivalves and even fish (FWC, 2011).

The invasive non-native lionfish, is regularly observed at artificial offshore fishing reefs in Lee and Charlotte counties. Several documented sightings of lionfish within or adjacent to CHAP have occurred, the first being within Gasparilla Sound-Charlotte Harbor Aquatic Preserve near the eastern shoreline of Charlotte Harbor between Burnt Store Marina and Matlacha Pass (Lollar, 2014). Along with the common lionfish, red lionfish have become prolific along the Atlantic coast in less than a decade and are now becoming so in the Gulf of Mexico. These fish, originally from the Indo-Pacific, have venomous spines on their dorsal, anal and pelvic fins that contain a debilitating neurotoxin. In their native habitat, they live in tropical coral reef communities about 10 to 175 feet deep, hiding within crevices during daytime hours and coming out at night to hunt small fish and crustaceans (Schofield, Morris, Langston, & Fuller 2012). Red lionfish, however, are fairly good adapters and have been reported in water as cold as 56°F (13.3°C) off of Long Island, New York, as well as documented utilizing mangrove habitats in the Bahamas (Barbour, Montgomery, Adamson, Díaz-Ferguson, & Silliman, 2010). In a 2010 study in Roatan Marine Park, Honduras, lionfish were found to inhabit aggregate reefs over half the time (54 percent), patchy reefs 30 percent of the time, and seagrass beds 16 percent of the time. Those in seagrass areas tended to be smaller, juvenile individuals, perhaps using the grass beds as a nursery, much like other fish species do (Biggs & Olden, 2011). Although only one lionfish has been officially documented in CHAP, there are numerous confirmed sightings in the eastern Gulf of Mexico as well as in canals and waters adjacent to the aquatic preserves. This rapid and dangerous invasion is one that aquatic preserve staff will need to watch closely. It is still not fully understood to what extent lionfish can utilize the estuarine environment.

The following freshwater invasive fish have been documented within CHAP: Mayan cichlid (*Cichlasoma urophthalmus*), Asian swamp eel (*Monopterus albus*), flathead catfish (*Pylodictis olivaris*) and Asian carp (species unknown). Mayan cichlids are known to reside in the mangrove creeks on the eastern shoreline of Charlotte Harbor where they benefit from hydrologic alterations

(Adams, 2006). Freshwater invasive fish that may occur within the tributaries of CHAP include the freshwater oscar (*Astronotus ocellatus*), armored catfish (*Hoplosternum littorale*), suckermouth catfish (*Hypostomus plecostomus*), spotted tilapia (*Tilapia mariae*), and blue tilapia (*Oreochromis aureus*), among others.

The Florida Exotic Pest Plant Council maintains the list of plant species considered to be most invasive or potentially most invasive in Florida. Category I plants on this list are considered to be non-native invasive plants that are currently disrupting native plant communities in certain areas or throughout the state. Category II plants have the potential to disrupt native plant communities.

Brazilian pepper and Australian pine (*Casuarina equisetifolia*) are the most problematic invasive plant species on shorelines and on natural and spoil islands of CHAP. Carrotwood is becoming an increasing problem. CHPSP staff are aggressively treating Brazilian pepper and a number of other non-native invasive plant species (DEP, 2007). Brazilian pepper trees were introduced in south Florida in the late 1800s as an ornamental landscape plant. Australian pines were introduced for use as windbreaks around citrus groves and crops (DEP, 2007).

Problem Species

Problem species are native species whose habits create specific concerns or management issues. Raccoon over-population, for example, can have decimating effects on both bird rookeries and sea turtle nests through the raiding of nests and predation of eggs and young. Additionally, populations of the native green macroalgae (*Ulva* spp.) and red macroalgae species such as *Acanthophora spicifera*, *Gracilaria* sp., *Laurencia* sp., and *Hypnea* sp. can proliferate quickly after an influx of nutrients. Aquatic preserve staff have noted this phenomenon at various locations. Harmful algal blooms (HABs) are also found periodically in the waters of CHAP. A HAB is defined as the proliferation of a toxic or nuisance algae. While normally present in the water column at low concentrations, these algae can quickly multiply into blooms that can discolor the water, making it appear red, greenish, brownish, and even purple in color. Depending on the species, the organisms may also produce a toxin that can affect the central nervous system of fish. In Florida, the species that causes the most red tide, a HAB that affects the respiratory system and can cause large-scale fish kills and manatee mortalities, is *Karenia brevis*. Cyanobacteria (or blue-green algae) are also commonly found in Florida estuaries, as well as in lakes and rivers (Florida Department of Health, 2012) such as the Caloosahatchee River. HABs can have significant negative impacts on natural resources or humans, and recently there has been a noticeable increase in problems associated with HABs. Impacts of these natural phenomena include human illness (or death) from contaminated seafood, marine mammal and seabird deaths, and extensive fish kills (EPA, n.d.b).

Although mosquitoes and biting flies are important for the ecosystem, they can be a concern for people. There are dozens of mosquito species in the counties encompassing CHAP. Five species are associated with salt marshes. These species are the land crabhole mosquito (*Deinocerites cancer*), *Culex nigripalpus* (often associated with West Nile virus), brackish water mosquito (*Anopheles atropos*), black saltmarsh mosquito (*Ochlerotatus taeniorhynchus*), and golden saltmarsh mosquito (*O. sollicitans*). The latter two mosquito species listed are the dominant mosquito species in CHAP. Female adults lay eggs on exposed mud flats where they can remain for extended periods until submerged by rain or high tide, when they develop into larvae and eventually adults.

Organized mosquito control in Lee, Charlotte and Sarasota counties started in the late 1920s and 1930s. The focus of this work was hand-ditching mosquito production sites in the salt marshes. Methods used in the past played a major role in alteration of natural salt marsh habitats and their function. The primary focus of mosquito control in the counties is the same now as it was in the past, reduce mosquito production in salt marshes by creating pathways for native fish to prey on immature mosquitoes (i.e. rotary ditching). This mosquito control method can often eliminate mosquito production completely from a site for years. If this technique is not appropriate to reduce or alter a mosquito production site, larviciding is the next best method to control immature mosquitoes. The method of last resort for mosquito control is the adulticide, a spray to control adult mosquitoes. Through coordination with the local mosquito control authorities, rookery islands are not sprayed with either adulticide or larvicide in Lee County. Treating for adult mosquitoes in the past was only done in the adjacent upland residential areas, not on the state-owned lands. However, in 2013, Lee County also treated adult mosquitoes on state-owned lands above the mean high water line by the Governor's order due to human health concerns. Larvicide has historically been used to treat state-owned lands.

Refer to Appendix B.3.3 for a complete list of problem and invasive non-native species.

Archaeological and Historical Resources

Florida's coastal areas, especially uplands adjacent to water, often have a rich history of human settlement. Human activity within CHAP and CHPSP dates back to the Archaic period, 10,500 B.P. – 3,000 B.P. There are hundreds of historic or archaeological sites recorded in the Florida Master Site File within or immediately adjacent (i.e. within 50 m) to CHAP, most of which are within CHAP boundaries. However, much of the area has not been surveyed and it is expected that there are still unrecorded sites located along the coastline of the uplands, on islands, and in inundated areas. These historic sites include Native American and European encampments and villages and shipwrecks, along with prehistoric shell kitchen middens (DEP, 2007).

While there are many recorded sites, the prehistoric cultural sequence for the coastal areas around CHAP is still incompletely understood, particularly the earlier pre-ceramic occupations. Part of the problem centers on the fact that there has been an overall 30-50 meter rise in sea level in the past 10-12,000 years. Thus, the majority of the coastal sites from these earliest periods lie drowned on the bottom of the Gulf of Mexico and the extensive bay system comprising the aquatic preserves. The historic sites of Little Salt Springs and Warm Mineral Springs, located in nearby Sarasota County, and the Bay West site in Collier County were interior sites around water sources during drier, lower sea-level times. In addition, there are identified drowned, former coastal and river edge habitation and quarry sites in Pinellas, Hillsborough and Sarasota counties, as well as further northward along the Gulf Coast and the Atlantic Coast.

Refer to Chapter 3.1 for more detailed information on the historical background of the area. See Appendix B.4 for a list of archaeological or historic sites within or immediately adjacent (i.e. within 50 meters) to CHAP. It should be noted that archaeological sites and historical resources are protected (Chapter 267, Florida Statutes) and are not to be disturbed unless prior permission is granted from the Department of State's Division of Historical Resources.

Other Associated Resources

The Great Florida Birding and Wildlife Trail (www.floridabirdingtrail.com), an FWC program, has several parks and preserves listed within the CHAP area including, but not limited to, Lemon Bay Park and Environmental Center, Charlotte Harbor Environmental Center, Amberjack Environmental Park, Tippecanoe Environmental Park, CHPSP, Cayo Costa State Park and J.N. "Ding" Darling National Wildlife Refuge. In addition, thousands of acres of nearby conservation lands offer protection measures for CHAP and provide recreational opportunities to residents and visitors alike. These lands are managed by various agencies such as USFWS, DEP, FWC, Sarasota County, Charlotte County and Lee County.

Paddling trails weave throughout CHAP, offering perhaps the best opportunities for viewing wildlife. Maps and access points throughout the three county region can be accessed through:

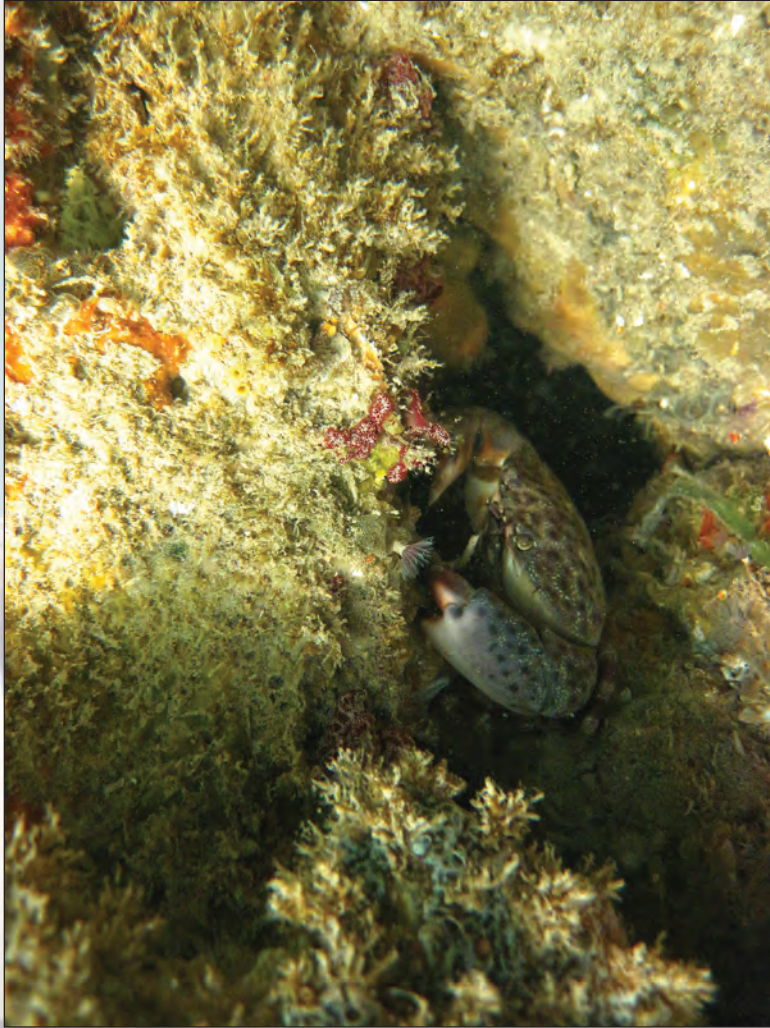
- The Great Calusa Blueway, Lee County paddling trails / <http://www.fortmyers-sanibel.com/calusablueway/about>
- Charlotte County Blueways Trails, Charlotte County paddling trails / www.charlottecountyfl.com/CommunityServices/blueway.asp
- Florida Paddling Trails, Coastal Florida paddling trails / www.floridapaddlingtrails.com

3.4 / Values

Florida's economic well-being is firmly linked to its marine resources. Statewide coastal communities increasingly must learn how to sustain economic viability while maintaining and restoring the environmental integrity of coastal resources. Rapid coastal population growth, a concurrent increase in recreational boating and other water-related activities and declining quality of natural environments all contribute to this challenge. The designation of CHAP and the Aquatic Preserve Rule, Chapter 18-20, F.A.C., help buffer against negative environmental impacts that might result from coastal development. CHAP and other aquatic preserves around Florida help provide protection to areas so that environmental compromise is far less likely to occur than in unprotected marine environments.

Tourism is an important driving force in southwest Florida, fueled by a healthy environment. Florida's largest economic industry employs more than one million Floridians and included approximately 93.7 million travelers visiting the Sunshine State in 2013. These tourists spent more than \$76 billion and generated nearly a quarter of the state's sales tax revenue in 2013 (VISIT FLORIDA, n.d.). This revenue is an important contributor for public necessities such as schools, transportation and museums, as well as enhancing Florida's offerings to entice future visitors. In Lee County alone, tourism employs one of every five people, with approximately five million visitors bringing in \$3 billion in economic impact annually

(Lee County Visitor & Convention Bureau, 2009). With their white sand beaches, fishing and boating, Lee, Charlotte and Sarasota counties are a natural draw for many visitors to southwest Florida. The area enjoys both domestic and international tourism. During the spring and summer, Floridians flock to the southwest region from all parts of the state. Visitors from Britain arrive during the summer months, from Germany in the fall, and from Canada in the winter (Beever, 2008). In addition, the region also sees an annual population increase during the winter months, when seasonal residents arrive from states to the north. These residents, known as “snowbirds,” typically arrive in autumn as temperatures in northern states begin to fall. Stays usually coincide with the local dry season, as temperatures here are mild and rainfall is minimal. In general, these seasonal residents begin heading back up north in the spring, before south Florida’s summer weather pattern begins.



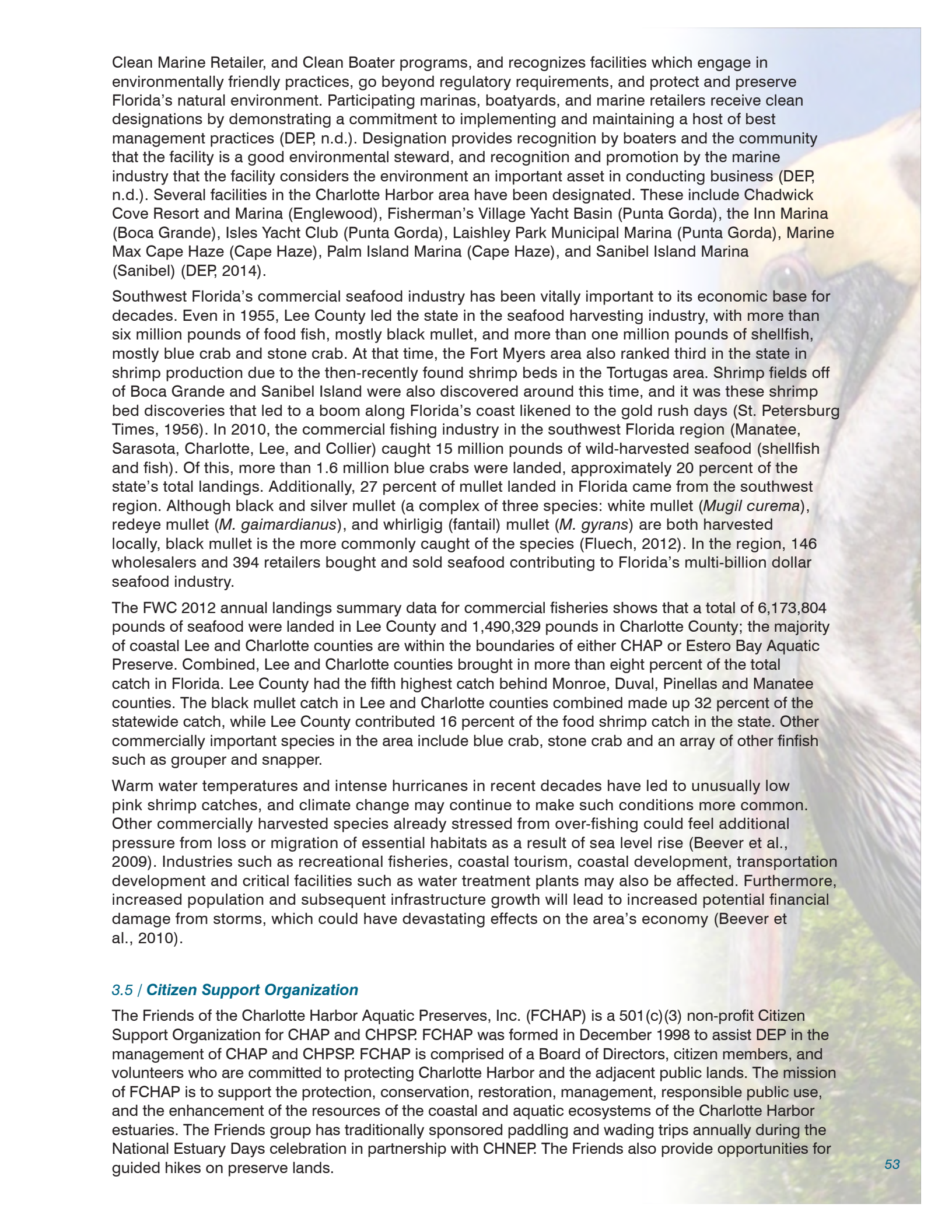
Stone crabs hide in crevices of hard bottom habitats in the Charlotte Harbor Aquatic Preserves.

Water-dependent activities are a large draw for visitors to the area. Boating, kayaking and fishing are just some of the activities that attract people to southwest Florida. Within the vicinity of CHAP, there are several canoe/kayak rental facilities and dozens of boat ramps, marinas, and boat rental operators. Eco-tour businesses are also prevalent in the Charlotte Harbor area, bringing nature enthusiasts to the area and educating the public on the importance of a healthy ecosystem. Eco-tours bring people into nature and give them the chance to learn about the importance of the local environment and provide them with the opportunity to encounter, first-hand, area wildlife including dolphins, manatees, wading birds, and sea turtles. Tours are generally conducted by kayak or powerboat. Although there is currently no collection of Best Management Practices for the local ecotourism industry, many operators promote environmental sustainability and ecological stewardship and some obtain certification through organizations such as Florida Society for Ethical Eco-Tourism. Appropriate ethical ecotourism will help to sustain the industry and the resources; integration of these practices into the daily workings of local eco-tour companies would be beneficial to the companies and CHAP.

One of the main draws to Florida, and the Charlotte Harbor area, continues to be its fishing opportunities. Florida’s recreational

fishery is among the largest in the country and is an important component of the state’s tourism economy, as one of every three tourists comes to Florida to fish (Beever, 2008). Close to half the estimated recreational fishing trips in Florida are made by visitors to the state (FWC, 2012a). Additionally, DEP data indicate that 21 percent of the Florida population engages in recreational fishing, and total angling in the region exceeds \$1.1 billion annually (Beever et al., 2009). While many anglers fish from shore, there continues to be a significant increase over time in the estimated number of trips made by anglers from private or rental boats. In west Florida specifically, estimated private or rental boat trips increased from approximately five million in 1981 to more than 8.9 million in 2006 (FWC, 2012a). The most commonly sought fish in the Charlotte Harbor estuaries are snook, redfish, trout, snapper, mackerel (*Scomberomorus* spp.), sheepshead, and tarpon. Boca Grande Pass is world renowned for tarpon fishing and is home to the “World’s Richest Tarpon Tournament” held every May.

With the growing number of boaters on the water for fishing and other recreational purposes, and in order to preserve the value of the natural environment, DEP is encouraging clean boating practices through its Florida Clean Marina Program. This program includes the Clean Marina, Clean Boatyard,



Clean Marine Retailer, and Clean Boater programs, and recognizes facilities which engage in environmentally friendly practices, go beyond regulatory requirements, and protect and preserve Florida's natural environment. Participating marinas, boatyards, and marine retailers receive clean designations by demonstrating a commitment to implementing and maintaining a host of best management practices (DEP, n.d.). Designation provides recognition by boaters and the community that the facility is a good environmental steward, and recognition and promotion by the marine industry that the facility considers the environment an important asset in conducting business (DEP, n.d.). Several facilities in the Charlotte Harbor area have been designated. These include Chadwick Cove Resort and Marina (Englewood), Fisherman's Village Yacht Basin (Punta Gorda), the Inn Marina (Boca Grande), Isles Yacht Club (Punta Gorda), Laishley Park Municipal Marina (Punta Gorda), Marine Max Cape Haze (Cape Haze), Palm Island Marina (Cape Haze), and Sanibel Island Marina (Sanibel) (DEP, 2014).

Southwest Florida's commercial seafood industry has been vitally important to its economic base for decades. Even in 1955, Lee County led the state in the seafood harvesting industry, with more than six million pounds of food fish, mostly black mullet, and more than one million pounds of shellfish, mostly blue crab and stone crab. At that time, the Fort Myers area also ranked third in the state in shrimp production due to the then-recently found shrimp beds in the Tortugas area. Shrimp fields off of Boca Grande and Sanibel Island were also discovered around this time, and it was these shrimp bed discoveries that led to a boom along Florida's coast likened to the gold rush days (St. Petersburg Times, 1956). In 2010, the commercial fishing industry in the southwest Florida region (Manatee, Sarasota, Charlotte, Lee, and Collier) caught 15 million pounds of wild-harvested seafood (shellfish and fish). Of this, more than 1.6 million blue crabs were landed, approximately 20 percent of the state's total landings. Additionally, 27 percent of mullet landed in Florida came from the southwest region. Although black and silver mullet (a complex of three species: white mullet (*Mugil curema*), redeye mullet (*M. gaimardianus*), and whirligig (fantail) mullet (*M. gyrans*) are both harvested locally, black mullet is the more commonly caught of the species (Fluech, 2012). In the region, 146 wholesalers and 394 retailers bought and sold seafood contributing to Florida's multi-billion dollar seafood industry.

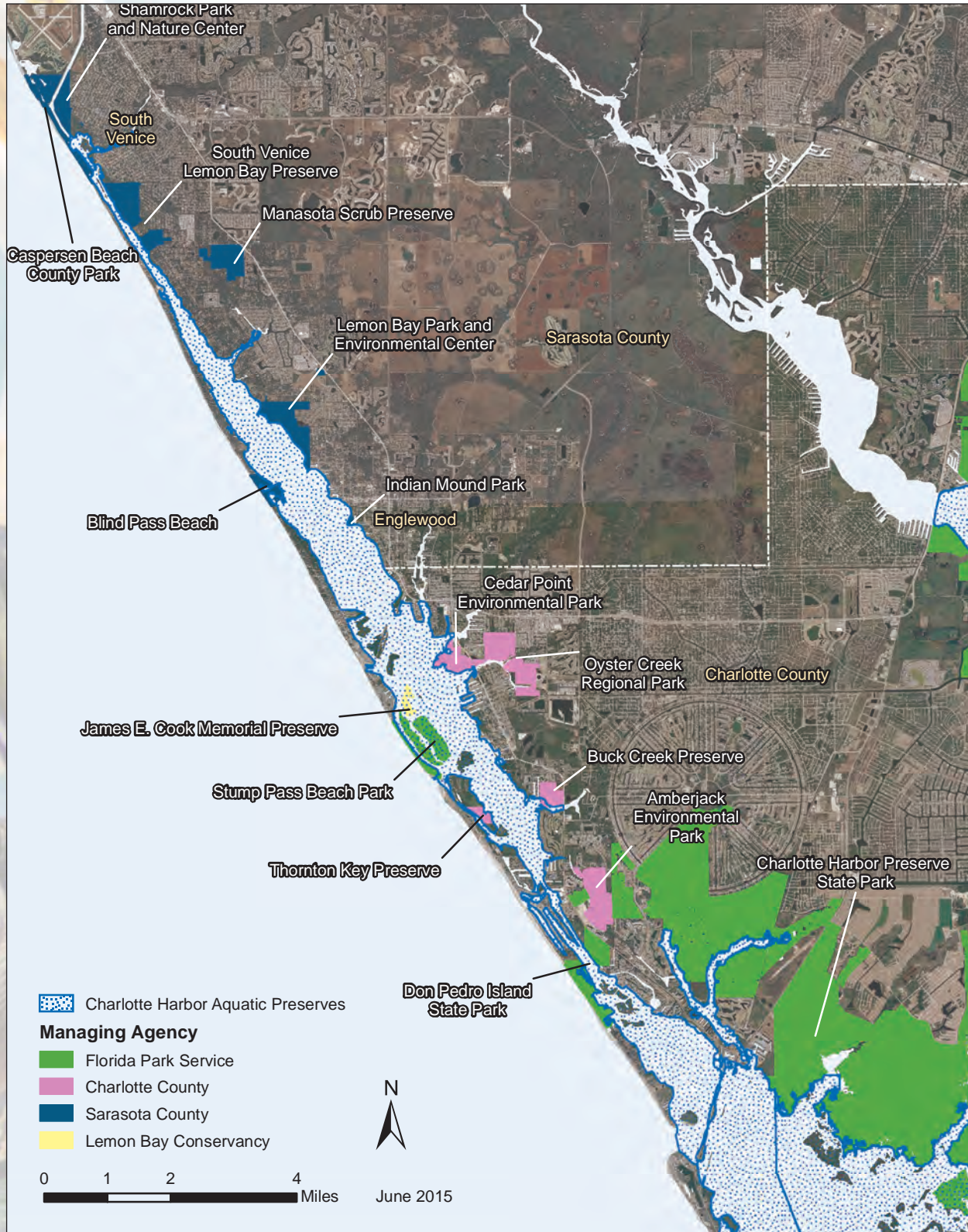
The FWC 2012 annual landings summary data for commercial fisheries shows that a total of 6,173,804 pounds of seafood were landed in Lee County and 1,490,329 pounds in Charlotte County; the majority of coastal Lee and Charlotte counties are within the boundaries of either CHAP or Estero Bay Aquatic Preserve. Combined, Lee and Charlotte counties brought in more than eight percent of the total catch in Florida. Lee County had the fifth highest catch behind Monroe, Duval, Pinellas and Manatee counties. The black mullet catch in Lee and Charlotte counties combined made up 32 percent of the statewide catch, while Lee County contributed 16 percent of the food shrimp catch in the state. Other commercially important species in the area include blue crab, stone crab and an array of other finfish such as grouper and snapper.

Warm water temperatures and intense hurricanes in recent decades have led to unusually low pink shrimp catches, and climate change may continue to make such conditions more common. Other commercially harvested species already stressed from over-fishing could feel additional pressure from loss or migration of essential habitats as a result of sea level rise (Beever et al., 2009). Industries such as recreational fisheries, coastal tourism, coastal development, transportation development and critical facilities such as water treatment plants may also be affected. Furthermore, increased population and subsequent infrastructure growth will lead to increased potential financial damage from storms, which could have devastating effects on the area's economy (Beever et al., 2010).

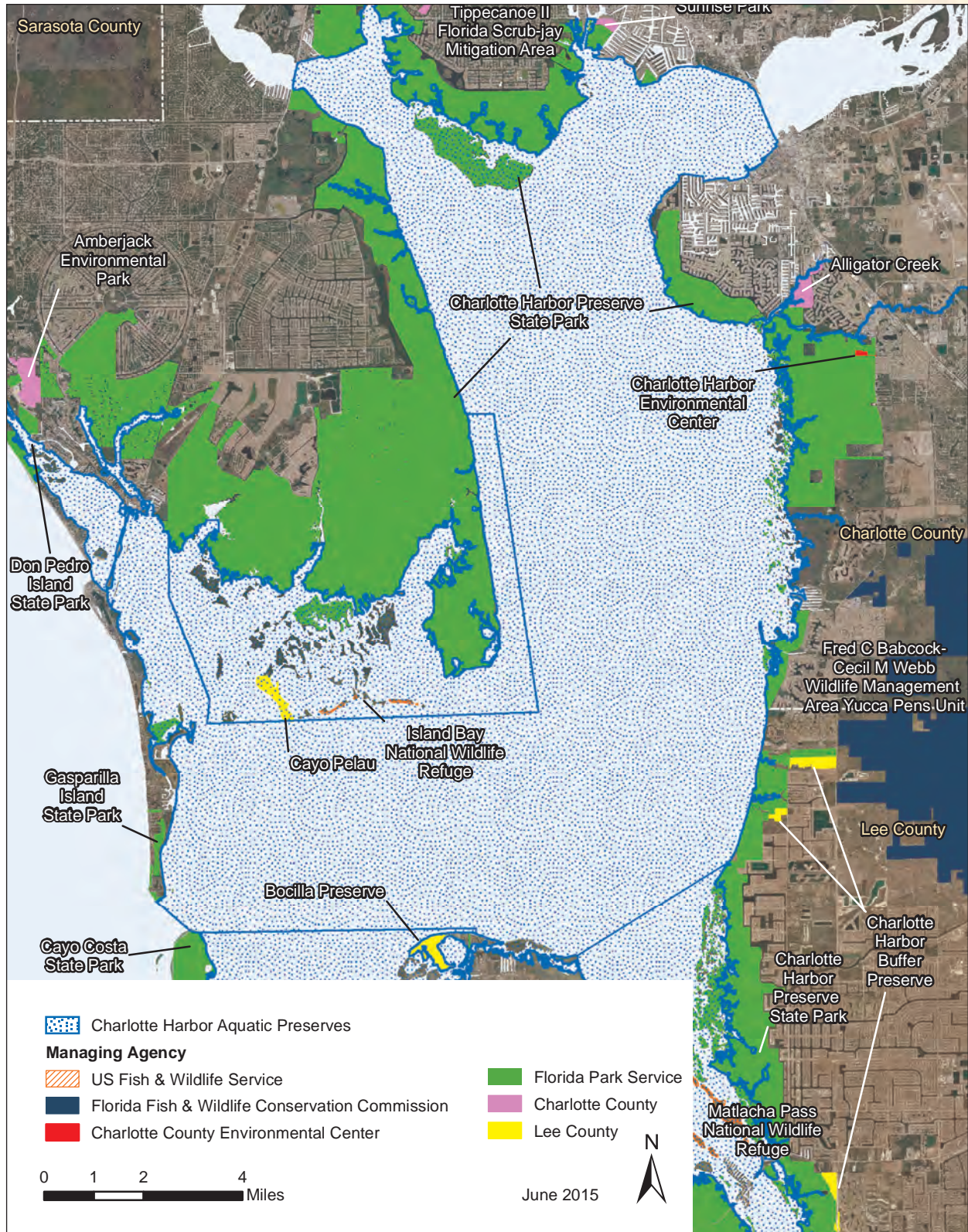
3.5 / Citizen Support Organization

The Friends of the Charlotte Harbor Aquatic Preserves, Inc. (FCHAP) is a 501(c)(3) non-profit Citizen Support Organization for CHAP and CHPSP. FCHAP was formed in December 1998 to assist DEP in the management of CHAP and CHPSP. FCHAP is comprised of a Board of Directors, citizen members, and volunteers who are committed to protecting Charlotte Harbor and the adjacent public lands. The mission of FCHAP is to support the protection, conservation, restoration, management, responsible public use, and the enhancement of the resources of the coastal and aquatic ecosystems of the Charlotte Harbor estuaries. The Friends group has traditionally sponsored paddling and wading trips annually during the National Estuary Days celebration in partnership with CHNEP. The Friends also provide opportunities for guided hikes on preserve lands.

FCHAP members and volunteers provide invaluable assistance and greatly benefit CHAP and CHPSP through trail construction and maintenance, exotic plant removal, and Coastal Cleanups. The Friends represent CHAP at local festivals, which have included the CHNEP Nature Festival, Cape Coral Burrowing Owl Festival, Florida Sportsman Expo, the Southwest Florida Nautical Flea Market and Boat Show, and the Calusa Blueway Paddling Festival. FCHAP has secured funding through several granting organizations to support CHAP and CHPSP activities, including, in 2014, the purchase of snorkeling equipment needed for CHAP to provide public snorkeling ecoventures. The group also raises funds to support their mission; in addition to membership dues, fundraisers have included



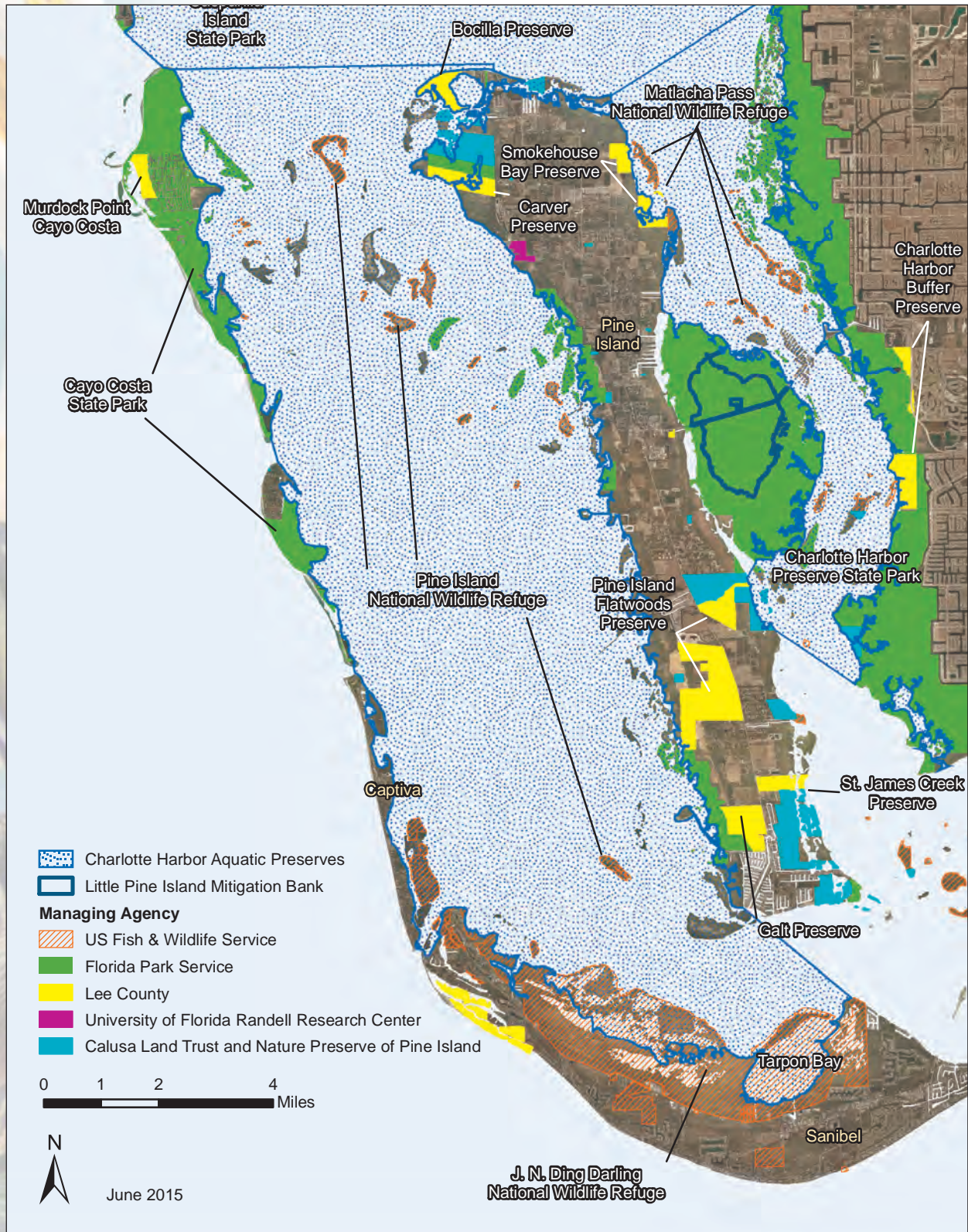
paddling trips, trail runs and t-shirt sales. FCHAP regularly provides financial support for staff training, travel to scientific meetings, and volunteer appreciation events; in addition the group was able to provide funding (with matching funds from DEP) for new equipment for the recently constructed CHAP Field Support Facility. In 2014, FCHAP also supported visiting Grand Valley State University students by supplying lunches for their Alternate Spring Break week at CHAP, where they assisted with a TNC/CHAP oyster reef restoration project in the Peace River. And in 2014, the FCHAP President played a major role in establishing the statewide, non-profit Aquatic Preserve Society, Inc., a citizen support organization for all aquatic preserves in the state.



Map 21 | Cape Haze and Gasparilla Sound-Charlotte Harbor aquatic preserves adjacent public lands.

3.6 / Adjacent Public Lands and Designated Resources

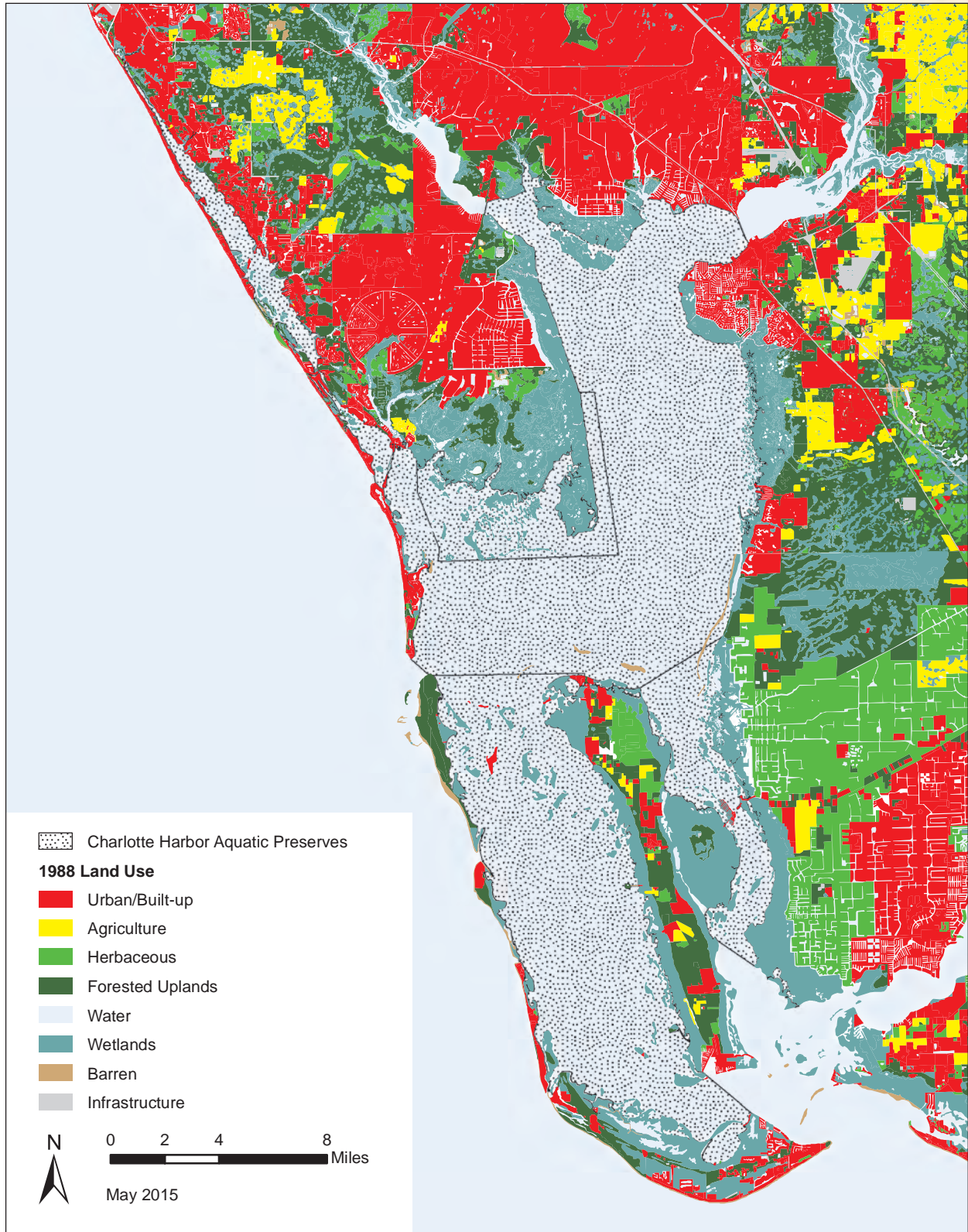
CHAP is surrounded in large part by publicly owned land. A large portion of the mangrove fringe and upland areas surrounding CHAP was originally established as the Charlotte Harbor State Reserve, then Charlotte Harbor State Buffer Preserve under the management of DNR, then DEP, with land acquisition beginning in the 1970s. In 2003 - 2004, those areas were transferred to the state park system and designated as Charlotte Harbor Preserve State Park (CHPSP). CHPSP is comprised of 43,000 acres and protects 80 miles of shoreline along the Charlotte Harbor estuaries in Charlotte and Lee Counties,



56 Map 22 / Pine Island Sound and Matlacha Pass aquatic preserves adjacent public lands.

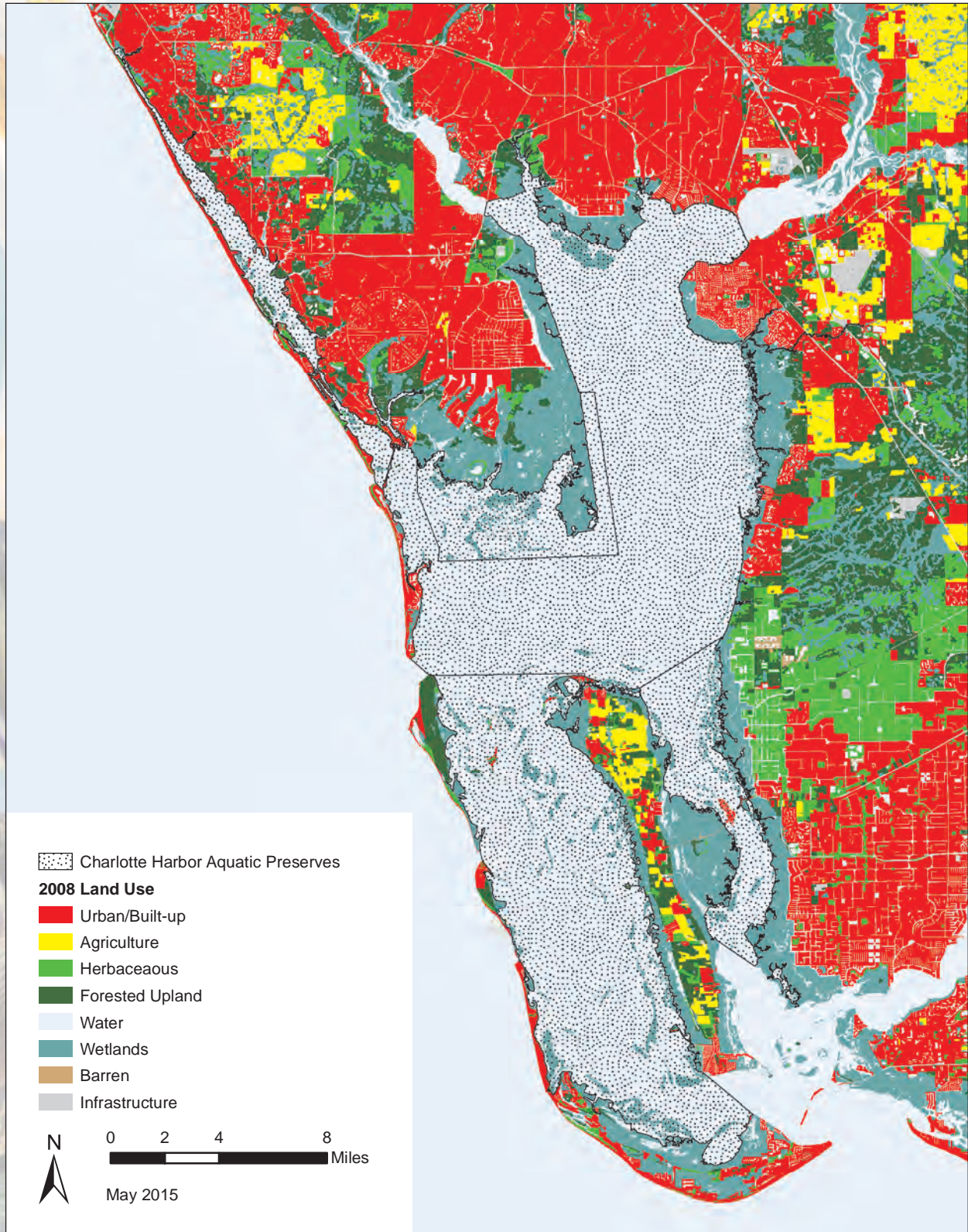
providing a buffer between the aquatic preserves and urban development and agriculture. Portions of CHPSP are adjacent to four of the five CHAPs; these include Gasparilla Sound-Charlotte Harbor, Cape Haze, Pine Island Sound and Matlacha Pass aquatic preserves (see maps 20-22). The Little Pine Island Mitigation Bank adjacent to Matlacha Pass Aquatic Preserve is also part of CHPSP.

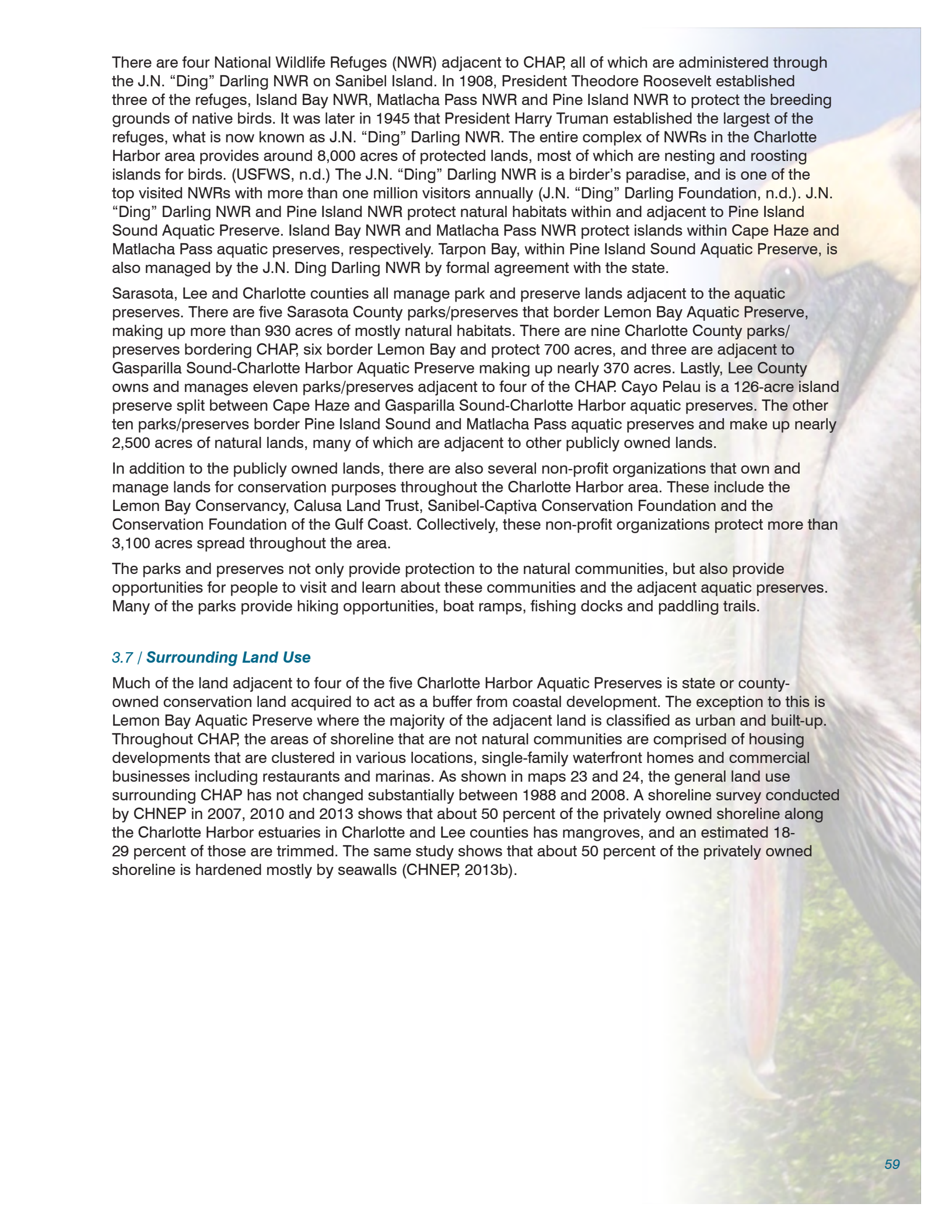
In addition to CHPSP, there are four other state parks that abut CHAP: Don Pedro Island, Stump Pass Beach, Gasparilla Island and Cayo Costa state parks, all of which protect the natural habitats of barrier islands. Don Pedro Island State Park is located adjacent to Lemon Bay and provides a trail system



Map 23 | 1988 land use surrounding the Charlotte Harbor Aquatic Preserves.

through the natural communities and a mile of beach. Also bordering Lemon Bay is Stump Pass Beach State Park, consisting of the south end of Manasota Key, Peterson Island and Whidden Key. Gasparilla Island State Park, located just north of Boca Grande Pass and adjacent to Gasparilla Sound-Charlotte Harbor Aquatic Preserve, is home to the Boca Grande lighthouse built in 1890. The north end of Cayo Costa State Park is on the south side of Boca Grande Pass and to the west of Pine Island Sound; this park covers the majority of the nine-mile long barrier island and protects more than 2,400 acres of natural habitat.





There are four National Wildlife Refuges (NWR) adjacent to CHAP, all of which are administered through the J.N. “Ding” Darling NWR on Sanibel Island. In 1908, President Theodore Roosevelt established three of the refuges, Island Bay NWR, Matlacha Pass NWR and Pine Island NWR to protect the breeding grounds of native birds. It was later in 1945 that President Harry Truman established the largest of the refuges, what is now known as J.N. “Ding” Darling NWR. The entire complex of NWRs in the Charlotte Harbor area provides around 8,000 acres of protected lands, most of which are nesting and roosting islands for birds. (USFWS, n.d.) The J.N. “Ding” Darling NWR is a birder’s paradise, and is one of the top visited NWRs with more than one million visitors annually (J.N. “Ding” Darling Foundation, n.d.). J.N. “Ding” Darling NWR and Pine Island NWR protect natural habitats within and adjacent to Pine Island Sound Aquatic Preserve. Island Bay NWR and Matlacha Pass NWR protect islands within Cape Haze and Matlacha Pass aquatic preserves, respectively. Tarpon Bay, within Pine Island Sound Aquatic Preserve, is also managed by the J.N. Ding Darling NWR by formal agreement with the state.

Sarasota, Lee and Charlotte counties all manage park and preserve lands adjacent to the aquatic preserves. There are five Sarasota County parks/preserves that border Lemon Bay Aquatic Preserve, making up more than 930 acres of mostly natural habitats. There are nine Charlotte County parks/preserves bordering CHAP, six border Lemon Bay and protect 700 acres, and three are adjacent to Gasparilla Sound-Charlotte Harbor Aquatic Preserve making up nearly 370 acres. Lastly, Lee County owns and manages eleven parks/preserves adjacent to four of the CHAP. Cayo Pelau is a 126-acre island preserve split between Cape Haze and Gasparilla Sound-Charlotte Harbor aquatic preserves. The other ten parks/preserves border Pine Island Sound and Matlacha Pass aquatic preserves and make up nearly 2,500 acres of natural lands, many of which are adjacent to other publicly owned lands.

In addition to the publicly owned lands, there are also several non-profit organizations that own and manage lands for conservation purposes throughout the Charlotte Harbor area. These include the Lemon Bay Conservancy, Calusa Land Trust, Sanibel-Captiva Conservation Foundation and the Conservation Foundation of the Gulf Coast. Collectively, these non-profit organizations protect more than 3,100 acres spread throughout the area.

The parks and preserves not only provide protection to the natural communities, but also provide opportunities for people to visit and learn about these communities and the adjacent aquatic preserves. Many of the parks provide hiking opportunities, boat ramps, fishing docks and paddling trails.

3.7 / Surrounding Land Use

Much of the land adjacent to four of the five Charlotte Harbor Aquatic Preserves is state or county-owned conservation land acquired to act as a buffer from coastal development. The exception to this is Lemon Bay Aquatic Preserve where the majority of the adjacent land is classified as urban and built-up. Throughout CHAP, the areas of shoreline that are not natural communities are comprised of housing developments that are clustered in various locations, single-family waterfront homes and commercial businesses including restaurants and marinas. As shown in maps 23 and 24, the general land use surrounding CHAP has not changed substantially between 1988 and 2008. A shoreline survey conducted by CHNEP in 2007, 2010 and 2013 shows that about 50 percent of the privately owned shoreline along the Charlotte Harbor estuaries in Charlotte and Lee counties has mangroves, and an estimated 18-29 percent of those are trimmed. The same study shows that about 50 percent of the privately owned shoreline is hardened mostly by seawalls (CHNEP, 2013b).



Old stilt fish houses, a remnant of the past, can still be seen in Cape Haze Aquatic Preserve.

Part II

Management Programs and Issues

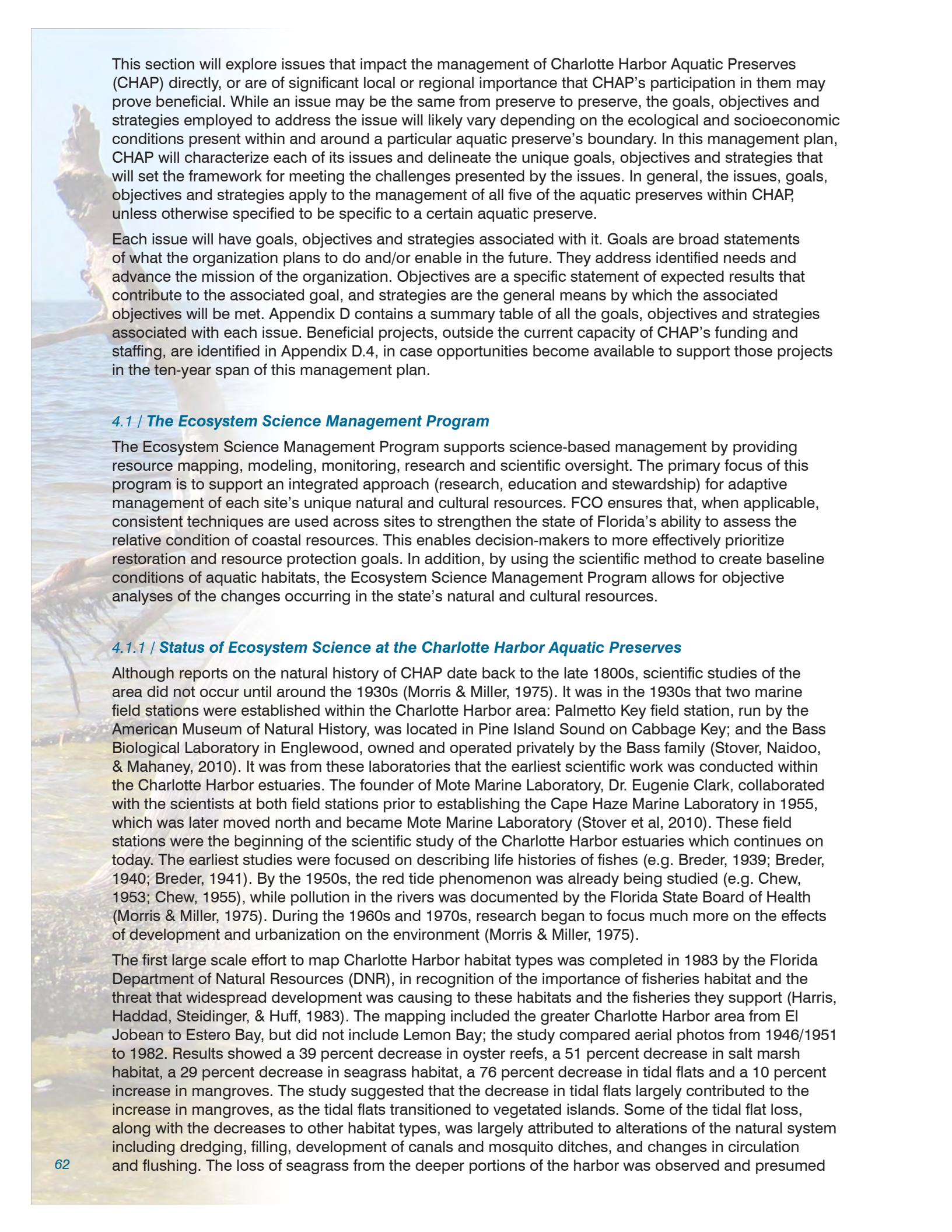
Chapter Four

The Charlotte Harbor Aquatic Preserves' Management Programs and Issues

The work performed by the Florida Coastal Office (FCO) is divided into components called management programs. In this management plan all site operational activities are explained within the following four management programs: Ecosystem Science, Resource Management, Education and Outreach, and Public Use.

The hallmark of Florida's Aquatic Preserve Program is that each site's natural resource management efforts are in direct response to, and designed for unique local and regional issues. When issues are addressed by an aquatic preserve it allows for an integrated approach by the staff using principles of the Ecosystem Science, Resource Management, Education and Outreach, and Public Use Programs. This complete treatment of issues provides a mechanism through which the goals, objectives and strategies associated with an issue have a greater chance of being met. For instance, an aquatic preserve may address declines in water clarity by monitoring levels of turbidity and chlorophyll (Ecosystem Science - research), planting eroded shorelines with marsh vegetation (Resource Management - habitat restoration), creating a display or program on preventing water quality degradation (Education and Outreach), and offering training to municipal officials on retrofitting stormwater facilities to increase levels of treatment (Education and Outreach).

Issue-based management is a means through which any number of partners may become involved with an aquatic preserve in addressing an issue. Because most aquatic preserves are endowed with very few staff, partnering is a necessity, and by bringing issues into a broad public consciousness partners who wish to be involved are able to do so. Involving partners in issue-based management ensures that a particular issue receives attention from angles that the aquatic preserve may not normally address.



This section will explore issues that impact the management of Charlotte Harbor Aquatic Preserves (CHAP) directly, or are of significant local or regional importance that CHAP's participation in them may prove beneficial. While an issue may be the same from preserve to preserve, the goals, objectives and strategies employed to address the issue will likely vary depending on the ecological and socioeconomic conditions present within and around a particular aquatic preserve's boundary. In this management plan, CHAP will characterize each of its issues and delineate the unique goals, objectives and strategies that will set the framework for meeting the challenges presented by the issues. In general, the issues, goals, objectives and strategies apply to the management of all five of the aquatic preserves within CHAP, unless otherwise specified to be specific to a certain aquatic preserve.

Each issue will have goals, objectives and strategies associated with it. Goals are broad statements of what the organization plans to do and/or enable in the future. They address identified needs and advance the mission of the organization. Objectives are a specific statement of expected results that contribute to the associated goal, and strategies are the general means by which the associated objectives will be met. Appendix D contains a summary table of all the goals, objectives and strategies associated with each issue. Beneficial projects, outside the current capacity of CHAP's funding and staffing, are identified in Appendix D.4, in case opportunities become available to support those projects in the ten-year span of this management plan.

4.1 / The Ecosystem Science Management Program

The Ecosystem Science Management Program supports science-based management by providing resource mapping, modeling, monitoring, research and scientific oversight. The primary focus of this program is to support an integrated approach (research, education and stewardship) for adaptive management of each site's unique natural and cultural resources. FCO ensures that, when applicable, consistent techniques are used across sites to strengthen the state of Florida's ability to assess the relative condition of coastal resources. This enables decision-makers to more effectively prioritize restoration and resource protection goals. In addition, by using the scientific method to create baseline conditions of aquatic habitats, the Ecosystem Science Management Program allows for objective analyses of the changes occurring in the state's natural and cultural resources.

4.1.1 / Status of Ecosystem Science at the Charlotte Harbor Aquatic Preserves

Although reports on the natural history of CHAP date back to the late 1800s, scientific studies of the area did not occur until around the 1930s (Morris & Miller, 1975). It was in the 1930s that two marine field stations were established within the Charlotte Harbor area: Palmetto Key field station, run by the American Museum of Natural History, was located in Pine Island Sound on Cabbage Key; and the Bass Biological Laboratory in Englewood, owned and operated privately by the Bass family (Stover, Naidoo, & Mahaney, 2010). It was from these laboratories that the earliest scientific work was conducted within the Charlotte Harbor estuaries. The founder of Mote Marine Laboratory, Dr. Eugenie Clark, collaborated with the scientists at both field stations prior to establishing the Cape Haze Marine Laboratory in 1955, which was later moved north and became Mote Marine Laboratory (Stover et al, 2010). These field stations were the beginning of the scientific study of the Charlotte Harbor estuaries which continues on today. The earliest studies were focused on describing life histories of fishes (e.g. Breder, 1939; Breder, 1940; Breder, 1941). By the 1950s, the red tide phenomenon was already being studied (e.g. Chew, 1953; Chew, 1955), while pollution in the rivers was documented by the Florida State Board of Health (Morris & Miller, 1975). During the 1960s and 1970s, research began to focus much more on the effects of development and urbanization on the environment (Morris & Miller, 1975).

The first large scale effort to map Charlotte Harbor habitat types was completed in 1983 by the Florida Department of Natural Resources (DNR), in recognition of the importance of fisheries habitat and the threat that widespread development was causing to these habitats and the fisheries they support (Harris, Haddad, Steidinger, & Huff, 1983). The mapping included the greater Charlotte Harbor area from El Jobean to Estero Bay, but did not include Lemon Bay; the study compared aerial photos from 1946/1951 to 1982. Results showed a 39 percent decrease in oyster reefs, a 51 percent decrease in salt marsh habitat, a 29 percent decrease in seagrass habitat, a 76 percent decrease in tidal flats and a 10 percent increase in mangroves. The study suggested that the decrease in tidal flats largely contributed to the increase in mangroves, as the tidal flats transitioned to vegetated islands. Some of the tidal flat loss, along with the decreases to other habitat types, was largely attributed to alterations of the natural system including dredging, filling, development of canals and mosquito ditches, and changes in circulation and flushing. The loss of seagrass from the deeper portions of the harbor was observed and presumed

to have been due to changes in water quality. However, a need to better understand the relationship between seagrass health and various water quality components was acknowledged.

Long-term monitoring and targeted scientific studies have focused on changes in the estuarine system and understanding the relationships between development, water quality, natural habitat degradation, and the overall health of the system. Today there is a much greater understanding of both natural water quality fluctuations and those fluctuations resulting from pollution and landscape alterations. Models have been developed to determine how the various water quality constituents affect the depth to which seagrasses grow, to help set water quality goals for restoring seagrasses, and to identify locations where oyster restoration may be successful (e.g. McPherson & Miller, 1987; Dixon & Kirkpatrick, 1999; Corbett & Hale, 2006; Boswell et al., 2012).

Many individuals, agencies, and organizations including CHAP have contributed to the extensive scientific understanding of the Charlotte Harbor ecosystem through the vast number of monitoring, modeling, mapping and research projects conducted over past decades. This collective work provides the framework for the management of CHAP. Summarized below are the CHAP monitoring programs and some of the partner programs that assist CHAP in addressing ecosystem science issues (i.e. water quality, submerged resources, colonial wading and diving birds). Additionally, many research scientists work within CHAP studying topics relevant to the management of the aquatic preserves and CHAP staff have worked with researchers from J.N. “Ding” Darling National Wildlife Refuge (NWR), Mote Marine Laboratory, Florida Gulf Coast University (FGCU), Sanibel-Captiva Conservation Foundation (SCCF), Florida Fish and Wildlife Conservation Commission (FWC) – Florida Wildlife Research Institute (FWRI) and University of Florida/Institute of Food and Agricultural Sciences Extension (UF/IFAS), Florida Sea Grant.

Water Quality

Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network – In 1994 the Lemon Bay Conservancy began the Three Creek Watch program in Lemon Bay Aquatic Preserve, which was adapted in 1996 by the Charlotte Harbor Environmental Center into the Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network (CHEVWQMN) program and expanded into Gasparilla Sound-Charlotte Harbor Aquatic Preserve. In 1998 CHAP began managing this long-term volunteer monitoring program for water quality and expanded the program from 10 sites to 50 throughout the greater Charlotte Harbor area and into Estero Bay. Forty-six of these sites are still active. The CHEVWQMN program is a joint effort by CHAP, Charlotte Harbor National Estuary Program (CHNEP), and the Charlotte Harbor Environmental Center, and includes the regions of Lemon Bay, Gasparilla Sound, Charlotte Harbor proper, Pine Island Sound, Matlacha Pass, San Carlos Bay, and Estero Bay. The program consists of more than 80 water quality monitor volunteers that sample 46 fixed stations within the greater Charlotte Harbor area (see Maps 25-27). All the volunteers collect samples on the first Monday of every month at sunrise, using the same methods and protocols, to capture a snapshot look at the water quality across the estuaries. Volunteers collect water samples for chlorophyll *a*, total nitrogen, nitrate and nitrite, total Kjeldahl nitrogen, total phosphorous, turbidity, color and fecal coliform bacteria which are all sent to the Florida Department of Environmental Protection (DEP) Central Laboratory in Tallahassee for analyses (except fecal coliform bacteria which is sent to a local contracted laboratory due to the short holding time). Specific parameters are measured in the field, including weather and water conditions, tide stage, water depth, secchi (water clarity), water and air temperature, salinity, pH and dissolved oxygen (DO). Titration techniques for DO and pH color comparator were used until 2009, at which time handheld automated meters were introduced so that the program would remain compliant with DEP Standard Operating Procedures. Volunteers receive initial one-on-one training and also attend bi-annual Quality



A volunteer conducts monthly water quality sampling for the Charlotte Harbor Aquatic Preserves.

Assurance sessions to maintain precision and accuracy within the program. Quality assurance is integral to the CHEVWQMN program. In addition, each month the volunteers calibrate their meters and conduct post-sampling verification to ensure accuracy. The monthly data are screened for outliers and qualifiers are added if the verification values are not within the accuracy range. Data are then uploaded into the U.S. Environmental Protection Agency's (EPA) STORage and RETrieval (STORET) data warehouse and are submitted to the Charlotte Harbor NEP Water Atlas. Information from this program is used to help identify potential pollutants and problem areas that may need the attention of governing agencies. To date, the data has been used by organizations and agencies to set regional water quality targets, identify



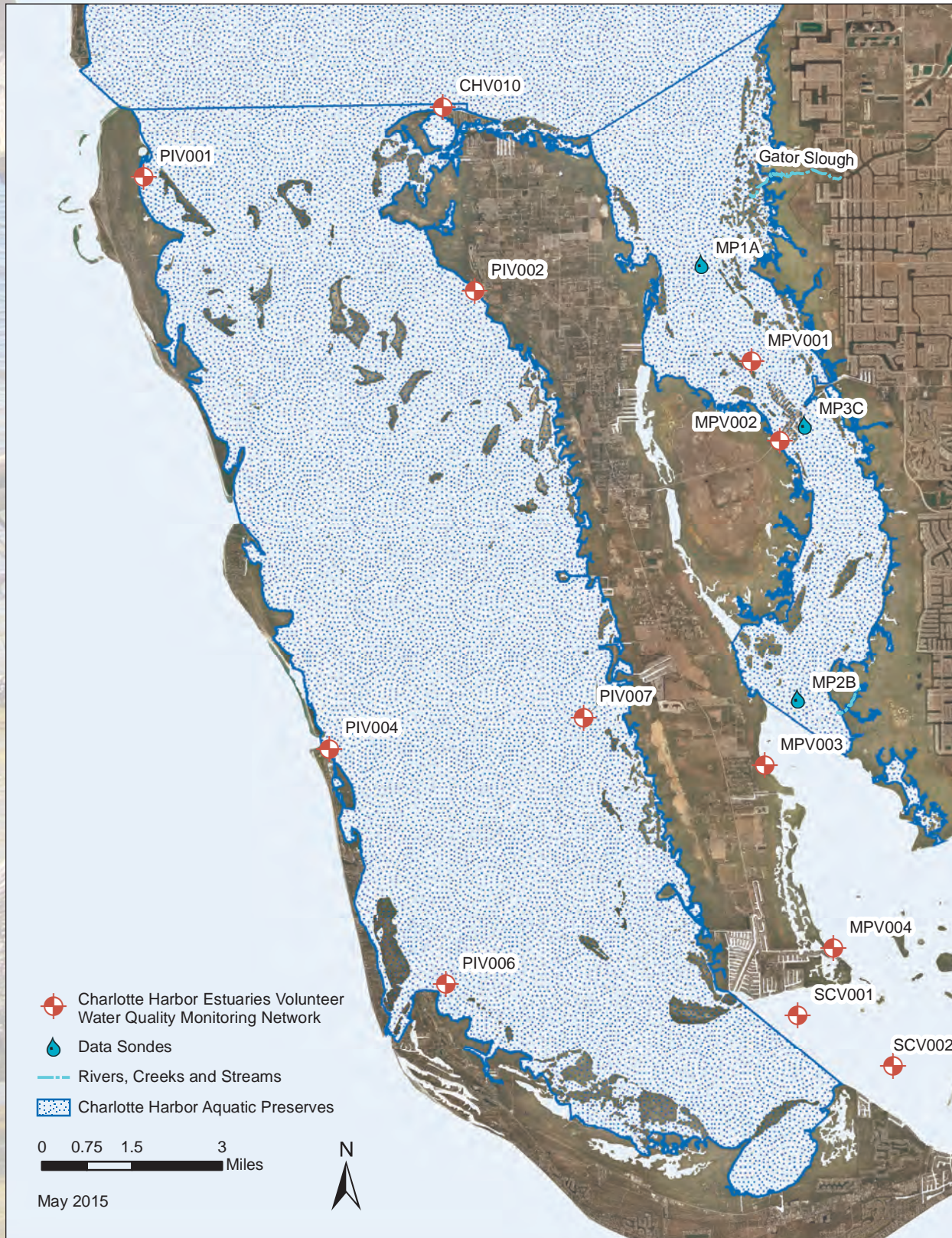
state “impaired waters” and educate citizens and elected officials about the value of our exceptional estuarine resources. In 2007, the CHEWQMN program won the Gulf Guardian Award (see Section 4.3.1 for more information) and volunteers received letters of recognition from Senator Nelson in 2012 for their continued contribution to understanding estuarine water quality.

Charlotte Harbor Aquatic Preserves Data Sonde Program - In 2004, FCO obtained funding from the National Oceanographic and Atmospheric Administration’s (NOAA) Coastal Zone Management Program to purchase 27 extended deployment water quality monitoring devices, or data sondes, for operation in aquatic preserves around the state. FCO began a pilot program for several of its aquatic preserves,



Map 26 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves water quality monitoring sites.

including Matlacha Pass Aquatic Preserve which received four data sondes to establish two sites. The original purpose of the program was to establish baseline and continuous data that would assist in determining the health of Florida's aquatic preserves around the state. The data was anticipated to help in assessing Matlacha Pass water quality and to determine the influence from Charlotte Harbor to the north and the Caloosahatchee River to the south. In 2005, two fixed monitoring sites were established, one in the northern end, MP1A, and one in the southern end of Matlacha Pass, MP2B. In 2009, a third station, MP3C, was added by the Matlacha bridge to help determine the extent of the tidal node (see Map 27).



66 Map 27 | Pine Island Sound and Matlacha Pass aquatic preserves water quality monitoring sites.

There were several factors considered when selecting the monitoring sites including salinity gradients, water depth, freshwater inputs, tidal circulation patterns and the location of navigational markers. Additionally, to correlate existing data collection efforts and refrain from duplicating data, locations of other water quality studies were also taken into consideration. The data sondes record data every 15 minutes for parameters including depth, temperature, salinity, specific conductance, pH, DO, and turbidity. Monthly samples are collected at each site for chlorophyll *a*, total nitrogen, nitrate and nitrite, total Kjeldahl nitrogen, total phosphorous and Harmful Algal Blooms (HABs/red tide). A HAB is the proliferation of a toxic or nuisance algal species that negatively affects natural resources or humans. Many call HABs “red tide,” but the algal blooms are not always red and are not related to tides (FWC, n.d.b). The continuous data allow for daily observations but can also show water quality patterns such as the influence of tide and weather-related phenomena (hurricanes) that may not be captured in monthly sampling. The data has also been correlated with the CHAP seagrass monitoring data in order to assess the cause of changes in abundance or species shifts.

Coastal Charlotte Harbor Monitoring Network

– In 2001, CHNEP established a random water quality sampling program throughout the CHNEP study area which includes all of CHAP. Through the program, partner agencies and organizations collect monthly water quality data at 60 random stations, five stations each within twelve strata. Partner organizations include Lee County, city of Sanibel, FWC, city of Cape Coral, Charlotte County and Southwest Florida Water Management District (SWFWMD). CHAP personnel assisted in data collection within Lemon Bay and Lower Charlotte Harbor from 2001 to 2011. This entailed creating annual schedules, generating random sample sites, mapping site locations using geographic information systems (GIS), monthly sampling of Lemon Bay and Lower Charlotte Harbor (five sites in Lemon Bay, five in Lower Charlotte Harbor) maintaining accurate paperwork, dropping off water samples at the laboratory, quality checking the data and entering the data. Data owners are responsible for uploading data to STORET.

Sarasota County Water Quality Monitoring

- Sarasota County has monitored ambient water quality of its bays on a monthly basis from 1995 to the present, including stations within the Lemon Bay Aquatic Preserve. Monthly ambient water quality samples have been taken from creeks and rivers throughout Sarasota County since 2007.

Lee County Environmental Laboratory Water Quality Monitoring – Lee County has conducted routine water quality monitoring throughout the Lee County portion of CHAP (i.e., Matlacha Pass Aquatic Preserve, Pine Island Sound Aquatic Preserve, and the southern portion of Gasparilla Sound-Charlotte Harbor Aquatic Preserve) since 1991 as part of an ongoing effort to maintain a long term water quality dataset, and as part of the Coastal Charlotte Harbor Monitoring Network.

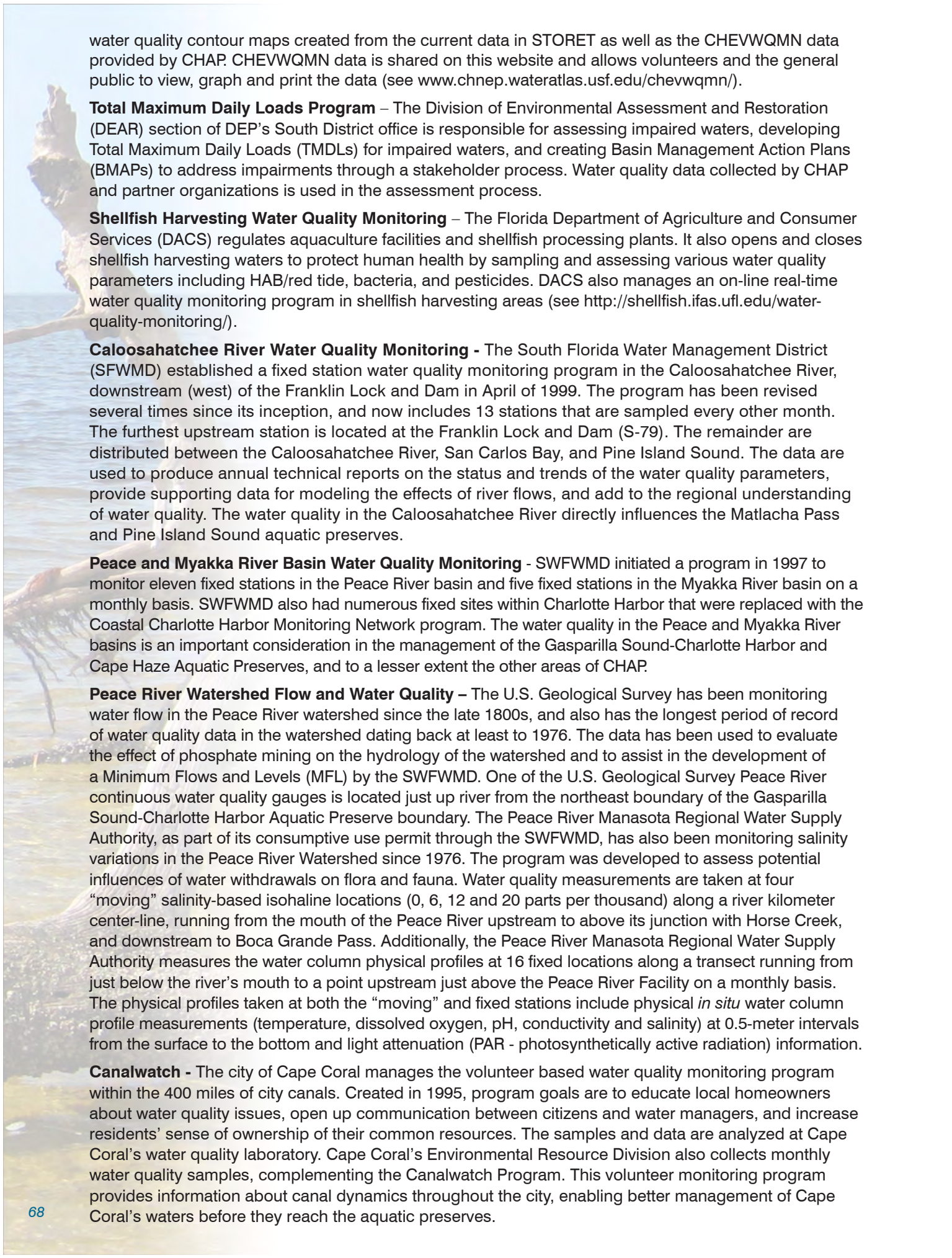
River Estuary Coastal Observing Network – SCCF initiated a project in 2007 to track water quality conditions in relation to water releases from Lake Okeechobee using continuously recording data sondes (www.recon.sccf.org). The program includes three data sondes that are located within Pine Island Sound Aquatic Preserve, and is complementary to the data sonde program run by CHAP in Matlacha Pass Aquatic Preserve.

Charlotte Harbor National Estuary Program Water Quality Status and Trends – CHNEP has been analyzing water quality status and trends for the CHNEP watershed, which includes all of CHAP, every three years since 2003. The analyses utilize all available water quality data from EPA’s STORET program, used by CHAP and most of its partners to store and share water quality data.

Charlotte Harbor National Estuary Program Water Atlas – CHNEP works with the University of South Florida Water Institute to provide data to the Charlotte Harbor NEP Water Atlas (www.chnep.wateratlas.usf.edu), a website used to share resources related to the CHNEP study area. The website includes



Data sondes are used to collect continuous water quality data in Matlacha Pass Aquatic Preserve.



water quality contour maps created from the current data in STORET as well as the CHEVWQMN data provided by CHAP. CHEVWQMN data is shared on this website and allows volunteers and the general public to view, graph and print the data (see www.chnep.wateratlas.usf.edu/chevwqmn/).

Total Maximum Daily Loads Program – The Division of Environmental Assessment and Restoration (DEAR) section of DEP’s South District office is responsible for assessing impaired waters, developing Total Maximum Daily Loads (TMDLs) for impaired waters, and creating Basin Management Action Plans (BMAPs) to address impairments through a stakeholder process. Water quality data collected by CHAP and partner organizations is used in the assessment process.

Shellfish Harvesting Water Quality Monitoring – The Florida Department of Agriculture and Consumer Services (DACS) regulates aquaculture facilities and shellfish processing plants. It also opens and closes shellfish harvesting waters to protect human health by sampling and assessing various water quality parameters including HAB/red tide, bacteria, and pesticides. DACS also manages an on-line real-time water quality monitoring program in shellfish harvesting areas (see <http://shellfish.ifas.ufl.edu/water-quality-monitoring/>).

Caloosahatchee River Water Quality Monitoring - The South Florida Water Management District (SFWMD) established a fixed station water quality monitoring program in the Caloosahatchee River, downstream (west) of the Franklin Lock and Dam in April of 1999. The program has been revised several times since its inception, and now includes 13 stations that are sampled every other month. The furthest upstream station is located at the Franklin Lock and Dam (S-79). The remainder are distributed between the Caloosahatchee River, San Carlos Bay, and Pine Island Sound. The data are used to produce annual technical reports on the status and trends of the water quality parameters, provide supporting data for modeling the effects of river flows, and add to the regional understanding of water quality. The water quality in the Caloosahatchee River directly influences the Matlacha Pass and Pine Island Sound aquatic preserves.

Peace and Myakka River Basin Water Quality Monitoring - SWFWMD initiated a program in 1997 to monitor eleven fixed stations in the Peace River basin and five fixed stations in the Myakka River basin on a monthly basis. SWFWMD also had numerous fixed sites within Charlotte Harbor that were replaced with the Coastal Charlotte Harbor Monitoring Network program. The water quality in the Peace and Myakka River basins is an important consideration in the management of the Gasparilla Sound-Charlotte Harbor and Cape Haze Aquatic Preserves, and to a lesser extent the other areas of CHAP.

Peace River Watershed Flow and Water Quality – The U.S. Geological Survey has been monitoring water flow in the Peace River watershed since the late 1800s, and also has the longest period of record of water quality data in the watershed dating back at least to 1976. The data has been used to evaluate the effect of phosphate mining on the hydrology of the watershed and to assist in the development of a Minimum Flows and Levels (MFL) by the SWFWMD. One of the U.S. Geological Survey Peace River continuous water quality gauges is located just up river from the northeast boundary of the Gasparilla Sound-Charlotte Harbor Aquatic Preserve boundary. The Peace River Manasota Regional Water Supply Authority, as part of its consumptive use permit through the SWFWMD, has also been monitoring salinity variations in the Peace River Watershed since 1976. The program was developed to assess potential influences of water withdrawals on flora and fauna. Water quality measurements are taken at four “moving” salinity-based isohaline locations (0, 6, 12 and 20 parts per thousand) along a river kilometer center-line, running from the mouth of the Peace River upstream to above its junction with Horse Creek, and downstream to Boca Grande Pass. Additionally, the Peace River Manasota Regional Water Supply Authority measures the water column physical profiles at 16 fixed locations along a transect running from just below the river’s mouth to a point upstream just above the Peace River Facility on a monthly basis. The physical profiles taken at both the “moving” and fixed stations include physical *in situ* water column profile measurements (temperature, dissolved oxygen, pH, conductivity and salinity) at 0.5-meter intervals from the surface to the bottom and light attenuation (PAR - photosynthetically active radiation) information.

Canalwatch - The city of Cape Coral manages the volunteer based water quality monitoring program within the 400 miles of city canals. Created in 1995, program goals are to educate local homeowners about water quality issues, open up communication between citizens and water managers, and increase residents’ sense of ownership of their common resources. The samples and data are analyzed at Cape Coral’s water quality laboratory. Cape Coral’s Environmental Resource Division also collects monthly water quality samples, complementing the Canalwatch Program. This volunteer monitoring program provides information about canal dynamics throughout the city, enabling better management of Cape Coral’s waters before they reach the aquatic preserves.

Harmful Algal Bloom Program - FWC-FWRI monitors changes in water quality and levels of contaminants in Florida's fresh and marine waters, including levels of mercury in fish, and monitors and tracks HAB events. FWRI coordinates a statewide volunteer program to collect HAB samples which are then sent to their laboratory for analysis. CHAP staff assist by collecting HAB/red tide samples monthly at the three data sonde stations, and volunteers collect samples at two CHEVVQMN sites within CHAP. Additional samples are collected by CHAP staff and CHEVVQMN volunteers when needed.

Red Tide Monitoring - Mote Marine Laboratory scientists conduct research within CHAP for red tide and maintain continuous red tide monitoring stations in Boca Grande and in Charlotte Harbor proper.

Submerged Aquatic Resources

Charlotte Harbor Aquatic Preserves Seagrass

Transect Monitoring - In 1998, through a joint project between CHAP and SWFWMD's Surface Water Improvement and Management Program, Scheda Ecological Associates, Inc., SWFWMD and CHAP field staff conducted preliminary seagrass monitoring in northern Charlotte Harbor and Lemon Bay. The following year the program was expanded to include a total of 50 sites throughout CHAP (see Maps 28-30). These transects are monitored annually during the summer growing season. Transect lengths at the sites vary from 50 meters to more than 700 meters. Each transect begins on the shoreward side of the seagrass bed and is marked with a PVC stake and flagging tape. The 1999 original start of the seagrass bed is recorded as the zero station, and is marked with a stake and Global Positioning System (GPS) coordinates. Each repeat station along the transect is marked with a stake and GPS coordinates as well, except for the beginning and end of bed which varies annually. The beginning and end of bed is noted as a distance measurement in meters. Transect direction is followed using a compass heading and visual reference points. Data is collected along the transect at repeat stations marked every 50 meters, or every 10 meters if the total transect is less than 50 meters long. Parameters recorded at the stations include distance from the zero station, depth, seagrass species present, abundance by species, seagrass blade lengths, epiphyte density, shoot count, epiphyte description, sediment type and comments relating to field observations. Weather and tide stage (at beginning and end of monitoring) is recorded along with water quality parameters including salinity, DO, temperature and secchi readings. The Braun-Blanquet method is used to estimate both total and individual species abundance. Total abundance was added as a unique parameter in 2004 when it became evident that an overall estimation of abundance was needed for analysis purposes. In 2005, shoot counts for each species were recorded at each station to describe the density quantitatively. Estero Bay Aquatic Preserve (EBAP) and DEP South District DEAR both employ the same methodologies for regional consistency.

Recording attached algae and drift algae abundance along the transects has become another critical parameter to document during seagrass monitoring, as extensive drift algae mats can smother the seagrass beds. SCCF scientists have assisted regional partners with training on drift algae identification



A quadrat is used to monitor the seagrass within one square meter to evaluate change over time.



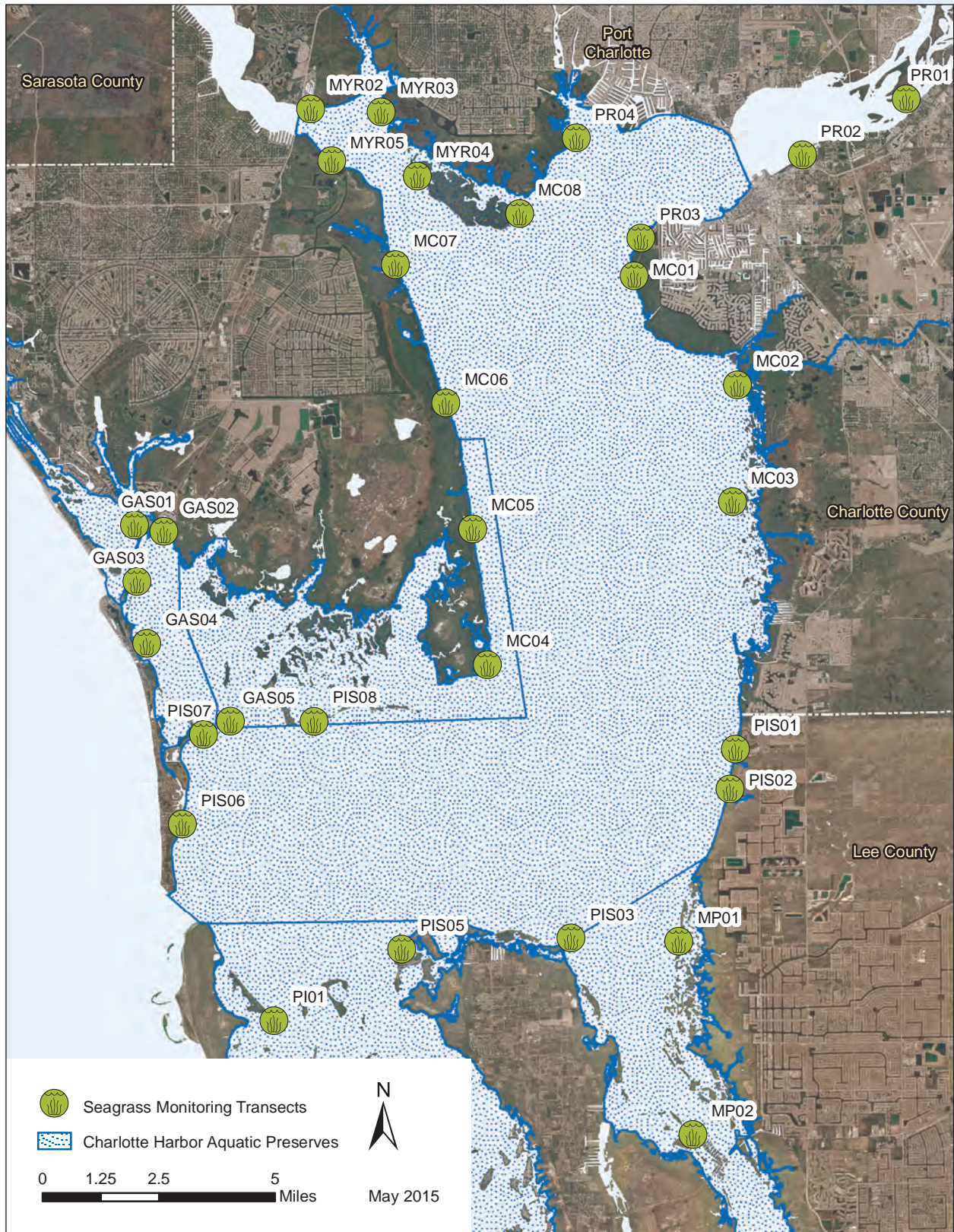
Staff host their annual interagency seagrass monitoring training.

to genus or species when possible. In the case of attached algae, the Braun-Blanquet method is used to estimate and record total attached algae abundance. Drift algae abundance has increased after periods of extensive rainfall, hurricanes, and in general from freshwater influences, a result of increased nutrient loads into the estuaries often associated with freshwater runoff.

Sanibel-Captiva Conservation Foundation Seagrass Monitoring – In 2003, the SCCF Marine Laboratory began monitoring four seagrass transects within Pine Island Sound and San Carlos Bay



using the same methodology as the CHAP seagrass monitoring program. These transects have not been monitored since 2008. Currently, SCCF monitors 10 seagrass transects in Pine Island Sound and in J.N. Ding Darling NWR once a year. Eight seagrass sites in Pine Island Sound/San Carlos Bay and southern Caloosahatchee Estuary are monitored three times during the rainy season. SCCF also monitors the areal extent of tape grass (*Vallisneria americana*) quarterly in the upper Caloosahatchee Estuary to determine its optimal growing conditions, and the possible effects of variable freshwater inflows and environmental conditions in the Caloosahatchee on this valuable freshwater species.



Map 29 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves seagrass monitoring transects.

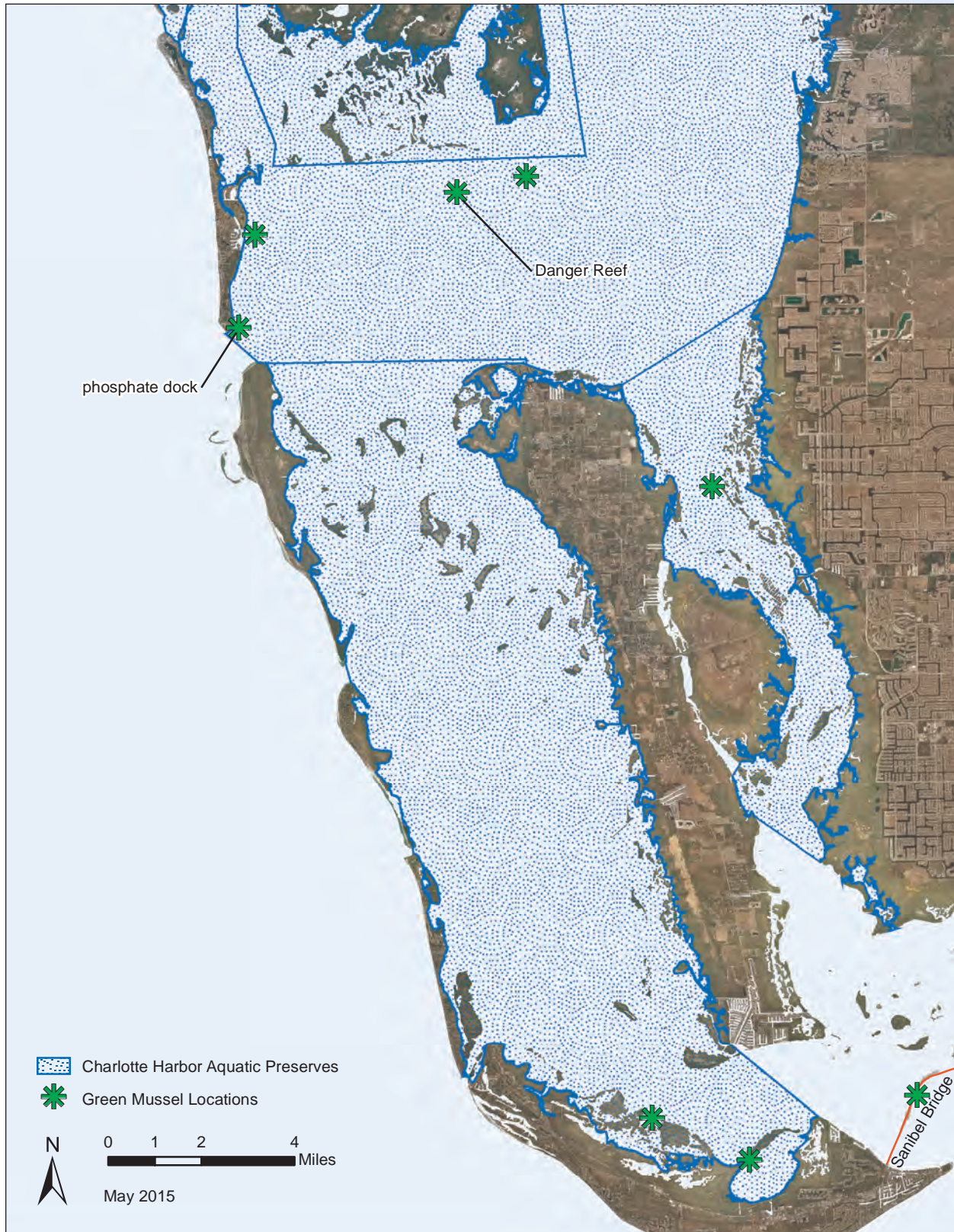
Department of Environmental Protection - Division of Environmental Assessment and Restoration Seagrass Transect Monitoring - DEAR began monitoring seagrass transects in the early 2000s in the Caloosahatchee River. Currently, the program consists of quarterly sampling (February, May, August and November) at three river sites and three CHAP seagrass sites (MP04, MP05, and SC03) in the San Carlos Bay/southern Matlacha Pass areas. Quarterly monitoring allows for a seasonal, and year round look at changes in seagrass abundance, specifically related to water quality and freshwater influences from the Caloosahatchee River. Data is managed by CHAP. DEAR employs



72 Map 30 / Pine Island Sound and Matlacha Pass aquatic preserves seagrass monitoring transects.

CHAP seagrass methodologies for consistency and comparison of data, and attends the annual field training coordinated by CHAP.

Estero Bay Aquatic Preserve Seagrass Transect Monitoring - EBAP began seagrass monitoring at five locations in Estero Bay in 2002. Monitoring is conducted twice a year (February and August) to capture seasonal changes in seagrass abundance. Data is managed by CHAP. EBAP currently employs CHAP seagrass methodologies for consistency and comparison of data and attends the annual field training coordinated by CHAP.



Map 31 / Green mussel locations within Charlotte Harbor Aquatic Preserves.

SFWMD Seagrass Monitoring - SFWMD conducts in-water manual monitoring every other month at seven stations located in the Caloosatchee River Estuary and San Carlos Bay as part of the Comprehensive Everglades Restoration Plan. At each station, 30 quadrats are sampled within a large polygon. Parameters measured include percent occurrence, percent cover and canopy height of the different species present. Due to the very low densities of tape grass in recent years, the most upstream station is not always sampled in this manner. Rather, a larger quadrat is deployed at 20 locations in the upper estuary between Beautiful Island and the railroad trestle.

Sarasota County Seagrass Monitoring - Seagrass is monitored at least once per year at fixed and random locations throughout the bays. A local rapid-assessment method includes presence, absence, species, percent cover over ground, percent of each seagrass species, epiphytes, blade length, and other biological observations. Thousands of locations have been characterized.

Seagrass Mapping – SWFWMD has been mapping seagrass beds from aerial photos since 1988 every two to four years. SFWMD began seagrass mapping in 1999 and has completed five maps since that time. For the first time, both water management districts flew aerials collaboratively in 2014 and will have a joint seagrass mapping effort covering the entire CHAP area. CHAP staff and volunteers assist with obtaining water quality and clarity conditions prior to aerial photography being taken.

Florida Gulf Coast University – FGCU studies threats to seagrass ecology from pollution, altered water flows and salinities, boating impacts, and changes in the abundance of influential organisms such as grazers. Fieldwork is conducted in the Caloosahatchee Estuary, Matlacha Pass, and Estero Bay, and the university maintains laboratory experiments at FGCU's main campus in Estero and at the Vester Field Station in Bonita Springs.

Habitat Mapping – The FWC-FWRI Center for Spatial Analysis produces statewide habitat maps using the best available data; available maps include seagrasses, tidal flats, mangroves, oyster reefs and salt marshes. CHNEP partnered with FWC-FWRI in 2003 to map seagrass scarring throughout the greater Charlotte Harbor region. Seagrass beds were assessed as either lightly, moderately or severely prop scarred depending on prop scars visible through aerial photography. An update to the seagrass prop scarring map is needed in order to assess the current state of scarring within CHAP. FWC also generates a Seagrass Integrated Mapping and Monitoring report in which CHAP has assisted with writing the Charlotte Harbor and Lemon Bay chapters. CHNEP also mapped the shoreline types in Charlotte and Lee counties using a mix of aerial photo interpretation and volunteer surveying in 2006. Volunteer surveys of the

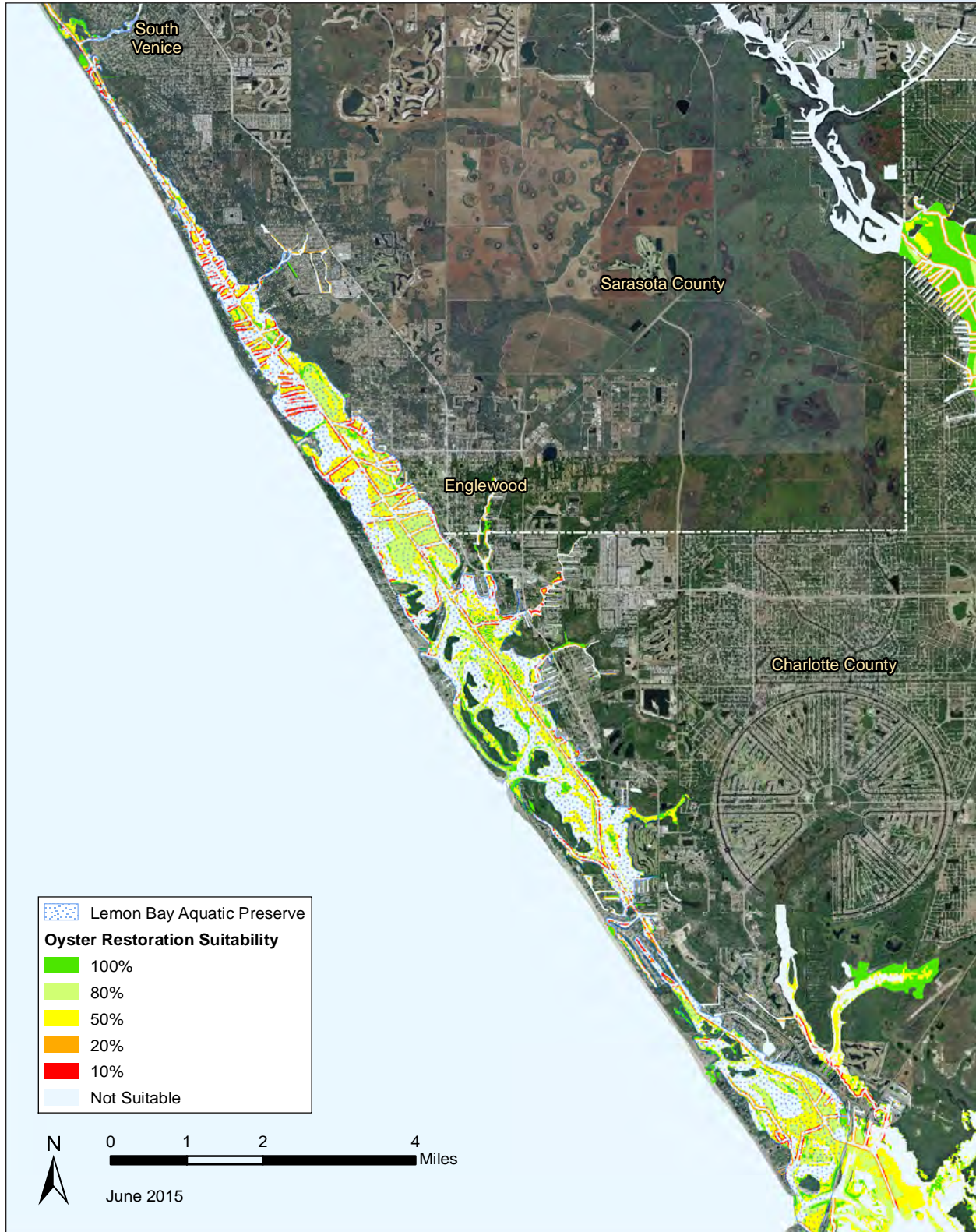


Staff records data during bay scallop spat monitoring in Gasparilla Sound-Charlotte Harbor Aquatic Preserve.

privately-owned shorelines were repeated in 2010 and 2013 and reports are available. CHAP assisted with the quality assurance check of the data in the 2013 survey.

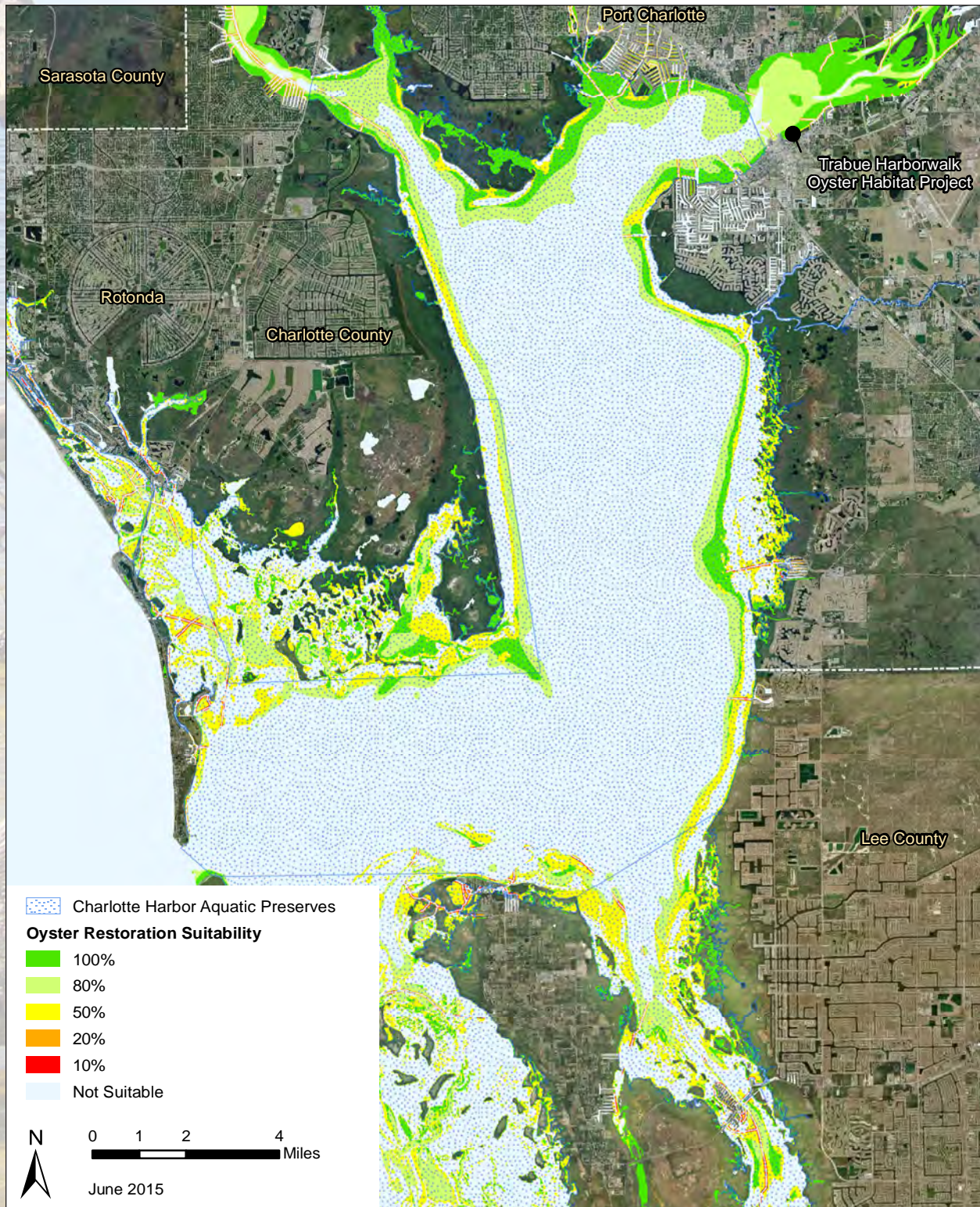
Charlotte Harbor Aquatic Preserves Green Mussel Program – CHAP staff began reconnaissance efforts of Asian green mussel populations within the CHAP complex in 2009. Asian green mussels are an invasive exotic mollusk in Florida and were first discovered in Tampa Bay in 1999. They outcompete local species for space, rapidly increasing in numbers (FWC, n.d.a). By 2000, this prolific species spread into Charlotte Harbor most likely via currents from Tampa into Boca Grande Pass. They are generally found growing on hard surfaces such as rocks, pilings and floating docks, and prefer areas with high water flow. They can tolerate a fairly wide range of salinities (15-45 parts per thousand) and temperatures (50°F-108°F [10°C-42°C]) (University of Florida, 2009). The largest densities, found by CHAP staff, have been found at the Sanibel bridge close to the surface. CHAP staff have documented them at the phosphate dock located in Charlotte Harbor near Boca Grande Pass at densities of <10 per square meter (less than one per square foot). In November 2009, 31 individuals were collected at this location, all were sexually mature. CHAP also found Asian green mussels on Danger Reef in 2011 and 2012 (an artificial reef in Gasparilla Sound-Charlotte Harbor

Aquatic Preserve). Individuals collected ranged in size from 25-140 millimeters (1.0-5.5 inches). The densities at Danger Reef were >100 per square meter (greater than nine per square foot). At both the phosphate dock and Danger Reef, the green mussels were found at water depths around 4.6m-6.1m (15-20 feet). The other green mussel locations have been isolated sightings on navigational markers and bridges (one to two individuals). To date, CHAP has only documented Asian green mussels on artificial structures. CHAP will continue to document the location, water quality, and depths of Asian green mussels found in the aquatic preserves. When feasible, individuals are removed and shell lengths are recorded (see Map 31).

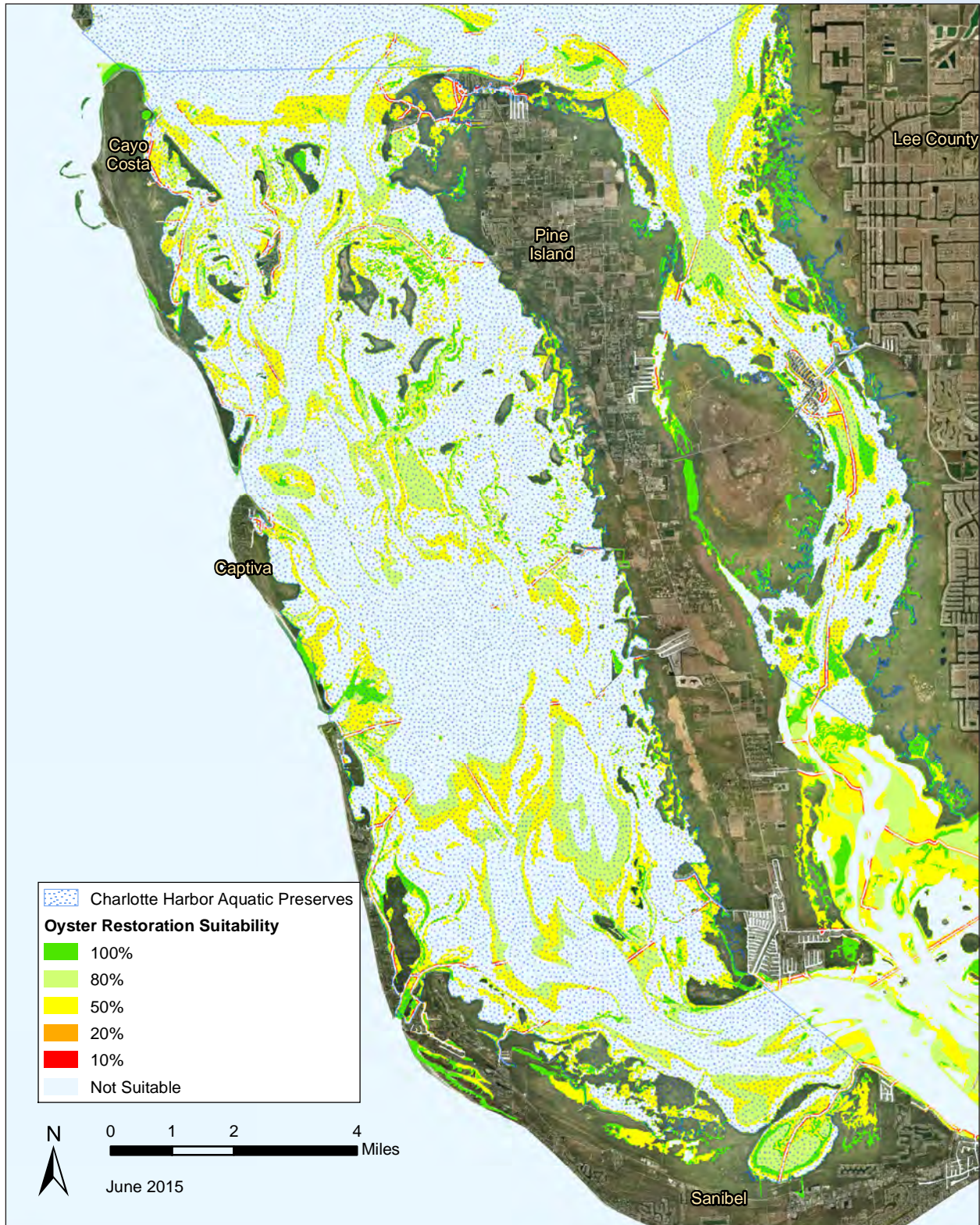


Map 32 / Lemon Bay Aquatic Preserve oyster restoration suitability.

Oyster Restoration – In 2012, the CHNEP and The Nature Conservancy (TNC) finalized an oyster restoration plan for the CHNEP estuaries, including the CHAP. The plan was developed collaboratively with local stakeholders through the Southwest Florida Oyster Working Group. The CHAP staff were active in the development of the plan. The plan identifies the need for oyster restoration and oyster habitat mapping throughout the area. Suitability maps were developed to show where oyster restoration is most likely to succeed (see Maps 32-34). Following the approval of the plan, a subcommittee of the working group, including CHAP, and other stakeholders from around the state collaborated to develop a new DEP General Permit (62-330.632 Florida Administrative Code [F.A.C.]) that provides for state authorization for certain low profile oyster habitat restoration activities.



In 2014, CHAP and TNC partnered to employ a temporary employee as the Community Outreach Coordinator for the Trabue Harborwalk Oyster Habitat Creation Project (Map 33) in the Peace River, just outside Gasparilla Sound-Charlotte Harbor Aquatic Preserve. This project is the first of its kind in southwest Florida, using three different methods (bags, mats and loose shell surrounded by bags) to create 0.25 acres of oyster habitat. Public involvement is a key component for this project, as various local organizations and citizens within the Punta Gorda area have made the 1,500 bags and 750 mats that will be deployed. Pre and post monitoring of the created reefs is an important component to determine the success of the project, as well as which method(s) is most suitable for the CHAP area.



Map 34 | Pine Island Sound and Matlacha Pass aquatic preserves oyster restoration suitability.

Sarasota County Oyster Monitoring and Mapping - Sarasota County monitors percentage of oysters that are live twice per year in coastal creeks, including stations in Lemon Bay Aquatic Preserve. Sarasota County has also mapped oyster habitat within portions of Lemon Bay Aquatic Preserve.

Bay Scallop Monitoring – FWC-FWRI began monitoring adult bay scallop populations in northern Pine Island Sound in 1992. In 2004, with assistance from SCCF, adult monitoring was expanded to southern Pine Island Sound and San Carlos Bay, and recruitment monitoring began throughout Pine Island Sound. FWC-FWRI expanded recruitment monitoring in 2008 into Lemon Bay and Gasparilla Sound in coordination with Sarasota County and UF/IFAS Extension, Florida Sea Grant. In 2009 UF/IFAS Extension, Florida Sea Grant began the annual Great Bay Scallop Search, an event utilizing volunteers and partnering agencies, such as CHAP, to find and count bay scallops in a square mile grid method. A similar program was initiated in 2012 by UF/IFAS Extension, Florida Sea Grant in Lee County. CHAP staff also report bay scallops that are observed during seagrass surveys.



Staff conducting rookery monitoring.

Fisheries-Independent Monitoring – FWC-FWRI began fisheries-independent monitoring of fish populations in 1989 in Charlotte Harbor. Sampling is conducted monthly using a variety of sampling methods at random stratified locations. The sampling provides data that can be used to study population dynamics of fish species in the Charlotte Harbor estuaries.

Manatee Population Aerial Surveys – FWC-FWRI marine mammal scientists use aerial surveys to assess the seasonal distribution and relative abundance in the near coastal waters around Florida, including CHAP. Winter synoptic aerial surveys have been conducted 28 times since 1991 to estimate manatee population size by doing counts when the manatees are congregated at springs and other warm water sources.

Shark Initiative – As part of this program, Mote Marine Laboratory scientists use acoustic and satellite tags to monitor bull sharks and great hammerheads in Boca Grande Pass, to understand their short and long-term movements and behavior, and conduct abundance surveys of keystone species of sharks both in the Boca Grande Pass and in adjacent areas. This work provides scientists with information about the movement and population dynamics of the sharks in the area.

Sarasota Dolphin Research Program – This Mote Marine Laboratory program began monitoring dolphins in 1970; the program includes Charlotte Harbor and Pine Island Sound. Dolphins are visually identified by distinctive fin shapes and markings with surveys being conducted at least 10 times per month. The data is used to determine abundance trends, site fidelity and seasonality.

Turtle Monitoring – Sea turtle nesting is monitored on the beaches surrounding CHAP by various groups, including Mote Marine Laboratory, Coastal Wildlife Club and SCCF. SCCF has also been conducting diamondback terrapin (*Malaclemys terrapin*) monitoring within Pine Island Sound Aquatic Preserve.

Wading and Diving Colonial Nesting Birds

Charlotte Harbor Aquatic Preserves Bird Rookery Monitoring - From 1977 until 2008, bird rookery monitoring was conducted sporadically, and a variety of survey methods were employed. May nest counts conducted 1977 through 1982, and again in 1997 and 1998 only monitored for brown pelicans. From 1983 through 1989 all wading and diving birds were included in the May survey counts. Survey schedules were changed in 1998, with surveys of all wading and diving bird species, conducted in April of that year and again in 2001 and 2007, when staff from Audubon's Florida Coastal Islands Sanctuaries

in Tampa assisted with surveys. The CHAP manager identified regular rookery monitoring as a gap in resource information needed to manage the aquatic preserve ecosystem as a whole.

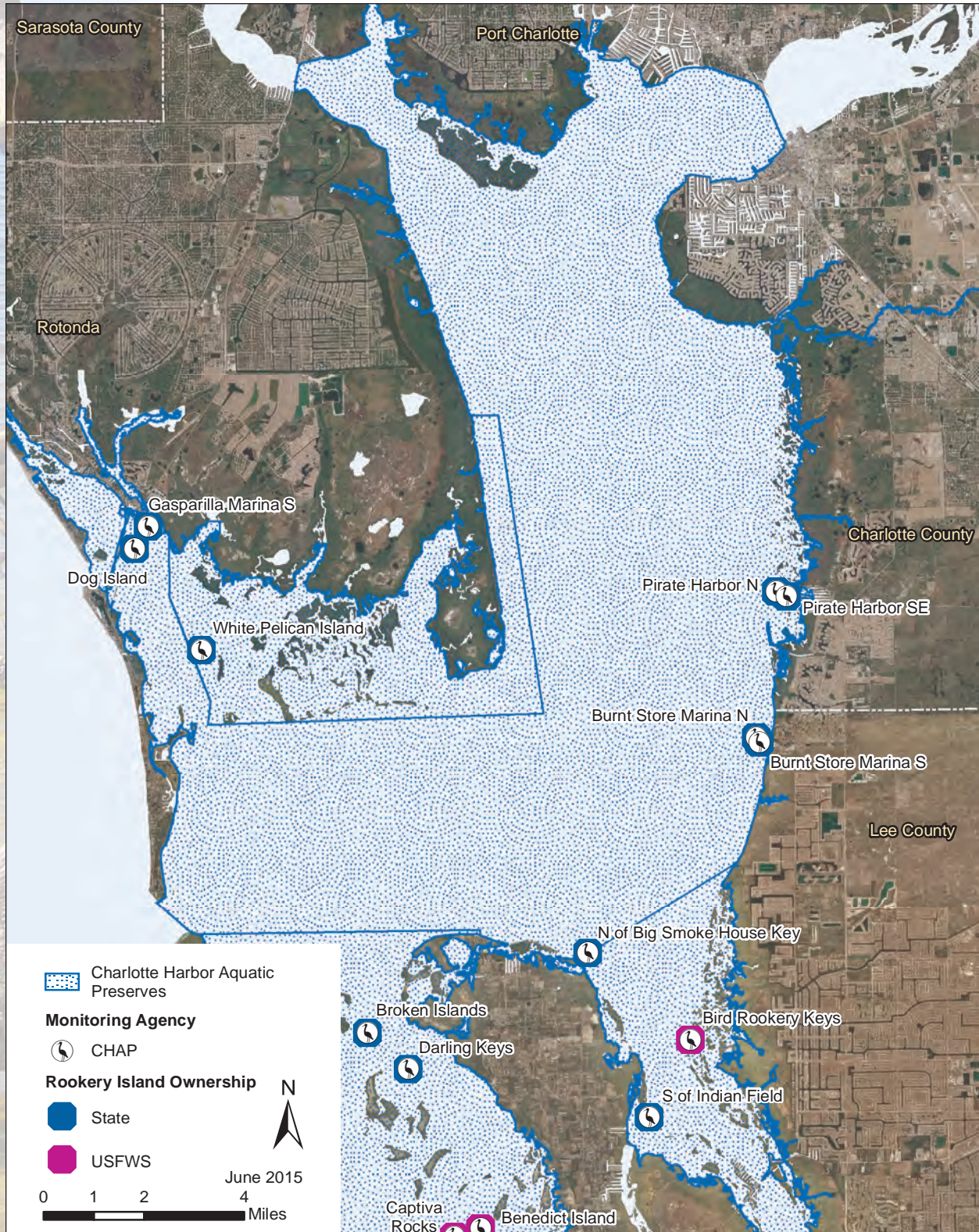
Since 2008, CHAP staff has coordinated with staff from J.N. Ding Darling NWR to conduct monthly nest counts of all active and historically active islands using a direct count method. Islands were selected by both agencies to monitor based on location of their respective offices (see maps 35-37 for current and historically active nesting islands). Objectives of the current program include: to provide



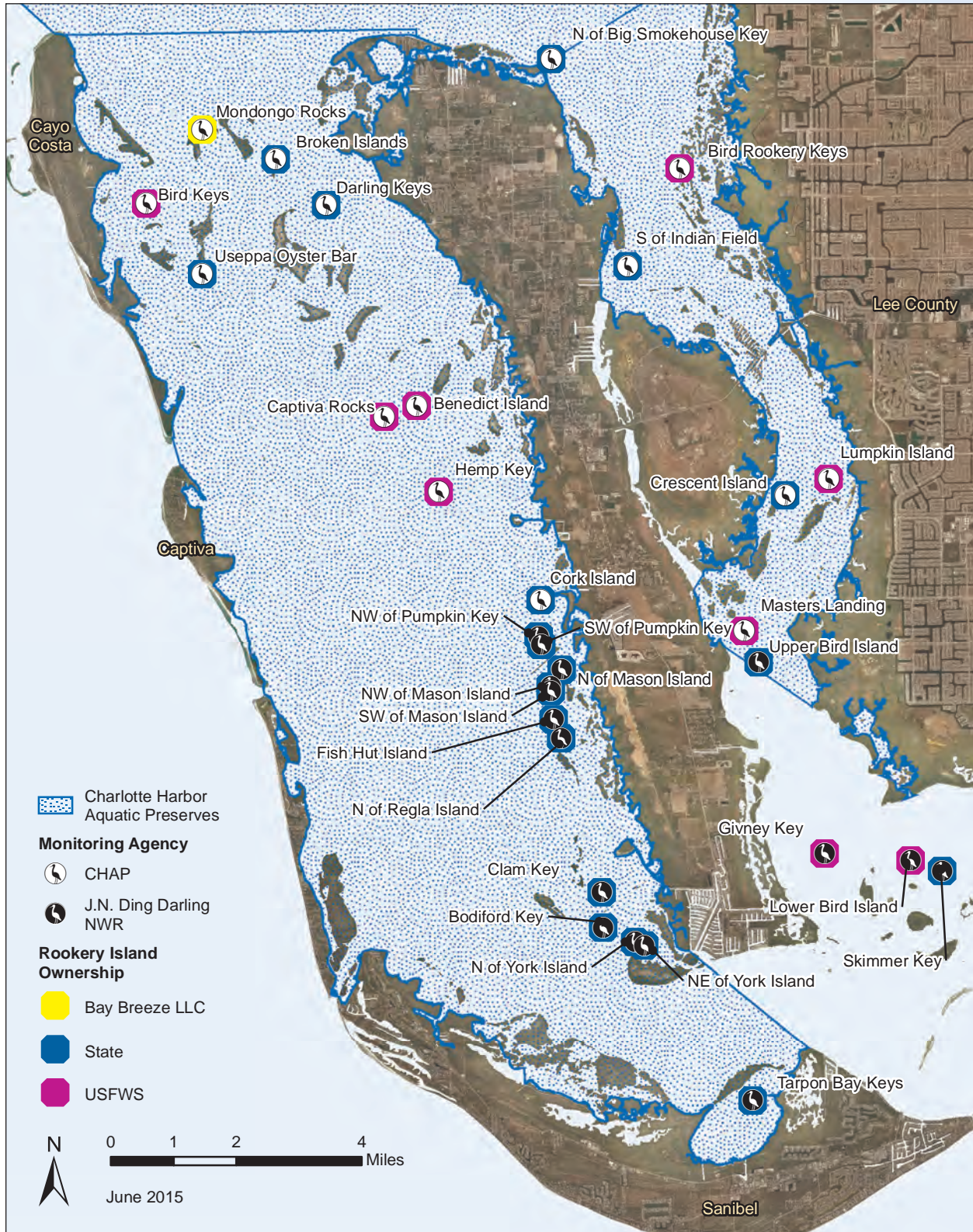
Map 35 | Lemon Bay Aquatic Preserve rookery monitoring islands.

peak estimates of nesting effort for each species of colonial nesting bird; to monitor population trends; to document movement of colonies; to document human disturbance and bird fatalities due to fishing line entanglement; to reduce the number of entanglements and fatalities due to fishing line and trash within the bay; and to provide recommendations for long term monitoring of nesting wading bird colonies in CHAP. Many species of birds nest on the islands in CHAP, including three state-listed threatened species: reddish egret, little blue heron, and tricolored heron.

Staff and volunteers monitor wading and diving bird nesting colonies throughout the year, with 33 islands monitored each month during the 2014 season. Currently active islands are monitored until nesting



activity subsides, and historically active islands are monitored periodically to look for evidence of new nesting activity. Direct count surveys are conducted by slowly circling each island on a boat at a safe distance so that nesting birds will not be disturbed. Two observers count the number of nests by species and nesting stage. Nests are recorded as “empty” if no birds or eggs are observed, “unknown” if an adult is present at the nest but no eggs or chicks were visible or if the pair is copulating, “incubating” if the adult is in an incubating posture or if eggs are visible or “chicks” if chicks are present in the nest or within the vicinity of the nest. Each year, CHAP and J.N. Ding Darling NWR combine the data and report the peak nest counts regionally. The data is analyzed and submitted each year to the SFWMD for



Map 37 / Pine Island Sound and Matlacha Pass aquatic preserves rookery monitoring islands.

publication in the annual South Florida Wading Bird Report. The report is used to follow trends in wading bird activity and to estimate the number of nesting wading birds in Florida. Staff and volunteers also work to protect nesting colonies by conducting trash cleanups and working with local agencies to educate the public about rookery islands.

Estero Bay Aquatic Preserve Bird Rookery Monitoring - EBAP began monitoring nests monthly at all active and historically active islands in 2008 using the same methods as CHAP. CHAP and EBAP coordinate with monitoring efforts and training, and to provide regional consistency.

Data Management and Analysis

The long-term monitoring programs of water quality, seagrass, and colonial nesting waterbirds began in the 1990s and are expected to continue indefinitely into the future. It is important that the data from these programs are of high quality and are maintained in a way that makes it readily accessible for use by resource managers and scientists. The CHEVWQMN data follows DEP quality assurance and quality control (QA/QC) methods and is uploaded into STORET and the Charlotte Harbor NEP Water Atlas. Several CHAP reports have been published using the CHEVWQMN data and is requested by various stakeholders and researchers. The CHAP data sonde program follows YSI, Inc.'s and NOAA's Central Data Management Office procedures for QA/QC and data management. The data is stored in house and shared as requested. This information has been used for the Cape Coral Spreader Waterway water quality model, FWC manatee program, and presented at various conferences and workshops specifically pertaining to the influence of the Caloosahatchee River flow and the impacts to the estuary.

The annual CHAP seagrass transect monitoring data is entered and stored in a relational Microsoft Access database which allows CHAP staff to query for specific data in response to requests from partners, or in relation to resource management issues. EBAP and DEP DEAR seagrass monitoring data is also managed by CHAP in the Access database. In 2013, CHAP seagrass data was published in the *Florida Scientist* journal summarizing data from 1999-2009. Data about colonial nesting waterbirds is stored in an Excel spreadsheet, population analysis will be conducted on combined CHAP and J.N. Ding Darling NWR data. Efforts to integrate CHAP monitoring data into one geodatabase are currently underway. The project integrates existing science-based data and information, and links it to a spatial management framework through the application of GIS software. As a result, this geodatabase will serve as a powerful information tool for use by not only CHAP staff, but also by regulatory personnel and other coastal management professionals and scientists.



A researcher records data for wading and diving bird nest counts.

Numerous reports and manuscripts have included analyses of CHAP long-term monitoring data (see Appendix B.5 for complete list); some of these are listed below:

- South Florida Wading Bird Report. (SFWMD, 2013)
- Results of the Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves' Seagrass Monitoring Program from 1999–2009 (Brown et al., 2013)
- Charlotte Harbor & Estero Bay Aquatic Preserves Water Quality Status & Trends for 1998 - 2005 (Duffey, Leary, & Ott, 2007)
- Seagrass Species Composition and Distribution Trends in Relation to Salinity Fluctuations in Charlotte Harbor, Florida (Greenawalt-Boswell, Hale, Fuhr, & Ott, 2006)
- Comparison of Light Limiting Water Quality Factors in Six Florida Aquatic Preserves (Ott et al., 2006)
- Development of Water Quality Targets for Charlotte Harbor, Florida using Seagrass Light Requirements (Corbett & Hale, 2006)
- Water Quality Data Analysis and Report for the CHNEP (Janicki Environmental, 2003)

- Charlotte Harbor Estuary Status and Trends: Water Quality Data Analysis and Report for the Charlotte Harbor National Estuary Program. (Janicki Environmental, 2007) http://www.chnep.org/info/wq/water_quality_data_analysis.htm
- CHNEP Water Quality Status and Trends (Janicki Environmental, 2010)
- CHNEP Water Quality Status and Trends (Janicki Environmental, 2013)
- State of the Southwest Florida Aquatic Preserves: Lemon Bay to Estero Bay (Leary, 2010)

4.1.2 / *Ecosystem Science Issues*

Issue One: Water Quality

The basic characteristics of CHAP's water vary naturally in response to the daily, seasonal, and long term forces which make the estuarine habitat conditions among the most dynamic on earth. The waters also vary throughout CHAP dependent on the location relative to each of the three major rivers and the passes that open to the Gulf of Mexico. The estuaries are also sensitive to runoff and upland discharge that moves into the estuary through sheetflow, small tributaries and canal systems. Historically, CHAP consisted of low-lying topography with slow moving flow, allowing rainfall to provide a constant input of fresh water into the estuaries throughout the year. This water was filtered by vegetation and sediments as it slowly moved its way across the landscape and into the estuary, depositing nutrients and other materials in habitats like salt marshes and mangrove swamps before entering into the rivers, tributaries or into the estuary itself. Through time, however, development has led to the disruption of the naturally slow sheetflow, resulting in stronger pulses of more concentrated freshwater often polluted by surrounding land uses. Runoff from agriculture and development has led to an influx of excess nutrients, as well as pesticides, fecal coliforms and other substances. Many people do not realize that materials entering into the majority of area stormwater drains are carried directly into the estuaries. A large portion of the land abutting CHAP has been acquired for preservation, and serves to filter some of the sheetflow from across the landscape, providing some protection from nutrients entering the estuary.

Hydrologic alterations, however, continue to exacerbate water quality conditions. Such alterations have led to altered timing, flow and reduced filtration of water coming off the landscape and entering into the estuaries. Additionally, increases in stormwater runoff from developments and agriculture areas carries with it pesticides, fertilizers, and other substances into area creeks and rivers, as well as the estuary itself. Old and failing septic systems also add nutrients as well as pharmaceuticals and possibly other poisonous chemicals from household products. As a result of these and other sources of pollution, increased nutrient loading has occurred. Fortunately, there are currently several efforts by multiple agencies and organizations addressing these issues. Some of these are discussed in more detail in Section 4.2.1.

The DEP classifies all aquatic preserves as Outstanding Florida Waters (OFWs), as specified in §403, Florida Statute (F.S.) and Chapter 62-302, F.A.C. This is the highest level of protection for water quality that a body of water can receive, and no degradation of water quality, other than that allowed by rule, can be permitted. These waters were found to be worthy of special protection because of their exceptional ecological or recreational significance. In general, DEP cannot issue permits for direct pollution and discharges to OFWs that would lower ambient (existing) water quality, or for indirect discharges that would significantly degrade the OFW. A 2010 report entitled State of the Southwest Florida Aquatic Preserves: Lemon Bay to Estero Bay found that, over the last 40 years, protected waterbodies exhibited greater water quality than surrounding unprotected waterbodies. For example, protected waters and those adjacent to protected uplands had lower total concentrations of nitrogen, phosphorus and chlorophyll *a*, as well as higher dissolved oxygen levels. Overall, for the Charlotte Harbor estuary region, water quality has been improving over the last 40 years. Nitrogen, phosphorus and chlorophyll *a* levels have been declining at statistically significant rates, while dissolved oxygen percentages have been increasing at significant rates. (Leary, 2010). Conversely, many of the waters that are listed as OFWs are now also listed as "impaired" under the Impaired Waters Rule, Chapter 62-303, F.A.C (see Section 4.2.1). It is important that CHAP staff remain aware of any potential for water quality degradation to occur within the aquatic preserves, through monitoring, trend analysis, and participation in local meetings and partnerships. Water quality monitoring assists in documentation of status and trends, and evaluation of water quality targets set to enable the restoration of seagrasses and other natural resources.

Goal One: Maintain and improve water quality within CHAP.

Objective One: Annually evaluate the threats to water quality that may result in the loss or degradation of natural resources within each of the Charlotte Harbor Aquatic Preserves.



Staff checking on one of the data sondes used to monitor water quality.

Integrated Strategies:

1. Collect and evaluate data from CHAP water quality monitoring programs to determine status, trends and data gaps.

Performance Measures:

- Coordinate CHEVWQMN monthly data collection.
- Collect monthly water samples for FWC-HAB program.
- Maintain data sondes for water quality assessments in Matlacha Pass Aquatic Preserve.
- Input, organize, QA/QC and maintain water quality data within CHAP water quality databases, Charlotte Harbor NEP Water Atlas and STORET.
- Evaluate water quality data annually to determine status, trends or data gaps.
- Identify areas where water quality threatens natural resources.

2. Collaborate with partners to provide data and stay informed about the water quality status and trends within CHAP and its tributaries.

Performance Measures:

- Track participation at technical meetings (e.g. CHNEP Technical Advisory Committee) where local water quality issues are being discussed.
- Compile and update a list of other agencies and organizations collecting water quality data within CHAP.
- Review water quality reports for areas within CHAP.
- Upload CHEVWQMN data into STORET and the Charlotte Harbor NEP Water Atlas.

Objective Two: Expand water quality data collection efforts and continue to enhance methodologies.

Integrated Strategies:

1. Expand data sonde program, as budget and personnel allow, and as data gaps are identified.

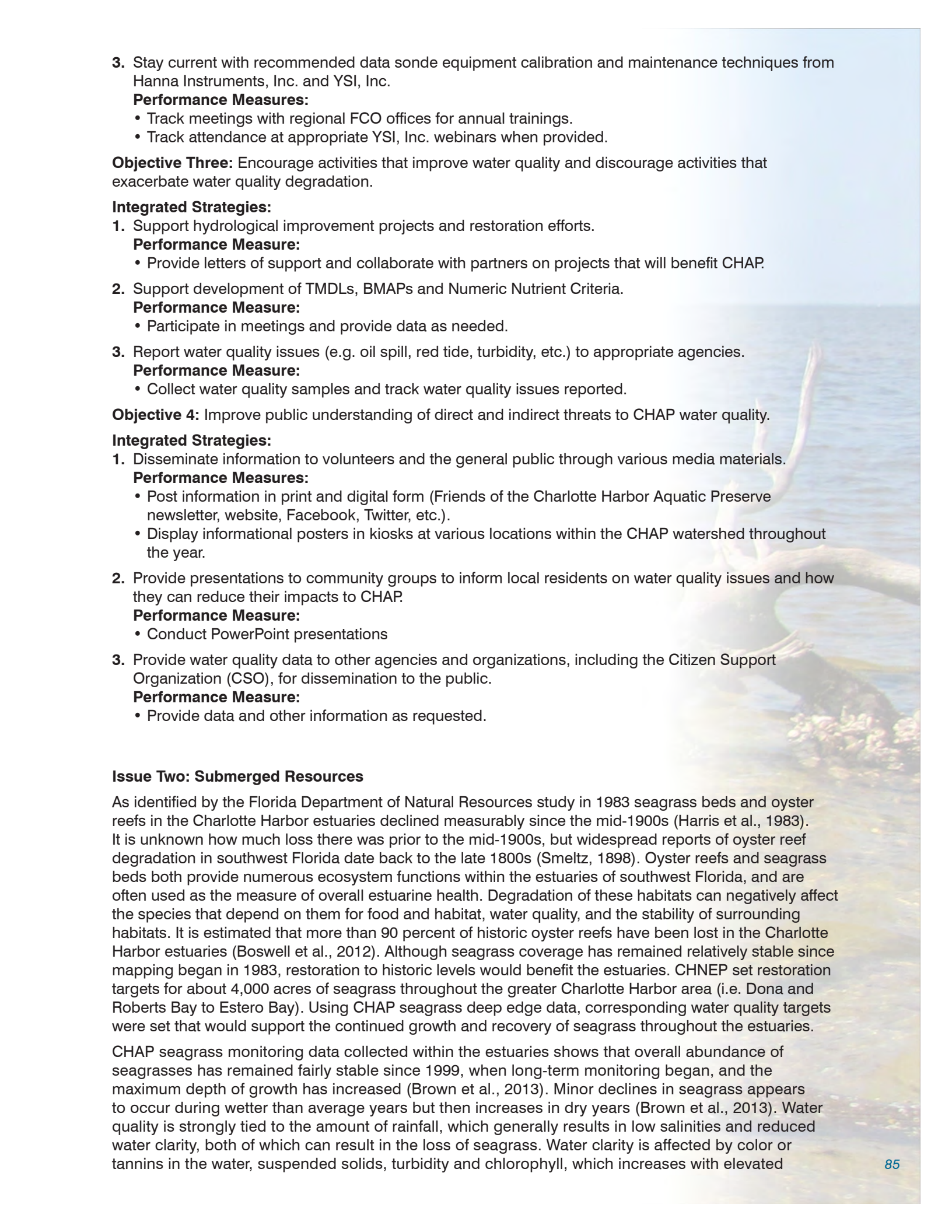
Performance Measure:

- Develop a prioritized list of water quality monitoring needs.

2. Encourage continued consistency within aquatic preserve offices regarding water quality data collection and data management techniques.

Performance Measure:

- Track participation in meetings and discussions with other aquatic preserve staff regarding water quality data collection and data management techniques.

- 
3. Stay current with recommended data sonde equipment calibration and maintenance techniques from Hanna Instruments, Inc. and YSI, Inc.

Performance Measures:

- Track meetings with regional FCO offices for annual trainings.
- Track attendance at appropriate YSI, Inc. webinars when provided.

Objective Three: Encourage activities that improve water quality and discourage activities that exacerbate water quality degradation.

Integrated Strategies:

1. Support hydrological improvement projects and restoration efforts.

Performance Measure:

- Provide letters of support and collaborate with partners on projects that will benefit CHAP.

2. Support development of TMDLs, BMAPs and Numeric Nutrient Criteria.

Performance Measure:

- Participate in meetings and provide data as needed.

3. Report water quality issues (e.g. oil spill, red tide, turbidity, etc.) to appropriate agencies.

Performance Measure:

- Collect water quality samples and track water quality issues reported.

Objective 4: Improve public understanding of direct and indirect threats to CHAP water quality.

Integrated Strategies:

1. Disseminate information to volunteers and the general public through various media materials.

Performance Measures:

- Post information in print and digital form (Friends of the Charlotte Harbor Aquatic Preserve newsletter, website, Facebook, Twitter, etc.).
- Display informational posters in kiosks at various locations within the CHAP watershed throughout the year.

2. Provide presentations to community groups to inform local residents on water quality issues and how they can reduce their impacts to CHAP.

Performance Measure:

- Conduct PowerPoint presentations

3. Provide water quality data to other agencies and organizations, including the Citizen Support Organization (CSO), for dissemination to the public.

Performance Measure:

- Provide data and other information as requested.

Issue Two: Submerged Resources

As identified by the Florida Department of Natural Resources study in 1983 seagrass beds and oyster reefs in the Charlotte Harbor estuaries declined measurably since the mid-1900s (Harris et al., 1983). It is unknown how much loss there was prior to the mid-1900s, but widespread reports of oyster reef degradation in southwest Florida date back to the late 1800s (Smeltz, 1898). Oyster reefs and seagrass beds both provide numerous ecosystem functions within the estuaries of southwest Florida, and are often used as the measure of overall estuarine health. Degradation of these habitats can negatively affect the species that depend on them for food and habitat, water quality, and the stability of surrounding habitats. It is estimated that more than 90 percent of historic oyster reefs have been lost in the Charlotte Harbor estuaries (Boswell et al., 2012). Although seagrass coverage has remained relatively stable since mapping began in 1983, restoration to historic levels would benefit the estuaries. CHNEP set restoration targets for about 4,000 acres of seagrass throughout the greater Charlotte Harbor area (i.e. Dona and Roberts Bay to Estero Bay). Using CHAP seagrass deep edge data, corresponding water quality targets were set that would support the continued growth and recovery of seagrass throughout the estuaries.

CHAP seagrass monitoring data collected within the estuaries shows that overall abundance of seagrasses has remained fairly stable since 1999, when long-term monitoring began, and the maximum depth of growth has increased (Brown et al., 2013). Minor declines in seagrass appears to occur during wetter than average years but then increases in dry years (Brown et al., 2013). Water quality is strongly tied to the amount of rainfall, which generally results in low salinities and reduced water clarity, both of which can result in the loss of seagrass. Water clarity is affected by color or tannins in the water, suspended solids, turbidity and chlorophyll, which increases with elevated



Staff assessing epiphytic growth on manatee grass.

nutrients from runoff. Water quality and seagrasses are both influenced by natural events, but anthropogenic alterations to natural flows and pollution can exacerbate the natural fluctuations. The quality and extent of seagrass beds can serve as an indicator of the overall health of the estuaries. Different seagrass species have different salinity, light and nutrient requirements, and tolerance levels. Changes in water quality can therefore affect seagrass range and distribution, as well as species abundance. Moreover, as species migrate and changes in seagrass bed composition occur, there can be ramifications throughout the food web, affecting a wide variety of floral, faunal and algal species. Although it is obvious that large changes in seagrass bed composition and density can produce major changes in the community structure, even subtle variations can produce major community differences (Zieman & Zieman, 1989). This is particularly important since many commercially and recreationally important fish species rely on area seagrass beds at some point in their life. Water quality can also affect seagrasses indirectly, as increases in nutrient levels can intensify naturally occurring populations of drift algae. Populations of the native green macroalgae *Ulva* spp. and red macroalgae species such as *Acanthophora spicifera*, *Gracilaria* spp., *Laurencia* spp., and *Hypnea* spp. can proliferate quickly after an influx of nutrients. This is more prevalent during the summer months near areas of heavy freshwater inflow, where these macroalgae, as well as green filamentous algae, can flourish. Aquatic preserve staff have noted this phenomenon several times during seagrass monitoring. The SCCF Marine Laboratory has been studying macroalgae, and has correlated large amounts of algae with times of higher flows from the Caloosahatchee River. When drift algae blooms occur, they can overrun seagrass beds, blocking out sunlight and effectively smothering the seagrasses. Decomposition of algae can also lower the amount of available oxygen for marine animals.

In comparison to seagrasses, the loss and degradation of oyster reefs has not been as widely studied in the Charlotte Harbor estuaries. Recognizing the need to understand the loss and restoration potential for oyster reefs in the area, the CHNEP and TNC cooperatively developed a consensus-based regional oyster restoration plan in 2012. Aerial photo interpretation from 1999 suggests a 90 percent loss of oyster reefs since the 1946/1951 mapping, however a lack of ground truthing in association with the photo interpretation leaves questions about the accuracy of this information (Boswell et al., 2012). Much of the widespread loss of oyster reefs in the area likely occurred prior to the earliest mapping as a result of dredging, mining oyster reefs for road beds, sedimentation and hydrologic alterations from development, as well as harvest. The CHNEP Oyster Reef Restoration Plan identifies the potentially suitable areas for oyster reef restoration throughout the CHNEP estuaries, including CHAP. Short-term goals for oyster



Researchers find hard clams in the soft unvegetated bottoms of Charlotte Harbor Aquatic Preserves.

reef restoration include mapping oyster habitats, implementing pilot restoration projects, increasing public awareness, and seeking funding. Oyster restoration research that has been done over the past decade by FGCU and SCCF has demonstrated that the lack of oysters in the area is primarily the result of substrate limitation. By using appropriate substrate enhancement methodologies in areas with stable hydrologic conditions, oyster reefs can be restored. Additional mapping and research on restoration methodologies will assist with the long term goal of restoring self-sustaining oyster habitat and related ecosystem services throughout the Charlotte Harbor area.

The loss of native habitats and natural water flow and water quality regimes can result in decreased numbers of native species and the increased proliferation of exotic species. There have been documented declines in native fisheries species such as spotted sea trout, mullet and blue crab; decreases in landings numbers of these species were recorded from 1998 to 2008 (Gray, Beaver, & Beaver, 2009). The bay scallop population in the area declined sharply in the 1960s, likely resulting from a mixture of overfishing and development. Efforts to restore the bay scallop population have been underway since 2006, and have led to increased numbers (Stephenson et al., 2014). There has also been some interest in restoring native hard clam (*Mercenaria campechiensis*) beds. Mapping of hard clam beds would be valuable in understanding restoration and protection needs. Invasive exotic species such as the Asian green mussel have been found within the aquatic preserves. Asian green mussels are easily introduced by boaters and can quickly establish populations. Non-native fish such as the lionfish have been documented in CHAP and threaten native fish species as they often out compete for food, shelter and space, or consume native fish species themselves. Other exotic species have been documented and may become increasingly problematic with time. (See Chapter 3.3: Invasive Non-native and/or Problem Species for more information.) HABs, although typically composed of native species, can have significant negative impacts on natural resources and humans, and recently there has been a noticeable increase in problems associated with HABs. Impacts from these blooms can include human illness (or death) from contaminated seafood, marine mammal and seabird deaths, and extensive fish kills (EPA, n.d.b). Gaining an understanding of these events is of vital importance, as HABs in recent years in the Caloosahatchee River and along the coastline have been raising media attention and concern among residents and tourists.

In addition to the submerged natural resources, CHAP is also home to numerous culturally significant sites that should be protected. Many of these coastal historic sites are located underwater due to

historic sea level rise, or may be susceptible to inundation from a rise in sea level in the future. These archaeological and historic sites are also susceptible to erosion and to the threat of human impacts (i.e. vandalism and disturbance). Coordination with Division of Historical Resources, Florida Public Archaeology Network, and local law enforcement will be necessary in order to help protect these sites. See the “Archaeological and Historical Resources” section of Chapter 3 for more information and Appendix B.4 for a list of archaeological or historic sites within or immediately adjacent to CHAP.

Goal One: Assess the condition of CHAP’s submerged resources to identify threats to the health of the estuaries.

Objective One: Annually evaluate seagrass status and trends.

Integrated Strategies:

1. Collect, analyze and provide data from CHAP seagrass monitoring program to determine status and trends.

Performance Measures:

- Conduct annual seagrass monitoring.
- Maintain seagrass monitoring program database.
- Review and analyze data, as time and funding allow.
- Provide data as requested.
- Develop a prioritized list of seagrass monitoring and data management needs.

2. Collaborate with other groups collecting seagrass data within CHAP and other local waters to stay informed about seagrass status and encourage consistency in methodology.

Performance Measures:

- Attend scientific meetings and conferences where seagrass status and trends are discussed.
- Coordinate the annual methodology field collaboration with DEAR, EBAP, SCCF, and others.

Objective Two: Expand the documentation of submerged resources found within CHAP, including plant, animal, and algal communities.

Integrated Strategies:

1. Support the efforts of partner organizations to map seagrass and oyster habitat in CHAP.

Performance Measures:

- Participate in the Southwest Florida Oyster Working Group.
- Support the SWFWMD and SFWMD seagrass mapping efforts and continue to assist with water clarity data collection.
- Participate in the Southwest Florida Seagrass Working Group.

2. Document locations of habitat types (e.g. live rock, sponge beds, corals) within CHAP.

Performance Measures:

- Build a GIS layer of habitat types found within CHAP as they are identified during field surveys.
- Maintain and update current GIS layers of habitat types found within CHAP.

3. Document species found within CHAP.

Performance Measures:

- Maintain a list of species identified during field surveys, public wading and snorkeling trips.
- Compile data from scientific studies and reports.

Goal Two: Preserve, protect, and restore submerged resources within CHAP.



An adult bay scallop, once a common sight in the Charlotte Harbor Aquatic Preserves, is now a prized find.

Objective One: Increase or improve submerged resources that have been degraded due to anthropogenic influences.

Integrated Strategies:

1. Support the effort by partner organizations to restore oyster habitat in CHAP.

Performance Measures:

- Participate in the Southwest Florida Oyster Working Group.
- Provide input to partners regarding appropriate methodologies for use within CHAP.
- Support the use of restoration methodologies proven to be successful for use in CHAP.

2. Support efforts by partners to restore or improve sea-grass beds damaged by prop scarring or water quality degradation.

Performance Measures:

- Participate in the Southwest Florida Seagrass Working Group.
- Provide input to partners regarding appropriate restoration methodologies for use within CHAP.

3. Support efforts by partners to increase native hard clam and bay scallop populations within CHAP.

Performance Measures:

- Participate in the Southwest Florida Scallop Working Group.
- Provide input to partners regarding appropriate restoration methodologies for use within CHAP.

Objective Two: Maintain existing submerged cultural resources.

Integrated Strategy:

1. Document submerged cultural resources within CHAP.

Performance Measures:

- Collaborate with the Division of Historical Resources and Florida Public Archaeology Network to stay abreast of documented submerged cultural resources.
- Verify location and condition of submerged cultural resources.
- Report the condition of and any potential threats to these cultural resources to the Division of Historical Resources. The Division of Historical Resources will also be notified for any new or potentially unrecorded sites.

Objective Three: Identify the presence and threat of invasive exotic species.

Integrated Strategies:

1. Continue expansion of the CHAP Asian green mussel eradication program.

Performance Measures:

- Document locations and conditions of green mussels.
- Track number of removed green mussels.

2. Encourage the public to report locations within CHAP of exotic species such as the Asian green mussel and lionfish.

Performance Measure:

- Maintain a list and locations of exotic species found within CHAP.

3. Collaborate with groups collecting data on exotic species within CHAP.

Performance Measures:

- Provide list and locations of exotic species found within CHAP.
- Assist other agencies/organizations in their efforts to control invasive exotics found within CHAP.

4. Report any invasive species found within CHAP to the appropriate documenting agency/organization.

Performance Measure:

- Maintain record of reports.

Objective Four: Improve public understanding of CHAP submerged resources.

Integrated Strategies:

1. Disseminate information to the general public and volunteers through various media materials.

Performance Measures:

- Provide printed educational information to the public and track participation at outreach events.
- Post information in print and digital form (Friends of Charlotte Harbor Aquatic Preserves newsletter, websites, and social media).
- Provide and track informational presentations to community groups and organizations.
- Display informational posters in kiosks at various locations within the CHAP watershed throughout the year.
- Distribute informational brochures and pamphlets from other agencies/organization at CHAP office.

2. Support other agencies and organizations with their submerged natural and cultural resources education efforts.

Performance Measure:

- Participate in the CHNEP Nature Festival, UF/IFAS Extension, Florida Sea Grant Scallop Searches, Science Technology Engineering Math (STEM) fairs at local schools and universities, Florida Sportsman Expo, and Cayo Costa Heritage Days.

3. Provide and encourage volunteer opportunities.

Performance Measure:

- Coordinate volunteers to assist in monitoring efforts.

4. Post aquatic preserve boundary signs for seagrass protection.

Performance Measure:

- Boundary signage posted to educate and discourage prop scarring within CHAP.

Issue Three: Wading and Diving Colonial Nesting Birds

In the late 19th century, after 40 years of plume hunting, wading birds became a focal point for conservation. In the 1970s, extensive colonial nesting bird surveys were initiated along the North American Atlantic and Gulf coasts (Kushlan, 1997). Wading birds maintain a high aesthetic and recreational value to humans and their reproductive performance is a crucial aspect of their population dynamics (Kushlan, 1993). Anthropological interference has led to the decline of many bird species in southwest Florida, through both direct and indirect effects. Hydrological changes within a watershed, for example, can put stress on native bird species as wetlands that drain too quickly are unable to maintain ample food supplies for wading birds. This can lead to diminished or failed reproductive efforts. Other anthropological activities have more direct and immediate consequences. Colonial nesting wading birds are particularly susceptible to local human disturbances (Parnell et al., 1988). Many recreational activities within the aquatic preserves happen within the 109 yards (100 m) buffer suggested for nesting wading birds (Erwin, 1989; Rodgers & Smith, 1995; Burger, 1998; Carney & Sydeman, 1999). For example, several wading and diving bird nesting colonies within CHAP have been impacted by human disturbances, including camping on active nesting islands, and eco-tour boats flushing colonies multiple times a day. Disturbances in early nest building and incubation periods can cause nest desertion (Steinkamp, Peterjohn, Byrd, Carter, & Lowe, 2003), and frequent disturbance may cause a reduction in clutch size and hatching success (Schreiber & Risebrough, 1972). Predation of eggs by fish crows (*Corvus ossifragus*) when adult birds were flushed from the nest due to disturbance was noted by Schreiber and Risebrough (1972) as the leading cause of egg loss. Monitoring, education and maintenance of natural conditions on the rookery islands are reasonable steps in addressing many of the anthropological issues facing wading and diving bird colonies. Efforts to provide the public with information on safe wildlife viewing procedures and proper boating distances to rookery islands are ongoing. High population turnover rates due to the large number of seasonal residents and vacationing visitors in the area demand that educational efforts be maintained continuously.

Goal One: Assess the condition of CHAP's wading and diving bird colonies.

Objective One: Annually evaluate the status and trends of wading and diving bird populations within CHAP.

Integrated Strategies:

1. Collect and analyze data to determine status and trends.

Performance Measures:

- Investigate potential nesting islands within CHAP annually.
- Conduct monthly colonial wading bird surveys.
- Maintain up-to-date survey records throughout nesting season.
- Maintain a database housing existing data collected by CHAP, J.N. Ding Darling NWR, Audubon and others.
- Conduct an annual review of status and trends and produce a report of population trends with J.N. Ding Darling NWR.

2. Identify threats to wading and diving bird colonies.

Performance Measures:

- Enter and submit bird fatality data from fishing line entanglement to FWC database.
- Coordinate with law enforcement regarding monitoring of nesting islands for harassment of wildlife.
- Document human disturbance to nesting wading birds.

- Cooperate with FWC and assist, as staff are available, with the development of an imperiled fish and wildlife species management strategy, including survey and monitoring protocols for species and their associated habitats that occur, or have the potential to occur, at CHAP.

3. Collaborate with other groups collecting regional nesting island data to encourage consistency in methodology.

Performance Measures:

- Meet annually with J.N. Ding Darling NWR before active nesting season.
- Conduct training and monitoring with EBAP staff.

Goal Two: Preserve and protect wading bird nesting islands.

Objective One: Reduce threats to the natural conditions on wading bird nesting islands.

Integrated Strategies:

1. Remove exotic vegetation from nesting islands.

Performance Measures:

- Document locations and acreage of exotic vegetation on nesting islands.
- Coordinate with partners to remove exotic vegetation.
- Track acreage of exotic vegetation removed.

2. Conduct fishing-line and trash cleanups within CHAP, in cooperation with other agencies, organizations, and volunteers.

Performance Measure:

- Document information including trash removed from nesting islands, number of volunteers participating in cleanups, number of working partnerships, etc.

3. Report wildlife harassment activity to appropriate law enforcement personnel.

Performance Measure:

- Track reports to law enforcement.

4. Coordinate with permitting agencies on any proposed public and private use activities (e.g. fireworks, marine events, and construction) in proximity of nesting islands.

Performance Measure:

- Provide comments to permitting agencies about potential impacts to nesting islands from proposed activities.

5. Post signage around wading bird nesting islands to reduce impacts.

Performance Measures:

- Active islands are posted with temporary closure signage for marine events, as necessary.
- Boundary signage is posted to discourage human disturbance, as allowed.
- Support the efforts to establish Critical Wildlife Areas as deemed necessary.

Objective Two: Improve public understanding of colonial wading birds and nesting island habitat.

Integrated Strategies:

1. Educate the public and disseminate information at environmental events.

Performance Measures:

- Provide current status and trends information for the general public.
- Produce and update a fact sheet about the CHAP colonial wading and diving bird program.

2. Provide volunteer opportunities and train volunteers to assist with rookery monitoring.

Performance Measures:

- Ensure volunteers receive adequate training on CHAP monitoring methods.
- Keep track of volunteer hours.

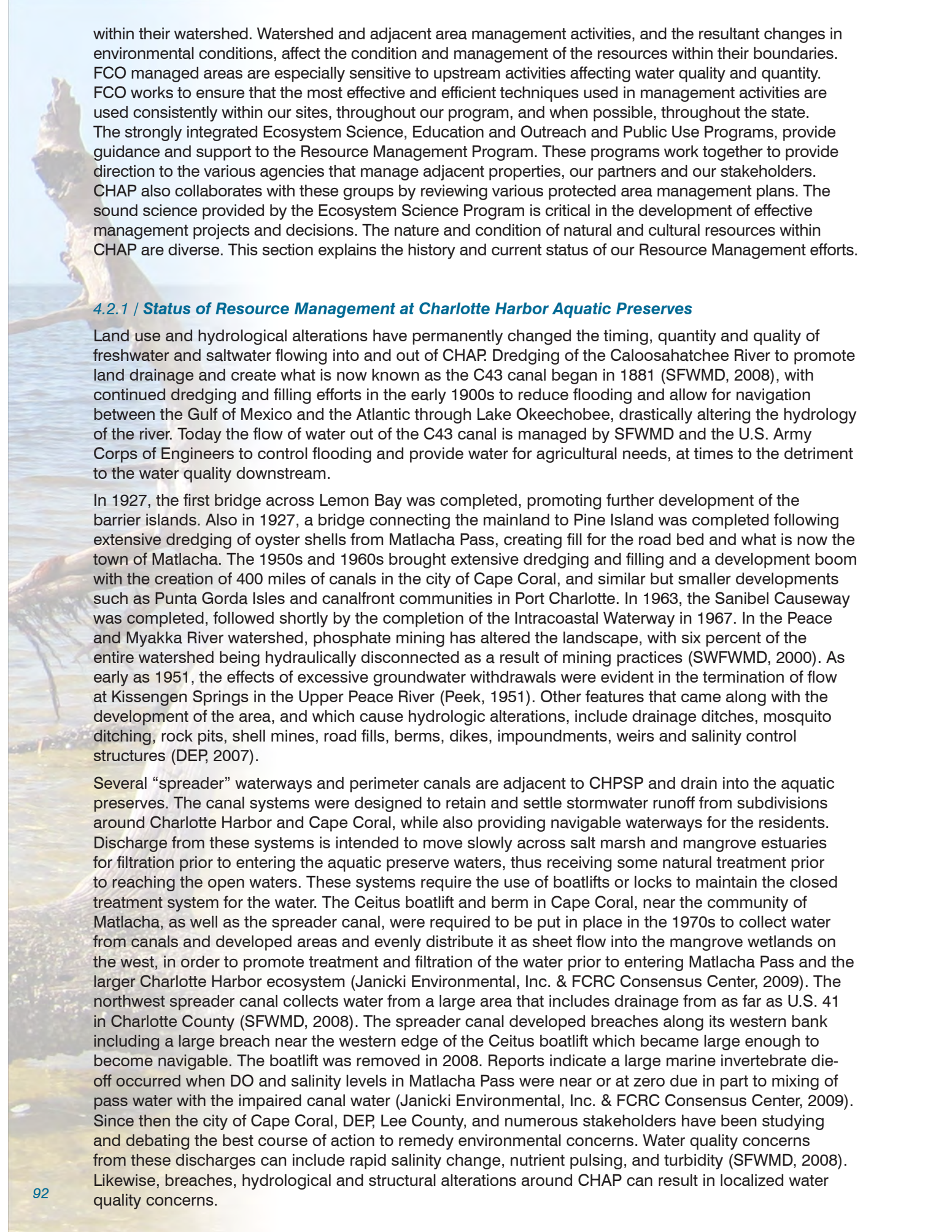
3. Support partners that provide education and outreach.

Performance Measure:

- Provide fact sheets and annual trends report to partners, as requested.

4.2 / *The Resource Management Program*

The Resource Management Program addresses how FCO manages CHAP and its resources. The primary concept of CHAP Resource Management projects and activities are guided by FCO's mission statement: "To protect Florida's coastal and aquatic resources." FCO's sites accomplish resource management by physically conducting management activities on the resources for which they have direct management responsibility, and by influencing the activities of others within and adjacent to their managed areas and



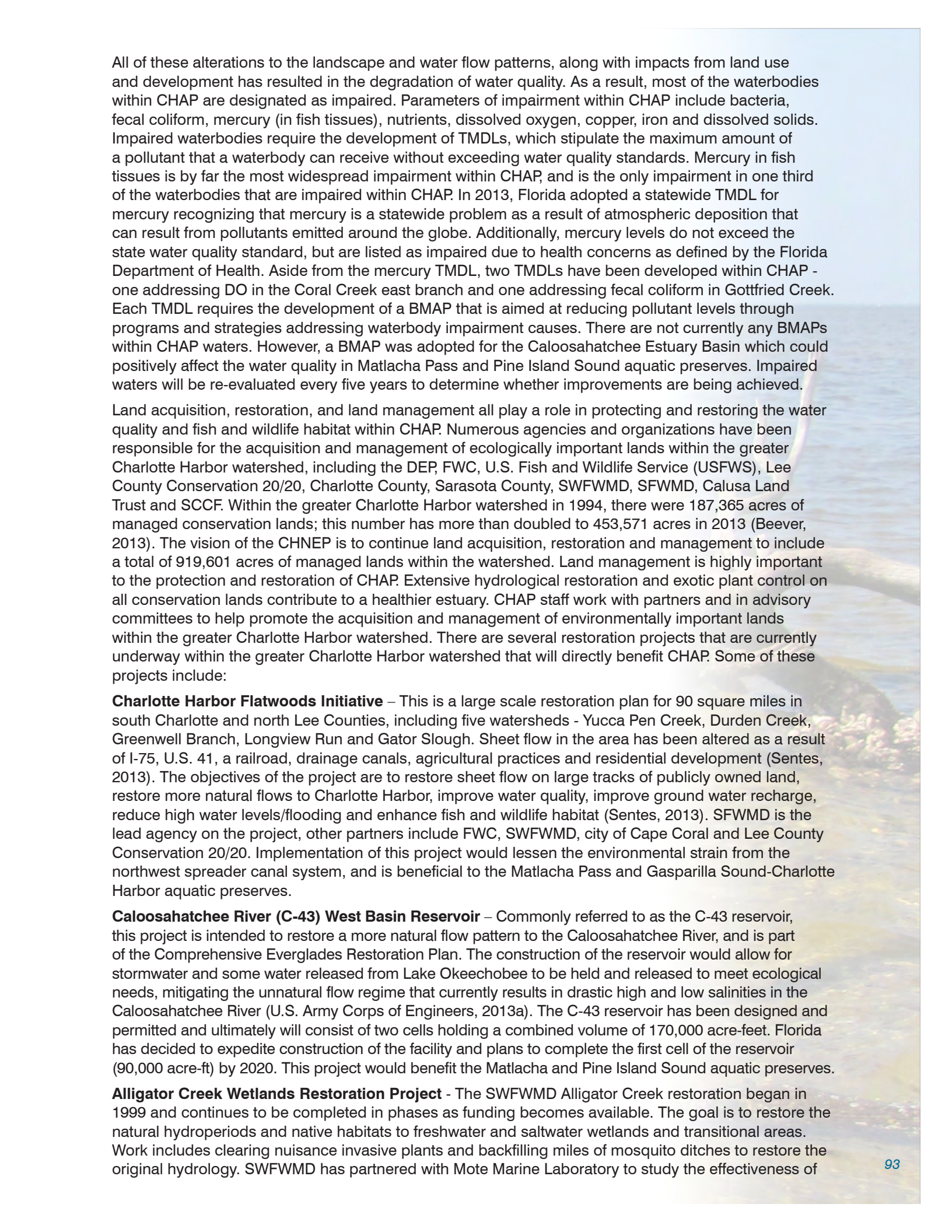
within their watershed. Watershed and adjacent area management activities, and the resultant changes in environmental conditions, affect the condition and management of the resources within their boundaries. FCO managed areas are especially sensitive to upstream activities affecting water quality and quantity. FCO works to ensure that the most effective and efficient techniques used in management activities are used consistently within our sites, throughout our program, and when possible, throughout the state. The strongly integrated Ecosystem Science, Education and Outreach and Public Use Programs, provide guidance and support to the Resource Management Program. These programs work together to provide direction to the various agencies that manage adjacent properties, our partners and our stakeholders. CHAP also collaborates with these groups by reviewing various protected area management plans. The sound science provided by the Ecosystem Science Program is critical in the development of effective management projects and decisions. The nature and condition of natural and cultural resources within CHAP are diverse. This section explains the history and current status of our Resource Management efforts.

4.2.1 / Status of Resource Management at Charlotte Harbor Aquatic Preserves

Land use and hydrological alterations have permanently changed the timing, quantity and quality of freshwater and saltwater flowing into and out of CHAP. Dredging of the Caloosahatchee River to promote land drainage and create what is now known as the C43 canal began in 1881 (SFWMD, 2008), with continued dredging and filling efforts in the early 1900s to reduce flooding and allow for navigation between the Gulf of Mexico and the Atlantic through Lake Okeechobee, drastically altering the hydrology of the river. Today the flow of water out of the C43 canal is managed by SFWMD and the U.S. Army Corps of Engineers to control flooding and provide water for agricultural needs, at times to the detriment to the water quality downstream.

In 1927, the first bridge across Lemon Bay was completed, promoting further development of the barrier islands. Also in 1927, a bridge connecting the mainland to Pine Island was completed following extensive dredging of oyster shells from Matlacha Pass, creating fill for the road bed and what is now the town of Matlacha. The 1950s and 1960s brought extensive dredging and filling and a development boom with the creation of 400 miles of canals in the city of Cape Coral, and similar but smaller developments such as Punta Gorda Isles and canalfront communities in Port Charlotte. In 1963, the Sanibel Causeway was completed, followed shortly by the completion of the Intracoastal Waterway in 1967. In the Peace and Myakka River watershed, phosphate mining has altered the landscape, with six percent of the entire watershed being hydraulically disconnected as a result of mining practices (SFWMD, 2000). As early as 1951, the effects of excessive groundwater withdrawals were evident in the termination of flow at Kissengen Springs in the Upper Peace River (Peek, 1951). Other features that came along with the development of the area, and which cause hydrologic alterations, include drainage ditches, mosquito ditching, rock pits, shell mines, road fills, berms, dikes, impoundments, weirs and salinity control structures (DEP, 2007).

Several “spreader” waterways and perimeter canals are adjacent to CHPSP and drain into the aquatic preserves. The canal systems were designed to retain and settle stormwater runoff from subdivisions around Charlotte Harbor and Cape Coral, while also providing navigable waterways for the residents. Discharge from these systems is intended to move slowly across salt marsh and mangrove estuaries for filtration prior to entering the aquatic preserve waters, thus receiving some natural treatment prior to reaching the open waters. These systems require the use of boatlifts or locks to maintain the closed treatment system for the water. The Ceitus boatlift and berm in Cape Coral, near the community of Matlacha, as well as the spreader canal, were required to be put in place in the 1970s to collect water from canals and developed areas and evenly distribute it as sheet flow into the mangrove wetlands on the west, in order to promote treatment and filtration of the water prior to entering Matlacha Pass and the larger Charlotte Harbor ecosystem (Janicki Environmental, Inc. & FCRC Consensus Center, 2009). The northwest spreader canal collects water from a large area that includes drainage from as far as U.S. 41 in Charlotte County (SFWMD, 2008). The spreader canal developed breaches along its western bank including a large breach near the western edge of the Ceitus boatlift which became large enough to become navigable. The boatlift was removed in 2008. Reports indicate a large marine invertebrate die-off occurred when DO and salinity levels in Matlacha Pass were near or at zero due in part to mixing of pass water with the impaired canal water (Janicki Environmental, Inc. & FCRC Consensus Center, 2009). Since then the city of Cape Coral, DEP, Lee County, and numerous stakeholders have been studying and debating the best course of action to remedy environmental concerns. Water quality concerns from these discharges can include rapid salinity change, nutrient pulsing, and turbidity (SFWMD, 2008). Likewise, breaches, hydrological and structural alterations around CHAP can result in localized water quality concerns.



All of these alterations to the landscape and water flow patterns, along with impacts from land use and development has resulted in the degradation of water quality. As a result, most of the waterbodies within CHAP are designated as impaired. Parameters of impairment within CHAP include bacteria, fecal coliform, mercury (in fish tissues), nutrients, dissolved oxygen, copper, iron and dissolved solids. Impaired waterbodies require the development of TMDLs, which stipulate the maximum amount of a pollutant that a waterbody can receive without exceeding water quality standards. Mercury in fish tissues is by far the most widespread impairment within CHAP, and is the only impairment in one third of the waterbodies that are impaired within CHAP. In 2013, Florida adopted a statewide TMDL for mercury recognizing that mercury is a statewide problem as a result of atmospheric deposition that can result from pollutants emitted around the globe. Additionally, mercury levels do not exceed the state water quality standard, but are listed as impaired due to health concerns as defined by the Florida Department of Health. Aside from the mercury TMDL, two TMDLs have been developed within CHAP - one addressing DO in the Coral Creek east branch and one addressing fecal coliform in Gottfried Creek. Each TMDL requires the development of a BMAP that is aimed at reducing pollutant levels through programs and strategies addressing waterbody impairment causes. There are not currently any BMAPs within CHAP waters. However, a BMAP was adopted for the Caloosahatchee Estuary Basin which could positively affect the water quality in Matlacha Pass and Pine Island Sound aquatic preserves. Impaired waters will be re-evaluated every five years to determine whether improvements are being achieved.

Land acquisition, restoration, and land management all play a role in protecting and restoring the water quality and fish and wildlife habitat within CHAP. Numerous agencies and organizations have been responsible for the acquisition and management of ecologically important lands within the greater Charlotte Harbor watershed, including the DEP, FWC, U.S. Fish and Wildlife Service (USFWS), Lee County Conservation 20/20, Charlotte County, Sarasota County, SWFWMD, SFWMD, Calusa Land Trust and SCCF. Within the greater Charlotte Harbor watershed in 1994, there were 187,365 acres of managed conservation lands; this number has more than doubled to 453,571 acres in 2013 (Beever, 2013). The vision of the CHNEP is to continue land acquisition, restoration and management to include a total of 919,601 acres of managed lands within the watershed. Land management is highly important to the protection and restoration of CHAP. Extensive hydrological restoration and exotic plant control on all conservation lands contribute to a healthier estuary. CHAP staff work with partners and in advisory committees to help promote the acquisition and management of environmentally important lands within the greater Charlotte Harbor watershed. There are several restoration projects that are currently underway within the greater Charlotte Harbor watershed that will directly benefit CHAP. Some of these projects include:

Charlotte Harbor Flatwoods Initiative – This is a large scale restoration plan for 90 square miles in south Charlotte and north Lee Counties, including five watersheds - Yucca Pen Creek, Durden Creek, Greenwell Branch, Longview Run and Gator Slough. Sheet flow in the area has been altered as a result of I-75, U.S. 41, a railroad, drainage canals, agricultural practices and residential development (Sentes, 2013). The objectives of the project are to restore sheet flow on large tracks of publicly owned land, restore more natural flows to Charlotte Harbor, improve water quality, improve ground water recharge, reduce high water levels/flooding and enhance fish and wildlife habitat (Sentes, 2013). SFWMD is the lead agency on the project, other partners include FWC, SWFWMD, city of Cape Coral and Lee County Conservation 20/20. Implementation of this project would lessen the environmental strain from the northwest spreader canal system, and is beneficial to the Matlacha Pass and Gasparilla Sound-Charlotte Harbor aquatic preserves.

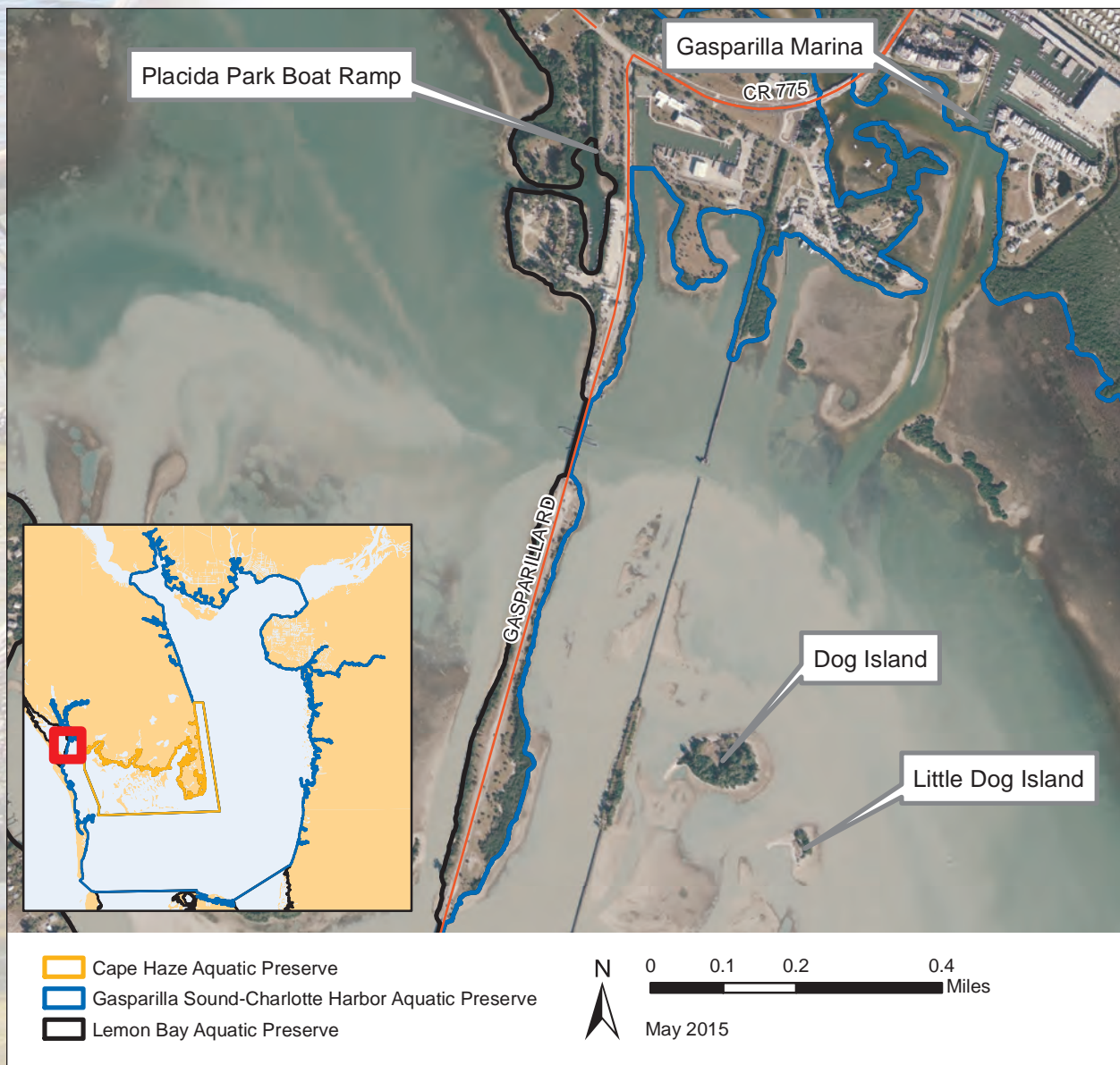
Caloosahatchee River (C-43) West Basin Reservoir – Commonly referred to as the C-43 reservoir, this project is intended to restore a more natural flow pattern to the Caloosahatchee River, and is part of the Comprehensive Everglades Restoration Plan. The construction of the reservoir would allow for stormwater and some water released from Lake Okeechobee to be held and released to meet ecological needs, mitigating the unnatural flow regime that currently results in drastic high and low salinities in the Caloosahatchee River (U.S. Army Corps of Engineers, 2013a). The C-43 reservoir has been designed and permitted and ultimately will consist of two cells holding a combined volume of 170,000 acre-feet. Florida has decided to expedite construction of the facility and plans to complete the first cell of the reservoir (90,000 acre-ft) by 2020. This project would benefit the Matlacha and Pine Island Sound aquatic preserves.

Alligator Creek Wetlands Restoration Project - The SWFWMD Alligator Creek restoration began in 1999 and continues to be completed in phases as funding becomes available. The goal is to restore the natural hydroperiods and native habitats to freshwater and saltwater wetlands and transitional areas. Work includes clearing nuisance invasive plants and backfilling miles of mosquito ditches to restore the original hydrology. SWFWMD has partnered with Mote Marine Laboratory to study the effectiveness of

the Alligator Creek Wetlands Restoration Project on improving habitats for mangrove creek fishes. The study will help to guide future conservation and management measures in the Charlotte Harbor region (SWFWMD, 2007).

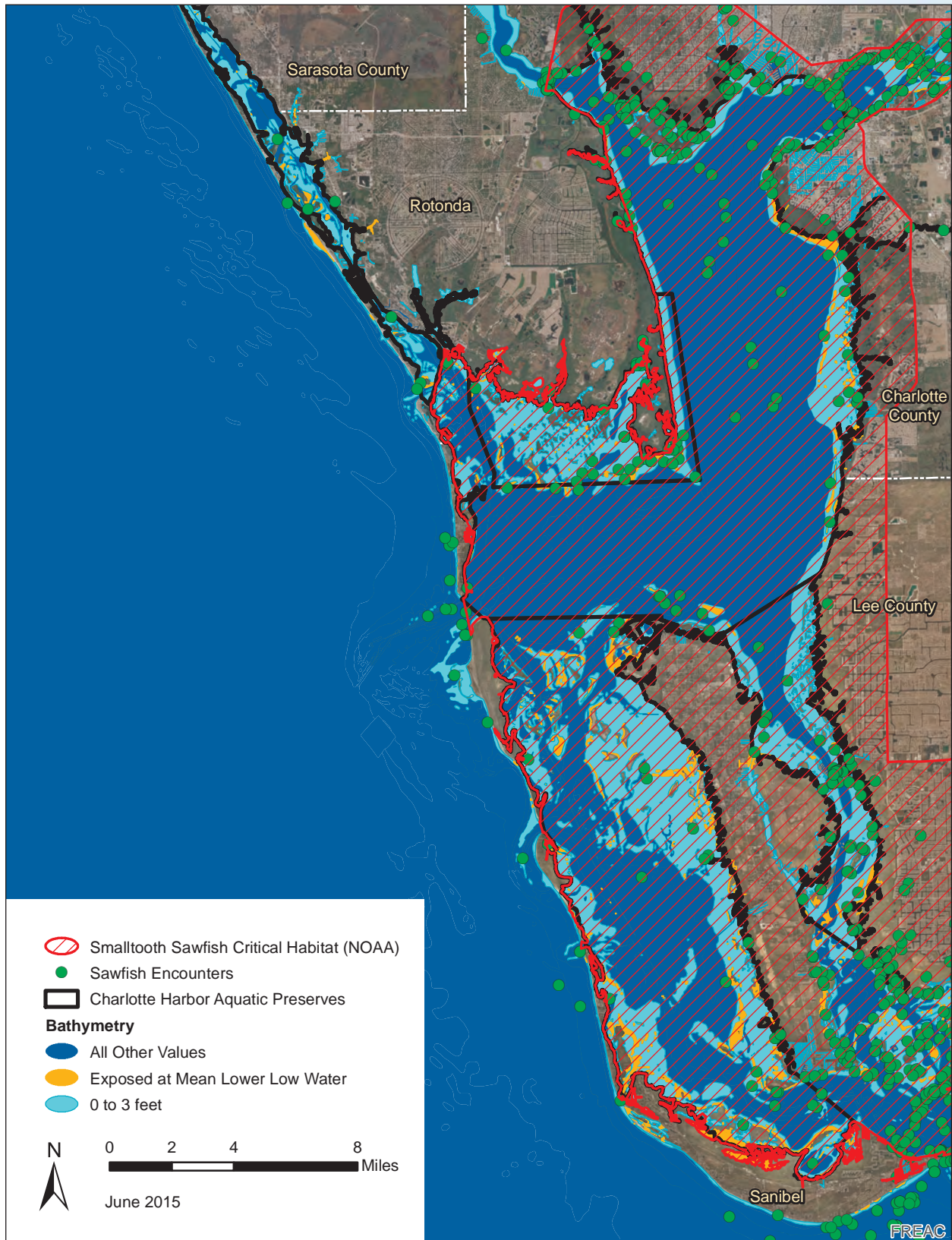
Coral Creek Ecosystem Restoration – This SWFWMD project, located on the Cape Haze peninsula, consists of hydrologic and habitat restoration of approximately 2,600 acres of degraded and impacted wetlands. The project is designed to provide water quality polishing for stormwater that moves into the area from a nearby subdivision. The first phase of the project began in 2013 (U.S. Army Corps of Engineers, 2013b). SWFWMD worked through the CHNEP technical advisory committee to identify metrics to measure the effectiveness of the project. Through the cooperation of SWFWMD, DEP and Charlotte County, it was completed in 2014, with 250 acres of uplands and wetlands restored (SWFWMD, 2014). This project will result in benefits to the Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves.

CHAP staff are responsible for the management of the spoil islands within the CHAP boundaries, and must balance the protection of natural resources and public use on these islands. Two of the islands are Dog Island and Little Dog Island. These islands are located within Gasparilla Sound-Charlotte Harbor Aquatic Preserve near Placida (see Map 38) and have been used in the past by the public for day use, camping and large marine events, such as the Redneck Yacht Club barge party (discussed in more detail in Section 4.4.1). Dog Island became an active rookery nesting island in 2011, and is monitored monthly. With the gathering of hundreds of boats and people during the barge parties around both



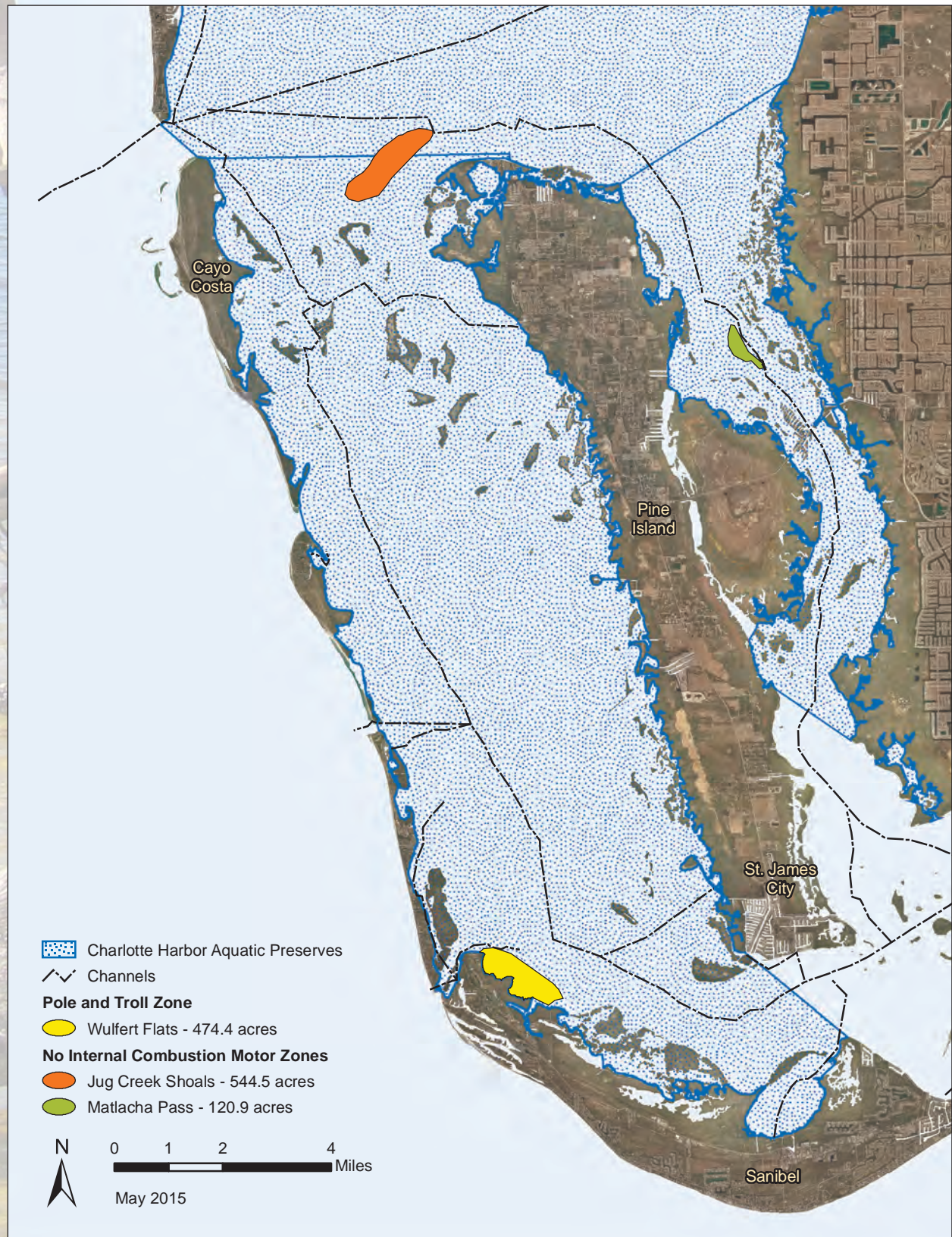
islands, CHAP staff closed Dog Island in May 2012 to protect the active great blue heron nests during the event. Other resource management efforts on Dog Island (started in 2014) and other preserve uplands that may come under CHAP management may include exotic plant treatment and prescribed fire.

CHAP staff also review DEP, SFWMD, SWFWMD and other agency permit applications for any project that has the potential to impact CHAP. This includes applications for activities within the aquatic preserves such as dredging or dock construction, as well as other projects within the watershed such as Developments of

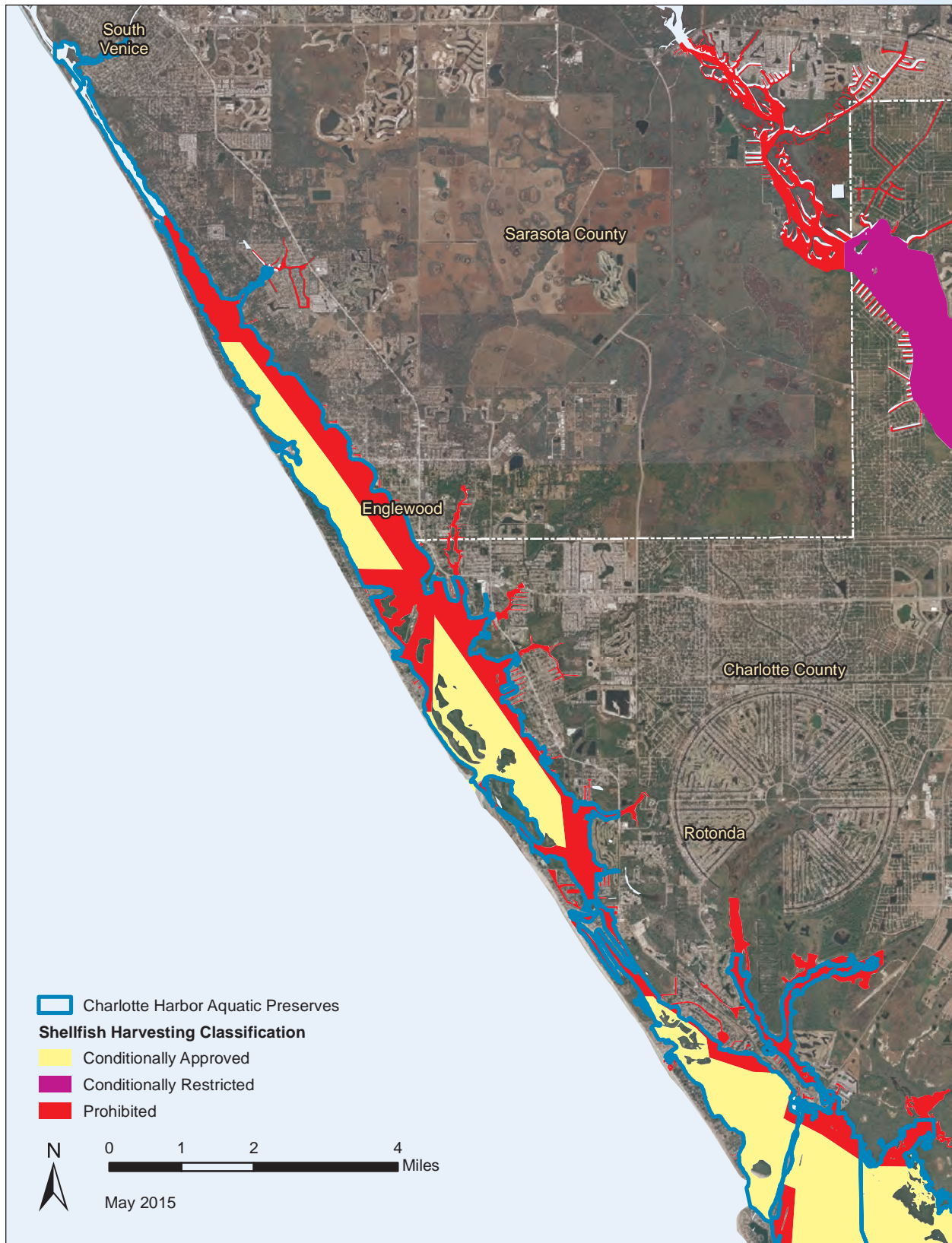


Map 39 / Smalltooth Sawfish Critical Habitat and hotspots.

Regional Impact or coastal alterations. It is important for all potential projects to be reviewed, as the aquatic preserve program is concerned with not only impacts of the proposed project, but also the cumulative impact from all projects within the area. It is this slowly increasing and collective pressure of development on the preserve that can be easily overlooked but can have significant consequences such as loss of habitat and degraded water quality. Staff review applications and conduct joint site inspections at which aquatic preserve resource concerns and determination of public interest are discussed with permitting



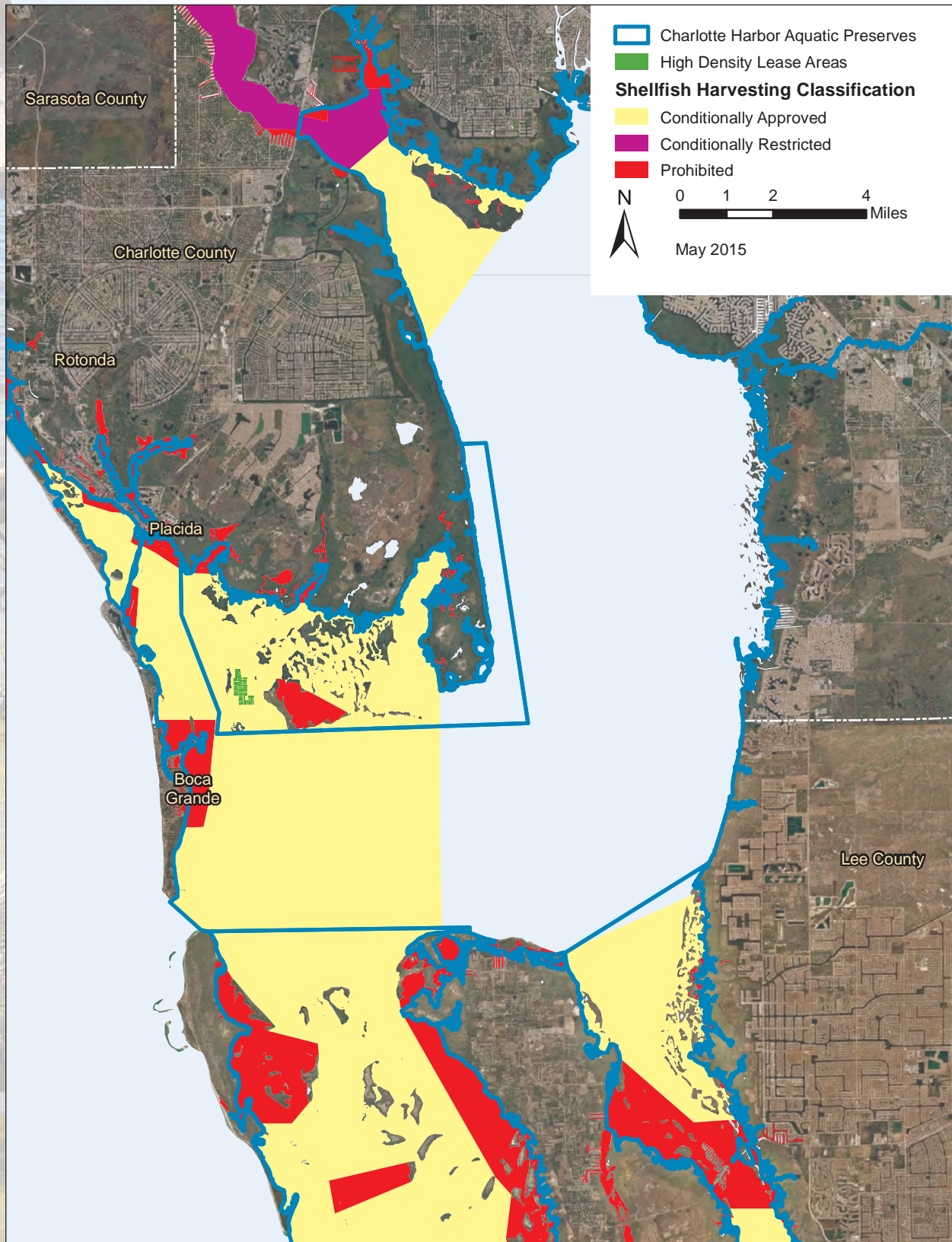
staff. CHAP staff also participate in a monthly coordination meeting with DEP South District Environmental Resource Permitting (ERP) staff. Aquatic preserve staff stay well-informed of current issues and collaborate with other agencies and organizations through participation in various meetings and working groups, including Lee County Marine Law Enforcement Task Force, Charlotte County Marine Advisory Committee, Lee County Waterways Advisory Committee, the Southwest Florida Seagrass Working Group, the Southwest Florida Oyster Working Group, and the Charlotte County Marine Response Committee, among



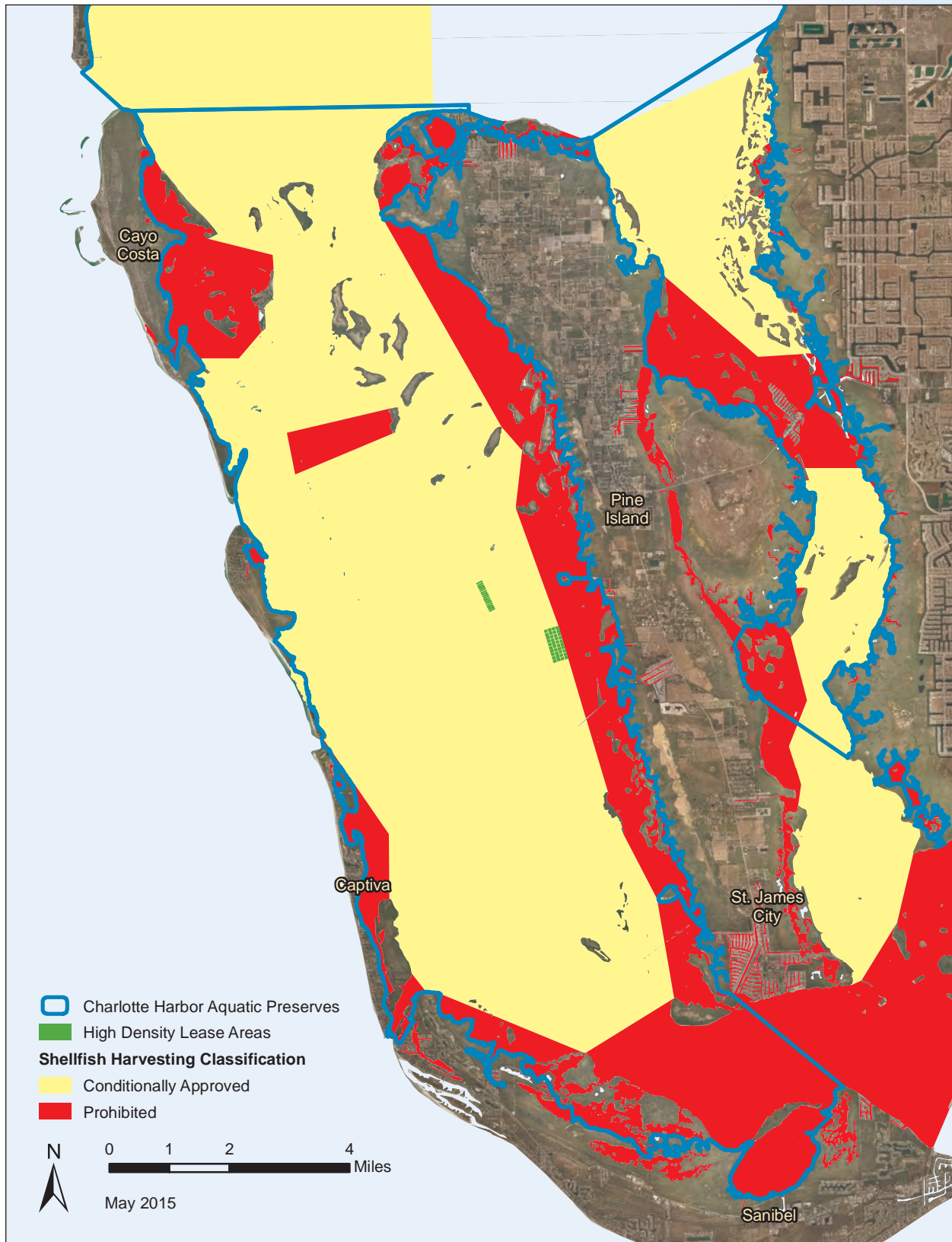
Map 41 | Lemon Bay Aquatic Preserve Shellfish Harvesting Areas.

others. In addition, CHAP has a member representative on the CHNEP Management Committee and is part of the CHNEP's Technical Advisory Committee conference group. These venues provide staff the opportunity to provide input on topics that may affect the aquatic preserves.

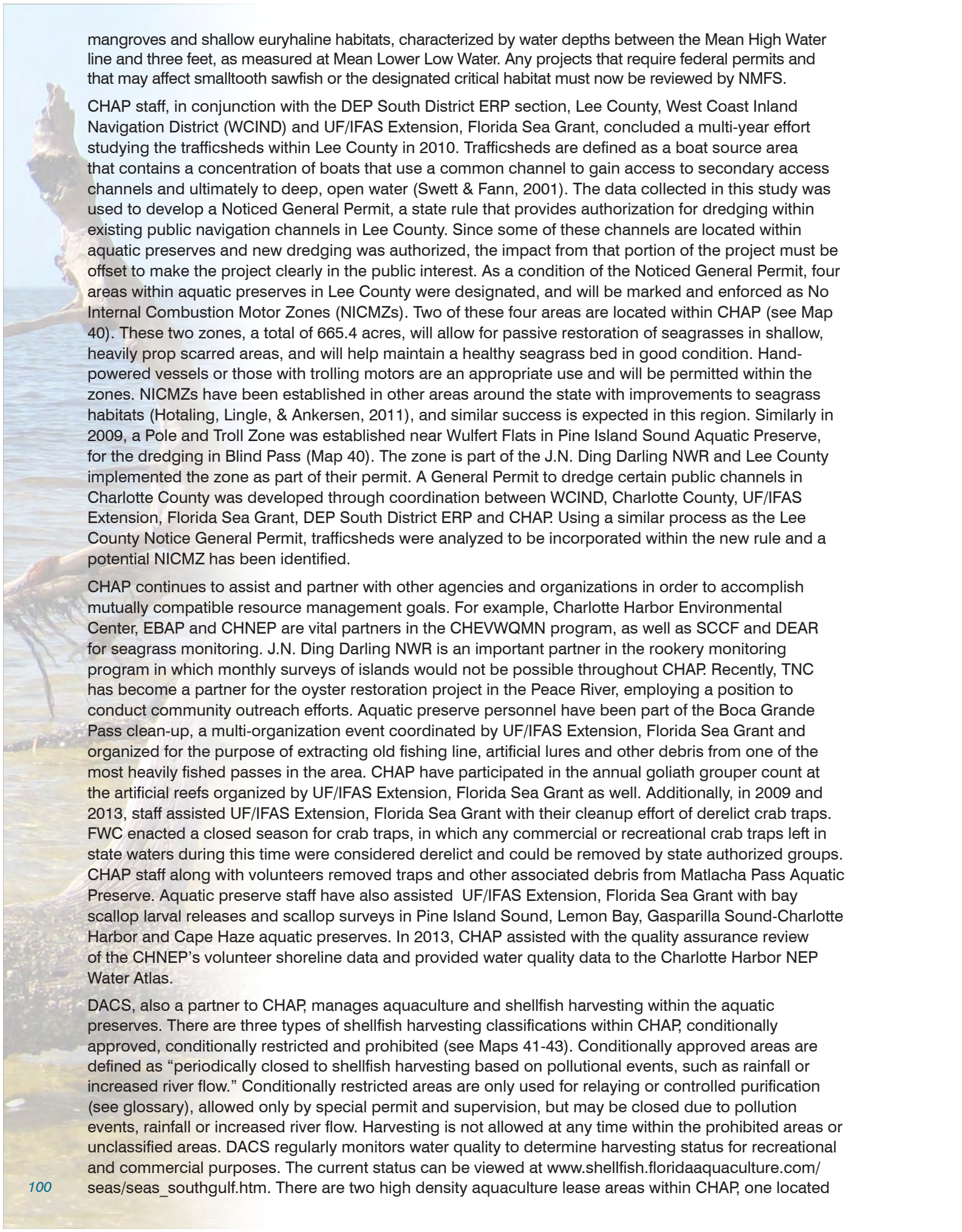
In 2009, all of CHAP except Lemon Bay Aquatic Preserve was designated by NOAA as critical habitat for the endangered smalltooth sawfish as part of its Charlotte Harbor Estuary Unit (see Map 39). This designation excludes areas containing existing federally authorized or permitted man-made structures such as channels



or canals maintained at depths greater than three feet (0.9 m) at Mean Lower Low Water. Additionally, per the Endangered Species Act, § 3(5)(A)(i), boat ramps, docks, and marinas deeper than three feet at Mean Lower Low Water are excluded. According to the NOAA National Marine Fisheries Service (NMFS), activities that may be affected by this critical habitat designation include dredging/ filling and other inwater construction (docks, marinas, boat ramps, etc.), among others. Specific areas within the critical habitat that may require special management considerations for the conservation of smalltooth sawfish include red



Map 43 / Pine Island Sound and Matlacha Pass aquatic preserves Shellfish Harvesting Areas.



mangroves and shallow euryhaline habitats, characterized by water depths between the Mean High Water line and three feet, as measured at Mean Lower Low Water. Any projects that require federal permits and that may affect smalltooth sawfish or the designated critical habitat must now be reviewed by NMFS.

CHAP staff, in conjunction with the DEP South District ERP section, Lee County, West Coast Inland Navigation District (WCIND) and UF/IFAS Extension, Florida Sea Grant, concluded a multi-year effort studying the trafficheds within Lee County in 2010. Trafficheds are defined as a boat source area that contains a concentration of boats that use a common channel to gain access to secondary access channels and ultimately to deep, open water (Swett & Fann, 2001). The data collected in this study was used to develop a Noticed General Permit, a state rule that provides authorization for dredging within existing public navigation channels in Lee County. Since some of these channels are located within aquatic preserves and new dredging was authorized, the impact from that portion of the project must be offset to make the project clearly in the public interest. As a condition of the Noticed General Permit, four areas within aquatic preserves in Lee County were designated, and will be marked and enforced as No Internal Combustion Motor Zones (NICMZs). Two of these four areas are located within CHAP (see Map 40). These two zones, a total of 665.4 acres, will allow for passive restoration of seagrasses in shallow, heavily prop scarred areas, and will help maintain a healthy seagrass bed in good condition. Hand-powered vessels or those with trolling motors are an appropriate use and will be permitted within the zones. NICMZs have been established in other areas around the state with improvements to seagrass habitats (Hotaling, Lingle, & Ankersen, 2011), and similar success is expected in this region. Similarly in 2009, a Pole and Troll Zone was established near Wulfert Flats in Pine Island Sound Aquatic Preserve, for the dredging in Blind Pass (Map 40). The zone is part of the J.N. Ding Darling NWR and Lee County implemented the zone as part of their permit. A General Permit to dredge certain public channels in Charlotte County was developed through coordination between WCIND, Charlotte County, UF/IFAS Extension, Florida Sea Grant, DEP South District ERP and CHAP. Using a similar process as the Lee County Notice General Permit, trafficheds were analyzed to be incorporated within the new rule and a potential NICMZ has been identified.

CHAP continues to assist and partner with other agencies and organizations in order to accomplish mutually compatible resource management goals. For example, Charlotte Harbor Environmental Center, EBAP and CHNEP are vital partners in the CHEVWQMN program, as well as SCCF and DEAR for seagrass monitoring. J.N. Ding Darling NWR is an important partner in the rookery monitoring program in which monthly surveys of islands would not be possible throughout CHAP. Recently, TNC has become a partner for the oyster restoration project in the Peace River, employing a position to conduct community outreach efforts. Aquatic preserve personnel have been part of the Boca Grande Pass clean-up, a multi-organization event coordinated by UF/IFAS Extension, Florida Sea Grant and organized for the purpose of extracting old fishing line, artificial lures and other debris from one of the most heavily fished passes in the area. CHAP have participated in the annual goliath grouper count at the artificial reefs organized by UF/IFAS Extension, Florida Sea Grant as well. Additionally, in 2009 and 2013, staff assisted UF/IFAS Extension, Florida Sea Grant with their cleanup effort of derelict crab traps. FWC enacted a closed season for crab traps, in which any commercial or recreational crab traps left in state waters during this time were considered derelict and could be removed by state authorized groups. CHAP staff along with volunteers removed traps and other associated debris from Matlacha Pass Aquatic Preserve. Aquatic preserve staff have also assisted UF/IFAS Extension, Florida Sea Grant with bay scallop larval releases and scallop surveys in Pine Island Sound, Lemon Bay, Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves. In 2013, CHAP assisted with the quality assurance review of the CHNEP's volunteer shoreline data and provided water quality data to the Charlotte Harbor NEP Water Atlas.

DACS, also a partner to CHAP, manages aquaculture and shellfish harvesting within the aquatic preserves. There are three types of shellfish harvesting classifications within CHAP, conditionally approved, conditionally restricted and prohibited (see Maps 41-43). Conditionally approved areas are defined as "periodically closed to shellfish harvesting based on pollutional events, such as rainfall or increased river flow." Conditionally restricted areas are only used for relaying or controlled purification (see glossary), allowed only by special permit and supervision, but may be closed due to pollution events, rainfall or increased river flow. Harvesting is not allowed at any time within the prohibited areas or unclassified areas. DACS regularly monitors water quality to determine harvesting status for recreational and commercial purposes. The current status can be viewed at www.shellfish.floridaaquaculture.com/seas/seas_southgulf.htm. There are two high density aquaculture lease areas within CHAP, one located

within Pine Island Sound Aquatic Preserve, and one within Cape Haze Aquatic Preserve (see Maps 42 and 43). CHAP staff assisted DACS in identifying suitable locations for aquaculture. The Pine Island Sound lease area is highly active, with numerous clam farmers maintaining leases and working out of the Pine Island Commercial Marina. Marine debris resulting from aquaculture has been documented and identified as a management concern.

4.2.2 / Resource Management Issue

Issue Four: Coastal and Watershed Activities

Since the 1950s, southwest Florida has seen amazing growth and prosperity and has become a premiere destination for sun-seeking tourists, investors and retirees. This has brought, and will continue to bring, a multitude of challenges to maintain a healthy environment for not only the local economy but also for area residents, and for the intrinsic value of southwest Florida habitats themselves. Fortunately, this importance was recognized decades ago by area citizens, and residents today are enjoying the result of their past efforts in the vast array of public lands located within the area. For example, the motivation for the creation of the aquatic preserves came from a growing awareness that coastal development was destroying the natural areas needed to maintain healthy fisheries, as well as an increasing realization that the old policy of selling submerged lands for development was in fact harming the state's economic activities, and at a rather small profit to the state in terms of revenue. For some people, this was primarily an aesthetic and/or environmental issue. Others were concerned about detrimental effects on the commercial and recreational fishing industries, as well as other industries reliant on tourism - a major economic engine of the region.

With continued development pressures, it is important that CHAP staff stay informed about the activities in the watershed and involved in preserving and restoring the ecological integrity of the CHAP watershed. There has been a shift toward an emphasis on environmentally friendly building and development techniques, as well as an emphasis on the importance of project impact minimization. This focus on smart growth helps to assuage future cumulative impacts to the landscape. Endeavors to improve the water quality of the Charlotte Harbor estuaries have begun to concentrate more on nonpoint sources of pollution, such as homeowner education and local fertilizer ordinances. Additionally, in already developed portions of the watershed, efforts such as the replacement of septic tanks with sewer are geared towards reducing impacts on water quality. The combination of land preservation, smart growth principles and development retrofitting efforts is essential to sustaining the area's healthy economy and quality of life for not only its current residents, but for future generations as well.

Goal One: Protect and improve the ecological integrity of the CHAP watershed.

Objective One: Preserve natural habitats within the CHAP watershed in order to maintain or restore water quality and natural resources within CHAP.

Integrated Strategies:

1. Support and encourage science-based sustainable land use strategies within the CHAP watershed.

Performance Measure:

- Track participation in meetings where sustainable land use strategies are being discussed.
- Participate in the development of local comprehensive plans as needed.

2. Support regional land acquisition program efforts within the CHAP watershed.

Performance Measure:

- Provide input to state and local land acquisition organizations regarding purchase or sale of environmentally sensitive lands within the CHAP watershed.

3. Support the development and implementation of rules and ordinances that protect CHAP.

Performance Measure:

- Provide input and data to agencies and groups during the development of rules and ordinances.
- Support efforts to expand CHAP boundaries adjacent to existing boundaries in the Peace and Myakka rivers and Matlacha Pass Aquatic Preserve.

4. Engage in outreach and education opportunities with government and area decision makers and serve as a point of contact for information regarding the health of CHAP natural resources.

Performance Measures:

- Track participation in Charlotte County Marine Advisory Committee and Lee County Waterways Advisory Committee meetings.
- Track participation in CHNEP technical advisory committee and management committee and UF/IFAS Extension, Florida Sea Grant Advisory Committee meetings.
- Track number of educational site visits provided for elected officials and their staff.

Objective Two: Coordinate with permitting agencies to reduce impacts from development within and/or adjacent to CHAP and its watersheds.

Integrated Strategies:

1. Stay abreast of proposed applications that have the potential to impact CHAP resources if authorized.

Performance Measures:

- Track proposed applications and review for potential impacts.
- Monitor ERP online self-certification system and utilize DEP GIS software/website.
- Monitor SFWMD and SWFWMD online ePermitting Records Search webpage.

2. Coordinate with DEP ERP, SFWMD, SWFWMD, NOAA NMFS, U.S. Army Corps of Engineers, U.S. Coast Guard (USCG), USFWS, FWC, county and city staff regarding current and ongoing project applications that have the potential to impact or benefit CHAP.

Performance Measures:

- Review ERP applications proposed in CHAP.
- Attend monthly and other appropriate meetings to discuss and provide input on project applications.
- Conduct biological site inspections for proposed activities.
- Provide comments regarding resources to permitting agencies and stakeholders related to current and ongoing permit applications, as needed.

3. Report violations to compliance assurance and enforcement staff.

Performance Measure:

- Track reports and follow up as needed.

Objective Three: Promote restoration and improvement projects that will enhance the CHAP watershed.

Integrated Strategies:

1. Support efforts to restore and protect natural freshwater inflows to the fullest extent possible, such as the water management districts' Surface Water Improvement and Management programs and the development of MFLs.

Performance Measures:

- Track participation in the CHNEP technical and management advisory meetings.
- Coordinate with CHPSP on restoration projects.

2. Support projects such as septic tank retrofitting and connection to sewer systems, stormwater treatment upgrades, reduction of impervious surfaces within the watershed, and other types of green infrastructure retrofits.



Sea stars are found throughout Charlotte Harbor Aquatic Preserves, this one was discovered during a wading trip in Pine Island Sound Aquatic Preserve.



The turquoise waters near Gasparilla Pass are a great place to snorkel in Gasparilla Sound-Charlotte Harbor Aquatic Preserve.

Performance Measure:

- Provide water quality data as requested.

3. Educate homeowners on how they can reduce their impacts to the local environment.

Performance Measure:

- Track number of outreach presentations to homeowners' associations and other organizations.

4.3 / The Education and Outreach Management Program

The Education and Outreach Management Program components are essential management tools used to increase public awareness and promote informed stewardship by local communities. Education programs include on and off-site education and training activities. These activities include: field studies for students and teachers; the development and distribution of media; the distribution of information at local events; the recruitment and management of volunteers; and, training workshops for local citizens and decision-makers. The design and implementation of education programs incorporates the strategic targeting of select audiences. These audiences include all ages and walks of life; however, each represents key stakeholders and decision-makers. These efforts by the Education and Outreach Management Program allow the aquatic preserves to build and maintain relationships and convey knowledge to the community; invaluable components to successful management.

4.3.1 / Status of Education and Outreach at Charlotte Harbor Aquatic Preserves

The history of aquatic preserves in Florida began in the 1960s, just south of CHAP, with a massive outreach event by a few tireless citizens to mobilize the Estero Bay community against the encroaching development of the shoreline. The ongoing efforts of those citizens resulted in the formation of the Lee County Conservation Association and the creation of the state's first aquatic preserve in 1966, first called an offshore preserve, which was used as the model for the 1975 Aquatic Preserve Act. The establishment of Estero Bay as an aquatic preserve, an early victory for Lee County Conservation Association, was even more impressive when considered that at that time the concept of "aquatic preserve" was yet unknown. The first of the aquatic preserves in Charlotte Harbor - Pine Island Sound Aquatic Preserve - was designated in 1970, followed shortly by Matlacha Pass Aquatic Preserve in 1972. During this time period, several citizen organizations also formed to acquire and preserve lands, including Sanibel-

Captiva Conservation Foundation (1967), Lemon Bay Conservancy (1971) and the Calusa Land Trust (1976). The public outreach by these local citizen organizations was instrumental in the protection of the ecological integrity of the Charlotte Harbor area.

The Friends of the Charlotte Harbor Aquatic Preserves (FCHAP), formed in 1998, to provide citizen support to the management of CHAP and what was at the time the Charlotte Harbor State Buffer Preserve, now the CHPSP. FCHAP is made up of volunteers that assist CHAP and CHPSP in resource management with a strong focus on education and outreach efforts. The goals of FCHAP are to increase public awareness through involvement in educational programs, resource-based activities, and special events; to develop stewardship for our estuaries and our public lands; to improve and restore the natural and cultural resources of the greater Charlotte Harbor estuaries; and to establish and maintain cooperative efforts with organizations, institutions and government agencies involved in environmental protection. FCHAP serves as a local outreach resource and members attend local festivals and events to educate the public about CHAP and CHPSP.

For many years, FCHAP also provided guided paddling trips for adults and children's groups. The guided paddles were used to educate participants about the aquatic preserves while providing them an opportunity to experience the beauty that they offer. Similarly, CHAP staff offered wading trips within CHAP in coordination with CHNEP. During wading trips, participants learned about estuaries and aquatic preserves while exploring local seagrass beds and discovering the different species within the estuarine community. Participants also discovered how seagrass beds are important nursery grounds for the majority of commercial and recreational fish species, and why estuaries are referred to as "cradles of the ocean." Other local organizations like Charlotte Harbor Environmental Center and Randell Research Center offer numerous opportunities for wading trips; therefore CHAP staff host wading trips only when requested. FCHAP recently received grant funding from WCIND through Charlotte County to purchase snorkeling equipment needed to start up public snorkeling eco-ventures. These snorkeling eco-ventures will provide participants with a broader opportunity to discover the aquatic preserves and the myriad of habitats and marine life within.



Staff and volunteers conduct rookery monitoring at a safe distance.

In addition to outreach events and educational opportunities, CHAP personnel have created a two page fact sheet for each of the five Charlotte Harbor Aquatic Preserves to help highlight some of the aquatic preserve's accomplishments and help educate the public about the uniqueness of each of the estuaries. Most recently, students of UF/IFAS Extension, Florida Sea Grant's Master Naturalist program in Charlotte County, with the help of FCHAP, created and printed a brochure for CHAP, highlighting the CHAP goals and programs. Funding to print the brochure was provided by Charlotte County as part of the public interest project for a permit. This brochure and other materials are distributed at various education and outreach events to help educate and inform

the public about CHAP, its programs and mission. They are also available in local and state government office waiting rooms. Staff also participate in local workshops to disseminate data and information about the aquatic preserve and to provide input on issues related to either CHAP or its watershed.

Volunteers are a vital part of aquatic preserve management efforts. Without them, much of the data collection, cleanup and restoration efforts conducted would not be able to be accomplished. They assist staff with monitoring efforts, help with cleanup events and provide support during outreach events. Most recently, more than a thousand volunteers donated their time and effort to create the oyster bags and mats for the Trabue Harborwalk Oyster Habitat Creation project in the Peace River.



The Punta Gorda regional group of volunteers in the CHEVWQMN program, meeting for a training session.

Additionally, students from FGCU occasionally volunteer to gain experience and expand upon skills before entering the job market. The annual seagrass monitoring program utilizes volunteers and other agency staff to assist in recording data at the longer transects. They must be willing and able to work on the water for extended periods of time, which can be a challenge. Additionally, volunteers must also obtain DEP snorkel certification prior to assisting with in water monitoring. Colonial wading and diving bird nest monitoring volunteers assist in the annual rookery island cleanup and monthly counting of bird nests and chicks on mangrove islands. Program participants must be able to count active nests on the island, through binoculars, while on a moving vessel that is circumnavigating the island and classify nests as incubating, chick or unknown. Volunteers fill the vital roles of data recorder and secondary observer counting nests in conjunction with aquatic preserve staff to make sure that the documented numbers are precise. An annual training session held by EBAP staff is available for volunteers who wish to participate and learn more about the program prior to committing to a full day on the water. The training not only teaches new volunteers how to identify and count active nests, but also maintains consistency among the more experienced participants in the program and allows staff and volunteers to learn from the questions and experience of others. Volunteers who choose to obtain the DEP boating and trailering certification may also act as vessel captains for surveys. CHAP is also reaching out to FGCU for interns and graduate students to expand upon some of the existing monitoring programs or research specific topics that would benefit CHAP.

Lastly, volunteers are the core of the CHEVWQMN program. CHEVWQMN is a coordinated system of more than 80 volunteers who regularly conduct water quality monitoring throughout six local aquatic preserves in southwest Florida. CHEVWQMN ranges from its northernmost point in Lemon Bay to its southernmost point in Estero Bay. The project is a cooperative effort of DEP, CHAP, EBAP, CHNEP and Charlotte Harbor Environmental Center. The program is valuable because it includes monitoring sites in all five of the Charlotte Harbor Aquatic Preserves as well as in Estero Bay Aquatic Preserve; builds on and expands existing volunteer monitoring programs; provides both scientific and educational functions; and includes critical quality assurance, data management and training components necessary for providing credible data and long term volunteer support. Aquatic preserve staff serve as the overall program coordinators as well as regional coordinators for volunteers in the Punta Gorda/Port Charlotte area. CHAP staff also coordinate four biannual quality assurance sessions held at regional



Snorkeling is a great way to explore Charlotte Harbor Aquatic Preserves.

locations for the volunteers to review procedures and updates to ensure the valid collection of data. CHAP staff also creates a newsletter for water quality volunteers quarterly, highlighting recent data and recognizing volunteers. CHEVWQMN is one of the only volunteer water quality monitoring program in the state whose data is housed in the state's water quality database, STORET. CHEVWQMN volunteers receive certificates and acknowledgment for their years of service, but in 2007, they and the aquatic preserve staff received additional recognition when the program received the prestigious Gulf Guardian award. The honor is given by the Gulf of Mexico Program, which is a partnership of 23 state and local governments, citizens, businesses and industries from around the Gulf of Mexico in the U.S., Mexico and Caribbean. The mission of the program is to facilitate collaborative actions that protect, maintain and restore the health of the Gulf of Mexico in ways which are consistent with the economic well-being of the region. The Gulf Guardian awards were created by the program in 2005 to recognize outstanding contributions to protecting and improving the Gulf of Mexico, and each year the program recognizes exceptional environmental stewardship projects from around the five Gulf of Mexico states and Mexico. The CHEVWQMN received the 2007 award for long term, cooperative efforts in monitoring water quality conditions throughout the Charlotte Harbor and Estero Bay estuaries. In April 2012, each volunteer received a personalized letter of appreciation from United States Senator Bill Nelson recognizing their service and commitment to the community as a water quality volunteer.

CHAP outreach activities are diverse. CHAP staff and FCHAP participate in numerous events throughout the region such as the Charlotte Harbor Nature Festival, Calusa Heritage Day at Randell Research Center,



A student learns how to use water quality monitoring equipment at a public outreach event.

Florida Sportsmen Expo and others. Technical presentations by CHAP staff are aimed at providing pertinent information to assist agencies and organizations that work with the aquatic preserve in some capacity (such as providing seagrass identification and state lands resource rules and statutes training to law enforcement officials), and presentations of research and monitoring results to peers at local conferences and workshops. Educational displays are also mounted in the kiosk at Charlotte Harbor Environmental Center, Fisherman's Village, Pine Island Commercial Marina, and the CHAP office. They are periodically updated to provide the public with current and topical information.

4.3.2 / Education and Outreach Issue

Issue Five: Public Involvement

Public involvement is identified as a stand-alone issue and as a component of all of the other CHAP issues. Public outreach and involvement is crucial to the success of all of the CHAP programs. Within each of the programs the objectives and strategies for public involvement are outlined specific to the goals that they will help to achieve. However, increasing public involvement and public awareness about CHAP is an issue in itself. The role of CHAP is often confused with that of many of its partner organizations, such as CHNEP, Charlotte Harbor Environmental Center, and CHPSP. Additionally, the aquatic preserve designation and the protections it provides are not widely understood by the general public. By providing opportunities for public involvement and education CHAP staff seek to increase awareness about aquatic preserves. CHAP staff will also be assisting the CSO, FCHAP, to recruit and maintain involvement by members that fully understand the importance of the aquatic preserves.

Goal One: Increase public involvement, awareness and knowledge of CHAP.

Objective One: Assist CSO with recruitment and involvement in public outreach.

Integrated Strategies:

1. Provide prospective FCHAP board members with educational recruitment opportunities.

Performance Measure:

- Coordinate events and track new recruitment with CSO.

2. Utilize CSO media to educate the public about CHAP.

Performance Measure:

- Track number of articles that disseminate information about CHAP to the CSO website, Facebook and newsletter.

3. Educate the public at outreach events about the role of the CSO.

Performance Measure:

- Track participation in outreach events.

4. Continue cooperation with the CSO and CHPSP in order to further the mission of the CSO.

Performance Measure:

- Track attendance at CSO meetings and provide CHAP updates.

5. Assist in the development of the Aquatic Preserve Society, Inc. and their efforts to support all FCO Aquatic Preserves.

Performance Measure:

- Track attendance in Aquatic Preserve Society meetings and events.

Objective Two: Increase public (resident and visitor) knowledge and awareness of CHAP, its issues and importance.



Prop scars through turtle grass are an all-too-common sight in the shallow waters of Charlotte Harbor Aquatic Preserves.

Integrated Strategies:

1. Provide a variety of formal and informal educational opportunities that foster stewardship while offering a chance to experience the coastal environment.

Performance Measures:

- Track number of snorkeling eco-ventures and other field trips provided to the public.
- Track number of presentations on monitoring results at various meetings, scientific and professional forums.
- Regularly update the CHAP two-page fact sheet.

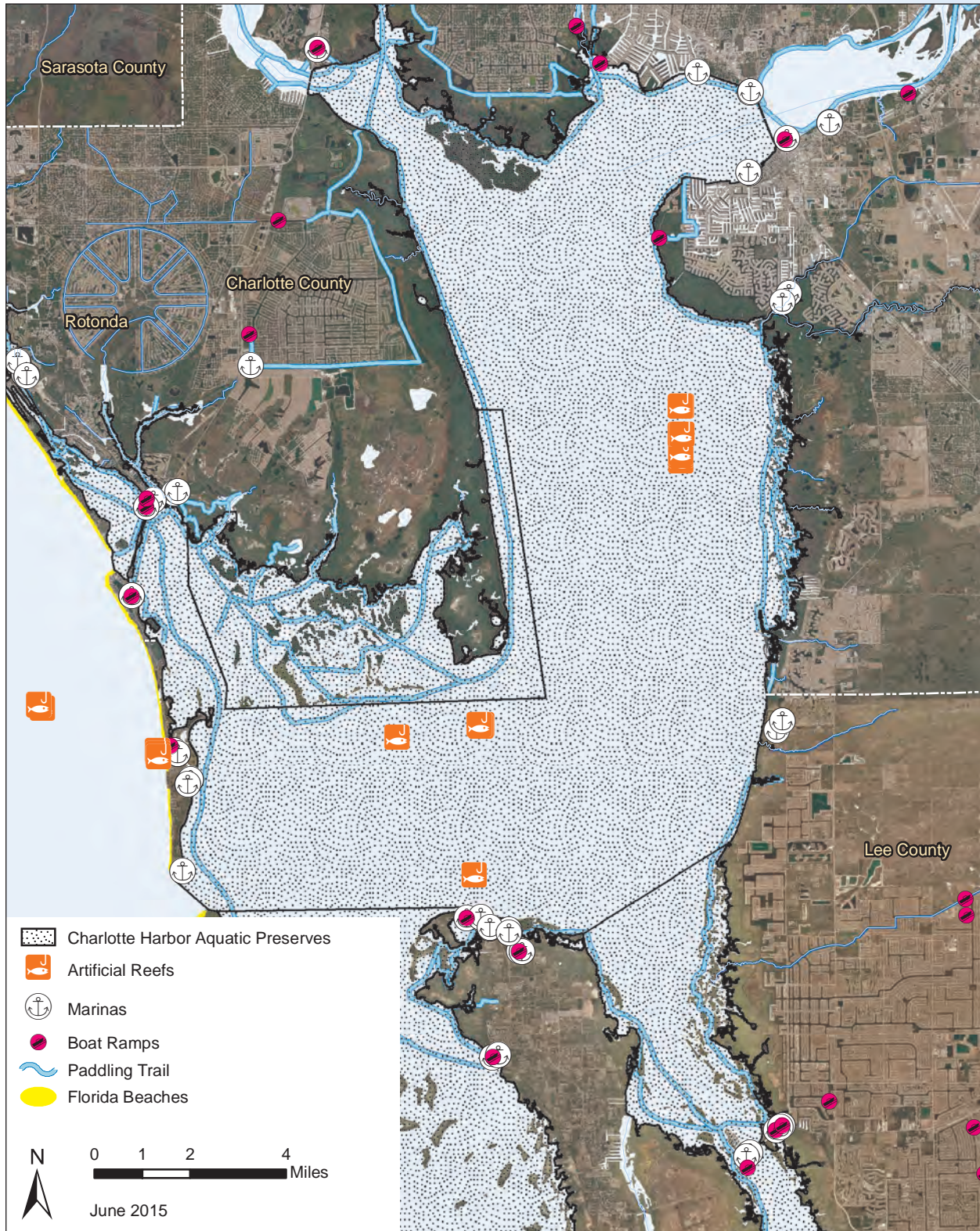


- Regularly post updates to relevant social media on activities, events for visitors, and information on natural resources (e.g. water quality monitoring, wading trips, bird rookery monitoring results).

2. Provide volunteer and internship opportunities.

Performance Measures:

- Track number of volunteers recruited and trained to assist with CHAP programs.
- Coordinate with local colleges and universities.
- Document hours of service.
- Develop intern projects based on CHAP needs and data gaps.



Map 45 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves public use.

4.4 / The Public Use Management Program

The Public Use Management Program addresses the delivery and management of public use opportunities at the aquatic preserves. The components of this program focus on providing the public recreational opportunities within the site's boundaries which are compatible with resource management objectives. The goal for public access management in FCO managed areas is to "promote and manage public use of our preserves and reserves that supports the research, education, and stewardship mission of FCO."

While access by the general public has always been a priority, the conservation of FCO's sites is the primary management concern for FCO. It is essential for staff to analyze existing public uses and





Assemblages of boats anchoring in areas without designated moorings may damage resources.

define management strategies that balance these activities where compatible in a manner that protects natural, cultural and aesthetic resources. This requires gathering existing information on use, needs, and opportunities, as well as a thorough consideration of the existing and potential impacts to critical upland, wetland and submerged habitats. This includes the coordination of visitor program planning with social science research. One of FCO's critical management challenges during the next 10 years is balancing

anticipated increases in public use with the need to ensure preservation of site resources. This section explains the history and current status of our Public Use efforts.



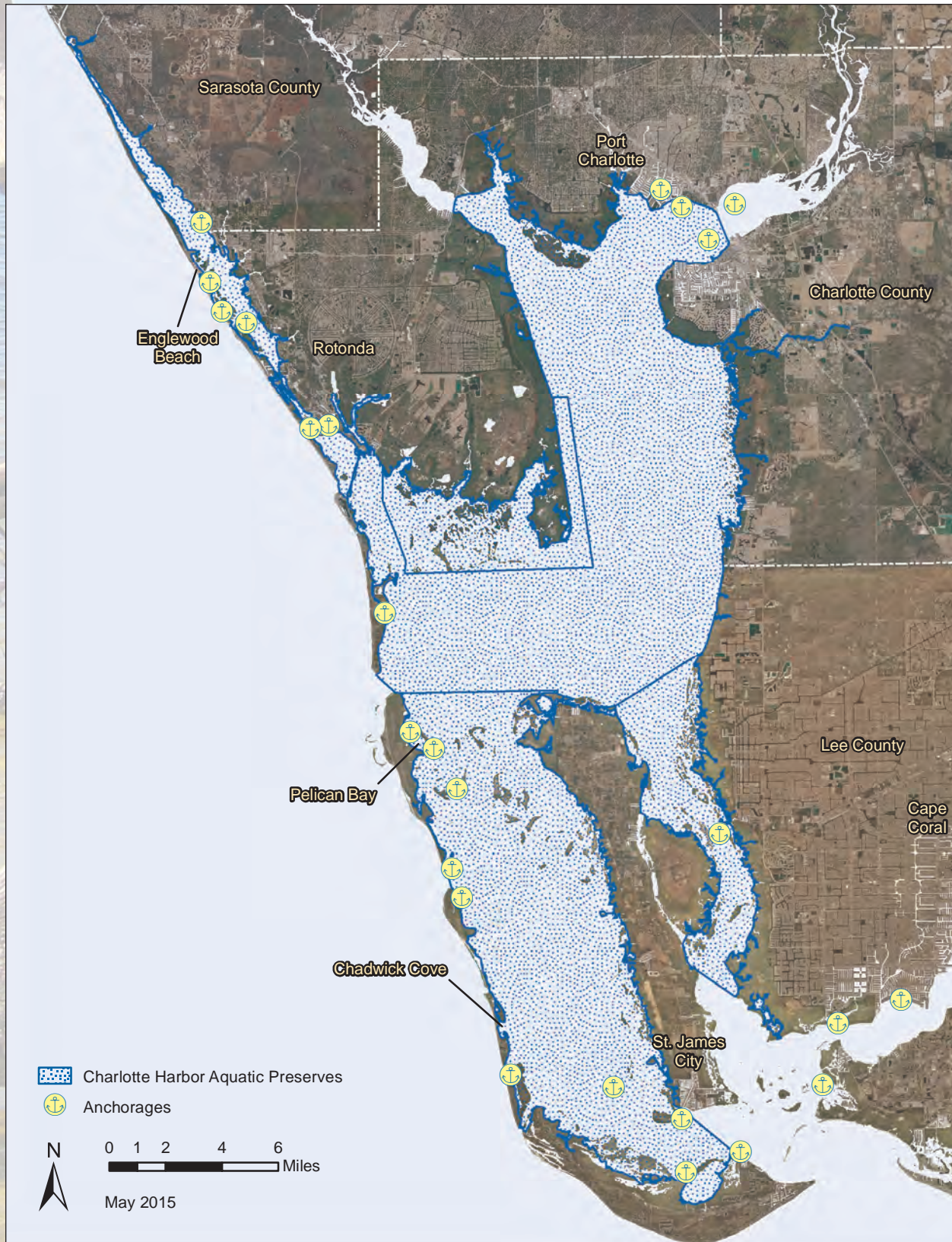
Entanglement in discarded fishing line, such as this found by staff on a wading and diving bird nesting island, has the potential to kill fledgling and adult birds.

4.4.1 / Status of Public Use at Charlotte Harbor Aquatic Preserves

While CHAP is first and foremost set aside to maintain essentially natural or existing conditions for the enjoyment of future generations, those living along its shoreline have a right of access to the aquatic preserves as granted to them by the Florida Legislature. As such, they can receive DEP permits to build docks along their shoreline or conduct other water-dependent activities. These rights and the rules and regulations that define them are stipulated in §258, F.S. and are promulgated in Chapter 18-20, F.A.C. All proposed activities must be consistent with these rules and regulations and must adhere to specific criteria in order to be permitted or approved. Recent years, however, have brought a host of proposed activities within the aquatic preserves

that are not specifically identified in Chapter 18-20, F.A.C. or §258, F.S., and a growing population that continues to place added demands on the environment.

Water-dependent activities are extremely popular with residents and visitors alike. Power boats, sail boats, kayaks and personal watercraft (PWC) are all commonly found in the estuary. Recreational fishing, nature photography, and nature and wildlife viewing are all popular activities throughout CHAP. Within the vicinity of the aquatic preserves, there are more than 60 marinas, 25 boat ramps, and numerous



112 Map 47 | Charlotte Harbor Aquatic Preserves anchorages.

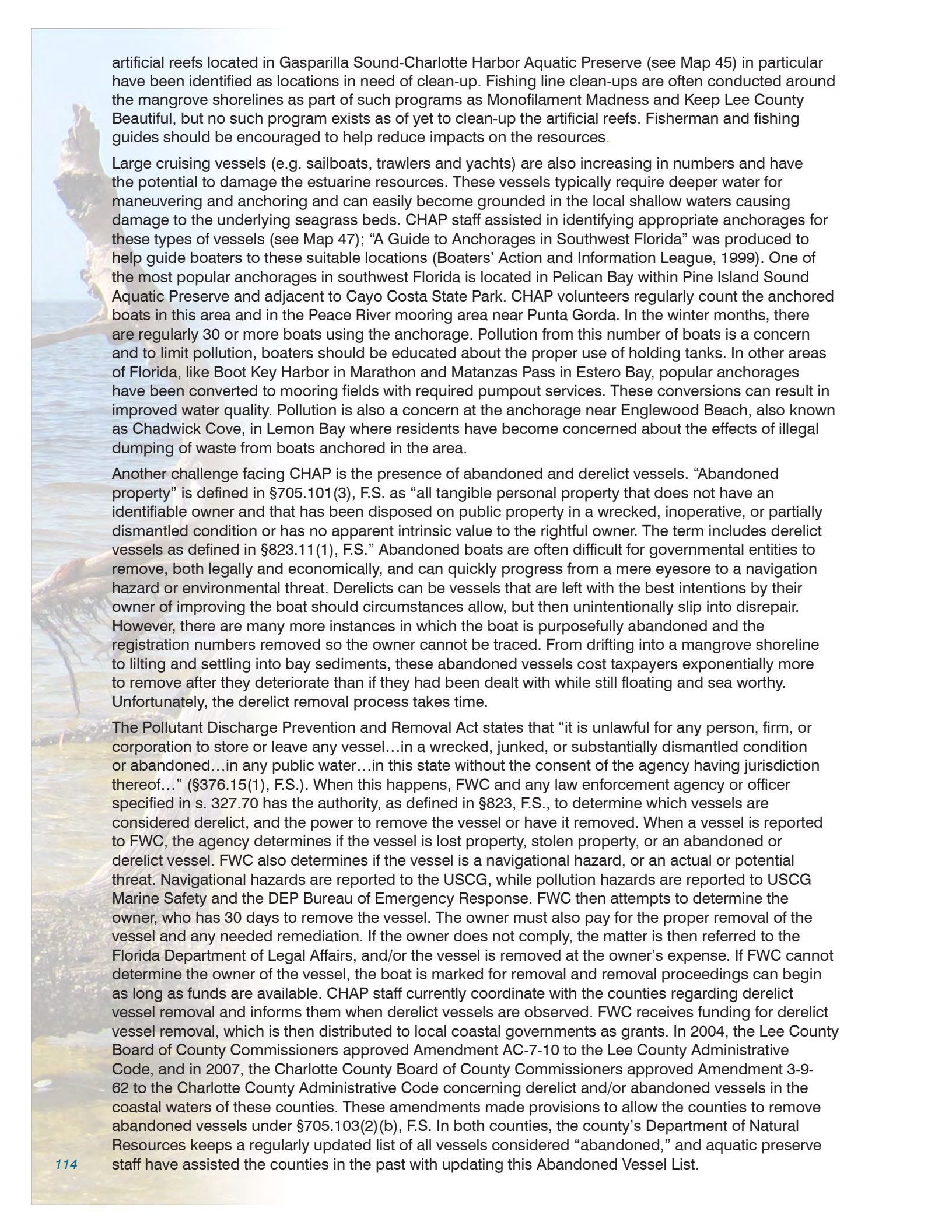


The derelict vessel (on the left) was removed from Jug Creek in Gasparilla Sound-Charlotte Harbor Aquatic Preserve.

PWC, boat, and paddlecraft rental operators (see Maps 44-46). As the resident population within southwest Florida continues to rise and more people are vacationing within the region, the number of vessels utilizing the coastal waters is also rising. Lee County has one of the highest number of registered vessels in the state of Florida, behind only Miami-Dade and Pinellas counties. According to the Florida Department of Highway Safety and Motor Vehicles, there were 896,632 boats registered in Florida in 2013. In Lee County alone, there were 43,736 boats registered, representing nearly five percent of the boats registered within the state. Charlotte and Sarasota counties also have high numbers, with an additional 20,545 boats registered in Charlotte County and 21,577 in Sarasota County (Florida Department of Highway Safety and Motor Vehicles, 2014). There is a cumulative effect and pressure on the CHAP natural resources and water quality with the increase in public access, including the construction of new docks (single-family, multi-family and commercial) and boat ramps, dredging new channels and basins, and dredging existing channels to deeper depths.

While CHAP encourages sustainable public use of the aquatic preserves, prop scarring and turbidity from boaters has been an issue in the past and will continue to be so. With so many rental boats and vacationers with their own boats using the estuaries, there are a lot of transient boaters who may not be knowledgeable of local rules or may not be aware of the relative shallowness of the waters. Groundings are frequent and can lead to prop scarring and turbidity plumes. Daily rentals of motorized vessels by individuals and guided tours in CHAP have increased in recent years, leading to concerns about impacts to estuarine resources. Often times the uniqueness of an area can lead to its own demise, as increased activity places pressure on the very resources that originally drew people to the area. In recent years staff have noticed an intensification in the number of sightseers and fishermen boating in close proximity and walking within active bird rookeries. This activity can have several disastrous effects: parents can be frightened off of their nests crushing the eggs that they are incubating or leaving them susceptible to predation, chicks can be frightened and fall out of the nest to their demise, and predators can be attracted by the additional activity to the rookery island. CHAP staff will be working with local ecotour operators to elevate citizen awareness about how to responsibly view wildlife. In addition, the development of Best Management Practices for local ecotour operators should be considered, as well as encouraging vendors and ecotour operators to abide by guidelines set by the Florida Society for Ethical Ecotourism.

Irresponsible fishing practices can also leave a mark on the environment through fishing line, hooks, lures, bobbers, nets and other items entangled and left in mangroves and other structures. The seven



artificial reefs located in Gasparilla Sound-Charlotte Harbor Aquatic Preserve (see Map 45) in particular have been identified as locations in need of clean-up. Fishing line clean-ups are often conducted around the mangrove shorelines as part of such programs as Monofilament Madness and Keep Lee County Beautiful, but no such program exists as of yet to clean-up the artificial reefs. Fisherman and fishing guides should be encouraged to help reduce impacts on the resources.

Large cruising vessels (e.g. sailboats, trawlers and yachts) are also increasing in numbers and have the potential to damage the estuarine resources. These vessels typically require deeper water for maneuvering and anchoring and can easily become grounded in the local shallow waters causing damage to the underlying seagrass beds. CHAP staff assisted in identifying appropriate anchorages for these types of vessels (see Map 47); “A Guide to Anchorages in Southwest Florida” was produced to help guide boaters to these suitable locations (Boaters’ Action and Information League, 1999). One of the most popular anchorages in southwest Florida is located in Pelican Bay within Pine Island Sound Aquatic Preserve and adjacent to Cayo Costa State Park. CHAP volunteers regularly count the anchored boats in this area and in the Peace River mooring area near Punta Gorda. In the winter months, there are regularly 30 or more boats using the anchorage. Pollution from this number of boats is a concern and to limit pollution, boaters should be educated about the proper use of holding tanks. In other areas of Florida, like Boot Key Harbor in Marathon and Matanzas Pass in Estero Bay, popular anchorages have been converted to mooring fields with required pumpout services. These conversions can result in improved water quality. Pollution is also a concern at the anchorage near Englewood Beach, also known as Chadwick Cove, in Lemon Bay where residents have become concerned about the effects of illegal dumping of waste from boats anchored in the area.

Another challenge facing CHAP is the presence of abandoned and derelict vessels. “Abandoned property” is defined in §705.101(3), F.S. as “all tangible personal property that does not have an identifiable owner and that has been disposed on public property in a wrecked, inoperative, or partially dismantled condition or has no apparent intrinsic value to the rightful owner. The term includes derelict vessels as defined in §823.11(1), F.S.” Abandoned boats are often difficult for governmental entities to remove, both legally and economically, and can quickly progress from a mere eyesore to a navigation hazard or environmental threat. Derelicts can be vessels that are left with the best intentions by their owner of improving the boat should circumstances allow, but then unintentionally slip into disrepair. However, there are many more instances in which the boat is purposefully abandoned and the registration numbers removed so the owner cannot be traced. From drifting into a mangrove shoreline to tilting and settling into bay sediments, these abandoned vessels cost taxpayers exponentially more to remove after they deteriorate than if they had been dealt with while still floating and sea worthy. Unfortunately, the derelict removal process takes time.

The Pollutant Discharge Prevention and Removal Act states that “it is unlawful for any person, firm, or corporation to store or leave any vessel...in a wrecked, junked, or substantially dismantled condition or abandoned...in any public water...in this state without the consent of the agency having jurisdiction thereof...” (§376.15(1), F.S.). When this happens, FWC and any law enforcement agency or officer specified in s. 327.70 has the authority, as defined in §823, F.S., to determine which vessels are considered derelict, and the power to remove the vessel or have it removed. When a vessel is reported to FWC, the agency determines if the vessel is lost property, stolen property, or an abandoned or derelict vessel. FWC also determines if the vessel is a navigational hazard, or an actual or potential threat. Navigational hazards are reported to the USCG, while pollution hazards are reported to USCG Marine Safety and the DEP Bureau of Emergency Response. FWC then attempts to determine the owner, who has 30 days to remove the vessel. The owner must also pay for the proper removal of the vessel and any needed remediation. If the owner does not comply, the matter is then referred to the Florida Department of Legal Affairs, and/or the vessel is removed at the owner’s expense. If FWC cannot determine the owner of the vessel, the boat is marked for removal and removal proceedings can begin as long as funds are available. CHAP staff currently coordinate with the counties regarding derelict vessel removal and informs them when derelict vessels are observed. FWC receives funding for derelict vessel removal, which is then distributed to local coastal governments as grants. In 2004, the Lee County Board of County Commissioners approved Amendment AC-7-10 to the Lee County Administrative Code, and in 2007, the Charlotte County Board of County Commissioners approved Amendment 3-9-62 to the Charlotte County Administrative Code concerning derelict and/or abandoned vessels in the coastal waters of these counties. These amendments made provisions to allow the counties to remove abandoned vessels under §705.103(2)(b), F.S. In both counties, the county’s Department of Natural Resources keeps a regularly updated list of all vessels considered “abandoned,” and aquatic preserve staff have assisted the counties in the past with updating this Abandoned Vessel List.



Marine events such as this “barge party” in Gasparilla Sound-Charlotte Harbor Aquatic Preserve can dramatically impact submerged resources in just a few days. More than 200 boats are pictured here.

Canoes, kayaks, and paddleboards are also becoming a more common sight throughout the estuaries. One large contributor to this increase was the creation of the Great Calusa Blueway Paddling Trail, a 190-mile marked canoe and kayak trail that runs through Estero Bay, San Carlos Bay, Pine Island Sound, Matlacha Pass, and up into the Caloosahatchee River and its tributaries (see Map 46). These marked trails provide a safe and informative environment for paddling enthusiasts, as the trails average only around four feet deep and traverse areas protected from heavy winds. Although not marked on the water, the Charlotte County Blueway and the Florida Paddling Trails Association also provide maps of paddling trails throughout Lemon Bay, Cape Haze, and Gasparilla Sound-Charlotte Harbor aquatic preserves (see Maps 44-45). Paddlecraft provide a low impact way for nature enthusiasts to enjoy the estuaries with little to no impact to the environment.

Geocaching has exploded in popularity in recent years, and if done responsibly, can have little to no impact on the environment. Participants use handheld GPS devices to locate a specific location that usually contains a cache with a logbook and possibly some small item. Participants then go online to document their finding. Geocaching is a worldwide phenomenon that does not seem to be waning anytime soon, with caches all over the world. In fact, some people plan their vacation around geocaching adventures. Because caches are placed by participants, they can be anywhere, and there are hundreds of caches within and around CHAP. Geocache guidelines stipulate that participants get authorization from the landowner to establish a cache. The CHAP office should be notified prior to the placement of any cache, as locations chosen by geocachers could result in detrimental impacts to area natural resources such as mangroves, seagrass, oyster beds, and bird rookeries. An example of this is the CHAP staff discovery in April 2015 of a family searching an active rookery island for a geocache thought to be located there. A report concerning the incident and illegal cache was written by CHAP staff and submitted to FWC law enforcement. While the people did leave when asked, they may have inadvertently disturbed or added unnecessary stress to nesting efforts of birds on the island as staff observed bird behavior indicative of flushing from nests. Prop dredging through a seagrass bed adjacent to the island was also documented when the people left. FCO has a webpage providing information on how to hide caches and tips for responsible geocaching techniques. However, since most general users of CHAP do not know that they are in an aquatic preserve, they may be unaware of who to contact. Unfortunately, it is cost prohibitive to place signage at all possible access points leading into CHAP, therefore, there

is a plan to post aquatic preserve signage at strategic access areas where channels converge, or in main channels for the best visibility. To expand on the popularity of geocaching, EarthCache evolved to help educate the public about the world around them. The Geological Society of America administers the listing of EarthCache sites around the world. These sites do not have a physical cache, but instead provide the participant a location and information about the unique geosciences feature and how it is scientifically important. These virtual caches, as well as responsibly placed and FCO-approved physical caches, are an opportunity for CHAP staff and FCO to both familiarize and teach the public about what aquatic preserves are and why they are important.

The growing occurrence of marine events, such as the barge parties where a large number of boats congregate for days, is an issue within CHAP and at other various aquatic preserves across the state. The barge party on and around Dog and Little Dog Islands (see Map 38) has attracted up to 1,000 boats over a weekend's time. CHAP staff have been involved since 2012, when the events became large enough to apply to the USCG for permission to hold the event. CHAP were notified in this process and coordinated with the applicant, USCG, as well as NOAA NMFS staff to better site this event to avoid and

minimize impacts to resources. Other proactive measures were taken, such as distributing seagrass scarring information flyers, posting seagrass and CHAP information on the event's website as well as regular announcements over the loud speaker to avoid seagrass areas during the event. FWC law enforcement and Charlotte County Sheriff provided increased enforcement during the event, when CHAP staff closed Dog Island due to active great blue heron nesting. CHAP also conducted seagrass site inspections before, during and after the event, and were able to obtain aerial images coordinating with the Civil Air Patrol to document seagrass impacts. CHAP staff used ground truthing and aerials to document an increase in prop scarring after the 2011 and 2012 event. In 2013 and 2014, the event was not held.

Similar barge parties have occurred in north Matlacha Pass Aquatic Preserve. Up to 300 boats have attended, traversing and anchoring in seagrass beds. CHAP became involved in 2012 when the applicant applied to USCG. CHAP coordinated with the applicant, USCG, Lee County Natural Resources Division, NOAA NMFS, as well as FWC and Lee County Sheriff law enforcement to address the issues pertaining to natural resource damage. Proactive measures included meetings and site inspections with the stakeholder group to collectively and adequately site the event, marking the entrance channel and seagrass areas to avoid with buoys, and developing and publishing a map of the event

area and buoy locations in the local newspaper and event website. Marking the seagrass areas during the event in October 2013 was effective as the adjacent seagrass beds had minimal prop scarring compared to previous events.

The coordination and partnering with stakeholders for these events takes time to develop, but it was worth it in the case of the Matlacha Pass Aquatic Preserve event as the applicant was willing to site the event properly and the seagrass in turn was not damaged as badly. However, an underlying issue develops with the occurrence of the marine events; how do aquatic preserve staff get notified of these reoccurring or single events and how does the state properly manage or issue permits to use state owned submerged land? The DEP ERP program does not issue permits to use state owned submerged land for marine events. The only formal way an aquatic preserve office is notified of an event is if the applicant applies to the USCG, which is issued as a letter of non-permit. Aquatic preserve staff can at this



Aerial view of a sailboat anchored in Lemon Bay Aquatic Preserve near an area with heavy prop scarring.

time, coordinate with the applicant and other stakeholders, but it's purely a recommendation and does not have any regulatory teeth with the USCG. The aquatic preserves would benefit from a requirement that stipulates event coordinators obtain Division of State Lands authorization for marine events.

Overnight camping and environmental violations associated with continued human habitation have become an issue on CHAP spoil islands such as Dog Island. In the past, a private company had a formal agreement with the state to manage and maintain four campsites on Dog Island. This agreement has expired and the company is no longer in existence. Due to staffing limitations and the distance between Dog Island and the CHAP office, in addition to heightened unauthorized use, there is an immediate need to reestablish a similar agreement with another organization or find alternative ways to effectively manage Dog Island. This would improve the camping and picnicking experience for visitors and better protect the natural resources. An alternative is to establish a reservation system through CHAP to receive camping authorizations on spoil islands that would include best management practices guidelines.

Finally, any scientific research, monitoring, or restoration conducted within an aquatic preserve that does not require Board of Trustees of the Internal Improvement Trust Fund authorization, should require approval from FCO with input from the local aquatic preserve office. This is standard procedure for state parks and should be so with FCO. Concurrence from FCO should be a requirement for any nontraditional activity, granted after careful review by the aquatic preserve office. At a minimum, staff should continue to serve as a source of local knowledge and expertise, as well as provide input on current applications to the proper permitting authority, when appropriate. Complete knowledge of all current and proposed activities taking place within the aquatic preserves is essential for proper management.

4.4.2 / Public Use Issue

Issue Six: Public Use

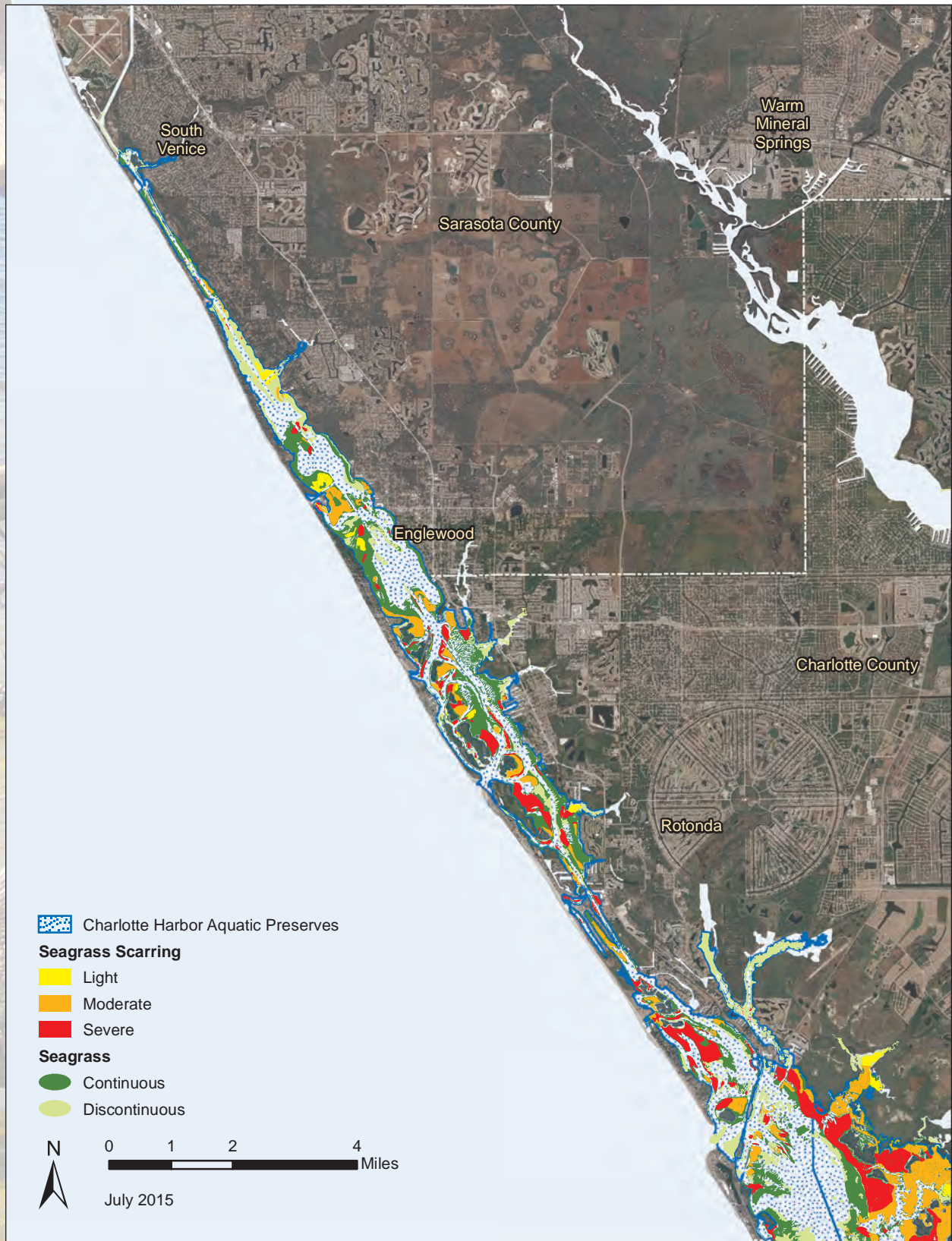
In addition to tourists, southwest Florida also draws a lot of seasonal and new residents. Boating is popular among all of these groups, as well as those who were born and raised in the area. With so many boats on the water, impacts to natural resources have become a concern. Increasing threats to seagrass beds from improper boating techniques recently led to the passing of legislation (§253.04(3)(a), F.S.) making it illegal to cause destruction to seagrass beds in aquatic preserves. Given the legislation has a direct impact on the aquatic preserves, staff assisted law enforcement agencies with education of this new law and familiarized them with local seagrass species. CHAP staff also coordinated the installation of prop scarring rule notification signs at boat ramps, marinas and other access points to the aquatic preserves with local counties, cities and other businesses. Prop scarring in the Charlotte Harbor area was mapped in 2003 by FWC-Florida Marine Research Institute (now FWRI) through a contract with the CHNEP. As shown in maps 48-50, prop scarring has been widespread throughout the estuaries.

Regrettably, the ability of so many different user groups to be able to enjoy the resources of the aquatic preserves can come at a cost to wildlife (see Map 51). In 2011, there were 22 watercraft-related manatee deaths in Lee, Charlotte and Sarasota counties (FWC, 2014b). Unlike federal, state, and local law enforcement officers, FCO does not have authority to regulate boat speed within the aquatic preserves. However, local governments (such as Lee County) have the authority to adopt local ordinances that limit the speed in areas to protect manatees; the current manatee speed zones are depicted in Map 52. Debris is also a continuous challenge within the aquatic preserves. Fishing line, in



A sign alerts boaters to special speed zones used to protect manatees in Cape Haze Aquatic Preserve.

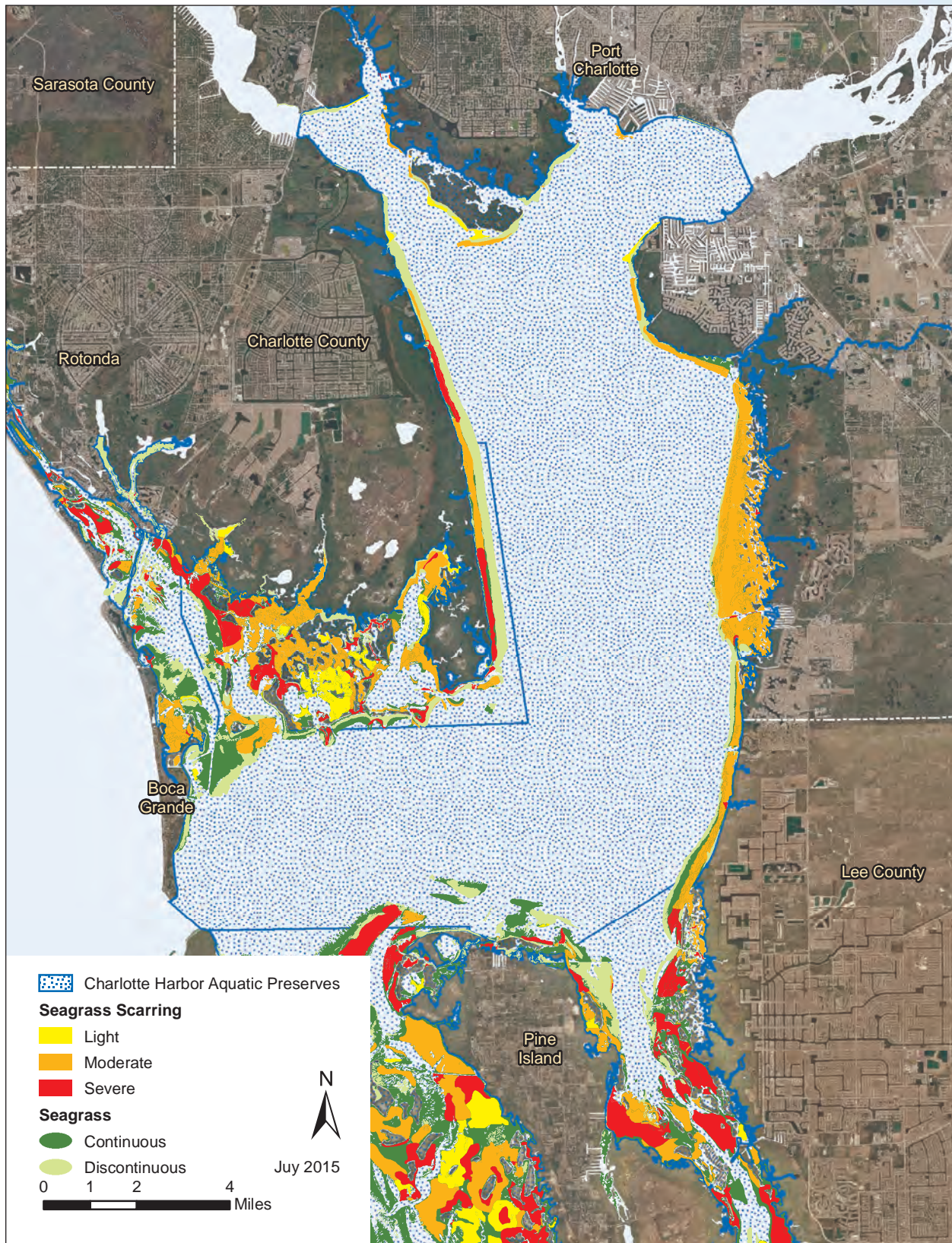
particular, is of critical concern to colonial water bird populations, as well as to other species. Animal entanglement is a problem as abandoned line caught among mangroves and manmade structures is prevalent around the estuary. Derelict vessels also litter portions of the bay, creating potential navigational and environmental hazards. Although local agencies and organizations continue to work tirelessly to remove these and other forms of debris from the aquatic preserves, public education and stewardship is vital to addressing the problem and helping to maintain and even improve the health of



118 Map 48 / Lemon Bay Aquatic Preserve seagrass scarring.

the bay. High resident turnover rates and tourism-based recreation mean that education and outreach is a continuous effort and stewardship may be an elusive goal. To this end, CHAP staff regularly join their CSO, FCHAP, in public awareness efforts, attending various outreach events and facilitating public education efforts regarding minimization of user impacts on the environment.

Goal One: Assist federal, state and local agencies and organizations in managing public use and access while protecting the natural resources of CHAP.

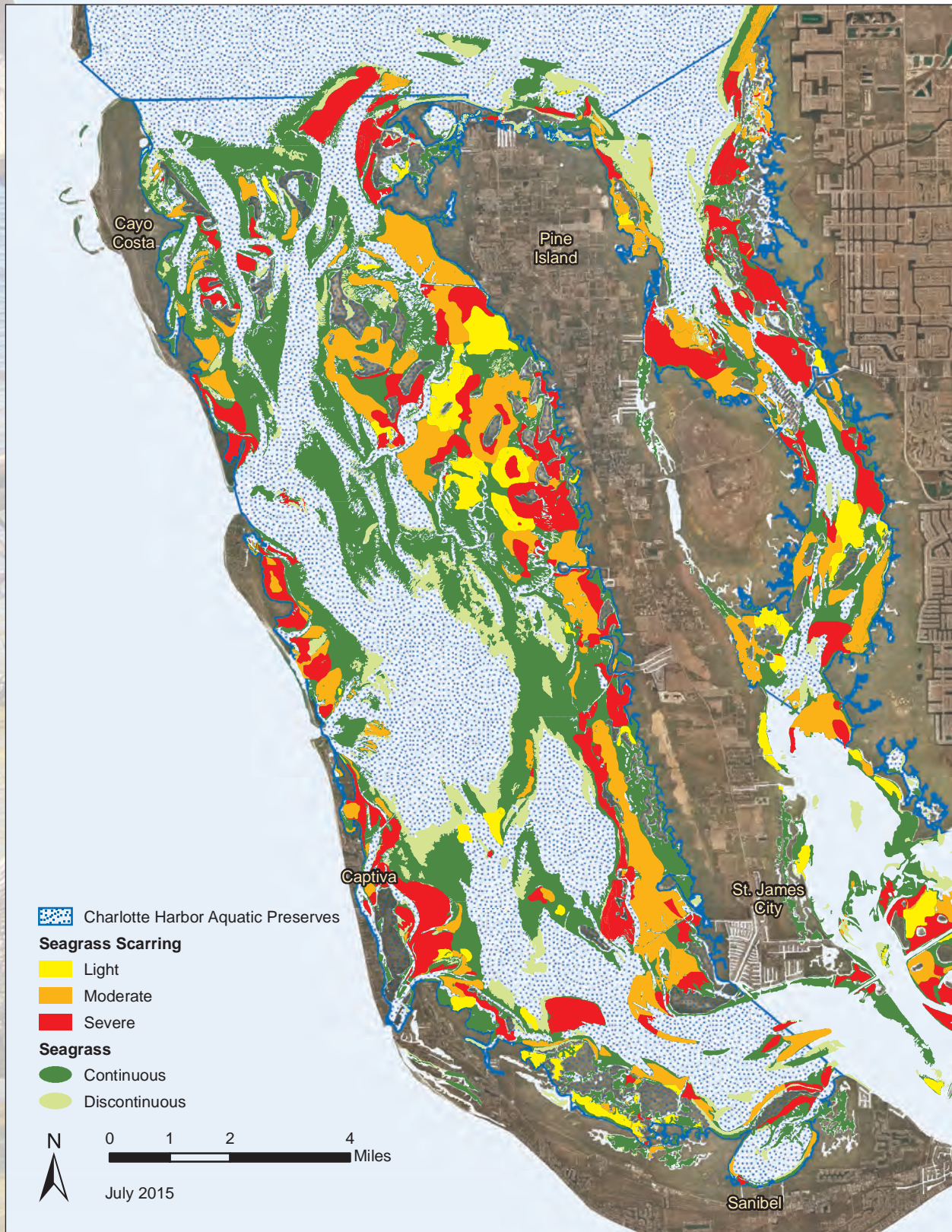


Map 49 / Gasparilla Sound-Charlotte Harbor and Cape Haze aquatic preserves seagrass scarring.

Objective One: Identify specific public use activities within CHAP and coordinate with the appropriate agencies.

Integrated Strategies:

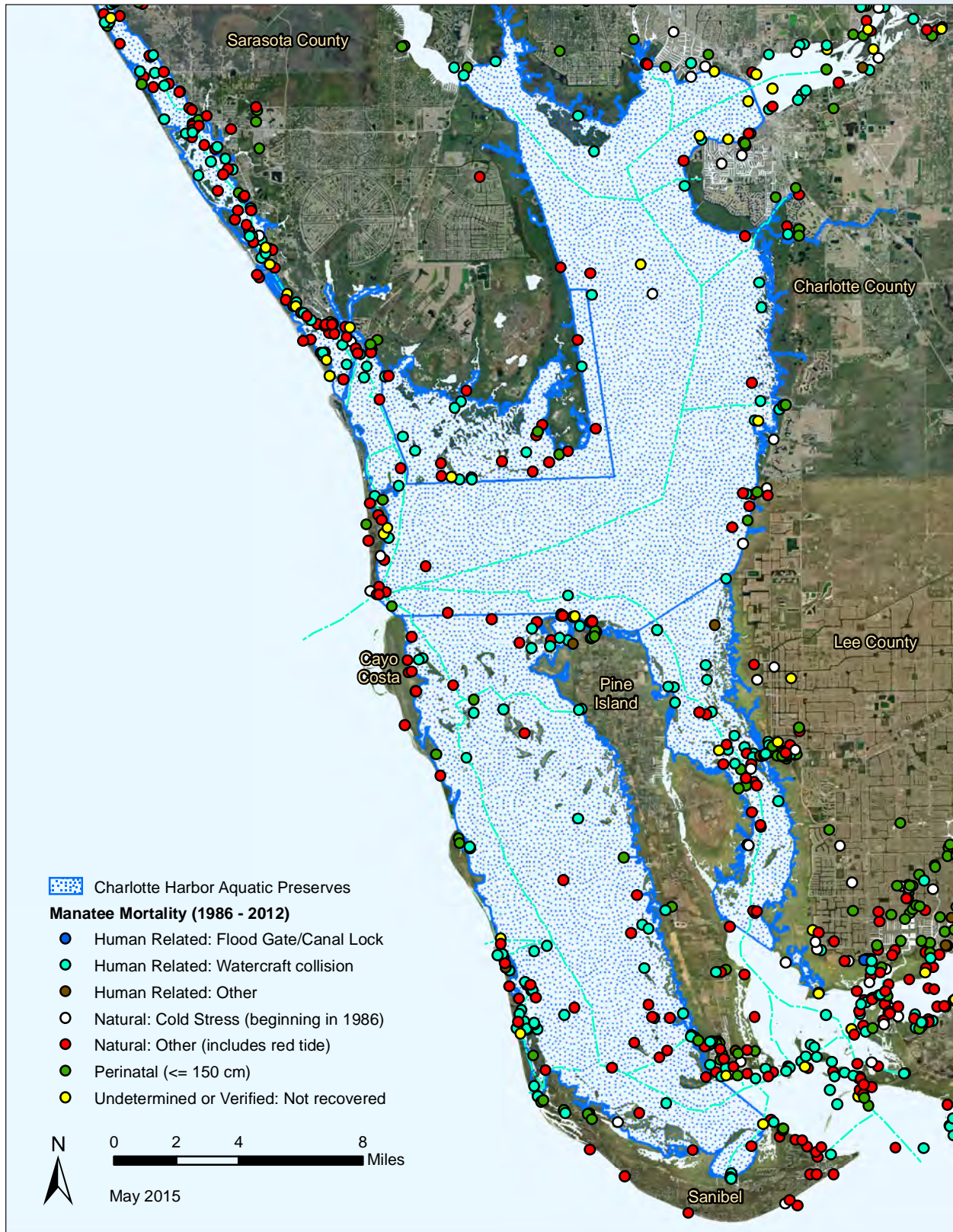
1. Work with regulatory agencies, law enforcement, USCG, and other resource management entities to identify and address uses within CHAP (e.g. camping, marine events) that are potentially illegal or



harmful to natural resources, and other marine activities that do not currently require state regulatory approval and/or DEP's Division of State Lands authorization.

Performance Measures:

- Track participation in meetings for Lee County Waterways Advisory Committee, Charlotte County Marine Advisory Committee, Charlotte County Marine Response Committee and the Lee County Marine Law Enforcement Task Force.

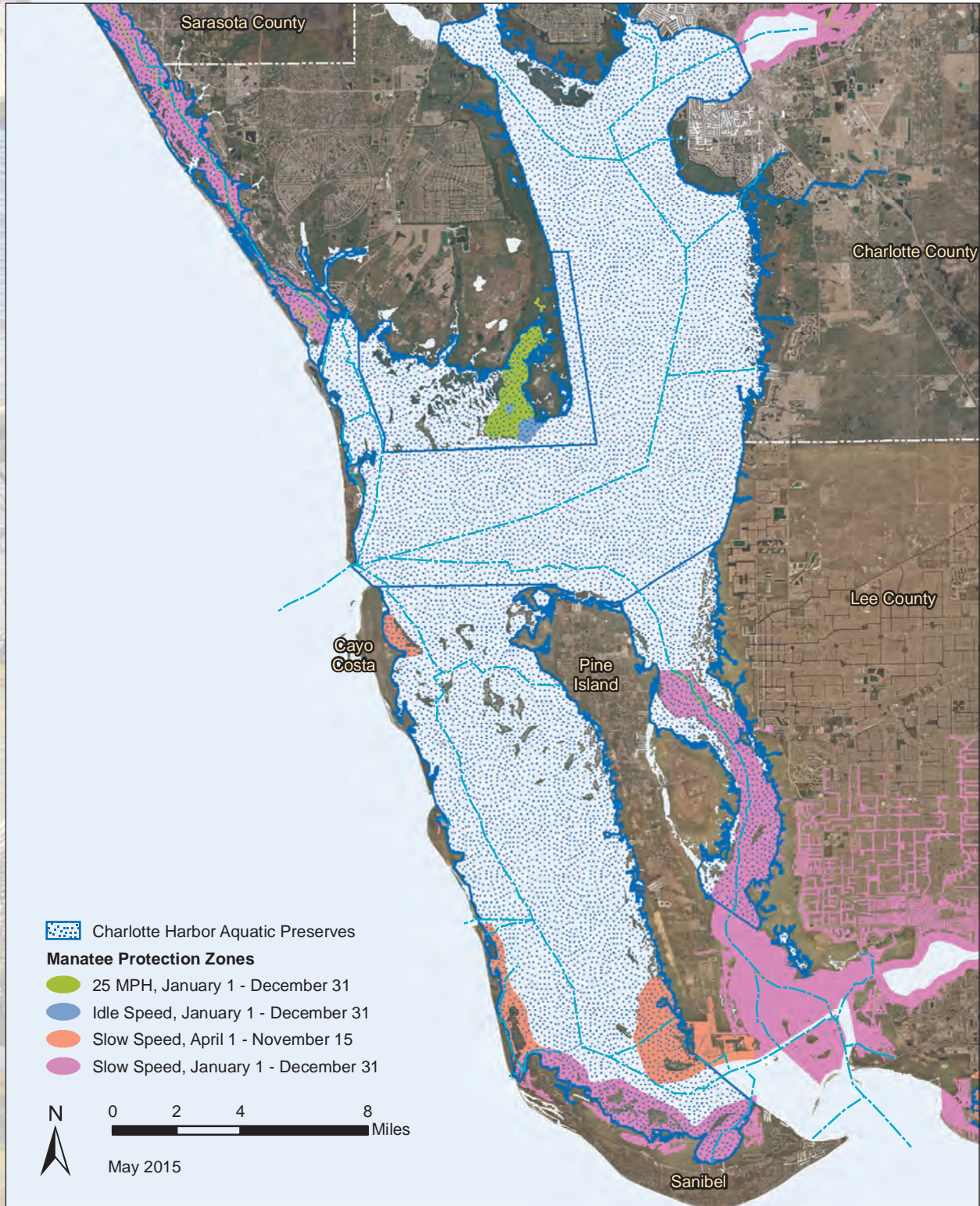


Map 51 | Charlotte Harbor Aquatic Preserves manatee mortality.

- Track number of marine events in CHAP coordinated with state and federal agencies, county staff and law enforcement for proper siting and avoidance of resources.
 - Coordinate with potential partners to address camping and other public use issues on Dog Island.
2. Support local governments in their efforts to promote conservation, proper stewardship, and resource protection (e.g., seagrass and manatee protection, derelict vessel removal, etc.).

Performance Measures:

- Provide data and track presentations, as requested.



- Report derelict vessels and marine debris to the appropriate county authorities.
- Support county efforts to establish pole and troll zones where appropriate.

3. Maintain effective relations with law enforcement agencies and serve as a point of contact for natural resource information.

Performance Measures:

- Report unauthorized or illegal activities to the appropriate law enforcement personnel (e.g. illegal mooring, taking of live shells where prohibited).
- Track number of workshops on seagrass identification training and effects of prop scarring/ seagrass damage.
- Track number of presentations and provide educational brochures on CHAP resources.

4. Maintain effective partnerships with, and stay current on potential user issues facing regional aquatic preserves and state parks.

Performance Measures:

- Continue mutual assistance with regional aquatic preserves and state park offices.
- Continue regular meetings as required by the Memorandum of Agreement between Division of Recreation and Parks, and FCO and track the number of meetings.

Objective Two: Support and provide input regarding legislative rules and local ordinances that address public use in CHAP.

Integrated Strategy:

1. In coordination with FCO and partners, stay up to date on potential state rule changes, local ordinances and land use policies that relate to public use in aquatic preserves.

Performance Measures:

- Track participation in relevant meetings and provide input on development of sustainable public use guidelines.
- Advise FCHAP and Aquatic Preserve Society, Inc. of potential changes in public use guidelines.

Goal Two: Educate the public about the importance of sustainable public use.

Objective One: Create and/or support programs for appropriate and compatible uses of CHAP.

Integrated Strategies:

1. Provide snorkeling eco-ventures for the general public.

Performance Measures:

- Track number of people attending.
- Receive feedback through surveys and track number of responses.
- Coordinate with Rookery Bay National Estuarine Research Reserve regional program staff regarding ecotourism guiding principles.

2. Support and encourage appropriate-use activities within CHAP.

Performance Measures:

- Provide printed educational information to the public at outreach events, regarding appropriate use activities available within CHAP.
- Utilize local fishing guides, marine interest groups, and boat charter services to disseminate outreach materials regarding CHAP and its resources.

3. Support appropriate ecotourism operations within CHAP.

Performance Measures:

- Provide educational brochures and outreach materials to area ecotourism businesses for dissemination to the public.
- Support Florida Society for Ethical Ecotourism.

4. Support other agencies in their efforts to develop/update and distribute information (e.g. boaters' guides) to the public encouraging appropriate use of CHAP.

Performance Measure:

- Provide input on the development of outreach materials, signage and kiosks.



The low-lying mangrove shoreline separates the blue skies from the blue waters of Charlotte Harbor Aquatic Preserves.

Part III

Additional Plans

Chapter Five

Administrative Plan

Successful implementation of the Charlotte Harbor Aquatic Preserves (CHAP) program and the goals outlined in this management plan are dependent upon adequate staffing, facilities, and funding. Citizen support and the cooperation of partnering agencies, non-governmental organizations, and other groups are also critical. Current CHAP staffing includes four Full Time Equivalent (FTE) positions and one part-time Other Personal Services (OPS) position. The FTEs include a Select Exempt Service aquatic preserve manager (an Environmental Specialist [ES] III), one Career Service (CS) ES II and two CS ES I's; the OPS position (20 hours/week) is an ES I. Other project-specific, time-limited OPS funding has come in the form of federal and not-for-profit organization grants over the past several years. As of July 2012, the National Oceanic and Atmospheric Administration (NOAA), through the Florida Coastal Management Program, has funded the bulk of the Florida Coastal Office's (FCO) Aquatic Preserve Program. For CHAP, this funding covers the FTE positions, the expense budget, and the 20-hour/week OPS position.

There have been too many CHAP staffing, facility and funding changes since the approval of the 1983 CHAP Management Plan and the 1991 Lemon Bay Aquatic Preserve Management Plan to explain here in much detail. Prior to 2003, aquatic preserves and state-owned lands surrounding them (buffer preserves) were managed jointly through the CHAP office. In 2003 - 2004, management, including funding, equipment, and staff for the Charlotte Harbor State Buffer Preserve, was moved under the Division of Recreation and Parks and renamed Charlotte Harbor Preserve State Park (CHPSP). Since then, the ES III served as the aquatic preserve manager of CHAP, which consists of five aquatic preserves located within

Sarasota, Charlotte, and Lee counties, through an office in Punta Gorda, as well as the aquatic preserve manager of Estero Bay Aquatic Preserve (EBAP), in Lee County, with an office in Fort Myers Beach. The ES III divided time between the EBAP (30 percent) and CHAP (70 percent) offices. In November 2013, the responsibility of managing EBAP was split off as it gained its own manager.

In an effort to find efficiencies, the CS Administrative Assistant I position at the CHAP office was removed in November 2013 and the bulk of the administrative work for the CHAP office shifted to FCO's Southwest Regional office in Naples. In addition to facility management responsibility for the field support facility that CHAP built in 2012, a mobile office building was transferred from CHPSP's inventory to CHAP's inventory in February 2015. The current staffing level at CHAP requires that all team members perform a variety of tasks to ensure that the primary priority resource management responsibilities are being accomplished in addition to the facility, vehicle and vessel maintenance and repair, and administrative responsibilities.

There are three National Estuarine Research Reserve (NERR) offices in Florida: Guana Tolomato Matanzas NERR in Ponte Vedra Beach near St. Augustine, Apalachicola NERR in Eastpoint, and Rookery Bay NERR in Naples. These NERRs also function as regional offices through which most aquatic preserve offices report. Rookery Bay NERR is the Southwest Regional office and the manager (FCO's Southwest Regional Administrator) supervises the CHAP manager. The Southwest Regional Administrator also oversees two aquatic preserves within the NERR boundary and two other aquatic preserve offices including Estero Bay and Tampa Bay, totaling 12 aquatic preserves in all.

Successful implementation of the strategies outlined in this management plan depends on funding and staffing factors over the next 10 years. To adequately address short-term management of CHAP, the following staffing needs have been identified:

- Upgrade the Select Exempt Service ES III to Environmental Manager, the ES II to ES III, and one ES I to ES II.
- Establish an additional CS ES II to maintain and grow existing CHAP programs; to address FCO restoration priorities and the ecotourism initiative; and to seek external funding and coordinate community outreach for special projects within and outside CHAP boundaries.
- Provide staff training and funding to gain and maintain DEP Diver certification status in order to more efficiently and effectively carry out aspects of the seagrass monitoring, data sonde and Asian green mussel eradication programs, as well as submerged resources and marine debris mapping and ground-truthing efforts.
- Increase regional assistance from the Southwest Regional office in the form of vehicle, vessel, and facility maintenance and repair, prescribed fire, exotic plant control, and ecotourism initiatives.

Volunteers and Internships

Current staff resources are supplemented by active volunteer programs. More than 80 trained volunteers are engaged in the Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network program. Other volunteers assist with the colonial wading and diving bird nest monitoring and seagrass monitoring programs. 2014 marked the first Alternative Spring Break student volunteer group from Grand Valley State University, which came to assist with an oyster habitat creation project, and returned in 2015. CHAP is planning to continue these successful college Alternative Spring Break programs in the future. In addition to the Grand Valley State University students, 2,331 individual and group volunteer hours were logged between January and June, 2014 for the Trabue Harborwalk Oyster Habitat Creation Project.

Discussions with Florida Gulf Coast University (FGCU) faculty to institute a consistent internship/graduate fellowship program began in 2014 and are ongoing. CHAP has provided descriptions of value-added projects from which students can choose, and is responding to internship and fellowship requests from FGCU, other universities, and through DEP's South District Ombudsman. The first part-time FGCU intern started in May 2015. This type of collaboration will provide undergraduate and graduate students with valuable work experience while filling some of the aquatic preserves' program needs. Together, students and volunteers help staff accomplish FCO's mission.



Staff use their field support facility to calibrate water quality monitoring equipment.

Chapter Six

Facilities Plan

Since 1999, the headquarters for the Charlotte Harbor Aquatic Preserves (CHAP) office has been located in Charlotte County (12301 Burnt Store Road, Punta Gorda), east of the Gasparilla Sound-Charlotte Harbor Aquatic Preserve. The CHAP office and the Charlotte Harbor Preserve State Park (CHPSP) office are co-located on state-owned property.

Buildings

In addition to sharing work space with CHPSP, CHAP staff offices, meeting space and visitor area are located in a 1,400 square foot mobile office building transferred from CHPSP to CHAP in February 2015. Significant termite damage repair was completed in the office building in 2014 and window replacement in 2015. The building shifted during Hurricane Charley in 2004, causing interior wall cracks. They are being monitored, as is the need for structural support and leveling of the building. A 500 square foot concrete block CHAP field support facility was constructed on the property in 2012. The air conditioning system in the field support facility has not been operating correctly and replacement will be considered after factoring in continual repair costs. Lawn maintenance equipment has impacted the foundation of the building. A perimeter of grass surrounding the building has been replaced with rock to avoid any further damage, and will help reduce the amount of grass cuttings that had been regularly cleaned off of the outside air handler filter. Equipment storage (317 square feet) and outdoor vehicle and vessel storage are also located on the property. CHAP has maintenance and repair responsibilities for the office and field support buildings which includes pest control, plumbing, central air conditioning, electrical and phone system.

Evacuation destinations for all files, equipment, vehicles and vessels located at the CHAP facilities are outlined in the Hurricane Evacuation Procedures that are reviewed and updated annually by staff. This plan has been successfully implemented several times.

Vehicles and Vessels

All vehicles and vessels are shared between staff depending on project needs. Scheduled, preventative maintenance and major repairs of all vehicles and vessels are performed by authorized vendors. Minor repairs and maintenance are performed by staff. Saltwater damage and repairs are ongoing issues for many of the CHAP vehicles and trailers and there is a need to upgrade the aging fleet.

Vehicles

- **1998 4x4 Ford F-250** – This vehicle was transferred from Biscayne Bay Aquatic Preserves in 2013 so that CHAP would have a vehicle capable of towing the 25' vessel. The F-250 also served as the primary vehicle for The Nature Conservancy-contracted Department of Environmental Protection position for oyster habitat creation work, hauling buckets, bags and mats made of shell. This vehicle has 119,000 miles as of January 2015, and was refurbished with new tires, back seat and dashboard. In June 2014, a rusted and leaking roof was replaced, along with a headliner and additional rust repairs and painting.
- **2001 Chevy Blazer** – The Blazer is a multipurpose vehicle with 89,000 miles as of January 2015, and is used primarily for transportation to meetings, transporting water samples to the laboratory, transporting equipment for resource monitoring programs, and long distance travel.
- **2002 4x4 Ford Explorer** – This vehicle, with 94,000 miles as of January 2015, was transferred from Florida Fish and Wildlife Conservation Commission law enforcement. The Explorer replaces a surplused 1998 Chevy pickup and is used to tow the 17' Mako, as transportation to meetings, to transport water samples to the laboratory, and to transport equipment for education and outreach programs.
- **2005 Chevy Hybrid Silverado** – This vehicle with 49,000 miles as of January 2015, is the newest CHAP vehicle and is mainly used to tow vessels, as well as to transport monitoring equipment and water samples, and occasionally as transportation to meetings. The bed of the truck, including tow bar and hitch was replaced and repainted in June 2014 as it had severe rust damage from saltwater exposure.

Vessels

- **1984 17' Mako with a 2007 90 horsepower Mercury four-stroke outboard engine** – This boat with 1,304 hours as of January 2015, is stored at the CHAP office and is trailered to various boat ramps for seagrass, bird rookery and water quality monitoring as well as site inspections on a weekly basis. In 2007, a new four stroke motor was purchased which greatly enhanced the reliability of the boat. This boat is outfitted with a trolling motor as well as a Power Pole (anchoring system) which was donated to CHAP for this boat.
- **1990 21' Mako with a 2002 200 horsepower Mercury two-stroke outboard motor** – This boat with 2,307 hours as of January 2015, was donated to CHAP in the 1990s and was previously a law enforcement boat. It has a deeper draft and has been used for water quality monitoring in the open waters of Charlotte Harbor and as a diving platform. It is stored in Bokeelia at Four Winds Marina as a condition of their submerged lands lease. In 2004, this boat weathered Hurricane Charley at the marina; however, the motor was damaged and has been unreliable and costly ever since. As such, the boat has not been able to be used since 2012.
- **2005 25' Windsor Craft with a 2009 Yamaha 250 horsepower four-stroke outboard motor** – This shallow-draft boat with 144 hours, as of January 2015, was transferred to CHAP from Indian River Lagoon Aquatic Preserves in 2012. It was donated to Indian River Lagoon Aquatic Preserves as mitigation for a permitted activity. The open deck seating is beneficial as a passenger boat carrying up to 12 people at a time. The tri-hull is very stable in open waters and it has been used for water quality monitoring and tours of aquatic preserves for elected officials and visitors. The steps at the stern make the boat most suitable for public snorkeling eco-ventures. The three-axle trailer and braking system for this vessel require careful and continuous upkeep to ensure safety. To alleviate trailering this large, heavy boat back and forth to Placida for the snorkeling eco-ventures, a dry storage slip would be more suitable and economical.



This 17' Mako is the primary vessel used by staff.

Vehicle and Vessel Needs

Increasing maintenance and repair costs for older vehicles and vessels will necessitate replacements. CHAP staff will continue to look for replacement opportunities, such as in Legislative Budget Requests.

- Acquire a new 4x4 vehicle (replacing the Blazer) capable of towing the 25' Windsor Craft as well as the more frequently used 17' Mako.
- Find dry storage slip for the 25' Windsor Craft in the Lemon Bay/Placida area for the snorkel eco-ventures.
- Trade the 21' Mako for a shallow-draft boat, such as a Pathfinder, to use in the many shallow areas of Pine Island Sound and Matlacha Pass for the resource monitoring programs. The new vessel would be kept in a dry slip at Four Winds Marina in place of the 21' Mako. As a marina permit condition, and at no cost, CHAP staff would be able to call ahead of time to have the boat put in the water as needed.
- Acquire an additional shallow-draft boat, and locate storage in Lemon Bay/Placida area to use for resource monitoring programs.

List of Appendices

Appendix A / Legal Documents	131
A.1 / Aquatic Preserve Resolutions	132
A.2 / Florida Statutes	143
A.3 / Florida Administrative Code	143
A.4 / Management Agreements.....	144
Appendix B / Resource Data	178
B.1 / Glossary of Terms	178
B.2 / References	181
B.3 / Species Lists	187
Native Species	187
Listed Species.....	206
Invasive Non-native and/or Problem Species	207
B.4 / Florida Master Site File Archaeological and Historical Sites List	210
B.5 / Reports and Publications using Charlotte Harbor Aquatic Preserves' Data	219
B.6 / Arthropod Control Plans.....	221
Appendix C / Public Involvement	222
C.1 / Advisory Committee	222
List of Members and their Affiliations.....	222
Florida Administrative Register Posting.....	223
Meeting Summary	224
C.2 / Formal Public Meetings.....	231
Florida Administrative Register Postings.....	231
Advertisement Flyers	233
Newspaper Advertisements.....	234
Summaries of the Formal Public Meetings	236
Appendix D / Goals, Objectives, and Strategies	247
D.1 / Current Goals, Objectives, and Strategies Budget Table	247
D.2 / Budget Summary Table.....	253
D.3 / Major Accomplishments Since the Approval of the Previous Plan.....	253
D.4 / Gulf Priority Restoration Projects	255
D.5 / Additional Research Needs for the Charlotte Harbor Aquatic Preserves	261
Appendix E / Other Requirements	262
E.1 / Acquisition and Restoration Council Management Plan Compliance Checklist	262
E.2 / Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands	268
E.3 / Letters of Compliance with County Comprehensive Plans	269
E.4 / Division of State Lands Management Plan Approval Letter	273

Legal Documents

A.1 / Aquatic Preserve Resolution

WHEREAS, the State of Florida, by virtue of its sovereignty, is the owner of the beds of all navigable waters, salt and fresh, lying within its territory, with certain minor exceptions, and is also the owner of certain other lands derived from various sources; and

WHEREAS, title to these sovereignty and certain other lands has been vested by the Florida Legislature in the State of Florida Board of Trustees of the Internal Improvement Trust Fund, to be held, protected and managed for the long range benefit of the people of Florida; and

WHEREAS, the State of Florida Board of Trustees of the Internal Improvement Trust Fund, as a part of its overall management program for Florida's state-owned lands, does desire to insure the perpetual protection, preservation and public enjoyment of certain specific areas of exceptional quality and value by setting aside forever these certain areas as aquatic preserves or sanctuaries; and

WHEREAS, the ad hoc Florida Inter-Agency Advisory Committee on Submerged Land Management has selected through careful study and deliberation a number of specific areas of state-owned land having exceptional biological, aesthetic and scientific value, and has recommended to the State of Florida Board of Trustees of the Internal Improvement Trust Fund that these selected areas be officially recognized and established as the initial elements of a statewide system of aquatic preserves for Florida;

NOW, THEREFORE, BE IT RESOLVED by the State of Florida Board of Trustees of the Internal Improvement Trust Fund:

THAT it does hereby establish a statewide system of aquatic preserves as a means of protecting and preserving in perpetuity certain specially selected areas of state-owned land: and

THAT specifically described, individual areas of state-owned land may from time to time be established as aquatic preserves and included in the statewide system of aquatic preserves by separate resolution of the State of Florida Board of Trustees of the Internal Improvement Trust Fund; and

THAT the statewide system of aquatic preserves and all individual aquatic preserves established thereunder shall be administered and managed, either by the said State of Florida Board of Trustees of the Internal Improvement Trust Fund or its designee as may be specifically provided for in the establishing resolution for each individual aquatic preserve, in accordance with the following management policies and criteria:

- (1) An aquatic preserve is intended to set aside an exceptional area of state-owned land and its associated waters for preservation essentially in their natural or existing condition by reasonable regulation of all human activity which might have an effect on the area.
- (2) An aquatic preserve shall include only lands or water bottoms owned by the State of Florida, and such private lands or water bottoms as may be specifically authorized for inclusion by appropriate instrument from the owner. Any included lands or water bottoms to which a private ownership claim might subsequently be proved shall upon adjudication of private ownership be automatically excluded from the preserve, although such exclusion shall not preclude the State from attempting to negotiate an arrangement with the owner by which such lands or water bottoms might be again included within the preserve.
- (3) No alteration of physical conditions within an aquatic preserve shall be permitted except: (a) minimum dredging and spoiling for authorized public navigation projects, or (b) other approved activity designed to enhance the quality or utility of the preserve itself. It is inherent in the concept of the aquatic preserve that, other than as contemplated above, there be: no dredging and filling to create land, no drilling of oil wells or excavation for shell or minerals, and no erection of structures on stilts or otherwise unless associated with authorized activity, within the confines of a preserve - to the extent these activities can be lawfully prevented.
- (4) Specifically, there shall be no bulkhead lines set within an aquatic preserve. When the boundary of a preserve is intended to be the line of mean high water along a particular shoreline, any bulkhead line subsequently set for that shoreline will also be at the line of mean high water.
- (5) All human activity within an aquatic preserve shall be subject to reasonable rules and regulations promulgated and enforced by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and/or any other specifically designated managing agency. Such rules and regulations shall not interfere unduly with lawful and traditional public uses of the area, such as fishing (both sport and commercial), hunting, boating, swimming and the like.
- (6) Neither the establishment nor the management of an aquatic preserve shall infringe upon the lawful and traditional riparian rights of private property owners adjacent to a preserve. In furtherance of these

rights, reasonable improvement for ingress and egress, mosquito control, shore protection and similar purposes may be permitted by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and other jurisdictional agencies, after review and formal concurrence by any specifically designated managing agency for the preserve in question.

(7) Other uses of an aquatic preserve, or human activity within a preserve, although not originally contemplated, may be permitted by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and other jurisdictional agencies, but only after a formal finding of compatibility made by the said Trustees on the advice of any specifically designated managing agency for the preserve in question.

IN TESTIMONY WHEREOF, the Trustees for and on behalf of the State of Florida Board of Trustees of the Internal Improvement Trust Fund have hereunto subscribed their names and have caused the official seal of said State of Florida Board of Trustees of the Internal Improvement Trust Fund to be hereunto affixed, in the City of Tallahassee, Florida, on this the 24th day of November A. D. 1969.

CLAUDE R. KIRK, JR, Governor

TOM ADAMS, Secretary of State

EARL FAIRCLOTH, Attorney General

FRED O. DICKINSON, JR., Comptroller

BROWARD WILLIAMS, Treasurer

FLOYD T. CHRISTIAN, Commissioner of Education

DOYLE CONNER, Commissioner of Agriculture

THAT the state-owned lands within the following described boundaries be hereby recognized for their exceptional public value and dedicated in perpetuity as an aquatic preserve and as an element of a statewide system of aquatic preserves:

AQUATIC PRESERVE G-13

The sovereignty lands in Pine Island Sound and San Carlos Bay lying within the following described boundaries:

Begin at the intersection of the North line of Section 6, Township 44 South, Range 21 East, with the Westerly mean high water line of Pine Island Sound, thence East to a Northerly extension of the East line of Section 25, Township 44 South, Range 21 East, thence South along the line dividing Ranges 21 and 22 East to its intersection with the Easterly mean high water line of Pine Island Sound, thence Southerly along the mean high water line of Pine Island Sound to its intersection with the East line of Section 3, Township 46 South, Range 22 East, thence Southeasterly crossing San Carlos Bay to the most Northerly point of Section 13, Township 46 South, Range 22 East, thence Westerly and Northerly along the mean high water line of San Carlos Bay and Pine Island Sound to the Point of Beginning.

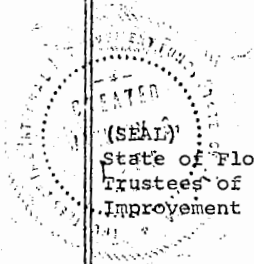
AND BE IT FURTHER RESOLVED:

THAT it is hereby declared to be the purpose and intent of the State of Florida Board of Trustees of the Internal Improvement Trust Fund to set aside and manage the above described aquatic preserve in accordance with the management policies and criteria adopted and set forth by separate resolution adopted on the 21st day of October, A.D. 1969, for application uniformly to all elements of the statewide system of aquatic preserves.

IN TESTIMONY WHEREOF, the Trustees, for and on behalf of the State of Florida Board of Trustees of the Internal Improvement Trust Fund have hereunto subscribed their names and have caused the official seal of said State of Florida Board of Trustees of

No. 70-25

the Internal Improvement Trust Fund to be hereunto affixed, in the City of Tallahassee, Florida, on this the 11th day of December, A.D. 1970.



State of Florida Board of Trustees of the Internal Improvement Trust Fund

Charles R. Foy
Governor

John G. O'Connell
Secretary of State

Earl Faircloth
Attorney General

Comptroller

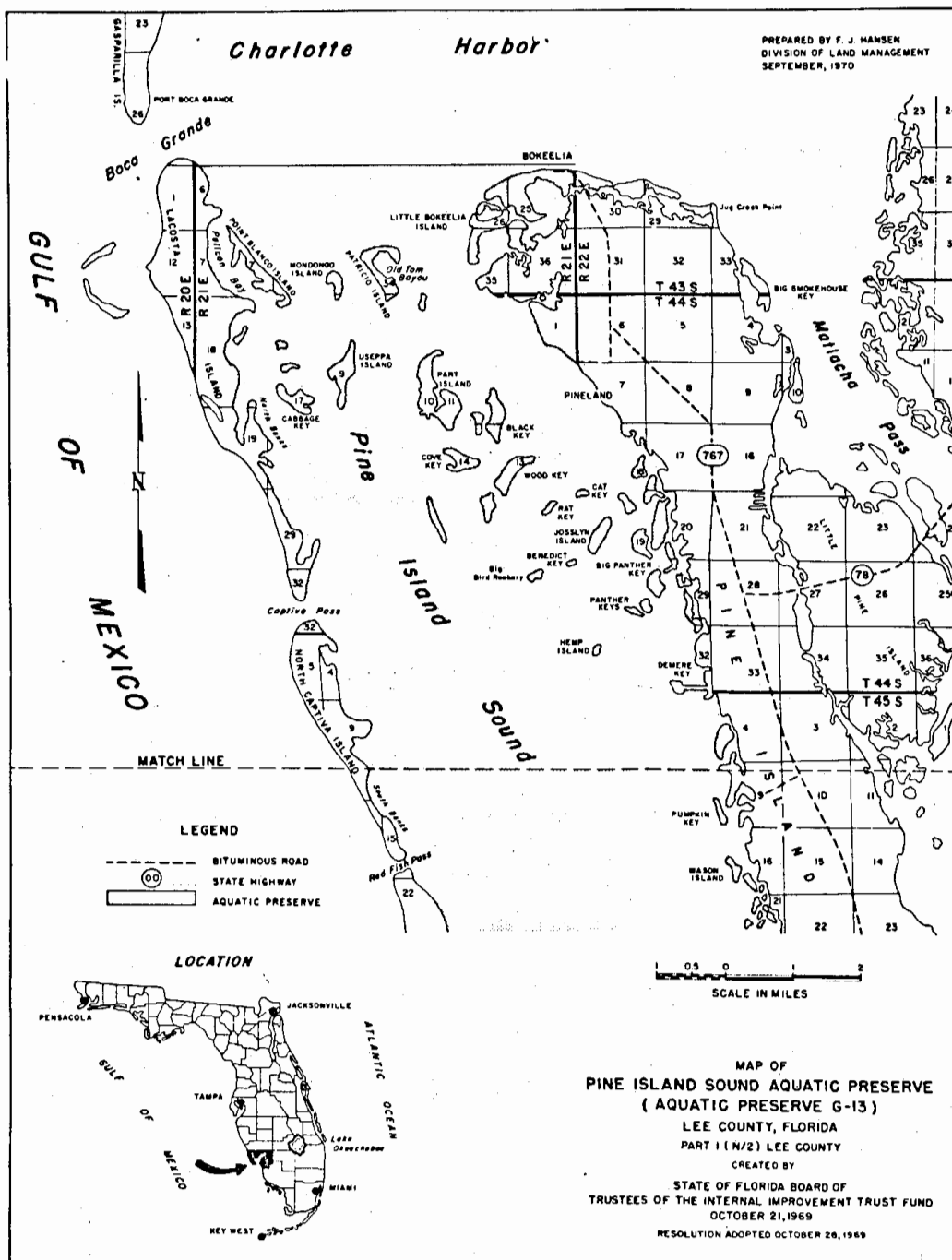
Howard William
Treasurer

Glenn T. Christian
Commissioner of Education

Jack O'Connell
Commissioner of Agriculture

As and Constituting the State of Florida Board of Trustees of the Internal Improvement Trust Fund.

No. 70-25

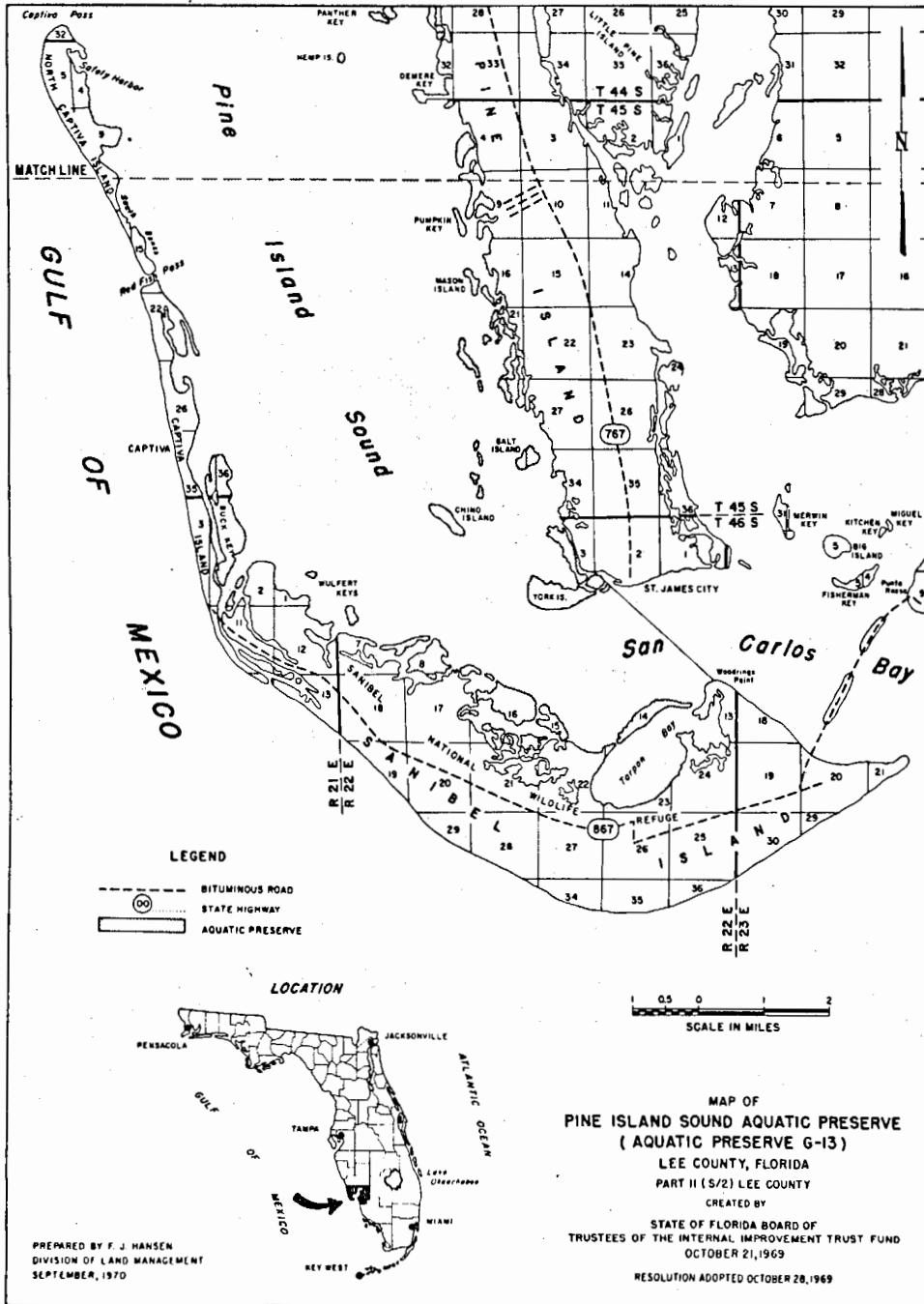


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DATE 10/21/70



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Billard*

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OFF. REC. 800 PAGE 725

STATE OF FLORIDA
BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

R E S O L U T I O N

No. 72-3

WHEREAS, the State of Florida, by virtue of its sovereignty, is the owner of the beds of all navigable waters, salt and fresh, lying within its territory, with certain minor exceptions, and is also the owner of certain other lands derived from various sources; and

WHEREAS, title to these sovereignty and certain other lands has been vested by the Florida Legislature in the State of Florida Board of Trustees of the Internal Improvement Trust Fund, to be held, protected and managed for the long-range benefit of the people of Florida; and

WHEREAS, the State of Florida Board of Trustees of the Internal Improvement Trust Fund, as a part of its overall management program for Florida's state-owned lands, does desire to insure the perpetual protection, preservation and public enjoyment of certain specific areas of exceptional quality and value by setting aside forever these certain areas as aquatic preserves or sanctuaries; and

WHEREAS, the ad hoc Florida Inter-Agency Advisory Committee on Submerged Land Management has selected through careful study and deliberation a number of specific areas of state-owned land having exceptional biological, aesthetic and scientific value, and has recommended to the State of Florida Board of Trustees of the Internal Improvement Trust Fund that these selected areas be officially recognized and established as the initial elements of a statewide system of aquatic preserves for Florida;

NOW, THEREFORE BE IT RESOLVED by the State of Florida Board of Trustees of the Internal Improvement Trust Fund;

THAT the state-owned lands within the following described boundaries be hereby recognized for their exceptional public value and dedicated in perpetuity as an aquatic preserve and as an element of a statewide system of aquatic preserves:

APPROVED AS TO FORM AND LEGALITY
TRUSTEES I. I. TRUST FUND - LEGAL
BY *[Signature]*

OFF. REC. 800 PAGE 726

Aquatic Preserve G-12

The sovereignty lands in Matlacha Pass lying within the following described boundaries:

Begin at the intersection of the North line of Section 23, Township 43 South, Range 22 East; thence East along the North line of said Section 23 to the Northeast Corner thereof; thence South along the East line of said Section 23 and Sections 26 and 35, Township 43 South, Range 22 East to the Northwest Corner of Section 1, Township 44 South, Range 22 East; thence Southeast to the Northwest Corner of Section 7, Township 44 South, Range 23 East; thence South along the West line of said Section 7 and Sections 18, Township 44 South, Range 23 East to the Northwest Corner of Section 19, Township 44 South, Range 23 East; thence Southeast to the Northeast Corner of Section 30, Township 44 South, Range 23 East; thence South along the East line of said Section 30 and Section 31 of Township 44 South, Range 23 East to the Northeast Corner of Section 6, Township 45 South, Range 23 East; thence continue South along the East line of said Section 6 and Sections 7, 18 and 19 of Township 45 South, Range 23 East to the Southwest corner of the NW 1/4 of Section 20 Township 45 South, Range 23 East; thence Southeast to the Southeast Corner of the SW 1/4 of said Section 20; thence South to the mean high water line; thence Westerly and Northwesterly along the mean high line to its intersection with the South line of Section 13, Township 45 South, Range 22 East; thence Northwesterly crossing Matlacha Pass to the intersection of the Westerly mean high water line with the North line of Section 14, Township 45 South, Range 22 East; thence Northerly along the Westerly mean high water line of Matlacha Pass to the most northern point of Jug Creek Point; thence Northeasterly to point of beginning.

AND BE IT FURTHER RESOLVED:

THAT it is hereby declared to be the purpose and intent of the State of Florida Board of Trustees of the Internal Improvement Trust Fund to set aside and manage the above described aquatic preserve in accordance with the management policies and criteria adopted and set forth by separate resolution adopted on the 21st day of October, A. D. 1969, for application uniformly to all elements of the statewide system of aquatic preserves.

IN TESTIMONY WHEREOF, the Trustees for and on behalf of the State of Florida Board of Trustees of the Internal Improvement Trust Fund have hereunto subscribed their names and have caused the official seal of said State of Florida Board of Trustees of the Internal Improvement Trust Fund to be hereunto affixed, in the City of Tallahassee, Florida, on this the 30th day of March, A. D. 19 72.

Harlin O. Lukas
Governor

Richard Dick Stone
Secretary of State

LOCAL DEPT. OF REVENUE
AND
THIS INSTRUMENT WAS PREPARED BY
JOHN DIBACE
ELIOT BUCKING
TALLAHASSEE, FLORIDA 32304

C 2

(SEAL)
State of Florida Board of
Trustees of the Internal
Improvement Trust Fund

OFF. REC. 800 PAGE 121

Robert L. Harin

Attorney General

Fred W. Dickerson

Comptroller

Thomas H. Malley

Treasurer

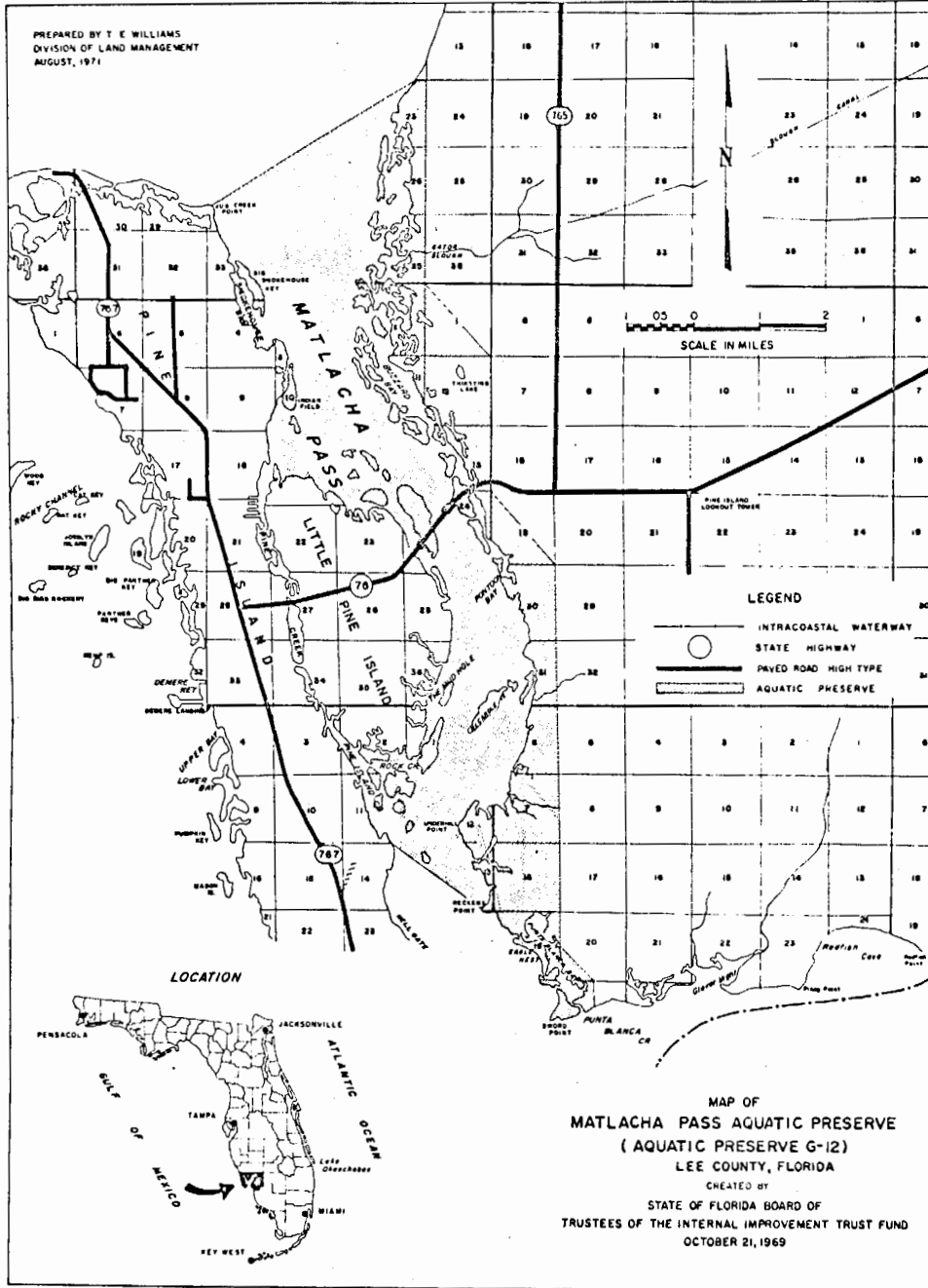
Wloyd S. Christian

Commissioner of Education

Dayton Conner

Commissioner of Agriculture

As and Constituting the State of
Florida Board of Trustees of the
Internal Improvement Trust Fund



RECORDED IN OFFICIAL
RECORDS
LEE COUNTY, FLORIDA
RECORD VERIFIED

APR 13 11 26 AM '72

D. T. SARGENT
CLERK CIRCUIT COURT
BY: *[Signature]*
D. C.

A.2 / Florida Statutes

All the statutes can be found according to number at <http://www.leg.state.fl.us/Statutes/>

Florida Statutes, Chapter 253: State Lands

Florida Statutes, Chapter 258: State Parks and Preserves
Part II (Aquatic Preserves)

Florida Statutes, Chapter 267 (Historical Resources)

Florida Statutes, Chapter 370: Saltwater Fisheries

Florida Statutes, Chapter 372: Wildlife

Florida Statutes, Chapter 403: Environmental Control

(Statute authorizing the Florida Department of Environmental Protection (DEP) to create Outstanding Florida Waters is at 403.061(27))

Florida Statutes, Chapter 597: Aquaculture

A.3 / Florida Administrative Codes

All rules can be found according to number at <https://www.flrules.org/Default.asp>

Florida Administrative Code, Chapter 18-20: Florida Aquatic Preserves
<http://www.dep.state.fl.us/legal/Rules/shared/18-20.pdf>

Florida Administrative Code, Chapter 18-21: Sovereignty Submerged Lands Management
<http://www.dep.state.fl.us/legal/Rules/shared/18-21.pdf>

Florida Administrative Code, Chapter 62-302: Surface Water Quality Standards
(Rule designating Outstanding Florida Waters is at 62-302.700)
<http://www.dep.state.fl.us/legal/Rules/shared/62-302/62-302.pdf>



United States Department of the Interior

FISH AND WILDLIFE SERVICE

1875 Century Boulevard
Atlanta, Georgia 30345

OCT 04 1995

IN REPLY REFER TO:

FWS/R4/RE

LA-Florida
J.N. "Ding" Darling NWR
State of Florida (2C-2)
Tarpon Bay Management Agreement

Memorandum

To: Refuge Manager, J.N. "Ding" Darling National Wildlife Refuge

From: Supervisory Realty Specialist, FWS, Atlanta, GA

Subject: Management Agreement with the State of Florida

The Management Agreement with the State of Florida which gives the Fish and Wildlife Service management rights on approximately 950 acres of state waterbottoms at Tarpon Bay for a 50-year term was executed on September 29, 1995. Attached is your copy of the Management Agreement.

You are hereby charged with custody of the land and instructed to administer and protect it as part of J.N. "Ding" Darling National Wildlife Refuge, effective immediately.

Please attach The Tarpon Bay Management Plan as "Exhibit B" to this document. Note that the Tarpon Bay Management Plan needs to be reviewed by the State of Florida every 5 years.

Attachment

RECEIVED

JAN 15 2004

D.E.P. - South District

MANAGEMENT AGREEMENT
FOR
CERTAIN LANDS IN LEE COUNTY, FLORIDA

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida holds title to certain sovereignty submerged lands in Lee County, Florida; and

WHEREAS, the Board may authorize the management of said lands by virtue of Chapter 253.03, Florida Statutes; and

WHEREAS, the U.S. Fish and Wildlife Service possesses authority to enter into Agreement by virtue of the National Wildlife Refuge Administration Act, 16 U.S.C. § 668dd et seq; and

WHEREAS, the U.S. Fish and Wildlife Service desires to manage the subject lands for public purposes as outlined in Exhibit "A" attached hereto;

NOW, THEREFORE, THE BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA, referred to herein as "Board", hereby grant to U.S. Fish and Wildlife Service, herein referred to as "Grantee", the right to manage for public purposes all lands titled in the Board (including islands, tidal lands, and sovereignty submerged lands) which are located within the boundaries described in Exhibit "A", for a period of 50 years from the effective date of this Agreement, on the following terms and conditions:

1. Grantee shall manage the subject properties as provided in the Tarpon Bay Management Plan attached as Exhibit "B", attached hereto and made part hereof in a manner which will not conflict with the conservation, protection and enhancement of said lands and which will not interfere with the maintenance of public navigation projects or other public works projects authorized by the United States Congress.

RECEIVED
JAN 15 2004
D.E.P. - South District

2. Grantee shall manage said lands as part of J.N. "Ding" Darling National Wildlife Refuge. The wildlife management and public use of said lands will be administered in accordance with the National Wildlife Refuge System Administration Act of 1966, 16 U.S.C. § 668dd, and the regulations pertaining to the National Wildlife Refuge System contained in Title 50 of the Code of Federal Regulations.

3. The Tarpon Bay Management Plan attached hereto as Exhibit "B" shall be reviewed jointly by the Board and the Grantee at no greater than five (5) year intervals and updated as necessary. The Grantee shall not alter the property or engage in any activity except as provided for in the required plan without the prior written approval of the Board.

4. Upon execution of this Agreement, the Grantee shall have the right to enter and occupy the property for the purpose of fulfilling the activities designated on Page 13 under "Management Objectives" in Exhibit "B", subject to all pre-existing rights and interests.

5. The Board shall have the right at any time to inspect the works and operations of the Grantee in any matter pertaining to this Agreement.

6. This Agreement does not convey any title interest to the area described in Exhibit "A" attached hereto.

7. This Agreement may be unilaterally terminated by either party, with or without cause, by providing written notice of the intent to terminate this Agreement to the other party at least 60 days prior to the proposed date of termination.

8. The Board retains the right to enter the property and to engage in management activities other than those provided for herein following notification, confirmation, and approval by Grantee. The Grantee retains the right to affirm or deny any further management activities by third parties, and determine if such activities are compatible with lands incorporated into the National Wildlife Refuge System. Upon such affirmation by Grantee, the Board may grant approval by third parties for compatible management activities

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JAN 15 2004
D.E.P. - South District

under the term of this Agreement.

9. This Agreement may be renewed for succeeding additional ten-year terms by mutual Agreement of the parties. The Agreement to renew, together with all additions, deletions, and modifications to this Agreement, shall be affixed hereto.

10. This Agreement and any rights and privileges contained herein are for the sole use of the Grantee and shall not be assigned or transferred in whole or in part to any other party without the prior written consent of the Board.

11. The Grantee agrees to assist in the investigation of injury or damage claims either for or against the State or the Board and pertaining to Grantee's area of responsibility or arising out of Grantee's management programs hereunder and to contact the Board regarding whatever legal action Grantee deems appropriate to remedy same.

12. The liability of the Grantee for the acts and omissions of its employees pursuant to this Agreement shall be governed by the Federal Tort Claims Act.

13. Section 267.061(7)(b), Florida Statutes, specifies that title to all treasure trove, artifacts and such objects or antiquity having intrinsic, scientific or historical and archaeological value, which have been abandoned on state-owned lands or state-owned sovereignty submerged lands is vested in the Division of Historical Resources (DHR) of the Department of State, for the purpose of administration and protection for the State of Florida. Execution of this Agreement in no way affect any of the parties' obligations pursuant to Chapter 267, Florida Statutes. The disturbance of archaeological and historical sites on state-owned lands is prohibited unless prior authorization has been obtained from DHR. All proposals for changes in the character or use of state lands shall be coordinated with DHR in order to mitigate potential damage or disturbance of, or to preserve, archaeological and historical sites and properties.

RECEIVED

JAN 15 2004

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14. Upon termination or expiration of this Agreement, the Grantee agrees to leave all fixed improvements for the use of the Board and to put no claim upon said fixed improvements; or, at the option of the Board, the Grantee agrees to remove any or all improvements from the property at Grantee's expense.

15. The Grantee shall not discriminate against any individual because of that individual's race, color, religion, sex, national origin, age, handicap, or marital status with respect to any activity occurring with the area subject to this Agreement or upon lands adjacent to and used as an adjunct of the area.

16. In the event of litigation between the parties, arising out of this Agreement, the recovery by the Board of its attorneys fees and costs incurred in such litigation including any appeal therefrom, shall be governed by the provisions of the Equal Access to Justice Act, 28 U.S.C. § 2412.

17. Unless specified herein to the contrary, this Agreement shall be governed and interpreted according to the laws of the State of Florida.

18. This Agreement is executed in duplicate originals each of which shall be considered an original for all purposes.

19. This Agreement does not cover gas, petroleum, or petroleum products, phosphate, minerals, or metals, and does not give the right to the Grantee to explore, mine, drill, or develop the same.

20. Fee title to the management lands described herein is held by the Board. The Grantee shall not do or permit anything to be done which purports to create a lien or encumbrance of any nature against the management lands including, but not limited to, mortgages, or construction liens against the management lands or against any interest of the Board therein.

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21. All notices given under this Agreement shall be in writing, and shall be mailed to the last address of the party to whom notice is to be given, as designed by such party in writing. The Board and the Grantee hereby designate their respective address as follows:

BOARD: Florida Department of Environmental Protection
Division of State Lands
Bureau of Land Management Services
3900 Commonwealth Boulevard
Mail Station 130
Tallahassee, Florida 32399

GRANTEE: Regional Director
U.S. Fish and Wildlife Service
1875 Century Blvd
Atlanta, Georgia 30345

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IN TESTIMONY WHEREOF, witnesseth the signature of the Regional Director, Fish and Wildlife Service, on behalf of the United States of America, and the signature of the legally designated agent of the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida, this 29th day of September 1995.

UNITED STATES OF AMERICA

Department of Interior

By: *Marcel K. Clough*
Fish and Wildlife Service
Regional Director
Southeast Region

Trillax E. Couillion
Witness

Peggy S. Handrich
Witness

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BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND OF THE STATE
OF FLORIDA

By: *Daniel T. Crabb*

Daniel T. Crabb

Chief

Bureau of Land Management Services

Division of State Lands

Florida Department of Environmental Protection

Gloria C. Nelson

Witness

Karen S. Harrison

Witness

Approved as to Form and Legality

By: *Sally L. Hise*

DEP Attorney

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EXHIBIT A

J.N. "Ding" Darling National Wildlife Refuge

Lee county, Florida

Description of the Tarpon Bay and Ladyfinger Lake Agreement area

T. 46 S., R. 22 E., TALLAHASSEE MERIDIAN:

Those parts of sections 13, 14, 22, 23, and 24 more particularly described as follows:

COMMENCING at a point in the east boundary line of U.S. Government Tract (2a), said point being the southeast corner of said section 13, an 80d nail set in pavement in the center of Dixie Beach Boulevard;

thence N. 01° 02' 20" W., with the east boundary line of said U.S. Government Tract (2a), with the east boundary line of said section 13, and with the said centerline of Dixie Beach Boulevard, 2,646.42 feet to a corner common to U.S. Government Tract (2a) and U.S. Government Tract (128), the northeast corner of the SE 1/4 of said section 13, an 60d nail set in pavement;

thence S. 71° 43' 00" W., with the boundary line common to U.S. Government Tract (2a) and U.S. Government Tract (128), 835.75 feet to Corner No. 1, the POINT OF BEGINNING in the line of mean high water of Ladyfinger Lake, being a corner common to said Tract (2a) and said Tract (128), a 2" iron pipe;

thence S. 77° 10' 00" W., with the north boundary line of U.S. Government Tract (2a), crossing the waters of Ladyfinger Lake, approximately 660 feet to Corner No. 2, a point on the north side of an unnamed island;

thence S. 55° 10' 00" W., with the north boundary line of U.S. Government Tract (2a), crossing the waters of Ladyfinger Lake, approximately 480 feet to Corner No.3, in the center of an inlet connecting the waters of Ladyfinger Lake with the waters of Tarpon Bay where the waters of said lake converge with the waters of said inlet;

thence S. 01° 02' 20" E., with the west boundary line of U.S. Government Tract (2a) and with the meanders of the centerline of the aforementioned inlet, approximately 190 feet to Corner No. 4, a point in the center of said inlet;

thence S. 61° 40' 00" W., with the west boundary line of U.S. Government Tract (2a) and with the meanders of the centerline of the aforementioned inlet, approximately 500 feet to Corner No. 5, a point in the center of said inlet where the waters of said inlet converge with the waters of Tarpon Bay;

thence S. 28° 20' 00" E., with the west boundary line of U.S. Government Tract (2a), approximately 75 feet to Corner No. 6, a point in the line of mean high water of Tarpon Bay;

thence SOUTHERLY and SOUTHWESTERLY, with the line of mean high water of Tarpon Bay, across an inlet to Ladyfinger Lake, and with the west boundary line of U.S. Government Tract (2a), approximately 1, 680 feet to Corner No. 7, the intersection with the section line common to said sections 13 and 14, a point;

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thence SOUTHWESTERLY and SOUTHEASTERLY, continuing with the line of mean high water of Tarpon Bay and with the west boundary line of U.S. Government Tract (2a), approximately 2,610 feet to Corner No. 8, the intersection with the section line common to said sections 14 and 23, a point;

thence SOUTHEASTERLY and SOUTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the west boundary line of U.S. Government Tract (2a), approximately 5,950 feet to Corner No. 9, a corner common to U.S. Government Tract (2a) and U.S. Government Tract (36), a point;

thence SOUTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the north boundary line of U.S. Government Tract (36), approximately 1,000 feet to Corner No. 10, a corner common to U.S. Government Tract (36) and U.S. Government Tract (34), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the north boundary line of U.S. Government Tract (34), approximately 575 feet to Corner No. 11, a corner common to U.S. Government Tract (34) and U.S. Government Tract (33), a point;

thence SOUTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (33), approximately 600 feet to Corner No. 12, a corner common to U.S. Government Tract (33) and U.S. Government Tract (32), a point;

thence SOUTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (32), approximately 225 feet to Corner No. 13, a corner common to U.S. Government Tract (32) and U.S. Government Tract (35), a point;

thence SOUTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the north boundary line of U.S. Government Tract (35), approximately 300 feet to Corner No. 14, a corner common to U.S. Government Tract (35) and U.S. Government Tract (41), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the north boundary line of U.S. Government Tract (41), approximately 1,023 feet to Corner No. 15, a corner common to U.S. Government Tract (41) and U.S. Government Tract (41-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the east boundary line of U.S. Government Tract (41-I), approximately 62 feet to Corner No. 16, a corner common to U.S. Government Tract (41-I) and U.S. Government Tract (41-II), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (41-II), approximately 315 feet to Corner No. 17, a corner common to U.S. Government Tract (41-II) and U.S. Government Tract (43-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (43-I), approximately 128 feet to Corner No. 18, the northwest corner of U.S. Government Tract (43-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay, approximately 650 feet to Corner No. 10, the northeast corner of U.S. Government Tract (16a-I), a point;

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thence EASTERLY and NORTHEASTERLY, with the said line being parallel with, perpendicular to, and 100 feet offshore from the line of mean high water of Ladyfinger Lake, approximately 3500 feet to Corner No. 30, an intersection with a southeasterly projection of the west boundary line of U.S. Government Tract (128), a point;

thence N. 51° 50' 00" W., with the aforementioned projection of the west boundary line of U.S. Government Tract (128), approximately 100 feet to Corner No. 31, an intersection with the line of mean high water of Ladyfinger Lake, a 2" iron pipe;

thence SOUTHERLY, with the line of mean high water of Ladyfinger Lake and with the west boundary line of U.S. Government Tract (128), approximately 2100 feet to Corner No. 1, the POINT OF BEGINNING, a 2" iron pipe, containing approximately 950 acres.

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thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (16a-I), approximately 60 feet to Corner No. 20, a corner common to U.S. Government Tract (16a-I) and U.S. Government Tract (48-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (48-I), approximately 178 feet to Corner No. 21, a corner common to U.S. Government Tract (48-I) and U.S. Government Tract (16b-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (16b-I), approximately 565 feet to Corner No. 22, a corner common to U.S. Government Tract (16b-I) and U.S. Government Tract (32a-II), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the east boundary line of U.S. Government Tract (32a-II), approximately 166 feet to Corner No. 23, a corner common to U.S. Government Tract (32a-I) and U.S. Government Tract (31-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the east boundary line of U.S. Government Tract (31-I), approximately 832 feet to Corner No. 24, a corner common to U.S. Government Tract (31-I) and U.S. Government Tract (2), a point;

thence NORTHEASTERLY, continuing with the line of mean high water of Tarpon Bay and with the east boundary line of U.S. Government Tract (2), approximately 1,800 feet to Corner No. 25, a corner common to U.S. Government Tract (2) and U.S. Government Tract (11) and in the section line common to said sections 22 and 23, a point;

thence NORTHEASTERLY, continuing with the line of mean high water of Tarpon Bay and with the southeast boundary line of U.S. Government Tract (11), approximately 2,100 feet to Corner No. 26, the intersection with the section line common to said sections 14 and 23, a point;

thence NORTHEASTERLY, continuing with the line of mean high water of Tarpon Bay and with the southeast boundary line of U.S. Government Tract (11), approximately 4,950 feet to Corner No. 27, the intersection with the section line common to said sections 13 and 14, a point;

thence EASTERLY, continuing with the line of mean high water of Tarpon Bay and with the south boundary line of U.S. Government Tract (11), approximately 2,000 feet to Corner No. 28, the southeast corner of said U.S. Government Tract (11), a point;

thence SOUTHEASTERLY, leaving the line of mean high water of Tarpon Bay and crossing an inlet connecting the waters of Tarpon Bay with the waters of San Carlos Bay where the waters of Tarpon Bay converge with the waters of said inlet, approximately 200 feet to Corner No. 29, an intersection with a line parallel with, perpendicular to, and 100 feet offshore from the line of mean high water of Tarpon Bay and with a southwesterly projection of the northern boundary line of Lot No-1 of the S.B. Woodring's Division recorded in Plat Book 1, Page 20 in the records of Lee County, Florida, a point;

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U.S. FISH AND WILDLIFE SERVICE

J.N. 'DING' DARLING NATIONAL WILDLIFE SERVICE

SECTIONS 13, 14, 22, 23 AND 24,
TOWNSHIP 46 SOUTH, RANGE 22, EAST,
SANIBEL ISLAND, LEE COUNTY, FLORIDA

TARPON BAY MANAGEMENT PLAN

PREPARED FOR:

FLORIDA DEPARTMENT OF ENVIRONMENTAL
PROTECTION

DIVISION OF STATE LANDS

PREPARED BY:

COASTPLAN, INC.
7181 COLLEGE PARKWAY, SUITE 43
FORT MYERS, FLORIDA 33907

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TARPON BAY MANAGEMENT PLAN

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TABLE OF CONTENTS

INTRODUCTION.....	01
PURPOSE AND SCOPE OF PLAN.....	01
MANAGEMENT PROGRAM OVERVIEW.....	02
Legislated Mandate.....	03
Goals of National Wildlife Refuge System.....	03
Refuge Objectives.....	04
RESOURCE MANAGEMENT ELEMENT.....	04
Introduction.....	04
RESOURCE DESCRIPTION AND ASSESSMENT.....	05
Natural Communities.....	05
Vegetation Communities.....	06
Wildlife.....	08
Special Natural Features.....	09
Soils Description.....	09
RESOURCE MANAGEMENT PROGRAM.....	10
Management Needs and Problems.....	10
Management Objectives.....	13
LAND USE ELEMENT.....	16
Land Use History.....	16
Preserve Boundaries and Ownership.....	17
Adjacent Land Use.....	17
Potential Recreational Uses.....	18
MAINTENANCE.....	19
PUBLIC INPUT.....	19
SUMMARY.....	20
ADDENDA	
LEGAL DESCRIPTION OF THE LEASED PROPERTY.....	A1
WILDLIFE LIST.....	A2
EXOTIC PEST TREE MANAGEMENT.....	A3
ARCHAEOLOGICAL OR HISTORICAL RESOURCES.....	A4
FIGURES	
LOCATION MAP.....	F1
SEAGRASS, MANGROVE AND BATHYMETRY MAP.....	F2
SURVEY BOUNDARY MAP.....	F3

U.S. FISH AND WILDLIFE SERVICE
J.N. 'DING' DARLING NATIONAL WILDLIFE REFUGE
SECTIONS 13, 14, 22, 23 AND 24,
TOWNSHIP 46 SOUTH, RANGE 22 EAST,
SANIBEL ISLAND, LEE COUNTY, FLORIDA
TARPON BAY MANAGEMENT PLAN
MARCH 16, 1994

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INTRODUCTION

Tarpon Bay is a body of water located on the north side of Sanibel Island. This site, owned by the State of Florida, represents approximately 950 acres of submerged lands nearly surrounded by the J.N. 'Ding' Darling National Wildlife Refuge. Sanibel Island is visited by millions of tourists from all over the world each year. With these numbers of visitors and the level of demand for water-based recreation, management needs for Tarpon Bay have increased dramatically in recent years.

This management plan is prepared to provide the State of Florida, Department of Environmental Protection, Division of State Lands, representing the Board of Trustees of the Internal Improvement Trust Fund and the American public, a narrative of how the U.S. Fish and Wildlife Service will manage the lands, waters and bay bottoms of Tarpon Bay under the authority of a management agreement.

PURPOSE AND SCOPE OF THE PLAN

This plan serves to provide a policy statement and direction for the management of Tarpon Bay. It is intended to

LEGISLATED MANDATE

The purpose of the Refuge, as established by Congress, is "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act) and "...suitable for 1. incidental fish and wildlife-oriented recreation development, 2. the protection of natural resources, 3. the conservation of endangered species or threatened species..." (Refuge Recreation Act).

GOALS OF THE NATIONAL WILDLIFE REFUGE SYSTEM

The goals of the National Wildlife Refuge System are as follows:

1. To preserve, restore and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.
2. To perpetuate the migratory bird resource.
3. To preserve a natural diversity and abundance of fauna and flora on Refuge lands.
4. To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment and to provide Refuge visitors with high quality, safe, wholesome and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with

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resources of Tarpon Bay and identifies the methods that will be employed, by the refuge, to manage them.

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RESOURCE DESCRIPTION AND ASSESSMENT

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Natural Communities

Tarpon Bay and Lady Finger Lake have, at their perimeter, strongly tidal red mangrove-dominated systems that are part of the detrital export network that feeds the bay and Pine Island Sound. A series of long, narrow intertidal oyster bars occur in the general vicinity of the navigation channel near the center of the bay. Mangrove islands established on these bars provide rookery habitat for a variety of colonial water birds. Because the bay is quite shallow, there are extensive areas of seagrasses (see Figure Two). Cuban shoal weed, manatee grass and turtle grass grow in those areas where water depths are generally less than four feet. The deeper areas support red algae species that, with seagrasses, provide nutrition and cover for juvenile forms of pink shrimp and numerous fish species.

The only exceptions to the mangrove-vegetated shoreline are the Tarpon Bay Recreational Area and two government houses, which are both seawalled. The seawall at the Tarpon

Bay Recreational Area is 245 linear feet and the seawall at the residences is 290 linear feet.

A detailed description of individual communities follows.

Vegetation Communities

Mangrove Fringe

The predominant mangrove along the fringe is the red mangrove (*Rhizophora mangle*), but black mangrove (*Avicennia germinans*) and white mangrove (*Laguncularia racemosa*) can also be found. The mangroves serve many functions. They function as the primary producer in the food chain and therefore serve as the base for productivity and life within this ecosystem. The root structures capture and stabilize sediments and retard erosion. The mangrove canopy and root tangle also serves as a protected habitat for nursery-stage fish, crustaceans and shellfish. Mangroves cleanse inflowing water and aid in nutrient cycling.

Mangrove Islands

Along with the facts stated above, red mangrove islands within the bay provide important habitat for nesting and roosting colonial water birds. Many species of birds have been documented using these islands. During the last year, 1,000 to 2,000 birds have roosted and 100 to 300 birds have nested on these islands.

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Estuarine Subtidal Zone

Estuarine subtidal zone is an area of unconsolidated bay bottom that is continuously submerged. Commonly called "deep water habitat", these areas provide a safe haven for larger fishes and marine mammals when the tide is low. In areas where sufficient sunlight reaches the bay bottom, seagrasses will grow. The very deepest portion of the subtidal zone is utilized by boaters as a means of ingress and egress from the bay.

Water Column

Overlying parts or all of the other habitats is the water column. The water column is the medium through which most marine fauna travel and feed. It is the habitat for phytoplankton, zooplankton, fish, dolphins, manatees etc.

Wildlife

Oyster Beds

The oyster community is an important link in the bay's food web as well as a substrate. The oyster's position in the food web is as a secondary consumer, converting zooplankton, detritus and possible dissolved organics into animal protein, which is then available to higher levels of consumers through predation.

The rock-like substrate formed by the oyster colonies is in areas where there are no other hard substrates. These

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A description of the perimeter soil, however, provides information that is of value to resource managers. The perimeter land area consists of Wulfert muck which is a tidal swamp soil. It has a surface layer of anaerobic, reddish brown muck that is accumulated mangrove detritus being transformed into peat. Below this layer is a gray fine sand with about 10 percent shell fragments. This soil unit is strongly tidal and supports mangrove vegetation.

Cultural Resources

The coastal areas of Pine Island Sound are extremely rich in archaeological sites. Several sites, primarily shell middens, are located on government-owned lands surrounding Tarpon Bay as identified in the Florida Department of State, Division of Historic Resources master site file. As of October 12, 1993, the archaeological resources located on the adjacent lands or the bay bottoms of Tarpon Bay included eight sites which are listed in Addendum 4.

RESOURCE MANAGEMENT PROGRAM

Management Needs and Problems

Increased human activity in Tarpon Bay and in the upland areas surrounding Tarpon Bay will affect the quality of natural systems. The following are potential problems affecting the quality of Tarpon Bay's natural resources:

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- II. Loss of sea grasses (primary habitat of forage fish) (See BI - IV)

- F. Birds (sea, wadding, shore, raptors)
 - I. Human disturbance of roosting and nesting islands
 - II. Disturbance of feeding activity and feeding sites
 - III, Reduced water quality (I-VI)

- G. Fish
 - I. Commercial fishing (current level, increased level)
 - II. Bait fishing (current level, increased level)
 - III. Sport fishing (current level, increased level)
 - IV. Reduced water quality (See AI-VI)
 - V. Reduced sea grasses (See BI - IV)
 - VI. Increasing boat traffic (pleasure/fun) disturbance

- H. Invertebrates
 - I. Collecting
 - a. Commercial (for sale, live shelling, bait worms, oysters, clams)
 - b. Private (collections and consumption)
 - II. Reduced water quality (See AI - VI)
 - III. Reduction in sea grass beds (See BI - IV)
 - IV. Sediment loading

- I. Oyster Bars and Mud Flats
 - I. Disturbance from boat motors
 - II. Water quality (especially sedimentation)

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boats will be required to maintain one foot between the lowest part of the boat and the bay bottom.

Boating Activity

Continuation of public access to Tarpon Bay is an integral part of the overall management plan. A review of the management needs and problems indicates, however, that motorized boat traffic is the source of many adverse impacts to the natural systems. These impacts are not currently threatening to the overall health of Tarpon Bay, but the cumulative impact of increased motorized boat traffic is a basis of concern.

Environmental Education

Environmental education is an integral part of the plan. Its use will help decrease disturbance to the area and help to preserve the natural integrity of the area. A more educated user will help to preserve the area.

As more people discover a recreational area, such as Tarpon Bay, it often becomes less desirable for flora and fauna. Education is a means of reducing human impacts to wildlife. With education, users are more willing to get involved and to help keep the area in its natural state. A public education program will be developed, targeted specifically for Tarpon Bay, by the Refuge with educational displays located at the Refuge and at Tarpon Bay.

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LAND USE ELEMENT

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INTRODUCTION

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This component of the management plan includes the description of the preserve's boundary, brief historical information, an inventory of adjacent land uses and uses within the preserve, a conceptual land use plan, and a proposed recreational program.

LAND USE HISTORY

The common name of the water body is Tarpon Bay. The history of Tarpon Bay focuses primarily on exploiting marine resources. The shallow entrance to the bay and narrow channel have certainly limited use to small boats. There are several locations scattered around the bay where pilings, used to support manmade structures, are still in evidence. These pilings supported either ice houses, fish houses or packing houses when processing commercial fishing catches was much less centralized. The bay has had a long history of both commercial and recreational fishing. In Elinore M. Dormer's book, "The Sea Shell Islands" she talks about schools of mullet and scallops for the gathering among other fish caught for consumption in Tarpon Bay.

Commercial fishing still takes place in the bay, but the mullet, trout, redfish, snook and snapper landings have been greatly reduced in recent years. The blue eyed scallops were lost as a natural resource of the bay shortly after the

small pier that extends into the bay, a boat ramp, gift shop, canoe and kayak rentals and fishing bait and tackle sales.

A residential area is located near Tarpon Bay Recreational Area. This is an area of primarily government housing for Refuge employees. The only structures that extend into the bay are docks located at Tarpon Bay Recreational Area and at the government houses.

The only private property adjacent to the preserve is located on Woodring Road, at the entrance to Tarpon Bay. This is an area of waterfront, single family homes. Boating access to these properties is not through Tarpon Bay and does not impact the management plan. These residents will be provided information about management objectives and asked to join a "Refuge Watch" volunteer group. They will be asked to report any activities witnessed that are counter to resource management objectives. Adjacent land uses are shown on Figure 3.

POTENTIAL RECREATIONAL USES

Uses permitted will be passive recreation uses such as flora and fauna observation and interpretation, photography, canoeing, picnicking, boating and nature education. "Uses" prohibited within the refuge will be prohibited within the Bay. This will include, but not limited to aircraft landing, jet skiing, water skiing, parasailing, commercial bait fishing/ netting, and shell collecting. All standard national wildlife refuge regulations will apply. The entire area will

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Prior to the implementation of the plan, the general public will be notified through news releases. Several copies of the plan will be placed in the Sanibel public library for public information purposes.

SUMMARY

The renewable natural systems of Tarpon Bay have a long history of exploitation. Increasing numbers of users require increased levels of management if the quality of the resources is to be maintained.

Increased human activity in Tarpon Bay and in the upland areas surrounding Tarpon Bay will affect the quality of natural systems. Implementation of this plan is important to meet the demands and minimize the impact resulting from human presence.

The proposed project is in the public interest because, with the continued growth and development of Southwest Florida, it is increasingly difficult to find areas with the natural conditions preserved. This management plan is designed to help protect endangered and threatened species, habitat for important fisheries, nesting and roosting water birds, and many other plant and invertebrate species. The plan allows for a level of public recreational opportunities

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ADDENDUM 1

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LEGAL DESCRIPTION

J. N. "Ding" Darling National Wildlife Refuge
Lee County, Florida

Description of the Tarpon Bay and Ladyfinger Lake management area

T. 46 S., R. 22 E., TALLAHASSEE MERIDIAN;

Those parts of sections 13, 14, 22, 23, and 24 more particularly described as follows:

COMMENCING at a point, in the east boundary line of U.S. Government Tract (2a), said point being the southeast corner of said section 13, an 80d nail set in pavement in the center of Dixie Beach Boulevard;

thence N. 01° 02' 20" W., with the east boundary line of said U.S. Government Tract (2a), with the east boundary line of said section 13, and with the said centerline of Dixie Beach Boulevard, 2,646.42 feet to a corner common to U.S. Government Tract (2a) and U.S. Government Tract (128), the northeast corner of the SE 1/4 of said section 13, an 60d nail set in pavement;

thence S. 71° 43' 00" W., with the boundary line common to U.S. Government Tract (2a) and U.S. Government Tract (128), 835.75 feet to Corner No. 1, the POINT OF BEGINNING in the line of mean high water of Ladyfinger Lake, being a corner common to said Tract (2a) and said Tract (128), a 2" iron pipe;

thence S. 77° 10' 00" W., with the north boundary line of U.S. Government Tract (2a), crossing the waters of Ladyfinger Lake, approximately 660 feet to Corner No. 2, a point on the north side of an unnamed island;

thence S. 55° 10' 00" W., with the north boundary line of U.S. Government Tract (2a), crossing the waters of Ladyfinger Lake, approximately 480 feet to Corner No. 3, in the center of an inlet connecting the waters of Ladyfinger Lake with the waters of Tarpon Bay where the waters of said lake converge with the waters of said inlet;

thence S. 01° 02' 20" E., with the west boundary line of U.S. Government Tract (2a) and with the meanders of the centerline of the aforementioned inlet, approximately 190 feet to Corner No. 4, a point in the center of said inlet;

thence SOUTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (32), approximately 225 feet to Corner No. 13, a corner common to U.S. Government Tract (32) and U.S. Government Tract (35), a point;

thence SOUTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the north boundary line of U.S. Government Tract (35), approximately 300 feet to Corner No. 14, a corner common to U.S. Government Tract (35) and U.S. Government Tract (41), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the north boundary line of U.S. Government Tract (41), approximately 1,023 feet to Corner No. 15, a corner common to U.S. Government Tract (41) and U.S. Government Tract (41-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the east boundary line of U.S. Government Tract (41-I), approximately 62 feet to Corner No. 16, a corner common to U.S. Government Tract (41-I) and U.S. Government Tract (41-II), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (41-II), approximately 315 feet to Corner No. 17, a corner common to U.S. Government Tract (41-II) and U.S. Government Tract (43-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (43-I), approximately 128 feet to Corner No. 18, the northwest corner of U.S. Government Tract (43-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay, approximately 650 feet to Corner No. 19, the northeast corner of U.S. Government Tract (16a-I), a point;

thence NORTHWESTERLY, continuing with the line of mean high water of Tarpon Bay and with the northeast boundary line of U.S. Government Tract (16a-I), approximately 60 feet to Corner No. 20, a corner common to U.S. Government Tract (16a-I) and U.S. Government Tract (48-I), a point;

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thence SOUTHEASTERLY, leaving the line of mean high water of Tarpon Bay and crossing an inlet connecting the waters of Tarpon Bay with the waters of San Carlos Bay where the waters of Tarpon Bay converge with the waters of said inlet, approximately 200 feet to Corner No. 29, an intersection with a line parallel with, perpendicular to, and 100 feet offshore from the line of mean high water of Tarpon bay and with a southwesterly projection of the northern boundary line of Lot No.1 of the S.B. Woodring's Division recorded in Plat Book 1, Page 20 in the records of Lee County, Florida, a point;

thence EASTERLY and NORTHEASTERLY, with the said line being parallel with, perpendicular to, and 100 feet offshore from the line of mean high water of Ladyfinger Lake, approximately 3500 feet to Corner No. 30, an intersection with a southeasterly projection of the west boundary line of U.S. Government Tract (128), a point;

thence N. 51° 50' 00" W., with the aforementioned projection of the west boundary line of U.S. Government Tract (128), approximately 100 feet to Corner No. 31, an intersection with the line of mean high water of Ladyfinger Lake, a 2" iron pipe;

thence SOUTHERLY, with the line of mean high water of Ladyfinger Lake and with the west boundary line of U.S. Government Tract (128), approximately 2100 feet to Corner No. 1, the POINT OF BEGINNING, a 2" iron pipe, containing approximately 950 acres.

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ADDENDUM 2

Wildlife list of those species found in Tarpon Bay.

FISH

gulf menhaden	<i>Brevoortia patronus</i>
Atlantic spadefish	<i>Chaetodipterus faber</i>
Atlantic thread herring	<i>Opisthonema oglinum</i>
bonnethead	<i>Sphyrna tiburo</i>
bull shark	<i>Careharhinus leucas</i>
cobia	<i>Rachycentron canadum</i>
crevalle	<i>Caranx hippos</i>
eagle ray	<i>Aetobatus narinari</i>
Florida pompano	<i>Trachinotus carolinus</i>
Southern flounder	<i>Paralichthys lethostigma</i>
gafftopsail catfish	<i>Bagre marinus</i>
mangrove snapper	<i>Lutjanus griseus</i>
white grunt	<i>Haemulon plumieri</i>
gulf black seabass	<i>Centropristis striata</i>
gulf killifish	<i>Fundulus confluentus</i>
houndfish	<i>Tylosurus crocodilus</i>
spotted jewfish	<i>Epinephelus itajara</i>
Southern kingfish	<i>Menticirrhus americanus</i>
ladyfish	<i>Elops saurus</i>
lane snapper	<i>Lutjanus synagris</i>
inshore lizardfish	<i>Synodus foetens</i>
mottled mojarra	<i>Ulaema lefroyi</i>
striped mullet	<i>Mugil cephalus</i>
white mullet	<i>Mugil curema</i>
pigfish	<i>Orthopristis chrysoptera</i>
pinfish	<i>Lagodon rhomboides</i>
Florida pompano	<i>Trachinotus carolinus</i>
grass porgy	<i>Calamus arctifrons</i>
sheepshead	<i>Archosargus probatocephalus</i>
Southern puffer	<i>Sphoeroides nephelus</i>
cownose ray	<i>Rhinoptera bonasus</i>
Spotted eagle ray	<i>Aetobatus narinari</i>
red grouper	<i>Epinephelus morio</i>
redfish	<i>Sciaenops ocellata</i>
remora	<i>Remora remora</i>
highfin scorpionfish	<i>Pontinus rathbuni</i>
silver seatrout	<i>Cynoscion nothus</i>
blacktip shark	<i>Carcharhinus limbatus</i>
nurse shark	<i>Ginglymostoma cirratum</i>
spinner shark	<i>C. maculipinnis</i>
common snook	<i>Centropomus undecimalis</i>
Southern stingray	<i>Dasyatis americana</i>
speckled trout	<i>Cynoscion nebulosus</i>
Atlantic stingray	<i>Dasyatis sabina</i>
tarpon	<i>Megalops atlantica</i>

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BIRDS (Cont'd):

great blue heron	<i>Ardea herodias</i>
little blue heron	<i>Egretta caerulea</i>
great egret	<i>Casmerodius albus</i>
reddish egret	<i>Egretta rufescens</i>
tricolored heron	<i>Egretta tricolor</i>
snowy egret	<i>Egretta thula</i>
osprey	<i>Pandion haliaetus</i>
limpkin	<i>Aramus guarana</i>
American oystercatcher	<i>Haematopus palliatus</i>
plover	<i>Charadrius spp.</i>
sandpiper	<i>Calidris spp.</i>
wood stork	<i>Mycteria americana</i>
Southern bald eagle	<i>Haliaeetus leucocephalus</i>
Migratory insectivorous songbirds including warblers and black-whiskered vireos.	

MAMMALS

Atlantic bottle-nosed dolphin	<i>Tursiops truncatus</i>
raccoon	<i>Procyon lotor</i>
river otter	<i>Lutra canadensis</i>
West Indian manatee	<i>Trichechus manatus</i>

LISTED SPECIES

The following endangered or threatened animals have occurred on the area:

Endangered

West Indian manatee	<i>Trichechus manatus</i>
wood stork	<i>Mycteria americana</i>

Threatened

Southern bald eagle	<i>Haliaeetus leucocephalus</i>
American alligator	<i>Alligator mississippiensis</i>

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ADDENDUM 3 - EXOTIC PEST TREE MANAGEMENT

Schinus terebinthifolius, commonly called Brazilian pepper, but also known as Florida holly and Christmas berry, is a native species of South America, but is now found in most tropical and subtropical regions of the world. The generic name *Schinus* (properly pronounced sky-nus) is the Greek word for the mastic tree and the specific name *terebinthifolius* is from the Latin "terebinth" for the turpentine odor of its crushed leaves.

Brazilian pepper seeds, spread by migratory and resident seed eating birds, raccoons and other wildlife can establish on hummocks in the mangrove fringe around the bay or on the mangrove islands in the bay. When seen in or around the bay Brazilian peppers will be controlled to prevent spread.

Many methods of control for Brazilian pepper have been tried, among these: manual removal, mechanical removal, physical control and herbicides. Currently the use of herbicides is the most used-method of control. A detailed plan for Brazilian pepper control will be developed using current herbicide guidelines.

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Memorandum

Florida Department of
Environmental Protection

April 29, 2005

TO: District Bureau Chiefs

FROM: Mike Bullock, Director *m.b.*
Florida Park Service

SUBJECT: Memorandum of Agreement

The enclosed Memorandum of Agreement secures the commitment of the Divisions of Recreation and Parks and Coastal and Aquatic Managed Areas to collaborate resources. This partnership will unify our similar missions to better protect Florida's natural resources while offering quality recreational opportunities.

Please review the document, which includes future steps for implementing the agreement, and share it with your staff. Employee cooperation will enhance the ability of both Divisions to improve resource management and protection.

Thank you for your support of this team effort. Its success will benefit both programs.

MB/jg
Enclosure



Jeb Bush
Governor

Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Colleen M. Castill
Secretary

MEMORANDUM AGREEMENT BETWEEN DIVISION OF RECREATION & PARKS AND COASTAL & AQUATIC MANAGED AREAS

DRP and CAMA are programs with comparable missions: to protect and manage Florida's diverse natural resources and provide outdoor recreation. Ecosystems do not recognize divisional lines and organizational structure must not impede our mission to protect Florida's resources. Because of our similar missions and close proximity in the field, DRP and CAMA will collaborate on upland and submerged land management issues, as well as share manpower, facilities, vehicles, boats and other resources. DEP employees will work in teams and share resources, regardless from which Division or Office an employee or resource originates. If Parks or Aquatic Preserve staff needs assistance with resource management, events or programs, it is encouraged and expected that staff from each Office or Division will assist as time allows.

To promote an even greater spirit of cooperation among our two sister divisions, we are directing the DRP District Bureau Chiefs and the CAMA Environmental Administrators to foster inter-division employee cooperation. In the future, we will:

- * Hold two joint CAMA/FPS district staff meetings onsite where appropriate per year. FPS District Bureau Chiefs and CAMA Environmental Administrators shall attend these meetings. The respective directors must be notified of the meeting schedule. Additional meetings should be scheduled as needed.
- * On an annual basis, work together to identify and develop joint priority project plans that share efforts to protect and manage neighboring resources. Possibly a good time to perform this work would be at one of the meetings discussed in the previous paragraph.
- * Hold meetings where properties have changed hands so that the FPS can learn about CAMA experience with their properties and vice-versa. We encourage the exchange of information regarding managed lands wherever there is the opportunity.
- * Encourage joint participation in site management plans of both the FPS and CAMA.
- * Actively explore ways to share office space, equipment, tools and staff, where appropriate, to achieve a specific project or goals. (Examples might be: heavy equipment, staff for burning, staff for an event, administrative staff costs, etc...)
- * Seek to help the other division whenever possible, while not interfering with present work responsibilities.

"More Protection, Less Process"

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Page Two

Please share this memorandum with your staff. DRP and CAMA's joint commitment to work together in the spirit of true cooperation to manage Florida's natural resources and provide quality outdoor recreation will enhance our accomplishments, benefiting both programs. The success of this partnership will be monitored on an ongoing basis.

Mike Bullock 4-27-05
Mike Bullock (Date)
Director
Florida Park Service

Katherine Andrews 4-27-05
Katherine Andrews (Date)
Director
Coastal and Aquatic Managed Areas

Bob Ballard 4/27/05
Witness (Date)

Resource Data

B.1 / Glossary of Terms

References to these definitions can be found at the end of this list and in Appendix B.3.

adulticide – broad-spectrum pesticides, often considered the method of last resort in an Integrated Pest Management approach to mosquito control, targeting adult mosquitos and administered via either ground or aerial application. (Connelly & Carlson, 2009)

algal bloom - an explosive increase in the density of phytoplankton within an area. (Lincoln, Boxshall & Clark, 2003)

anaerobic - growing or occurring in the absence of molecular oxygen. (Lincoln et al., 2003)

anthropogenic - resulting from human activity. (Allaby, 2005)

aquaculture - the cultivation of aquatic organisms. (Lincoln et al., 2003)

aquatic - living in or near water; used of plants adapted for a partially or completely submerged life. (Lincoln et al., 2003)

aquifer - permeable underground rock strata which hold water. (Lincoln et al., 2003)

attenuation - a reduction in strength or intensity. (Lincoln et al., 2003)

bathymetry - the measurement of the depth of the ocean floor from the water surface. (Allaby, 2005)

benthic - pertaining to the sea bed, river bed or lake floor. (Lincoln et al., 2003)

berm - large deposits of dry loose sediment above the high tide line on a beach. (Lincoln et al., 2003)

biodiversity - the existence of a wide variety of species of plants, animals, and microorganisms in a natural community or habitat, or of communities within a particular environment; genetic variation within a species. (Martin & Hine, 2014)

biota - all the organisms living in a particular region, including plants, animals, and microorganisms. (Martin & Hine, 2014)

biotic community - a group of interacting species coexisting in a particular habitat. (Lincoln et al., 2003)

buffer - to protect a system from change by external factors; anything that reduces an impact. (Lincoln et al., 2003)

community - a grouping of populations of different organisms found living together in a particular environment.

(Allaby, 2005) **conservation** - the planned management of natural resources; the retention of natural balance, diversity and evolutionary change in the environment; preservation. (Lincoln et al., 2003)

controlled purification - the process of using a controlled, aquatic environment to reduce the level of bacteria and viruses in live shellfish. (Canadian Food Inspection Agency, 2013)

cyanobacteria - the blue-green bacteria and the grass-green bacteria, or chloroxybacteria. Both groups obtain their food by photosynthesis in a manner very similar to that of green plants and true algae, producing oxygen in the process. They occur in all aquatic habitats. (Martin & Hine, 2014)

database - a mass of data in a computer, arranged for rapid expansion, updating, and retrieval. (Neufeldt & Sparks, 1990)

degradation - breakdown into smaller or simpler parts; reduction of complexity. (Lincoln et al., 2003)

derelict - deserted by the owner; abandoned. (Neufeldt & Sparks, 1990)

dike - an embankment or dam made to prevent flooding as by the sea. (Neufeldt & Sparks, 1990)

dissemination - scattering or spreading, as of infections agents, seeds, or spores; distribution. (Lincoln et al., 2003)

diversity - a measure of the number of species and their relative abundance in a community. (Lincoln et al., 2003)

drainage basin (catchment) - the area from which a surface watercourse or a groundwater system derives its water; watershed. (Allaby, 2005)

dredge - an apparatus for scooping up mud, for deepening channels. (Neufeldt & Sparks, 1990)

easement - a right that one may have in another's land. (Neufeldt & Sparks, 1990)

ecology - the study of the interrelationships between living organisms and their environment. (Lincoln et al., 2003)

ecosystem - a community of organisms and their physical environment interacting as an ecological unit. (Lincoln et al., 2003) **ecosystem management** - the active and purposeful manipulation of an ecosystem in order to exploit its productivity or to enhance its biodiversity and conservation value. (Allaby, 2005)

ecotourism - travel to an area of ecological, geographical, or natural history interest, with an interest in avoiding bringing additional pressures upon the region, and concern to ensure that both local human culture and the environment are enhanced rather than damaged. (Allaby, 2005)

emergent - an aquatic plant having most of the vegetative parts above water; a tree which reaches above the level of the surrounding canopy. (Lincoln et al., 2003)

endangered species - an animal or plant species in danger of extinction throughout all or a significant portion of its range. (U.S. Fish and Wildlife Service [USFWS], 2015)

endemic - native to, and restricted to, a particular geographical region. (Lincoln et al., 2003)

environment -the physical, chemical and biological surroundings of an organism at any given time. (Lincoln et al., 2003)

epifauna - the animal life inhabiting a sediment surface or water surface. (Lincoln et al., 2003)

epiphyte - a plant that uses another plant, typically a tree, for its physical support, but which does not draw nourishment from it. (Allaby, 2005)

estuary - semi-enclosed coastal water, open to the sea, having a high freshwater drainage and with marked cyclical fluctuations in salinity; usually the mouth of a river. (Lincoln et al., 2003)

euryhaline – used of organisms that are tolerant of a wide range of salinity. (Lincoln et al., 2003)

exotic - not native; an organism or species that has been introduced into an area. (Lincoln et al., 2003)

extinction - the disappearance of a species from a given habitat. (Lincoln et al., 2003)

extirpation - extermination of the population of a given species from an area. (Lincoln et al., 2003)

fauna - the animal life of a given region, habitat or geological stratum. (Lincoln et al., 2003)

flora - the plant life of a given region, habitat or geological stratum. (Lincoln et al., 2003)

geocaching - a game in which players are given the geographical coordinates of a cache of items which they search for with a GPS device. (Geocaching, 2015)

geographic information system (GIS) - computer system supporting the collection, storage, manipulation and query of spatially referred data, typically including an interface for displaying geographical maps. (Lincoln et al., 2003)

geomorphology - the scientific study of the landforms or the Earth's surface and of the processes that have fashioned them. (Allaby, 2005)

habitat - the living place of an organism or community, characterized by its physical or biotic properties. (Allaby, 2005)

hydric - pertaining to water; wet. (Lincoln et al., 2003)

hydrology - the study of the hydrologic cycle, emphasized the study of bodies of surface water on land and how they change with time. (Allaby, 2005)

infauna - the animal life within a sediment; epifauna. (Lincoln et al., 2003)

intertidal zone - the shore zone between the highest and lowest tides; littoral. (Lincoln et al., 2003)

invasive exotics - non-native; are exotics known to have a negative impact on other species or on habitats to which they have been introduced. (Lincoln et al., 2003)

isohaline – a line on a chart or map connecting points of equal salinity. (Lincoln et al., 2003)

larvicide – agent used to kill immature mosquitos for the purpose of controlling mosquito larvae and/or pupae (Connelly & Carlson, 2009)

listed species - a species, subspecies, or distinct population segment that has been added to the Federal list of endangered and threatened wildlife and plants. (USFWS, 2015)

lithostratigraphic – the organization and classification of rock strata according to their lithological character (Lincoln et al., 2003)

littoral - the intertidal zone of the seashore; sometimes used to refer to both the intertidal zone of the seashore and the adjacent continental shelf to a depth of about 200 m. (Lincoln et al., 2003)

load - the total amount of material carried by a stream or river. (Allaby, 2005)

mandate - an order or command; the will of constituents expressed to their representative, legislature, etc. (Neufeldt & Sparks, 1990)

mesic - pertaining to conditions of moderate moisture or water supply; used of organisms occupying moist habitats. (Lincoln et al., 2003)

midden - a refuse heap; used especially in archeology. (Lincoln et al., 2003)

mitigation - to make or become less severe, less painful; to work against. (Neufeldt & Sparks, 1990)

monitor - to watch or check on. (Neufeldt & Sparks, 1990)

muck - highly decomposed plant material typically darker and with higher mineral content than peat. (Lincoln et al., 2003)

native - indigenous; living naturally within a given area. (Lincoln et al., 2003)

ocean acidification – a reduction in the pH of the ocean over an extended period time, caused primarily by uptake of carbon dioxide (CO₂) from the atmosphere. (National Ocean Service, 2014)

oligohaline - brackish water having a salinity between 0.5 and 3.0 ppt, or sea water having a salinity between 17 and 30 ppt. (Lincoln et al., 2003)

pesticide - a chemical agent that kills insects and other animal pests. (Lincoln et al., 2003)

photosynthetically active radiation – measures irradiance or the amount of sunlight that diffuses through water compared to surface light. (National Aeronautics and Space Administration, 2011)

physiographic - pertaining to geographical features of the Earth's surface. (Lincoln et al., 2003)

phytoplankton - planktonic plant-life. (Lincoln et al., 2003)

plankton - organisms that are unable to maintain their position or distribution independent of the movement of water or air masses. (Lincoln et al., 2003)

pollution - the contamination of a natural ecosystem. (Lincoln et al., 2003)

population - all individuals of one or more species within a prescribed area. A group of organisms of one species, occupying a defined area and usually isolated to some degree from other similar groups. (Lincoln et al., 2003)

potentiometric surface – the imaginary line where a given reservoir of fluid will “equalize out to” if allowed to flow. (U.S. Geological Survey, 2014)

relaying - the transfer of shellfish from marginally contaminated areas to approved areas for natural biological cleansing using the ambient environment as a treatment system. (Canadian Food Inspection Agency, 2013)

restoration - being returned to a former or normal state, to health. (Neufeldt & Sparks, 1990)

riparian - pertaining to, living or situated on the banks of rivers and streams. (Lincoln et al., 2003)

ruderal - pertaining to or living amongst rubbish or debris, or inhabiting disturbed sites. (Lincoln et al., 2003) (Florida Natural Areas Inventory describes ruderal as areas impacted by development measures such as roadways, drainage ditches, navigational channels or are considered hydrological alterations.)

runoff - part of precipitation that is not held in the soil but drains freely away. (Lincoln et al., 2003)

salinity - a measure of the total concentration of dissolved salts in seawater. (Lincoln et al., 2003)

sediment - material derived from preexisting rock deposited at or near the Earth’s surface. (Allaby, 2005)

seine - a large fishing net weighted along the bottom. (Neufeldt & Sparks, 1990)

sessile - non-motile; permanently attached at the base. (Lincoln et al., 2003)

shoal - a shallow place in a river, sea etc.; a sand bar forming a shallow place. (Neufeldt & Sparks, 1990)

sonde – any of various devices for testing physical conditions. (Sonde, 2015.)

spat - a young oyster or oysters. (Neufeldt & Sparks, 1990)

spawn - the eggs of certain aquatic organisms. The act of producing such eggs or egg masses. (Lincoln et al., 2003)

species - a group of organisms, minerals or other entities formally recognized as distinct from other groups; the basic unit of biological classification. (Lincoln et al., 2003)

species of concern - an informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing. A similar term is “species at risk,” which is a general term for listed species as well as unlisted ones that are declining in population. Canada uses the term in its new “Species at Risk Act.” “Imperiled species” is another general term for listed as well as unlisted species that are declining. (USFWS, 2015)

stakeholder - any person or organization who has an interest in the actions discussed or is affected by the resulting outcomes of a project or action. (USFWS, 2015)

stratigraphy – study of the origin, composition, distribution and succession of rock strata (Lincoln et al., 2003)

submergent - pertaining to a plant growing entirely under water. (Lincoln et al., 2003)

subtidal - environment which lies below the mean low water level. (Allaby, 2005)

supratidal - the zone on the shore above mean high tide level. (Lincoln et al., 2003)

synopsis (synoptic) - a brief description of the essential features of a taxon. (Lincoln et al., 2003)

threatened species - an animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. (USFWS, 2015)

topography – all natural and man-made surface features of a geographical area. (Lincoln et al., 2003)

transect - a line or narrow belt used to survey the distributions of organisms across a given area. (Lincoln et al., 2003)

trawl - a large net dragged along the bottom of a fishing bank. (Neufeldt & Sparks, 1990)

trophic - pertaining to nutrition. (Lincoln et al., 2003)

turbid - cloudy; opaque with suspended matter. (Lincoln et al., 2003)

upland - land elevated above other land. (Neufeldt & Sparks, 1990)

vector - any agent responsible for the introduction or dispersal of an animal or plant species. (Lincoln et al., 2003)

vegetation - plant life or cover in an area; also used as a general term for plant life. (Lincoln et al., 2003)

viable - having the capacity to live, grow, germinate or develop. (Lincoln et al., 2003)

water column - the vertical column of water in a sea or lake extending from the surface to the bottom. (Lincoln et al., 2003)

watershed - an elevated boundary area separating tributaries draining in to different river systems; drainage basin. (Lincoln et al., 2003)

wetland - an area of low lying land, submerged or inundated periodically by fresh or saline water. (Lincoln et al., 2003)

wildlife - any undomesticated organisms; wild animals. (Allaby, 2005)

B.2 / References

- Adams, A. (2006). *Do altered coastal habitats promote non-native fish invasions into the Charlotte Harbor estuary?* (Technical Report No. 1479). Sarasota, FL: Mote Marine Laboratory. Retrieved from <http://hdl.handle.net/2075/2981>
- Allaby, M. (Ed.). (2005). *Oxford dictionary of ecology* (3rd ed.). Oxford, UK: Oxford University Press.
- Alperin, L. M. (1983). *History of the Gulf Intracoastal Waterway. National Waterways Study (Navigation History NWS-83-9)*. Alexandria, VA: U.S. Army Engineer Water Resources Support Center, Institute for Water Resources.
- Antonini, G. A., Fann, D. A. & Roat, P. (2002). *A historical geography of southwest Florida waterways: Volume two Placida Harbor to Marco Island*. UF/IFAS Extension, Florida Sea Grant (SGEB56).
- Barbour, A. B., Montgomery, M. L., Adamson, A. A., Díaz-Ferguson, E., & Silliman, B. R. (2010). Mangrove use by the invasive lionfish *Pterois volitans*. *Marine Ecology Progress Series*, 401:291-294.
- Beever, J. W. III. (2008). *Growth management regulation, public investment and resource implications for the Estero Bay watershed 2006-2007- Southwest Lee County, Florida*. Fort Myers, FL: Southwest Florida Regional Planning Council.
- Beever, J. W. III, Gray, W., Trescott, D., Cobb, D., Utley, J. & Beever, L. B. (2009). *Comprehensive Southwest Florida/ Charlotte Harbor climate change vulnerability assessment*. (Technical Report No. 09-3). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Beever, J. W. III, Gray, W., Trescott, D., Cobb, D., Utley, J. & Hutchinson, D. (2010). *Lee County climate change vulnerability assessment*. Fort Myers, FL: Southwest Florida Regional Planning Council. Retrieved October 11, 2012, from http://www.swfrpc.org/content/Natural_Resources/Ecosystem_Services/Lee_County_Climate_Change_Vulnerability_Assessment.pdf
- Beever, L. B (2013). *Conservation lands acquired and restored in the CHNEP study area*. Presentation at the CHNEP Conservation Lands Workshop. Charlotte Harbor National Estuary Program.
- Biggs, C. R., & Olden, J. D. (2011). Multi-scale habitat occupancy of invasive lionfish (*Pterois volitans*) in coral reef environments of Roatan, Honduras. *Aquatic Invasions*, 6(3):347-353.
- Blanchard, C. E. (1995). *New words, old songs: Understanding the lives of ancient peoples in southwest Florida through archaeology*. Institute of Archaeology and Paleoenvironmental Studies, University of Florida, Gainesville, FL.
- Breder, C. M., Jr. (1939). On the life history and development of the sponge blenny, *Paraclinus marmoratus*. *Zoologica*, 24:487-496.
- Breder, C. M., Jr. (1940). The spawning of *Mugil cephalus* on the Florida west coast. *Copeia*, 1940(2).
- Breder, C. M., Jr. (1941). On the reproductive behavior of the sponge blenny, *Paraclinus marmoratus*. *Zoologica*, 26:233-235.
- Boaters' Action and Information League, Inc. (1999). *A guide to anchorages in Southwest Florida*. Available from UF/IFAS Extension, Florida Sea Grant.
- Boswell, J. G., Ott, J. A., & Birch, A. (2012). *Charlotte Harbor National Estuary Program oyster habitat restoration plan, Charlotte Harbor National Estuary Program technical report*. Fort Myers, FL: Charlotte Harbor National Estuary Program. Retrieved October 10, 2012, from <http://www.chnep.org/2012agendas/OysterRestorationPlan10-12.pdf>
- Briscoe, J. (2012). Tropical Storm Isaac spares southwest Florida from damage. *Examiner.com*. Retrieved March 6, 2013, from <http://www.examiner.com/article/tropical-storm-isaac-spare-southwest-florida-from-damage>
- Brown, M., Leary, R., Langenberg, N., McMurray, M., & Stafford, H. (2013). Results of the Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves' seagrass monitoring program from 1999-2009. *Florida Scientist*, 76(2):92-106.
- Burger, J. (1998). Effects of motor boats and personal watercraft on flight behavior over a colony of common terns. *The Condor*, 100:528-534.
- Byrne, M. J., & Gabaldon, J. N. (2008). *Hydrodynamic characteristics and salinity patterns in Estero Bay, Lee County, Florida*. (Scientific Investigations Report 2007-5217). Fort Lauderdale, FL: U.S. Geological Survey.
- Canadian Food Inspection Agency. (2013). *Canadian Shellfish Sanitation program- Manual of Operations: Definitions*. Retrieved April 6, 2015, from <http://www.inspection.gc.ca/food/fish-and-seafood/manuals/canadian-shellfish-sanitation-program/eng/1351609988326/1351610579883?chap=3>
- Carney, K. M., & Sydeman, W. J. (1999). A review of human disturbance effects on nesting colonial waterbirds. *Waterbirds*, 22(1):68-79.
- Chamberlain, R. H., & Doering, P. H. (1998). Preliminary estimate of optimum freshwater inflow to the Caloosahatchee estuary: A resource based approach. p. 121-130. In S.F. Treat (ed.), *Proceedings of the 1997 Charlotte Harbor Public Conference and Technical Symposium*. South Florida Water Management District and Charlotte Harbor National Estuary Program, Technical Report No. 98-02. Washington, D.C.
- Charlotte Harbor National Estuary Program. (2013a). *Comprehensive Conservation and Management Plan 2013 Update*. Retrieved April 30, 2014, from www.chnep.org/CCMP.html

- Charlotte Harbor National Estuary Program. (2013b). *2013 volunteer tidal shoreline survey*. Retrieved April 30, 2014, from www.chnep.wateratlas.usf.edu/shoreline-survey/
- Chew, F. (1953). Results of hydrographic and chemical investigations in the region of "red tide" bloom on the west coast of Florida in November 1952. *Bull. Mar. Sci. Gulf and Car.*, 2(4):610-625.
- Chew, F. (1955). Red tide and the fluctuation of conservative concentrations at an estuary mouth. *Bull. Mar. Sci. Gulf and Car.*, 5(4):321-330.
- Connelly, C.R. & Carlson, D.B. (Eds.). (2009). *Florida Mosquito Control 2009: The state of the mission as defined by mosquito controllers, regulators, and environmental managers*. Florida Coordinating Council on Mosquito Control. Vero Beach, FL: University of Florida, Institute of Food and Agricultural Sciences, Florida Medical Entomology Laboratory. Retrieved February 3, 2015, from www.mosquito.ifas.ufl.edu/Documents/Florida_Mosquito_Control_White_Paper.pdf
- Cook, M. I. (Ed.). (2013). *South Florida wading bird report* (Vol. 19). West Palm Beach, FL: South Florida Water Management District.
- Corbett, C. A., & Hale, J. A. (2006). Development of water quality targets for Charlotte harbor, Florida using seagrass light requirements. *Florida Scientist*, 69(2):36-50.
- Covington, J. W. (1959). Trade relations between southwestern Florida and Cuba 1600-1840. *Florida Historical Quarterly*, 38.
- Davidson-Peterson Associates. (2013). *2012 Annual visitors profile and occupancy analysis*. Fort Myers, FL: Lee County Board of County Commissioners. Lee County Visitor and Convention Bureau.
- Dixon, L. K., & Kirkpatrick, G. J. (1999). *Causes of light attenuation with respect to seagrasses in upper and lower Charlotte Harbor*. Report to Southwest Florida Water Management District, SWIM Program and Charlotte Harbor National Estuary Program. Available from the Southwest Florida Water Management District, SWIM Program, Tampa, FL and Charlotte Harbor National Estuary Program, Fort Myers, FL.
- Duffey, R., Leary, R. E., & Ott, J. (2007). *Charlotte Harbor & Estero Bay Aquatic Preserves water quality status & trends for 1998 – 2005*. (CHAP Technical Report #2). Punta Gorda, FL: Charlotte Harbor Aquatic Preserves Office. Retrieved from https://www.dep.state.fl.us/coastal/sites/charlotte/volunteer/2007_CHEVWQMN_Report.pdf
- Ecological Society of America. (2004). *Invasion*. Retrieved September 30, 2015, from <http://www.esa.org/esa/wp-content/uploads/2012/12/invasion.pdf>
- Erwin, R. M. (1989). Responses to human intruders by birds nesting in colonies: experimental results and management guidelines. *Colonial Waterbirds*, 12(1):104–108.
- Estevez, E. D. (1998). *The story of the greater Charlotte Harbor watershed*. North Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Florida Department of Environmental Protection. (2007). *Charlotte Harbor Preserve State Park unit management plan*. Tallahassee, FL: Florida Department of Environmental Protection.
- Florida Department of Environmental Protection. (2011). *Factsheet about Outstanding Florida Waters*. Retrieved September 10, 2012, from <http://www.dep.state.fl.us/water/wqssp/docs/ofw-factsheet.pdf>
- Florida Department of Environmental Protection. (2014). *Designated marinas*. Retrieved March 17, 2014, from www.dep.state.fl.us/cleanmarina/marinas.htm#s
- Florida Department of Environmental Protection. (n.d.). *Florida clean marina programs*. Retrieved October 1, 2012, from www.dep.state.fl.us/cleanmarina/default.htm
- Florida Department of Health. (2012). *Frequently asked questions about blue-green algae (Cyanobacteria) and their toxins*. Retrieved August 31, 2015 from http://www.floridahealth.gov/environmental-health/aquatic-toxins/_documents/cyano-fact-sheet.pdf
- Florida Department of Health. (2014). *Frequently Asked Questions: Red Tide*. Retrieved August 31, 2015 from http://www.floridahealth.gov/environmental-health/aquatic-toxins/_documents/faqs-red-tide-2014-8-22-38kb.pdf
- Florida Department of Highway Safety and Motor Vehicles. (2014). 2013 Alphabetical Vessel Statistics by County. Retrieved June 20, 2014, from www.flhsmv.gov/dmv/TaxCollDocs/vesselstats2013.pdf
- Florida Department of Natural Resources. (1983). *Charlotte Harbor Aquatic Preserves management plan: Cape Haze, Gasparilla Sound-Charlotte Harbor, Matlacha Pass and Pine Island Sound Aquatic Preserves*. Tallahassee, FL: Florida Department of Natural Resources.
- Florida Department of Natural Resources. (1991). *Lemon Bay Aquatic Preserve management plan*. Tallahassee, FL: Florida Department of Natural Resources.
- Florida Fish and Wildlife Conservation Commission. (2009). *Florida tidal flats*. Retrieved May 18, 2014, from www.ocean.floridamarine.org/acp/KWACP/Geodata/Metadata/Tidal_Flats_Florida.html
- Florida Fish and Wildlife Conservation Commission. (2011). *FWC asks fisherman to report giant tiger prawn*. Retrieved June 5, 2012, from www.myfwc.com/news/news-releases/2011/october/04/giant-tiger-prawn/

- Florida Fish and Wildlife Conservation Commission. (2012a). *Recreational fisheries landings*. Retrieved October 1, 2012, from www.myfwc.com/research/saltwater/fishstats/recreational-fisheries/landings
- Florida Fish and Wildlife Conservation Commission. (2012b). *Marine fisheries information system, 2011 annual landings summary, edited landings data through batch 1147 (Closed 6/12/12)*. Retrieved October 15, 2012, from www.myfwc.com/media/1540768/sumcnty_11.pdf
- Florida Fish and Wildlife Conservation Commission. (2013). *Florida's endangered and threatened species*. Tallahassee, FL: Florida Fish and Wildlife Conservation Commission. Retrieved from <http://myfwc.com/wildlifehabitats/imperiled/>
- Florida Fish and Wildlife Conservation Commission. (2014a). *The economic impact of saltwater fishing in Florida*. Retrieved March 13, 2014, from www.myfwc.com/conservation/value/saltwater-fishing/
- Florida Fish and Wildlife Conservation Commission. (2014b). *2013 Preliminary manatee mortality report*. Retrieved on June 20, 2014, from www.myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/2013/
- Florida Fish and Wildlife Conservation Commission. (2015). *Marine fisheries information system, 2013 annual landings summary, edited landings data through batch 1257 (Closed 1/7/2015)*. Retrieved April 28, 2015, from http://myfwc.com/media/2641794/sumcnty_13.pdf
- Florida Fish and Wildlife Conservation Commission. (n.d.a). *Asian Green Mussel*. Retrieved March 31, 2015, from <http://myfwc.com/research/saltwater/mollusc/other-molluscs/asian-green-mussels/>
- Florida Fish and Wildlife Conservation Commission. (n.d.b). *What is a Harmful Algal Bloom?* Retrieved April 13, 2015, from www.myfwc.com/research/redtide/general/harmful-algal-bloom/
- Florida Natural Areas Inventory. (2010). *Guide to the natural communities of Florida: 2010 edition*. Tallahassee, FL: Florida Natural Areas Inventory.
- Florida State University, Florida Climate Center. (n.d.). Data. Retrieved October 5, 2012, from www.climatecenter.fsu.edu/products-services/data
- Fluech, B. (2012, July 22). Local catch: commercial fishing in Southwest Florida. *The Marine Scene: The Southwest Florida Sea Grant Newsletter*. Retrieved September 10, 2012, from www.flseagrant.ifas.ufl.edu/newsletter/2012/07/commercial-fishing-in-southwest-florida/
- Fraser, T. H. (1991). The lower Peace River and Horse Creek: flow and water quality characteristics, 1976-1986. Pp. 143-185. R. Livingston (ed.). *The Rivers of Florida*. New York: Springer New York.
- Geocaching. (2015). In *Merriam-Webster.com*. Retrieved May 26, 2015, from www.merriam-webster.com/dictionary/geocaching
- Gray, W., Beever, J. W., III, & Beever, L. B. (2009). *State of the Bay update*. Fort Myers, FL: Southwest Florida Regional Planning Council, Estero Bay Agency on Bay Management.
- Greenawalt-Boswell, J. M., Hale, J. S, Fuhr, K. S. & Ott, J. A. (2006). Seagrass species composition and distribution trends in relation to salinity fluctuations in Charlotte Harbor, Florida. *Florida Scientist*, 69(2):24-35.
- Gulf of Mexico Foundation. (n.d.) *Gulf Ecological Management Sites*. Retrieved October 22, 2015 from <http://www.gulfmex.org/conservation-restoration/gems/>
- Haddad, K. D., & Hoffman, B. H. (1986). *Charlotte harbor habitat assessment*. St. Petersburg, FL: Florida Department of Natural Resources, Bureau of Marine Research.
- Hammett, K. M. (1990). Land use, water use, streamflow characteristics, and water quality characteristics of the Charlotte Harbor inflow area, Florida. Water Supply Paper 2359-A. Tallahassee, FL: U.S. Geological Survey.
- Harris, B. A., Haddad, K. D., Steidinger, K. A. & Huff, J. A. (1983). *Assessment of fisheries habitat: Charlotte Harbor and Lake Worth, Florida*. St. Petersburg, FL: Florida Department of Natural Resources, Bureau of Marine Research.
- Herwitz, S. (1977). *The natural history of Cayo-Costa Island*. (Publication, No. 14.) Sarasota, FL: New College Environmental Studies Program.
- Hoffmeister, J. E. (1974). *Land from the Sea*. Coral Gables, FL: University of Miami Press.
- Hotaling, A.S., Lingle, R.B., & Ankersen, T.T. (2011). Comprehensive seagrass restoration planning in southwest Florida: Science, law and management. *Sea Grant Law and Policy Journal*, 4(1), 61-78.
- Hurricane City. (n.d.). *Fort Myers, Florida's history with tropical systems*. Retrieved October 10, 2012, from www.hurricanecity.com/city/fortmyers.htm
- Jacoby J., Walters, L., Baker S., & Blyler, K. (2003). *A primer on invasive species in coastal and marine waters (SGEB 60)*. Retrieved on June 16, 2001, from Florida Sea Grant College Program website: www.solutionsforyourlife.ufl.edu/environment/invasive_species.html
- Janicki Environmental, Inc. (2003). *Water quality data analysis and report for the CHNEP*. Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2007). *Charlotte Harbor estuary status and trends: water quality data analysis and report for the Charlotte Harbor National Estuary Program*. Fort Myers, FL: Charlotte Harbor National Estuary Program.

- Janicki Environmental, Inc. (2010). *CHNEP water quality status and trends*. Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2013). *CHNEP water quality status and trends*. Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. & FCRC Consensus Center. (2009). *Findings and Conclusions of the North Spreader Canal Ecosystem Management Agreement Process Stakeholder Group, Draft*. Retrieved on February 27, 2015, from www.publicfiles.dep.state.fl.us/SDRO/Watershed/NSEMA/SpreaderCanalDraft_12-18-09R.pdf
- J.N. "Ding" Darling Foundation. (n.d.). *J.N. "Ding" Darling National Wildlife Refuge*. Retrieved March 19, 2014, from www.dingdarling.org/wildlife.html
- Johnson Engineering, Inc, Agnoli, Barber & Brundage, Inc & Boylan Environmental Consultants, Inc. (1999). *South Lee County watershed plan* (Vol. 1). South Florida Water Management District. West Palm Beach, FL
- Kushlan, J. A. (1993). Colonial waterbirds as bioindicators of environmental change. *Colonial Waterbirds*, 16(2):223–251.
- Kushlan, J. A. (1997). The conservation of wading birds. *Colonial Waterbirds*, 20(1):129–137.
- Leary, R. E. (2010). *State of the Southwest Florida Aquatic Preserves, Lemon Bay to Estero Bay: 40-year status and trends, 1970-2009*. Punta Gorda, FL: Charlotte Harbor Aquatic Preserves Office.
- Lee County Visitor and Convention Bureau. (2009). *The beaches of Fort Myers & Sanibel*. Retrieved November 11, 2009, from www.leevcb.com/statistics/index.php
- Lee County Visitor and Convention Bureau. (2014). *Value of tourism*. Retrieved March 13, 2014, from www.leevcb.com/content/value-tourism
- Lincoln, R. J., Boxshall, G. A., & Clark, P. F. (2003). *A dictionary of ecology, evolution and systematics*. New York: Cambridge University Press.
- Lollar, K. (2014, May 2). Lionfish in the estuary. How could it be bad? *The News-Press*. Retrieved May 18, 2014, from www.news-press.com/story/life/outdoors/2014/05/02/lionfish-estuary-bad/8580891/
- Martin, E., & Hine, R. (2014). *A Dictionary of Biology* (6 ed.). Oxford University Press. Retrieved May 12, 2015, from www.oxfordreference.com/view/10.1093/acref/9780199204625.001.0001/acref-9780199204625
- McGuire, M., & Stevely, J. (2009). *Invasive species of Florida's coastal waters: the Asian green mussel (Perna viridis)*. (IFAS publication No. SGEF-175). Gainesville, FL: U.S. Department of Commerce. Retrieved April 1, 2015, from <http://edis.ifas.ufl.edu/pdf/SG/SG09400.pdf>
- McPherson, B. F., & Miller, R. I. (1987). The vertical attenuation of light in Charlotte Harbor, a shallow, subtropical estuary, south- western Florida. *Estuar. Coastal and Sh. Sci.*, 25:721–737.
- McPherson, B. F., Miller, R. I., & Stoker, Y. E. (1996). *Physical, chemical, and biological characteristics of the Charlotte Harbor basin and estuarine system in southwestern Florida--A summary of the 1982-89 U.S. Geological Survey Charlotte Harbor assessment and other studies*. (U.S. Geological Survey Water-Supply Paper 2486). Washington D.C.: United States Government Printing Office. Retrieved June 3, 2010, from www.fl.water.usgs.gov/PDF_files/wsp2486_mcperson.pdf
- Morris, J. & Miller, J. (1975). *A guide to written and graphic information of the Charlotte Harbor estuarine region*. Compiled for the Environmental Confederation of Southwest Florida. Sarasota, FL: New College Environmental Studies Program.
- National Aeronautics and Space Administration. (2011). *Photosynthetically Active Radiation*. Retrieved May 6, 2015, from <http://disc.sci.gsfc.nasa.gov/hydrology/data-holdings/nldas-parameters/photo-active-radiation>
- National Marine Fisheries Service. (2009). *Smalltooth sawfish recovery plan (Pristis pectinata)*. Silver Springs, MD: National Marine Fisheries Service, Smalltooth Sawfish Recovery Team.
- National Ocean Service. (2014). *What is Ocean Acidification?* Retrieved February 3, 2015, from <http://oceanservice.noaa.gov/facts/acidification.html>
- National Oceanic and Atmospheric Administration (n.d.). NOAA National Centers for Environmental Information: About Us. Retrieved October 13, 2015, from www.ncdc.noaa.gov/about
- Neufeldt, V., & Sparks, A. N. (1990). *Webster's new world dictionary* (3rd Ed.). Cleveland, OH: Webster's New World Dictionaries.
- Office of Economic and Demographic Research. (2013). *Demographic overview and population trends (November 6, 2013)*. Retrieved April 30, 2014, from http://edr.state.fl.us/Content/presentations/population-demographics/DemographicTrends_11-6-13.pdf.
- Office of Economic and Demographic Research. (2014). *Population and demographic data*. Retrieved March 31, 2014, from www.edr.state.fl.us/Content/population-demographics/data/index.cfm
- Ott, J. A, Duffey, R. M., Erickson, S. E., Fuhr, K. S., Rodgers, B. A. & Schneider, M. A. (2006). Comparison of light limiting water quality factors in six Florida aquatic preserves. *Florida Scientist*, 69(2):73-91.

- Parnell, J. F., Ainley, D. G., Blokpoel, H., Cain, B., Custer, T. W., Dusi, J. L., Kress, S., Kushlan, J. A., Southern, W. E., Stenzel, L. E., & Thompson, B. C. (1988). Colonial Waterbird Management in North America. *Colonial Waterbirds*, 11(2):129–345.
- Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (Eds.). (2007). *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. Cambridge, UK and New York, USA.
- Parsons, M.L. (Ed.). (2013). *Deliverable 3.3, Synthesis Report-FINAL, Caloosahatchee Science Workshop*. Florida Gulf Coast University. Retrieved April 28, 2015, from http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/calooos_science_workshop_final_report.pdf
- Patz, J. A., Githeko, A. K., McCarty, J. P., Hussein, S., Confalonieri, U., & de Wet, N. (2003). Climate change and infectious diseases. In A. J. McMichael, D. H. Campbell-Lendrum, C. F. Corvalan *Climate Change and Human Health – Risks and Responses Summary*. Retrieved October 10, 2012, from www.who.int/globalchange/environment/en/chapter6.pdf
- Peek, H. M. (1951). Cessation of flow of Kissengen Spring in Polk County, Florida. In *Water Resource Studies Report of Investigations No. 7* (pp. 76-82). Tallahassee, FL: Florida Geological Survey.
- Poulakis, G. R., Stevens, P. W., Timmers, A. A., Stafford, C. J., Curtis, C., Tringali, M. D., & Bakenhaster, M. D. (2010). *Distribution, habitat use, and movements of juvenile smalltooth sawfish, Pristis pectinata, in the Charlotte Harbor estuarine system, Florida*. Port Charlotte, FL: Florida Fish and Wildlife Conservation Commission.
- Rodgers, J. A., & Smith, H. T. (1995). Set-back distance to protect nesting bird colonies from human disturbance in Florida. *Conservation Biology*, 9(1):89–99.
- Sanibel-Captiva Conservation Foundation. (n.d.). *Caloosahatchee Conditions Reports*. Retrieved May 5, 2015, from <http://marinelab.sccf.org/research/calooosahatchee-conditions-reports/>
- Scarlato, P. D. (1988). *Caloosahatchee Estuary hydrodynamics*. (Technical Publication 88-7). West Palm Beach, FL: South Florida Water Management District. Retrieved October 5, 2012, from www.my.sfwmd.gov/portal/page/portal/pg_grp_tech_pubs/portlet_tech_pubs/dre-256.pdf
- Schmid, J. R. (2009). *Ecological assessment and calibration of water quality in Estero Bay, Florida*. Naples, FL: Conservancy of Southwest Florida.
- Schofield, P. J., Morris, J. A., Jr, Langston, J. N., & Fuller, P. L. (2012). *Pterois volitans/miles*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <http://nas.er.usgs.gov/queries/factsheet.aspx?speciesid=963> Revision date: 9/18/2012.
- Schreiber, R. W., & Risebrough, R. W. (1972). Studies of the Brown Pelican. *The Wilsons Bulletin*, 84(2):19–135.
- Scott, T. M., Missimer, T. M. (2001). The Surficial Geology of Lee County and the Caloosahatchee Basin. In *Geology and Hydrogeology of Lee County, Florida: Durward H. Boggess Memorial Symposium*. (Florida Geological Survey Special Publication No. 49). Tallahassee, FL: Florida Geological Survey.
- Sentes, S. (2013). *Charlotte Harbor Flatwoods initiative: September 2013*. Presentation at the CHNEP Conservation Lands Workshop. Retrieved on June 24, 2014, from www.chnep.org/Events/ConservationLandsWorkshop2013/CL9-26-13_Sentes.pdf
- Simberloff, D. (1994). *Why is Florida being invaded? An assessment of invasive non-indigenous species in Florida's public lands, Florida*. (Technical report no. TSS-94-100). Tallahassee, FL: Florida Department of Environmental Protection.
- Smeltz, H.A. (1898). The oyster-bars of the west coast of Florida: their depletion and restoration. *Bulletin of the U.S. Fish Commission*, 17:305-308.
- Sonde. (2015). In *Merriam-Webster.com*. Retrieved May 26, 2015, from www.merriam-webster.com/dictionary/sonde
- South Florida Water Management District. (2008). *Lower Charlotte Harbor surface water improvement and management plan*.
- South Florida Water Management District, Florida Department of Environmental Protection, & Florida Department of Agricultural and Consumer Services. (2009). *Caloosahatchee River Watershed Protection Plan*. Retrieved from www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/ne_crwpp_main_123108.pdf
- Southwest Florida Regional Planning Council. (1995). *Strategic regional policy plan*. North Fort Myers, FL: Southwest Florida Regional Planning Council.
- Southwest Florida Water Management District. (1997). *Estimated water use – 1995*.
- Southwest Florida Water Management District. (2000). Tampa, FL: Southwest Florida Water Management District.
- Southwest Florida Water Management District. (2007). *Alligator Creek restoration project vital to fish population*. Retrieved June 9, 2014, from www.swfwmd.state.fl.us/documents/publications/watermatters/jan-feb2007/5.html
- Southwest Florida Water Management District. (2014). *Projects and Partners: District Dedicates First Phase of Restoration*. Retrieved May 5, 2015, from www.swfwmd.state.fl.us/blog/entry.php?blogPRlid=80

- Southwest Florida Water Management District. (2015). *Final Draft 2015 Regional Water Supply Plan Southern Planning Region*. Brookville, FL: Southwest Florida Water Management District. Retrieved November 12, 2015, from www.swfwmd.state.fl.us/files/database/site_file_sets/2675/RWSP_SPR_FINAL_DRAFT_110815.pdf
- Steinkamp, M., Peterjohn, B., Byrd, V., Carter, H., & Lowe, R. (2003). *Draft breeding season survey techniques for seabirds and colonial waterbirds throughout North America*. Retrieved February 25, 2013, from www.waterbirdconservation.org/pubs/PSGManual03.pdf
- St. Petersburg Times. (1956, December 17). Shrimp bring Lee County golden flood of cash: 300 trawlers based in area. *St. Petersburg Times*. Retrieved September 13, 2012, from www.news.google.com/newspapers?nid=888&date=19561217&id=KSVSAAAIBAJ&sjid=NHYDAAAIBAJ&pg=7326,1077683
- Stephenson, S. P., Parker, M. L., & Geiger, S. P. (2014). *Review of bay scallop abundance and recruitment in Pine Island Sound with implications for restoration*. Presentation at the Charlotte Harbor National Estuary Program Watershed Summit 2014.
- Stover, S. M., Naidoo, L., & Mahaney E. (2010). *Rescuing records and research: Building an Ecosystem of information on Florida's environment, 1930's – present*. Mote Marine Laboratory Library. Retrieved May 26, 2014, from http://www.flalib.org/conference_2010/poster_session_documents/MotePoster_pt3-Rpts.pdf
- Swett, R. A., & Fann, D. A. (2001). *A manual of methods and procedures for the regional waterway management system*. Retrieved March 5, 2013, from www.edis.ifas.ufl.edu/pdf/files/SG/SG08200.pdf
- Thomas, D., & Rumbold, D. (2006). *Coastal bays and barrier islands conceptual ecological model*. Retrieved February 25, 2013, from www.evergladesplan.org/pm/studies/study_docs/swfl/swffs_cems_coastalbays6.pdf
- Tolley, S. G., Volety, A. K., & Savarese, M. (2005). Influence of salinity on the habitat use of oyster reefs in three Southwest Florida estuaries. *Journal of Shellfish Research*, 24:127-137.
- Tomasko, D. A., Keenan, E., Alderson, M. & Leverone J. (2010). *Sarasota Bay seagrass recovery: More of an improvement than originally thought?* Retrieved May 18, 2014, from <http://www.tbep.tech.org/attachments/article/85/Tomasko%20Seagrass%20Surveyresults%208-31-10.pdf>
- University of Florida. (n.d.). *What are green mussels?* Retrieved April 1, 2014, from www.sfrc.ufl.edu/greenmussel/
- U.S. Army Corps of Engineers. (2013a). Caloosahatchee River (C-43) west basin storage reservoir facts & information. Retrieved June 20, 2014, from www.evergladesplan.org/docs/fs_c43_july_2013_508.pdf
- U.S. Army Corps of Engineers. (2013b). *Coral Creek restoration project may serve as regional prototype*. Retrieved on June 9, 2014, from www.sad.usace.army.mil/Media/NewsStories/tabid/10145/Article/475646/coral-creek-restoration-project-may-serve-as-regional-prototype.aspx
- U.S. Census Bureau. (2014). *Florida Passes New York to Become the Nation's Third Most Populous State, Census Bureau Reports*. Release Number: CB14-232. Retrieved on December 29, 2014, from www.census.gov/newsroom/press-releases/2014/cb14-232.html
- U.S. Environmental Protection Agency. (2014). *National Estuary Program (NEP) overview*. Retrieved March 13, 2014, from www.water.epa.gov/type/oceb/nep/index.cfm
- U.S. Environmental Protection Agency. (n.d.a). *Climate change*. Retrieved October 11, 2012, from www.epa.gov/climatechange/
- U.S. Environmental Protection Agency. (n.d.b). *Harmful algal blooms (HABs)*. Retrieved June 5, 2012, from www.epa.gov/gmpo/habpage.html
- U.S. Fish and Wildlife Service. (2010). *Pine Island, Matlacha Pass, Island Bay, and Caloosahatchee National Wildlife Refuges, comprehensive conservation plan*. Retrieved February 25, 2013, from <http://www.fws.gov/southeast/planning/CCP/JNDingDarlingNationalWildlifeRefugeComplexFinalPg.html>
- U.S. Fish and Wildlife Service. (2015). *Endangered Species Glossary*. Retrieved May 26, 2015, from www.fws.gov/engangered/about/glossary.html
- U.S. Fish and Wildlife Service. (n.d.). *J.N. "Ding" Darling NWR*. Retrieved October 1, 2015, from http://www.fws.gov/refuge/JN_Ding_Darling/About_the_Complex.html/
- U.S. Geological Survey. (2014). *Water Science Glossary of Terms*. Retrieved February 3, 2015, from www.water.usgs.gov/edu/dictionary.html
- VISIT FLORIDA. (n.d.). *About VISIT FLORIDA, Florida's official travel planning website*. Retrieved June 20, 2014, from www.visitflorida.com/en-us/about-visit-florida.html
- Wetlands International. (2013). *Ramsar Sites information service*. Retrieved May 1, 2014, from www.ramsar.wetlands.org/
- Woodward, C. (February 24, 2010). *The Silver King*. *Coastal Breeze News*. Retrieved May 5, 2015, from www.coastalbreezenews.com/2010/02/24/the-silver-king/
- Zieman, J. C., & Zieman, R. T. (1989). *The ecology of the seagrass meadows of the west coast of Florida: A community profile*. (U.S. Fish and Wildlife Service Biological Report. 85, 7.25) Slidell, LA: U.S. Fish and Wildlife Service, National Wetlands Research Center.

B.3 / Species Lists

B.3.1 / Native Species

Common Name	Species Name	Status
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Kingdom Bacteria		
Phylum Cyanobacteria		
cyanobacteria	<i>Anabaena circinalis</i>	P
cyanobacteria	<i>Cylindrospermopsis raciborskii</i>	P
Lyngbya	<i>Lyngbya majuscula</i>	P
Lyngbya	<i>Lyngbya wollei</i>	P
cyanobacteria	<i>Merismopedia spp.</i>	
cyanobacteria	<i>Microcoleus lyngbyaceus</i>	P
cyanobacteria	<i>Microcystis aeruginosa</i>	P
filamentous cyanobacteria	<i>Oscillatoria spp.</i>	P
cyanobacteria	<i>Schizothrix calcicola</i>	P
spirulina	<i>Spirulina major</i>	
Kingdom Chromista		
Phylum Cryptophyta		
Cryptomonas	<i>Cryptomonas spp.</i>	
Phylum Dinoflagellata		
Class Dinophyceae		
	<i>Akashiwo sanguinea</i>	
	<i>Ceratium hircus</i>	
	<i>Dinophysis caudata</i>	
	<i>Gonyaulax polygramma</i>	
	<i>Gonyaulax spp.</i>	
red tide	<i>Karenia brevis</i>	P
	<i>Peridinium spp.</i>	
	<i>Prorocentrum micans</i>	
	<i>Prorocentrum minimum</i>	
	<i>Prorocentrum triestinum</i>	
Phylum Heterokontophyta		
Class Bacillariophyceae		
	<i>Asterionella japonica</i>	
	<i>Bacillaria paxillifer</i>	
	<i>Cerataulina pelagica</i>	
	<i>Cerataulina spp.</i>	
	<i>Chaetoceros spp.</i>	
	<i>Corethron hystrix</i>	
	<i>Cyclotella spp.</i>	
	<i>Cylindrotheca closterium</i>	
	<i>Cymbella spp.</i>	
	<i>Didymosphenia geminata</i>	
	<i>Entomoneis alata</i>	
	<i>Gyrosigma spp.</i>	
	<i>Leptocylindrus minimus</i>	
	<i>Nitzschia seriata</i>	
	<i>Nitzschia vermicularis</i>	
	<i>Pseudo-nitzschia spp.</i>	
	<i>Rhizosolenia calcar-avis</i>	
	<i>Rhizosolenia setigera</i>	

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	<i>Skeletonema costatum</i>	
	<i>Thalassionema nitzschioides</i>	
	<i>Thalassiosira pseudonana</i>	
Phylum Ochrophyta		
Class Chrysophyceae		
	<i>Mallomonas</i> spp.	
Class Xanthophyceae		
	<i>Olisthodiscus</i> spp.	
Phylum Phaeophyta (brown algae)		
Canistrocarpus	<i>Canistrocarpus cervicornis</i>	
Cladosiphon	<i>Cladosiphon occidentalis</i>	
Dictyopteris	<i>Dictyopteris polypodioides</i>	
Dictyota	<i>Dictyota ciliolata</i>	
Dictyota	<i>Dictyota pulchella</i>	
Feldmannia	<i>Feldmannia mitchelliae</i>	
Hincksia	<i>Hincksia onslowensis</i>	
Padina	<i>Padina</i> spp.	
Rosenvingea	<i>Rosenvingea</i> spp.	
Sargassum	<i>Sargassum filipendula</i>	
Sargassum	<i>Sargassum fluitans</i>	
Sargassum	<i>Sargassum hystrix</i>	
Sargassum	<i>Sargassum natans</i>	
Sargassum	<i>Sargassum</i> spp.	
Sargassum	<i>Sargassum vulgare</i>	
Kingdom Protozoa		
	<i>Eutreptia</i> spp.	
Kingdom Plantae		
Division Chlorophyta (green algae)		
umbrella algae	<i>Acetabularia caliculus</i>	
Acetabularia	<i>Acetabularia polyphysoides</i>	
Acetabularia	<i>Acetabularia</i> spp.	
green microalgae	<i>Ankistrodesmus falcatus</i>	
Batophora	<i>Batophora oerstedii</i>	
feather alga	<i>Caulerpa ashmeadii</i>	
Mexican feathery green seaweed	<i>Caulerpa mexicana</i>	
leafy Caulerpa	<i>Caulerpa prolifera</i>	
sea grapes	<i>Caulerpa racemosa</i>	
feathery Caulerpa	<i>Caulerpa sertularioides</i>	
fuzzy Caulerpa	<i>Caulerpa verticillata</i>	
Chaetomorpha	<i>Chaetomorpha linum</i>	
Chaetomorpha	<i>Chaetomorpha minima</i>	
Cladophora	<i>Cladophora delicatula</i>	
Cladophoropsis	<i>Cladophoropsis</i> spp.	
Codium	<i>Codium isthmocladum</i>	
Codium	<i>Codium</i> spp.	
Codium	<i>Codium taylorii</i>	
green microalgae	<i>Crucigenia irregularis</i>	
green microalgae	<i>Crucigenia quadrata</i>	

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green microalgae	<i>Crucigenia tetrapedia</i>	
green microalgae	<i>Dunaliella</i> spp.	
green microalgae	<i>Pandorina morum</i>	
Rhizoclonium	<i>Rhizoclonium kernerii</i>	
Udotea	<i>Udotea abbottiorum</i>	
Udotea	<i>Udotea looensis</i>	
Udotea	<i>Udotea wilsonii</i>	
Ulva	<i>Ulva flexuosa</i>	P
Ulva	<i>Ulva intestinalis</i>	P
sea lettuce	<i>Ulva lactuca</i>	P
Ulva	<i>Ulva</i> spp.	P
Division Rhodophyta (red algae)		
Acanthophora	<i>Acanthophora muscoides</i>	
sheep's wool	<i>Acanthophora spicifera</i>	P
Agardhiella	<i>Agardhiella ramosissima</i>	
Agardhiella	<i>Agardhiella subulata</i>	
Botryocladia	<i>Botryocladia occidentalis</i>	
Champia	<i>Champia parvula</i>	
Chondria	<i>Chondria atropurpurea</i>	
Chondria	<i>Chondria capillaris</i>	
Chondria	<i>Chondria collinsiana</i>	
Chondria	<i>Chondria leptacremon</i>	
Chondria	<i>Chondria littoralis</i>	
Chondria	<i>Chondria sedifolia</i>	
Dasya	<i>Dasya antillarum</i>	
Dasya	<i>Dasya baillouviana</i>	
Dasya	<i>Dasya crouaniana</i>	
Dasya	<i>Dasya ocellata</i>	
Dasya	<i>Dasya pedicellata</i>	
Dasya	<i>Dasya ramosissima</i>	
Dasya	<i>Dasya rigidula</i>	
Dasya	<i>Dasya</i> spp.	
Digenea	<i>Digenea simplex</i>	
Eucheuma	<i>Eucheuma isiforme denudatum</i>	
Gelidiopsis	<i>Gelidiopsis variabilis</i>	
Gracilaria	<i>Gracilaria armata</i>	P
Gracilaria	<i>Gracilaria blodgettii</i>	P
Gracilaria	<i>Gracilaria bursa-pastoris</i>	P
Gracilaria	<i>Gracilaria cervicornis</i>	P
Gracilaria	<i>Gracilaria cylindrica</i>	P
Gracilaria	<i>Gracilaria damaecornis</i>	P
Gracilaria	<i>Gracilaria flabelliformis</i>	P
Gracilaria	<i>Gracilaria intermedia</i>	P
Gracilaria	<i>Gracilaria mammillaris</i>	P
Gracilaria	<i>Gracilaria</i> spp.	P
graceful red seaweed	<i>Gracilaria tikvahiae</i>	P
Gracilaria	<i>Gracilaria venezuelensis</i>	P
Gracilariopsis	<i>Gracilariopsis lemneiformis</i>	
Gymnogongrus	<i>Gymnogongrus griffithsiae</i>	
Halymenia	<i>Halymenia floresii</i>	
Halymenia	<i>Halymenia pseudofloresii</i>	
Halymenia	<i>Halymenia</i> spp.	

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Heterosiphonia	<i>Heterosiphonia gibbesii</i>	
Hydropuntia	<i>Hydropuntia caudata</i>	
Hypnea	<i>Hypnea cornuta</i>	P
hook weed	<i>Hypnea musciformis</i>	P
Hypnea	<i>Hypnea spinella</i>	P
Hypnea	<i>Hypnea valentiae</i>	P
Jania	<i>Jania rubens</i>	
Laurencia	<i>Laurencia chondrioides</i>	P
Laurencia	<i>Laurencia intricata</i>	P
Lomentaria	<i>Lomentaria baileyana</i>	
Polysiphonia	<i>Polysiphonia flaccidissima</i>	
Polysiphonia	<i>Polysiphonia spp.</i>	
Polysiphonia	<i>Polysiphonia subtilissima</i>	
Pterocladiaella	<i>Pterocladiaella sanctarum</i>	
Scinaia	<i>Scinaia halliae</i>	
Sebdenia	<i>Sebdenia flabellata</i>	
drift algae	<i>Solieria filiformis</i>	
Spyridia	<i>Spyridia filamentosa</i>	
Wurdemania	<i>Wurdemannia miniata</i>	
Division Tracheophyta		
golden leather fern	<i>Acrostichum aureum</i>	
giant leather fern	<i>Acrostichum danaeifolium</i>	
Division Magnoliophyta (flowering plants)		
Class Liliopsida (grass-like flowering plants)		
swamp lily	<i>Crinum americanum</i>	
saltgrass	<i>Distichlis spicata</i>	
spike rush	<i>Eleocharis cellulosa</i>	
butterfly orchid	<i>Encyclia tampensis</i>	CE
Cuban shoal grass	<i>Halodule wrightii</i>	
paddle grass	<i>Halophila decipiens</i>	
star grass	<i>Halophila engelmannii</i>	
needlerush	<i>Juncus roemerianus</i>	
common reed	<i>Phragmites australis</i>	
widgeon grass	<i>Ruppia maritima</i>	
cabbage palm	<i>Sabal palmetto</i>	
saltmarsh cordgrass	<i>Spartina alterniflora</i>	
saltmeadow cordgrass	<i>Spartina patens</i>	
manatee grass	<i>Syringodium filiforme</i>	
turtle grass	<i>Thalassia testudinum</i>	
stiff leaf wild pine	<i>Tillandsia fasciculata</i>	SE
twisted airplant	<i>Tillandsia flexuosa</i>	ST
ball moss	<i>Tillandsia recurvata</i>	
needle leaf airplant	<i>Tillandsia setacea</i>	
Spanish moss	<i>Tillandsia usneoides</i>	
giant wild pine	<i>Tillandsia utriculata</i>	SE
cat-tail	<i>Typha spp.</i>	P
tape grass	<i>Vallisneria americana</i>	
Class Magnoliopsida (woody flowering plants)		
pond apple	<i>Annona glabra</i>	
black mangrove	<i>Avicennia germinans</i>	

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salt wort	<i>Batis maritima</i>	
silver sea ox-eye, sea daisy	<i>Borrchia arborescens</i>	
sea ox-eye	<i>Borrchia frutescens</i>	
sea grape	<i>Coccoloba uvifera</i>	
buttonwood	<i>Conocarpus erectus</i>	
love vine, five-angled dodder	<i>Cuscuta pentagona</i>	
coinvine	<i>Dalbergia ecastaphyllum</i>	
white mangrove	<i>Laguncularia racemosa</i>	
mangrove rubber vine	<i>Rhabdadenia biflora</i>	
red mangrove	<i>Rhizophora mangle</i>	
glasswort	<i>Salicornia virginica</i>	
white twinevine	<i>Sarcostemma clausum</i>	P
sea purslane	<i>Sesuvium portulacastrum</i>	
poison ivy	<i>Toxicodendron radicans</i>	P
Kingdom Animalia		
Phylum Chordata		
Class Aves (birds)		
Cooper's hawk	<i>Accipiter cooperii</i>	
sharp-shinned hawk	<i>Accipiter striatus</i>	
spotted sandpiper	<i>Actitis macularius</i>	
red-winged blackbird	<i>Agelaius phoeniceus</i>	
wood duck	<i>Aix sponsa</i>	
saltmarsh sharp-tailed sparrow	<i>Ammodramus caudacutus</i>	
Florida grasshopper sparrow	<i>Ammodramus savannarum floridanus</i>	FE
northern pintail	<i>Anas acuta</i>	
American wigeon	<i>Anas americana</i>	
northern shoveler	<i>Anas clypeata</i>	
green-winged teal	<i>Anas crecca carolinensis</i>	
blue-winged teal	<i>Anas discors</i>	
mottled duck	<i>Anas fulvigula</i>	
mallard	<i>Anas platyrhynchos</i>	
gadwall	<i>Anas strepera</i>	
anhinga	<i>Anhinga anhinga</i>	
limpkin	<i>Aramus guarana</i>	
ruby-throated hummingbird	<i>Archilochus colubris</i>	
great egret	<i>Ardea alba</i>	
great blue heron	<i>Ardea herodias</i>	
ruddy turnstone	<i>Arenaria interpres</i>	
lesser scaup	<i>Aythya affinis</i>	
redhead	<i>Aythya americana</i>	
ring-necked duck	<i>Aythya collaris</i>	
canvasback	<i>Aythya valisineria</i>	
cedar waxwing	<i>Bombycilla cedrorum</i>	
American bittern	<i>Botaurus lentiginosus</i>	
great horned owl	<i>Bubo virginianus</i>	
red-tailed hawk	<i>Buteo jamaicensis</i>	
red-shouldered hawk	<i>Buteo lineatus</i>	
broad-winged hawk	<i>Buteo platypterus</i>	
green heron	<i>Butorides virescens</i>	
sanderling	<i>Calidris alba</i>	
dunlin	<i>Calidris alpina</i>	
rufa red knot	<i>Calidris canutus rufa</i>	FT

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white-rumped sandpiper	<i>Calidris fuscicollis</i>	
stilt sandpiper	<i>Calidris himantopus</i>	
semipalmated sandpiper	<i>Calidris pusilla</i>	
chuck-will's widow	<i>Caprimulgus carolinensis</i>	
northern cardinal	<i>Cardinalis cardinalis</i>	
American goldfinch	<i>Carduelis tristis</i>	
turkey vulture	<i>Cathartes aura</i>	
hermit thrush	<i>Catharus guttatus</i>	
chimney swift	<i>Chaetura pelagica</i>	
piping plover	<i>Charadrius melodus</i>	FT
snowy plover	<i>Charadrius nivosus</i>	ST
semipalmated plover	<i>Charadrius semipalmatus</i>	
killdeer	<i>Charadrius vociferus</i>	
Wilson's plover	<i>Charadrius wilsonia</i>	
black tern	<i>Chlidonias niger</i>	
lark sparrow	<i>Chondestes grammacus</i>	
common night hawk	<i>Chordeiles minor</i>	
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>	
Marian's marsh wren	<i>Cistothorus palustris marianae</i>	ST
yellow-billed cuckoo	<i>Coccyzus americanus</i>	
mangrove cuckoo	<i>Coccyzus minor</i>	
northern "yellow-shafted" flicker	<i>Colaptes auratus</i>	
northern bobwhite	<i>Colinus virginianus</i>	
common ground-dove	<i>Columbina passerina</i>	
black vulture	<i>Coragyps atratus</i>	
American crow	<i>Corvus brachyrhynchos</i>	
fish crow	<i>Corvus ossifragus</i>	
smooth-billed ani	<i>Crotophaga ani</i>	
blue jay	<i>Cyanocitta cristata</i>	
bobolink	<i>Dolichonyx oryzivorus</i>	
pileated woodpecker	<i>Dryocopus pileatus</i>	
gray catbird	<i>Dumetella carolinensis</i>	
little blue heron	<i>Egretta caerulea</i>	ST
reddish egret	<i>Egretta rufescens</i>	
snowy egret	<i>Egretta thula</i>	ST
tricolored heron	<i>Egretta tricolor</i>	ST
swallow-tailed kite	<i>Elanoides forficatus</i>	
white ibis	<i>Eudocimus albus</i>	
merlin	<i>Falco columbarius</i>	
peregrine falcon	<i>Falco peregrinus</i>	
southeastern American kestrel	<i>Falco sparverius paulus</i>	ST
magnificent frigatebird	<i>Fregata magnificens</i>	
American coot	<i>Fulica americana</i>	
Wilson's snipe	<i>Gallinago delicata</i>	
common moorhen	<i>Gallinula chloropus</i>	
common loon	<i>Gavia immer</i>	
gull-billed tern	<i>Gelochelidon nilotica</i>	
common yellowthroat	<i>Geothlypis trichas</i>	
American oystercatcher	<i>Haematopus palliatus</i>	ST
American bald eagle	<i>Haliaeetus leucocephalus</i>	
black-necked stilt	<i>Himantopus mexicanus</i>	
barn swallow	<i>Hirundo rustica</i>	
Caspian tern	<i>Hydroprogne caspia</i>	

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Baltimore oriole	<i>Icterus galbula</i>	
loggerhead shrike	<i>Lanius ludovicianus</i>	
herring gull	<i>Larus argentatus</i>	
ring-billed gull	<i>Larus delawarensis</i>	
lesser black-backed gull	<i>Larus fuscus</i>	
great black-backed gull	<i>Larus marinus</i>	
American herring gull	<i>Larus smithsonianus</i>	
laughing gull	<i>Leucophaeus atricilla</i>	
short-billed dowitcher	<i>Limnodromus griseus</i>	
long-billed dowitcher	<i>Limnodromus scolopaceus</i>	
Swainson's warbler	<i>Limnothlypis swainsonii</i>	
marbled godwit	<i>Limosa fedoa</i>	
hooded merganser	<i>Lophodytes cucullatus</i>	
belted kingfisher	<i>Megaceryle alcyon</i>	
eastern screech-owl	<i>Megascops asio</i>	
red-bellied woodpecker	<i>Melanerpes carolinus</i>	
red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	
swamp sparrow	<i>Melospiza georgiana</i>	
common merganser	<i>Mergus merganser</i>	
red-breasted merganser	<i>Mergus serrator</i>	
northern mockingbird	<i>Mimus polyglottos</i>	
black-and-white warbler	<i>Mniotilta varia</i>	
wood stork	<i>Mycteria americana</i>	FT
great crested flycatcher	<i>Myiarchus crinitus</i>	
long-billed curlew	<i>Numenius americanus</i>	
whimbrel	<i>Numenius phaeopus</i>	
yellow-crowned night heron	<i>Nyctanassa violacea</i>	
black-crowned night heron	<i>Nycticorax nycticorax</i>	
ruddy duck	<i>Oxyura jamaicensis</i>	
osprey	<i>Pandion haliaetus</i>	
Savannah sparrow	<i>Passerculus sandwichensis</i>	
painted bunting	<i>Passerina ciris</i>	
American white pelican	<i>Pelecanus erythrorhynchos</i>	
brown pelican	<i>Pelecanus occidentalis</i>	
double-crested cormorant	<i>Phalacrocorax auritus</i>	
Wilson's phalarope	<i>Phalaropus tricolor</i>	
downy woodpecker	<i>Picoides pubescens</i>	
hairy woodpecker	<i>Picoides villosus</i>	
eastern towhee	<i>Pipilo erythrophthalmus</i>	
roseate spoonbill	<i>Platalea ajaja</i>	ST
glossy ibis	<i>Plegadis falcinellus</i>	
black-bellied plover	<i>Pluvialis squatarola</i>	
horned grebe	<i>Podiceps auritus</i>	
pie-billed grebe	<i>Podilymbus podiceps</i>	
blue-gray gnatcatcher	<i>Polioptila caerulea</i>	
sora	<i>Porzana carolina</i>	
purple martin	<i>Progne subis</i>	
prothonotary warbler	<i>Protonotaria citrea</i>	
boat-tailed grackle	<i>Quiscalus major</i>	
common grackle	<i>Quiscalus quiscula</i>	
king rail	<i>Rallus elegans</i>	
Virginia rail	<i>Rallus limicola</i>	
clapper rail	<i>Rallus longirostris</i>	

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Florida clapper rail	<i>Rallus longirostris scottii</i>	
American avocet	<i>Recurvirostra americana</i>	
ruby-crowned kinglet	<i>Regulus calendula</i>	
black skimmer	<i>Rynchops niger</i>	ST
eastern phoebe	<i>Sayornis phoebe</i>	
northern parula	<i>Setophaga americana</i>	
yellow-rumped warbler	<i>Setophaga coronata</i>	
prairie warbler	<i>Setophaga discolor</i>	
yellow-throated warbler	<i>Setophaga dominica</i>	
palm warbler	<i>Setophaga palmarum</i>	
yellow warbler	<i>Setophaga petechia</i>	
American redstart	<i>Setophaga ruticilla</i>	
eastern bluebird	<i>Sialia sialis</i>	
yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	
roseate tern	<i>Sterna dougallii</i>	FT
Forster's tern	<i>Sterna forsteri</i>	
common tern	<i>Sterna hirundo</i>	
least tern	<i>Sternula antillarum</i>	ST
barred owl	<i>Strix varia</i>	
eastern meadowlark	<i>Sturnella magna</i>	
tree swallow	<i>Tachycineta bicolor</i>	
royal tern	<i>Thalasseus maximus</i>	
sandwich tern	<i>Thalasseus sandvicensis</i>	
Carolina wren	<i>Thryothorus ludovicianus</i>	
brown thrasher	<i>Toxostoma rufum</i>	
lesser yellowlegs	<i>Tringa flavipes</i>	
greater yellowlegs	<i>Tringa melanoleuca</i>	
willet	<i>Tringa semipalmata</i>	
solitary sandpiper	<i>Tringa solitaria</i>	
house wren	<i>Troglodytes aedon</i>	
American robin	<i>Turdus migratorius</i>	
gray kingbird	<i>Tyrannus dominicensis</i>	
eastern kingbird	<i>Tyrannus tyrannus</i>	
common barn owl	<i>Tyto alba</i>	
black-whiskered vireo	<i>Vireo altiloquus</i>	
mourning dove	<i>Zenaida macroura</i>	
Class Mammalia		
opossum	<i>Didelphis virginiana</i>	
river otter	<i>Lontra canadensis</i>	
bobcat	<i>Lynx rufus</i>	
Florida mouse	<i>Peromyscus floridanus</i>	
northern raccoon	<i>Procyon lotor</i>	P
hispid cotton rat	<i>Sigmodon hispidus</i>	
insular cotton rat	<i>Sigmodon hispidus insulicola</i>	
marsh rabbit	<i>Sylvilagus palustris</i>	
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>	
Florida manatee	<i>Trichechus manatus latirostris</i>	FE
bottlenose dolphin	<i>Tursiops truncatus</i>	
Florida black bear	<i>Ursus americanus floridanus</i>	
Class Reptilia		
Florida cottonmouth	<i>Agkistrodon piscivorus conanti</i>	

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American alligator	<i>Alligator mississippiensis</i>	FT(S/A)
green anole	<i>Anolis carolinensis carolinensis</i>	
Florida softshell turtle	<i>Apalone ferox</i>	
Atlantic loggerhead turtle	<i>Caretta caretta</i>	FT
Atlantic green turtle	<i>Chelonia mydas</i>	FT
Florida snapping turtle	<i>Chelydra serpentina</i>	
southern black racer	<i>Coluber constrictor priapus</i>	
American crocodile	<i>Crocodylus acutus</i>	FT
Florida chicken turtle	<i>Deirochelys reticularia chrysea</i>	
leatherback turtle	<i>Dermochelys coriacea</i>	FE
southern ringnecked snake	<i>Diadophis punctatus punctatus</i>	
Atlantic hawksbill turtle	<i>Eretmochelys imbricata</i>	FE
striped mud turtle	<i>Kinosternon baurii</i>	
Florida mud turtle	<i>Kinosternon subrubrum stenindachneri</i>	
Kemp's ridley turtle	<i>Lepidochelys kempii</i>	FE
ornate diamondback terrapin	<i>Malaclemys terrapin macrospilota</i>	
mangrove saltmarsh snake	<i>Nerodia clarkii compressicauda</i>	
Florida banded water snake	<i>Nerodia fasciata pictiventris</i>	
brown water snake	<i>Nerodia taxispilota</i>	
peninsular cooter	<i>Pseudemys floridana peninsularis</i>	
Florida redbelly turtle	<i>Pseudemys nelsoni</i>	
dusky pigmy rattlesnake	<i>Sistrurus miliarius barbouri</i>	
ribbon snake	<i>Thamnophis sauritus sackerii</i>	
Class Amphibia		
Florida cricket frog	<i>Acris gryllus dorsalis</i>	
oak toad	<i>Bufo quercicus</i>	
southern toad	<i>Bufo terrestris</i>	
eastern narrowmouth toad	<i>Gastrophryne carolinensis</i>	
green treefrog	<i>Hyla cinerea</i>	
pinewoods treefrog	<i>Hyla femoralis</i>	
squirrel treefrog	<i>Hyla squirela</i>	
Florida chorus frog	<i>Pseudacris nigrita verrucosa</i>	
little grass frog	<i>Pseudacris ocularis</i>	
pig frog	<i>Rana grylio</i>	
southern leopard frog	<i>Rana utricularia</i>	
eastern spadefoot	<i>Scaphiopus holbrookii</i>	
Class Actinopterygii (ray finned fishes)		
scrawled cowfish	<i>Acanthostracion quadricornis</i>	
lined sole	<i>Achirus lineatus</i>	
diamond killifish	<i>Adinia xenica</i>	
bonefish	<i>Albula vulpes</i>	
orange filefish	<i>Aluterus schoepfi</i>	
yellow bullhead	<i>Ameiurus natalis</i>	
fringed pipefish	<i>Anarchopterus criniger</i>	
striped anchovy	<i>Anchoa hepsetus</i>	
bay anchovy	<i>Anchoa mitchilli</i>	
ocellated flounder	<i>Ancylopsetta ommata</i>	
sheepshead	<i>Archosargus probatocephalus</i>	
sea bream	<i>Archosargus rhomboidalis</i>	
hardhead sea catfish	<i>Ariopsis felis</i>	
southern stargazer	<i>Astroscopus y-graecum</i>	

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trumpet fish	<i>Aulostomus maculatus</i>	
gafftopsail catfish	<i>Bagre marinus</i>	
silver perch	<i>Bairdiella chrysoura</i>	
frillfin goby	<i>Bathygobius soporator</i>	
twospot flounder	<i>Bothus robinsi</i>	
gulf menhaden	<i>Brevoortia patronus</i>	
grass porgy	<i>Calamus arctifrons</i>	
jolthead porgy	<i>Calamus bajonado</i>	
whitebone porgy	<i>Calamus leucosteus</i>	
knobbed porgy	<i>Calamus nodosus</i>	
sheepshead porgy	<i>Calamus penna</i>	
orangespotted filefish	<i>Cantherhines pullus</i>	
blue runner	<i>Caranx crysos</i>	
crevalle jack	<i>Caranx hippos</i>	
horse-eye jack	<i>Caranx latus</i>	
common snook	<i>Centropomus undecimalis</i>	
rock sea bass	<i>Centropristis philadelphica</i>	
black sea bass	<i>Centropristis striata</i>	
Atlantic spadefish	<i>Chaetodipterus faber</i>	
Florida blenny	<i>Chasmodes saburrae</i>	
striped burrfish	<i>Chilomycterus schoepfii</i>	
Atlantic bumper	<i>Chloroscombrus chrysurus</i>	
spotted whiff	<i>Citharichthys macrops</i>	
darter goby	<i>Ctenogobius boleosoma</i>	
emerald goby	<i>Ctenogobius smaragdus</i>	
sand seatrout	<i>Cynoscion arenarius</i>	
spotted seatrout	<i>Cynoscion nebulosus</i>	
sheepshead minnow	<i>Cyprinodon variegatus</i>	
Irish pompano	<i>Diapterus auratus</i>	
striped mojarra	<i>Diapterus plumieri</i>	
balloonfish	<i>Diodon holocanthus</i>	
sand perch	<i>Diplectrum formosum</i>	
sportail pinfish	<i>Diplodus holbrookii</i>	
fat sleeper	<i>Dormitator maculatus</i>	
threadfin shad	<i>Dorosoma petenense</i>	
sharksucker	<i>Echeneis naucrates</i>	
whitefin sharksucker	<i>Echeneis neucratoides</i>	
Everglades pygmy sunfish	<i>Elassoma evergladei</i>	
ladyfish	<i>Elops saurus</i>	
goliath grouper	<i>Epinephelus itajara</i>	
red grouper	<i>Epinephelus morio</i>	
lake chubsucker	<i>Erimyzon sucetta</i>	
chain pickerel	<i>Esox niger</i>	
swamp darter	<i>Etheostoma fusiforme</i>	
fringed flounder	<i>Etropus crossotus</i>	
spotfin mojarra	<i>Eucinostomus argenteus</i>	
silver jenny	<i>Eucinostomus gula</i>	
tidewater mojarra	<i>Eucinostomus harengulus</i>	
slender mojarra	<i>Eucinostomus jonesii</i>	
striped mojarra	<i>Eugerres plumieri</i>	
bluespotted cornetfish	<i>Fistularia tabacaria</i>	
gold spotted killifish	<i>Floridichthys carpio</i>	
golden topminnow	<i>Fundulus chrysotus</i>	

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marsh killifish	<i>Fundulus confluentus</i>	
gulf killifish	<i>Fundulus grandis</i>	
mummichog	<i>Fundulus heteroclitus</i>	
striped killifish	<i>Fundulus majalis</i>	
Seminole killifish	<i>Fundulus seminolis</i>	
longnose killifish	<i>Fundulus similis</i>	
western mosquitofish	<i>Gambusia affinis</i>	
eastern mosquitofish	<i>Gambusia holbrooki</i>	
yellowfin mojarra	<i>Gerres cinereus</i>	
stippled clingfish	<i>Gobiesox punctulatus</i>	
skilletfish	<i>Gobiesox strumosus</i>	
sharptail goby	<i>Gobionellus hastatus</i>	
highfin goby	<i>Gobionellus oceanicus</i>	
naked goby	<i>Gobiosoma bosc</i>	
twoscale goby	<i>Gobiosoma longipala</i>	
code goby	<i>Gobiosoma robustum</i>	
ocellated moray	<i>Gymnothorax saxicola</i>	
tomtate	<i>Haemulon aurolineatum</i>	
white grunt	<i>Haemulon plumierii</i>	
blue striped grunt	<i>Haemulon sciurus</i>	
slippery dick	<i>Halichoeres bivittatus</i>	
scaled sardine	<i>Harengula jaguana</i>	
bluntnose jack	<i>Hemicarax amblyrhynchus</i>	
jewelfish	<i>Hemichromis bimaculatus</i>	
least killifish	<i>Heterandria formosa</i>	
lined seahorse	<i>Hippocampus erectus</i>	
dwarf seahorse	<i>Hippocampus zosterae</i>	
zebratail blenny	<i>Hypleurochilus caudovittatus</i>	
crested blenny	<i>Hypleurochilus geminatus</i>	
reef silverside	<i>Hypoatherina harringtonensis</i>	
false silverstripe halfbeak	<i>Hyporhamphus meeki</i>	
common halfbeak	<i>Hyporhamphus unifasciatus</i>	
feather blenny	<i>Hypsoblennius henz</i>	
channel catfish	<i>Ictalurus punctatus</i>	
flagfish	<i>Jordanella floridae</i>	
brook silverside	<i>Labidesthes sicculus</i>	
hogfish	<i>Lachnolaimus maximus</i>	
trunkfish	<i>Lactophrys trigonus</i>	
smooth puffer	<i>Lagocephalus laevigatus</i>	
pinfish	<i>Lagodon rhomboides</i>	
spot croaker	<i>Leiostomus xanthurus</i>	
spotted gar	<i>Lepisosteus oculatus</i>	
longnose gar	<i>Lepisosteus osseus</i>	
Florida gar	<i>Lepisosteus platyrhincus</i>	
bluegill	<i>Lepomis macrochirus</i>	
dollar sunfish	<i>Lepomis marginatus</i>	
redear sunfish	<i>Lepomis microlophus</i>	
spotted sunfish	<i>Lepomis punctatus</i>	
tripletail	<i>Lobotes surinamensis</i>	
crested goby	<i>Lophogobius cyprinoides</i>	
bluefin killifish	<i>Lucania goodei</i>	
rainwater killifish	<i>Lucania parva</i>	
highfin blenny	<i>Lupinoblennius nicholsi</i>	

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mutton snapper	<i>Lutjanus analis</i>	
schoolmaster	<i>Lutjanus apodus</i>	
mangrove (gray) snapper	<i>Lutjanus griseus</i>	
lane snapper	<i>Lutjanus synagris</i>	
tarpon	<i>Megalops atlanticus</i>	
rough silverside	<i>Membras martinica</i>	
inland silverside	<i>Menidia beryllina</i>	
tidewater silverside	<i>Menidia peninsulae</i>	
southern kingfish	<i>Menticirrhus americanus</i>	
gulf kingfish	<i>Menticirrhus littoralis</i>	
northern kingfish	<i>Menticirrhus saxatilis</i>	
clown goby	<i>Microgobius gulosus</i>	
green goby	<i>Microgobius thalassinus</i>	
Atlantic croaker	<i>Micropogonias undulatus</i>	
largemouth bass	<i>Micropterus salmoides</i>	
fringed filefish	<i>Monacanthus ciliatus</i>	
black (striped) mullet	<i>Mugil cephalus</i>	
white mullet	<i>Mugil curema</i>	
redeye mullet	<i>Mugil gaimardianus</i>	
whirligig (fantail) mullet	<i>Mugil gyrans</i>	
red goatfish	<i>Mullus auratus</i>	
black grouper	<i>Mycteroperca bonaci</i>	
gag grouper	<i>Mycteroperca microlepis</i>	
speckled worm eel	<i>Myrophis punctatus</i>	
emerald parrotfish	<i>Nicholsina usta</i>	
taillight shiner	<i>Notropis maculatus</i>	
coastal shiner	<i>Notropis petersoni</i>	
yellowtail snapper	<i>Ocyurus chrysurus</i>	
polka-dot batfish	<i>Ogcocephalus cubifrons</i>	
leatherjacket	<i>Oligoplites saurus</i>	
Atlantic thread herring	<i>Opisthonema oglinum</i>	
spotfin jawfish	<i>Opistognathus robinsi</i>	
gulf toadfish	<i>Opsanus beta</i>	
pigfish	<i>Orthopristis chrysoptera</i>	
seaweed blenny	<i>Parablennius marmoratus</i>	
marbled blenny	<i>Paraclinus marmoratus</i>	
gulf flounder	<i>Paralichthys albigutta</i>	
broad flounder	<i>Paralichthys squamilentus</i>	
gulf butterfish	<i>Peprilus burti</i>	
harvestfish	<i>Peprilus paru</i>	
sailfin molly	<i>Poecilia latipinna</i>	
black drum	<i>Pogonias cromis</i>	
bluefish	<i>Pomatomus saltatrix</i>	
portunid	<i>Portunus spp.</i>	
blackfin (blackwing) searobin	<i>Prionotus rubio</i>	
leopard searobin	<i>Prionotus scitulus</i>	
bighead searobin	<i>Prionotus tribulus</i>	
cobia	<i>Rachycentron canadum</i>	
dace	<i>Rhinichthys spp.</i>	
mangrove rivulus	<i>Rivulus marmoratus</i>	
Spanish sardine	<i>Sardinella aurita</i>	
red drum	<i>Sciaenops ocellatus</i>	
king mackerel	<i>Scomberomorus cavalla</i>	

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Spanish mackerel	<i>Scomberomorus maculatus</i>	
barbfish	<i>Scorpaena brasiliensis</i>	
lookdown	<i>Selene vomer</i>	
pygmy sea bass	<i>Serraniculus pumilio</i>	
belted sandfish	<i>Serranus subligarius</i>	
northern puffer	<i>Sphoeroides maculatus</i>	
southern puffer	<i>Sphoeroides nephelus</i>	
least puffer	<i>Sphoeroides parvus</i>	
bandtail puffer	<i>Sphoeroides spengleri</i>	
checkered puffer	<i>Sphoeroides testudineus</i>	
great barracuda	<i>Sphyraena barracuda</i>	
northern sennet	<i>Sphyraena borealis</i>	
guaguanche	<i>Sphyraena guachancho</i>	
planehead filefish	<i>Stephanolepis hispidus</i>	
Atlantic needlefish	<i>Strongylura marina</i>	
redfin needlefish	<i>Strongylura notata</i>	
timucu	<i>Strongylura timucu</i>	
shoal (dusky) flounder	<i>Syacium papillosum</i>	
sargassum pipefish	<i>Syngnathus pelagicus</i>	
blackcheek tonguefish	<i>Symphurus plagiusa</i>	
dusky pipefish	<i>Syngnathus floridae</i>	
chain pipefish	<i>Syngnathus louisianae</i>	
gulf pipefish	<i>Syngnathus scovelli</i>	
bull pipefish	<i>Syngnathus springeri</i>	
inshore lizardfish	<i>Synodus foetens</i>	
Florida pompano	<i>Trachinotus carolinus</i>	
permit	<i>Trachinotus falcatus</i>	
hogchoker	<i>Trinectes maculatus</i>	
houndfish	<i>Tylosurus crocodilus</i>	
dwarf goatfish	<i>Upeneus parvus</i>	
southern hake	<i>Urophycis floridana</i>	

Class Chondrichthyes (cartilaginous fishes, skates, rays)

spotted eagle ray	<i>Aetobatus narinari</i>	
brown bullhead	<i>Ameiurus nebulosus</i>	
bull shark	<i>Carcharhinus leucas</i>	
blacktip shark	<i>Carcharhinus limbatus</i>	
sandbar shark	<i>Carcharhinus plumbeus</i>	
southern stingray	<i>Dasyatis americana</i>	
Atlantic stingray	<i>Dasyatis sabina</i>	
whiptail stingrays	<i>Dasyatis spp.</i>	
nurse shark	<i>Ginglymostoma cirratum</i>	
smooth butterfly ray	<i>Gymnura micrura</i>	
lemon shark	<i>Negaprion brevirostris</i>	
smalltooth sawfish	<i>Pristis pectinata</i>	FE
clearnose skate	<i>Raja eglanteria</i>	
Atlantic guitarfish	<i>Rhinobatos lentiginosus</i>	
cownose ray	<i>Rhinoptera bonasus</i>	
great hammerhead shark	<i>Sphyrna mokarran</i>	
bonnethead shark	<i>Sphyrna tiburo</i>	
yellow stingray	<i>Urobatis jamaicensis</i>	

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Subphylum Urochordata (tunicates, sea squirts)		
sea pork	<i>Aplidium stellatum</i>	
black tunicate	<i>Ascidia nigra</i>	
flat/encrusting tunicate	<i>Botryllus planus</i>	
painted tunicate	<i>Clavelina picta</i>	
mangrove tunicate	<i>Ecteinascidia turbinata</i>	
sandy-skin tunicate	<i>Molgula occidentalis</i>	
sea-squirt, sea grape	<i>Molgula spp.</i>	
leathery tunicate, pleated sea squirt	<i>Styela plicata</i>	
Phylum Mollusca		
striate barrel-bubble	<i>Acteocina bullata</i>	
Cande's barrel bubble	<i>Acteocina candeii</i>	
paper mussel	<i>Amygdalum papyrium</i>	
greedy dovesnail	<i>Anachis avara</i>	
dovesnail	<i>Anachis translirata</i>	
blood ark	<i>Anadara ovalis</i>	
transverse ark	<i>Anadara transversa</i>	
sea hares	<i>Anaspidea spp.</i>	
pointed venus	<i>Anomalocardia cuneimeris</i>	
common jingle	<i>Anomia simplex</i>	
sooty/ mottled/ black sea hare	<i>Aplysia fasciata</i>	
turkey wing/ zebra arc	<i>Arca zebra</i>	
adams ark	<i>Arcopsis adamsi</i>	
bay scallop	<i>Argopecten irradians</i>	
pen shell	<i>Atrina rigida</i>	
white-bearded ark	<i>Barbatia candida</i>	
West Indian false cerith	<i>Batillaria minima</i>	
variable bittium, grass cerith	<i>Bittium varium</i>	
impressed odostome	<i>Boonea impressa</i>	
scorched mussel	<i>Brachidontes exustus</i>	
common West Indian bubble	<i>Bulla occidentalis</i>	
ragged sea hare	<i>Bursatella leachii pleii</i>	
lightning whelk	<i>Busycon contrarium</i>	
pear whelk	<i>Busycotypus spiratus</i>	
Green's miniature cerith	<i>Cerithiopsis greenii</i>	
awl miniature cerith	<i>Cerithiopsis subulata</i>	
ivory cerith	<i>Cerithium eburneum</i>	
flyspeck cerith	<i>Cerithium muscarum</i>	
variable cerith	<i>Cerithium lutosum</i>	
lace murex	<i>Chicoreus dilectus</i>	
cross-barred venus	<i>Chione cancellata</i>	
Conrad's false mussel	<i>Congeria leucophaeta</i>	
jasper cone	<i>Conus jaspideus</i>	
contracted corbula	<i>Corbula contracta</i>	
eastern oyster	<i>Crassostrea virginica</i>	
common slipper shell, slipper limpet	<i>Crepidula fornicata</i>	
spotted slipper shell	<i>Crepidula maculosa</i>	
eastern white slippersnail	<i>Crepidula plana</i>	
gold-line marginella	<i>Dentimargo aureocinctus</i>	
Atlantic giant cockle shell	<i>Dinocardium robustum</i>	
variable coquina	<i>Donax variabilis</i>	
sharp-rib drill	<i>Eupleura sulcidentata</i>	

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banded tulip snail	<i>Fasciolaria liliium hunteria</i>	
true tulip snail	<i>Fasciolaria tulipa</i>	
Atlantic fig snail, paper fig snail	<i>Ficus communis</i>	
teardrop marginella	<i>Granulina ovuliformis</i>	
Antilles glassy-bubble	<i>Haminoea antillarum</i>	
elegant glassy-bubble	<i>Haminoea elegans</i>	
hooked mussel	<i>Ischadium recurvum</i>	
common egg cockle	<i>Laevicardium laevigatum</i>	
periwinkle	<i>Littorina spp.</i>	
mangrove periwinkle	<i>Littoraria angulifera</i>	
Loliginidae squids	<i>Loliginidae spp.</i>	
glassy Lyonsia	<i>Lyonsia hyalina</i>	
waxy macoma	<i>Macoma cerina</i>	
calico clam	<i>Macrocallista maculata</i>	
sunray venus clam	<i>Macrocallista nimbosa</i>	
plicate mangelia	<i>Mangelia plicosa</i>	
coffee bean snail	<i>Melampus coffeus</i>	
no common name	<i>Melanella intermedia</i>	
Florida crown conch	<i>Melongena corona</i>	
southern quahog	<i>Mercenaria campechiensis</i>	
northern quahog, hard clam, cherry stone clam	<i>Mercenaria mercenaria</i>	
lunar dovesnail	<i>Mitrella lunata</i>	
Atlantic ribbed mussel	<i>Modiolus demissus</i>	
lateral mussel	<i>Musculus lateralis</i>	
common eastern nassa, bruised nassa	<i>Nassarius vibex</i>	
bleeding tooth nerite	<i>Nerita peloronta</i>	
olive nerite	<i>Neritina reclivata</i>	
lettered olive	<i>Oliva sayana</i>	
tiny dwarf olive	<i>Olivella pusilla</i>	
moon snail/ shark eye	<i>Polinices duplicatus</i>	
predatory sea snail	<i>Polinices spp.</i>	
common Atlantic marginella	<i>Prunum apicinum</i>	
pitted baby-bubble	<i>Rictaxis punctostriatus</i>	
no common name	<i>Rissoina chesnelii</i>	
no common name	<i>Rissoina multicostata</i>	
oyster drill	<i>Strombina haemastoma</i>	
Florida fighting conch	<i>Strombus alatus</i>	
rose-petal tellin	<i>Tellina lineata</i>	
black-lined triphora	<i>Triphora nigrocincta</i>	
horse conch	<i>Triplofusus giganteus</i>	
suffuse/ pink trivia	<i>Trivia suffusa</i>	
Conrad's turbonille	<i>Turbonilla conradi</i>	
Dall's turbonille	<i>Turbonilla dalli</i>	
drill snail	<i>Urosalpinx spp.</i>	
West Indian worm snail	<i>Vermicularia spirata</i>	
smooth risso	<i>Zebina browniana</i>	
Phylum Arthropoda (insects, crustaceans)		
Subphylum Chelicerata		
horseshoe crab	<i>Limulus polyphemus</i>	
sea spider	<i>Pycnogonid spp.</i>	

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Subphylum Crustacea (shrimp, crabs)		
Calanoid copepod	<i>Acartia tonsa</i>	
snapping shrimp (L, J, A)	<i>Alpheidae spp.</i>	
bay snapping shrimp	<i>Alpheus heterochaelis</i>	
snapping shrimp	<i>Alpheus normanni</i>	
night shrimp (L, A)	<i>Ambidexter symmetricus</i>	
opossum shrimp, mysid	<i>Americamysis almyra</i>	
opossum shrimp, mysid	<i>Americamysis bahia</i>	
mysid shrimp	<i>Americamysis bigelowi</i>	
opossum shrimp, mysid	<i>Americamysis stucki</i>	
mangrove tree crab	<i>Aratus pisonii</i>	
squareback marsh crab (L)	<i>Armases cinereum</i>	
striped barnacle	<i>Balanus amphitrite</i>	
ivory barnacle	<i>Balanus eburneus</i>	
opossum shrimp, mysid	<i>Bowmaniella dissimilis</i>	
twoclaw shrimp	<i>Brachycarpus biunguiculatus</i>	
opossum shrimp, mysid	<i>Brasilomysis castroi</i>	
ghost shrimp (L)	<i>Callianassa spp.</i>	
shelligs/swimming crab	<i>Callinectes ornatus</i>	
blue crab (L, J, A)	<i>Callinectes sapidus</i>	
lesser blue crab	<i>Callinectes similis</i>	
Cyclopoid copepod	<i>Cyclops spp.</i>	
Diastylis	<i>Diastylis spp.</i>	
mole crab (L)	<i>Emerita spp.</i>	
olivepit porcelain crab (L)	<i>Euceramus praelongus</i>	
flatback mud crab (L, A)	<i>Eurypanopeus depressus</i>	
Harpacticoid copepod	<i>Euterpina acutifrons</i>	
pink shrimp (L, J, A)	<i>Farfantepenaeus duorarum</i>	
false zostera shrimp	<i>Hippolyte pleuracantha</i>	
zostera shrimp (L, J, A)	<i>Hippolyte zostericola</i>	
sargassum shrimp (L, A)	<i>Latreutes parvulus</i>	
red-algae shrimp (J, A)	<i>Leander paulensis</i>	
Palaemonid shrimps	<i>Leander spp.</i>	
sand crab (L)	<i>Lepidopa sp.</i>	
combclaw shrimp (J)	<i>Leptochela serratorbita</i>	
longnosed spider crab (L, J, A)	<i>Libinia dubia</i>	
prawn (J, A)	<i>Lucifer faxoni</i>	
cleaner shrimp (L)	<i>Lysmata sp.</i>	
Florida stone crab (L, A)	<i>Menippe mercenaria</i>	
stone crab	<i>Menippe spp.</i>	
Florida grassflat crab	<i>Neopanope packardii</i>	
mud crab	<i>Neopanope texana</i>	
ghost crab	<i>Ocypode quadrata</i>	
estuarine longeye shrimp (L)	<i>Ogyrides alphaerostris</i>	
Cyclopoid copepod	<i>Oithona sp.</i>	
hermit crab	<i>Pagurus bonairensis</i>	
long-clawed hermit crab (L, J)	<i>Pagurus longicarpus</i>	
flat-clawed hermit crab	<i>Pagurus pollicaris</i>	
Florida grass shrimp (L, J, A)	<i>Palaemon floridanus</i>	
brackish grass shrimp	<i>Palaemonetes intermedius</i>	
riverine grass shrimp	<i>Palaemonetes paludosus</i>	
daggerblade grass shrimp (J, A)	<i>Palaemonetes pugio</i>	
Palaemonetes grass shrimps (L, J, A)	<i>Palaemonetes spp.</i>	

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marsh grass shrimp (J, A)	<i>Palaemonetes vulgaris</i>	
mud crab (L, A)	<i>Panopeus herbstii</i>	
cryptic teardrop crab	<i>Pelia mutica</i>	
mud crab	<i>Panopeus spp.</i>	
American grass shrimp (L, J, A)	<i>Periclimenes americanus</i>	
longtail grass shrimp (L, J, A)	<i>Periclimenes longicaudatus</i>	
purse crab (L)	<i>Persephona sp.</i>	
green porcelain crab (L, J, A)	<i>Petrolisthes armatus</i>	
pea crab (L, J)	<i>Pinnixa sayana</i>	
pea crab (L, A)	<i>Pinnixa sp.</i>	
pea crab (L)	<i>Pinnotheres hemphilli</i>	
pea crab (L)	<i>Pinnotheres spp.</i>	
oval urn crab	<i>Pitho anisodon</i>	
iridescent swimming crab	<i>Portunus gibbesii</i>	
blotched swimming crab	<i>Portunus spinimanus</i>	
Portunus crabs (L)	<i>Portunus spp.</i>	
Bermuda night shrimp	<i>Processa bermudensis</i>	
night shrimp	<i>Processa hemphilli</i>	
Calanoid copepod	<i>Pseudodiaptomus coronatus</i>	
Harris mud crab (L)	<i>Rhithropanopeus harrisi</i>	
roughneck shrimp	<i>Rimapenaeus constrictus</i>	
heavy/ purple marsh crab (L)	<i>Sesarma reticulatum</i>	
marsh crab (L)	<i>Sesarma spp.</i>	
hardback rock shrimp	<i>Sicyonia laevigata</i>	
Sicyonia rock shrimp	<i>Sicyonia parri</i>	
kinglet rock shrimp	<i>Sicyonia typica</i>	
rough mantis shrimp (A, L)	<i>Squilla empusa</i>	
opossum mud shrimp, mysid	<i>Taphromysis bowmani</i>	
Manning grass shrimp (L, J, A)	<i>Thor manningi</i>	
arrow (stick) shrimp (L, J, A)	<i>Tozeuma carolinense</i>	
squatter pea crab (L)	<i>Tumidotheres maculatus</i>	
Atlantic sand fiddler crab	<i>Uca pugilator</i>	
fiddler crab (L)	<i>Uca spp.</i>	
mud shrimp (L, J)	<i>Upogebia spp.</i>	
Subphylum Hexapoda		
Class Insecta		
mosquito (18 species)	<i>Aedes spp.</i>	P
Gulf fritillary butterfly	<i>Agraulis vanillae</i>	
white peacock butterfly	<i>Anartia jatrophae</i>	
mosquito (12 species)	<i>Anopheles spp.</i>	P
great southern white butterfly	<i>Ascia monuste</i>	
eastern pygmy blue butterfly	<i>Brephidium pseudofea</i>	
mosquito	<i>Coquillettidia perturbans</i>	P
mosquito	<i>Culex nigripalpus</i>	P
mosquito (15 species)	<i>Culex spp.</i>	P
no-see-ums, biting midges	<i>Culicoides spp.</i>	
mosquito	<i>Culiseta spp.</i>	P
queen butterfly	<i>Danaus gilippus</i>	
monarch butterfly	<i>Danaus plexippus</i>	
crabhole mosquito	<i>Deinocerites cancer</i>	P
zebra longwing butterfly	<i>Heliconius charithonia</i>	
viceroxy butterfly	<i>Limenitis archippus</i>	

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mosquito (3 species)	<i>Mansonia spp.</i>	P
black saltmarsh mosquito	<i>Ochlerotatus taeniorhynchus</i>	P
golden saltmarsh mosquito	<i>Ochlerotatus sollicitans</i>	P
mosquito	<i>Orthopodomyia alba</i>	P
mangrove skipper butterfly (L, A)	<i>Phocides pigmalion</i>	
orange-barred sulphur butterfly	<i>Phoebis philea</i>	
buckeye butterfly	<i>Junonia coenia</i>	
mosquito (8 species)	<i>Psorophora spp.</i>	P
water striders	<i>Rheumatobates spp.</i>	
mosquito (2 species)	<i>Toxorhynchites spp.</i>	
mosquito (3 species)	<i>Uranotaenia spp.</i>	P
mosquito (3 species)	<i>Wyeomyia spp.</i>	P
Phylum Bryozoa		
(moss-like animal)	<i>Bryozoa spp.</i>	
Phylum Chaetognatha		
arrow worm	<i>Ferrosagitta hispida</i>	
arrow worm	<i>Flaccisagitta enflata</i>	
arrow worm	<i>Parasagitta tenuis</i>	
arrow worm	<i>Sagitta spp.</i>	
Phylum Cnidaria (jellyfish, corals, hydroids, etc.)		
pale anemone	<i>Aiptasia spp.</i>	
moon jellyfish	<i>Aurelia aurita</i>	
ringed anemone	<i>Bartholomea annulata</i>	
Bougainvillia (hydromedusa)	<i>Bougainvillia spp.</i>	
warty sea anemone	<i>Bunodosoma cavernata</i>	
upside down jellyfish	<i>Cassiopea xamachana</i>	
sea nettle	<i>Chrysaora quinquecirrha</i>	
Clytia (hydromedusa)	<i>Clytia spp.</i>	
Eutima (hydromedusa)	<i>Eutima spp.</i>	
hydroid	<i>Hydrozoa spp.</i>	
colorful sea whip	<i>Leptogorgia virgulata</i>	
Liriope (hydromedusa)	<i>Liriope tetraphylla</i>	
stinging hydroid	<i>Macrorhynchia philippina</i>	
Obelia (hydromedusa)	<i>Obelia spp.</i>	
hard coral	<i>Oculina spp.</i>	
Portuguese man of war	<i>Physalia physalis</i>	
purple sea plume	<i>Pseudopterogorgia acerosa</i>	
mushroom jellyfish	<i>Rhopilema verrilli</i>	
massive starlet coral	<i>Siderastrea siderea</i>	
smooth star coral	<i>Solenastrea bournoni</i>	
Phylum Ctenophora (comb jellies, sea walnuts)		
comb jelly (ctenophore)	<i>Mnemiopsis spp.</i>	
Phylum Echinodermata (sea stars, sea urchins, sand dollars)		
brittle star	<i>Amphiodia spp.</i>	
brittle star	<i>Amphioplus abditus</i>	
brittle star	<i>Amphipholis gracillima</i>	
Atlantic purple sea urchin	<i>Arbacia punctulata</i>	
fissured sea cucumber	<i>Astichopus multifidus</i>	

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dwarf brittle star	<i>Axiognathus squamata</i>	
long-spined/black urchin	<i>Diadema antillarum</i>	
sand dollar	<i>Echinarachnius parma</i>	
sea star	<i>Echinaster spp.</i>	
slate-pencil urchin	<i>Eucidaris tribuloides</i>	
burrowing brittle star	<i>Hemipholis elongata</i>	
burrowing sea cucumber	<i>Holothuria arenicola</i>	
Florida sea cucumber	<i>Holothuria floridana</i>	
impatient sea cucumber	<i>Holothuria impatiens</i>	
sea cucumber	<i>Leptosynapta sp.</i>	
variegated sea urchin	<i>Lytechinus variegatus</i>	
brittle star	<i>Ophiactis spp.</i>	
black brittle star	<i>Ophiocoma echinata</i>	
red ophiocoma	<i>Ophiocoma wendtii</i>	
serpeant sea star	<i>Ophioderma sp.</i>	
slimy brittle star	<i>Ophiomyxa flaccida</i>	
Caribbean mud brittle star	<i>Ophionephthys limicola</i>	
reticulate brittle star	<i>Ophionereis reticulata</i>	
brittle star	<i>Ophiophragmus filograneus</i>	
mud brittle star	<i>Ophiophragmus wurdemani</i>	
brittle star	<i>Ophiopsila riisei</i>	
brittle star	<i>Ophiothrix sp.</i>	
scaly brittle star	<i>Ophiozoma impressa</i>	
pygmy sea cucumber	<i>Pentacta pygmaea</i>	
hairy sea cucumber	<i>Sclerodactyla briareus</i>	
four-sided sea cucumber	<i>Stichopus badionotus</i>	
synaptid	<i>Synaptula hydriformis</i>	
Mexican thylene sea cucumber	<i>Thyone mexicana</i>	
striped sea cucumber	<i>Thyonella gemmata</i>	
Phylum Platyhelminthes		
flatworms	<i>Platyhelminthes</i>	
Phylum Annelida (segmented worms)		
Class Polychaeta		
parchment tube worm	<i>Chaetopterus sp.</i>	
polychaete worms	<i>Eunicidae-Eunice</i>	
medusa worm	<i>Loimia medusa</i>	
clam polychaete worms	<i>Nereidae-Nereis</i>	
syllid polychaete worms	<i>Nereidoidea</i>	
trumpet worm	<i>Pectinaria gouldi</i>	
paddle polychaete worm	<i>Phyllodoceidae-Phyllodoce</i>	
mud worms	<i>Polydora websteri</i>	
feather duster worms	<i>Sabellastarte indica</i>	
Phylum Porifera (sponges)		
vase sponge	<i>Callyspongia sp.</i>	
yellow boring sponge	<i>Cliona celata</i>	
sponges	<i>Porifera spp.</i>	
purple encrusting sponge	<i>Pseudoceratina</i>	

B.3.2 / Listed Species

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Plants		
butterfly orchid	<i>Encyclia tampensis</i>	CE
stiff leaf wild pine	<i>Tillandsia fasciculata</i>	SE
twisted airplant	<i>Tillandsia flexuosa</i>	ST
giant wild pine	<i>Tillandsia utriculata</i>	SE
Animals		
Birds		
Florida grasshopper sparrow	<i>Ammodramus savannarum floridanus</i>	FE
rufa red knot	<i>Calidris canutus rufa</i>	FT
piping plover	<i>Charadrius melodus</i>	FT
snowy plover	<i>Charadrius nivosus</i>	ST
Marian's marsh wren	<i>Cistothorus palustris marianae</i>	ST
little blue heron	<i>Egretta caerulea</i>	ST
reddish egret	<i>Egretta rufescens</i>	ST
tricolored heron	<i>Egretta tricolor</i>	ST
southeastern American kestrel	<i>Falco sparverius paulus</i>	ST
American oystercatcher	<i>Haematopus palliatus</i>	ST
wood stork	<i>Mycteria americana</i>	FT
roseate spoonbill	<i>Platalea ajaja</i>	ST
black skimmer	<i>Rynchops niger</i>	ST
roseate tern	<i>Sterna dougallii</i>	FT
least tern	<i>Sternula antillarum</i>	ST
Mammals		
Florida manatee	<i>Trichechus manatus latirostris</i>	FE
Reptiles		
American alligator	<i>Alligator mississippiensis</i>	FT(S/A)
Atlantic loggerhead turtle	<i>Caretta caretta</i>	FT
Atlantic green turtle	<i>Chelonia mydas</i>	FT
American crocodile	<i>Crocodylus acutus</i>	FT
leatherback turtle	<i>Dermochelys coriacea</i>	FE
Atlantic hawksbill turtle	<i>Eretmochelys imbricata</i>	FE
Kemp's ridley turtle	<i>Lepidochelys kempii</i>	FE
Fishes		
smalltooth sawfish	<i>Pristis pectinata</i>	FE

B.3.3 / Invasive, Non-Native and/or Problem Species

Common Name	Species Name	Plants (FLEPPC* Category) Others (Invasive Status)
NN = non-native; P = problem; HAB = harmful algal bloom species.		
Bacteria		
cyanobacteria	<i>Anabaena circinalis</i>	HAB
cyanobacteria	<i>Cylindrospermopsis raciborskii</i>	HAB
Lyngbya	<i>Lyngbya majuscula</i>	HAB
Lyngbya	<i>Lyngbya wollei</i>	HAB
cyanobacteria	<i>Microcoleus lyngbyaceus</i>	HAB
cyanobacteria	<i>Microcystis aeruginosa</i>	HAB
filamentous cyanobacteria	<i>Oscillatoria sp.</i>	HAB
cyanobacteria	<i>Schizothrix calciola</i>	HAB
Chromists		
red tide	<i>Karenia brevis</i>	HAB
Green Algae		
mini Caulerpa	<i>Caulerpa brachypus</i>	NN
Caulerpa	<i>Caulerpa taxifolia</i>	NN
Ulva	<i>Ulva flexuosa</i>	P
Ulva	<i>Ulva intestinalis</i>	P
sea lettuce	<i>Ulva lactuca</i>	P
Ulva	<i>Ulva spp.</i>	P
Red Algae		
sheep's wool	<i>Acanthophora spicifera</i>	P
Gracilaria	<i>Gracilaria armata</i>	P
Gracilaria	<i>Gracilaria blodgettii</i>	P
Gracilaria	<i>Gracilaria bursa-pastoris</i>	P
Gracilaria	<i>Gracilaria cervicornis</i>	P
Gracilaria	<i>Gracilaria cylindrica</i>	P
Gracilaria	<i>Gracilaria damaecornis</i>	P
Gracilaria	<i>Gracilaria flabelliformis</i>	P
Gracilaria	<i>Gracilaria intermedia</i>	P
Gracilaria	<i>Gracilaria mammillaris</i>	P
Gracilaria	<i>Gracilaria spp.</i>	P
graceful red seaweed	<i>Gracilaria tikvahiae</i>	P
Gracilaria	<i>Gracilaria venezuelensis</i>	P
Hypnea	<i>Hypnea cornuta</i>	P
hook weed	<i>Hypnea musciformis</i>	P
Hypnea	<i>Hypnea spinella</i>	P
Hypnea	<i>Hypnea valentiae</i>	P
Laurencia	<i>Laurencia chondrioides</i>	P
Laurencia	<i>Laurencia intricata</i>	P
Flowering Plants		
rosary pea	<i>Abrus precatorius</i>	I
earleaf acacia	<i>Acacia auriculiformis</i>	I
alligator weed	<i>Alternanthera philoxeroides</i>	II
giant reed	<i>Arundo donax</i>	NN

Common Name	Species Name	Plants (FLEPPC* Category) Others (Invasive Status)
NN = non-native; P = problem; HAB = harmful algal bloom species.		
Australian pine	<i>Casuarina equisetifolia</i>	I
carrotwood	<i>Cupaniopsis anacardioides</i>	I
Brazilian waterweed	<i>Egeria densa</i>	NN
water hyacinth	<i>Eichhornia crassipes</i>	I
hydrilla	<i>Hydrilla verticillata</i>	I
water spinach	<i>Ipomoea aquatica</i>	I
lead tree	<i>Leucaena leucocephala</i>	II
purple loosestrife	<i>Lythrum salicaria</i>	NN
melaleuca	<i>Melaleuca quinquenervia</i>	I
Eurasian water-milfoil	<i>Myriophyllum spicatum</i>	II
water lettuce	<i>Pistia stratiotes</i>	I
castor bean	<i>Ricinus communis</i>	II
white twinevine	<i>Sacrostemma clausum</i>	P
giant salvinia	<i>Salvinia molesta</i>	NN
mother-in-laws tongue	<i>Sansevieria hyacinthoides</i>	II
Brazilian pepper	<i>Schinus terebinthifolius</i>	I
seaside mahoe	<i>Thespesia populnea</i>	I
poison ivy	<i>Toxicodendron radicans</i>	P
cat-tail	<i>Typha sp.</i>	P
Animals		
Birds		
cattle egret	<i>Bubulcus ibis</i>	NN
muscovy duck	<i>Cairina moschata</i>	NN
rock pigeon	<i>Columba livia</i>	NN
house sparrow	<i>Passer domesticus</i>	NN
Eurasian collared-dove	<i>Streptopelia decaocto</i>	NN
ringed turtle-dove	<i>Streptopelia risoria</i>	NN
European starling	<i>Sturnus vulgaris</i>	NN
Mammals		
coyote	<i>Canis latrans</i>	NN
nothern raccoon	<i>Procyon lotor</i>	P
feral hog	<i>Sus scrofa</i>	NN
Reptiles		
Cuban brown anole	<i>Anolis sagrei sagrei</i>	NN
Nile monitor	<i>Varanus niloticus</i>	NN
Amphibians		
cane toad	<i>Bufo marinus</i>	NN
greenhouse frog	<i>Eleutherodactylus planirostris</i>	NN
Cuban treefrog	<i>Osteopilus septentrionalis</i>	NN
bull frog	<i>Rana catesbeiana</i>	NN
Fishes		
Asian carp	<i>species unknown</i>	NN
oscar	<i>Astronotus ocellatus</i>	NN

Common Name	Species Name	Plants (FLEPPC* Category) Others (Invasive Status)
NN = non-native; P = problem; HAB = harmful algal bloom species.		
black acara	<i>Cichlasoma bimaculatum</i>	NN
Mayan cichlid	<i>Cichlasoma urophthalmus</i>	NN
armored catfish, brown hoplo	<i>Hoplosternum littorale</i>	NN
pleco, suckermouth catfish	<i>Pterygoplichthys multiradiatus</i>	NN
Asian swamp eel	<i>Monopterus albus</i>	NN
blue tilapia	<i>Oreochromis aureus</i>	NN
Mozambique tilapia	<i>Oreochromis mossambicus</i>	NN
common lionfish	<i>Pterois miles</i>	NN
red lionfish	<i>Pterois volitans</i>	NN
vermiculated sailfin catfish	<i>Pterygoplichthys disjunctivus</i>	NN
flathead catfish	<i>Pylodictis olivaris</i>	NN
blackchin tilapia	<i>Sarotherodon melanotheron</i>	NN
spotted tilapia	<i>Tilapia mariae</i>	NN
unknown tilapia	<i>Tilapia sp.</i>	NN
Mollusks and Crustaceans		
giant tiger prawn	<i>Penaeus monodon</i>	NN
Asian green mussel	<i>Perna viridis</i>	NN
titan acorn barnacle	<i>Megabalanus coccopoma</i>	NN
Insects		
mosquito (18 species)	<i>Aedes spp.</i>	P
mosquito (12 species)	<i>Anopheles spp.</i>	P
mosquito	<i>Coquillettidia perturbans</i>	P
mosquito	<i>Culex nigripalpus</i>	P
mosquito (15 species)	<i>Culex spp.</i>	P
mosquito	<i>Culiseta spp.</i>	P
crabhole mosquito	<i>Deinocerites cancer</i>	P
mosquito (3 species)	<i>Mansonia spp.</i>	P
black saltmarsh mosquito	<i>Ochlerotatus taeniorhynchus</i>	P
golden saltmarsh mosquito	<i>Ochlerotatus sollicitans</i>	P
mosquito	<i>Orthopodomyia alba</i>	P
lovebug	<i>Plecia nearctica</i>	NN
mosquito (8 species)	<i>Psorophora spp.</i>	P
mosquito (3 species)	<i>Uranotaenia spp.</i>	P
mosquito (3 species)	<i>Wyeomyia spp.</i>	P

*Florida Exotic Pest Plant Council (FLEPPC) categorizes invasive exotic plants as Category I (plants that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives) or Category II (plants that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species).

B.4 / Florida Master Site File Archaeological and Historical Sites List

Sites within Charlotte Harbor Aquatic Preserves boundary.		
Site ID	Site Name	Site Type
CH00001	CAYO PELAU	Land-terrestrial
CH00008	CEDAR POINT SHELL HEAP	Subsurface features are present
CH00009	CATFISH POINT	Habitation (prehistoric)
CH00012	VANDERBILT	Prehistoric shell midden
CH00013	NN	Habitation (prehistoric)
CH00014	NN	Habitation (prehistoric)
CH00015	CORAL CREEK	Prehistoric shell midden
CH00017	NO NAME	Habitation (prehistoric)
CH00022	NN	Prehistoric mound(s)
CH00027	NN	Habitation (prehistoric)
CH00028	NN	Habitation (prehistoric)
CH00029	NN	Habitation (prehistoric)
CH00032	GALLAGER KEY	Habitation (prehistoric)
CH00033	NN	Habitation (prehistoric)
CH00035	NN	Habitation (prehistoric)
CH00036	TURTLE BAY ONE	Land-terrestrial
CH00037	TURTLE BAY TWO	Habitation (prehistoric)
CH00042	NN	Building remains
CH00043	NN	Prehistoric shell midden
CH00044	NN	Campsite (prehistoric)
CH00048	CAPE HAZE	Habitation (prehistoric)
CH00050	NN	Prehistoric shell midden
CH00051	CATTLE DOCK POINT	Prehistoric shell midden
CH00052	NN	Prehistoric shell midden
CH00053	NN	Prehistoric shell midden
CH00054	NN	Land-terrestrial
CH00060	NN	Land-terrestrial
CH00061	DUNWOODY	Prehistoric burial(s)
CH00062	NN	Prehistoric shell midden
CH00068	AQUI ESTA MOUND	Prehistoric burial mound(s)
CH00070	HUCKABY CREEK MOUND	Prehistoric burial mound(s)
CH00071	MUDDY COVE 1	Destroyed
CH00072	MUDDY COVE TWO	Prehistoric shell midden
CH00073A	HUCKABY CREEK WEST	Campsite (prehistoric)
CH00073B	HUCKABY CREEK EAST	Campsite (prehistoric)
CH00087	TIPPCANOE BAY MIDDEN	Campsite (prehistoric)
CH00090	NN	Habitation (prehistoric)
CH00091	NN	Habitation (prehistoric)
CH00092	NN	Habitation (prehistoric)
CH00093	LAST CHANCE	Land-terrestrial
CH00348	BIRD DOG KEY	Habitation (prehistoric)
CH00349	NO NAME	Campsite (prehistoric)
CH00350	GRASSY POINT	Land-terrestrial
CH00353	DUBOIS	Land-terrestrial
CH00355	COCKROACH	Campsite (prehistoric)
CH00357	SILCOX NORTH	Campsite (prehistoric)
CH00358	SILCOX KEY	Campsite (prehistoric)
CH00359	BLACK'S ISLAND	Campsite (prehistoric)
CH00360	LIME KEY	Campsite (prehistoric)
CH00361	FINE'S KEY	Campsite (prehistoric)

Sites within Charlotte Harbor Aquatic Preserves boundary.

Site ID	Site Name	Site Type
CH00362	COTTON KEY	Campsite (prehistoric)
CH00363	LITTLE GASPARILLA ISLAND STATE PARK	Prehistoric shell midden
CH00364	LAGOON	Land-terrestrial
CH00365	STUMP PASS 1	Prehistoric shell midden
CH00366	STUMP PASS 2	Prehistoric shell midden
CH00367	PETERSON KEY	Prehistoric shell midden
CH00442	NO NAME ISLAND	Prehistoric shell midden
CH00461	EASTERNMOST GALLAGHER KEY	Historic earthworks
CH00462	BLANCHARD	Campsite (prehistoric)
CH00486	CREEK-BEND	Habitation (prehistoric)
CH00488	PROP-WASH	Prehistoric shell midden
CH00490	POWELL HOME	Building remains
CH00498	FISHERMAN'S VILLAGE MIDDEN	Land-terrestrial
CH00505	NARROW, T/MARKER 7	Prehistoric shell midden
CH00509	CROW KEY	
CH00650	Punta Gorda old Long Dock	Other
CH01585	Gasparilla Ice House Ruins	Building remains
CH02166	Cotty Loger	Habitation (prehistoric)
CH02168	Cutoff Point	Habitation (prehistoric)
CH02169	Neighboring Site	Habitation (prehistoric)
CH02173	Sea Daisy Site	Habitation (prehistoric)
CH02175	Baby Raccoon Site	Habitation (prehistoric)
CH02177	Cutoff Cove Site	Habitation (prehistoric)
CH02178	Wounded Foot Site	Habitation (prehistoric)
CH02179	Woolverton Site	Habitation (prehistoric)
CH02190	Catfish West	Habitation (prehistoric)
CH02192	Catfish Lagoon Wooden Platform	Specialized site for procurement of raw materials
CH02193	Cayo Pelau #5	Specialized site for procurement of raw materials
CH02195	Cayo Pelau #7	Habitation (prehistoric)
CH02196	Cayo Pelau #8	Habitation (prehistoric)
CH02197	Cayo Pelau #9	Habitation (prehistoric)
CH02706	The Fractured Site	Prehistoric burial(s)
CH02715	Cattle Dock Point Road	Land-terrestrial
LL00027	GALT ISLAND	Prehistoric shell midden
LL00028	REGLA KEY	Land-terrestrial
LL00029	CORAL KEY	Historic burial(s)
LL00030	HOOKER KEY	Campsite (prehistoric)
LL00032	JOSSLYN ISLAND	Campsite (prehistoric)
LL00033	PINELAND (PINELAND COMPLEX)	Habitation (prehistoric)
LL00035	BOKEELIA BEACH	Prehistoric shell midden
LL00039	INDIAN FIELD	Land-terrestrial
LL00044	HOWARD MOUND	Prehistoric shell midden
LL00045	CALUSA ISLAND MIDDEN	Land-terrestrial
LL00046	BOKEELIA 3	Prehistoric shell midden
LL00047	LITTLE BOKEELIA ISLAND	Prehistoric shell midden
LL00049	PATRICIO KEY	Land-terrestrial
LL00051	USEPPA ISLAND	Prehistoric burial(s)
LL00052	MONDONGO ISLAND	Prehistoric shell midden
LL00054	WIGHTMAN	Prehistoric shell midden
LL00055	BUCK KEY BURIAL MOUND	Land-terrestrial
LL00063	MCCARDLE ISLAND	Prehistoric shell midden

Sites within Charlotte Harbor Aquatic Preserves boundary.

Site ID	Site Name	Site Type
LL00064	BIRD ROOKERY KEYS	Land-terrestrial
LL00065	MASON ISLAND	Campsite (prehistoric)
LL00067	CAYO TUNA	Land-terrestrial
LL00068	LITTLE PANTHER KEY	Prehistoric shell midden
LL00069	BENEDICT KEY (JIB KEY)	Prehistoric midden(s)
LL00070	RAT KEY	Land-terrestrial
LL00071	CABBAGE KEY	Habitation (prehistoric)
LL00072	MIDDLE KEY	Prehistoric shell midden
LL00074	BIG SMOKEHOUSE KEY	Prehistoric shell midden
LL00076	CABBAGE KEY II	Prehistoric shell midden
LL00077	NN	Prehistoric shell midden
LL00078	BUZZARD ROOST	Prehistoric shell midden
LL00085	NN	Artifact scatter-low density (< 2 per sq meter)
LL00087	FAULKNER MOUND	House
LL00091	NN	Habitation (prehistoric)
LL00091A	NN	Artifact scatter-low density (< 2 per sq meter)
LL00100	NN	Prehistoric shell midden
LL00101	NN	Prehistoric shell midden
LL00102	NN	Habitation (prehistoric)
LL00111	DR WILSON'S SANCTUARY 3	Prehistoric shell midden
LL00116	DR WILSON'S SANCTUARY 4E	Prehistoric midden(s)
LL00123	DR WILSON'S SANCTUARY 2	Prehistoric midden(s)
LL00648	PART ISLAND	Prehistoric shell midden
LL00649	COVE KEY	Land-terrestrial
LL00700A	QUARANTINE STATION	Industrial
LL00700B	PILOTS/QUARANTINE STATION DOCK	Wharf midden-underwater
LL00700C	SAND DOLLAR WRECK	Historic shipwreck
LL00700D	SCATTERED HISTORIC REFUSE/QUAR STAT D	Underwater disposal midden
LL00702	CLARK 1	Prehistoric shell midden
LL00721	BUCK KEY 1	Specialized site for procurement of raw materials
LL00722	BUCK KEY 2	Subsurface features are present
LL00733	FOSTER BAY MIDDEN	Prehistoric shell midden
LL00734	FOSTER BAY HOMESTEAD	House
LL00739	SAND FLY KEY	Habitation (prehistoric)
LL00749	NN	Prehistoric shell midden
LL00753	OLD TOM BAYOU I	Prehistoric shell midden
LL00754	OLD TOM BAYOU II	Prehistoric shell midden
LL00755	CAPTIVA ROCKS	House
LL00757	NN (PINELAND COMPLEX)	Prehistoric shell midden
LL00763	LITTLE BOKEELIA BAY	Prehistoric mound(s)
LL00766	WOODRINGS POINT	Cistern
LL00768	YORK ISLAND I	Prehistoric shell midden
LL00769	YORK ISLAND II	Prehistoric shell midden
LL00773	MCCARDLE ISLAND II	Prehistoric shell midden
LL00774	RECKEMS POINT	Prehistoric shell midden
LL01412	NN	Prehistoric shell midden
LL01413	NN	
LL01430A	JOHNSON HOUSE	Building remains
LL01453	LITTLE BOKEELIA ISLAND 1	Prehistoric mound(s)
LL01454	LITTLE BOKEELIA ISLAND 2	Prehistoric mound(s)

Sites within Charlotte Harbor Aquatic Preserves boundary.

Site ID	Site Name	Site Type
LL01455	LITTLE BOKEELIA ISLAND 3	Prehistoric mound(s)
LL01456	LITTLE BOKEELIA ISLAND 4	Prehistoric mound(s)
LL01491	POST OFFICE MIDDEN	Prehistoric midden(s)
LL01606	MARK PARDO SHELLWORKS	Prehistoric shell midden
LL01607	WULFERT POINT MIDDEN	Prehistoric midden(s)
LL01913	MATLACHA PASS 1	Campsite (prehistoric)
LL01918	CHARLOTTE HARBOR CLAM CO #1	Campsite (prehistoric)
LL01919	CHARLOTTE HARBOR CLAM CO #2	Campsite (prehistoric)
LL01942	HOAGEN KEY	Prehistoric shell midden
LL01943	SISTERS KEY	Prehistoric shell midden
LL01944	BG #4	Prehistoric shell midden
LL01946	BOCA GRANDE #1	Prehistoric shell midden
LL01953	BUCK KEY 4	Land-terrestrial
LL01954	BUCK KEY 5	Agriculture/Farm structure
LL02021	WHICH WAY SITE	Land-terrestrial
LL02446	Gopher's Crossing Historic Bottle Dump	Land-terrestrial
LL02491	Fish Weir	Habitation (prehistoric)
LL02492	Sword Point Pond	Lake/Pond-lacustrine
LL02493	Blocker Site	Prehistoric midden(s)
LL02578	Cayo Pelau #3	Habitation (prehistoric)
LL02579	Cayo Pelau #4	Habitation (prehistoric)
LL02580	Cayo Pelau #10	Habitation (prehistoric)
LL02581	Cayo Pelau #6	Habitation (prehistoric)
LL02624	Buck Key South	Land-terrestrial
SO00010	FORKED CREEK POINT MIDDEN	Prehistoric shell midden
SO00011	LEMON BAY	Prehistoric shell midden
SO00012	SECOND POINT NORTH OF LEMON BAY FISHERIE	Artifact scatter-low density (< 2 per sq meter)
SO00024	GORY	Prehistoric burial(s)
SO00064	FORKED CREEK MOUND	Prehistoric shell midden
SO00100	MANASOTA KEY BRIDGE	Destroyed
SO00399	BLIND PASS MIDDEN	Specialized site for procurement of raw materials
SO01359	LEMON BAY FISHERY COMPLEX	House
SO01373	6855 MANASOTA KEY ROAD ARCHAEOLOGICAL SITE	Prehistoric shell midden
SO01374	FORD MIDDEN	Campsite (prehistoric)
SO02306	JUVENILE FIGHTING CONCH SHELL	Campsite (prehistoric)
SO05277	Lemon Bay Park Addition	Habitation (prehistoric)

Sites within 164 feet (50 meters) of Charlotte Harbor Aquatic Preserves' boundary.

Site ID	Site Name	Site Type
CH00001	CAYO PELAU	Land-terrestrial
CH00006	ANGER SHELL HEAP	Land-terrestrial
CH00008	CEDAR POINT SHELL HEAP	Subsurface features are present
CH00009	CATFISH POINT	Habitation (prehistoric)
CH00010	BIG MOUND KEY	Campsite (prehistoric)
CH00011	ANGER	Habitation (prehistoric)
CH00012	VANDERBILT	Prehistoric shell midden
CH00013	NN	Habitation (prehistoric)
CH00014	NN	Habitation (prehistoric)
CH00015	CORAL CREEK	Prehistoric shell midden

Sites within 164 feet (50 meters) of Charlotte Harbor Aquatic Preserves' boundary.

Site ID	Site Name	Site Type
CH00017	NO NAME	Habitation (prehistoric)
CH00020	NN	Habitation (prehistoric)
CH00021	PLACIDA 2	Campsite (prehistoric)
CH00022	NN	Prehistoric mound(s)
CH00025	NN	Prehistoric burial(s)
CH00027	NN	Habitation (prehistoric)
CH00028	NN	Habitation (prehistoric)
CH00029	NN	Habitation (prehistoric)
CH00032	GALLAGER KEY	Habitation (prehistoric)
CH00033	NN	Habitation (prehistoric)
CH00035	NN	Habitation (prehistoric)
CH00036	TURTLE BAY ONE	Land-terrestrial
CH00037	TURTLE BAY TWO	Habitation (prehistoric)
CH00038	CASH MOUND	Prehistoric shell midden
CH00039	NN	Habitation (prehistoric)
CH00040	NN	Habitation (prehistoric)
CH00042	NN	Building remains
CH00043	NN	Prehistoric shell midden
CH00044	NN	Campsite (prehistoric)
CH00048	CAPE HAZE	Habitation (prehistoric)
CH00049	HALFWAY	Prehistoric shell midden
CH00050	NN	Prehistoric shell midden
CH00051	CATTLE DOCK POINT	Prehistoric shell midden
CH00052	NN	Prehistoric shell midden
CH00053	NN	Prehistoric shell midden
CH00054	NN	Land-terrestrial
CH00056	NN	Campsite (prehistoric)
CH00058	NO NAME	Habitation (prehistoric)
CH00060	NN	Land-terrestrial
CH00061	DUNWOODY	Prehistoric burial(s)
CH00062	NN	Prehistoric shell midden
CH00068	AQUI ESTA MOUND	Prehistoric burial mound(s)
CH00070	HUCKABY CREEK MOUND	Prehistoric burial mound(s)
CH00071	MUDDY COVE 1	Destroyed
CH00072	MUDDY COVE TWO	Prehistoric shell midden
CH00073A	HUCKABY CREEK WEST	Campsite (prehistoric)
CH00073B	HUCKABY CREEK EAST	Campsite (prehistoric)
CH00087	TIPPCANOE BAY MIDDEN	Campsite (prehistoric)
CH00089	NN	Habitation (prehistoric)
CH00090	NN	Habitation (prehistoric)
CH00091	NN	Habitation (prehistoric)
CH00092	NN	Habitation (prehistoric)
CH00093	LAST CHANCE	Land-terrestrial
CH00348	BIRD DOG KEY	Habitation (prehistoric)
CH00349	NO NAME	Campsite (prehistoric)
CH00350	GRASSY POINT	Land-terrestrial
CH00351	FISH HOOK	Prehistoric burial(s)
CH00353	DUBOIS	Land-terrestrial
CH00354	ALLIGATOR CREEK MOUND	Prehistoric shell midden
CH00355	COCKROACH	Campsite (prehistoric)
CH00357	SILCOX NORTH	Campsite (prehistoric)

Sites within 164 feet (50 meters) of Charlotte Harbor Aquatic Preserves' boundary.

Site ID	Site Name	Site Type
CH00358	SILCOX KEY	Campsite (prehistoric)
CH00359	BLACK'S ISLAND	Campsite (prehistoric)
CH00360	LIME KEY	Campsite (prehistoric)
CH00361	FINE'S KEY	Campsite (prehistoric)
CH00362	COTTON KEY	Campsite (prehistoric)
CH00363	LITTLE GASPARILLA ISLAND STATE PARK	Prehistoric shell midden
CH00364	LAGOON	Land-terrestrial
CH00365	STUMP PASS 1	Prehistoric shell midden
CH00366	STUMP PASS 2	Prehistoric shell midden
CH00367	PETERSON KEY	Prehistoric shell midden
CH00368	RIDGE	Prehistoric shell midden
CH00442	NO NAME ISLAND	Prehistoric shell midden
CH00449	THE JOHN QUIET LAKES SHELL MIDDEN	Prehistoric shell midden
CH00461	EASTERNMOST GALLAGHER KEY	Historic earthworks
CH00462	BLANCHARD	Campsite (prehistoric)
CH00463	SAM KNIGHT CREEK # 1	Single artifact or isolated find
CH00464	SAM KNIGHT CREEK # 2	Artifact scatter-low density (< 2 per sq meter)
CH00465	DOOLITTLE WATERWAY RAILROAD BRIDGE	River/Stream/Creek-riverine
CH00466	EASTWIND & CRESTWOOD WATERWAYS RAILROAD	River/Stream/Creek-riverine
CH00486	CREEK-BEND	Habitation (prehistoric)
CH00487	BUMBLEBEE	Prehistoric shell midden
CH00488	PROP-WASH	Prehistoric shell midden
CH00489	NN	Building remains
CH00490	POWELL HOME	Building remains
CH00497	CHRISTOPHER WATERWAY MIDDEN	Campsite (prehistoric)
CH00498	FISHERMAN'S VILLAGE MIDDEN	Land-terrestrial
CH00505	NARROW, T/MARKER 7	Prehistoric shell midden
CH00509	CROW KEY	
CH00513	GRANDE PRESERVE SITE	Tidal-estuarine
CH00636	Creekside	Campsite (prehistoric)
CH00637	Old Pecan	Campsite (prehistoric)
CH00639	Alligator Creek South	Campsite (prehistoric)
CH00650	Punta Gorda old Long Dock	Other
CH01585	Gasparilla Ice House Ruins	Building remains
CH01586	Edic Site	Prehistoric shell midden
CH01937	Tom's Mound	Habitation (prehistoric)
CH02160	Peny's Mound	Habitation (prehistoric)
CH02161	Kristian's Midden	Habitation (prehistoric)
CH02166	Cotty Loger	Habitation (prehistoric)
CH02167	Washover	Habitation (prehistoric)
CH02168	Cutoff Point	Habitation (prehistoric)
CH02169	Neighboring Site	Habitation (prehistoric)
CH02170	Two Bumps Site	Habitation (prehistoric)
CH02171	Exclamation Site	Habitation (prehistoric)
CH02172	Cape Haze Bay Site	Habitation (prehistoric)
CH02173	Sea Daisy Site	Habitation (prehistoric)
CH02174	Terrapin Site	Habitation (prehistoric)
CH02175	Baby Raccoon Site	Habitation (prehistoric)
CH02176	Big Cutoff Site	Habitation (prehistoric)

Sites within 164 feet (50 meters) of Charlotte Harbor Aquatic Preserves' boundary.

Site ID	Site Name	Site Type
CH02177	Cutoff Cove Site	Habitation (prehistoric)
CH02178	Wounded Foot Site	Habitation (prehistoric)
CH02179	Woolverton Site	Habitation (prehistoric)
CH02180	Buttonwood (Ridges)	Habitation (prehistoric)
CH02190	Catfish West	Habitation (prehistoric)
CH02191	Cape Haze Midden East	Habitation (prehistoric)
CH02192	Catfish Lagoon Wooden Platform	Specialized site for procurement of raw materials
CH02193	Cayo Pelau #5	Specialized site for procurement of raw materials
CH02195	Cayo Pelau #7	Habitation (prehistoric)
CH02196	Cayo Pelau #8	Habitation (prehistoric)
CH02197	Cayo Pelau #9	Habitation (prehistoric)
CH02705	The Angry Fisherman Site	Habitation (prehistoric)
CH02706	The Fractured Site	Prehistoric burial(s)
CH02715	Cattle Dock Point Road	Land-terrestrial
LL00027	GALT ISLAND	Prehistoric shell midden
LL00028	REGLA KEY	Land-terrestrial
LL00029	CORAL KEY	Historic burial(s)
LL00030	HOOKER KEY	Campsite (prehistoric)
LL00032	JOSSLYN ISLAND	Campsite (prehistoric)
LL00033	PINELAND (PINELAND COMPLEX)	Habitation (prehistoric)
LL00035	BOKEELIA BEACH	Prehistoric shell midden
LL00039	INDIAN FIELD	Land-terrestrial
LL00044	HOWARD MOUND	Prehistoric shell midden
LL00045	CALUSA ISLAND MIDDEN	Land-terrestrial
LL00046	BOKEELIA 3	Prehistoric shell midden
LL00047	LITTLE BOKEELIA ISLAND	Prehistoric shell midden
LL00049	PATRICIO KEY	Land-terrestrial
LL00051	USEPPA ISLAND	Prehistoric burial(s)
LL00052	MONDONGO ISLAND	Prehistoric shell midden
LL00053	TARPON BAY, SANIBEL ISLAND	Prehistoric burial(s)
LL00054	WIGHTMAN	Prehistoric shell midden
LL00055	BUCK KEY BURIAL MOUND	Land-terrestrial
LL00063	MCCARDLE ISLAND	Prehistoric shell midden
LL00064	BIRD ROOKERY KEYS	Land-terrestrial
LL00065	MASON ISLAND	Campsite (prehistoric)
LL00067	CAYO TUNA	Land-terrestrial
LL00068	LITTLE PANTHER KEY	Prehistoric shell midden
LL00069	BENEDICT KEY (JIB KEY)	Prehistoric midden(s)
LL00070	RAT KEY	Land-terrestrial
LL00071	CABBAGE KEY	Habitation (prehistoric)
LL00072	MIDDLE KEY	Prehistoric shell midden
LL00074	BIG SMOKEHOUSE KEY	Prehistoric shell midden
LL00076	CABBAGE KEY II	Prehistoric shell midden
LL00077	NN	Prehistoric shell midden
LL00078	BUZZARD ROOST	Prehistoric shell midden
LL00084	JACKS POINT	Artifact scatter-low density (< 2 per sq meter)
LL00085	NN	Artifact scatter-low density (< 2 per sq meter)
LL00087	FAULKNER MOUND	House
LL00091	NN	Habitation (prehistoric)
LL00091A	NN	Artifact scatter-low density (< 2 per sq meter)
LL00100	NN	Prehistoric shell midden

Sites within 164 feet (50 meters) of Charlotte Harbor Aquatic Preserves' boundary.

Site ID	Site Name	Site Type
LL00101	NN	Prehistoric shell midden
LL00102	NN	Habitation (prehistoric)
LL00111	DR WILSON'S SANCTUARY 3	Prehistoric shell midden
LL00112	DR WILSON'S SANCTUARY 4A	Prehistoric shell midden
LL00113	DR WILSON'S SANCTUARY 4B	Prehistoric shell midden
LL00114	DR WILSON'S SANCTUARY 4C	Prehistoric midden(s)
LL00115	DR WILSON'S SANCTUARY 4D	Prehistoric midden(s)
LL00116	DR WILSON'S SANCTUARY 4E	Prehistoric midden(s)
LL00119	KESSON'S BAYOU SHELL MOUND	Prehistoric shell midden
LL00123	DR WILSON'S SANCTUARY 2	Prehistoric midden(s)
LL00648	PART ISLAND	Prehistoric shell midden
LL00649	COVE KEY	Land-terrestrial
LL00698	NORTH CAPTIVA 1	Prehistoric shell midden
LL00700A	QUARANTINE STATION	Industrial
LL00700B	PILOTS/QUARANTINE STATION DOCK	Wharf midden-underwater
LL00700C	SAND DOLLAR WRECK	Historic shipwreck
LL00700D	SCATTERED HISTORIC REFUSE/QUAR STAT D	Underwater disposal midden
LL00702	CLARK 1	Prehistoric shell midden
LL00704	CLARK 3	Land-terrestrial
LL00721	BUCK KEY 1	Specialized site for procurement of raw materials
LL00722	BUCK KEY 2	Subsurface features are present
LL00733	FOSTER BAY MIDDEN	Prehistoric shell midden
LL00734	FOSTER BAY HOMESTEAD	House
LL00739	SAND FLY KEY	Habitation (prehistoric)
LL00749	NN	Prehistoric shell midden
LL00753	OLD TOM BAYOU I	Prehistoric shell midden
LL00754	OLD TOM BAYOU II	Prehistoric shell midden
LL00755	CAPTIVA ROCKS	House
LL00757	NN (PINELAND COMPLEX)	Prehistoric shell midden
LL00763	LITTLE BOKEELIA BAY	Prehistoric mound(s)
LL00764	BIG JIM CREEK	Prehistoric mound(s)
LL00766	WOODRINGS POINT	Cistern
LL00768	YORK ISLAND I	Prehistoric shell midden
LL00769	YORK ISLAND II	Prehistoric shell midden
LL00773	MCCARDLE ISLAND II	Prehistoric shell midden
LL00774	RECKEMS POINT	Prehistoric shell midden
LL00784	SWEETWATER 2	Prehistoric burial mound(s)
LL01412	NN	Prehistoric shell midden
LL01413	NN	
LL01430A	JOHNSON HOUSE	Building remains
LL01431A	CAPTAIN HAINS MIDDEN	Homestead
LL01446	NORTH CAPTIVA SAFETY HARBOR	Prehistoric shell midden
LL01453	LITTLE BOKEELIA ISLAND 1	Prehistoric mound(s)
LL01454	LITTLE BOKEELIA ISLAND 2	Prehistoric mound(s)
LL01455	LITTLE BOKEELIA ISLAND 3	Prehistoric mound(s)
LL01456	LITTLE BOKEELIA ISLAND 4	Prehistoric mound(s)
LL01491	POST OFFICE MIDDEN	Prehistoric midden(s)
LL01606	MARK PARDO SHELLWORKS	Prehistoric shell midden
LL01607	WULFERT POINT MIDDEN	Prehistoric midden(s)
LL01648	FLETCHER	

Sites within 164 feet (50 meters) of Charlotte Harbor Aquatic Preserves' boundary.

Site ID	Site Name	Site Type
LL01913	MATLACHA PASS 1	Campsite (prehistoric)
LL01918	CHARLOTTE HARBOR CLAM CO #1	Campsite (prehistoric)
LL01919	CHARLOTTE HARBOR CLAM CO #2	Campsite (prehistoric)
LL01942	HOAGEN KEY	Prehistoric shell midden
LL01943	SISTERS KEY	Prehistoric shell midden
LL01944	BG #4	Prehistoric shell midden
LL01946	BOCA GRANDE #1	Prehistoric shell midden
LL01953	BUCK KEY 4	Land-terrestrial
LL01954	BUCK KEY 5	Agriculture/Farm structure
LL02021	WHICH WAY SITE	Land-terrestrial
LL02023	LAACKONEN SITE	Land-terrestrial
LL02322	Captiva Pass/Cayo Costa State Park	Prehistoric shell midden
LL02333	Bokeelia Midden I	Campsite (prehistoric)
LL02334	Bokeelia Midden II	Campsite (prehistoric)
LL02446	Gopher's Crossing Historic Bottle Dump	Land-terrestrial
LL02491	Fish Weir	Habitation (prehistoric)
LL02492	Sword Point Pond	Lake/Pond-lacustrine
LL02493	Blocker Site	Prehistoric midden(s)
LL02548	Redfish Shores Mound	Land-terrestrial
LL02578	Cayo Pelau #3	Habitation (prehistoric)
LL02579	Cayo Pelau #4	Habitation (prehistoric)
LL02580	Cayo Pelau #10	Habitation (prehistoric)
LL02581	Cayo Pelau #6	Habitation (prehistoric)
LL02624	Buck Key South	Land-terrestrial
SO00008	MANASOTA KEY	Destroyed
SO00009	COVE	Prehistoric midden(s)
SO00010	FORKED CREEK POINT MIDDEN	Prehistoric shell midden
SO00011	LEMON BAY	Prehistoric shell midden
SO00012	SECOND POINT NORTH OF LEMON BAY FISHERIE	Artifact scatter-low density (< 2 per sq meter)
SO00013	DAVIDS	Prehistoric midden(s)
SO00023	PAULSEN POINT	Prehistoric shell midden
SO00024	GORY	Prehistoric burial(s)
SO00064	FORKED CREEK MOUND	Prehistoric shell midden
SO00065	CHEROKEE MIDDEN	Destroyed
SO00100	MANASOTA KEY BRIDGE	Destroyed
SO00399	BLIND PASS MIDDEN	Specialized site for procurement of raw materials
SO00598	STOLTZNER	Artifact scatter-low density (< 2 per sq meter)
SO01359	LEMON BAY FISHERY COMPLEX	House
SO01360	PAULSEN POINT PREHISTORIC CEMETERY	Prehistoric burial(s)
SO01369	JOHNSON MIDDEN	Habitation (prehistoric)
SO01370	SEVERINSEN MIDDEN	Campsite (prehistoric)
SO01372	HERMITAGE MIDDEN	Campsite (prehistoric)
SO01373	6855 MANASOTA KEY ROAD ARCHAEOLOGICAL SITE	Prehistoric shell midden
SO01374	FORD MIDDEN	Campsite (prehistoric)
SO02306	JUVENILE FIGHTING CONCH SHELL	Campsite (prehistoric)
SO05277	Lemon Bay Park Addition	Habitation (prehistoric)

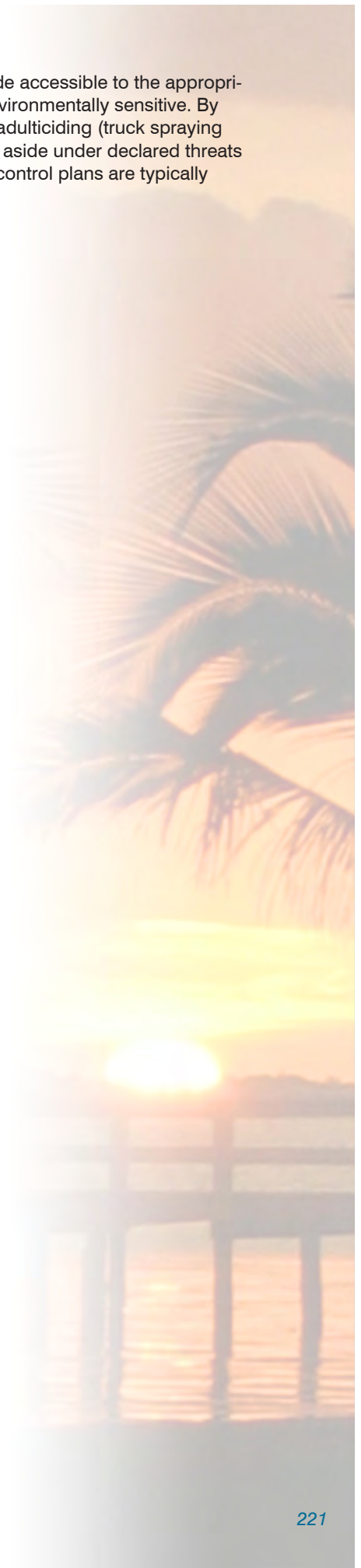
B.5 / Reports and Publications using Charlotte Harbor Aquatic Preserves' Data

- Bortone, S. A., Milbrandt, E., & Greenawalt, J. (2003). *Assessment report on the status and trends of the environmental and ecological components in the waters surrounding Sanibel and Captiva islands*. Sanibel, FL: Sanibel-Captiva Conservation Foundation.
- Bridger, K. (2010). *Fecal coliform TMDL for Gottfried Creek, WBID 2049*. (TMDL Report). Tallahassee, FL: Florida Department of Environmental Protection.
- Brown, M. A. (2011). *Charlotte Harbor Aquatic Preserves' eleven year results of the seagrass transect monitoring program (1999-2009)*. Tallahassee, FL: Florida Department of Environmental Protection.
- Brown, M., Leary, R., Langenberg, N., McMurray, M., & Stafford, H. (2013). Results of the Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves' seagrass monitoring program from 1999-2009. *Florida Scientist*, 76(2):92-106.
- Charlotte Harbor Environmental Center, Inc & Charlotte Harbor Aquatic Preserves Florida Department of Environmental Protection. (2006). *Seagrass transect data summary and analysis from a six-year period: 1999-2004*. Tampa, FL: Southwest Florida Water Management District.
- Charlotte Harbor National Estuary Program. (2005). *Environmental indicators for the Charlotte Harbor National Estuary Program*. (Charlotte Harbor National Estuary Program Technical Report 05-1). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Charlotte Harbor National Estuary Program. (2006). *Lower Charlotte Harbor reconnaissance report*. Fort Myers, FL: South Florida Water Management District.
- Charlotte Harbor National Estuary Program. (2007). Gulf of Mexico National Estuary Program coastal condition, Charlotte Harbor National Estuary Program. In *National Estuary Program Coastal Condition Report* (pp. 223-312). U.S. Environmental Protection Agency.
- Charlotte Harbor National Estuary Program. (2010). Watershed approach lowers fecal coliform in Pine Island Sound. In *Watershed Improvement Summary, Florida*. U.S. Environmental Protection Agency.
- Corbett, C. A. (2006). *Numeric Water Quality Targets for Lemon Bay, Charlotte Harbor and Estero Bay, Florida*. (Charlotte Harbor National Estuary Program Technical Report 06-3). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Corbett, C. A., & Hale, J. A. (2006). Development of water quality targets for Charlotte harbor, Florida using seagrass light requirements. *Florida Scientist*, 69(2):36-50.
- Corbett, C. A., Doering, P. H., Madley, K. A., Ott, J. A. & Tomasko, D. A. (2005). Issues with using seagrass as an indicator of ecosystem condition. In *Estuarine Indicators* (p. 229-245). Bortone, S.A. (Ed.). Boca Raton, FL: CRC Press.
- Duffey, R., Leary, R. E. & Ott, J. (2007). *Charlotte Harbor & Estero Bay Aquatic Preserves water quality status & trends for 1998-2005*. (FDEP/CHAP Technical Report #2).
- Flannery, M. S., Chen, X., Dixon, L. K., Estevez, E. D., & Leverone, J. (2011). *The determination of minimum flows for the lower Myakka River*. Southwest Florida Water Management District.
- Florida Department of Agriculture and Consumer Services. (2007). *Aquaculture coordination and monitoring*. (FDACS Publication DACS-P-01528). Tallahassee, FL: Florida Department of Agriculture and Consumer Services.
- Florida Department of Environmental Protection. (2006). *Integrated water quality assessment for Florida: 2006 305(b) Report and 303(d) List Update*. Florida Department of Environmental Protection.
- Florida Department of Environmental Protection. (2008). *Integrated water quality assessment for Florida: 2008 305(b) Report and 303(d) List Update*. Florida Department of Environmental Protection.
- Florida Department of Environmental Protection. (2010). *Integrated water quality assessment for Florida: 2010 305(b) Report and 303(d) List Update*. Tallahassee, FL: Florida Department of Environmental Protection.
- Florida Department of Environmental Protection. (2013). *Technical support document: derivation of dissolved oxygen criteria to protect aquatic life in Florida's fresh and marine waters*. Florida Department of Environmental Protection..
- Florida Fish and Wildlife Conservation Commission; Fish and Wildlife Research Institute. (2011). *Seagrass integrated mapping and monitoring for the state of Florida*. (Mapping and Monitoring Report #1). Yarbro, L.A. & Carlson Jr., P.A. (Eds.). St. Petersburg, FL: Florida Fish and Wildlife Conservation Commission.
- Gilpin, E. (1998). Charlotte Harbor estuaries volunteer water quality monitoring network, northern Charlotte Harbor group: 1st annual report, Spring 1998. FDEP/CHAP Publication.
- Greenawalt-Boswell, J. M., Hale, J. S, Fuhr, K. S. & Ott, J. A. (2006). Seagrass species composition and distribution trends in relation to salinity fluctuations in Charlotte Harbor, Florida. *Florida Scientist*, 69(2):24-35.
- Janicki Environmental, Inc. (2007). *Water quality data analysis and report for the Charlotte Harbor National Estuary Program*. Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2009). *Water quality targets refinement project, task 1: harbor segmentation scheme*. (Report 1). Fort Myers, FL: Charlotte Harbor National Estuary Program
- Janicki Environmental, Inc. (2010). *Final water quality target refinement project, task 4: pollutant loading estimates development*. (Report 4). Fort Myers, FL: Charlotte Harbor National Estuary Program.

- Janicki Environmental, Inc. (2010). *Water quality target refinement project, task 6: numeric nutrient criteria data analysis plan*. (Report 5). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2011). *Water quality target refinement project, task 7: numeric nutrient criteria development*. (Report 6). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2011). *Charlotte Harbor numeric nutrient criteria: task 8 - tn and tp loading and concentration based criteria*. (Letter Memorandum). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2011). *Charlotte Harbor numeric nutrient criteria: task 8 supplement - tidal creeks*. (Letter Memorandum). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2011). *Charlotte Harbor numeric nutrient criteria: task 9 - downstream protection values*. (Letter Memorandum). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2011). *Charlotte Harbor National Estuary Program numeric nutrient criteria: task 10 - dissolved oxygen*. (Letter Memorandum). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki Environmental, Inc. (2011). *Charlotte Harbor numeric nutrient criteria: task 11- implementation issues*. (Letter Memorandum). Fort Myers, FL: Charlotte Harbor National Estuary Program.
- Janicki, T., Pribble, R., Wessel, M. & Hackett, K. (2010). *Empirical approaches to establishing numeric nutrient criteria for southwest Florida estuaries*. Tampa Bay, Sarasota Bay, and Charlotte Harbor National Estuary Programs.
- Leary, R. E. (2008). *Charlotte Harbor & Estero Bay Aquatic preserves water quality status & trends for 1998–2005; Citizens Summary*. Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves Office.
- Leary, R. E. (2009). *Comparison of water quality results from fixed station and random sampling monitoring programs in the Charlotte Harbor and Estero Bay Aquatic Preserves: 2001–2007*. (FDEP/CHAP Technical Report #3). Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves Office.
- Leary, R. E. (2010). *State of the coasts for the charlotte harbor estuary: 40-year status and trends, 1970-2009*. Draft under review. Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves Office.
- Leary, R. E. (2011). *Documentation of screening for outliers, testing statistical assumptions, and trends showing statistical significance for seagrass transect monitoring within the Matlacha Pass Aquatic Preserve (1999–2009)*. Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves Office.
- Leary, R. E. (2011). *Seagrass dynamics within the Matalacha Pass Aquatic Preserve along fixed transects (1999–2009)*. Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves Office.
- Leary, R. E. (2011). *Documentation of screening for outliers, testing statistical assumptions, and trends showing statistical significance for continuous water quality monitoring within the Matlacha Pass Aquatic Preserve (2005–2011)*. Florida Department of Environmental Protection, Charlotte Harbor Aquatic Preserves Office.
- Magley, W. (2012). *Evaluation of available data sonde datasets in Florida's estuarine and coastal waters*. Florida Department of Environmental Protection.
- Ott, J. A., Duffey, R. M., Erickson, S. E., Fuhr, K. S., Rodgers, B. A. & Schneider, M. A. (2006). Comparison of light limiting water quality factors in six Florida aquatic preserves. *Florida Scientist*, 69(2):73-91.
- South Florida Water Management District. (2008). *South Florida wading bird report* (Volume 14). Cook, M. I. & Kobza, M. (Eds.). South Florida Water Management District.
- South Florida Water Management District. (2008). *Surface water improvement & management plan*. South Florida Water Management District.
- South Florida Water Management District. (2009). *South Florida wading bird report* (Volume 15). Cook, M. I. & Kobza, M. (Eds.). South Florida Water Management District.
- South Florida Water Management District. (2010). *South Florida wading bird report* (Volume 16). Cook, M. I. & Kobza, M. (Eds.). South Florida Water Management District.
- South Florida Water Management District. (2012). *South Florida wading bird report* (Volume 18). Cook, M. I. & Kobza, M. (Eds.). South Florida Water Management District.
- South Florida Water Management District. (2013). *South Florida wading bird report* (Volume 19). Cook, M. I. & Kobza, M. (Eds.). Florida Water Management District.
- Stearns, C. (2007). *Seagrass annual data summary from the Charlotte Harbor & Estero Bay aquatic preserves seagrass transect monitoring program 1999–2006*. Florida Department of Environmental Protection.
- Staugler, E. (2008). *The seagrasses of Charlotte Harbor*. (U.F. IFAS Publication EAS-10152008-010). University of Florida.
- Staugler, E. & Ott, J. (2001). *Establishing baseline seagrass health using fixed transects in Charlotte Harbor, Florida: 2 Year Seagrass Monitoring Summary 1999–2000*. (FDEP/CHAP Technical Report #1). Florida Department of Environmental Protection.
- Wade, D., Janicki, A., Janicki, S., & Winowitch, M. (2003). *Water quality data analysis and report for the Charlotte Harbor National Estuary Program*. Charlotte Harbor National Estuary Program.
- Wessel, M. R. & Corbett, C. A. (2009). Assessing the performance of an optical model used in setting water quality targets in Lemon Bay, Charlotte Harbor and Estero Bay, Florida. *Florida Scientist*. 72(4):367–385.

B.6 / Arthropod Control Plan

Spatial data (e.g. shapefiles) for the boundaries of the aquatic preserve have been made accessible to the appropriate mosquito control district. The aquatic preserve is deemed highly productive and environmentally sensitive. By policy of DEP since 1987, aerial adulticiding is not allowed, but larviciding and ground adulticiding (truck spraying in public use areas) is typically allowed. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a Governor's Emergency Proclamation. Mosquito control plans are typically proposed by local mosquito control agencies when they desire to treat on public lands



Public Involvement

C.1 / Advisory Committee

The following Appendices contain information about the advisory committee meeting which was held in order to obtain input for the Charlotte Harbor Aquatic Preserves Management Plan Advisory Committee regarding the draft management plan.

C.1.1 / List of members and their affiliations

Stakeholders	LB	CH	GS	PI	MP	Contact	Affiliation
LB=Lemon Bay CH=Cape Haze GS=Gasparilla Sound/Charlotte Harbor PI= Pine Island Sound MP= Metlacha Pass							
State & Federal							
CHNEP	x	x	x	x	x	Lisa Beever, Director	co-managing entity
FFWCC	x	x	x	x	x	Amber Whittle, Habitat Research Administrator	co-managing entity
SWFRPC	x	x	x	x	x	Jim Beever	co-managing entity
SWFWMD	x	x	x			Kris Kaufman, Senior Environmental Specialist	co-managing entity
SFWMD			x	x	x	Peter Doering	co-managing entity
Charlotte Harbor Preserve State Park		x	x	x	x	John Aspiolea, Park Manager	co-managing entity
Cayo Costa State Park				x		Chad Lach, Park Manager	co-managing entity
DEP, DEAR	x	x	x	x	x	Kirby Wolfe	co-managing entity
Ding Darling NWR		x		x	x	Joyce Palmer, Deputy Refuge Manager	co-managing entity
Florida Gulf Coast University				x	x	Greg Tolley	
Seagrant/UFL	x	x	x	x	x	Betty Staugler AND Joy Hazell	
County							
Sarasota	x					John Ryan	
Charlotte	x	x	x			Bill Truex	local elected official
Lee		x	x	x	x	Frank Mann AND Steve Boutelle	local elected official (Frank Mann)
Local-Government							
Cape Coral					x	Connie Jarvis, Environmental Resources Manager	
Sanibel				x		James Evans, Director of Natural Resources	
Local-Private							
Charlotte Harbor Environmental Center	x	x	x			Thomas Hecker, Executive Director	local conservation organization
Lemon Bay Conservancy	x					Jim Cooper, President	local conservation organization
Friends of CHAP	x	x	x	x	x	Liz Donley	local conservation organization
Calusa Land Trust			x	x	x	John Kendall, President	local conservation organization
Sanibel-Captiva Conservation Foundation				x	x	Eric Milbrandt, Marine Lab Director	local conservation organization
Mote Marine Laboratory	x	x	x	x	x	Kellie Dixon, Senior Scientist	
The Nature Conservancy			x			Laura Geselbracht	local conservation organization
Audubon	x	x	x	x	x	Jim Knoy, Peace River Audubon Society	local conservation organization
Sierra Club	x	x	x	x	x	Hugh Havlik, Chair, Greater Charlotte Harbor Group	local conservation organization
Gulf Coast Kayak					x	Diana Stockbridge, owner	local private property owner
King Fisher Fleet			x			Captain Ralph Allen	local private property owner
Charlotte Soil and Water Conservation District						Don McCormick, Chair	soil and water conservation district
Private Landowners						Joe Udvari AND Frank Campagne	local private property owner

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Charlotte Harbor Aquatic Preserves Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/charlotte/plan.htm. The Florida Coastal Office seeks public comment on the draft. Members of the Charlotte Harbor Aquatic Preserves Management Plan Advisory Committee have also been invited to attend, listen to comments, and may provide or respond to comments.

A copy of the agenda may be obtained by contacting: Mindy Brown at Melynda.A.Brown@dep.state.fl.us or (941)575-5861.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Mindy Brown at (941)575-5861. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION
The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Thursday, April 28, 2016, 9:00 a.m.

PLACE: Charlotte Harbor Aquatic Preserves Office, 12301 Burnt Store Road, Punta Gorda, FL 33955

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Charlotte Harbor Aquatic Preserves Management Plan Advisory Committee will meet to discuss comments at the public meetings - scheduled for April 25, 26, and 27, and separately noticed - and possible revisions to the draft Charlotte Harbor Aquatic Preserves Management Plan. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/charlotte/plan.htm.

A copy of the agenda may be obtained by contacting: Mindy Brown at Melynda.A.Brown@dep.state.fl.us or (941)575-5861.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Mindy Brown at (941)575-5861. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Recreation and Parks

The Myakka River Management Coordinating Council announces a public meeting to which all persons are invited.

DATE AND TIME: April 8, 2016, 9:30 a.m. – 12:30 p.m.

PLACE: SWFWMD Sarasota Service Office, 6750 Fruitville Road, Sarasota, Florida 34240

GENERAL SUBJECT MATTER TO BE CONSIDERED: Conduct Council Business for administering the Myakka River as a Wild and Scenic River.

A copy of the agenda may be obtained by contacting: A copy of the agenda may be requested from Chris Oliver, Division of Recreation and Parks, District 4 Administration, 1843 S. Tamiami Tr. Osprey, FL 34229 or by calling (941)882-7206.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 5 days before the workshop/meeting by contacting: Chris Oliver, (941)882-7206. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

If any person decides to appeal any decision made by the Board with respect to any matter considered at this meeting or hearing, he/she will need to ensure that a verbatim record of the proceeding is made, which record includes the testimony and evidence from which the appeal is to be issued.

DEPARTMENT OF HEALTH

The Board of Nursing announces a telephone conference call to which all persons are invited.

DATE AND TIME: April 5, 2016, 3:30 p.m.

PLACE: Department of Health, Tallahassee at Meet Me number 1(888)670-3525, pass code 9908086106

GENERAL SUBJECT MATTER TO BE CONSIDERED: To consider cases where Probable Cause has previously been found.

A copy of the agenda may be obtained by contacting: MQA.Nursing@flhealth.gov.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: (850)245-4125. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

If any person decides to appeal any decision made by the Board with respect to any matter considered at this meeting or hearing, he/she will need to ensure that a verbatim record of



Florida Department of Environmental Protection

Charlotte Harbor Aquatic Preserves
12301 Burnt Store Road
Punta Gorda, Florida 33955-9204

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Charlotte Harbor Aquatic Preserves Draft Management Plan Advisory Committee Meeting Summary

Date: April 28, 2016

Time: 9:00 am

Location: Charlotte Harbor Aquatic Preserves Office, 12301 Burnt Store Road, Punta Gorda, Florida

Advisory Committee Members – Jim Knoy, Bill Truex, Connie Jarvis, Don McCormick, James Evans, Liz Donley, Peter Doering, Lesli Haynes, Ralph Allen, Eric Milbrandt, Lisa Beever, Laura Geselbracht, Betty Staugler, Kris Kauffman, Joyce Palmer, Kirby Wolfe, John Aspiolea, John Ryan, Keith Laakkonen, Thomas Hecker

DEP Representatives – Penny Isom, Earl Pearson, Melynda Brown, Heather Stafford, Arielle Taylor-Manges, Mary McMurray, Stephanie Erickson, Jaime Boswell

Agenda:

Penny Isom opened the meeting with a welcome and introductions. The meeting proceeded with an open discussion of advisory committee member comments on the management plan. Each management plan issue was discussed in order. Upon completion of discussion on each issue, Penny Isom lead the group to initiate comments on the next issue.

General Comments:

- Betty Staugler – should current staff and budget be considered in relation to suggestions?
- Liz Donley – recommendation to increase budget, at a minimum to include the consumer price index, but should also increase in consideration with staff capabilities to meet performance measures.
- Don McCormick – recommendation that the state legislatures be made aware of the mechanism of the Coastal Zone Management grant and fund it adequately.
- Liz Donley and Eric Milbrandt – recommends that the state reverts back to previous funding mechanism (using state dollars), and use Coastal Zone Management (CZM) money for other special projects/needs.

Issue 1: Water Quality

- Kirby Wolfe – consider other DEP water quality monitoring (DEAR), coordinate between DEAR and FCO/CHAP, a lot of data is already being collected.
- James Evans – what is the feedback loop between data being collected by DEAR and FCO/CHAP and management decisions.
- Eric Milbrandt and Betty Staugler – develop a strategy to coordinate data from various partners to answer questions management questions.
- James Evans – add more discussion on nutrient dynamics, in relation to red tide, freshwater releases etc.
- Lesli Haynes – look at all water quality data being monitored (including partners) and look for gaps.
- Connie Jarvis – include a map of existing water quality monitoring (including partners) or reference an existing map/website (e.g. SFWMD, water atlas, DEP/DEAR) that has this information.
- Liz Donley – add a performance measure to connect identifying water quality threats to regulatory activities (ex. CHAP staff provides highlights of what they are noticing in the field during DEAR meetings), and edit existing performance measure to change from “participate” to more descriptive wording “review and comment”.
- Kris Kauffman – add “align activities” with partners, be specific about what partners are being coordinated with in those performance measures where partners are mentioned
- Kris Kauffman – need information about connection between CHAP and the TMDL and BMAP programs, what are the steps to address impaired Waterbody IDs (WBIDS) within CHAP.
- Kirby Wolfe – provide information within management plan as a narrative or a link to DEAR to emphasize the activities of that branch of DEP.
- James Evans – can CHAP provide comment on projects that will support TMDLs etc., for example the C43 reservoir.
- Peter Doering – need to update C43 reservoir language to indicate that SFWMD is expediting construction.
- Kirby Wolfe and Betty Staugler – add DACS information about pesticides in water quality text and in regards to opening and closing shellfish harvesting.

Issue 2: Submerged Resources

- Laura Geselbracht – add reference to the TNC SLAM model website – www.coastalresilience.org.
- Kris Kauffman – provide a mechanism for making seagrass transect data (including macroalgae information) publicly available (e.g. Water Atlas with map/attribute table) – in general making resource data available is important, Water Atlas would be a good mechanism – tie in with existing performance measure (see 1.1.1) - to create the electronic files for spatial availability, possibly use intern to create the files.

- Liz Donley - consider adding a performance measure, or in text somewhere, the need for developing a Water Atlas page or the like to make data available.
- Lisa Beever – develop a georeferenced database of submerged resources, include soil information etc.
- John Ryan – add “gather available information and make available” such as on Water Atlas page, this is a really good strategy to proactively share data and can lead to other people doing additional analyses, studies etc.
- Lisa Beever – use the term “seek funding for” for those items that are not within the current budget/staff availability in order to capture needs.
- Don McCormick, Eric Milbrandt and Peter Doering – discussed macroalgae and seagrass – various studies regarding nutrient loading, epiphytes and macroalgae – community is starting to be concerned about macroalage – it is important to track it and look for trends – provide feedback to agencies/regulatory in order to protect the resources.
- Laura Geselbracht – add a section that identifies research needs, this can be a reference for other researchers, graduate students etc., and will capture needs that staff do not have time and funds to address.
- Lisa Beever - CHNEP has a list of research needs that might be used as a reference.
- John Ryan – need to quantify public use of submerged resources as this can be used to evaluate economic benefits of protection.
- Betty Staugler - some data available about level of use from air patrol, UF/IFAS – Florida SeaGrant, boat ramp surveys, NWR public use surveys, and boater registration trends.
- Lesli Haynes – suggest focusing on analyzing/mining data, this goes back to research needs.
- James Evans - data should be used for management decisions now.
- Don McCormick – recommendation to have an administrator, additional staff member, to coordinate partnerships, data analysis, oversight of interns etc.
- John Ryan - set forth as a goal periodic analysis of the data with a specific time frame, include as a research need if not doable with current funds.
- Keith Laakkonen – there are some statewide approaches to get data analyzed “State of the Resources”.
- Liz Donley - this would be an appropriate use of federal funding (Coastal Zone Management).
- Bill Truex – important to include absolutely everything, from a policy perspective you need to have all needs documented to shift funding.
- Laura Geselbracht – perhaps in the future a ballot item for supporting funding for aquatic resource protection.
- Betty Staugler – include some mention of sea level change in the narrative of submerged resources, refer back to www.coastalresilience.org.

- Lesli Haynes – ground-truthing of aerial photo interpretation of submerged resources is needed, seagrasses are pretty well covered, but other resources such as oysters are not well ground-truthed.
- Jim Knoy – monitoring of sea level rise is needed.
- Keith Laakkonen and John Ryan – there is a local gap in the Sentinel Site program, this is a research need or something for which funding needs to be sought.
- Laura Geselbracht – field data sites can be very helpful over a long time and are cheaper than Sentinel sites, this should be added as a research need.
- Peter Doering – add in SFWMD seagrass fixed sites, also update Caloosahatchee River monitoring.
- Kris Kauffman – within Goal 2, regarding restoration within CHAP, consider changing to “review and comment” instead of provide input, make sure the performance measures accurately account for the level of effort that is going into the work that staff is currently doing.
- Joyce Palmer – add collaborate with partners for rapid response method to the invasive species objective.
- Kirby Wolfe – check Eurasian ruffe (*Gymnocephalus cernuus*) species reference, this species is not known to occur in this area.

Issue 3: Wading and Diving Colonial Nesting Birds

- Laura Geselbracht – develop an action strategy for critical point for bird rookeries, including some type of response (e.g. oyster restoration) to degradation.
- Liz Donley – include the need to use data to identify suitable habitat that may be acquired in the future to protect against impacts in the future (e.g. sea level rise), the SLAM model might provide input.
- Eric Milbrandt – include above as a research need, evaluate characteristics of the islands, why do birds abandon and/or switch islands, any concern with exotic predators (e.g. Nile monitors).
- John Ryan – include somewhere in narrative that population growth in urban areas means that the value of protecting these areas is greater, not just locally but to the larger area.
- James Evans – include discussion about living shorelines.
- Lesli Haynes – include a performance measure to document disturbance as input to FWC to establish a CWA designation.
- Jim Knoy – can information from wildlife recovery centers (e.g. Peace River Wildlife, Clinic for the Rehabilitation of Wildlife) be utilized, check if these are submitted to FWC.
- Liz Donley – make reference to statewide marine debris working group.
- Ralph Allen – change the word monofilament to fishing line to be inclusive of different types of fishing line, or any better or worse for wildlife.

Issue 4: Coastal and Watershed Activities

- Lisa Beever – recommendation to move base funding to come from state funding, use federal funding for additional projects.
- Lisa Beever – move Goal 1 under issue 6 into issue 4, move Goal 2 under issue 6 to issue 5.
- James Evans – can new boundaries of aquatic preserves be established.
- Ralph Allen – consider inclusion of expansion of boundaries in management plan (e.g. hole in San Carlos Bay).
- Don McCormick – expand CHAP boundary up to include all of the tidal Peace River – additional discussion about looking at other boundaries, such as smalltooth sawfish critical habitat.
- Lesli Haynes – clarify in performance measures how “participation” is tracked, is just going to a meeting considered performance, other suggested language “participated as a stakeholder”.
- Betty Staugler – can effects/outcomes of participating in meetings be tracked, include in narrative some examples of CHAP participation.
- Laura Geselbracht – to assist in tracking ask partners to write letters regarding how CHAP staff have participated/influenced etc.
- Group discussion regarding making performance measure information available to the public or advisory committee in the form of reports or annual meetings, report out to public through social media.
- Peter Doering – description of Caloosahatchee MFL on page 31 needs to be corrected, the rule was adopted in September 2001, SFWMD is re-evaluating MFLs, statement regarding 4000-6000 cfs, consider if this should be included – Peter to assist in clarifying language about flows, be specific about locations.
- Liz Donley – in reference to above comment, edit language to reflect that “research indicates”, change the word “needs”.
- James Evans – on page 31 reference and clarify where flow numbers came from.
- Lisa Beever – for the drainage basins map get different drainage basin lines from CHNEP.
- Betty Staugler – on page 98 update text to indicate permit has been received for general dredging permit.
- Betty Staugler – under Objective 3, number 2, add county in addition to city sewer, or just make general and leave out “city”.
- John Ryan – expand aquatic preserve up the Myakka River to match the wild and scenic river designation.
- Connie Jarvis – concern about bias in narrative about the Ceitus barrier, barrier was taken out because “mother nature” created a separate path, the sentence specifically about “inconvenience to boaters” and sentence about “due to the lack of progress” should be removed or edited.
- John Ryan – simplify discussion about Ceitus and include only facts and reference controversy.

- Liz Donley – suggests ending paragraph about Ceitus at line 7, include information of CHAP involvement in advisory group.
- Don McCormick and John Aspiolea – clarify that the beginning of the paragraph is general for all spreader canals not just Ceitus.

Issue 5: Public Involvement

- John Ryan – look at how effective outreach is in regards to being able to reach the most people, get the most bang for the buck. Need to understand how outreach/education works, words to use, avenues to use to be most effective.
- Liz Donley – with loss of outreach/education position does staff need to have additional funding for training, or funding for additional staff to focus on this aspect.
- Lesli Haynes – existing performance measure to coordinate with FGCU/students etc. is great, reach out to programs to tap in for internships.
- Lesli Haynes – on page 113, in regards to the paragraph about pollutant discharge, change to FWC and any law enforcement officers.
- Heather Stafford - new Vessel at Risk program needs to be added in.
- Lesli Haynes – on page 116, second paragraph, concern about sentence regarding requiring approval from FCO for research.
- General discussion about authorizing, permitting, notification etc. in regards to above comment, how to implement, one idea was a google form for notification.

Issue 6: Sustainable Public Use

- General discussion about barge parties and other “activities” that don’t require permits, explore avenues for regulatory authority, CHAP encourages participating with event sponsors to protect resources. Fees needed to fund staff time. Use data to drive regulations, not just preferences for certain activities. Need to consider infringement on public use.
- Betty Staugler – emphasis to define sustainable in the narrative, suggested “not losing function over time” or “leave no trace” definition. Keep at level intended by the laws of aquatic preserve, sustainable definition based on maintaining a certain level.
- Liz Donley – the term sustainable is too low-bar, does not provide the protection and improvement intended.
- Peter Doering – need a realistic goal about what restoration is possible/realistic.
- Lisa Beever – drop issue 6, move goals to issue 4 and 5 - discussion, is there a reason to keep issue 6 – staff needs to go back to review this suggestion.
- John Ryan – consider management of other natural resources, archaeological resources etc. as models for managing public use.
- Joyce Palmer – change word from sustainable to compatible (indicating no conflicts between uses), outreach and education is the most important component in regards to public use, if people understand their impact they won’t cause as much harm.

- Don McCormick – signage at boat ramps to indicate “you are launching into an aquatic preserve”.
- Connie Jarvis – consider a required boater education program.
- Keith Laakkonen – watch National Park Service permit/safe-boating program going in at Everglades National Park.
- Betty Staugler - expand the examples, or remove “such as the Blueway Paddling Trails”.
- Liz Donley – on page 118, Goal 1 Objective 2, this is a full time job for someone. Clarify regarding collaborating and/or FCO role, who is involved. Edit performance measure, possibly include some information in the narrative.
- Lisa Beever – include on research needs to digitize the Harris maps from 1982 and also the 1945.
- Liz Donley - use data to demonstrate/measure “protecting and preserving”.
- Lesli Haynes – need to check the data on Map 51, consider lumping, not all information seems to be portrayed.

Appendix D

- Liz Donley – the budget does not include an allowance for inflation or indexing of costs over time.

After the comments were received, Penny explained the next steps in the management plan process. The advisory committee was reminded that comments could still be submitted on or before May 12. They were thanked for taking time out of their busy schedules to attend and provide valuable feedback. Meeting was adjourned.

C.2 / Formal Public Meeting

The following Appendices contain information about the Formal Public Meetings which were held in order to obtain input from the public about the Charlotte Harbor Aquatic Preserves Draft Management Plan.

C.2.1 / Florida Administrative Register Posting

Florida Administrative Register

Volume 42, Number 59, March 25, 2016

DATES AND TIMES: Wednesday, April 27, 2016, 9:00 a.m. - 5:00 p.m.; Thursday, April 28, 2016, 9:00 a.m. - 5:00 p.m.

PLACE: 3rd Floor Auditorium, Center of Excellence for Coral Reef Ecosystem Research, Nova Southeastern University Oceanographic Center, 8000 North Ocean Drive, Dania Beach, FL 33004

GENERAL SUBJECT MATTER TO BE CONSIDERED: The FDEP Coral Reef Conservation Program is holding its biannual, two-day meeting of its Technical Advisory Committee (TAC). The TAC will be advising the Southeast Florida Coral Reef Initiative (SEFCRI) on its mission to develop and support the implementation of an effective strategy to preserve and protect southeast Florida's coral reefs and associated reef resources, emphasizing balance between resource use and protection, in cooperation with all interested parties.

Specifically, the TAC will be reviewing current status and trends on water quality issues, water quality monitoring, and a recent coral disease outbreak in southeast Florida to help advise the SEFCRI body.

A copy of the agenda may be obtained by contacting: David Cox by e-mail: David.F.Cox@dep.state.fl.us or by phone: (561)681-6691.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: David Cox at (561)681-6691. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Monday, April 25, 2016, 6:00 p.m. - 7:30 p.m.

PLACE: Charlotte Harbor Environmental Center/Cedar Point, 2300 Placida Road, Englewood, FL 34224

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Charlotte Harbor Aquatic Preserves Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/charlotte/plan.htm. The Florida Coastal Office seeks public comment on the draft. Members of the Charlotte Harbor Aquatic Preserves Management Plan Advisory Committee have also been invited to attend, listen to comments, and may provide or respond to comments.

A copy of the agenda may be obtained by contacting: Mindy Brown at Melynda.A.Brown@dep.state.fl.us or (941)575-5861.

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, April 26, 2016, 6:00 p.m. - 7:30 p.m.

PLACE: Charlotte Harbor Aquatic Preserves Office, 12301 Burnt Store Road, Punta Gorda, FL 33955

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Charlotte Harbor Aquatic Preserves Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/charlotte/plan.htm. The Florida Coastal Office seeks public comment on the draft. Members of the Charlotte Harbor Aquatic Preserves Management Plan Advisory Committee have also been invited to attend, listen to comments, and may provide or respond to comments.

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Wednesday, April 27, 2016, 6:00 p.m. - 7:30 p.m.

PLACE: Fort Myers Library, 1651 Lee Street, Fort Myers, FL 33901

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft Charlotte Harbor Aquatic Preserves Management Plan has been prepared by the Florida Coastal Office. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/charlotte/plan.htm. The Florida Coastal Office seeks public comment on the draft. Members of the Charlotte Harbor Aquatic Preserves Management Plan Advisory Committee have also been invited to attend, listen to comments, and may provide or respond to comments.

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
The Florida Department of Environmental Protection, Florida Coastal Office announces a public meeting to which all persons are invited.

DATE AND TIME: Thursday, April 28, 2016, 9:00 a.m.
PLACE: Charlotte Harbor Aquatic Preserves Office, 12301 Burnt Store Road, Punta Gorda, FL 33955

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Charlotte Harbor Aquatic Preserves Management Plan Advisory Committee will meet to discuss comments at the public meetings - scheduled for April 25, 26, and 27, and separately noticed - and possible revisions to the draft Charlotte Harbor Aquatic Preserves Management Plan. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/charlotte/plan.htm.

A copy of the agenda may be obtained by contacting: Mindy Brown at Melynda.A.Brown@dep.state.fl.us or (941)575-5861.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Mindy Brown at (941)575-5861. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Recreation and Parks
The Myakka River Management Coordinating Council announces a public meeting to which all persons are invited.
DATE AND TIME: April 8, 2016, 9:30 a.m. – 12:30 p.m.
PLACE: SWFWMD Sarasota Service Office, 6750 Fruitville Road, Sarasota, Florida 34240

GENERAL SUBJECT MATTER TO BE CONSIDERED: Conduct Council Business for administering the Myakka River as a Wild and Scenic River.

A copy of the agenda may be obtained by contacting: A copy of the agenda may be obtained by contacting: A copy of the agenda may be requested from Chris Oliver, Division of Recreation and Parks, District 4 Administration, 1843 S. Tamiami Tr. Osprey, FL 34229 or by calling (941)882-7206.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 5 days before the workshop/meeting by contacting: Chris Oliver, (941)882-7206. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

If any person decides to appeal any decision made by the Board with respect to any matter considered at this meeting or hearing, he/she will need to ensure that a verbatim record of the proceeding is made, which record includes the testimony and evidence from which the appeal is to be issued.

DEPARTMENT OF HEALTH
The Board of Nursing announces a telephone conference call to which all persons are invited.

DATE AND TIME: April 5, 2016, 3:30 p.m.
PLACE: Department of Health, Tallahassee at Meet Me number 1(888)670-3525, pass code 9908086106

GENERAL SUBJECT MATTER TO BE CONSIDERED: To consider cases where Probable Cause has previously been found.

A copy of the agenda may be obtained by contacting: MQA.Nursing@flhealth.gov.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: (850)245-4125. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

If any person decides to appeal any decision made by the Board with respect to any matter considered at this meeting or hearing, he/she will need to ensure that a verbatim record of

Florida Department of Environmental Protection • Florida Coastal Office

Charlotte Harbor Aquatic Preserves

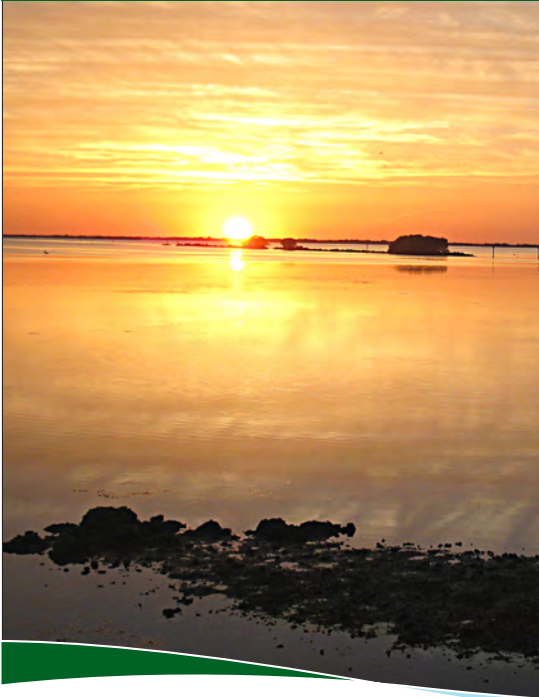
Public Meetings

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Charlotte Harbor Environmental Center/Cedar Point
2300 Placida Road
Englewood, FL 34224

Tuesday, April 26, 2016, 6:00 pm - 7:30 pm
Charlotte Harbor Aquatic Preserves Office
12301 Burnt Store Road
Punta Gorda, FL 33955

Wednesday, April 27, 2016, 6:00 pm - 7:30 pm
Fort Myers Library
1651 Lee Street
Fort Myers, FL 33901

To view the draft plan, please visit:
www.dep.state.fl.us/coastal/sites/charlotte/plan.htm



The Florida Department of Environmental Protection's Florida Coastal Office (FCO) is responsible for the management of Florida's 41 aquatic preserves, three National Estuarine Research Reserves, a National Marine Sanctuary, Florida Coastal Management Program, Outer Continental Shelf Program, and Coral Reef Conservation Program. These protected areas comprise more than 4 million acres of the most valuable submerged lands and select coastal uplands in Florida. FCO is updating these management plans, and is currently seeking input on the draft Charlotte Harbor Aquatic Preserves management plan, which includes Cape Haze, Gasparilla Sound-Charlotte Harbor, Lemon Bay, Matlacha Pass, and Pine Island Sound aquatic preserves.

Meeting objectives:

1. Review purpose and process for revising the Charlotte Harbor Aquatic Preserves management plan.
2. Present current draft plan with a focus on issues, goals, objectives and strategies.
3. Receive input on the draft management plan.

The information from the meeting will be compiled and used by FCO in the revision of the draft management plan.

Please contact Mindy Brown at Melynda.A.Brown@dep.state.fl.us or (941) 575-5861, or visit www.dep.state.fl.us/coastal/sites/charlotte/plan.htm for more information or to request a written copy of the plan. Written comments are welcome and can be submitted at FloridaCoasts@dep.state.fl.us on or before **May 12, 2016**.

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AFFIDAVIT OF PUBLICATION

SARASOTA HERALD-TRIBUNE
PUBLISHED DAILY
SARASOTA, SARASOTA COUNTY, FLORIDA

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COUNTY OF SARASOTA

BEFORE THE UNDERSIGNED AUTHORITY PERSONALLY APPEARED SHARI BRICKLEY, WHO ON OATH SAID SHE IS CLASSIFIED DIRECTOR OF ADVERTISING FOR THE SARASOTA HERALD-TRIBUNE, A DAILY NEWSPAPER PUBLISHED AT SARASOTA, IN SARASOTA COUNTY FLORIDA; AND CIRCULATED IN SARASOTA COUNTY DAILY; THAT THE ATTACHED COPY OF ADVERTISEMENT BEING A NOTICE IN THE MATTER OF:

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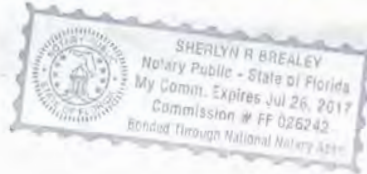
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SIGNED _____

SWORN OR AFFIRMED TO, AND SUBSCRIBED BEFORE ME THIS 18 DAY OF April, A.D., 2016
BY SHARI BRICKLEY WHO IS PERSONALLY KNOWN TO ME.

Sheryl R. Brealey
Notary Public



Attn: **ANIELLE TAYLOR-MANFES**
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
12301 BURNT STORE RD
PUNTA GORDA, FL 33955

STATE OF FLORIDA COUNTY OF LEE:
 Before the undersigned authority personally appeared Shari Terrell, who on oath says that he or she is a Legal Assistant of the News-Press, a daily newspaper published at Fort Myers in Lee County, Florida; that the attached copy of advertisement, being a Legal Ad in the matter of

Notice of Meetings

In the Twentieth Judicial Circuit Court was published in said newspaper in the issues of:

04/16/16

Affiant further says that the said News-Press is a paper of general circulation daily in Lee, Charlotte, Collier, Glades and Hendry Counties and published at Fort Myers, in said Lee County, Florida, and that the said newspaper has heretofore been continuously published in said Lee County, Florida each day and has been entered as periodicals matter at the post office in Fort Myers, in said Lee County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he or she has never paid nor promised any person, firm or corporation any ~~discount, rebate, commission or refund~~ for the purpose of securing this advertisement for publication in the said newspaper.

Sworn to and Subscribed before me this 18th of April 2016, by Shari Terrell who is personally known to me.

Milagros A. Isberto
 Milagros A. Isberto
 Notary Public for the State of Florida
 My Commission expires July 11, 2016

The Florida Department of Environmental Protection, Florida Coastal Office announces three public meetings to receive public comment on the draft Charlotte Harbor Aquatic Preserves Management Plan.

The meetings will be held in Charlotte County on Monday, April 25, 2016, 6:00 p.m. - 7:30 p.m. at Charlotte Harbor Environmental Center/Cedar Point, 2300 Placida Road, Englewood, FL 34224; in Charlotte County on Tuesday, April 26, 2016, 6:00 pm - 7:30 pm at Charlotte Harbor Aquatic Preserves Office, 12301 Burnt Store Road, Punta Gorda, FL 33955; and in Lee County on Wednesday, April 27, 2016, 6:00 pm - 7:30 pm at Fort Myers Library, 1651 Lee Street, Fort Myers, FL 33901. The draft plan is available for viewing or download at www.dep.state.fl.us/coastal/sites/charlotteplan.htm. A copy of the agenda may be obtained by contacting Mindy Brown at Mindy.A.Brown@dep.state.fl.us or (941)575-5861.

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 AD#1150186 APRIL 16, 2016

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 AD#1150186 APRIL 16, 2016



Florida Department of Environmental Protection

Charlotte Harbor Aquatic Preserves
12301 Burnt Store Road
Punta Gorda, Florida 33955-9204

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Charlotte Harbor Aquatic Preserves Draft Management Plan Public Meeting Summaries

Date: April 25, 2016

Time: 6:00 – 7:30 pm

Location: Cedar Point Environmental Park, 2300 Placida Rd., Englewood, Florida

Meeting Attendees:

Public - Ruth Ward, Bob Ward, Dee Allen, Gordon Roman, Bobbi Rodgers

Advisory Committee Members – Don McCormick, Chad Lach, Kris Kaufman, Bill Truex, John Ryan

DEP Representatives – Penny Isom, Earl Pearson, Melynda Brown, Heather Stafford, Arielle Taylor-Manges, Mary McMurray, Stephanie Erickson, Jaime Boswell

Agenda:

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After the comments were received, the group reconvened and Penny explained the next steps in the management plan process. The public was reminded that comments could still be submitted on or before May 12. They were thanked for taking time out of their busy schedules to attend and provide valuable feedback. Meeting was adjourned.

Issue 1: Water Quality

- Concern of water quality degradation related to anchored/moored boats (ex. Near Manasota Key – Chadwick Cove)
- Address red tide and freshwater release occurrences.

- Better define water quality (ex. What parameters are included).
- Determine point sources of pollution (related to Objective 4).
- Expand continuous water quality monitoring (currently only located in Matlacha Pass, concern expressed about lack of monitoring in the Peace and Myakka Rivers).
- Continue coordination with partners, Charlotte County may be filling in some gaps in the Peace and Myakka area.

Issue 2: Submerged Resources

- Freshwater releases are a threat to all submerged resources (including scallops, crabs, oysters, clams).
- Increase protection of oysters and clams, in particular regulation of oyster harvesting should be more stringent, harvest at the current limit is not sustainable.
- Signage to educate about seagrass prop-scarring and other resource protection issues should be placed at boat ramps.

Issue 3: Wading and Diving Colonial Nesting Birds

- Improve existing signage on islands (some signs are faded and unreadable).
- Add signage to rookery islands (current signage is only on NWR islands).
- Signs should be posted at boat ramps to educate boaters about rookery islands and to familiarize boaters with what the signs look like and what they say (this should lessen the numbers of people on boats approaching rookery islands to read the signs).
- Add an integrated strategy regarding monitoring and management of erosion on bird rookery islands.

Issue 4: Coastal and Watershed Activities

- Work with local associations (e.g. Manasota Key and proposed developments), civic organizations and other key stakeholders.
- Add to Objective 1, Integrated Strategy 1, to be involved with local planning agencies in the development of comprehensive plans.
- Bring CHAP draft management plan to the CHNEP management conference as an informational item.
- Send the draft management plan to the CHNEP for distribution prior to 5/12/16 comment deadline.

Issue 5: Public Involvement

- Objective 2 – specifically add in a focus on businesses (e.g. boat rental concessions) do not leave as just general public.
- Get more public involvement by getting them excited.

Issue 6: Sustainable Public Use

- More education for home owners and contractors is needed regarding aquatic preserve rules for allowable dock sizes and design.
- Sustainable is the important part, there may already be too much public use.

- The proposed cut in Alligator Creek “Bird Cut” is not a sustainable use (would result in negative impacts). The harbor cannot be expanded to accommodate more traffic; it is not the same as building new roads.
- The West Coast Inland Navigation District should be involved in sustainable public use.
- Combine 2.1.2 and 2.1.3.
- Paddleboard and kayak rental concessions and tour guides, in comparison to fishing guides, would be more appropriate to disseminate information about sustainable public use.
- Enforcement is an issue due to the lack of officers, enforcement should be increased (regarding impacts to resources, dock sizes etc.).
- Use signage to encourage voluntary care for resources (e.g. low wake adjacent to mangroves).

Additional written comments/questions:

- Need information to pass on to local restaurants to let them know about customers feeding wildlife and laws prohibiting that.
- Include fishing guides not just paddle boarders, get to the audience that may negatively impact resources.
- What is the typical lag time between monitoring data collection and availability in STORET?
- Any remediation programs in progress to improve water quality to meet TMDLs.
- How far upstream in watershed are you reviewing/commenting on permit applications?
- Suggest you make annual or biennial presentation to CHNEP committees (Technical Advisory Committee, CAC, Policy).



Florida Department of Environmental Protection

Charlotte Harbor Aquatic Preserves
12301 Burnt Store Road
Punta Gorda, Florida 33955-9204

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Charlotte Harbor Aquatic Preserves Draft Management Plan Public Meeting Summaries

Date: April 26, 2016

Time: 6:00 – 7:30 pm

Location: Charlotte Harbor Aquatic Preserves Office, 12301 Burnt Store Rd., Punta Gorda, Florida

Meeting Attendees:

Public - Dayton Dorey, David McGrath, Mary Dorey

Advisory Committee Members – Jim Knoy, Don McCormick, Liz Donley, Betty Staugler, Lesli Haynes, John Aspiolea, Nicole Iadevaia

DEP Representatives – Penny Isom, Earl Pearson, Melynda Brown, Heather Stafford, Arielle Taylor-Manges, Mary McMurray, Stephanie Erickson, Jaime Boswell

Agenda:

Penny Isom welcomed everyone, gave a brief introduction about the purpose of the meeting, and introduced aquatic preserve and Tallahassee staff. Melynda Brown gave a PowerPoint presentation about the Aquatic Preserve Program, the history of aquatic preserves, background on the Charlotte Harbor Aquatic Preserves, and the draft management plan. After the presentation, Penny explained the commenting process. The room was set up so there were six stations, one for each of the six issues identified in the management plan. The group had the opportunity to comment at each station, where staff gave them a little background on the issue and recorded comments (see below) the public had pertinent to each issue.

After the comments were received, the group reconvened and Penny explained the next steps in the management plan process. The public was reminded that comments could still be submitted on or before May 12. They were thanked for taking time out of their busy schedules to attend and provide valuable feedback. Meeting was adjourned.

Issue 1: Water Quality

- Coordinate with CHNEP and Charlotte Harbor Environmental Center for water quality monitoring.

- Work with County and City partners regarding water quality issues and projects (e.g. road expansion, septic and sewer expansion, stormwater improvement).
- Add DACS as a water quality partner.
- Should include pesticide testing.
- Consider opportunities to coordinate with Florida Friendly landscapes pertaining to runoff, fertilizer, stormwater etc.
- Consider pump outs (boat holding tanks) and water quality.
- Support protection and restoration of additional buffer lands.
- Resume involvement with Coastal Charlotte Harbor Monitoring Network (CCHMN).
- Add funding to train staff, and for staff to train others, on new methodologies in order to expand water quality monitoring.
- Expand tidal creek water quality monitoring; expand continuous water quality monitoring to tidal creeks.
- Coordinate with Soil and Water Conservation (attend meetings).
- More coordination with DACS, IFAS, SFWMD, SWFWMD.

Issue 2: Submerged Resources

- Continue coordination with CHNEP and other organizations.
- Consider the damaging effects of anchorages on resources.
- Plan for more boats in the future, need more pump out stations (needed in Lemon Bay now, everywhere in the future).
- Plan to limit usage in sensitive areas related to critical/endangered species (e.g. spawning areas).
- Coordinate with local planning entities (i.e. cities and counties) about properly citing mooring areas, docks and marinas so as not to damage resources (e.g. locate in deep waters).
- Consider influence of sea level rise on seagrass and other resources.
- Measure sea level/water level at fixed stations to assess effects of runoff and sedimentation.
- Need sea level rise monitoring stations.
- Monitor changes in abundance of macroalgae.
- Conduct research into other possible indicator species (e.g. scallops, drift algae) and monitor accordingly.
- Setup additional transects (seagrass) to adjust to watershed changes.
- Consider staff involvement in SeaGrant Advisory Committees and FGCU Watershed Institute.

Issue 3: Wading and Diving Colonial Nesting Birds

- Monitor rookery islands outside of the Aquatic Preserves.
- Place fliers about rookery islands in bait shops.
- Use stronger language to reduce human influence on nesting island habitats in order to change people's behavior.

- Develop strategies to protect nesting islands.
- Develop safe-viewing (of birds) guidelines.
- Incorporate bird rookery islands in boating guides.
- Monitor presence of predators on bird rookery islands.
- Collect meteorological conditions when surveying.
- Need resources to analyze and publish data in order to make recommendations to protect the resource.
- Need to post islands.
- Work with social media to identify the public island locations.
- Coordinate with Lee County Blueways to include rookery islands on their app.

Issue 4: Coastal and Watershed Activities


- Expand the Aquatic Preserves boundary to I-75 in the tidal Peace River, and extend in the tidal Myakka River, South Matlacha Pass and San Carlos Bay.
- Undertake review to determine if more “No Internal Combustion Motor Zones” (NICMZs) are appropriate by looking at prop scar mapping, seagrass transect data, rookery islands, and endangered species habitat.
- Coordinate with the SFWMD on the Charlotte Harbor Flatwoods Initiative.
- Review ERP applications that may affect CHAP.
- Provide training to CHAP staff on how to recognize violations and report them.

Issue 5: Public Involvement

- Work with WGPU for public service announcements.
- Produce periodic columns or op ed pieces (e.g. blogs, social media, newspapers) and track numbers of readers and demographics.
- Provide more presentations with stakeholders (e.g. fishing groups, Sierra Club, Audubon etc.) and user groups (e.g. boating and kayaking groups, high schools).
- Use partners to help promote/educate public about aquatic preserves by coordinating outreach efforts (e.g. Master Naturalist Program and Florida Sea Grant)
- Look to other organizations to share volunteers (e.g. Charlotte Harbor Environmental Center).

Issue 6: Sustainable Public Use

- Budget should reflect inflation at the minimum, but the overall budget should be increased in order to be able to reach the goals, consider amendment 1 money.
- Staff levels are inadequate to meet the goals.
- Work with boat concession businesses to put QR codes on kayaks, jet skis etc. with information about CHAP resources and appropriate uses.
- Work with guides, paddling organizations etc. to educate users.
- Coordinate with the Society for Ethical Tourism.

- 
- Emphasize citizen science volunteering opportunities to emphasize the usefulness (use of data in management and publications) and permanence of volunteer programs.
 - Emphasize boaters as major user group in CHAP plan by identifying as an entity in Goal 2, and potentially in other areas of the plan.
 - Organize snorkeling and wading trips for boater groups.
 - Differentiate between commercial and recreational boating groups with specific targeted messages.
 - Rental boat concessions can be a specific target audience.
 - Be aware of user group organizations, know what organizations exist and their specific purpose. Paddleboard and kayak rental concessions and tour guides, in comparison to fishing guides, would be more appropriate to disseminate information about sustainable public use.
 - Enforcement is an issue due to the lack of officers, enforcement should be increased (regarding impacts to resources, dock sizes etc.).
 - Use signage to encourage voluntary care for resources (e.g. low wake adjacent to mangroves).



Florida Department of Environmental Protection

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12301 Burnt Store Road
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Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Charlotte Harbor Aquatic Preserves Draft Management Plan Public Meeting Summaries

Date: April 27, 2016

Time: 6:00 – 7:30 pm

Location: Fort Myers Regional Library, 2450 First Street, Fort Myers, Florida

Meeting Attendees:

Public - Rachael Kangas, Hans Wilson, Judy Ott

Advisory Committee Members – Lisa Beever, Kirby Wolfe, Ralph Allen, James Evans, Joyce Palmer, Eric Milbrandt, Don McCormick, Peter Doering, Connie Jarvis

DEP Representatives – Penny Isom, Earl Pearson, Melynda Brown, Heather Stafford, Arielle Taylor-Manges, Mary McMurray, Stephanie Erickson, Jaime Boswell

Agenda:

Penny Isom welcomed everyone, gave a brief introduction about the purpose of the meeting, and introduced aquatic preserve and Tallahassee staff. Melynda Brown gave a PowerPoint presentation about the Aquatic Preserve Program, the history of aquatic preserves, background on the Charlotte Harbor Aquatic Preserves, and the draft management plan. After the presentation, Penny explained the commenting process. The room was set up so there were six stations, one for each of the six issues identified in the management plan. The group had the opportunity to comment at each station, where staff gave them a little background on the issue and recorded comments (see below) the public had pertinent to each issue.

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Issue 1: Water Quality

- Recommend that CHAP rejoin sampling water quality with CCHMN, this would allow for audits with CHNEP and consistency with other local partners.

- Identify point sources where nutrient loads are coming from, especially in regard to creeks.
- Test/monitor runoff and groundwater from barrier islands and Pine Island, specifically in regards to nutrient loading.
- Edit text where “Charlotte Harbor Water Atlas” is mentioned to “Charlotte Harbor NEP Water Atlas”, also include a link to the water atlas.
- Work with water management districts and other state agencies to avoid and minimize harm from Caloosahatchee River flows.
- Document regulatory changes resulting from CHAP water quality monitoring.
- Produce an annual “report card” of data collected, including how that data was used for management and regulatory decisions (e.g. fertilizers).
- Participate in Lake Okeechobee release calls and provide data to weekly calls.
- Use data to show effects of restoration projects (e.g. hydrological projects).
- Encourage hydrological restoration projects.
- Document examples/successes of how regulatory processes have benefited water quality.

Issue 2: Submerged Resources

- Coordinate with Florida Public Archaeology Network (FPAN) on identifying and monitoring (GPS coordinates) Southwest Florida cultural resources.
- Train volunteers to dive and monitor archaeological resources, use local dive clubs.
- Add performance measure to compare transect data (deep edge/presence & absence) to water management district mapping.
- Conduct remote sensing to check deep edge/extent accuracy of water management district mapping.
- Redo seagrass prop-scarring maps, potentially focusing on priority areas.
- Expand on mapping live rock and sponge beds to include hard bottom and other bottom types.
- Document Mayan cichlids on barrier islands.
- Look at SFWMD side-scan sonar oyster mapping conducted from Cape Coral bridge to San Carlos Bay.
- Coordinate with Comprehensive Everglades Restoration Plan (CERP) REstoration COordination & VERification (RECOVER) monitoring program (e.g. oysters).
- Map oysters consistently throughout CHAP with partners.
- Analyze data to evaluate epiphyte loads on seagrass with water quality.
- Analyze data to evaluate seagrass trends with water quality.
- Consider how fisheries data metrics (e.g. CPUE-catch per unit effort) could be evaluated in relation to the health of seagrass and other habitats (need to consider lag time, fish movement, larval stage habitat), and how this information relates to the public perception.

- Consider how monitoring efforts relate to endangered species (e.g. smalltooth sawfish).

Issue 3: Wading and Diving Colonial Nesting Birds

- Investigate why birds nest on different islands.
- Protect the shorelines of existing rookeries.
- Campaign to “keep off” islands – use minimum setback distance (double the distance needed to provide room for error in estimating distances on the water).
- Post signage around bird rookeries.
- Put information about bird rookeries on boating guides, including no motor zones.
- Promote/develop best management practices for ecotourism companies.
- Enlist boat tour companies to “chase people off” (educate people) that are too close.
- Consider effects of the use drones on bird rookeries.
- Evaluate site fidelity.
- Use regional data to assess correlation (relationships with bird rookery metrics) to sea level rise, climate change, and rainfall patterns.
- Design an adaptation plan for one of the most critical rookeries.
- Consider the implications as sea level increases and submerged land increase.

Issue 4: Coastal and Watershed Activities

- Nailed it!
- More equipment and more people needed.
- Direct state legislature to fund this state program using state funding.
- Budgets should show an increase over the 10-year period at least equivalent to the consumer price index.
- Need additional/reliable funding sources (e.g. WCIND interface).
- Place Preserve State Parks (buffer preserves) back under Florida Coastal Office management (reorganize).
- Document and make available the results of modifications to permitted activities as a result of CHAP comments.
- Document how CHAP data is influencing regulatory decisions.
- Comment on water management district restoration projects that will improve watershed/positively affect CHAP.
- Develop voluntary BMPs for existing private lands, including single family residential, to promote non-compliant retrofits. Participate in developing private/public partnerships.

Issue 5: Public Involvement

- Expand outreach to boating organizations, diving clubs, recreational outfitters and marine contractors within CHAP area.
- Educate marine contractors on possible impacts to submerged resources.
- Use data more in presentations, include information about what parameters mean.

- Need a concrete measure (numerical goal) of success of outreach goals or at least a target (e.g. what percentage of public do we want to reach?)
- 1.2.1 Performance Measure 4 – change “Facebook” to “relevant social media”
- Identify CHAP consumers.
- List CHAP in database for service learning at FGCU.
- Create internships opportunities for retired age group (similar to Peace Corps, working vacation).
- Document school program presentations given.
- Consider applicability of grant money for STEM to create programs for elementary aged school kids.
- Work with the Tourist Development Council.
- Develop/promote CHAP as an attraction.
- Develop a performance measure for public learning in order to be able to evaluate/demonstrate that people are learning from CHAP programs (e.g. send survey 3-6 months after program to program registrants).

Issue 6: Sustainable Public Use

- Identify a measure of success for sustainable public use (carrying capacity? Submerged resources?)
- Define sustainable.
- Have a performance measure that addresses public use (e.g. prop scars, nesting success etc.)
- Track numbers of prop scars as a performance measure, not just number of seminars.
- Identify current boating use, expected future use, and where boating should be encouraged/steered towards; come up with alternatives that maximize use and minimize impacts.
- Support/encourage school courses on boating use and other public use (starting at 7th/8th grade); develop a course for teachers to use, course could encourage high school students to teach younger students.
- Create family courses that combine boating, biology and enjoying outside.
- Create an app with navigational information for boaters (e.g. shallow seagrass beds).
- Eliminate issue #6, move goal 1 to issue #4, move goal 2 to issue #5.
- Promote use of anchorages and mooring fields.
- CHAP should be part of the permitting process for events such as the barge party (submerged land permit; it blocks other uses).
- Define sustainable public use; perspective of continued use versus submerged resources.
- Leave no trace.

Goals, Objectives, and Strategies

D.1 / Current Goals, Objectives and Strategies Budget Table

The following table provides a cost estimate for conducting the management activities identified in this plan. The data is organized by year and Management Program with subtotals for each program and year. The following represents the actual budgetary needs for managing the resources of the aquatic preserve. This budget was developed using data from the Florida Coastal Office (FCO) and other cooperating entities, and is based on actual costs for management activities, equipment purchases and maintenance, and for development of fixed capital facilities, however, does not adjust for inflation. This budget assumes optimal staffing levels and does not include the costs associated with staffing such as salary or benefits. Budget categories identified correlate with the FCO Management Program Areas. The Funding Source column depicts the source of funds with “S” designated for state, “F” for federal, and “O” for other funding sources (e.g. non-profit groups, etc.). Dollar figures in red font indicate funding not available at this time.

Large, beneficial projects, outside the current capacity of CHAP’s funding and staffing, are identified in Appendix D.4, in case opportunities become available to support those projects in the ten-year span of this management plan.

In addition, a list was developed, with ideas from the management plan advisory committee, as projects that would benefit the knowledge of aquatic preserve resources and management. These projects could potentially be conducted by additional CHAP staff/funding or by other organizations, universities, etc. and are listed in Appendix D.5.

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26
Issue 1: Water Quality															
Goal 1: Maintain and improve water quality within the Charlotte Harbor Aquatic Preserves.															
Objective 1: Annually evaluate the threats to water quality that may result in the loss or degradation of natural resources within each of the Charlotte Harbor Aquatic Preserves.															
Strategy 1: Collect and evaluate data from CHAP water quality monitoring programs to determine status, trends and data gaps.	Ecosystem Science	1998-1999	Recurring	\$48,756	F	\$44,056	\$46,056	\$47,056	\$50,056	\$50,056	\$50,056	\$50,056	\$50,056	\$50,056	\$50,056
Strategy 2: Collaborate with partners to provide data and stay informed about the water quality status and trends within CHAP and its tributaries.	Ecosystem Science	Ongoing	Recurring	\$3,350	F	\$3,350	\$3,350	\$3,350	\$3,350	\$3,350	\$3,350	\$3,350	\$3,350	\$3,350	\$3,350
Objective 2: Expand water quality data collection efforts and continue to enhance methodologies.															
Strategy 1: Expand data sonde program, as budget and personnel allow, and as data gaps are identified.	Ecosystem Science	2018-2019	Two years	\$24,000		\$0	\$0	\$24,000	\$24,000	\$0	0	0	0	0	0
Strategy 2: Encourage continued consistency within aquatic preserve offices regarding water quality data collection and data management techniques.	Ecosystem Science	Ongoing	Recurring	\$1,873	F	\$1,873	\$1,873	\$1,873	\$1,873	\$1,873	\$1,873	\$1,873	\$1,873	\$1,873	\$1,873
Strategy 3: Stay current with recommended datasonde equipment calibration and maintenance techniques from Hanna Instruments, Inc. and YSI, Inc.	Ecosystem Science	Ongoing	Recurring	\$1,541	F	\$1,541	\$1,541	\$1,541	\$1,541	\$1,541	\$1,541	\$1,541	\$1,541	\$1,541	\$1,541
Objective 3: Encourage activities that improve water quality and discourage activities that exacerbate water quality degradation.															
Strategy 1: Support hydrological improvement projects and restoration efforts.	Resource Mgmt.	Ongoing	Recurring	\$921	F	\$921	\$921	\$921	\$921	\$921	\$921	\$921	\$921	\$921	\$921
Strategy 2: Support development of TMDLs, BMAPs and Numeric Nutrient Criteria.	Resource Mgmt.	Ongoing	Recurring	\$921	F	\$921	\$921	\$921	\$921	\$921	\$921	\$921	\$921	\$921	\$921

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26
Strategy 3: Report water quality issues (e.g. oil spill, red tide, turbidity, etc.) to appropriate agencies.	Resource Mgmt.	Ongoing	Recurring	\$353	F	\$353	\$353	\$353	\$353	\$353	\$353	\$353	\$353	\$353	\$353
Objective 4: Improve public understanding of direct and indirect threats to CHAP water quality.															
Strategy 1: Disseminate information to volunteers and the general public through various media materials.	Education/ Outreach	Ongoing	Recurring	\$2,721	F	\$2,721	\$2,721	\$2,721	\$2,721	\$2,721	\$2,721	\$2,721	\$2,721	\$2,721	\$2,721
Strategy 2: Provide presentations to community groups to inform local residents on water quality issues and how they can reduce their impacts to CHAP.	Education/ Outreach	Ongoing	Recurring	\$3,264	F	\$3,264	\$3,264	\$3,264	\$3,264	\$3,264	\$3,264	\$3,264	\$3,264	\$3,264	\$3,264
Strategy 3: Provide water quality data to other agencies and organizations, including the Citizen Support Organization (CSO), for dissemination to the public.	Education/ Outreach	Ongoing	Recurring	\$3,082	F	\$3,082	\$3,082	\$3,082	\$3,282	\$3,282	\$3,282	\$3,282	\$3,282	\$3,282	\$3,282
Issue 2: Submerged Resources															
Goal 1: Assess the condition of the Charlotte Harbor Aquatic Preserves' submerged resources to identify threats to the health of the estuaries.															
Objective 1: Annually evaluate seagrass status and trends.															
Strategy 1: Collect, analyze and provide data from CHAP seagrass monitoring program to determine status and trends.	Ecosystem Science	1998-1999	Recurring	\$42,777	F	\$40,477	\$41,477	\$42,477	\$42,477	\$43,477	\$43,477	\$43,477	\$43,477	\$43,477	\$43,477
Strategy 2: Collaborate with other groups collecting seagrass data within CHAP and other local waters to stay informed about seagrass status and encourage consistency in methodology.	Ecosystem Science	Ongoing	Recurring	\$4,577	F	\$4,577	\$4,577	\$4,577	\$4,577	\$4,577	\$4,577	\$4,577	\$4,577	\$4,577	\$4,577
Objective 2: Expand the documentation of submerged resources found within CHAP, including plant, animal and algal communities.															
Strategy 1: Support the efforts of partner organizations to map seagrass and oyster habitat in CHAP.	Ecosystem Science	Ongoing	Recurring	\$1,627	F	\$1,627	\$1,627	\$1,627	\$1,627	\$1,627	\$1,627	\$1,627	\$1,627	\$1,627	\$1,627
Strategy 2: Document locations of habitat types (e.g. live rock, corals, sponge beds) within CHAP.	Ecosystem Science	2018-2019	Two years	\$15,000		\$0	\$0	\$15,000	\$15,000	\$0	\$0	\$0	\$0	\$0	\$0
Strategy 3: Document species found within CHAP.	Ecosystem Science	Ongoing	Recurring	\$1,032	F	\$1,032	\$1,032	\$1,032	\$1,032	\$1,032	\$1,032	\$1,032	\$1,032	\$1,032	\$1,032
Goal 2: Preserve, protect, and restore submerged resources within CHAP.															
Objective 1: Increase or improve submerged resources that have been degraded due to anthropogenic influences.															
Strategy 1: Support the effort by partner organizations to restore oyster habitat in CHAP.	Resource Mgmt.	Ongoing	Recurring	\$4,740	F	\$4,740	\$4,740	\$4,740	\$4,740	\$4,740	\$4,740	\$4,740	\$4,740	\$4,740	\$4,740
Strategy 2: Support efforts by partners to restore or improve seagrass beds damaged by prop scaring or water quality degradation.	Resource Mgmt.	Ongoing	Recurring	\$1,768	F	\$1,768	\$1,768	\$1,768	\$1,768	\$1,768	\$1,768	\$1,768	\$1,768	\$1,768	\$1,768

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26
Strategy 3: Support efforts by partners to increase native hard clam and bay scallop populations within CHAP.	Resource Mgmt.	Ongoing	Recurring	\$469	F	\$469	\$469	\$469	\$469	\$469	\$469	\$469	\$469	\$469	\$469
Objective 2: Maintain existing submerged cultural resources.															
Strategy 1: Document submerged cultural resources within CHAP.	Resource Mgmt.	2017-2018	Two years	\$2,000		\$0	\$2,000	\$2,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Objective 3: Identify the presence and threat of invasive exotic species.															
Strategy 1: Continue CHAP Asian green mussel eradication program.	Resource Mgmt.	2009-2010	Recurring	\$731	F	\$731	\$731	\$731	\$731	\$731	\$731	\$731	\$731	\$731	\$1,731
Strategy 2: Encourage the public to report locations within CHAP of exotic species such as the Asian green mussel and lionfish.	Education/ Outreach	Ongoing	Recurring	\$476	F	\$476	\$476	\$476	\$476	\$476	\$476	\$476	\$476	\$476	\$476
Strategy 3: Collaborate with groups collecting data on exotic species within CHAP.	Ecosystem Science	Ongoing	Recurring	\$905	F	\$905	\$905	\$905	\$905	\$905	\$905	\$905	\$905	\$905	\$905
Strategy 4: Report any invasive species found within CHAP to the appropriate documenting agency/organization.	Resource Mgmt.	Ongoing	Recurring	\$107	F	\$107	\$107	\$107	\$107	\$107	\$107	\$107	\$107	\$107	\$107
Objective 4: Improve public understanding of CHAP submerged resources.															
Strategy 1: Disseminate information to the general public and volunteers through various media materials.	Education/ Outreach	Ongoing	Recurring	\$1,936	F	\$1,936	\$1,936	\$1,936	\$1,936	\$1,936	\$1,936	\$1,936	\$1,936	\$1,936	\$1,936
Strategy 2: Support other agencies and organizations with their submerged natural and cultural resources education efforts.	Education/ Outreach	Ongoing	Recurring	\$2,542	F	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542	\$2,542
Strategy 3: Provide and encourage volunteer opportunities.	Education/ Outreach	Ongoing	Recurring	\$1,349	F	\$1,349	\$1,349	\$1,349	\$1,349	\$1,349	\$1,349	\$1,349	\$1,349	\$1,349	\$1,349
Strategy 4: Post aquatic preserve boundary signage for seagrass protection.	Education/ Outreach	2016-2017	Four years	\$826	F	\$1,504	\$600	\$600	\$600	\$0	\$0	\$0	\$0	\$0	\$0
Issue 3: Wading and Diving Colonial Nesting Birds															
Goal 1: Assess the condition of the Charlotte Harbor Aquatic Preserves' wading and diving bird colonies.															
Objective 1: Annually evaluate the status and trends of wading and diving bird populations within CHAP.															
Strategy 1: Collect and analyze data to determine status and trends.	Ecosystem Science	2008-2009	Recurring	\$26,141	F	\$24,891	\$25,891	\$25,891	\$26,391	\$26,391	\$26,391	\$26,391	\$26,391	\$26,391	\$26,391
Strategy 2: Identify threats to wading and diving bird colonies.	Ecosystem Science	Ongoing	Recurring	\$1,476	F	\$1,476	\$1,476	\$1,476	\$1,476	\$1,476	\$1,476	\$1,476	\$1,476	\$1,476	\$1,476
Strategy 3: Collaborate with other groups collecting regional nesting island data to encourage consistency in methodology.	Ecosystem Science	Ongoing	Recurring	\$2,112	F	\$2,112	\$2,112	\$2,112	\$2,112	\$2,112	\$2,112	\$2,112	\$2,112	\$2,112	\$2,112
Goal 2: Preserve and protect wading bird nesting islands.															
Objective 1: Reduce threats to the natural conditions on wading bird nesting islands.															
Strategy 1: Remove exotic vegetation from nesting islands.	Resource Mgmt.	2006-2007	Recurring	\$776	F/O	\$776	\$776	\$776	\$776	\$776	\$776	\$776	\$776	\$776	\$776

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26
Strategy 2: Conduct fishing-line and trash cleanups within CHAP, in cooperation with other agencies, organizations, and volunteers.	Resource Mgmt.	Ongoing	Recurring	\$1,595	F	\$1,595	\$1,595	\$1,595	\$1,595	\$1,595	\$1,595	\$1,595	\$1,595	\$1,595	\$1,595
Strategy 3: Report wildlife harassment activity to appropriate law enforcement personnel.	Resource Mgmt.	Ongoing	Recurring	\$1,012	F	\$1,012	\$1,012	\$1,012	\$1,012	\$1,012	\$1,012	\$1,012	\$1,012	\$1,012	\$1,012
Strategy 4: Coordinate with permitting agencies on any proposed public and private use activities (e.g. fireworks, marine events, and construction) in proximity of nesting islands.	Resource Mgmt.	Ongoing	Recurring	\$7,191	F	\$7,191	\$7,191	\$7,191	\$7,191	\$7,191	\$7,191	\$7,191	\$7,191	\$7,191	\$7,191
Strategy 5: Post signage around wading bird nesting islands where needed to reduce impacts.	Resource Mgmt.	2017-2018	Recurring	\$251	F	\$0	\$462	\$400	\$200	\$200	\$200	\$200	\$200	\$200	\$200
Objective 2: Improve public understanding of colonial wading birds and nesting island habitat.															
Strategy 1: Educate the public and disseminate information at environmental events.	Education/ Outreach	Ongoing	Recurring	\$2,023	F	\$2,023	\$2,023	\$2,023	\$2,023	\$2,023	\$2,023	\$2,023	\$2,023	\$2,023	\$2,023
Strategy 2: Provide volunteer opportunities and train volunteers to assist with rookery monitoring.	Education/ Outreach	Ongoing	Recurring	\$1,580	F	\$1,580	\$1,580	\$1,580	\$1,580	\$1,580	\$1,580	\$1,580	\$1,580	\$1,580	\$1,580
Strategy 3: Support partners that provide education and outreach.	Education/ Outreach	Ongoing	Recurring	\$476	F	\$476	\$476	\$476	\$476	\$476	\$476	\$476	\$476	\$476	\$476
Issue 4: Coastal and Watershed Activities															
Goal 1: Protect and improve the ecological integrity of the CHAP watershed.															
Objective 1: Preserve natural habitats within the CHAP watershed in order to maintain or restore water quality and natural resources within CHAP.															
Strategy 1: Support and encourage science-based sustainable land use strategies within the CHAP watershed.	Resource Mgmt.	Ongoing	Recurring	\$2,104	F	\$2,104	\$2,104	\$2,104	\$2,104	\$2,104	\$2,104	\$2,104	\$2,104	\$2,104	\$2,104
Strategy 2: Support regional land acquisition program efforts within the CHAP watershed.	Resource Mgmt.	Ongoing	Recurring	\$1,285	F	\$1,285	\$1,285	\$1,285	\$1,285	\$1,285	\$1,285	\$1,285	\$1,285	\$1,285	\$1,285
Strategy 3: Support the development and implementation of rules and ordinances that protect CHAP.	Resource Mgmt.	Ongoing	Recurring	\$1,928	F	\$1,928	\$1,928	\$1,928	\$1,928	\$1,928	\$1,928	\$1,928	\$1,928	\$1,928	\$1,928
Strategy 4: Engage in outreach and education opportunities with government and area decision makers and serve as a point of contact for information regarding the health of CHAP natural resources.	Education/ Outreach	Ongoing	Recurring	\$2,782	F	\$2,782	\$2,782	\$2,782	\$2,782	\$2,782	\$2,782	\$2,782	\$2,782	\$2,782	\$2,782
Objective 2: Coordinate with permitting agencies to reduce impacts from development within and/or adjacent to CHAP and its watersheds.															
Strategy 1: Stay abreast of proposed applications that have the potential to impact CHAP resources if authorized.	Resource Mgmt.	Ongoing	Recurring	\$5,620	F	\$5,620	\$5,620	\$5,620	\$5,620	\$5,620	\$5,620	\$5,620	\$5,620	\$5,620	\$5,620

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26
Strategy 2: Coordinate with DEP ERP, SFWMD, SWFWMD, NOAA NMFS, USACE, USCG, USFWS, FWC, county and city staff regarding current and ongoing project applications that have the potential to impact or benefit CHAP.	Resource Mgmt.	Ongoing	Recurring	\$15,221	F	\$15,221	\$15,221	\$15,221	\$15,221	\$15,221	\$15,221	\$15,221	\$15,221	\$15,221	\$15,221
Strategy 3: Report violations to compliance assurance and enforcement staff.	Resource Mgmt.	Ongoing	Recurring	\$1,830	F	\$1,830	\$1,830	\$1,830	\$1,830	\$1,830	\$1,830	\$1,830	\$1,830	\$1,830	\$1,830
Objective 3: Promote restoration and improvement projects that will enhance the CHAP watershed.															
Strategy 1: Support efforts to restore and protect natural freshwater inflows to the fullest extent possible, such as the water management districts' Surface Water Improvement and Management programs and the development of Minimum Flows and Levels.	Resource Mgmt.	Ongoing	Recurring	\$643	F	\$643	\$643	\$643	\$643	\$643	\$643	\$643	\$643	\$643	\$643
Strategy 2: Support projects such as septic tank retrofitting and connection to city sewer systems, stormwater treatment upgrades, reduction of impervious surfaces within the watershed.	Resource Mgmt.	Ongoing	Recurring	\$905	F	\$905	\$905	\$905	\$905	\$905	\$905	\$905	\$905	\$905	\$905
Strategy 3: Educate homeowners on how they can reduce their impacts to the local environment.	Education/ Outreach	Ongoing	Recurring	\$1,392	F	\$1,392	\$1,392	\$1,392	\$1,392	\$1,392	\$1,392	\$1,392	\$1,392	\$1,392	\$1,392
Issue 5: Public Involvement															
Goal 1: Increase public involvement, awareness and knowledge of CHAP.															
Objective 1: Assist CSO with recruitment and involvement in public outreach.															
Strategy 1: Provide prospective board members with educational recruitment opportunities.	Education/ Outreach	Ongoing	Recurring	\$854	F	\$854	\$854	\$854	\$854	\$854	\$854	\$854	\$854	\$854	\$854
Strategy 2: Utilize CSO media to educate the public about CHAP.	Education/ Outreach	Ongoing	Recurring	\$1,338	F	\$1,338	\$1,338	\$1,338	\$1,338	\$1,338	\$1,338	\$1,338	\$1,338	\$1,338	\$1,338
Strategy 3: Educate the public at outreach events about the role of the CSO.	Education/ Outreach	Ongoing	Recurring	\$2,759	F	\$2,759	\$2,759	\$2,759	\$2,759	\$2,759	\$2,759	\$2,759	\$2,759	\$2,759	\$2,759
Strategy 4: Continue cooperation with the CSO and CHPSP in order to further the mission of the CSO.	Education/ Outreach	Ongoing	Recurring	\$5,658	F	\$5,658	\$5,658	\$5,658	\$5,658	\$5,658	\$5,658	\$5,658	\$5,658	\$5,658	\$5,658
Strategy 5: Assist in the development of the Aquatic Preserve Society, Inc. and their efforts to support all FCO Aquatic Preserves.	Education/ Outreach	2014	Recurring	\$4,108	F	\$4,108	\$4,108	\$4,108	\$4,108	\$4,108	\$4,108	\$4,108	\$4,108	\$4,108	\$4,108
Objective 2: Increase public (resident and visitor) knowledge and awareness of CHAP, its issues and importance.															
Strategy 1: Provide a variety of formal and informal educational opportunities that foster stewardship while offering a chance to experience the coastal environment.	Education/ Outreach	Ongoing	Recurring	\$5,563	F	\$5,563	\$5,563	\$5,563	\$5,563	\$5,563	\$5,563	\$5,563	\$5,563	\$5,563	\$5,563
Strategy 2: Provide volunteer and internship opportunities.	Education/ Outreach	Ongoing	Recurring	\$5,228	F	\$4,918	\$4,918	\$4,918	\$5,018	\$5,018	\$5,018	\$5,118	\$5,118	\$6,118	\$6,118

Goals, Objectives & Integrated Strategies	Mgmt. Program	Implement. Date (Planned)	Length of Initiative	Est. Avg. Yearly Cost	Funding	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26
Issue 6: Public Use															
Goal 1: Assist federal, state and local agencies and organizations in managing public use and access while protecting the natural resources of CHAP.															
Objective 1: Identify specific public use activities within CHAP and coordinate with the appropriate agencies.															
Strategy 1: Work with regulatory agencies, law enforcement, USCG, and other resource management entities to identify and address uses within CHAP (e.g. camping, marine events) that are potentially illegal or harmful to natural resources, and other marine activities that do not currently require state regulatory approval and/or DEP's Division of State Lands authorization.	Public Use	Ongoing	Recurring	\$5,379	F	\$5,079	\$5,079	\$5,079	\$5,079	\$5,079	\$5,079	\$5,079	\$6,079	\$6,079	\$6,079
Strategy 2: Support local governments in their efforts to promote conservation, proper stewardship, and resource protection (e.g., seagrass and manatee protection, derelict vessel removal, etc.).	Public Use	Ongoing	Recurring	\$4,603	F	\$4,603	\$4,603	\$4,603	\$4,603	\$4,603	\$4,603	\$4,603	\$4,603	\$4,603	\$4,603
Strategy 3: Maintain effective relations with law enforcement agencies and serve as a point of contact for natural resource information.	Public Use	Ongoing	Recurring	\$3,087	F	\$3,087	\$3,087	\$3,087	\$3,087	\$3,087	\$3,087	\$3,087	\$3,087	\$3,087	\$3,087
Strategy 4: Maintain effective partnerships with, and stay current on potential user issues facing regional aquatic preserves and state parks.	Public Use	Ongoing	Recurring	\$3,464	F	\$3,464	\$3,464	\$3,464	\$3,464	\$3,464	\$3,464	\$3,464	\$3,464	\$3,464	\$3,464
Objective 2: Support and provide input regarding legislative rules and local ordinances that address public use in CHAP.															
Strategy 1: Stay up to date on potential state rule changes, local ordinances and land use policies that relate to public use in aquatic preserves.	Public Use	Ongoing	Recurring	\$2,140	F	\$2,140	\$2,140	\$2,140	\$2,140	\$2,140	\$2,140	\$2,140	\$2,140	\$2,140	\$2,140
Goal 2: Educate the public about the importance of sustainable public use.															
Objective 1: Create and/or support programs for appropriate and compatible uses of CHAP.															
Strategy 1: Provide snorkeling eco-ventures for the general public.	Education/ Outreach	2015	Recurring	\$10,296	F/S	\$9,046	\$9,246	\$9,246	\$9,446	\$9,446	\$10,446	\$11,446	\$11,546	\$11,546	\$11,546
Strategy 2: Support and encourage appropriate-use activities within CHAP, such as the Blueway Paddling Trails.	Public Use	Ongoing	Recurring	\$1,445	F	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445
Strategy 3: Support appropriate ecotourism operations within CHAP.	Public Use	Ongoing	Recurring	\$1,445	F	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445	\$1,445
Strategy 4: Support other agencies in their efforts to develop/update and distribute information (e.g. boaters' guides) to the public encouraging appropriate use of CHAP.	Education/ Outreach	Ongoing	Recurring	\$973	F	\$973	\$973	\$973	\$973	\$973	\$973	\$973	\$973	\$973	\$973


D.2 / Budget Summary Table

The following table provides a summary of cost estimates for conducting the management activities identified in this plan.

	Ecosystem Science	Resource Management	Education & Outreach	Public Use	Annual Total
2016-2017	\$127,917	\$50,120	\$60,344	\$21,263	\$259,644
2017-2018	\$131,917	\$52,582	\$59,640	\$21,263	\$265,402
2018-2019	\$172,917	\$52,520	\$59,640	\$21,263	\$306,340
2019-2020	\$176,417	\$50,320	\$60,140	\$21,263	\$308,140
2020-2021	\$138,417	\$50,320	\$59,540	\$21,263	\$269,540
2021-2022	\$138,417	\$50,320	\$60,540	\$21,263	\$270,540
2022-2023	\$138,417	\$50,320	\$61,640	\$21,263	\$271,640
2023-2024	\$138,417	\$50,320	\$61,740	\$22,263	\$272,740
2024-2025	\$138,417	\$50,320	\$62,740	\$22,263	\$273,740
2025-2026	\$138,417	\$51,320	\$62,740	\$22,263	\$274,740
Ten Year Totals	\$1,439,670	\$508,462	\$608,704	\$215,630	\$2,772,466

D.3 / Major Accomplishments Since the Approval of the Previous Plan

- In 1998, the CHAP office initiated a volunteer water quality monitoring program (Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network [CHEVWQMN]) spanning across six aquatic preserves and three counties. CHEVWQMN samples 46 sites monthly at sunrise for 19 field and lab parameters. The data has been used for baseline water quality assessments and for setting impaired waterbodies. This program won a Gulf Guardian Award in 2007 for its incorporation of volunteers and partners.
- A fixed seagrass transect monitoring program began in 1999, which includes an annual assessment of seagrass at 50 locations throughout CHAP. The data is summarized in CHAP reports and has been published in Florida Scientist.
- A new continuous water quality monitoring program was implemented in Matlacha Pass Aquatic Preserve to characterize and compare daily water quality conditions which vary by watershed influence. Three stations were installed (north, middle, and south); two were installed in 2005, and the third in 2009. It is an ongoing program in which the data has been used for various purposes and assists with resource management.
- In 2008, a monthly colonial wading and diving bird monitoring program began in order to assess the species' nesting efforts on mangrove islands within CHAP. In coordination with J.N. Ding Darling NWR, the data is published annually in the South Florida Birding Report. The program expanded from monitoring 11 islands in 2008 to 33 islands by 2014.
- In 2009 a pole and troll zone was implemented in Wulfert Flats for the Blind Pass dredging project. The area was selected based on the numerous prop scars with the intent that the scars will recover with reduced impact.
- Constructed a field support facility in 2012.
- Assisted with the creation of the Aquatic Preserve Society in 2014-2015, a 501c3 non-profit organization to support aquatic preserves statewide.
- Contributed to the multi-year and multi-agency agreement process to identify channels and dredge depths in both Lee and Charlotte counties for boat navigation and resource protection, resulting in DEP rule creation.
- Received funding for a contract position from The Nature Conservancy to coordinate local citizens in the construction of 900 oyster mats and 1,670 bags to be deployed for an oyster habitat creation project. Volunteers donated a total of 2,331 hours to the project.
- Received funding for a contract position from the Charlotte Harbor National Estuary Program to conduct water quality analysis and publish a report for the CHEVWQMN program. It was then extended to correlate CHAP seagrass and data sonde monitoring data.
- Snorkel eco-ventures were initiated in 2015 after CHAP received a West Coast Inland Navigational District grant to purchase snorkeling equipment. Free trips for the public were provided.
- Staff documented seagrass damage from large scale public marine events by obtaining aerial photographs before, during, and after these events. Staff successfully coordinated with U.S. Coast Guard, Lee County, NOAA National Marine Fisheries Service, and applicants of subsequent events to properly site entertainment barges, and boat access, to minimize natural resource impacts.
- Participated in statewide Aquatic Preserve Strategic Planning and Florida Coastal Management Program Strategic Planning committees, with DEP's Chief Operating Officer facilitating, resulting in concrete outcomes.

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- Initiated statewide aquatic preserve communication by leading monthly Aquatic Preserve Managers' conference calls that continue today with alternating leads.
 - Developed and continue to maintain many critical partnerships including the Charlotte Harbor National Estuary Program, Charlotte County Marine Advisory Committee, Florida Gulf Coast University, The Nature Conservancy, Lee County Marine Law Enforcement Task Force, Charlotte Harbor Environmental Center, Sanibel Captiva Conservation Foundation, J.N. Ding Darling National Wildlife Refuge, West Coast Inland Navigation District, National Marine Fisheries Service, and FWC Law Enforcement.
 - Initiated intern program.
 - Assumed management of Dog Island which included an assessment of public use, exotic plant removal, and closing of the island for nesting birds during public marine events.
 - Helped develop language and adoption of the DEP oyster habitat creation rule.

D.4 | Gulf Restoration Priority Projects

Florida's expansive coastline and wealth of aquatic resources have defined it as a subtropical oasis, attracting millions of residents and visitors, and the businesses that serve them. Florida's submerged lands play important roles in maintaining good water quality and hosting a diversity of wildlife and habitats (including economically and ecologically valuable nursery areas). The following five projects are proposed by the Florida Coastal Office as top priorities for the Charlotte Harbor Aquatic Preserves in regards to creating and maintaining healthy ecosystems and economies. Following the five projects is a table listing the projects, including the top five, that were reviewed and are supported by Charlotte Harbor Aquatic Preserves. In addition, the table also crosswalks the Charlotte Harbor Aquatic Preserves management plan's issues, goals, objectives, and strategies with the projects.



CHAP PRIORITY RESTORATION PROJECTS

Charlotte Harbor Aquatic Preserve' Restoration of Molluscan Shellfisheries Habitat

Project Objectives:

Partners:
Charlotte Harbor Aquatic Preserves, Florida Fish and Wildlife Research Institute, Lee County Environmental Lab, Friends of CHAP, GOMA, Bay Shellfish Company

Funding Required:
\$1,952,420

Location:
Sarasota, Charlotte, Lee Counties
26.9158° N, 82.3424° W

Project Timeline:
3 Years

Restore 2,000 acres of shellfish habitat in Tidal Peace and Myakka Rivers, 3,000 acres in Lemon Bay and 25,000 acres in Pine Island Sound. Increase the density and abundance of southern hard clam within Lemon Bay, wedge clam within Tidal Peace and Myakka Rivers, and bay scallop within Pine Island Sound through direct seeding taken from native broodstock. Characterize both structural and functional success through monitoring juvenile survival, as well as improve water clarity and quality through the quantization of PAR, color, turbidity and chlorophyll a levels.

This restoration project seeks to not only restore historic native mollusk levels, but also improve water quality, clarity and ecosystem functionality within the area, while increasing public awareness. Collaboration with volunteers will increase public awareness of the estuarine environment and importance of native species through hands on restoration. The submerged land is owned by the State of Florida and portions are directly managed by Charlotte Harbor Aquatic Preserves.



Project Outcomes:

30,000 acres will be restored to historic mollusk populations at sustainable levels, including the restoration of commercially important bivalves. Seagrass habitats will improve as a result of improved water clarity. Other species that are expected to benefit include arthropods (stone, blue and mud crabs), oysters, shrimp, and various commercial and recreational important fish.

Restoration of mollusks and associated habitat will improve water quality, clarity and overall estuarine diversity and health. Collaboration with volunteers will increase public awareness of the estuarine environment and the importance of native species through hands on restoration.



CHAP PRIORITY RESTORATION PROJECTS

Restoration and Mapping of Oyster Reef Habitat in Southwest Florida

Project Objectives:

The purposes of the Restoration of Oyster Reef Habitat in Southwest Florida Project are to: 1) map inter- and sub-tidal oysters from Pinellas County south to Lee County; and 2) Implement and monitor restoration of approximately 20 acres of oyster habitat within the Charlotte Harbor National Estuary Program (CHNEP). Estuarine segments in the Tampa Bay and Sarasota Bay estuaries may be targeted for oyster habitat restoration if the mapping phase identifies areas of critical need or optimal locations with high likelihood of success. Estuarine habitats such as oyster reef and salt marsh were directly and indirectly impacted by the Deepwater Horizon oil spill throughout the Gulf of Mexico. In turn, the impacts negatively affected the public use and local economies dependent on healthy habitats and their associated species, such as recreational and commercial fisheries. Restoring oyster habitat restores the Gulf's damaged natural foundation and enhances the resilience of local communities by reducing their vulnerability to storm damage and flooding.

Partners:

The Nature Conservancy,
Sanibel- Captiva
Conservation Foundation

Funding Required:
\$24,700,000

Location:
Sarasota, Charlotte, Lee
Counties
26.7453° N, 82.0837° W

Project Timeline:
9 Years

Project Outcomes:

Protecting and restoring oyster reefs helps sustain tourism and other coastal businesses, provides critical nursery areas for the Gulf's fisheries and reduces damages from storms. Reducing the vulnerability of coastal communities also enhances economic diversity in the Gulf. Oyster habitat restoration will be conducted in priority estuaries throughout the Gulf coast, including Tampa Bay, Sarasota Bay, Charlotte Harbor, Big Bend/Cedar Key, and Pensacola Bay.

The Project will implement the CHNEP Oyster Habitat Restoration Plan (2012) (Plan). As defined in the Plan, the oyster habitat restoration goals are to enhance and restore self-sustaining oyster habitat and related ecosystem services throughout the estuaries and tidal rivers and creeks in the CHNEP watershed.





CHAP PRIORITY RESTORATION PROJECTS

Oyster Reef Restoration in Tarpon Bay and Other Sites Near Sanibel

Partners:
SCCF

Funding Required:
\$750,000

Location:
Charlotte and Lee
Counties
26.4496° N, 82.0785° W

Project Timeline:

Project Objectives:

This project is designed to complement other larger oyster habitat restoration efforts being conducted throughout the Gulf, including work in the three contiguous NEP regions of Tampa Bay, Sarasota Bay and Charlotte Harbor. The project will implement the CHNEP Oyster Habitat Restoration Plan (2012). As defined in the Plan, the oyster habitat restoration goals are to enhance and restore self-sustaining oyster habitat and related ecosystem services throughout the estuaries and tidal rivers and creeks in the CHNEP watershed. All permits are held by the Sanibel-Captiva Conservation Foundation through 2020 (FDEP Environmental Resource Permits, a NMFS Biological Opinion, and USACOE Nationwide Permit).



Project Outcomes:

One to 2 large intertidal/subtidal fringe reefs (up to 0.5 acre) will be established in Tarpon Bay and San Carlos Bay (TBC, SCBC, MPC). For a 0.5-acre reef, it is estimated that 950 tons of shell will be needed (40 truckloads of fossilized shell). Fossilized shell (90) and restaurant collected oyster shell (10) will be staged, barged, and lowered using a barge and marine contractor. Control sites will be established to compare results at these sites versus restored reef. Parametric and non-parametric statistics will be used to compare oyster metrics and water quality values between years and between control and restoration sites. Multivariate statistical methods (Primer) will be used to try to establish a link between environmental parameters and changes in oyster metrics.



CHAP PRIORITY RESTORATION PROJECTS

Charlotte Harbor Flatwoods Initiative/ Northwest Lee County Surface Water Management Plan

Partners:
SFWMD, Lee County
Funding Required:
\$10,000,000

Location:
Charlotte, Lee Counties
26.8043° N, 81.9593° W

Project Timeline:
2 Years (ongoing)

Project Objective:

The Charlotte Harbor Flatwoods Initiative is a multi-phased regional hydrologic restoration effort coordinated by the South Florida Water Management District (SFWMD) and Florida Fish and Wildlife Conservation Commission (FWC). Multiple local, state and federal agencies have participated in the effort. The project area is approximately 90 square miles and includes the following sub-watersheds: 1) Yucca Pen Creek, 2) Durden Creek, 3) Greenwell Branch, 4) Longview Run and 5) Gator Slough. The objectives of the project are to restore sheet flow on large tracks of publicly owned land, restore more natural flows to Charlotte Harbor, improve water quality, improve ground water recharge, reduce high water levels/flooding and enhance fish and wildlife habitat. Implementation of this project is beneficial to the Matlacha Pass and Gasparilla Sound-Charlotte Harbor aquatic preserves.



Project Outcomes:

Sheet flow in the area has been altered as a result of I-75, US-41, canals, development, and other sources. Runoff from these systems originates in the northeastern reaches of the Babcock-Webb Wildlife Management Area (WMA) in Charlotte County within the SFWMD and then passes through the Southwest Florida Water Management District (SWFWMD) to reach the outfall in Lee County within the SFWMD again. Thus, the need for regional coordination is clear.



CHAP PRIORITY RESTORATION PROJECTS

M-24 Charlotte Harbor Estuary Florida Forever Land Acquisition/Charlotte Harbor Aquatic Preserve/ Charlotte Harbor Buffer State Preserve

Partners:
FWC on behalf of the
NWRA and Defenders of
Wildlife

Funding Required:
\$88,500,000

Location:
Sarasota, Charlotte and
Lee Counties
26.8511° N, 82.2518° W

Project Timeline:
(Ongoing)

Project Objectives:

Acquire the remaining 13,547 project acres from the Myakka River Estuary, Charlotte Harbor, and Cape Haze parcels. Restoration will include maintenance of hydrological processes and prescribed burning to maintain native vegetation. The land consists of extensive undisturbed areas and is important habitat for bald eagles, scrub jays, manatees, sandhill cranes, indigo snakes, and gopher tortoises.

Charlotte Harbor, one of the largest and most productive estuaries in Florida, supports an important recreational and commercial fishery, but is rapidly being surrounded by cities and residential developments that could harm this important resource. Conserving flatwoods and prairies behind the mangrove swamps and salt marshes along Charlotte and Placida Harbors will help the Charlotte Harbor Estuary project protect the water quality of the estuary, protect habitat for the Florida manatee and other rare wildlife, and provide residents of and visitors to the area with opportunities for boating, fishing, and other recreational pursuits.



Project Outcomes:

The project protects the water quality of the Charlotte Harbor estuary, designated as a series of Outstanding Florida Waters, and its recreational and commercial fisheries. The area is vulnerable to development, invasive exotic plants, and damage by off-road vehicles. This project provides an essential addition to lands previously acquired through the Environmentally Endangered Lands (EEL) program. Most of the lands are wetlands, including mangrove, salt marsh, and salt flats, but there are some mesic flatwoods. The project area offers habitat for several rare species and is threatened by dredging and filling from residential development.

The projects listed below have also been reviewed and are supported by Charlotte Harbor Aquatic Preserves. For project details go to www.dep.state.fl.us/deepwaterhorizon/default.htm.

Project Name	Amount	Partners	Location in CHAP mgmt plan
Charlotte Harbor Aquatic Preserve Restoration of Molluscan Shellfisheries Habitat	\$1,952,420	Charlotte Harbor Aquatic Preserves	Issue 2, Goal 2, Objective 1, Strategy 3
Restoration & Mapping of Oyster Reef Habitat in Southwest Florida	\$24,700,000	The Nature Conservancy, Sanibel Captiva Conservation Foundation, Florida Gulf Coast University	Issue 2, Goal 1, Objective 2, Strategy 1 AND Issue 2, Goal 2, Objective 1, Strategy 1
Oyster Reef Restoration in Charlotte Harbor, Tarpon Bay and Other Sites	\$750,000	Sanibel Captiva Conservation Foundation	Issue 2, Goal 2, Objective 1, Strategy 1
Charlotte Harbor Flatwoods Initiative/Northwest Lee County Surface Water Management Plan	\$10,000,000	South Florida Water Management District, FWC, Lee County	Issue 1, Goal 1, Objective 3, Strategy 1 AND Issue 4, Goal 1, Objective 1, Strategy 2 AND Issue 4, Goal 1, Objective 3, Strategy 1
Charlotte Harbor Estuary Florida Forever Land Acquisition	\$88,500,000	Florida Fish and Wildlife Conservation Commission, on behalf of the National Wildlife Refuge Association and Defenders of Wildlife	Issue 1, Goal 1, Objective 3, Strategy 1 AND Issue 4, Goal 1, Objective 1, Strategy 2 AND Issue 4, Goal 1, Objective 3, Strategy 1
Caloosahatchee River (C-43) West Basin Storage Reservoir	\$21,489,000	South Florida Water Management District	Issue 4, Goal 1, Objective 3, Strategy 1 AND Issue 1, Goal 1, Objective 3, Strategy 1
Land Acquisition and Perpetual Management for Habitat and Species Conservation	\$26,208,000	Florida Fish and Wildlife Conservation Commission	Issue 4, Goal 1, Objective 1, Strategy 2
District Seagrass Mapping Project	\$1,000,000	Southwest Florida Water Management District	Issue 2, Goal 1, Objective 2, Strategy 1
Lemon Bay Land Acquisition	\$1,950,000	Sarasota County	Issue 4, Goal 1, Objective 1, Strategy 2
Hydrologic Restoration in Sanibel and Captiva Islands in the Charlotte Harbor Area	\$1,000,000	Sanibel Captiva Conservation Foundation	Issue 1, Goal 1, Objective 3, Strategy 1
Caloosahatchee River Estuary Tape Grass Restoration Project	\$2,462,900	Coastal Watershed Institute at Florida Gulf Coast University	Issue 2, Goal 2, Objective 1, Strategy 2
Master's Landing	\$85,000	Charlotte Harbor National Estuary Program	Issue 1, Goal 1, Objective 3, Strategy 1 AND Issue 4, Goal 1, Objective 3, Strategy 1

D.5 / Additional Research Needs for the Charlotte Harbor Aquatic Preserves

The Charlotte Harbor Aquatic Preserves (CHAP) staff conduct a variety of monitoring projects that aid in the assessment and management of the aquatic preserves. However, there are many projects that could benefit the continuing advancement of knowledge of the CHAP resources that staff are not currently able to conduct. The following are research needs identified during the review of the draft CHAP management plan by the advisory committee that would aid in the management and knowledge of the aquatic preserves. The research needs projects could be spearheaded by local organizations, universities, state or federal agencies, etc. CHAP staff could also complete some projects with additional staff or funding.

- Document regulatory changes resulting from CHAP programs (e.g. changes in water quality criteria from CHEVWQMN program).
- Compare the fixed seagrass monitoring transect data (deep edge/presence and absence) to the WMD's seagrass mapping.
- Analyze seagrass transect monitoring data for status and trends and in conjunction with water quality data.
- Make seagrass/macroalgae transect monitoring data available either through Water Atlas, or through GIS shapefiles.
- Analyze seagrass transect monitoring data to evaluate epiphyte loads on seagrass with water quality.
- Monitor erosion on the colonial wading and diving bird nesting islands.
- Analyze suitability of existing and potential future nesting bird rookery islands within CHAP, based on ownership, elevation, predators, exotic plants, etc.
- Document locations of habitat types (live rock, sponge beds, corals) within CHAP.
- Map oysters, live-rock, hard bottom, corals and sponges throughout CHAP, in collaboration with partners to ensure consistent methods.
- Understand the effects of tidal creeks and their productivity on the aquatic preserve resources.
- Determine point sources of pollution.
- Produce a regular report card/rating system of water quality and resources within CHAP.
- Update seagrass propscar mapping using the same techniques as the FWRI 2003 study throughout the CHAP area.
- Study the effectiveness of the authorized No Internal Combustion Motor Zones in regards to natural recovery of seagrass propscars before and after implementation.
- Analyze fisheries data in comparison to seagrass data.
- Research nutrient loading in relation to red tide and freshwater influences.
- Conduct an economic evaluation of CHAP resources and economic benefit of CHAP aquatic preserve designation.
- Conduct visitation study of user groups within CHAP.
- Implement sentinel study site within CHAP based on NOAA/NERR models.

Other Requirements

E.1 / Acquisition and Restoration Council Management Plan Compliance Checklist

Land Management Plan Compliance Checklist Required for State-owned conservation lands over 160 acres			
Item #	Requirement	Statute/Rule	Pg#/App
Section A: Acquisition Information Items			
1	The common name of the property.	18-2.018 & 18-2.021	Ex. Sum.
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	p. 1-2
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	p. 1-2, 6-8
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	Ex. Sum & p. 12, 14-21
5	A map showing the approximate location and boundaries of the property, and the location of any structures or improvements to the property.	18-2.018 & 18-2.021	p. 12, 16-20
6	An assessment as to whether the property, or any portion, should be declared surplus. Provide information regarding assessment and analysis in the plan, and provide corresponding map.	18-2.021	N/A
7	Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property. Please clearly indicate parcels on a map.	18-2.021	N/A
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	p. 59
9	A statement of the purpose for which the lands were acquired, the projected use or uses as defined in 253.034 and the statutory authority for such use or uses.	259.032(10)	p. 6
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	p. 28-35, 55-59
Section B: Use Items			
11	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	p. 13-14, 55-59
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	p. 9-11, 13-14, 55-59
13	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	N/A
14	A description of the management responsibilities of each entity involved in the property's management and how such responsibilities will be coordinated.	18-2.018	p. 6-8, 61-122
15	Include a provision that requires that the managing agency consult with the Division of Historical Resources, Department of State before taking actions that may adversely affect archeological or historical resources.	18-2.021	App. E.2
16	Analysis/description of other managing agencies and private land managers, if any, which could facilitate the restoration or management of the land.	18-2.021	p. 61-122
17	A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	259.032(10)	p. 107-122
18	A finding regarding whether each planned use complies with the 1981 State Lands Management Plan, particularly whether such uses represent "balanced public utilization," specific agency statutory authority and any other legislative or executive directives that constrain the use of such property.	18-2.021	p. 6-8
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	App. E.3
20	An assessment of the impact of planned uses on the renewable and non-renewable resources of the property, including soil and water resources, and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to compensate/mitigate damage caused by such uses, including a description of how the manager plans to control and prevent soil erosion and soil or water contamination.	18-2.018 & 18-2.021	p. 28-35, 61-122

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
21	*For managed areas larger than 1,000 acres, an analysis of the multiple-use potential of the property which shall include the potential of the property to generate revenues to enhance the management of the property provided that no lease, easement, or license for such revenue-generating use shall be entered into if the granting of such lease, easement or license would adversely affect the tax exemption of the interest on any revenue bonds issued to fund the acquisition of the affected lands from gross income for federal income tax purposes, pursuant to Internal Revenue Service regulations.	18-2.021 & 253.036	N/A
22	If the lead managing agency determines that timber resource management is not in conflict with the primary management objectives of the managed area, a component or section, prepared by a qualified professional forester, that assesses the feasibility of managing timber resources pursuant to section 253.036, F.S.	18-021	N/A
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	p. 107-122

*The following taken from 253.034(10) is not a land management plan requirement; however, it should be considered when developing a land management plan: The following additional uses of conservation lands acquired pursuant to the Florida Forever program and other state-funded conservation land purchase programs shall be authorized, upon a finding by the Board of Trustees, if they meet the criteria specified in paragraphs (a)-(e): water resource development projects, water supply development projects, storm-water management projects, linear facilities and sustainable agriculture and forestry. Such additional uses are authorized where: (a) Not inconsistent with the management plan for such lands; (b) Compatible with the natural ecosystem and resource values of such lands; (c) The proposed use is appropriately located on such lands and where due consideration is given to the use of other available lands; (d) The using entity reasonably compensates the titleholder for such use based upon an appropriate measure of value; and (e) The use is consistent with the public interest.

Section C: Public Involvement Items

24	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	App. C
25	The management prospectus required pursuant to paragraph (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	259.032(10)	N/A
26	LMPs and LMP updates for parcels over 160 acres shall be developed with input from an advisory group who must conduct at least one public hearing within the county in which the parcel or project is located. Include the advisory group members and their affiliations, as well as the date and location of the advisory group meeting.	259.032(10)	App. C
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	App. C
28	During plan development, at least one public hearing shall be held in each affected county. Notice of such public hearing shall be posted on the parcel or project designated for management, advertised in a paper of general circulation, and announced at a scheduled meeting of the local governing body before the actual public hearing. Include a copy of each County's advertisements and announcements (meeting minutes will suffice to indicate an announcement) in the management plan.	253.034(5) & 259.032(10)	App. C
29	The manager shall consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan. Include manager's replies to the team's findings and recommendations.	259.036	N/A
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	N/A
31	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	N/A

Section D: Natural Resources

32	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding soil types. Use brief descriptions and include USDA maps when available.	18-2.021	p 25-27, Map 14 (p 28)
33	Insert FNAI based natural community maps when available.	ARC consensus	p. 38-40 (maps 17-19)

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
34	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding outstanding native landscapes containing relatively unaltered flora, fauna and geological conditions.	18-2.021	Ex Sum
35	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding unique natural features and/or resources including but not limited to virgin timber stands, scenic vistas, natural rivers and streams, coral reefs, natural springs, caverns and large sinkholes.	18-2.018 & 18-2.021	Ex Sum, p. 37-46
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	Ex Sum, p. 37-46
37	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding mineral resources, such as oil, gas and phosphate, etc.	18-2.018 & 18-2.021	App. A.1
38	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding fish and wildlife, both game and non-game, and their habitat.	18-2.018 & 18-2.021	p. 37-49, App. B.3.1 and B.3.2
39	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding State and Federally listed endangered or threatened species and their habitat.	18-2.021	p. 37-49, App. B.3.1 and B.3.2
40	The identification or resources on the property that are listed in the Natural Areas Inventory. Include letter from FNAI or consultant where appropriate.	18-2.021	p. 37-49
41	Specific description of how the managing agency plans to identify, locate, protect and preserve or otherwise use fragile, nonrenewable natural and cultural resources.	259.032(10)	p. 50-51, 87-89, App. B.4
42	Habitat Restoration and Improvement	259.032(10) & 253.034(5)	
42-A.	Describe management needs, problems and a desired outcome and the key management activities necessary to achieve the enhancement, protection and preservation of restored habitats and enhance the natural, historical and archeological resources and their values for which the lands were acquired.	259.032(10) & 253.034(5)	p. 61-122
42-B.	Provide a detailed description of both short (2-year planning period) and long-term (10-year planning period) management goals, and a priority schedule based on the purposes for which the lands were acquired and include a timeline for completion.	259.032(10) & 253.034(5)	App. D.1
42-C.	The associated measurable objectives to achieve the goals.	259.032(10) & 253.034(5)	App. D.1
42-D.	The related activities that are to be performed to meet the land management objectives and their associated measures. Include fire management plans - they can be in plan body or an appendix.	259.032(10) & 253.034(5)	App. D.1
42-E.	A detailed expense and manpower budget in order to provide a management tool that facilitates development of performance measures, including recommendations for cost-effective methods of accomplishing those activities.	259.032(10) & 253.034(5)	App. D.1
43	***Quantitative data description of the land regarding an inventory of forest and other natural resources and associated acreage. See footnote.	253.034(5)	Ex Sum
44	Sustainable Forest Management, including implementation of prescribed fire management	18-2.021, 253.034(5) & 259.032(10)	
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-C.	Measurable objectives (see requirement for #42-C).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-D.	Related activities (see requirement for #42-D).	18-2.021, 253.034(5) & 259.032(10)	N/A

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
44-E.	Budgets (see requirement for #42-E).	18-2.021, 253.034(5) & 259.032(10)	N/A
45	Imperiled species, habitat maintenance, enhancement, restoration or population restoration	259.032(10) & 253.034(5)	
45-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 61-122
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
45-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
45-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
45-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
46	***Quantitative data description of the land regarding an inventory of exotic and invasive plants and associated acreage. See footnote.	253.034(5)	p. 49-50
47	Place the Arthropod Control Plan in an appendix. If one does not exist, provide a statement as to what arrangement exists between the local mosquito control district and the management unit.	BOT require- ment via lease language	App. B.6
48	Exotic and invasive species maintenance and control	259.032(10) & 253.034(5)	
48-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 61-122
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
48-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
48-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
48-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section E: Water Resources

49	A statement as to whether the property is within and/or adjacent to an aquatic preserve or a designated area of critical state concern or an area under study for such designation. If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.	18-2.018 & 18-2.021	p. 1-3
50	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding water resources, including water classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water under Rule 62-302.700, F.A.C.	18-2.021	p. 1-3, 28-35
51	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding swamps, marshes and other wetlands.	18-2.021	p. 37-46
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. See footnote.	253.034(5)	Ex. Sum
53	Hydrological Preservation and Restoration	259.032(10) & 253.034(5)	
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	App. D.1
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
53-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
53-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
53-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
Section F: Historical, Archaeological and Cultural Resources			
54	**Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding archeological and historical resources. Include maps of all cultural resources except Native American sites, unless such sites are major points of interest that are open to public visitation.	18-2.018, 18-2.021 & per DHR's request	Ex. Sum, p. 50-51, App. B.4
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	Ex. Sum, p. 50-51, App. B.4
56	A description of actions the agency plans to take to locate and identify unknown resources such as surveys of unknown archeological and historical resources.	18-2.021	App. D.1
57	Cultural and Historical Resources	259.032(10) & 253.034(5)	
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	App. D.1
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
57-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
57-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
57-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
**While maps of Native American sites should not be included in the body of the management plan, the DSL urges each managing agency to provide such information to the Division of Historical Resources for inclusion in their proprietary database. This information should be available for access to new managers to assist them in developing, implementing and coordinating their management activities.			
Section G: Facilities (Infrastructure, Access, Recreation)			
58	***Quantitative data description of the land regarding an inventory of infrastructure and associated acreage. See footnote.	253.034(5)	p. 125-127
59	Capital Facilities and Infrastructure	259.032(10) & 253.034(5)	
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 125-127, App. D.1
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
59-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
59-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
59-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	p. 107-122, 125-127, App. D.1
61	Public Access and Recreational Opportunities	259.032(10) & 253.034(5)	
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	App. D.1
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
61-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
61-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
61-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

**Land Management Plan Compliance Checklist
Required for State-owned conservation lands over 160 acres**

Item #	Requirement	Statute/Rule	Pg#/App
Section H: Other/ Managing Agency Tools			
62	Place this LMP Compliance Checklist at the front of the plan.	ARC and managing agency consensus	Front & App. E.1
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	Ex. Sum
64	If this LMP is a 10-year update, note the accomplishments since the drafting of the last LMP set forth in an organized (categories or bullets) format.	ARC consensus	App. D.3
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	p.61-122
66	Summary budget for the scheduled land management activities of the LMP including any potential fees anticipated from public or private entities for projects to offset adverse impacts to imperiled species or such habitat, which fees shall be used to restore, manage, enhance, repopulate, or acquire imperiled species habitat for lands that have or are anticipated to have imperiled species or such habitat onsite. The summary budget shall be prepared in such a manner that it facilitates computing an aggregate of land management costs for all state-managed lands using the categories described in s. 259.037(3) which are resource management, administration, support, capital improvements, recreation visitor services, law enforcement activities.	253.034(5)	App. D.1
67	Cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired, include recommendations for cost-effective methods in accomplishing those activities.	259.032(10)	App. D.1
68	A statement of gross income generated, net income and expenses.	18-2.018	N/A

*** = The referenced inventories shall be of such detail that objective measures and benchmarks can be established for each tract of land and monitored during the lifetime of the plan. All quantitative data collected shall be aggregated, standardized, collected, and presented in an electronic format to allow for uniform management reporting and analysis. The information collected by the DEP pursuant to s. 253.0325(2) shall be available to the land manager and his or her assignee.

These procedures apply to state agencies, local governments, and non-profits that manage state-owned properties.

A. General Discussion

Historic resources are both archaeological sites and historic structures. Per Chapter 267, Florida Statutes, '*Historic property*' or '*historic resource*' means any prehistoric district, site, building, object, or other real or personal property of historical, architectural, or archaeological value, and folklife resources. These properties or resources may include, but are not limited to, monuments, memorials, Indian habitations, ceremonial sites, abandoned settlements, sunken or abandoned ships, engineering works, treasure trove, artifacts, or other objects with intrinsic historical or archaeological value, or any part thereof, relating to the history, government, and culture of the state."

B. Agency Responsibilities

Per State Policy relative to historic properties, state agencies of the executive branch must allow the Division of Historical Resources (Division) the opportunity to comment on any undertakings, whether these undertakings directly involve the state agency, i.e., land management responsibilities, or the state agency has indirect jurisdiction, i.e. permitting authority, grants, etc. No state funds should be expended on the undertaking until the Division has the opportunity to review and comment on the project, permit, grant, etc.

State agencies shall preserve the historic resources which are owned or controlled by the agency.

Regarding proposed demolition or substantial alterations of historic properties, consultation with the Division must occur, and alternatives to demolition must be considered.

State agencies must consult with Division to establish a program to location, inventory and evaluate all historic properties under ownership or controlled by the agency.

C. Statutory Authority

Statutory Authority and more in depth information can be found at www.flheritage.com/preservation/compliance/guidelines.cfm

D. Management Implementation

Even though the Division sits on the Acquisition and Restoration Council and approves land management plans, these plans are conceptual. Specific information regarding individual projects must be submitted to the Division for review and recommendations.

Managers of state lands must coordinate any land clearing or ground disturbing activities with the Division to allow for review and comment on the proposed project. Recommendations may include, but are not limited to: approval of the project as submitted, cultural resource assessment survey by a qualified professional archaeologist, modifications to the proposed project to avoid or mitigate potential adverse effects.

Projects such as additions, exterior alteration, or related new construction regarding historic structures must also be submitted to the Division of Historical Resources for review and comment by the Division's architects. Projects involving structures fifty years of age or older, must be submitted to this agency for a significance determination. In rare cases, structures under fifty years of age may be deemed historically significant. These must be evaluated on a case by case basis.

Adverse impacts to significant sites, either archaeological sites or historic buildings, must be avoided. Furthermore, managers of state property should make preparations for locating and evaluating historic resources, both archaeological sites and historic structures.

E. Minimum Review Documentation Requirements

In order to have a proposed project reviewed by the Division, certain information must be submitted for comments and recommendations. The minimum review documentation requirements can be found at www.flheritage.com/preservation/compliance/docs/minimum_review_documentation_requirements.pdf.

Questions relating to the treatment of archaeological and historic resources on state lands should be directed to:

Deena S. Woodward

Division of Historical Resources, Bureau of Historic Preservation, Compliance and Review Section

R. A. Gray Building, 500 South Bronough Street

Tallahassee, FL 32399-0250

Phone: (850) 245-6425, Toll Free: (800) 847-7278, Fax: (850) 245-6435



**Florida Department of
Environmental Protection**

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

Claire Jubb
Charlotte County Community Development Director
18400 Murdock Circle
Port Charlotte, Florida 33948

Lee County Planning Division
1500 Monroe Street
Fort Myers, Florida 33901

Sarasota County Planning and Development Services
1660 Ringling Boulevard
Sarasota, Florida 34236

Dear Planning Department:

Attached is a copy of the draft Charlotte Harbor Aquatic Preserves (CHAP) Management Plan. The plan was developed with input from the public and the CHAP Management Plan Advisory Group. It is anticipated to be reviewed and approved by the Acquisition and Restoration Council at the December 15-16, 2016 meetings in Tallahassee. We respectfully request, within 30 days of receipt of this letter, your review of the CHAP plan for its compliance with your county Comprehensive Plan. Please reply to the physical address (or e-mail address) below regarding whether the management plan is in compliance with your county's comprehensive plan. Thank you in advance for your time and effort in this matter.

The plan can also be found at
<http://www.dep.state.fl.us/coastal/sites/charlotteharbor/plan.htm>. If you have any questions, please don't hesitate to contact me at (850)245-2098 or Penny.Isom@dep.state.fl.us.

Sincerely,

A handwritten signature in black ink, appearing to read "Penny Isom".

Penny Isom
Florida Coastal Office
3900 Commonwealth Blvd., MS 235
Tallahassee, Florida 32399-3000

www.dep.state.fl.us



SARASOTA COUNTY
"Dedicated to Quality Service"

November 23, 2016

Penny Isom
Planning Manager, Florida Coastal Office
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000

RE: Charlotte Harbor Aquatic Preserves Management Plan Review

Dear Ms Isom:

Thank you for the copy of the Charlotte Harbor Aquatic Preserves Management Plan for review and for consistency with Sarasota County's Comprehensive Plan, which the County recently received.

Staff finds that the proposed amendment does not conflict with Sarasota County's goals, objectives, and policies of the Sarasota County Comprehensive Plan or its implementation.

Sarasota County appreciates Florida Department of Environmental Protection (FDEP) informing it of the proposed Management Plan. We value our relationship with Charlotte County and the FDEP, and the mutual efforts shared in the planning for quality communities. If you have any questions, please contact our office.

Sincerely,

Allen Parsons, AICP
Planning Division Manager

Cc: Rachel Herman, Manager, Environmental Planning (via email)

From: [Sweigert, Rebecca](#)
To: [Isom, Penny](#)
Cc: [Rozdolski, Mikki](#)
Subject: Charlotte Harbor Aquatic Preserve (CHAP) Management Plan
Date: Wednesday, November 30, 2016 2:59:40 PM

Penny,

Thank you for the opportunity to review the draft Charlotte Harbor Aquatic Preserve (CHAP) Management Plan. After review, staff did not find any conflicts between the Lee County Comprehensive Plan and the draft Charlotte Harbor Aquatic Preserve (CHAP) Management Plan.

Please let me know if you have any questions.

Thanks
Becky

Becky Sweigert
Principal Environmental Planner
Lee County DCD/Planning Section
PO Box 398
Fort Myers, FL 33902-0398
rsweigert@leegov.com

239-533-8552
239-485-8344 (fax)

Please note: Florida has a very broad public records law. Most written communications to or from County Employees and officials regarding County business are public records available to the public and media upon request. Your email communication may be subject to public disclosure.

Under Florida law, email addresses are public records. If you do not want your email address released in response to a public records request, do not send electronic mail to this entity. Instead, contact this office by phone or in writing.

Isom, Penny

From: Shao, Jie <Jie.Shao@charlottecountyfl.gov>
Sent: Wednesday, November 30, 2016 9:30 AM
To: Isom, Penny
Cc: Jubb, Claire; Cullinan, Shaun; Trepal, Matthew
Subject: RE: Charlotte Harbor Aquatic Preserves

Good morning, Ms. Penny Isom,

Thank you so much for allowing the Charlotte County staff to review the draft Charlotte Harbor Aquatic Preserve (CHAP) Management Plan, the proposed plan is consistent with the County's Comprehensive Plan.

Thank you,
Jie

Jie Shao
Planner, Principal
Charlotte County Community Development Department
18400 Murdock Circle
Port Charlotte, FL 33948-1094
[\(941\) 743-1272](tel:(941)743-1272)

Please visit our [Smart Charlotte 2050 website](#) to view the adopted Comprehensive Plan
Please click on www.CharlotteCountyFL.com to visit the Charlotte County Homepage



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Ryan E. Matthews
Interim Secretary

February 17, 2017

Ms. Penny Isom
Planning Manager
Florida Coastal Office
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, MS 235
Tallahassee, Florida 32399-3000

RE: Charlotte Harbor Aquatic Preserves Management Plan

Dear Ms. Isom:

On **February 17, 2017**, the Acquisition and Restoration Council recommended approval of the **Charlotte Harbor Aquatic Preserves** management plan. Please advise Mr. James Parker of this office when the plan has been approved by the Board of Trustees.

Sincerely,

A handwritten signature in blue ink, appearing to read "R. Spaulding", is written over the typed name.

Raymond V. Spaulding
Office of Environmental Services
Division of State Lands
Department of Environmental Protection



Charlotte Harbor Aquatic Preserves Management Plan

**Florida Department of Environmental Protection
Florida Coastal Office**

3900 Commonwealth Blvd., MS #235
Tallahassee, FL 32399 • www.aquaticpreserves.org