APALACHICOLA BAY

AQUATIC PRESERVE MANAGEMENT PLAN

1992

DEPARTMENT OF NATURAL RESOURCES

APALACHICOLA BAY

AQUATIC PRESERVE MANAGEMENT PLAN

ADOPTED

JANUARY 22, 1992

VIRGINIA WETHERELL

Executive Director

Department of Natural Resources

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Bureau of Submerged Lands and Preserves
Division of State Lands

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EXECUTIVE SUMMARY

The Apalachicola Bay Aquatic Preserve lies along the northeast coast of the Gulf of Mexico in Franklin County. The preserve, designated by the Governor and Cabinet in 1969, covers an area of 80,000 acres of sovereignty submerged lands including all tidal lands and islands, sandbars, shallow banks, submerged bottoms and lands waterward of mean high water to which the state holds title.

Apalachicola Bay produces 90% of Florida's oyster crop and 10% of the nation's oyster harvest. In addition, the estuary is a major breeding ground for the blue crab and an important nursery for shrimp and finfish. The Apalachicola River, which empties into the bay, has the largest flow of any river in Florida. The upper basin has the greatest number of endangered plant species of any comparably sized area in Florida and the highest density of amphibians and reptiles in the continent north of Mexico.

Tidal flats are located on the bayward sides of the barrier islands, along the mainland, and in the shallow waters associated with salt and freshwater marshes. Little is known about these tidal flats, and they are often ignored because their values to the aquatic ecosystem are not readily visible. However, marine biologists consider them to be even more productive than the submerged grassbeds because of their high microalgae production.

Population density in Franklin County and adjoining counties is low--less than 12.5 people/square mile. With few notable exceptions (i.e., cities of Apalachicola and Eastpoint, part of St. George Island, and the coastal strand between Eastpoint and Carrabelle), the major land uses in the Apalachicola Bay are forestry and federally or state-owned conservation areas. About 93% of Franklin County is in forestry, owned for conservation purposes, or is submerged under rivers, streams or lakes. In recent years, considerable acreage has been purchased in close proximity to the estuary for environmental rather than recreational reasons--to protect the estuary from impacts associated with habitat alteration.

The aquatic preserve has been divided into individual management areas. The management areas are classified and delineated based on the types and locations of existing and planned uses of the adjacent uplands, as well as on the types, occurrence and characteristics of the natural resources on submerged lands. Specific rule criteria and allowable uses are defined in the plan for each area.

The major objective of the aquatic preserve management program is to ensure the maintenance of an essentially natural condition within the preserve. Management will also be directed to ensure public recreational opportunities while assuring the continued propagation of fish and wildlife resources.

An additional management objective is the review and comment on application of the use of state-owned submerged lands. Meeting these objectives will require a fully implemented management program with on-site field personnel for the aquatic preserve.

Various state, federal and regional agencies oversee laws and regulations which apply to the lands and waters within the aquatic preserve. Therefore, management of the aquatic preserve will complement agency programs whenever it is in the preserve's interest. The Apalachicola National Estuarine Research Reserve, another arm of DNR, has a strong presence in the estuary and coordinates closely with aquatic preserve staff on management initiatives. Field personnel and central office staff work together with many agencies to assume effective management and protection.

The management of the preserve and protection of the resources included within its boundaries will be enhanced by continually identifying and resolving specific program needs. Meeting these needs, which may include legislative support, administrative rule changes, resource protection capabilities, and funding and staffing needs, will relieve some stress on the resources or personnel involved in the management of the preserve. In the future, the field staff will develop and submit a status report that summarizes the program's needs and suggests measures to be taken to resolve these needs.

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Bureau of Submerged Lands and Preserves
Department of Natural Resources
3900 Commonwealth Boulevard
Mail Station 125
Tallahassee, Florida 32399-3000

CHAPTER I

INTRODUCTION

Apalachicola Bay is in Franklin County, Florida along the northeast coast of the Gulf of Mexico. It was designated an aquatic preserve by the Governor and Cabinet in 1969 and is one of 42 such preserves in Florida (Figure 1). This aquatic preserve covers an area of about 80,000 acres of sovereignty submerged lands. The boundaries of the preserve (Figure 2) include all tidal lands and islands, sandbars, shallow banks, submerged bottom, and lands waterward of mean high water (MHW) to which the state holds title.

For many years, the Apalachicola estuary has supported the largest oystering industry in Florida, providing 90% of the state's and 10% of the nation's oyster harvest. The estuary also provides sizable shrimp, blue crab, and finfish yields. It is a major blue crab breeding ground for the entire west Florida coast (Oesterling and Evink, 1977) and an important nursery area for penaeid shrimp. Current annual seafood landings are typically in excess of $14 million dockside and the bay's seafood yield is an important part of the county's economy. The high productivity of the estuary is a result of the overall good quality of water in the bay, the physical form of the bay, the salinity regime in the estuary as defined by the flow of the river, and the nutrient and detrital transport from the river's floodplain (Livingston, 1984).

The estuary lies at the mouth of the Apalachicola-Chattahoochee-Flint (ACF) River system (Figure 3). The basin extends up into northern Georgia and drains 19,800 square miles in Alabama, Florida, and Georgia. Only 12% of the watershed lies in Florida. The Apalachicola River has the largest flow of any river in Florida, with a mean annual flow of 25,000 cubic feet per second (cfs). The drainage basin is a unique and important biological resource. The upper basin has the greatest number of endangered plant species of any comparably sized area in Florida (FCREPA, 1981) and the highest density of amphibians and reptiles on the continent north of Mexico (Means, 1977). The floodplain represents one of the largest tracts of bottomland hardwoods in the Southeast outside the Mississippi River system. The unusual biological diversity is attributable to geographical location which allows the basin to receive floral and faunal influences from five distinct physiographic areas (the Appalachian mountains, the Piedmont, the Atlantic coastal plain, the Gulf coastal plain, and peninsular Florida) and variability of physical environments.

The goal of the Florida Aquatic Preserve Program as specified in Section 258.36, Florida Statutes (F.S.), is to set aside forever state-owned submerged lands which have exceptional biological, aesthetic, or scientific value for the benefit of future

generations. Aquatic preserves include only lands or water bottoms owned or leased by the State and lands owned by other governmental bodies specifically authorized for inclusion in the preserve. Any publicly owned and maintained navigation channel or other public works project authorized by the United States Congress and designed to improve or maintain commerce and navigation are excluded from the aquatic preserve boundaries.

It was the intent of the Florida Legislature that aquatic preserves be maintained in an essentially natural or existing condition. Therefore, a program has been established in the Department of Natural Resources to develop and oversee implementation of a special management program and statutory guidelines for aquatic preserves to assure that the overall goal of setting aside aquatic preserves for future generations is realized. This management plan outlines that program. As more information is learned about the preserve, management strategies outlined in this plan may need to be modified. Specific goals included in the Apalachicola Bay Aquatic Preserve are: 1) to conduct those resource management actions necessary to conserve or enhance the natural resource-oriented values of the preserve for future generations; 2) to ensure that all laws, rules, ordinances, and permit conditions protecting the natural resources are complied with; 3) to conduct research and monitoring activities that enhance the understanding of the Preserve's dynamics and that maintain its natural conditions for future generations; and 4) to educate people to use the environment in ways that conserve it and to take part in making decisions that will affect their local natural resources.

Twenty-six management plans, of the 42 designated aquatic preserves in the state, have been adopted by reference into the existing aquatic preserves rule, Chapter 18-20 Florida Administrative Code (F.A.C.). This management plan will be subsequently incorporated into rule following its approval by the Board of Trustees of the Internal Improvement Trust Fund. As such, the special criteria in this plan will carry the same authority as current rule criteria.

Previous management plans were designed to be generic in nature, with policies and management guidance generally applicable to all aquatic preserves. However, this plan and all future aquatic preserve management plans will be more site-specific and contain policy guidance and directives applicable to each individual preserve.

Implementation of this plan relies heavily on authorities and activities existing outside the aquatic preserve program per se. Aquatic preserve's management emphasize maintenance and enhancement of natural resources. Section 18-20.004(2)(a), F.A.C. states that proposed development projects and lease requests to utilize sovereign bottoms in less developed aquatic preserves, such as Apalachicola Bay, shall be subject to a higher standard than similar projects in the more developed preserves. As more information is learned about the preserve and

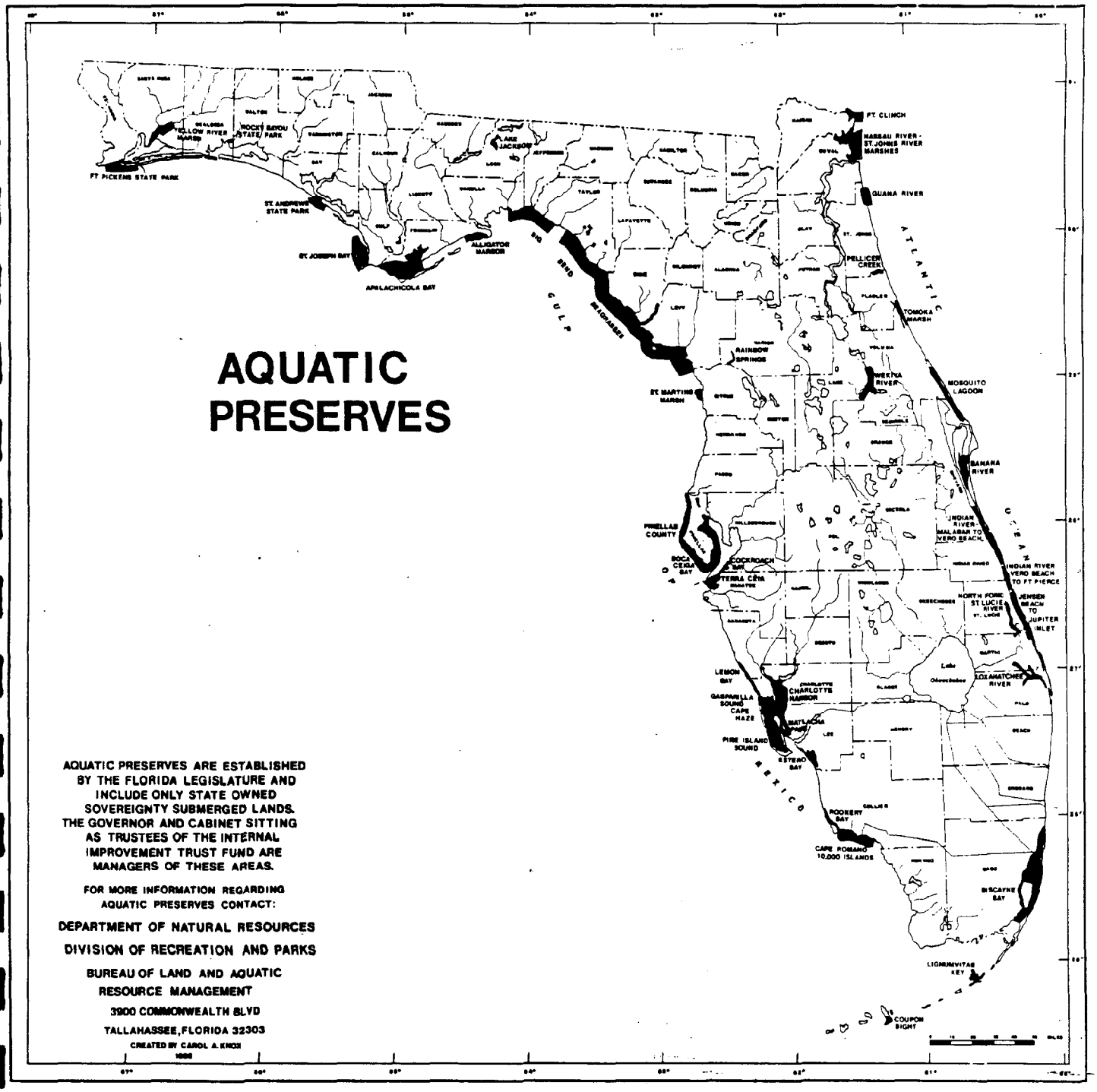


Figure 1 FLORIDA AQUATIC PRESERVE SYSTEM

Figure 2

APALACHICOLA BAY AQUATIC PRESERVE

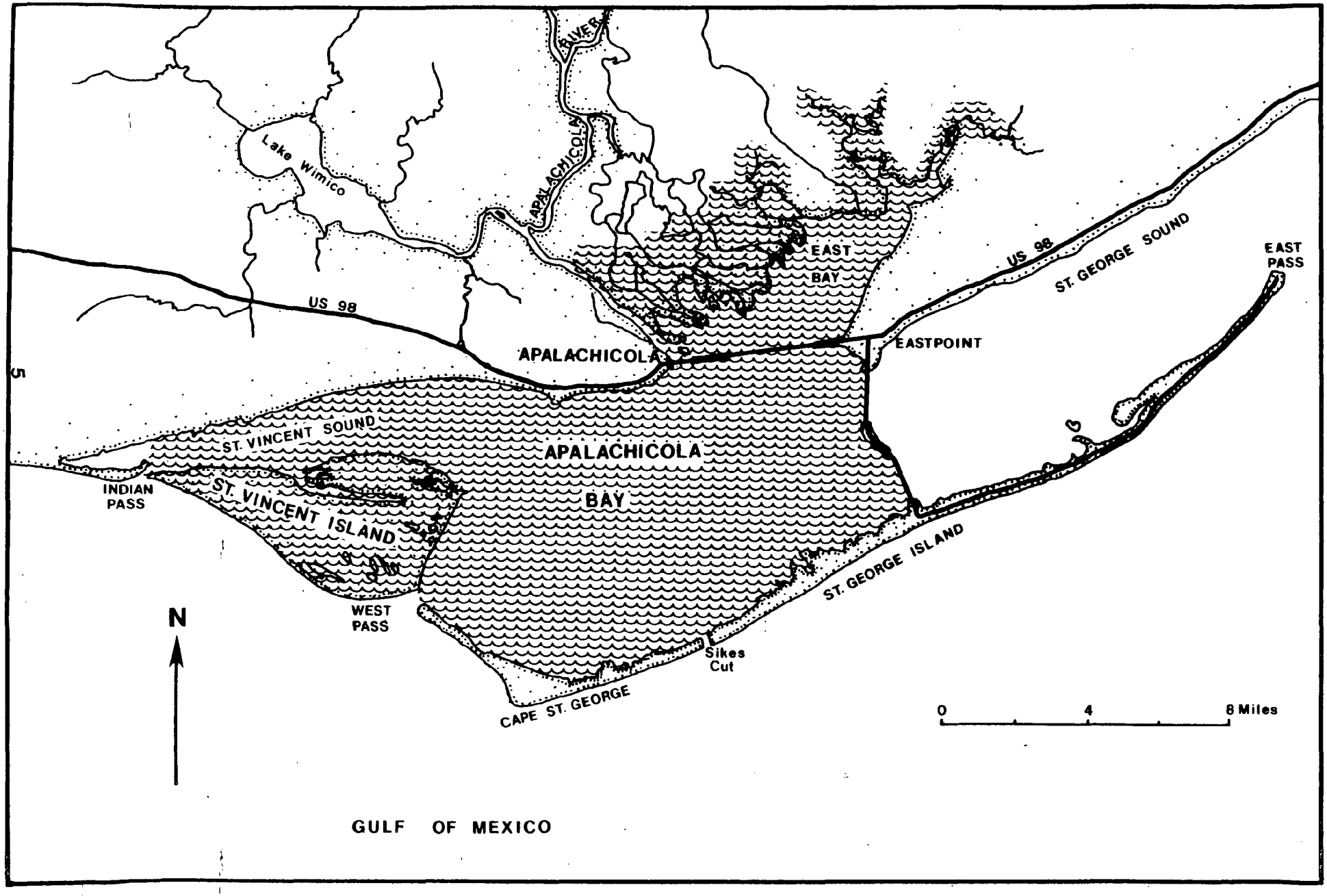
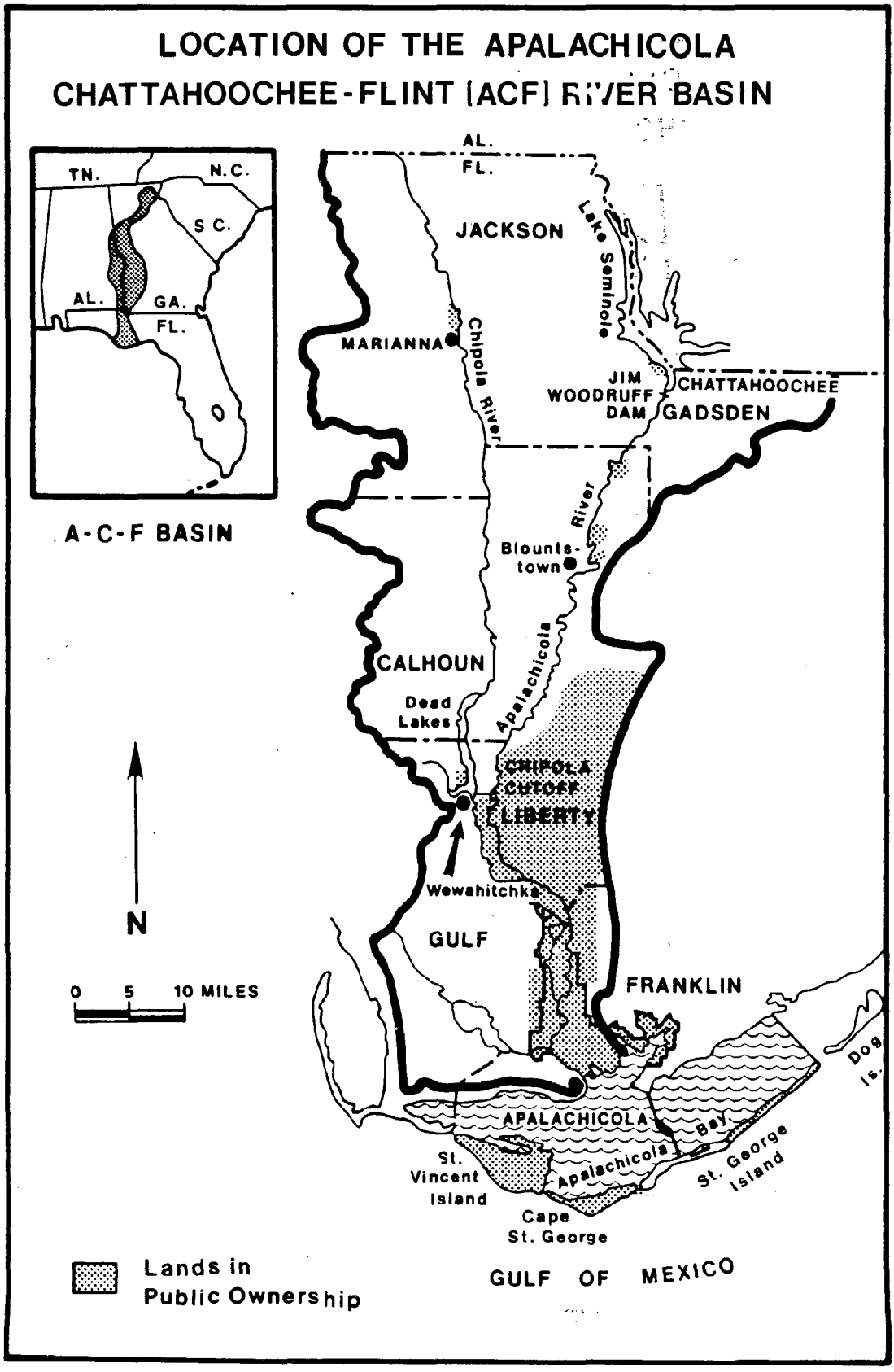


Figure 3


LOCATION OF THE APALACHICOLA
CHATTAHOOCHEE-FLINT (ACF) RIVER BASIN
TN.
N.C.
S.C.
AL.
GA.
FL.
A-C-F BASIN
AL.
FL.
JACKSON
Lake Seminole
MARIANNA
Chipola River
JIM WOODRUFF DAM
CHATTAHOOCHEE
GADSDEN
River
Blountstown
CALHOUN
Apalachicola
Dead Lakes
CHIPOLA CUTOFF
LIBERTY
Wewahitchka
GULF
FRANKLIN
N
0 5 10 MILES
Dog Is.
APALACHICOLA Bay
St. Vincent Island
Apalachicola
St. George Island
Cape St. George
Lands in Public Ownership
GULF OF MEXICO

ambient conditions analyzed, efforts to restore or enhance the productivity of certain areas may be undertaken.

To effectively manage natural resources they must be understood and managed in context to the greater whole of which they are a part. How the resource functions as an ecological system and the sensitivity or vulnerability of the resource to disturbance must be understood. The resource must be managed from a long-term perspective.

This management plan is divided as follows: Chapter II cites authorities upon which this management program and plan are built. Chapters III and IV discuss the resource, man's use of the resource, past problems associated with use of the resource, and status and content of applicable local government comprehensive plans. Chapter V focuses on site specific management issues and needs, and Chapter VI discusses designated management areas. Chapter VII provides a management action plan for the aquatic preserve. Chapter VIII the management coordination network. And, Chapters IX and X the staffing and fiscal needs and resources and activity monitoring program.

A considerable portion of the land adjacent to the Apalachicola Aquatic Preserve are in public ownership (Figure 4). St. Vincent Island is a National Wildlife Refuge owned by the U.S. Department of the Interior; Cape St. George Island is a subunit of the Apalachicola National Estuarine Research Reserve administered by the Department of Natural Resources; and much of the land surrounding East Bay was purchased through the Conservation and Recreation Lands (CARL) and Environmentally Endangered Lands (EEL) Programs. In addition, a high priority acquisition on the current CARL list includes the acquisition of additional lands which border the aquatic preserve.

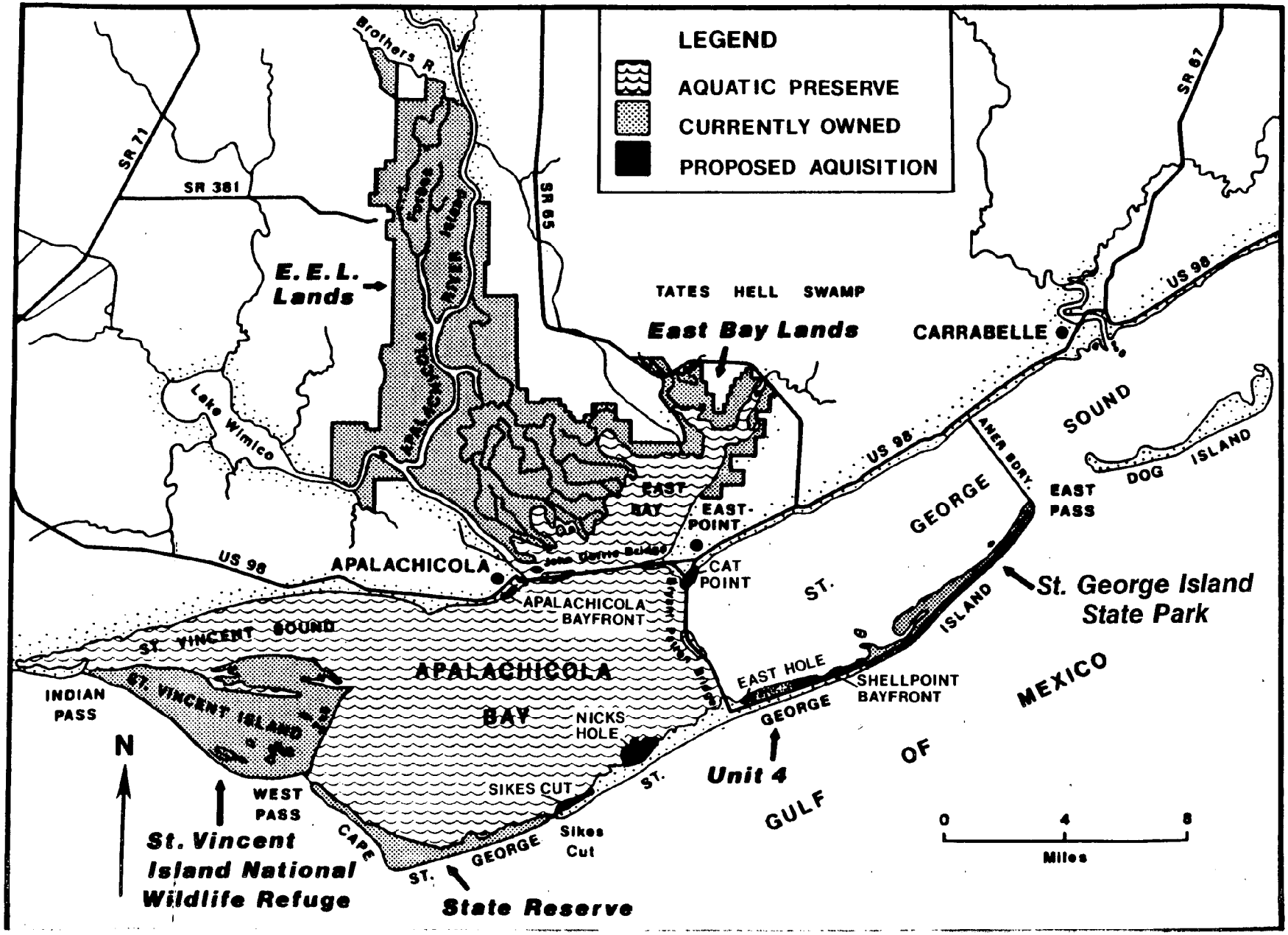
One incorporated (Apalachicola) and one unincorporated (Eastpoint) urban area border the preserve. In 1985 their combined population was less than 6,000 people (BEBR, 1986). St. George Island is also developed with a current residential population of less than 1,000 and a maximum seasonal tourist population of over 20,000 (DCA, 1986). Over half the water front on St. George Island adjacent to the preserve is zoned at a maximum of one unit per acre, with the remainder zoned at one unit per quarter acre. The mainland shore along St. Vincent Sound is owned by St. Joe Paper Company and is largely undeveloped.

Apalachicola Bay Aquatic Preserve lies within the Apalachicola National Estuarine Research Reserve. The Estuarine Research Reserve Program is intended to confer protection and management on an area for the long-term benefit and enjoyment of the public. Through this designation resource-oriented research and education activities, and the integration of research findings into management decisions are enhanced. The designation, however, does not afford any additional protection to the resource and has limited direct management capabilities.

The preserve also lies within an International Biosphere Reserve Unit. International recognition was conferred on the area in 1983 by the United Nations Educational, Scientific, and Cultural Organization as part of their Man and the Biosphere Program. The Biosphere Reserve Program emphasizes resource protection, research, and education.

Figure 4

LAND CURRENTLY IN PUBLIC OWNERSHIP AND LAND PROPOSED FOR AQUISITION IN PROXIMITY TO APALACHICOLA BAY AQUATIC PRESERVE



CHAPTER II

MANAGEMENT AUTHORITY

The primary laws providing management authority for aquatic preserves are Chapters 253 and 258, 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 submerged lands. They also empower the Trustees to adopt and enforce rules and regulations for managing all sovereignty submerged lands, including aquatic preserves.

The jurisdiction of the Florida Aquatic Preserve Program relates to the use of sovereign submerged lands within the boundaries of the aquatic preserve. Activities which cannot be controlled directly through an aquatic preserve designation include use of the adjacent uplands, federal navigation projects within an aquatic preserve, commercial fishing, water uses (i.e., boat speeds, wake zones, etc.), and water quality. Although the Aquatic Preserve Program does not directly control water quality, by virtue of the aquatic preserve designation the water body has been declared an Outstanding Florida Water (OFW) and therefore, ambient water quality at the time of the designation is the water quality standards for the estuary.

The principle differences between submerged bottoms designated as aquatic preserves and other submerged bottoms within the state are in regard to activities which would disturb the submerged bottoms such as in the drilling of oil and gas wells, excavation of minerals, construction of seawalls, the placement of rip rap, the construction of docks and boathouses, dredging and filling, and the placement of utilities. In addition, a public interest test must be met within aquatic preserves, whereas on other sovereign lands no public interest test exists except in regard to the sale of sovereign land.

Sections 258.35-258.46, F.S., enacted in 1975 comprise the Florida Aquatic Preserves Act. These sections set forth a standardized set of management criteria for all designated aquatic preserves and represent the primary laws governing use of sovereignty submerged lands within aquatic preserves.

Management responsibilities may be fulfilled directly by the Governor and Cabinet or indirectly by staff of the Division of State Lands through delegations of authority from the Board of Trustees. Staff of the Division of State Lands, Bureau of Submerged Lands and Preserves serve as on-site managers for the Board of Trustees and review requests for uses affecting state-owned sovereignty submerged lands within the aquatic preserves. Project assessments and reviews

are evaluated in accordance with the criteria in Sections 258.35-.42, F.S., (Florida Aquatic Preserves Act) and Chapter 18-20, F.A.C.

BACKGROUND

The laws supporting aquatic preserve management are the direct result of the public's awareness of the importance of preserving Florida's coastal environment resulting from the rampant dredge and fill activities in the late 1960s.

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 statutory authority (Section 253.03, F.S.) for the Board of Trustees to exercise proprietary control over state-owned lands. Also in 1967, government focus on protecting Florida's productive estuaries from development led to the Board of Trustees establishment of a moratorium on the sale of submerged lands to private interests. In the same year, an interagency advisory committee on submerged lands was created. In late 1968, the committee issued a report recommending the establishment of twenty-six aquatic preserves. Also in 1968, the Florida Constitution was revised, declaring in Article II, Section 7, the State's policy of conserving and protecting the natural resources and scenic beauty. That constitutional provision also established the authority for the legislature to enact measures for abatement of air and water pollution.

On October 21, 1969 the Governor and Cabinet acted upon the recommendations of the Interagency Advisory Committee and adopted by resolution eighteen of the water bodies as aquatic preserves, including Apalachicola Bay. Other preserves were similarly adopted at various times through 1971. Prior to the October 1969 action, the Legislature had created the Boca Ciega Aquatic Preserve. Subsequent legislation in 1972, 1973, and 1974 created the Pinellas County, Lake Jackson and Biscayne Bay Aquatic Preserves, respectively.

In 1975, the legislature established the Florida Aquatic Preserve Act (Chapter 258, F.S.), bringing all existing preserves under a standardized set of maintenance criteria. Subsequent acts added Cockroach Bay in 1976, Rookery Bay in 1977 and Gasparilla Sound-Charlotte Harbor in 1978 to the Aquatic Preserve Program.

In June, 1985, the Legislature passed Senate Bill 762 which expanded the boundaries of the Rookery Bay, Banana River, Indian River-Malabar to Vero Beach, Loxahatchee River-Lake Worth Creek, and Wekiva River Aquatic Preserves, and created the Guana River Marsh and Big Bend Seagrasses Aquatic Preserves. Lemon Bay and Rainbow Springs were added as aquatic preserves by SB 607 in 1986.

ADMINISTRATIVE RULES FOR AQUATIC PRESERVES

Chapters 18-20 and 18-21, F.A.C., are rules adopted by the Board of Trustees designating the allowable uses of aquatic preserves and other submerged lands. Chapter 18-20, F.A.C. addresses the aquatic preserves specifically and derives its authority from Sections 258.35, 258.36, 258.37, and 258.38, F.S. The intent of this Chapter is found in Section 18-20.001, F.A.C. which states:

> "(1) All sovereignty lands within a preserve shall be managed primarily for the maintenance of essentially natural conditions, the propagation of fish and wildlife, and public recreation including hunting and fishing where deemed appropriate by the board and the managing agency.
>
> (2) The aquatic preserves which are described in 73-534, Laws of Florida, Sections 258.39, 258.391, 258,392, and 258.393, Florida Statutes, future aquatic preserves established pursuant to general or special acts of the legislature, and in Rule 18-20.002, Florida Administrative Code, were established for the purpose of being preserved in essentially natural or existing condition so that their aesthetic, biological and scientific values may endure for the enjoyment of future generations.
>
> (3) The preserves shall be administered and managed in accordance with the following goals:
>
> > (a) to preserve, protect, and enhance these exceptional areas of sovereignty submerged lands by reasonable regulation of human activity within the preserves through the development and implementation of a comprehensive management program;
> >
> > (b) to protect and enhance the waters of the preserves so that the public may continue to enjoy the traditional recreational uses of those waters such as swimming, boating, and fishing;
> >
> > (c) to coordinate with federal, state, and local agencies to aid in carrying out the intent of the Legislature in creating the preserves;
> >
> > (d) to use applicable federal, state, and local management programs, which are compatible with the intent and provisions of the act and these rules, and to assist in managing the preserves;
> >
> > (e) to encourage the protection, enhancement, or restoration of the biological, aesthetic, or scientific values of the preserves, including but not limited to the modification of existing manmade conditions toward their natural condition, and discourage activities which would degrade the aesthetic, biological, or scientific values, or the quality, or utility of

a preserve, when reviewing applications, or when developing and implementing management plans for the preserves;

(f) to preserve, promote, and utilize indigenous life forms and habitats, including but not limited to: sponges, soft coral, hard corals, submerged grasses, mangroves, salt water marshes, fresh water marshes, mudflats, estuarine, aquatic and marine reptiles, game and non-game fish species, estuarine aquatic, and marine invertebrates, estuarine, aquatic, and marine mammals, birds, shellfish and mollusks;

(g) to acquire additional title interests in lands wherever such acquisitions would serve to protect or enhance the biological, aesthetic, or scientific values of the preserve;

(h) to maintain those beneficial hydrologic and biologic functions, the benefits of which accrue to the public at large."

Chapter 18-21, F.A.C., controls activities conducted on sovereignty submerged lands in general and is predicated upon the provisions of Sections 253.03 and 253.12, F.S. The general rules in Chapter 18-20, F.A.C. are supplemental to the rules in Chapter 18-21, F.A.C. in the regulation of activities in the aquatic preserve. The stated intent of this administrative rule is:

"(1) 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;

(2) to insure maximum benefit and use of sovereignty lands for all the citizens of Florida;

(3) 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;

(4) 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;

(5) 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,

(6) to aid in the implementation of the State Lands Management Plan."

RELATION TO OTHER APPLICABLE PLANS AND PROGRAMS

The State Comprehensive Plan, established by Chapter 187, F.S., provides long-range policy guidance for the orderly social, economic, and physical growth of the State. As such, the State Comprehensive Plan provides direction for management of physical resources within the State. The goals, objectives, and policies set forth in this aquatic preserve management plan are designed to be consistent with those of the State Comprehensive Plan.

The Conceptual State Lands Management Plan, adopted on March 17, 1981, and amended by the Board of Trustees on July 7, 1981 and March 15, 1983 contain specific policies concerning spoil islands, submerged lands leases, "Outstanding Native Florida Landscapes", unique natural features, seagrass beds, archaeological and historical resources, and endangered species. These policies provide some of the fundamental direction for formulating management plans and policies for the Aquatic Preserve Program.

Local Government Comprehensive Plans (LGCP) for Franklin County and the city of Apalachicola are required by Section 163.3161, F.S. These comprehensive plans are intended to guide the future development in the city and county. Both are required by law to conform to criteria, policies, and practices listed in their comprehensive plan. The Division of State Lands reviews these local plans to assure their compliance with submerged land policies of the state and of the Aquatic Preserve Program. Aquatic preserve management plans provide management guidance for state sovereign lands which are beyond the jurisdiction of the Local Government Comprehensive Planning Act. Therefore, if coordinated properly the management plan for an aquatic preserve can serve as the waterward extension of the city's and county's Local Government Comprehensive Plan. The city of Apalachicola's LGCP was formally adopted in 1990, whil Franklin County's was adopted in 1991 because of the need to resolve several comments by state agencies. In March 1990, the Beach Restoration Management Plan was adopted by the Governor and Cabinet for Gulf County. The Aquatic preserve management plan should be consistent with the beach management plan for the area.

Submerged areas are subject to the provisions of Section 161.041, F.S. and inlet management plans are subject to the provisions of Section 161.161, F.S., and would apply if promulgated for Indian Pass, West Pass, and Sikes Cut. Of these inlets, the Beach Restoration Management Plan of the Division of Beaches and Shores recommends that maintenance dredged materials from Sikes Cut be placed back on beaches.

Apalachicola River and Bay SWIM Program

The SWIM Program on the Apalachicola River and Bay consists of a multifaceted plan encompassing all aspects of water resource management in the basin. While not having specific authority to regulate or mandate management decisions, a major objective of the program includes establishing and monitoring the implementation of a basinwide management strategy. This effort requires a perspective which incorporates a long-term, comprehensive view with the details of specific, day-to-day management operations.

The SWIM Program will attempt to provide funding for a diversity of projects including those with a long term, basinwide focus, as well as site specific projects of an immediate and timely nature. All projects regarding management issues in the basin which may affect the water quality and aquatic habitat of the Apalachicola River and Bay are candidates for inclusion in the program. Since the Florida portion of the Apalachicola Basin remains in a relatively undisturbed state, a main thrust of the program will provide a framework in which effective and cooperative management decisions can be formulated to limit further degradation of the ecosystem. Restoration of areas that are beneficial to the functioning and enhanced use of the system should also be pursued concurrently.

An understanding of how the entire system functions is essential to successful implementation of a program designed to preserve and restore the natural resources of the Apalachicola Basin. Funding of baseline research projects and comprehensive review of previous studies is needed to adequately assess the various components and interrelationships within the basin. Such assessments of the natural cycles and functions of biota and hydrologic flow reqime are needed to develop effective and rational management decisions.

With such broad-based criteria to satisfy, allocation of limited funds to such a wide range of potential projects is a difficult task. To assist with this task, a Technical Advisory Committee (TAC), consisting of federal, state and local government representatives was formed to advise the NWFWMD.

A subcommittee of the TAC was created to review and rank all potential projects. After concurrence by the full TAC, funding allocations will be made based on these priority rankings and the existence of available funds.

CHAPTER III

RESOURCE DESCRIPTION

To adequately manage and protect the resources of an aquatic preserve it is essential to understand the physical and biological resources of the preserve, how they function and interact within the preserve boundaries, and how the resources within the preserve interact with the larger natural system of which they are part. The Apalachicola Bay Aquatic Preserve lies at the mouth of the Apalachicola-Chattahoochee-Flint (AFC) River system which extends up into northern Georgia and drains 19,800 square miles in Alabama, Florida, and Georgia. The Apalachicola River is the largest in Florida in terms of flow, and plays a major role in defining the salinity regime and ecology of Apalachicola Bay. The estuary covers an area of about 210 square miles, with about 60% of this area included within the aquatic preserve's boundaries.

PHYSIOGRAPHY

The Apalachicola estuary is bounded on the Gulf side by four barrier islands: St. Vincent Island, St. George Island, Cape St. George Island, and Dog Island (Figure 5). St. Vincent is a triangular-shaped island about 9 miles long and up to 4.5 miles wide. Dog Island, St. George Island, and Cape St. George Island range from 0.1 to 1.0 miles wide, and are 7, 22, and 9 miles long, respectively.

Between the islands are inlets and passes to the Gulf of Mexico. The bay system may be divided into four sections based both on natural bathymetry and man-made structural alterations. These are East Bay, St. Vincent Sound, Apalachicola Bay, and St. George Sound. East Bay, north and east of the Apalachicola delta, is surrounded by extensive marshes and swamps, and has an average depth of about three feet (Dawson, 1955). The John Gorrie Bridge is considered its southern limit. A causeway extending from Eastpoint, and a causeway island near the mouth of the Apalachicola River form partial barriers between East Bay and Apalachicola Bay.

St. Vincent Sound is shallow, with an average depth of about 4 feet (Gorsline, 1963). It contains numerous oyster bars and lumps, and separates St. Vincent Island from the mainland. It is linked to the Gulf by Indian Pass, whose maximum water depth is about 12 feet. Apalachicola Bay is the central and widest portion of the estuary. It is separated from St. Vincent Sound by shoal areas and oyster bars. To the north it is separated from the river mouth, delta, and East Bay by the John Gorrie Memorial Bridge. The bay is connected to the Gulf through West Pass, a deep tidal inlet, and Sikes Cut, a man-made navigation channel which separates St. George and Cape St. George Islands. Depths in Apalachicola Bay average 6 to 9

feet at mean low water (MLW). Oyster lumps are scattered throughout the central bay area and near the Gorrie Bridge. To the east, Apalachicola Bay is bounded by Bulkhead Shoal, a natural submerged bar that extends from the mainland to St. George Island. Construction of a causeway island in the center of the bar and a causeway extension at St. George Island raise part of the bar above sea level.

St. George Sound, with an average depth of about 9 feet, extends from Bulkhead Shoal to the Carrabelle River and East Pass. East Pass connects the sound with the Gulf of Mexico and seperates St. George and Dog Islands.

GEOLOGY

The Apalachicola coast is a classic example of a cuspate foreland and delta. The present bay delta, however, is a bay head delta of the compound lobate-birdfoot form and is filling in a drowned river valley. The presence of Pleistocene age alluvial sediments in a 50 mile wide band extending from Panama City to the present day Ochlockonee River indicates that the Apalachicola delta has migrated between these points in recent geologic time, with the most recent movement being in an easterly direction (Schnable and Goodell, 1969). The original source of sands that make up the barrier island system off the Apalachicola coast is the Appalachian Piedmont to the north (Schnable, 1966). These sands are extensively reworked coastal plain sediments deposited at lower sea levels. Kofoed (1961) concluded that no significant amount of quartz sand material is currently being supplied to the long shore drift system from outside the chain of barrier islands. Most of the sand-sized load of the Apalachicola River is being deposited at the delta front of the distributary channels. Isphording (1985) estimated that sand represents only about one percent of the river-borne sediment load deposited in the bay from the river. Some clay and some silt sized materials do reach the Gulf, however, the bulk of the sediment load of the Apalachicola River, both coarse and fine, is believed to have been deposited in the modern prograding, or forward moving, delta front since sea level attained its present position (Schnable, 1966). This was confirmed in a recently completed study of river and delta sediments and sedimentation rates by Donoghue (1987). That study found that most of the river's sediment is being deposited in the delta prograding into East Bay, with the remainder residing in the floodplain or Apalachicola Bay. Over this time period the delta is believed to have prograded about 5 to 10 miles.

The Apalachicola Bay system is considered to be less than 10,000 years old with the general outline of bay stable over the last 5,000 years, except for the migration of the delta front southward into the estuary (Tanner, 1983). The development and evolution of a barrier rimmed estuary such as Apalachicola Bay is an attempt by the physical environment to achieve a dynamic equilibrium with the hydraulic regime. Barrier islands are ephemeral features which are a response to the post-glacial

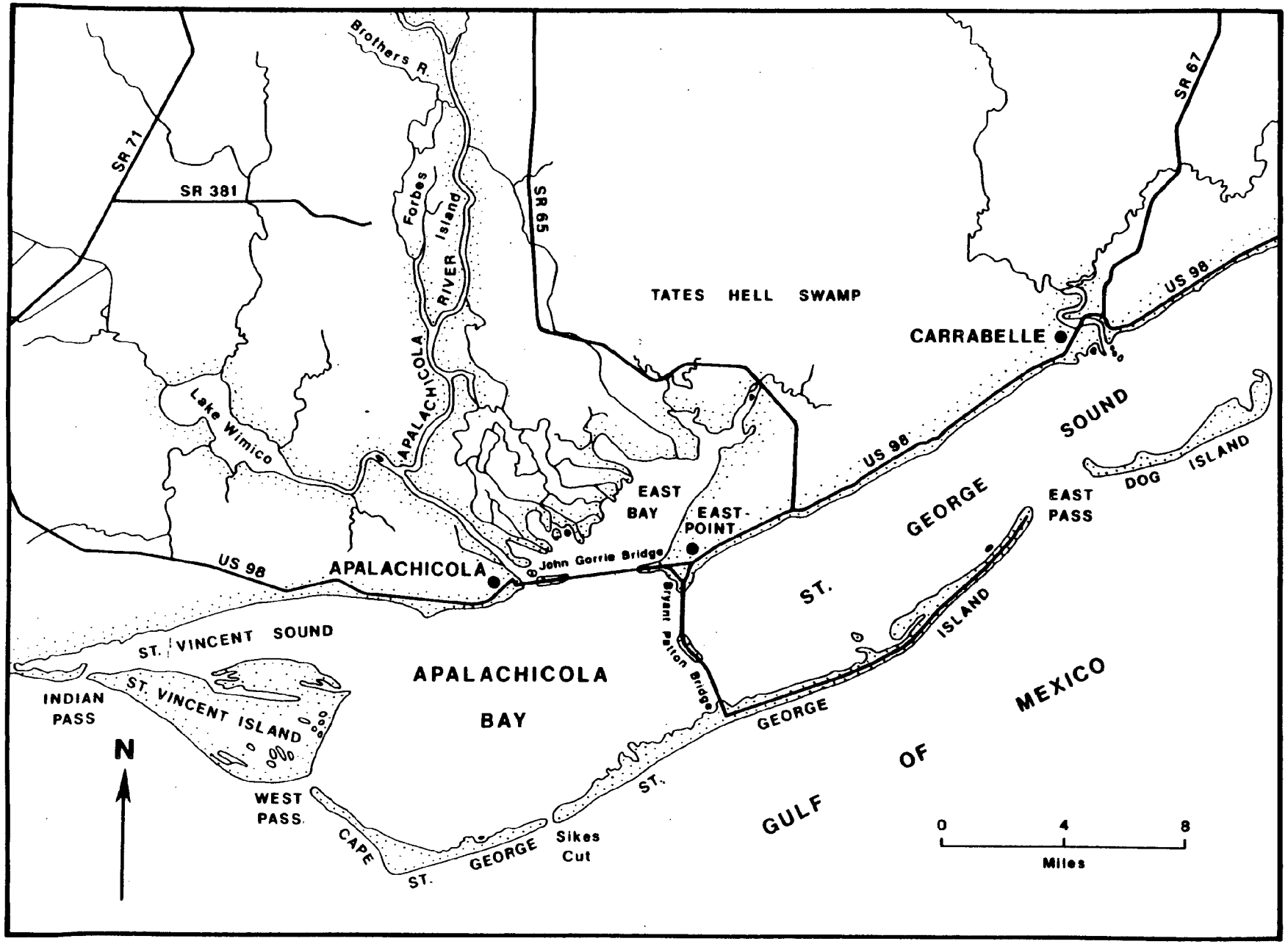


Figure 5 APALACHICOLA ESTUARY

submergence of the continental shelf. Therefore, to understand the evolution of250 to 400 feet below its present level (Schade, 1985). No conclusive evidence exists for a stand of the sea higher than its present level during recent time. The most commonly accepted theory has sea level rising asymptotically, with the sea level 4,500 years ago being 2.0 to 4.0 meters below its current level; 1.0 meter below 3,000 years ago; and 0.3 to 0.7 meters below 2,500 years ago (Schade, 1985). However, Stapor and Tanner (1977) derived an alternative theory in which sea level has fluctuated in the last several thousand years. Their theory has sea level 0.5 to 1.5 meters below its current level 3,000 to 5,000 years ago; at its present level 2,100 to 3,000 years ago; and 1.0 to 2.0 meters below its current level 1,500 to 2,100 years ago. Schade (1985) concluded that this alternative theory fits well with geological evidence and data on St. George and St. Vincent Islands.

Schade (1985) noted that three models exist to explain the evolution of barrier islands: 1) the up-building of submarine bars; 2) spit growth and subsequent separation by inlets; and 3) submergence of inland beach ridges. These models can operate independently or in combination. Schade (1985) concluded that St. George Island is a relatively young island (less than 3,000 years) composed of two smaller island cores grown together plus Gap Island upon which it has welded itself. Gap Island represents the first emergent feature on what is now St. George Island, dating back about 3,500 years. St. Vincent Island is believed to be the oldest of the barrier islands off the Apalachicola coast dating back over 3,500 years (Stapor, 1973). Schade (1985) hypothesized that during the sea level decline believed to have occurred 1,500 to 2,100 years ago, two other island cores emerged between Gap Island and St. Vincent Island. These two island cores are believed to have grown laterally mostly by spit progradation and eventually closing the inlet between them less than a 1,000 years ago to form a single island (Figure 6).

On a geologic time scale estuaries are ephemeral features having a life span which measures from a few thousand years to a few tens of thousands of years (Schubel and Hirschberg, 1978). The principle factor which leads to an estuary's demise is in-filling by river-born sediment load (Isphording, 1985). In-filling rates greater than 10 millimeters (mm) per year have been measured in the bay (Donoghue, personal communication), and Isphording (1985) calculated an average rate of 5.44 mm/year for the entire estuary, 2.87 mm/year for Apalachicola Bay, 17.2 mm/year St. George Sound, 1.31 mm/year for East Bay, and 0.37 mm/year for St. Vincent Sound. Bedosky (1987) found sedimentation rates in East Bay to average 2.6 mm/year, and where mixing occurs Donoghue found rates to be as large as 15 cm/year. Bedosky (1987) found long-term sedimentation rates in East Bay to be relatively constant over the last 100 years. These rates are large when compared to other Gulf and Atlantic estuaries, and consequently Isphording (1985) concluded that the combination of high rates of deposition and the absence of any appreciable subsidence in the estuary will inevitably lead to its demise. Donoghue (1987) estimated the expected lifetime of East Bay to be less than 400 years, whereas

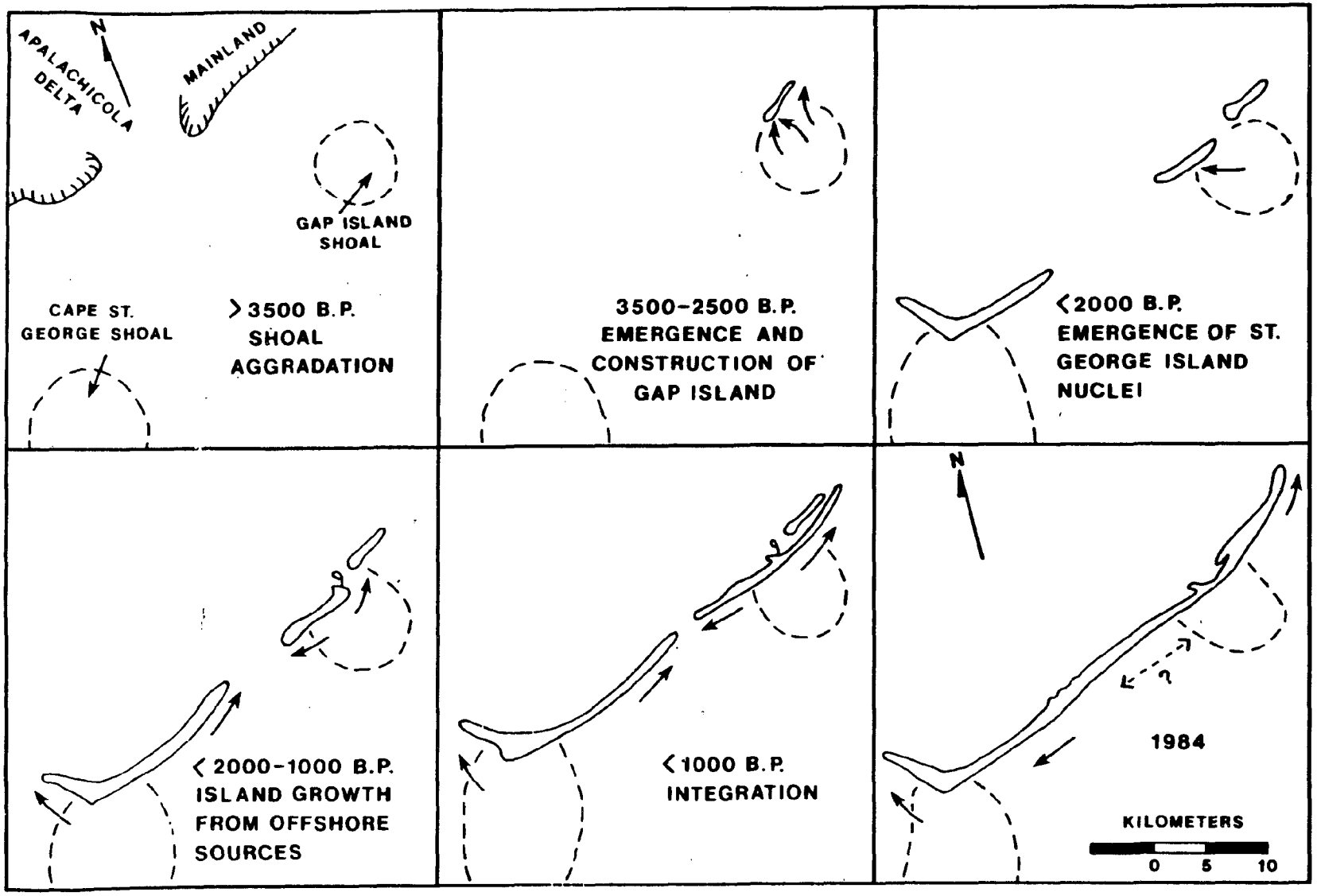
Isphording and Imsand (1987) estimated the estuary could be filled in less than 800 years. However, they also noted that hurricanes such as those in 1985 can scour out the bay and significantly prolong its existence. Bathymetric changes in the estuary are not only important from a long-term physical perspective. Changes in bathymetry induce changes in other parameters such as salinity, water temperature, and dissolved oxygen, and thereby influence the overall ecology of the system.

Kofoed and Gorsline (1963) concluded that the sedimentary characteristics of the Apalachicola Bay system are the result of several integrated factors including: bathymetry; reworking of sediments by wind, wave, and current action; the production of organic material by local faunal assemblages; and sediment from the Apalachicola River. Bathymetry is considered to be the most important single factor controlling the distribution and textural properties of bottom material. Waves and currents within the bay are also important in keeping material in suspension until it eventually reaches areas where energy is low enough to permit deposition.

In general, the sedimentary floor of the bay system is formed by quartz sand with a thin cover of clay in the central basin. The sediment cover in the central bay measures 30 to 60 feet thick (Gorsline, 1963). Oyster reefs have contributed substantial calcareous debris to estuarine sediments. The bottom sediment types in Apalachicola Bay are shown in Figure 7. St. George Sound is shown to be predominantly sandy, whereas the rest of the bay sediments have varying degrees of clay mixed with sand. Isphording (1985) compared the present bottom sediment types with those in 1825 by dating core samples. There was little difference in St. George Sound sediments; however, in the rest of the bay, there was a considerable shift from silts to clays. Clays, sandy clays, and clayey sands which are so widespread on the present map were formerly silty clays, silty sands, and sand-silt-clay mixtures. Isphording (1985) hypothesized that the present scarcity of silt in the Apalachicola Bay sediments is due to either: a change in the sediment carried by the Apalachicola River due to the upstream reservoirs; events taking place in the bay which have acted to remove or bury silt; or, a combination of both.

Biological assemblages contribute varying amounts of organic material and calcareous debris to the sediment. Once in the sediment, organic material becomes food for burrowing organisms, and is acted upon by bacteria and returned to the water column as inorganic nutrients. Kofoed and Gorsline (1963) found that a correlation exists between bathymetry and organic content of the sediments. Organic carbon values were found to be low in elevated areas where organic material is easily re-suspended from the sediment by current action. In depressions, the organic carbon content tends to increase. Organic carbon and nitrogen are deposited under the same energy conditions as clay and the percent composition is therefore greater in the finer sediments.

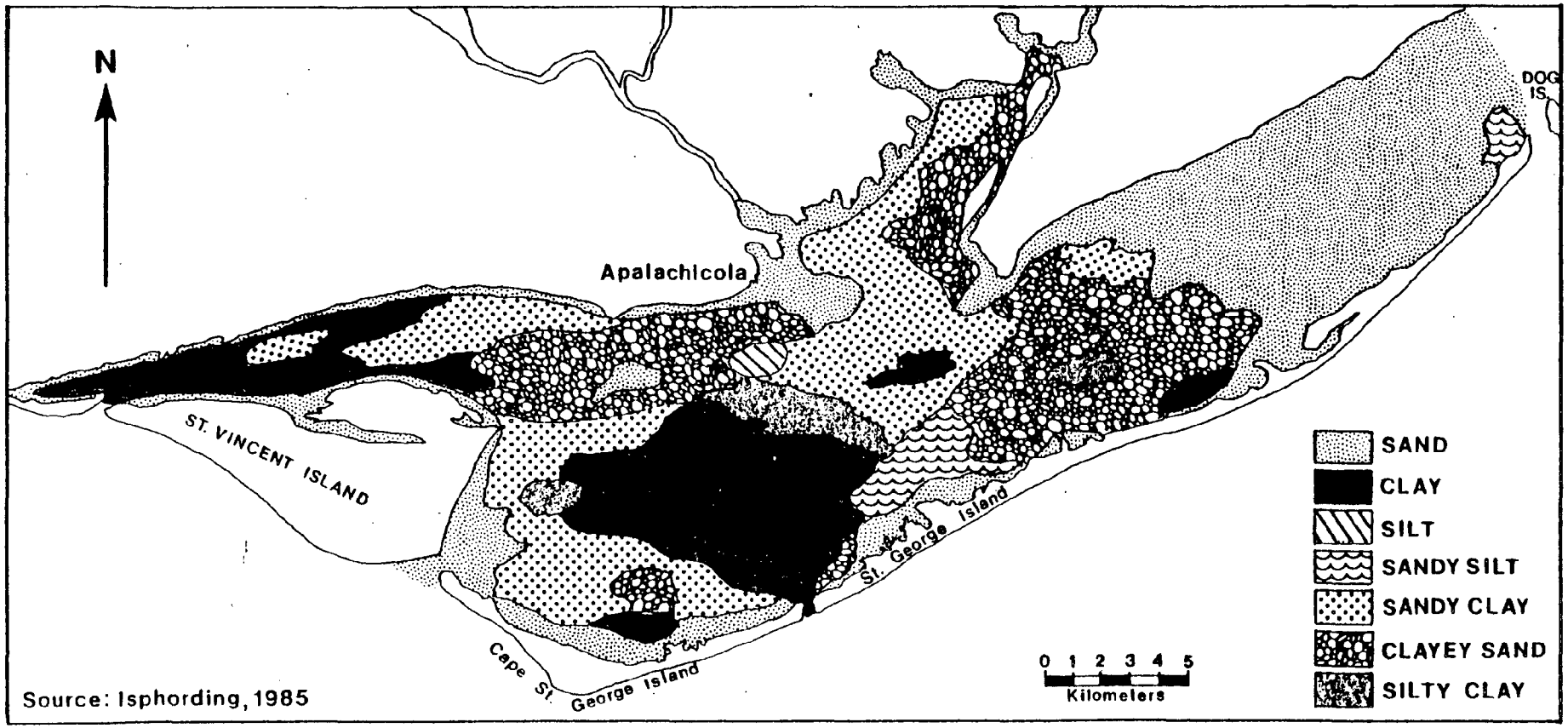
Figure 6
THE EVOLUTION OF ST. GEORGE ISLAND



Source: Schade, 1985

Figure 7

BOTTOM SEDIMENT TYPES OF APALACHICOLA BAY



Heavy minerals are uniformly distributed over the bay, rarely exceeding 1% of the sediment by weight. Dominant clay minerals in the bay are derived from rocks in the piedmont province (Bedosky, 1987). Glauconite is common in the small pellets and cavity fillings of silt and clay-sized material found throughout the bay. It is believed that these grains originated within the bay (Barackman, 1964). Kofoed and Gorsline (1963) and Bedosky (1987) found kaolinite to be the most abundant clay-mineral in the bay, but Isphording (1985) found montmorillonite to be the most abundant clay mineral. Other clay minerals present in the bay include smectite, muscovite, gibbsite, and palygorskite (Bedosky, 1987).

The only mineral materials of potential economic importance in the bay are road fill, foundation fill, and peat. Although the area is believed to have some potential for oil, no economically recoverable oil has been found to date in test wells drilled in the region, and there are no active leases within the estuary.

Coastal Franklin County has historically undergone moderate and systematic shifts in in shoreline location which can be tied, in large part, directly to longshore transport cells (DNR, 1990). The primary causative factors for beach and dune erosion in the vicinity of the Apalachicola Bay Aquatic Preserve are periodic major storm events, long term sea level rise, and inlet and cape effects (DNR, 1990). The pattern of erosion problem areas suggest a complex coastal regime which is somewhat dependent on shoreline alignment and shoal geometry and their effects on wave refraction and wave energy levels.

Clark (1989) identified a number of sites on barrier islands fronting Apalachicola Bay undergoing beach erosion. These included: 3.2 miles of the center portion of St. Vincent Island; a 0.4 mile segment near West Pass, a 1.3 mile segment of shore near Cape St. George, and a 3.2 mile segment west of Sikes Cut on Cape St. George Island; and, a 3.3 mile segment east of Sikes Cut and the eastern tip on St. George Island.

CLIMATE

The Apalachicola estuary is located in a transitional climatic zone between the semi-tropical climate of peninsular Florida and the subtropical climate of the southeastern United States. Average annual rainfall is about 56 inches. Maximum rainfall occurs during the summer and fall months, with September being the wettest. The dry season occurs from October through December. Mean rainfall from June to September accounts for about 55 percent of the annual total. Convection type storms are the predominant source of rainfall in the summer and frontal storms are the typical source in the winter.

Hurricanes and tropical storms occasionally further influence the late summer and fall weather of the region, bringing extremes in wind, rainfall, and tides. Twelve minor hurricanes (winds between 74 mph and 110 mph) and four major hurricanes (winds greater than 110 mph) passed within 50 miles of the island in the last 100 years. Over this same time period 16 minor and nine major hurricanes passed within 100 miles of island (Isphording and Imsand, 1987).

Apalachicola Bay is in an area of transition from the semi-diurnal tides of southwestern Florida and the diurnal tides of northwest Florida. Its tides are therefore classified as mixed. High tide arrives progressively later to the western and mainland portions of the bay. The normal tidal range is 1 to 2 feet, with a maximum of 3 feet. Because of the gentle slope of the continental shelf, wave energy along the Gulf coast beaches is generally moderate.

Mean monthly temperatures range from 54.4 degrees Fahrenheit in January to 81.4 degrees Fahrenheit in July and August. Periods of below freezing temperatures are generally brief, not lasting more than a few days.

There is large variability in wind direction over the course of the year. Cold, dry fronts from Canada cause winds to come from a north to north-easterly direction during the fall and winter. In contrast, warm, moist, southerly flow from the Gulf of Mexico dominates the weather pattern in the spring and summer.

HYDROLOGY

Water currents in Apalachicola Bay are due primarily to the astronomical tides, but are also strongly influenced by the direction and speed of prevailing winds, river flow, and the physical structure of the bay (Dawson, 1955). Roughly 700,000 cubic feet of water per second leave the bay system at maximum velocity during ebb flow (Gorsline, 1963). Although the Apalachicola River is the largest among Florida rivers with an annual discharge at the river's mouth of about 25,000 cubic feet per second (cfs), it has only a limited influence on the hydrodynamics of the bay except in the immediate receiving areas (Conner et al., 1982). The river does have a profound influence on the estuary's salinity regime. Net movement of water is from east to west. The more saline Gulf water enters through St.George Sound, and moves west mixing with water in East Bay and Apalachicola Bay, and eventually moves back into the bay through Sikes Cut, West Pass, and Indian Pass (Ingle and Dawson, 1953). Although the western passes account for only ten percent of the inlet area in the bay, they serve as outlets for about two-thirds of the bay discharge (Gorsline, 1963).

In a typical year flow in the Apalachicola River range from below 10,000 cfs to above 80,000 cfs. Upstream rainfall has a much greater influence on Apalachicola River flows than Florida rainfall because the majority of the basin is in Georgia and

Alabama (Meeter et al., 1979; Leitman et al., 1983). Figure 8 summarizes average monthly flows of the Apalachicola River at Chattahoochee, Florida, from 1957 to 1984. As can be seen from this figure, discharge peaks in the winter and early spring months, and declines until fall when low flows occur. Average monthly flow in the winter and early spring months is two to three times average summer flows. Over a typical year, average daily flow can vary tenfold. The fact that there is no peak in river flow associated with increased rainfall in the basin in late summer is believed to be caused by: seasonal differences in evapotranspiration rates in associated wetlands (Meeter et al., 1979); the climatic condition of summer rainfall being more localized than winter frontal storms; and, the management of up-basin Corps reservoirs.

Because of both the limited storage capacity of the reservoirs in the ACF basin and the fact that the period since the federal reservoirs which have the most storage capacity were constructed has been the wettest of any period since hydrologic records have been kept on the river, these reservoirs have not had a noticeable affect on the annual distribution of flow in of the Apalachicola River (Maristany, 1981; Leitman et al., 1983; Leitman et al., 1984; Alabama et al., 1984; and, Raney et al., 1985). Figure 9 summarizes the discharge-duration frequencies for the Apalachicola River before and after the construction of the federal reservoirs.

The Apalachicola Bay system is a shallow, mostly well-mixed system. However, deeper areas in the bay can become stratified, especially when river discharge is high and northerly winds are blowing (Clarke, 1975). Weisberg (1987) found the bay to be generally stratified with respect to salinity, and for changes in stratification to be primarily weather induced as opposed to tidal induced.

Strong winds can modify water movement to the point of obscuring tidal effects. When strong north and northeastern winds blow across Apalachicola Bay, the net effect is a deflection of water to the west and south with greater flows through Indian Pass and West Pass. In the bay, water velocities rarely exceed 1.5 feet per second, but in the passes velocities greater than 10 feet per second are common (Gorsline, 1963). Strong winds may thoroughly mix the shallow water of the bay, but winds of lesser velocity affect only the surface layer, resulting in stratification of the water column (Estabrook, 1973).

PHYSICO-CHEMICAL PARAMETERS

Temperature

Water temperature in Apalachicola Bay closely approximates that of the air. There is little spatial variation in temperature over the bay, and vertical stratification of temperature is minimal. Temperature peaks occur in July and August, and winter lows occur in January and February. Throughout the year the water temperature

may range from 38 degrees Fahrenheit to 90 degrees Fahrenheit. Summer temperature peaks show little variation over time, but winter minima may vary as much as 7 degrees Fahrenheit from year to year.

Salinity

Salinity is considered to be the single most important determination of the distribution of organisms in the estuary (Livingston, 1983). The salinity structure of the bay system is primarily defined by freshwater inflow from the Apalachicola River. Since the majority of the river basin is not in Florida, salinity levels in the estuary are more closely correlated to up basin rainfall (Livingston, 1983).

Variations in salinity (temporally, spatially, and vertically) are closely related to annual river flow and wind patterns. In late summer and fall, low flows and southerly winds can result in surface salinities greater than 20 parts per figure 8 thousand (ppt) near the river mouth, with correspondingly high salinities throughout the bay system (Livingston, 1984). During winter and spring flooding peaks, when river discharge is high and strong northerly winds are blowing, freshwater can spread out over most of the bay surface. At these times, salinity stratification commonly occurs in much of the bay, particularly the channels and passes (Estabrook, 1973; Clarke, 1975).

Spatial salinity distribution is affected most by river flow and, to a lesser extent, local rainfall. East Bay, Apalachicola Bay, and St. Vincent Sound show greater response to freshwater inflow than St. George Sound. The lowest recorded salinities are found near the river mouth and in East Bay, which receives freshwater drainage from Tate's Hell Swamp (Gorsline, 1963; Livingston, 1983). When local rainfall is heavy in late summer and early fall, reduced salinities occur in East Bay and in the vicinity of Nick's Hole (a major area of freshwater runoff from St. George Island). The eastern sounds tend to be more saline than the western portions of thesystem because of their broad connections with the Gulf and the minimal input of freshwater from runoff.

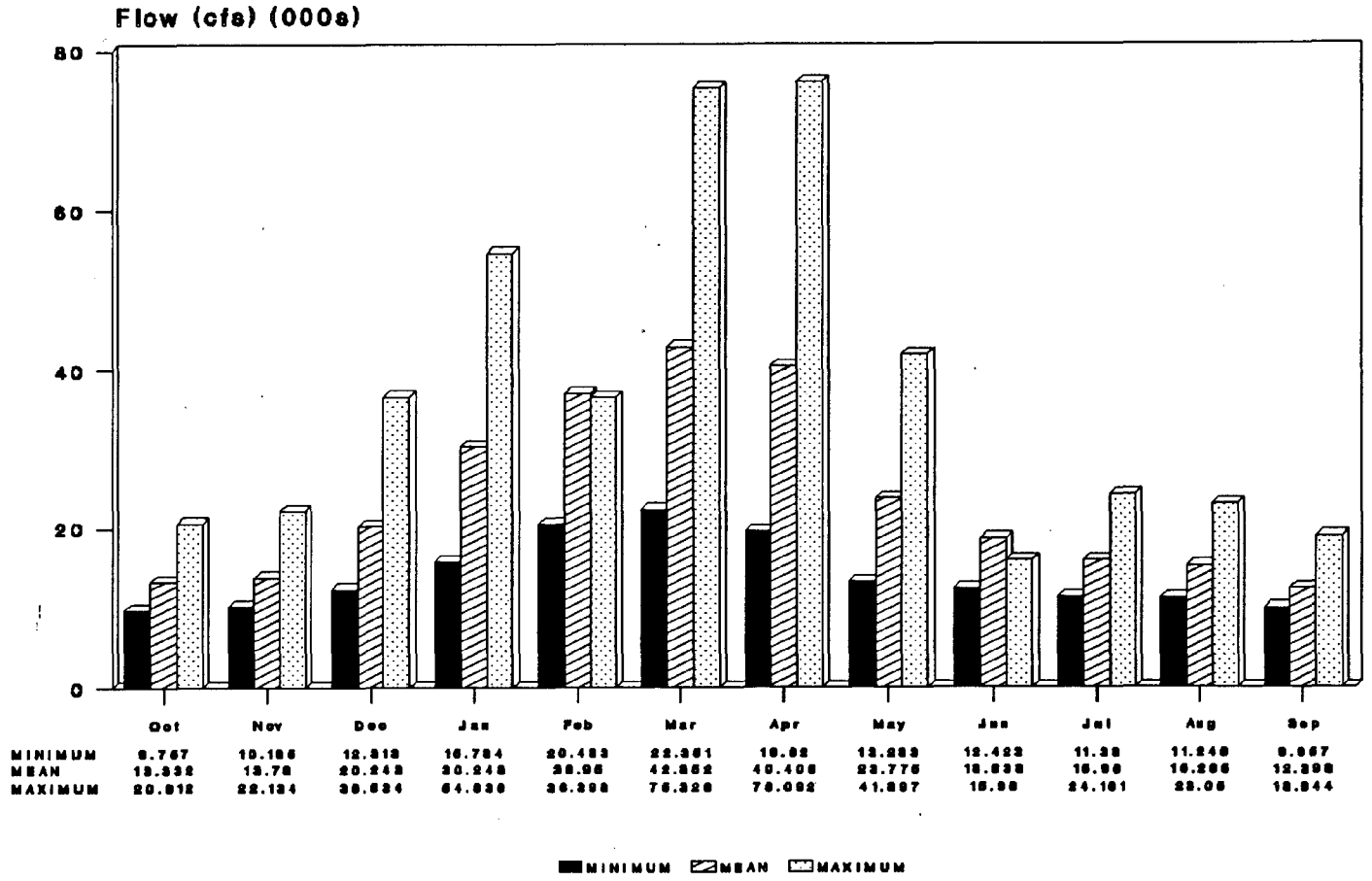
Color and Turbidity

Color levels in Apalachicola Bay vary seasonally and are directly related to runoff and river flow. Peaks in color levels occur in areas of high river water input and overland runoff in winter and spring. East Bay consistently has higher color levels than Apalachicola Bay due to the drainage from Tate's Hell Swamp and forestry operations (Livingston and Duncan, 1979).

Turbidity is directly related river flow. Turbidity values measured in the estuary ranged from 0 to 145 Jackson Turbidity Units. River turbidity values have been

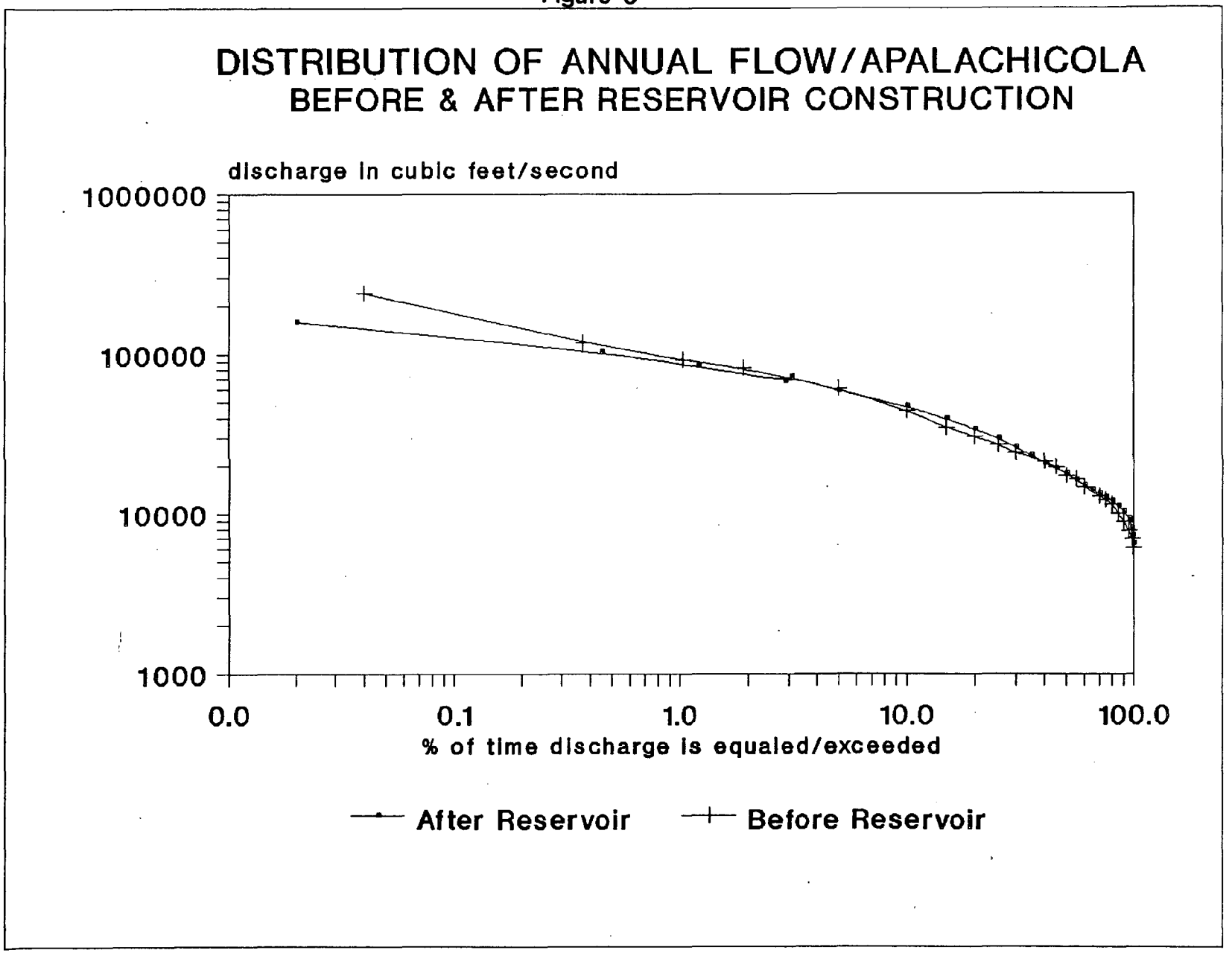
Figure 8

Average Monthly Flows of
Apalachicola River (1957-87)



Source: Northwest Florida WMD
Data from Chattahoochee gauging station

Figure 9


DISTRIBUTION OF ANNUAL FLOW/APALACHICOLA
BEFORE & AFTER RESERVOIR CONSTRUCTION
discharge in cubic feet/second
1000000
100000
10000
1000
0.0
0.1
1.0
10.0
100.0
% of time discharge is equaled/exceeded
After Reservoir
Before Reservoir

found to be highest during the months of February through July when river flow is highest, and lowest during the late summer and fall when flow subsides. Strong winds have also been shown to increase turbidity due to re-suspension of bottom sediments (Estabrook, 1973).

Dissolved Oxygen

The amount of dissolved oxygen (DO) in a body of water is related to air/water mixing, biological activity, temperature, and salinity. In Apalachicola Bay, peak levels of dissolved oxygen are found in winter and spring when temperatures are lowest. Conversely, lower values are found in the warm summer and fall months (Livingston, 1983). Spatially, highest levels of dissolved oxygen are found in upper East Bay, Nick's Hole, and the eastern side of St. Vincent Island. There is considerable natural daily and seasonal fluctuation of DO levels in Apalachicola Bay. Diurnally, the lowest DO concentrations occur in the early morning. There is no indication that cultural eutrophication is causing wide-spread reductions of DO in the estuary. In certain locations, such as the mouth of Scipio Creek, indications of significant reductions in DO levels have been noted (Livingston, 1983a).

Nutrients

Among the major features which determine habitat characteristics of the Apalachicola Bay estuary are the flow of the Apalachicola River and its effects on nutrient transport from the river's floodplain (Livingston, 1984). Nutrients are transported to the estuary both in the form of detritus (organic particulate matter from leaves and twigs) and as compounds dissolved in the water column. Annual flooding causes surges in nutrient transport, and these nutrients are the foundation for estuarine productivity. Nutrients transported from the Apalachicola River floodplain to its estuary are especially important since detritivores occupy key positions in the bay's food web (Livingston, 1983).

The major nutrients affecting estuarine productivity are nitrogen, phosphorus, and carbon. Nitrogen and phosphorus are the two nutrients most often in limited supply in aquatic ecosystems. Organic carbon is the principle constituent in all organic material. Nutrients were not found to be limiting to phytoplankton growth for most of the year. Phosphorus has been found to be the most critical limiting nutrient in Apalachicola Bay (Myers and Iverson, 1977), especially during low wind conditions in the late summer.

Nutrient concentrations in Apalachicola Bay were measured in 1971-1972 by Estabrook (1973). Nitrate and silicate values were found to vary inversely with salinity, with the greatest concentrations occurring in winter during highest river discharge. Orthophosphate concentrations correlated positively with turbidity.

WATER AND SEDIMENT QUALITY

According to the 1988 Florida Water Quality Assessment (Hand et al., 1988), the average overall water quality in the Apalachicola estuary is good. This rating is based on data from three stations (St. George Sound near Rattlesnake Cove, near St. Vincent Island, and in St. Vincent Sound). Hand et al. (1988) concluded that the most serious threats to the water quality of Apalachicola Bay are associated with nonpoint sources from the more urbanized areas in the basin. These include untreated stormwater runoff from the city of Apalachicola and nearby fish houses, pollutants associated with boat docking, and septic tank drainage.

Low dissolved oxygen concentrations (less than 4 milligrams per liter) have been measured in Scipio Creek, Eagle Creek, and the St. George Island boat basin. These water bodies receive stormwater runoff from municipal, urban, and developing areas. High fecal coliform bacteria levels have been found in these same areas. Sources of fecal coliform include municipal drainages, and agricultural and stormwater runoff (Livingston, 1983a). Elder (1986) evaluated the transport and variability of indicator bacteria in the Apalachicola River and estuary. This study found that coliform and streptococcal bacteria counts in the Apalachicola River and estuary showed considerable correlation to river stage, but stressed that the relation was modified by other factors. The analysis indicated that estuarine waters near the mouth of the Apalachicola were higher than other areas in coliform abundance. The Apalachicola Bay Protection Act of 1984 provided funds to upgrade the municipal sewage plants in Apalachicola, Eastpoint, and Carrabelle.

Past studies on pesticide distribution in the estuary indicate relatively low levels of organochlorine contamination in the Apalachicola Bay system in the mid-1970s (Livingston et al., 1978). Winger et al. (1984) found that biota from the Apalachicola River had moderately high levels of total DDT, total PCBs and toxaphene in 1978. Animals from the upper river had higher organic residues than those taken in the lower river.

The estuarine water column is an important transition zone in the geochemical cycle because of increases in pH and ionic strength associated with the change from freshwater to sea water. These increases change the solubility of substances, and may also enhance the flocculation and precipitation of materials. Many substances may be removed from the water column to the sediments when waters are mixed. For example, toxic organics such as petroleum hydrocarbons (e.g., PCBs and pesticides) have low solubilities and accumulate in sediments shortly after being introduced to estuarine waters. Therefore, estuarine sediments act as a sink for some constituents, so that the pollution status of an estuary is reflected better in the sediments than in the water column (Ryan et al., 1984). The historic emphasis of environmental quality assessment has been through water column sampling. In estuaries water quality data can provide an understanding of the impacts of individual pollution events, but are of little value in understanding long-term trends,

assessing ambient background conditions, or assessing the degree of environmental stress.

Sediment grain-size is an important qualitative predictor of sediment chemistry (Ryan et al., 1984). Fine-grained sediments usually contain elevated concentrations of metals and hydrocarbons, while lower levels are observed in coarse-grained sediments. Fine-grained sediments have greater concentrations because they are more enriched in organic and clay materials, and because they have greater surface areas which provide more binding sites.

Livingston (1983a) analyzed sediment samples taken from stations distributed throughout the bay. His results indicated that, overall, the Apalachicola Bay system remains relatively pollution-free at this time. However, the data show that some near shore areas are being contaminated. Livingston (1983a) found a strong positive correlation between silt/clay fractions and levels of organic matter in the sediments. These same areas of high organic content also showed increased concentrations of heavy metals. Locations which showed high concentrations of metals such as chromium, copper, nickel, lead, and zinc include: areas which receive municipal runoff (Scipio Creek, Eagle Creek, near shore Eastpoint); marinas (Apalachicola boat basin, St. George Island boat basin); and areas receiving agricultural runoff (Clark Creek, Murphy Creek, West Bayou). The easternmost area in St. Vincent Sound also had high metal concentrations, the cause of which was unknown. Livingston (1984) found that dredged channels of the Gulf Intracoastal Waterway, Eastpoint, and Two Mile channels also concentrate contaminants such as metals as part of the fallout of the silt/clay fraction. Geoscience, Inc. (1984) listed sampled sediments from the Apalachicola boat basin and Eastpoint Channel. Both sites had high heavy metal concentrations in the sediments, but failed to release appreciable amounts of these metals into adjacent waters.

Apalachicola Bay sediments contain high absolute concentrations of arsenic, cadmium, copper, chromium, and zinc. However, Apalachicola Bay also has the highest aluminum concentrations of any estuary in Florida (FDER, 1986). Therefore, when absolute concentrations are normalized using aluminum-to-metal ratios, only cadmium, chromium, and zinc appear not to be from natural sources.

BIOTA AND HABITAT

The overall high water quality of the Apalachicola estuary, with the combined effects of seasonal flooding, nutrient and detrital transport, and the variable salinity regime provide ideal living conditions for estuarine biota and result in a highly productive system. The Apalachicola Bay system is comparable to, or higher than, other Gulf estuaries in nutrient and detrital transport from the attendant river and floodplain, and in phytoplankton productivity (Estabrook, 1973; Elder and Mattraw, 1982).

It is also comparable to other Gulf estuaries in zooplankton production (Edmiston, 1979) and bay anchovy abundance (Sheridan and Livingston, 1979). The bay has long supported the largest oyster harvesting industry in Florida, as well as extensive shrimping and commercial fishing. And, it is believed that with more extensive clutch plantings and implementation of management and mariculture techniques, the bay could support a substantial increase in production of oysters and other commercial seafood species (Ednoff, 1984).

Relationship Between Apalachicola River and Bay

Among the major features which determine the habitat characteristic of the Apalachicola estuary are the flow of the Apalachicola River and nutrient transport from the river's floodplain (Livingston, 1984). Nutrients are transported to the estuary both in the form of detritus and as compounds in the water column. Annual flooding causes surges in nutrient transport and these nutrients are the foundation for estuarine productivity. Nutrients transported from the Apalachicola River floodplain to its estuary are especially important since detritivores occupy key positions in the estuary's food web (Livingston, 1984).

The relationships of the food web of Apalachicola Bay is well described in Livingston (1984). The exact mechanism of the transfer of nutrients and organic matter to estuarine populations remains unclear, although it is believed that phytoplankton and microorganisms hold an important key to nutrient cycling within the system. Temperature has been shown to limit phytoplankton growth in colder months, while nutrients tend to be the limiting factor in colder months (Myers and Iverson, 1977). Much of the productivity of estuaries occurs in warmer months when nutrient recycling within the estuary is more important than nutrient input.

The degree and timing of river flooding affects the level of detrital loading to the estuary and subsequently, the productivity of the bay (Livingston, 1981). Meeter et al. (1979) found the cyclic productivity of the Apalachicola Bay system to depend upon both annual pulses of detritus and the periodic large scale import of detritus during years of increased flow. It was therefore hypothesized by Wharton et al. (1982) that increases in seafood catches result from the unusually large load of detritus carried into the bay during floods. The surplus detritus is accumulated from portions of the floodplain not normally inundated, and it is also picked up by the additional scouring of areas that are annually flooded.

Since Jim Woodruff Dam restricts particulate flow from the Chattahoochee and Flint Rivers, the Chipola and Apalachicola floodplains are the primary contributors of detritus to the bay. Outflow at Jim Woodruff Dam does contain a substantial nutrient load in a dissolved form (Elder and Cairns, 1982) and is the largest single contributor of nutrients (Mattraw and Elder, 1984). Mattraw and Elder (1984) found that on an areal basis the Apalachicola basin exports greater quantities of carbon

and phosphorus than most watersheds. Annual flooding causes appreciable surges in nutrient transport, especially in the particulate organic form.

Elder and Cairns (1982) found that the floodplain of the Apalachicola River serves as both a sink and source of nutrients at different times of the year. Dissolved nutrients are consumed at about the same rate they are released to the floodplain, but the floodplain is an exporter of detrital matter. Overall, the Apalachicola wetlands function as a natural transformer-filtration system for waters passing through the basin (Elder and Cairns, 1982). Exchanges result in some net increases of organic carbon and phosphorus transport, much of it in the form of detritus, but no net increases of nitrogen (Mattraw and Elder, 1983).

Salinity is the major environmental parameter which affects species composition in the estuary, and the Apalachicola River is the primary source of freshwater to the estuary. Many Gulf species have high salinity requirements and, although they may enter the bay to feed, they cannot tolerate the rapid salinity fluctuations which may occur there. Euryhaline bay organisms (those adapted to variable salinity levels) are therefore protected from predation by the estuary's varying salinity environment. In summation, alterations in the flow regime, or in the form or amount of substances transported to the estuary could influence the bay's productivity and ecology.

Microbiota

Microscopic organisms, including bacteria, fungi, protozoans, and microalgae, are among the most biologically important organisms in the aquatic environment. In estuaries, microorganisms are very abundant and are found in the water column and also associated with sediments, detritus, plants and animals. Most are extremely small, single-celled, and are capable of multiplying rapidly in the water column. They play a role in the recycling of estuarine nutrients, particularly phosphorus (Myers and Iverson, 1977), and, when associated with organic matter and sediments, are vital to the estuary's food web (Livingston, 1983).

The high level of biological productivity in Apalachicola Bay is due in great measure to the nutrient recycling and detrital conditioning done by microbiota (Livingston, 1983). Communities of microbes are important in the process of decomposition of floodplain leaf litter (Morrison et al., 1977). By colonizing detrital particles, microbes enhance their food value since the variety and metabolic activity of the colonizing forms provide additional and more diverse proteins and nutrients than were originally available. Phytoplankton and aquatic plants depend upon the availability of nutrients in the water for growth; zooplankton and other planktivores use phytoplankton as a primary food source. Many bay organisms, particularly benthic invertebrates, consume detritus during all or part of their life cycle. These animals in turn are part of the food web when they are fed upon by omnivores and carnivores.

Phytoplankton, Zooplankton and Ichthyoplankton

The phytoplankton community is an important component of the aquatic system. Phytoplankton live and reproduce suspended in the water column, drifting with the currents. They are photosynthetic and utilize a variety of nutrients in the water, particularly nitrogen and phosphorus. In Apalachicola Bay the phytoplankton community is dominated by diatoms, single-celled and filamentous algae which have silicious cell-walls. The spatial and seasonal distribution of phytoplankton is patchy, and different species become dominant at different locations and times. In Apalachicola Bay proper, Chaetoceros lorenzianum, a marine diatom, is most abundant, while in East Bay, Melosira granulatum, a freshwater diatom, predominates (Estabrook, 1973).

The zooplankton community is an association of small aquatic animals that have limited swimming abilities and live suspended in the water column. It includes egg and larval stages of some animals which as adults are not planktonic, such as oysters, shrimp, crabs, and fishes. It also includes species that are planktonic through all stages of their lives, such as calanoid copepods. Zooplankton may be herbivorous, grazing on the abundant but patchy phytoplankton; or, carnivorous, consuming other planktonic forms; or omnivorous, feeding on almost anything organic including detritus. In Apalachicola Bay, Acartia tonsa is the most prevalent zooplankton species. The most abundant species of icthyoplankton found in the bay is the juvenile form of the bay anchovy (Anchoa mitchilli).

Benthic Invertebrates

Three major habitat types support populations of aquatic invertebrates in Apalachicola Bay: soft mud and sandy sediments; grassbeds and areas of detrital accumulations; and, oyster bars. The soft sediment habitat is the most extensive, covering about 78% of the total open water area (Livingston, 1984). Many benthic invertebrates, primarily polychaetes and amphipods, inhabit the soft sediments, using them as a burrowing and feeding substrate. Benthic community structure and distribution vary throughout the system. They are determined primarily by: the composition of the sediment; the proximity to currents, wave energy, and other bed load transport mechanisms; and by water quality conditions (Livingston, 1984). Organisms can affect the nature of the sediment by burrowing, tube-building, grazing, and filter-feeding activities. Many commercially important benthic invertebrates are harvested from this habitat. Penaeid shrimp (Peneaus spp.) and blue crab (Callinectes sapidus) are not restricted to this environment, but feed and burrow extensively here when they leave the protection of the marshes as they mature. The soft sediments contain nutrients and detritus brought in from the river as well as providing an ideal substrate for bacteria. The Atlantic croaker (Micropogonias undulatus) and spot (Leiostomus xanthurus) also feed here extensively. Most other important benthic invertebrates and epibenthic fishes dwell in this habitat at one time during their life cycle (Edmiston and Tuck, 1987).

Grassbeds are a complex habitat, providing food and shelter for many organisms. The dominant invertebrates in freshwater grassbeds are polychaetes, amphipods, chironomid larvae, and mollusks. In higher salinity grassbeds tanaids, polychaetes, amphipods, and oligochaetes are abundant (Livingston, 1984). Grassbeds provide a protected habitat with reduced water turbulence, high dissolved oxygen, and an abundant food source. The vegetation also provides attachment sites for epiphytes and epifauna, traps and produces detritus.

The oyster bars and lumps of Apalachicola Bay cover approximately 7% of the total bay area. As substrate, they provide a hard surface for the settling of sessile organisms such as oysters, mussels, anemones, tunicates, and attached algae. The rough structure of oyster reefs, with their cavities and empty shells, is used as habitat by numerous motile creatures. Among the prevalent inhabitants on Apalachicola Bay oyster bars are polychaete worms, isopods, amphipods, mud crabs, hermit crabs, chitons and barnacles (Pearse and Wharton, 1938). Small benthic fishes like gobies, blennies, clingfish, and toadfishes reside and/or nest in empty shells and holes. Many oyster predators live on or near the bars while other organisms use oyster shell as substrate for burrowing, or participate in some other sort of symbiotic relationship with oysters.

American Oyster

Commercially, the American oyster, Crassostrea virginica Gmelin, is the most important invertebrate of the Apalachicola estuary. Approximately 90% of the oysters harvested in Florida come from the Apalachicola estuary. Large oyster bars and numerous small oyster lumps are found throughout the Bay (Figure 10). Additionally, the Department of Natural Resources contributes to the acreage oyster beds by conducting a shell-planting program.

Galtsoff (1964) divides environmental factors into positive and negative categories based upon whether they are favorable or unfavorable to the growth and productivity of the oyster community. The principle positive factors are bottom substrate, water movements, salinity regime, temperature, and food. Negative factors include sedimentation, pollution, competition, disease, and predation. About 40% of the aquatic area of Apalachicola Bay has been estimated as being suitable for oyster bar development, with substrate type being the limiting factor (Whitfield and Beaumariage, 1977).

In Apalachicola Bay, spatfall, or settlement of oyster larvae, often lasts from April to late November. Because spat are planktonic, they have a very patchy distribution, and time and location of settlement is highly variable (Ingle and Dawson, 1953). As noted by Menzel et al., (1966) and Ingle and Dawson (1953), spatfall tends to be less intensive on reefs in lower salinity areas such as East Bay and St. Vincent Sound, and heavier in more saline areas.

The oyster-associated community varies in composition somewhat due to the salinity regime, which is the most important limiting factor on the bar itself (Menzel et al., 1966). Prolonged high salinities allow predators to infiltrate the bars, and also are indicative of lower food availability in the estuary. Prolonged low salinities eliminates many of the predators, but also stresses the oyster and can cause mortality (Menzel and Cake, 1969).

The most serious oyster predators besides humans are the southern oyster drill (Thais haemostoma) and the stone crab (Menippe mercenaria). They have low tolerances for freshwater and are not usually found in salinities below 15 and 12 to 15 parts per thousand (ppt) respectively. Summer conditions permit their encroachment into the bay and onto the oyster bars. In the past when droughts resulted in high persistent salinities, predators have become well-established on oyster bars such as St. Vincent or Dry Bar, and Porter Bar, and consequently these bars were depleted (Menzel et al., 1958; 1966). A variety of other predators take advantage of the stressed condition of oysters in the summertime; among them the blue crab (Callinectes sapidus), the crown conch (Melongena corona), and the whelk (Busycon contrarium).

The pathogen Dermo (Perkinsus marinus) also causes significant mortality to adult oysters during times of stress (Menzel, 1983). The prevalence and intensity of Dermo has been found to be positively correlated with salinity (Andrews and Ray, 1988; Craig et al., 1989). Other factors related to the occurrence of Dermo include temperature and pollution (relative to how it affects the health and stress in oysters) (Craig et al., 1989).

Hurricanes can have a pronounced impact on oyster bars. Hurricane Elena in September, 1985 was estimated by the Florida Department of Natural Resources to have destroyed 80 to 100 percent of the oysters in the highly productive eastern part of the bay (i.e., Cat Point and East Hole). Nick's Hole, off St. George Island, was also seriously affected. The bars were damaged by a combination of churning up and turning over of oyster shells and by direct burial. Some of the higher, inshore bars may have had some freshwater and/or exposure damage. After a good spat fall, the bay was recovering quickly when a second hurricane hit the bay.

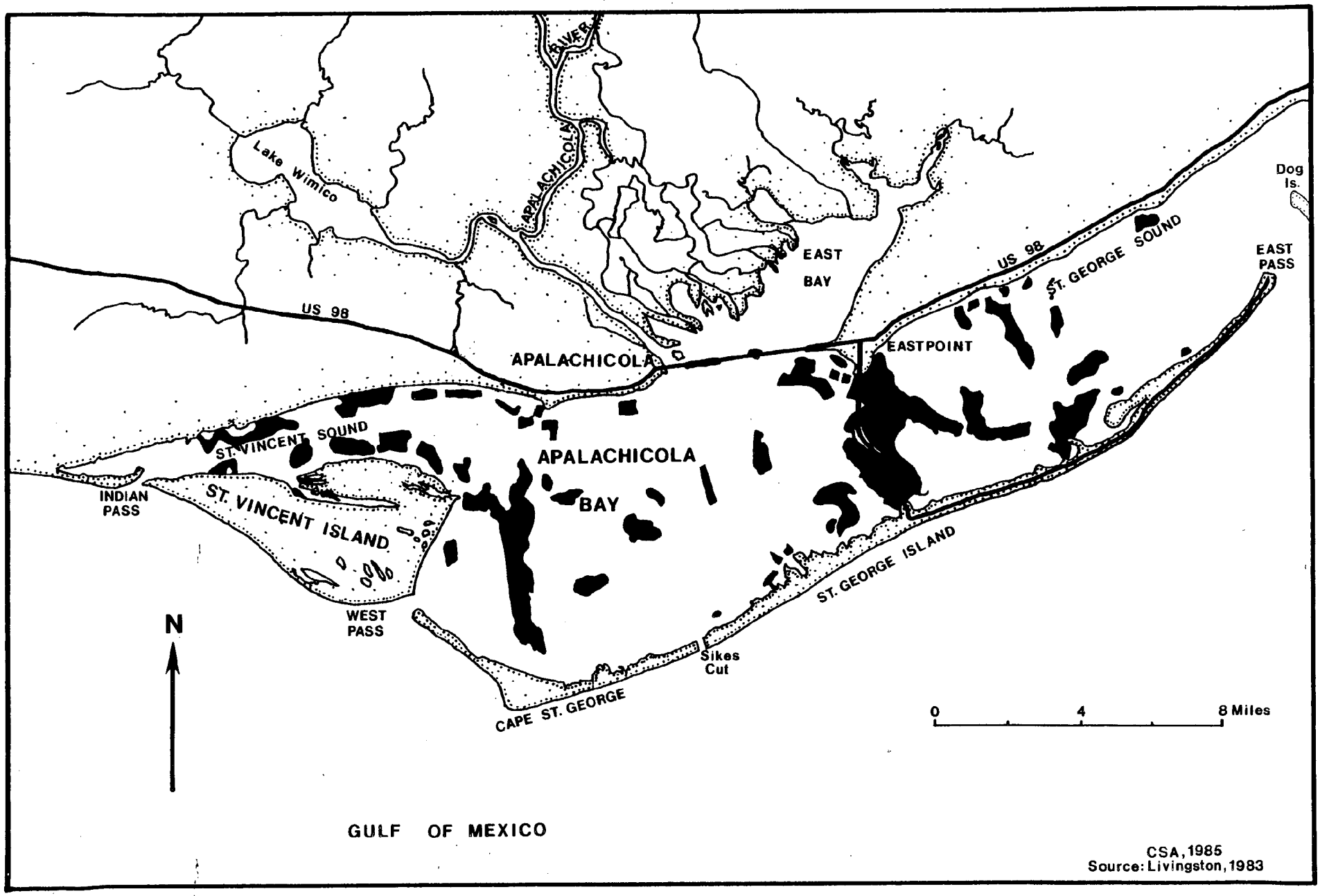
Penaeid Shrimp

Three species of penaeid shrimp in the Apalachicola estuary are economically and ecologically important to the region. These are the white shrimp (Penaeus setiferus), pink shrimp (P. duorarum), and brown shrimp (P. aztecus).

Adult penaeid shrimp migrate off shore to spawn in the Gulf of Mexico, with each species having its own spawning season and preferred spawning ground depth (Perez-Farfante, 1969). The eggs hatch off shore, and the larvae develop as they

Figure 10

LOCATION OF MAJOR OYSTER BARS IN APALACHICOLA BAY



CSA, 1985
Source: Livingston, 1983

are transported to the estuary by currents. In the low salinity tidal marsh areas where there is protection from predators and abundant food is available, the larvae develop into juveniles. As their size increases, the juveniles move gradually from the marshes to other parts of the estuary to become sub-adults (Perez-Farfante, 1969). When water temperature begins to decrease, they begin the spawning migration offshore to the adult grounds.

The three species of shrimp in Apalachicola Bay have different spawning times, migration patterns, and seasonal abundance. White shrimp are the most abundant in the bay.

Blue Crab

The blue crab (Callinectes sapidus) is one of the most abundant invertebrate species found in the Apalachicola Bay area. The blue crab is an estuarine-dependent, euryhaline species with a complex life cycle. Mating begins in summer in low-salinity creeks and marshes. Between September and April, egg bearing females from the entire west coast of Florida migrate to the high-salinity Gulf spawning site which extends from St. Vincent Island to Panacea (Oesterling and Evink, 1977). Eggs spawned here hatch out and undergo a series of larval stages while drifting with prevailing tides and currents. The developing zoea, megalops, and first crab stages eventually reach estuaries along the southern and western coasts of Florida. The very early crab stages and juveniles inhabit the estuaries, growing very rapidly, and reach maturity 12 to 18 months after hatching. Blue crabs normally live about one year as adults (Oesterling and Evink, 1977).

Blue crabs are opportunistic feeders in general, but do show preferences for certain food items at different stages in their development (Laughlin, 1982). Preferences of the larval stages have not been closely studied, but they probably eat single-celled phytoplankton and small zooplankton, as do many other small planktonic crustacea. Juvenile blue crabs consume detritus, plant material, and mollusks; adult crabs eat fishes and mud crabs (Laughlin, 1982). Enormous quantities of detritus enter the bay from January to April, coinciding with the arrival of the juvenile blue crabs. The large food supply may be the major reason for the large numbers of blue crabs found in the bay.

Fish

Available information on fish populations of Apalachicola Bay comes from two main sources: long-term monitoring studies conducted by Dr. R.J. Livingston and the Florida State University aquatic study group; and, the National Marine Fisheries Service (NMFS) annual seafood landing statistics. Although these two data bases are totally different in scope and intent, and are not comparable, together they

provide an overall perspective on the value of Apalachicola Bay as an important nursery ground, feeding ground, and habitat for estuarine fishes.

About three-fourths of the commercial catch of Franklin County is composed of species dependent on the estuarine habitat and conditions of Apalachicola Bay (Menzel and Cake, 1969). True estuarine species inhabit the estuary through-out their entire life cycle. The most abundant true estuarine species in Apalachicola Bay is the bay anchovy. It travels short distances, but makes no long-distance migrations. Other estuarine species tend to remain associated with specific habitats such as oyster bars or submerged vegetation.

Other fish inhabit the estuary during a large part of their life cycle, using it for a nursery and feeding ground. These species include striped mullet (Mugil cephalus), flounder (Paralichthys lethostigma),and members of the sciaenid family: speckled seatrout (Cynoscion nebulosus), redfish (red drum) (Sciaenops ocellatus), croaker (Micropogon undulatus), spot (Leiostomus xanthurus), and sand seatrout (Cynoscion arenarius). The life cycles of these species involves an offshore migration to Gulf spawning sites. Developing larvae are transported toward the coast by currents. They arrive in the estuaries and congregate in nursery areas where salinity is low, food is abundant, and predators relatively scarce. Juveniles of some species mature rapidly and move offshore to spawn within their first year. As adults, they return to the estuary and spend much of their time there, making annual off shore spawning migrations.

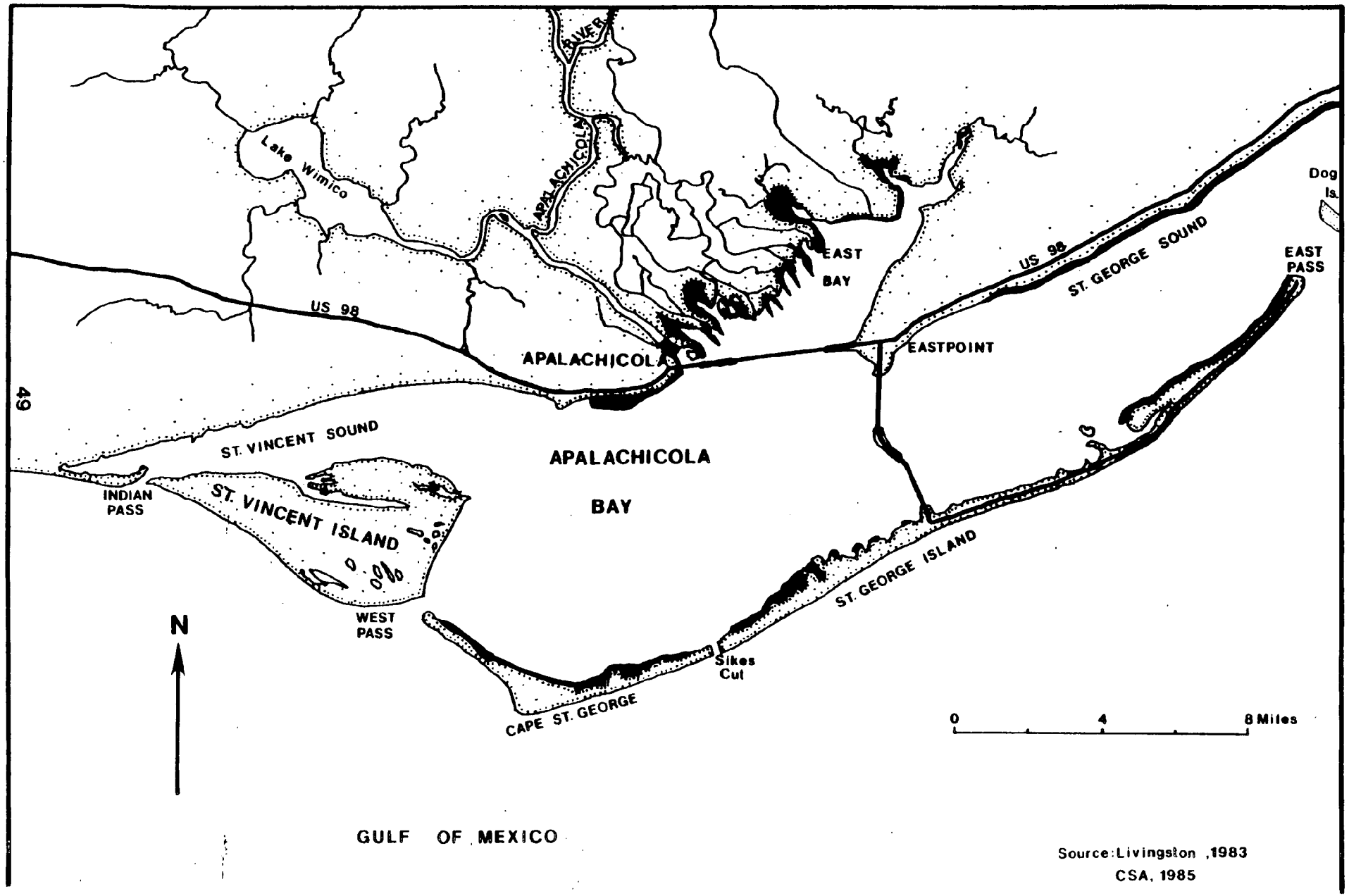
Anadromous fish spend a portion of their life cycle in the estuary when migrating from the ocean to their spawning grounds upstream. Anadromous fish species found in the bay include the Gulf sturgeon (Acipenser oxyrhynchus desotoi), striped bass (Morone saxitilis), Alabama shad (Alosa alabamae), and skipjack herring (Alosa chrysochloris). Other species only enter the bay when conditions are appropriate (e.g., low salinity). With winter and spring flooding bluegill (Lepomis machrohirus), redear sunfish (L. micro-lophus), and large-mouth bass (Micropterus salmoides) may enter the upper bay. Other freshwater fish found in the bay include spotted gar (Lepisosteus oculatus), long-nose gar (L. osseus), common carp (Cyprinus carpio), and mosquito fish (Gambusia affinis). In the summer and fall months, when bay salinities are high, marine fish such as shark, ray, and small grouper may enter the bay. Appendix D lists the fish of the Apalachicola estuary.

Submerged Vegetation

Aquatic plant distribution in Apalachicola Bay is limited to shallow areas along the coast (Figure 11). Their distribution is confined by high turbidity and color values because they limit the depth of the photic zone. Salinity is also an important variable. Table 1 summarizes the acreage of submersed vegetation in the estuary. Submerged vegetation covers about 10% of the aquatic area in the bay system

Figure 11

SUBMERGED AQUATIC VEGETATION DISTRIBUTION IN APALACHICOLA BAY



(Livingston, 1984), with the majority of the grassbeds located in areas of high salinity and low turbidity. Seagrass beds are important habitats in the marine environment not only for their high primary productivity, but also for the role they play in sediment accretion, substrate stabilization, and as a nursery, feeding ground, and permanent home to numerous organisms (Phillips, 1980). Sheridan and Livingston (1983) measured one of the highest infaunal densities recorded in the literature working in grassbeds in Apalachicola Bay.

TABLE 1

SUBMERGED VEGETATION ACREAGE IN THE APALACHICOLA BAY SYSTEM

LOCATION	SPECIES/ASSEMBLAGE	AREA (acres)
Apalachicola Bay		
	Halodule wrightii	1,145
	Ruppia maritima	282
	Vallisneria americana, R. maritima	50
St. Vincent Sound		0
St. George Sound		
	H. wrightii	711
	H. wrightii, Thallassia testudinum	277
East Bay		
	R. maritima, V. americana	166
	Myriopyllum spicatum, Potamogeton pectinatus, V. americana, R. maritima	1,179
	Najas guadalupensis	187
	R. maritima	25
	R. maritima, P. pectinatus	55

Source: Continental Shelf and Associates, 1985.

In Apalachicola Bay grassbeds are limited to the shallow lagoons of St. George Island and consist primarily of shoal grass (Halodule wrightii), manatee grass (Syringodium filiforme), and Gracilaria spp., a benthic red alga. By far the most

dominant species is Halodule, because it is most tolerant to variations in temperature and salinity, and because of its tendency to be an early colonizer of disturbed or unvegetated areas (Zieman, 1982). There is no submerged vegetation at Eastpoint and little or no grassbed development in St. Vincent Sound or along the east coast of St. Vincent Island (Livingston 1980; 1983). East Bay supports extensive grassbeds along its marshy perimeter. They are dominated by tape grass (Vallisneria americana), widgeon grass (Ruppia maritima), and sago pondweed (Potamogeton spp.), all freshwater to brackish species (Livingston, 1980). In recent years, the Eurasian watermilfoil (Myriophyllum spicatum) has become rooted throughout northern East Bay, and there is concern over its potential effects on the ecology of the area (Livingston, 1983). A recent study funded by the Corps of Engineers (CSA, 1985) found that Eurasian watermilfoil has undergone considerable expansion, increasing from 30% coverage in 1980 to 90% coverage in 1985 in the major bays along the west side of East Bay. Eurasian watermilfoil usually out-competes native plants, but does not benefit the overall ecosystem as much. It does not help stabilize sediments, and may restrict access to fishing areas in shallow waters, but it may help shrimp by providing shelter for the juveniles. The Scipio Creek area near Apalachicola is also experiencing a severe problem with Eurasian watermilfoil.

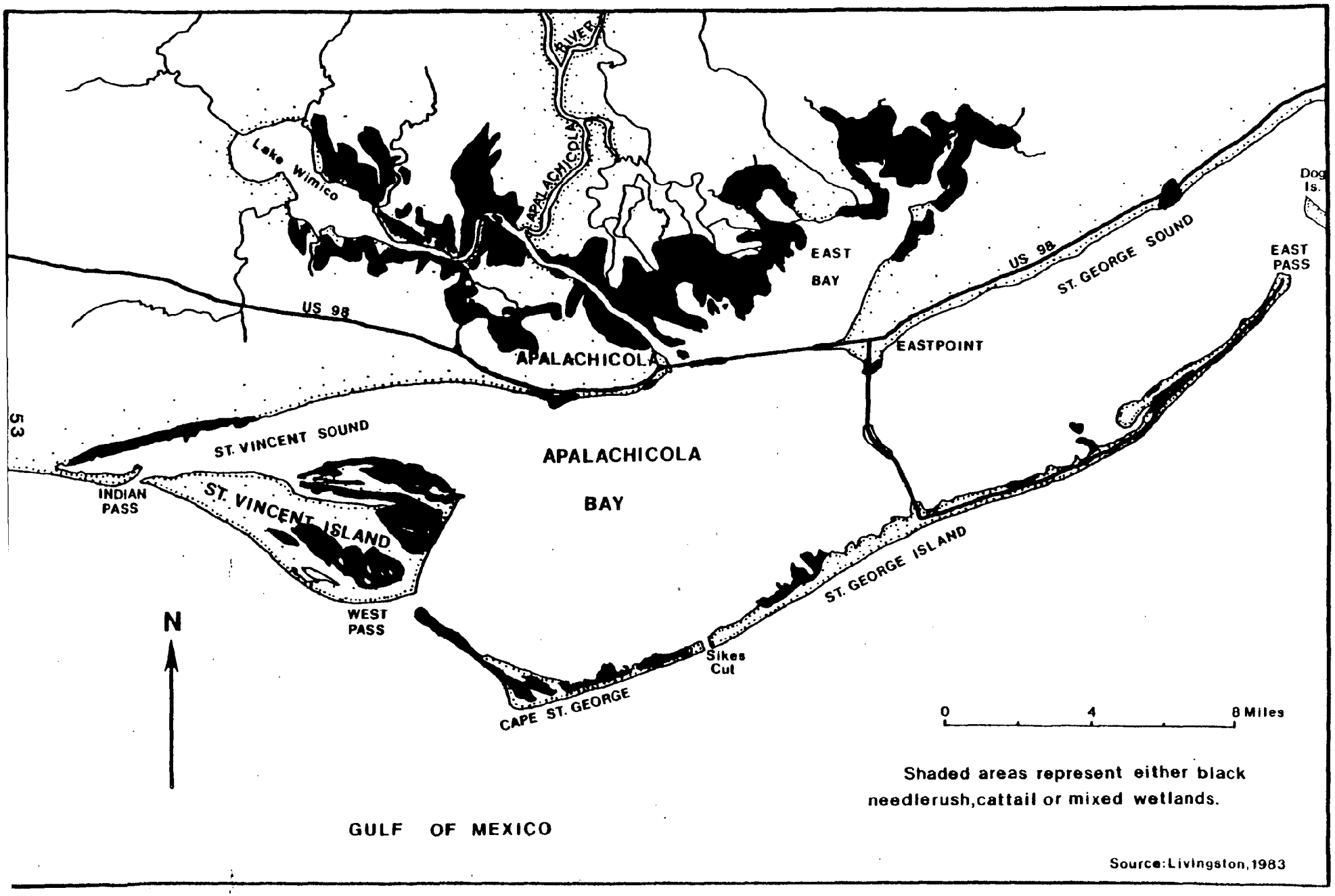
Two major evaluations of the grassbeds in the estuary have been conducted in recent years (Livingston, 1980; CSA, 1985). The total area of submerged grassbeds described in Livingston (1980) is considerably larger than that found in CSA (1985). CSA (1985) attributes these differences to differences in mapping and area calculation techniques, as well as the decline of grassbeds. CSA (1985) noted little change in species composition in Apalachicola Bay proper, St. George Sound, and St. Vincent Sound. However, CSA (1985) did note that both Livingston's habitat assessment of the area in 1980 and infrared imagery taken in 1979 showed the presence of a large seagrass bed (shoal grass) just west of Sikes Cut, which was not there when they surveyed the bay.

Emergent Vegetation and Tidal Flats

Marsh systems are among the most productive ecosystems in the world and are vital habitats for important commercial and game species. Marshes found in the Apalachicola system include fresh, brackish, and salt marshes which cover about 14% of the aquatic area (Livingston, 1980). Their distribution is limited to the intertidal areas along the perimeter of the bay and the delta area of the lower river and East Bay (Figure 12). Since the amount of organic material exported out of a marsh into the estuary is still under debate (de la Cruz, 1980), the most important function of marshes may be as a nursery habitat (Edmiston and Tuck, 1987). Marshes fulfill the three general criteria that characterize a nursery ground: provide protection from predators; provide an abundant food supply; and, are physiologically suitable in terms of physical and chemical features (Joseph, 1973).

Figure

EMERGENT AQUATIC VEGETATION DISTRIBUTION IN APALACHICOLA BAY



Shaded areas represent either black needlerush, cattail or mixed wetlands.

Source: Livingston, 1983

The most developed marsh systems are found in East Bay and along the lower reaches of the Apalachicola River. The marshes here support predominantly fresh to brackish water vegetation consisting of bullrushes (Scirpus spp.), cattails (Typha spp.), and sawgrasses (Cladium spp.). Black needlerush (Juncus roemarianus) and cordgrasses (Spartina spp.) are also present in the more brackish areas of East Bay (Livingston, 1983). St. Vincent Sound also supports a large brackish and salt-marsh system, primarily located along the northeastern areas of St. Vincent Island. The dominant species are black needlerush, cordgrass, and saltgrass (Distichlis spicata). Freshwater marshes also occur on St. Vincent Island with sawgrass (Cladium jamaicensis) being the dominant feature (Thompson, 1970). The lagoon and tidal creeks of Cape St. George and St. George Islands also support narrow bands of brackish and salt marshes. These are generally dominated by needlerush, with lesser amounts of cordgrass and saltgrass present (Livingston, 1984).

Plants and animals associated with salt marshes must be capable of tolerating rapid changes in environmental conditions. Because of stressful conditions, salt marshes typically exhibit low plant diversity, and in many instances consist of one or two species, with black needlerush and smooth cordgrass dominating in this area. Brackish marshes are not usually as stressful, and therefore, the number of species tends to be larger (Clewell, 1986). The paucity of species is usually offset by the extremely dense concentration of species present.

Animals associated with marshes must also be capable of withstanding rapid changes in environmental conditions. Since only about 10% of the vascular plant material in a marsh is consumed directly by herbivores (Heard, 1982), most organisms found in the marsh are predators and detritivores. Permanent residents of marshes include invertebrates such as insects, polychaete worms, amphipods, mollusks, larger crustaceans, and other omnivores. Year-round residents also include mammals such as muskrat (Neofiber alleni), and birds such as clapper rail (Rallus longirostris) and great blue heron (Ardea herodias). Transitory residents include such species as blue crabs, penaeid shrimp, anchovies, largemouth bass, striped mullet, spotted and sand seatrout, and lepomids (Livingston, 1984). These and other important estuarine organisms use the marsh habitat as either a nursery ground, breeding area, or feeding zone (Edmiston and Tuck, 1987). Transitory birds in marshes comprise one of the largest herbivorous groups and are also significant top carnivores in the system. Northeastern Gulf of Mexico marshes support summer nesting species, migrants, casual feeders, and summer visitors (Stout, 1984). Birds of prey that utilize the marsh system include hawks, owls, osprey (Pandion haliaetus), and bald eagle (Haliaeetus leucocephalus) (Edmiston and Tuck, 1987).

Tidal flats are located on the bayward sides of the barrier islands, along the mainland, and in shallow water areas associated with salt and freshwater marshes. Little is known about the tidal flats of Apalachicola Bay. These unvegetated

expanses of mud or sand are exposed at low tide and submerged at high tide. Tidal flats or mud flats are often ignored because their values to the aquatic ecosystem are not readily visible (Clark, 1974). As habitats they are subjected to one of the most variable environments in the aquatic system. Organisms inhabiting tidal flats must not only cope with extremes of salinity and temperature, but also with exposure and desiccation (Edmiston and Tuck, 1987).

Organisms associated with tidal flats vary with the salinity regime and type of substrate, as well as depth of water and time of exposure. The most visible organisms associated with tidal flats in Apalachicola Bay are oysters. Because of the increased stress in this environment, these oysters tend to remain small. They are commonly referred to as "coon oysters", and have been used in replanting programs on subtidal bars. Tidal flats provide important feeding grounds for finfish at high tide, as well as habitat for a wide variety of crabs, snails, worms, and algae (Edmiston and Tuck, 1987). They also provide important feeding and loafing areas for plovers, sandpipers, gulls, ducks, and other birds which find a wide variety of food to eat which has been exposed by the tide (Taylor et al., 1973).

Animals

The coastal marsh environment of the mainland and barrier islands surrounding Apalachicola Bay provides habitat for numerous reptiles and amphibians. A common marsh inhabitant is the American alligator (Alligator mississippiensis), which is listed as a designated species by the state and federal government. The salt marsh snake (Nerodia fasciata clarki) and the diamond back terrapin (Malaclemys terrapin) also inhabit marshes of the Apalachicola system (Means, 1977). The loggerhead seaturtle (Caretta caretta caretta), a state and federally designated species, nests on Gulf beaches of St. George, Cape St. George, and St. Vincent Islands. The Atlantic ridley turtle (Lepidochelys kempi), leatherback turtle (Dermochelys coriacea), and the Atlantic green turtle (Chelonia mydas mydas) may occasionally be found in the waters of the bay, although they do not nest in the vicinity.

Shorebirds and wading birds frequent the entire shoreline of the estuary, while sloughs, marshes and surrounding waters attract numerous waterfowl. The Apalachicola estuary lies on the eastern border between the Mississippi and east coast migratory flyways, and therefore receives birds from both the Midwest and the Atlantic seaboard which use the Gulf of Mexico and Peninsular Florida in migration. St. George and St. Vincent Islands, and the Apalachicola River form a unique system that creates land-marks for birds in migration (Cole, 1986). In both the spring and fall the barrier islands serve as vital resting spots for birds flying across the Gulf states. Cole (1986) identified 164 species of birds which utilize the islands in migration. These include tanagers, buntings, sparrows, and other passerine migrants.

Shorebird and waterfowl migrants also use the system. In addition, the island serves as residence for a number of bird species including mockingbirds, cardinals, towhees, grackles, blackbirds, and doves. Heron species spotted in the estuary include the little blue heron (Egretta caerulea), great blue heron (Ardea herodias), great egret (Casmerodius albus), snowy egret (Egretta thula), black-crowned night heron (Nycticorax nycticorax), yellow-crowned night heron (Nyctanassa violacea), Eastern least bittern (Ixobrachus exilis exilis), American bittern (Botaurus lentiginosus), green-backed heron (Butorides striatus), and Louisiana or tricolor heron (Egretta tricolor).

Mammals found in the waters of the preserve include dolphin (Tursiops truncatus), otter (Lutra canadensis), muskrat, mink (Mustela vison lutensis), and infrequently manatee (Trichechus manatus latirostris).

Designated Species

Some designated animal species which have legal status pursuant to the Endangered Species Act of 1973 are found on or in the vicinity of Apalachicola Bay. Additional plant and animal species are considered rare or of special concern, and have been recommended for protective legal status or for protective management. Table 2 lists species endangered, threatened, or of special concern which may be found in or near the preserve. For management of designated plant species in the preserve, the Florida Department of Agriculture and Consumer Services (list published in Preservation of Native Flora of Florida Act, Section 581.185-187, F.S.) is the primary reference source. For management of designated animal species, the Florida Game and Fresh Water Fish Commission (FGFWFC) (list published in 39-27.03-05, F.A.C.) is the primary reference source. The United States Fish and Wildlife Service (USFWS) are responsible for implementing the provisions of the federal Act.

Species may be classified as endangered, threatened, under review, or of special concern. Endangered species are those threatened with extinction if the deleterious factors affecting their populations continue. These are species whose numbers have already declined to such a critically low level or whose habitats have been so seriously reduced or degraded that without active assistance, survival is questionable. Threatened species are those likely to become endangered in the foreseeable future if current trends continue. Under review species are being considered for designation. Species of special concern are those that warrant special attention even though they do not fit the other categories. These species, although perhaps not rare, may be especially vulnerable to certain types of exploitation or environmental changes and have experienced long term population declines. Species of this designation may also have potential impact on endangered or threatened populations of other species.

TABLE 2

ENDANGERED AND POTENTIALLY ENDANGERED FLORA AND FAUNA OF THE APALACHICOLA BAY AQUATIC PRESERVE

SPECIES	LEGAL STATUS OR DESIGNATION				
	FGFWFC	USFWS	CITIES	FCREPA	STATUS ON RESERVE
MAMMALS					
River otter (Lutra canadensis)			II		S
West Indian Manatee (Trichechus manatus latirostris)	E	E	I		K
BIRDS					
Eastern brown pelican (Pelecanus occidentalis)	SSC		II	T	K
Southern bald eagle (Haliaeetus leucocephalus)	T	E	I	T	K
Peregrine falcon (Falco peregrinus)	E	T	I	E	K
Least tern (Sterna antillarum)	T			T	K
Southeastern kestrel (Falco sparverius paulus)	T	UR2	II	T	K
Cuban snowy plover (Charadrius alixandrinus tenuirostris)	T	UR2		E	K
American oystercatcher (Haematopus palliatus)	SSC			T	K
Little blue heron (Egretta caerulea)	SSC			SSC	K

SPECIES	LEGAL STATUS OR DESIGNATION				
	FGFWFC	USFWS	CITIES	FCREPA	STATUS ON RESERVE
Snowy egret (Egretta thula)	SSC			SSC	K
Louisiana heron (Egretta tricolor)	SSC			SSC	K
Reddish egret (Egretta rufescens)	SSC	UR2		R	K
Osprey (Pandion haliaetus)			II	T	K
Marsh Hawk (Circus cyaneus)			II		K
American redstart (Setophaga ruticilla)				R	K
Black-whiskered vireo (Vireo altiloquus)				R	K
Louisiana waterthrush (Seiurus motacilla)				R	K
Great egret (Casmeriodius albus)				SSC	K
Black-crowned night heron (Nycticorax nycticorax)				SSC	K
Yellow-crowned night heron (Nycticorax violacea)				SSC	K
Eastern least bittern (Ixobrychus exilis)				SSC	K
Cooper's Hawk (Accipiter cooperii)				SSC	K

SPECIES	LEGAL STATUS OR DESIGNATION				
	FGFWFC	USFWS	CITIES	FCREPA	STATUS ON RESERVE
Piping plover (Charadrius melodus)				SSC	K
Royal tern (Sterna maxima)				SSC	K
Sandwich tern (Sterna sandvicensis)				SSC	K
Caspian tern (Sterna caspia)				SSC	K
Black skimmer (Rynchops niger)				SSC	K
American avocet (Recurvirostra americana)				SSC	K
White ibis (Eudocimus albus)				SSC	K
Worm-eating warbler (Helmitheros vermivorus)				SSC	K
REPTILES					
American alligator (Alligator mississippiensis)	SSC	T(S/A)	II	SSC	K
Atlantic loggerhead turtle (Caretta caretta caretta)	T	T	I	T	K
Leatherback turtle (Dermochelys coriacea)	E	E	I	R	K

SPECIES	LEGAL STATUS OF DESIGNATION				
	FGFWFC	USFWS	CITIES	FCREPA	STATUS ON RESERVE
Atlantic Ridley turtle (Leipidochelys kempi)	E	E	I	R	K
Atlantic Green turtle (Chelonia mydas mydas)	E	E	I		K
Gulf salt marsh snake (Nerodia fasciata clarki)				R	K
AMPHIBIANS					
none					
FISHES					
Atlantic sturgeon Acipenser oxyrhynchus	SSC		II	T	K
INSECTS and MOLLUSKS					
None Known					
PLANTS					
Florida corkwood (Leitneria floridana)	T	UR5	II	R	K

Notes: All listing except FCREPA based on FGFWFC (1986). FCREPA listings based on Rare and Endangered Biota of Florida, Florida Committee on Rare and Endangered Plants and Animals.

FGFWFC= Florida Game and Fresh Water Fish Commission; USFWS= U.S. Fish and Wildlife Service; CITIES= Convention on International Trade in Endangered Species of Wild Fauna and Flora; DACS= Florida Department of Agriculture and Consumer Services; FCREPA= Florida Committee on Rare and Endangered Plants and Animals.

E= endangered; T= threatened; T(S/A)= threatened due to similarity of appearance; R= rare; SSC= species of special concern; UR2= under review for listing, but substantial evidence of biological vulnerability and/or threat is lacking; UR5= still formally under review for listing, but no longer being considered for listing because recent information indicates species is more widespread or abundant than previously believed; I= appendix I species; II= appendix II species; K= known to occur on the preserve; S= suspected to occur in the preserve.

CULTURAL RESOURCES

The Apalachicola River valley is believed to have been occupied by humans for over 10,000 years (Dunbar and Waller, 1983). Little is known of the early inhabitants other than that they were small, seasonally wide-ranging groups of hunter-gatherers organized in family bonds (White, 1984). Sites generally cluster around river crossings where game could be more easily taken. Because of the arid conditions during the Pleistocene period, water was an important factor in settlement location. Therefore, the Apalachicola River valley and estuary are believed to have been an ideal environment for small hunting groups. However, no direct evidence of paleo-indian occupation has been uncovered to date (Henefield and White, 1986). The understanding of Pre-Columbian history on the barrier islands adjacent to the Preserve is relatively limited due to the recent formation of the islands.

The archaic period (7000-1000 B.C.) is only slightly better known than the earlier period of habitation in the basin. The type of tools used indicate an increasing reliance on smaller game animals. Archaic sites are known in the region (Bullen, 1950; White, 1984). The late archaic period is marked by the introduction of fiber tempered pottery, which is probably an independent invention originating in southeast Georgia, Florida, and Louisiana at nearly the same time (Phelps, 1966; Bullen, 1972). Settlements of a seasonal or semipermanent nature are noted in the basin during the late archaic period (just after 3000 B.C.), and these people intensively exploited selected resources such as deer, nuts, fish, and shellfish. Expanded systems of socio-economic interaction helped to spread various technological innovations such as new projectile point styles, steatite vessels, and fired clay pots (White, 1984).

Human populations became more sedentary by 1000 B.C., engaging in hunting, foraging, and the beginnings of plant cultivation. In northwest Florida this period

is known as the Deptford period. Although the majority of the Deptford sites are associated with coastal swamps and estuaries (Milanich and Fairbanks, 1980), Deptford components have been located at a number of sites in the region (Bullen, 1950; White, 1984). The Deptford period is characterized by the appearance of sand tempered ceramics and larger, more settled villages (Hennefield and White, 1986).

The following Swift Creek period, 300 B.C. to 200 A.D. is best known for the paddle-malleated, complicated stamped ceramics. This decorative motif originated in central Georgia and radiated rapidly to both the Georgia and Florida coastlines.

The influx of ideas from the north (Hopewell) and from the west (Poverty Point) to the indigenous Florida Gulf coast culture culminated in a vibrant and dynamic set of regional adaptations during the Middle Woodland stage known as the Weeden Island culture. By 200 A.D., this culture had spread to the basin (White, 1981). Weeden Island ceramics are the most distinctive and well made in the Florida Gulf coast and have long been recognized as being among the finest native ceramics in North America (Willey, 1949).

Numerous Weeden Island sites have been documented in the region surrounding the Apalachicola basin (White, 1984). Through the Weeden Island period an increasing dependence on agriculture was responsible for a small, but constantly growing population. Sites with multiple burial mounds and extensive middens are noted in the central basin by Milanich and Fairbanks (1980). The building of burial mounds seems to have stopped between 500 and 1000 A.D.

Around 1000 A.D., in response to stresses from increasing populations, the native culture shifted, evidently fairly rapidly, to larger aggregations in more permanent, riverine villages, where a larger labor force could concentrate on an intensified maize culture (White, 1981). These changes developed in local Weeden Island populations as a response to constant diffusion of culture traits from Mississippian peoples. This Weeden Island culture is known as the Ft. Walton culture, which can be dated from 1000 A.D. to 1600 A.D.

Most of the barrier islands on the Gulf coast have predominantly Woodland and/or Fort Walton period occupations, dating from just after the time of Christ up to Spanish contact in the sixteenth century. St. George Island seems to have predominantly Fort Walton period remains. As is common, most sites are on the more protected bay side, which had both more resources to exploit and more fresh water sources (White, personal communication).

These Fort Walton populations were the first to have contact with Spanish explorers, which was followed by a chain of Spanish missions organized from 1670 to 1685 (Jones, 1973). The historic phase dating from 1600 A.D. to 1750 A.D. is known as the Leon-Jefferson period, during which aboriginal settlement patterns

were changed by Spanish influences. By the mid-seventeenth century, native cultures were disrupted and populations had declined severely, mostly because of the introduction of European disease (Hennefield and White, 1986).

Apalachee villages gradually moved to Franciscan mission sites which were established by Spanish missionaries in the 17th century. In the early 1700s English soldiers destroyed the missions, killing many of the Apalachee and forcing most of the survivors into slavery. The void in the aboriginal population was filled through the course of the 18th century by an influx of Creek and Seminole Indians.

During the British colonial period (1776-1783) trading patterns were established and maintained through the ensuing Second Spanish Period (1783-1821). Panton, Leslie and Company, and other British firms traded in Spanish Florida through frontier outposts such as the one that was situated on the Apalachicola River. During this period of oscillating colonial rule, British troops occupied and began a fortification on St. George Island in 1814. But this fortification was shortly abandoned (Owens, 1966).

Colonial policies of the time reserved for Indians the right to exclusive possession of their lands, subject only to domination of the king. The lands adjacent to the preserve lay within these reserved lands. The Indians of west Florida traded heavily with the British trade firm of Panton, Leslie and Company, which was succeeded by John Forbes and Company in 1783. By 1804 the Indians had become so indebted to the trading firm that their only recourse for payment was to cede portions of their lands to the traders. Additional cessions in 1811 for the same purpose included the land area surrounding the preserve, and the transactions came to be known as the Forbes Purchase.

Continued encroachment by American settlers onto native occupied areas led to increased hostility, which culminated in the Red Stick Rebellion (Moore, 1951). Following the War of 1812, and the defeat of the Creeks in 1814, only a few remnants of the Creek nation survived in the Apalachicola area.

The War of 1812 forced colonial powers out of the region and in 1822 Florida joined the union. Subsequently, remnants of the Creek population were forcibly removed and white settlers began to colonize the river valley. In 1822, the area around the mouth of the Apalachicola River was designated as a customs district and this was the beginnings of the city of Apalachicola.

The Spanish crown endorsed the validity of the cessions discussed above and when the United States gained possession of the Florida territory a series of cession claims was made by the successors of the Forbes' lands. In 1842, after lengthy litigation in United States courts, title was confirmed to the final successor to the cession claim, the Apalachicola Land and Development Company. By this time the town of Apalachicola had been established and was rapidly becoming an important port of commerce.

Prehistoric and historic artifacts still may be found on the shores adjacent to the Preserve, with registered sites being found on St. Vincent, Cape St. George and St. George Island.

CHAPTER IV

HUMAN USES OF THE RESOURCES AND ASSOCIATED IMPACTS

To develop a management program for the resources of the Apalachicola Bay Aquatic Preserve, it is essential to understand how humans use the resources in addition to the biology and ecology of the estuary. The major uses of the estuary by humans are commercial and recreation harvesting of marine resources; commercial navigation; and, adjacent land uses and their attendant facilities (e.g., docks, marinas, etc.). Because of the interrelationship between the river and estuary, management of the river basin and associated impacts on the aquatic preserve is also discussed.

HARVESTING OF MARINE RESOURCES

Apalachicola Bay supports major fisheries for oysters, shrimp, blue crab, and finfish. Tables 3 and 4 list the shellfish and finfish yields from the estuary. Prochaska and Mulkey (1983) have pointed out that Franklin County is economically dependent on commercial fisheries. Between 60 and 85 percent of the citizens of Franklin County make a living from the seafood industry, and the industry contributes in excess of $14 million dock side to the local economy. Colberg et al., (1968) projected an annual value of $34.2 million for commercial fishing and tourism in the estuary by the year 2000 if water quality and natural productivity are maintained.

In addition to commercial fishing, recreational fishing also contributes to Franklin County's economy by attracting tourists to the region. No estimates of recreational use of the estuary are available.

In 1915 the bay supported 7,135 acres of oyster beds (Danglade, 1917), while today only 6,000 acres are available. This includes over 750 acres of oyster bars constructed by the Florida Department of Natural Resources since 1949 (Futch, 1983). The major commercially important bars are located off Cat Point and at East Hole (see Figure 10, page 45). Historically, the estuary has provides about 90% of Florida's and 10% of the Nation's oyster harvest. Production data reveal that the bay yielded record harvests every successive year from 1977 to 1981. This is believed to be partially the result of the opening up of a summer harvest season. The size of the harvest has been down in recent years as result of several factors including several droughts and increased harvesting pressure.

TABLE 3

SUMMARY OF SELECTED FRANKLIN COUNTY SHELLFISH LANDINGS
QUANTITY IN THOUSANDS OF POUNDS/VALUE IN THOUSANDS OF DOLLARS

	BLUE CRABS	OYSTERS	SHRIMP	TOTAL
1978				
QUANTITY	880	5567	5412	11859
VALUE	164	4223	6020	10407
1979				
QUANTITY	1210	5810	2840	9860
VALUE	239	4869	5340	10448
1980				
QUANTITY	1304	6410	3420	11134
VALUE	274	5740	5039	11053
1981				
QUANTITY	1619	6617	5458	13694
VALUE	360	6463	8421	15244
1982				
QUANTITY	983	4153	3115	8251
VALUE	239	4151	6444	10834
1983				
QUANTITY	953	3936	3671	8560
VALUE	269	4158	8002	12429
1984				
QUANTITY	1265	6199	4386	11850
VALUE	305	6803	8159	15267
1985				
QUANTITY	1418	3816	3945	9179
VALUE	816	4348	7195	12359
1986				
QUANTITY	794	473	1935	3202
VALUE	318	449	3986	4753
1987				
QUANTITY	619	2780	1595	4994
VALUE	204	5199	3190	8593
1988				
QUANTITY	568	1292	3472	5332
VALUE	204	5199	3190	8593
1989				
QUANTITY	359	823	2982	4164
VALUE	147	1885	5546	7578
1990*				
QUANTITY	219	1346	1597	3162
VALUE	120	3755	3130	7005

SOURCE: For 1978-1985 Landings: Florida Department of Natural Resources, Summary of Florida Commercial Landings.
SOURCE: For 1986-1990 Landings: DNR Marine Fisheries Information System
* 1990 Data Preliminary

TABLE 4

SUMMARY OF FIN FISH LANDINGS FOR ESTUARINE DEPENDENT SPECIES
QUANTITY IN THOUSANDS OF POUNDS/VALUE IN THOUSANDS OF DOLLARS

	MULLET	FLOUNDER	SEATROUT	REDFISH	SPOT	TOTAL
1978						
QUANTITY	670	40	49	10	3	772
VALUE	134	6	25	3	<	168
1979						
QUANTITY	645	56	53	11	7	772
VALUE	118	29	32	4	1	184
1980						
QUANTITY	722	90	29	9	6	856
VALUE	140	47	18	3	1	209
1981						
QUANTITY	659	68	51	10	4	792
VALUE	144	37	33	4	1	219
1982						
QUANTITY	653	95	55	7	10	820
VALUE	15	50	38	3	2	108
1983						
QUANTITY	920	88	55	14	10	1087
VALUE	210	47	40	6	3	306
1984						
QUANTITY	896	86	51	9	17	1059
VALUE	209	49	39	4	3	304
1985						
QUANTITY	482	78	47	8	4	619
VALUE	116	49	38	4	1	208
1986						
QUANTITY	229	13	5	3		250
VALUE	75	15	5	2.5		97.5
1987						
QUANTITY	131	16	8	0		155
VALUE	50	17	9	0		76
1988						
QUANTITY	159	20	8	0	1	188
VALUE	70	26	8	0	<1	104
1989						
QUANTITY	243	20	33	0	2	298
VALUE	80	21	36	0	<1	137
1990*						
QUANTITY	355	15	16	0	2.5	388.5
VALUE	170	16	22	0	<1	208

SOURCE: For 1978-1985 Landings: Florida Department of Natural Resources, Summaries of Florida Commercial Landings.
SOURCE: For 1986-1990 Landings: DNR Marine Fisheries Information System.
* 1990 Data Preliminary

Shellfish harvesting areas are classified into one of four categories: approved areas normally opened to fishing; conditionally approved areas open to shellfishing which are occasionally closed either after finding high fecal coliform densities or by following established management policies (e.g., closure based on a specific river stage); Prohibited areas which are never opened to shellfishing due to pollution levels; and unclassified areas in which shellfishing is not permitted pending surveys by the Shellfish Environmental Assessment Section. Figure 13 shows the classification of oystering areas in Apalachicola Bay as adopted in November 1990.

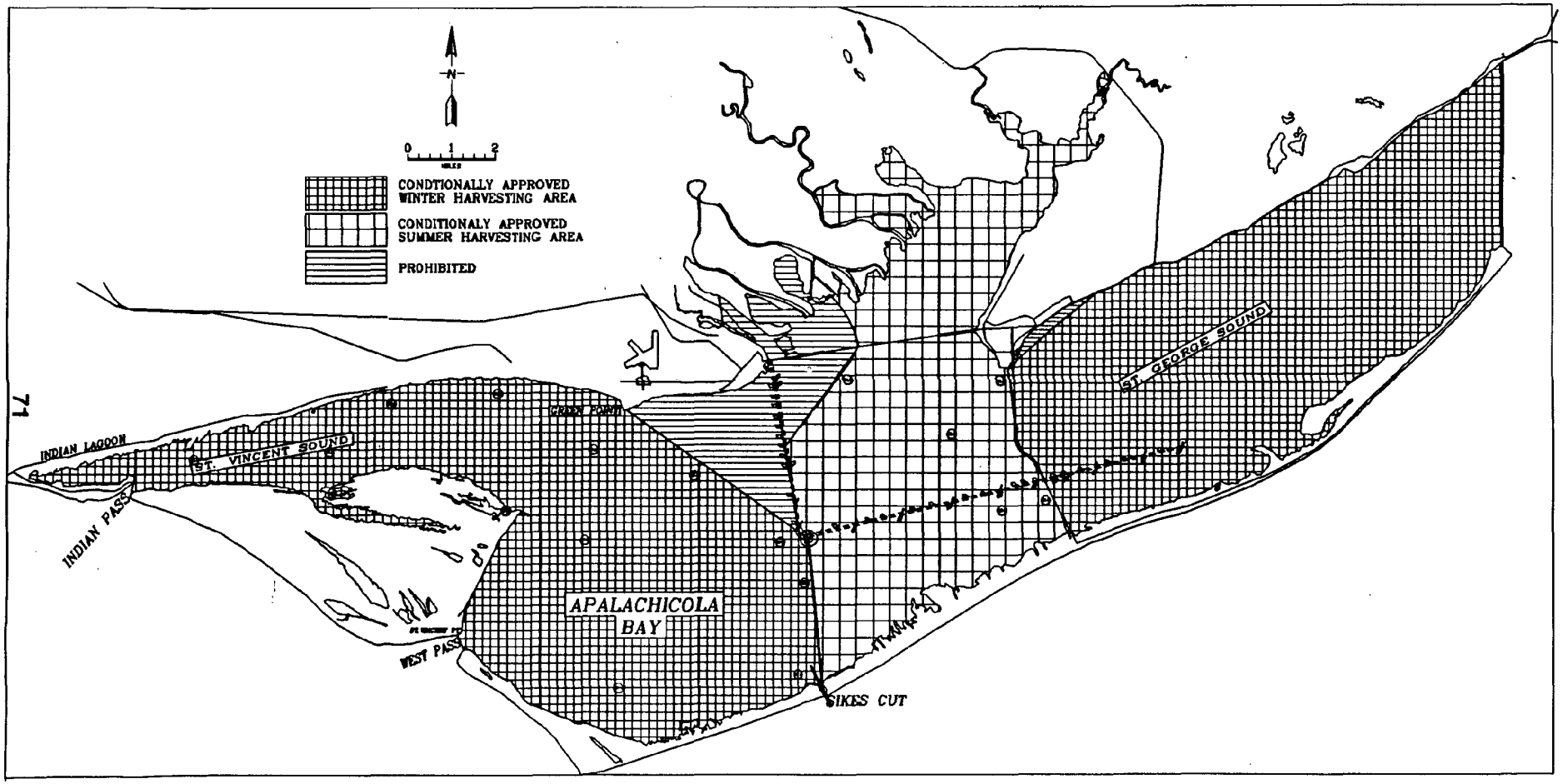
Historically, oysters have been harvested in Apalachicola Bay exclusively with tongs. However, the Florida Marine Fisheries Commission has drafted a rule allowing the limited use of oyster dredges on perpetual private lease bars which currently exist in St. Vincent Sound. This rule met with widespread local opposition, with oystermen being concerned that inadequate enforcement would lead to dredges being used on the public bars. Conditions intended to safeguard against the use of dredges outside the perpetual leases have been specified.

The Department of Natural Resources has tried to offset some of the pressure on the resource through oyster relaying, reef construction, and aquaculture. Through the relaying program, live oysters are moved from closed areas to locations which are approved or conditionally approved. Through the reef construction program, shell is placed on the bottom with the intent of creating new oyster bars. Because of rapid oyster growth in the bay, harvesting around the edges may begin at 18 months and a planted reef may be at full production within two years (Ingle and Dawson, 1952, 1953; Whitfield, 1973). When mature, these reefs can yield as much as 400 bushels per acre and it has been estimated that half of the bay's yield comes from DNR constructed or enhanced reefs (Whitfield and Beaumariage, 1977).

Through the Aquaculture Policy Act (Chapter 597, F.S.) the Department of Agriculture was made the lead agency in the state to promote and coordinate the development of aquaculture. Section 258.42 F.S. of the Florida Aquatic Preserves Act provides that aquaculture is presumed to be in the public interest, provided that aquaculture is limited to culture activities which are:

> a. on substrate, or do not extend beyond 6 inches above the substrate; and
>
> b. limited to those areas which will not destroy grassbeds, natural flow of waters, or other natural values which designation of the area as an aquatic preserve was intended to protect.

Figure 13



APALACHICOLA BAY SHELLFISH HARVESTING MAP

MAP REVISED MAY 16, 1990

FLORIDA DEPARTMENT OF NATURAL RESOURCES
SHELLFISH ENVIRONMENT ASSESSMENT SECTION

Chapter 18-21, F.A.C. further provides that aquaculture leases may only be granted for a maximum term of 10 years and that the maximum size of an oyster lease in Franklin County is one acre. The Department of Natural Resources also has adopted the following policies and special lease conditions to include in aquaculture lease contracts in Apalachicola Bay:

1. the source of brood stock must be Apalachicola Bay;

2. hatcheries must provide documentation showing that seed stocks are from native brood stock and that seed stocks are free from disease that may threaten endemic populations;

3. seed stocks must be certified free of disease that may threaten endemic populations by a recognized shellfish pathologist;

4. seed stock originating from hatcheries using waters from Apalachicola Bay do not require certification;

5. documentation must accompany each shipment of seed stock; and,

6. hatcheries, in-state and out-of-state, must be located in low risk areas where chance of contact with diseases that threaten endemic populations are minimal.

In 1989 an oyster aquaculture demonstration project was initiated in Franklin County. This project was conducted by the Harbor Branch Oceanographic Institute through a sub-contract and was intended to demonstrate methods of raising oysters in Apalachicola Bay. Some had hoped that through this program a network of small-scale aquaculture projects could be initiated in the Apalachicola estuary. This program, however, has experienced many difficulties, including a long standing disagreement by local fishermen to the concept of leasing of the public bottoms. This disagreement has its roots in the issue of perpetual leases and oyster dredging which were discussed above. As a result of this disagreement, in early 1990, the Franklin County Board of County Commissioners passed a resolution stating that:

1. No method of mechanical harvesting of oysters or other shellfish should be approved for use in Apalachicola Bay or any waters of Franklin County, Florida;

2. No leasehold interest should be granted by any authority over lands or waters being held as public trust property in Franklin County, Florida. The State of Florida should be granted permission after public hearings for the purpose of establishing some type of aquaculture research facility, to be owned and operated solely by the State.

Since Section 253.68, F.S. provides that the county has the final say on this manner, until this resolution is repealed the prospects for small-scale aquaculture programs in the county are currently small. Aquaculture can still be utilized on the perpetual private leases, but no new leases will be issued.

Shrimp represents the largest and most valuable fishery in the estuary in terms of dockside value. The value of annual dockside landings of shrimp from 1983-1985 exceeded $7 million. And, this figure understates the value of the estuary toward shrimp yields since many shrimp spend their juvenile stages in the bay, but are harvested elsewhere. In 1979, an estimated 150 in-county and 200 out-of-county shrimp boats worked the estuary (DNR, 1986). Many of the latter landed their catches elsewhere, therefore their catch is not reflected in Franklin County landings. It is also possible that shrimp caught elsewhere is landed here. There are two distinct fleets of boats which harvest shrimp from the estuary. One consists of larger boats which harvest shrimp in the gulf waters off the estuary. And the other of smaller boats which harvest shrimp within the estuary. State-wide landings are about half of what they were in the early 1950s, although the landings in the Apalachicola estuary have increased over this period.

Blue crabs and finfish landings are also an important harvest from the estuary, although they are dwarfed in volume by shrimp and oyster landings. As noted earlier, the estuary is an important spawning ground for blue crab in the eastern Gulf of Mexico. The value of blue crab landings for the estuary in 1985 was in excess of $500,000. Mullet is the major finfish harvested in the estuary with annual landings exceeding $200,000 in 1983 and 1984. As with shrimp, the value of the estuary to finfish landings is underestimated by Franklin County landing figures because of the role of the estuary as a nursery for many gulf species.

Several recent actions suggest that the concept of managing the commercial and recreational fisheries in the Apalachicola estuary is gaining acceptance. A conference on the Apalachicola oyster industry (Andree, 1983) concluded that a "functional long-range resource use plan is needed for oysters, as well as other marine resources in Apalachicola Bay". Since this conference, the Florida Marine Fisheries Commission has assumed the role of managing oysters. The Apalachicola Bay Area Protection Act required that Franklin County and the municipalities within it prepare, with assistance from concerned state agencies and other interested parties, a report on options to improve the fisheries for the bay, Section 380.0555 (11)(f), F.S.. This report was completed in November 1988 (Herbert, 1988). The project consisted of collecting data and information on the fisheries and an identification of and development of issues and options related to the fisheries. Major issues relating to fisheries which were noted in the report and which need to be discussed in the future include: water quality impacts from forestry operations; salinity impacts associated with Bob Sikes Cut; the allocation of water in the Apalachicola-Chattahoochee-Flint watershed; law enforcement; establishment of a salt water demarcation line; institution of a county-wide fishing

license; establishment of an independent center for fisheries information; the dredging of oysters on private leases; aquaculture; and the current shrimp count law.

The draft Franklin County Comprehensive Plan also contained a policy which stated that "Franklin County shall seek to establish an overall Apalachicola Bay management plan in conjunction with other local, regional, state, and federal agencies." Although no time frame for initiating this effort was provided or lead entity within the county designated, inclusion of this policy does suggest that there may be political support for the concept of comprehensive management of commercial and recreational fishing in the estuary. Care must be taken, however, to ensure that any efforts to manage the fishery from a comprehensive perspective do not cause additional burdens for the industry. It also must be recognized that management and protection of aquatic resources requires more than just managing the aquatic resources themselves. As discussed later in this chapter, shoreline uses and land use and water management activities within the entire drainage basin must also be considered.

In understanding the vulnerability of an economy based on a single industry, the county has recently explored options to expand their economic base. In early 1987, a conference was held to this end. Options discussed at the conference included better organization of the seafood industry; aquaculture; enhanced attraction of tourists; continued and expanded development of a historical district; and approaching economic diversification on a regional level (i.e., the whole river valley).

COMMERCIAL WATERBORNE NAVIGATION

Several navigation projects pass through, or are in close proximity to the aquatic preserve (Figure 14). These federal navigation channels are not included within the preserve boundaries. The Apalachicola-Chattahoochee-Flint (ACF) navigation project begins at the John Gorrie Bridge and extends up the Apalachicola River to Lake Seminole, and up the Chattahoochee River to Columbus, Georgia and up the Flint River to Bainbridge, Georgia. The project is authorized to have a 9x100 foot channel and the principle commodities shipped on the river include fertilizers, petroleum products, basic chemical products, and grains. Annual traffic on the river currently exceeds one million tons per year. Because the project is a spur channel off the Gulf Intracoastal Waterway (GIWW), and connects to the GIWW six miles north of the bridge, most of the traffic on the ACF project does not cross the aquatic preserve proper.

There are several federally authorized navigation projects which transverse Apalachicola Bay including the GIWW, Two Mile Channel, St. George Island Channel (Sikes Cut), Eastpoint Channel, and Scipio Creek Channel. The GIWW is

a 12 x 125 foot channel used for both waterborne commerce and as an access channel to the bay for a variety of commercial and recreational fishing interests. Principle commodities shipped on the GIWW across Apalachicola Bay include gasoline, phosphate rock, asphalt, tar and pitches, and sodium hydroxide.

Two Mile and Eastpoint Channels are used predominantly by oyster boats, smaller shrimp boats, and recreational craft. St. George Island Channel, or Sikes Cut, is used for access to the Gulf by larger shrimp boats and for recreational fishing. The Scipio Creek Channel is used as an access channel to a boat basin which is presently used as a mooring area for smaller shrimp boats that constitute the bay fishing fleet. Larger shrimp boats moor along the western edge of the access channel.

All of these channels require maintenance dredging to maintain their authorized dimensions. The ACF Waterway and the GIWW must be dredged annually. The other projects are dredged at varying intervals from once every two to three years at Two Mile, East-point and St. George Island Channels to once every 25 years for Scipio Creek. Disposal of material is done mostly at open-water sites in the estuary with over 1,150 acres of bay bottom designated as open-water disposal sites (Leitman et al., 1986). The navigation channels and disposal sites account for over one percent of the bay bottom.

The impacts of the Apalachicola-Chattahoochee-Flint (ACF) navigation project on the Apalachicola River and Bay system are discussed in Leitman et al., (1991). As noted earlier, flow of the Apalachicola River plays a major role in both contributing nutrients to the estuary and in defining the estuary's salinity regime. Therefore, any actions which influence the river's flow regime can significantly influence the estuary's ecosystems. Because of their limited storage capacity, the reservoirs on the ACF River system have had a limited effect on the hydrologic regime of Apalachicola River and Bay. As noted in the previous chapter, this issue has been evaluated by Maristany (1981), Leitman et al., (1983), Leitman et al., (1984), Alabama et al., (1984) and Raney et al., (1985), and all concluded that any effects the reservoir system has on flows are shadowed by variations in flow caused by climatic fluctuations.

Apalachicola Bay has been found to be one of the more rapidly in-filling estuaries on the Gulf coast (Isphording, 1985). This, however, cannot be attributed to dredging in the river since the material being dredged is predominantly sand which can only be carried limited distances from the disposal site, and the material in-filling the estuary is fine grained. In addition, this in-filling trend pre-dates major dredging on the system. Bedosky (1987) found long-term sedimentation rates in East Bay to be constant during the past 100 years, although Apalachicola Bay's clay mineral content was altered for a short period of time after construction of the dams. If anything, the reservoirs have reduced the rate of in-filling in the estuary through the trapping of material.

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$  5  049     NOAM %
$  6  245 00  Apalachicola Bay aquatic preserve management plan : 'b adopted
January 22, 1992 / 'c prepared by the Bureau of Submerged Lands and Preserves,
Division of State Lands. %
$  7  260     [Tallahassee] : 'b Dept. of Natural Resources, 'c [1992]. %
$  8  300     168 p. : 'b ill., charts, maps ; 'c 28 cm. %
$  9  504     Includes bibliographical references (p.145-157). %
$ 10  651  0  Apalachicola Bay (Fla.) %
$ 11  650  0  Bays 'z Florida. %
$ 12  650  0  Aquatic resources 'z Florida 'z Apalachicola Bay. %
$ 13  650  0  Marine parks and preserves 'z Florida 'z Apalachicola Bay 'x
Management. %
$ 14  710 1   Florida. 'b Bureau of Submerged Lands and Preserves. %
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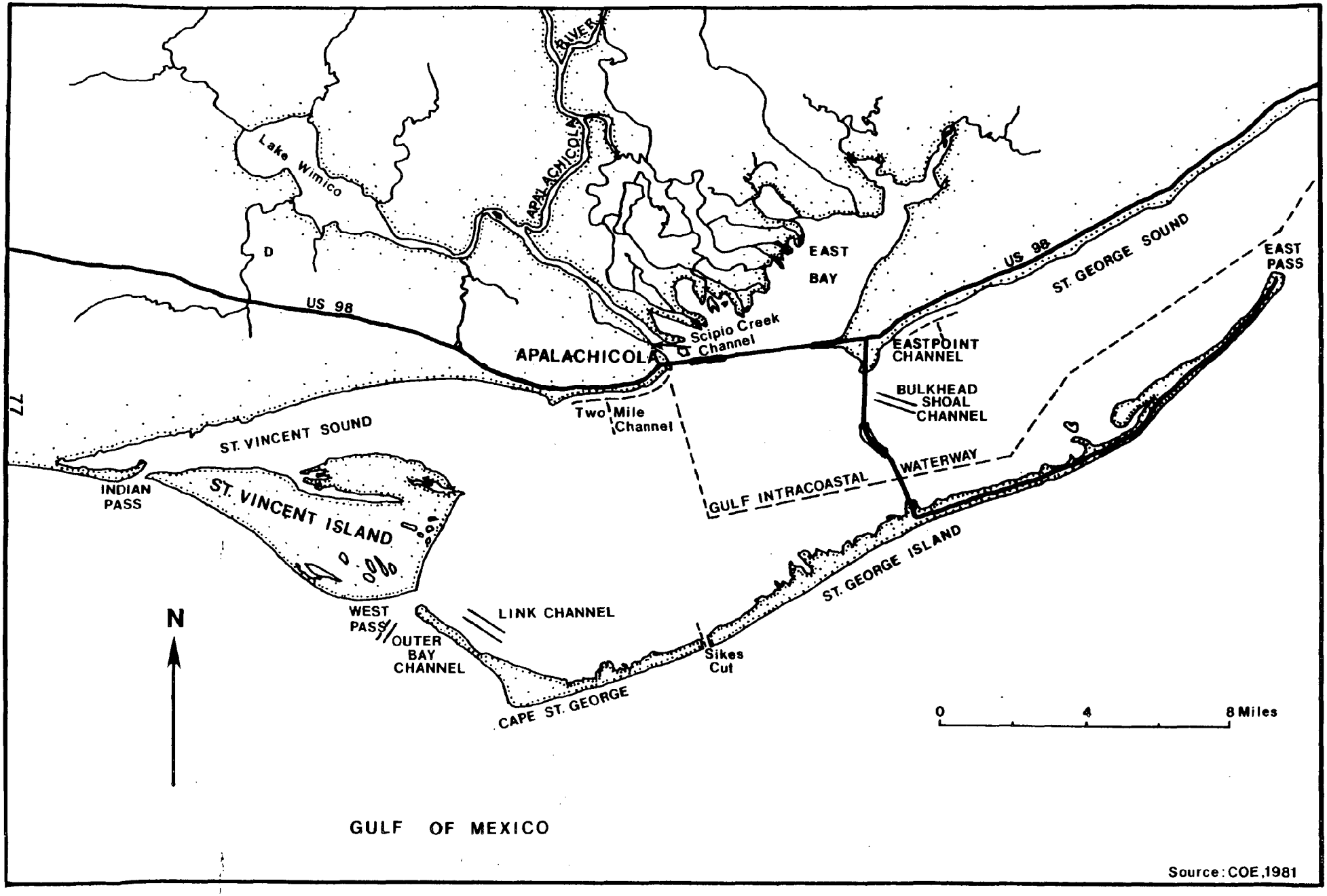
Figure 14

FEDERAL NAVIGATION CHANNELS WITHIN THE AQUATIC PRESERVE



Use of the Apalachicola River as a navigation project subjects Apalachicola Bay to potential impacts from the spilling of commodities. Commodities transported on the river which could have a deleterious impact if spilled include fertilizers, petroleum products and chemical products. In a typical year these can account for over 40% of the tonnage shipped on the river (over 500,000 tons). To date, there has not been any major spills on the Apalachicola River, but if traffic increases (as desired by navigation interests), the potential for accidents increases. In general, there are two types of impacts from spills: 1) short-term lethal effects from chemical components; and 2) sublethal effects occurring over time. Short-term effects may either be associated with chemical poisoning or smothering of plant and animal species unable to move from an area. Although an oil spill plan exists for the river (ARPC, 1984), no workable program for dealing with spills exists. The DER is currently working on developing a response plan for oil spills.

Leitman et al., (1986) evaluated existing navigation projects in Apalachicola Bay and the impacts of these projects on the estuarine ecosystem. They concluded that many of the studies evaluating environmental impacts of dredging and disposal in Apalachicola Bay are inadequate for determining the extent of ecological impacts. The institutional process for designing studies, assuring quality control, reviewing results, and integrating studies into operational programs has also been inadequate. Consequently, Leitman et al., (1986) recommended continued assessment of localized and system-wide impacts from maintenance dredging and disposal activities on the estuary.

By nature, estuaries are complex, dynamic systems which are not yet completely understood. Activities with gross impacts and/or impacts which manifest themselves over a short-term are more easily discernible. However, activities which have more subtle effects that may prove to have far reaching effects over time, such as a gradual shift of community structure are not so easily noticed. Because a specific impact has not been identified, or related to a specific activity, does not mean it is not occurring. As the discussion on Sikes Cut later in this section shows, if maintenance activities affect circulation patterns and/or salinity flux, the potential for subtle, widespread impact exists. On the other hand, if the effects are limited to burial of habitat or changes in water quality, the impacts may be more localized.

The most obvious physical impacts of dredge and disposal activities in the estuary are the relatively short-term increases in turbidity and suspended solids, and the long-term establishment of dredged channels and elevated disposal sites. Fluid mud flow and the continued resuspension of dredged material by wind generated waves and currents are less obvious and less studied impacts (Leitman et al., 1986). Turbidity plumes observed in Apalachicola Bay vary in size and persistence depending on factors such as density and grain-size of material being dredged, wind speed and direction, current speed and direction, tidal phase, and type of disposal pipe configuration. The degree of stratification of the water column also

influences the turbidity plume (COE, 1982). The largest turbidity plume measured in the estuary is 1.3 miles long (Schubel et al., 1978), and all studies of turbidity associated with dredging in the Apalachicola estuary found plumes to have much higher concentrations of suspended solids and turbidity near the bottom. The dimensions of the plume are also greater near the bottom. Secondary and tertiary resuspension of the dredged material by wind is more persistent and extensive than the initial plume (Leitman et al., 1986). The biota in dynamic systems which periodically experience natural increases in turbidity, such as Apalachicola Bay, are less affected by high turbidity than in systems which do not experience significant natural fluctuations in turbidity.

An assessment of fluid mud movement associated with dredging in Apalachicola Bay (USGS, 1984) suggest that material disposed in open-water sites spreads out in a layer up to one foot thick, and is then shifted around over time. The Corps depends on this migration of material off the sites to rejuvenate the site and extend its project life (COE, 1981; 1982). In Apalachicola Bay, the Eastpoint Channel is the most likely area to present fluid mud problems, not only because of the fine grained and polluted nature of disposal material there, but also because of its proximity to the productive oyster bars at Cat Point.

Dredge and disposal activities have impacted the chemical constituents in the water column and sediment layers of Apalachicola Bay. Because the water column and sediment layers of the estuary are in a relatively unpolluted state, they have not caused serious impacts (Leitman et al., 1986). Livingston (1984a) noted that the dredged channels of the GIWW, Two Mile, and Eastpoint Channels are depositories of silt-laden sediment contaminated with heavy metals. Dredging and disposal activities distribute these polluted sediments into the estuary at large. The DER and Corps have agreed that the next time the Eastpoint Channel is dredged the associated impacts will be monitored, especially as they relate to nearby oyster bars.

The most noticeable biological impact from dredging and disposal activities is the disruption of the benthic habitat and biologic communities which utilize the channel, and the burial of benthos during disposal. Because the area being dredged and disposed on is less than 1% of the estuary and some degree of recovery occurs, these impacts are not believed to be significant from a system-wide perspective (WAR, 1975; Taylor, 1979; COE, 1981; COE, 1982). However, because of the movement of material off site in the form of fluid mud, the total area affected and the rate of recovery of these areas is not completely understood (Leitman et al., 1986). No macro-invertebrate samples have been collected on or around disposal sites close to the time of dredging. WAR (1975) and Livingston (1984a) have investigated the impact of dredging on benthic macro-invertebrates in the estuary and were unable to define any impacts due to dredging and disposal. However, against the background of such high variability and within the studies' design and scope restraints, only catastrophic impacts would likely have been documented.

To minimize potential impacts to estuarine biota, the Corps has agreed to only dredge between December 1 and March 31.

Changes in hydrology of the bay due to the creation of channels and disposal mounds could affect the ecology of the bay. The Corps has developed a hydrodynamic model to assess circulation impacts from current disposal practices (Raney et al., 1985), although serious problems with this model have been noted (Weisberg, 1987; Rodriguez, 1988; Weisberg 1989). Perhaps the most significant impact of navigation channels on the estuary is associated with the construction and development of Sikes Cut. The channel was constructed in 1957 to shorten access for the Gulf shrimp fleet to Apalachicola. Considerable controversy has surrounded the question of whether the cut has influenced the estuarine ecosystem. Many local oystermen have expressed a belief that freshwater is shunted out of the bay through the cut causing the bay to become more saline and oysters are impacted by predators.

The bar that is believed to have been most damaged is St. Vincent Bar. Swift (1898) reported dense growth of oyster on the bar in 1895-1896. However, Danglade (1917) noted that the bar was showing signs of depletion and had been closed by the State to recover. During the investigations of Pearse and Wharton (1938), there was an indication that the bar was still productive, but Ingle and Dawson (1953) found no oyster production on the bar. Menzel et al., (1958) studied the causes of oyster depletion in the bar and found abundant spatfall, but high oyster mortality there. They concluded that predation, especially by drills and stone crabs, was the primary cause of mortality. Establishment of predators on the bar was believed to be due to four or five years of low rainfall. They predicted that with increased rainfall the reef could recover. However, since the cut was constructed the reef has not recovered (Miley, pers. comm.).

Two recent studies (Mehta and Zeh, 1980; Imsand, 1986) evaluated the distribution of tidal influences from Sikes Cut on Apalachicola Bay to determine whether the cut caused the degradation of oyster reefs, and concluded that the influence of inlet flow on the bay is localized and that the Cut's impact on the oyster reefs is minimal. Several problems have been identified with these studies (Leitman et al., 1985; Leitman, 1989), most notably that the authors considered only the impacts of a single tidal cycle, inappropriately discounting any incremental effects that would take more time to become evident.

The Corps continues to maintain that the model prepared for them does a good job of estimating salinity levels in the Bay, while State representatives are reluctant to assess the salinity impacts of the Sikes Cut channel with a model that they do not believe does an adequate job of representing salinity levels. Consequently, this study effort has been stopped before it was completed. The Northwest Florida Water Management District, however, through the Surface Water Improvement and

Management (SWIM) program is initiating an effort to prepare a three-dimensional model of Apalachicola Bay. This model should prove capable of assessing the salinity impacts of the Sikes Cut channel.

ADJACENT LAND USES

The Apalachicola Bay Aquatic Preserve is in Franklin County, Florida, about 90 miles southwest of Tallahassee and 65 miles southeast of Panama City. The population of Franklin County in 1987 was estimated to be 8,538, with 2,627 people living in Apalachicola. The combined population of the three counties adjacent to Franklin County (Gulf, Liberty, and Wakulla Counties) in 1987 was less than 30,000 (BEBR, 1988). In combination, the four counties have a population density of less than 12.5 people/square mile.

With a few notable exceptions (i.e., cities of Apalachicola and Eastpoint, part of St. George Island, and the coastal strand between Eastpoint and Carrabelle) the major land uses in the Apalachicola Bay area are forestry and federally or state owned conservation areas. About 93% of Franklin County is in forestry, owned for conservation purposes, or is submerged under rivers, streams, or lakes (FCPD, 1989). In recent years considerable acreage has been purchased in close proximity to the estuary (see Figure 4, page 11). The majority of recent acquisitions have been for environmental rather than recreational reasons and were intended to protect the estuary from impacts associated with habitat alteration.

St. Vincent Island was a privately owned game preserve until 1968, at which time it was acquired by the U.S. Fish and Wildlife Service, for inclusion in the National Wildlife Refuge System. Land use on the island is limited to outdoor recreation asthe 12,358 acre island's primary purpose is to serve as a wildlife refuge.

East of St. Vincent Island is Cape St. George and St. George Islands. Cape St. George is part of the Apalachicola National Estuarine Research Reserve and is managed as a preserve. The privately owned western end of St. George Island is being developed into a residential community which was planned under the guidance of the Development of Regional Impact (DRI) program. The central portion of the island is also in private ownership, but is zoned at one unit per quarter acre. There are currently about 700 dwelling units on the island, many of which support only weekend residents. The Department of Community Affairs estimates that over 4,000 units are foreseeable when the island is fully developed (DCA, 1986). On eastern end of St. George Island, 1883 acres are incorporated into Dr. J.G. Bruce/St. George Island State Park. Another 75 acres on the island is owned by the state and called "Unit 4". This tract has no designated management lease and is not managed. The state has also bought 17 acres contiguous with the west end of the St. George Island State Park.

In addition, the state is pursuing acquisition of several other tracts of land on St. George Island. Four tracts on St. George Island were included high on the most recently approved list for acquisition under the Conservation and Recreation Lands (CARL) program. These are: 1) Nick's Hole, a small natural embayment encompassing less than 30 acres on the western portion of St. George Island; 2) East Hole, a 25.5 acre site located on the bay side about 1000 feet east of the causeway; 3) Shell Point bay front tract, a 188 acre bay front tract located east of the causeway; and 4) Sikes Cut, a 37 acre tract adjacent to the cut on the bay front. Of these, Nick's Hole is the most important since it is the most significant drainage area for St. George Island and an important nursery area.

For more than a decade, it has been recognized that development of St. George Island could have a deleterious impact on Apalachicola estuary (Livingston et al., 1975). The narrowness of the island presents various problems with respect to intensified development including little room for sewage effluent treatment by individual septic systems.

In 1977 the Franklin County Commission approved the St. George Island Plantation DRI in accordance with Chapter 380, Florida Statutes. The project contains 1200 acres in two discrete areas and consists of variety of uses including single family, multiple family, a beach club, commercial district, and marina. Two of the commercial areas are located on the western portion of the island near Sikes Cut and Nick's Hole, and the third is near the park on the east end.

Across from St. Vincent Island, along the coast for approximately 18 miles west of Apalachicola the major land use is forestry. This area is sparsely developed. Apalachicola consists mostly of residential development, fringed by commercial fishing houses, light industry, and residential uses.

The major land use surrounding East Bay is forestry and conservation. In conjunction with establishing the Apalachicola National Estuarine Research Reserve, 4,744 acres were purchased through the CARL program. The community of Eastpoint consists of mostly single family homes and mobile homes/trailers. Along Highway 98 within and just outside Eastpoint is a large area used for single family home, light industry and commercial fishing. The Eastpoint area is also beginning to be developed for small, light commercial ventures not related to fishing. An additional 115 acres on Cat Point was recently purchased through the CARL program. This acquisition was important since Cat Point lies within 100 yards of the most productive oyster bars in the bay. From Eastpoint to Carrabelle, along the coast are single family homes owned by small land owners.

In the future it appears that the Apalachicola area will develop into residential/historic district; the Eastpoint area into a service oriented, light commercial area; and St. George Island as the tourist oriented area. Figures 15 and 16 provide future land use maps for Franklin County and the city of Apalachicola.

Disposal of sewage effluent in the vicinity of Apalachicola Bay has long been a problem because elevated coliform counts mandate closure of the bay's oyster beds. In late 1979 and early 1980 a considerable amount of publicity and regulatory action made this issue important to local interests because ten cases of infectious hepatitis in Georgia and Alabama were linked to the consumption of oysters from Apalachicola Bay. Then in the spring of 1980 the bay was repeatedly closed for oyster harvest because of high river levels and a 1984 sewage spill closed down the oyster industry for prolonged periods. Because of the potential problem of shellfish contamination, standards of the U.S. Food and Drug Administration mandate that estuarine shellfish harvesting be suspended when fecal coliform counts reach a median MPN (most probable number) of coliform bacteria of 14 per 100 milliliter. Closing of the bay is triggered by river stage, and the specific stages for the Apalachicola Bay are based on the results of Furfari (1975). Although this study did not consider the source of the coliform, local sewage treatment facilities and septic tanks were considered to be a prime source (ARPC, 1979). Other possible sources included animal fecal matter from the floodplain and fecal matter from other upstream sources.

As noted above, a primary suspect in high fecal counts in Apalachicola Bay are local sewage treatment plants and septic tanks, storm water runoff, infiltration, and bad sewage lines. There are presently nine centralized sewage systems in Franklin County. Five of these systems are privately owned and operated, one is located at the state park on St. George Island, and the remaining three are municipal systems located at Apalachicola, Carrabelle, and Eastpoint. Two of these municipal systems, the ones at Apalachicola and Eastpoint, are located in close proximity to the Apalachicola Bay aquatic preserve. A new sewage treatment facility was placed into operation in Apalachicola in 1985. Effluents which previously discharged almost directly into the bay were rerouted away from the bay through a titi swamp which discharges into the Jackson River instead of Scipio Creek. This more circuitous route was intended to provide a buffer for the bay in the event of plant failure. Unfortunately, this plant is presently operating without a valid DER operating permit. The City is under enforcement action by both the DER and the U.S. Environmental Protection Agency. Excessive infiltration and inflow entering the wastewater collection system hydraulically overload the plant. The wastewater is therefore diluted to the extent that the plant cannot achieve the percentage reduction of total suspended solids required by the federal discharge permit.

The Eastpoint Wastewater Treatment Plant, which treats only domestic wastes, began operating in 1975. Due to provisions in the Apalachicola Bay Protection Act and the subsequent collection system expansion, the facility will be treating industrial/commercial wastewater in the near future. The majority of this will be generated by the oyster industry. The plant is currently operating under a Notice of Violation and an Order for Corrective Action. The specific violations addressed in the order, have been or are being addressed and the system is to be expanded in the near future (FCPD, 1989).

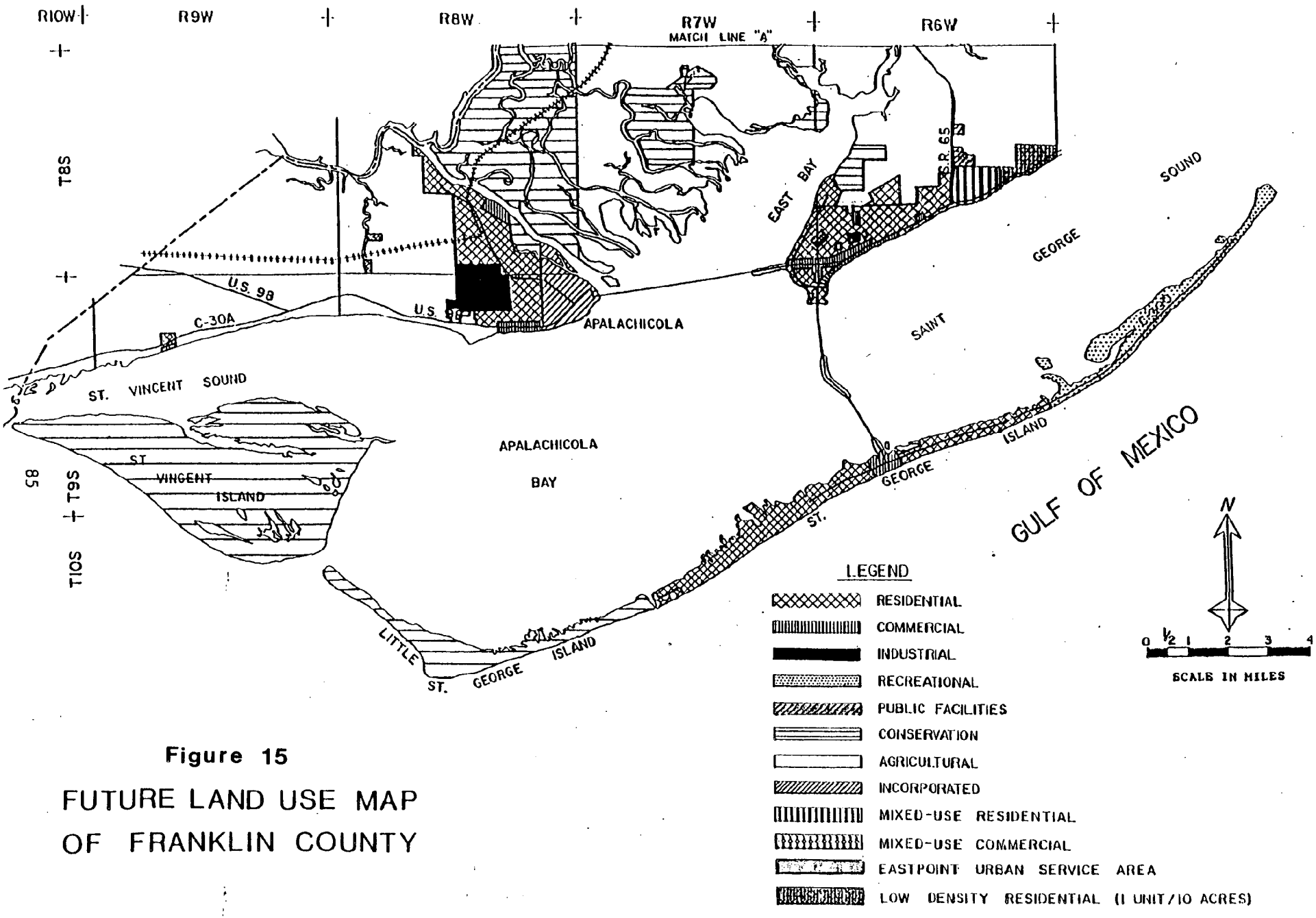


Figure 15

FUTURE LAND USE MAP
OF FRANKLIN COUNTY

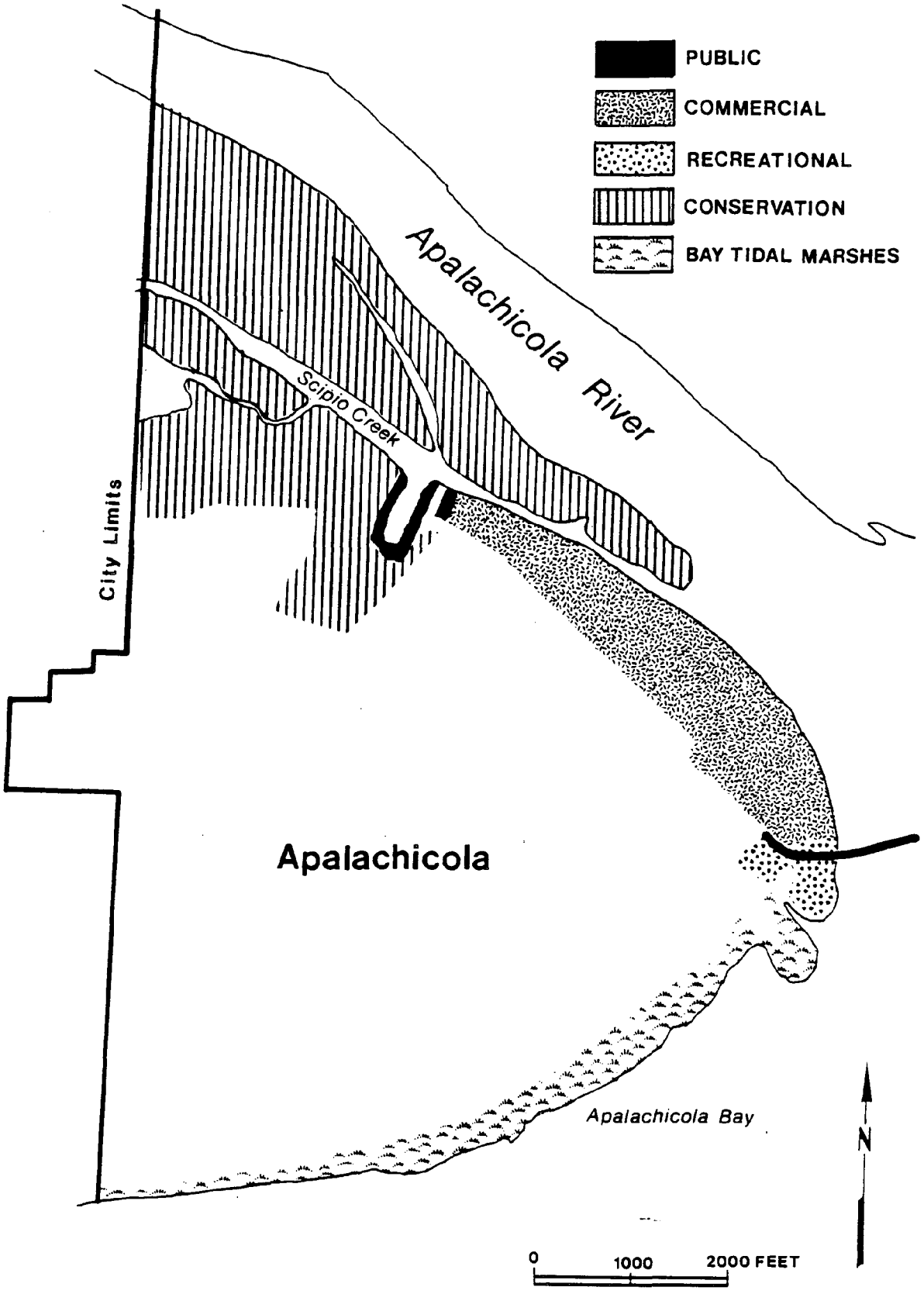


Figure 16 Future Land Use Map for the city of Apalachicola.

Septic tank systems are still widely used in Franklin County and evidence of septic tanks discharging either directly or indirectly into Apalachicola Bay exists (ARPC, 1979; Howell, 1980; EPA, 1981; Porter, 1985; DCA, 1986). About three-fourths of the septic tanks on St. George Island are located on soils that are either rated by the U.S. Soil Conservation Service as having severe limitations for septic tank use, or are in soils upon which the state limits development (DCA, 1986). Many of the existing systems in the county are either inadequately constructed or maintained (ARPC, 1979). DNR (1986a) noted that during periods of high water table, waterborne contaminants are not only likely to travel from septic system drainfields to the bay, but will experience little dilution and may arrive in the bay in significant concentrations.

In April, 1988 the Florida Department of Health and Rehabilitative Services reported on a survey of all septic tank systems in the Apalachicola Bay area to assess their suitability as onsite sewage treatment systems (FDHRS, 1988). Of the 751 systems surveyed west of the Apalachicola River, 292 were rated unsatisfactory. Of the 211 systems in Eastpoint, 61 were rated unsatisfactory. And, of 612 systems on St. George Island, 170 were rated unsatisfactory. The survey concluded that the number of illegal, failed, or otherwise non-compliant systems poses an unacceptable risk to Apalachicola Bay. The survey report also stated it would be cost-effective to extend central sewage treatment systems when possible to areas experiencing widespread problems than trying to correct each system individually.

The Department of Environmental Regulation's 1988 Water Quality Assessment Report (Hand et al., 1988) listed water quality problems at three monitoring stations in the Apalachicola estuary as fair, with water quality problems being attributed to poorly flushed canal systems and failing septic tanks. Untreated stormwater runoff from the City of Apalachicola and nearby fishhouses were also believed to have contributed to water quality problems. The Franklin County Fishery Option Report (Herbert, 1988) further notes that commercial crabbers, fishermen, and guides who work in the East Bay/East River area have recently reported that there are water quality problems associated with forestry activities in Tate's Hell Swamp. Forestry activities in Tate's Hell Swamp have been previously associated with local changes in water quality and short-term adverse effects on aquatic biological associations (Livingston, 1978).

There currently is a new marina being proposed for construction on St. George Island at Sikes Cut and the upgrading of an existing marina is also being proposed. The two existing marinas in Apalachicola have recently been upgraded. Construction and operation of marinas can lead to water quality problems in adjacent waters. Types of pollution commonly associated with marinas include toxic chemicals (contained in some marine paints), petroleum discharges, heavy metals, and bacterial contamination. As a result of public health, water quality and resource concerns, the DNR has established the following policy regarding marinas and shellfish waters; "In accordance with provisions of the Interstate Shellfish

Sanitation Program and Food and Drug Administration policy, the possibility of chance contamination of shellfish in the immediate vicinity would require a reclassification of that area within the marina proper to prohibited for the harvesting of shellfish. Additional prohibited areas beyond the marina limits may be required as well, depending on such factors as marina design and quality, marina usage, and hydrography". In determining the extent of additional area which should be closed, the DNR is forced to base this area on a worst case situation because of public health considerations.

A small marina on the west side of the John Gorrie Bridge on St. George Island experiences water quality problems which will probably persist until improved flushing and waste removal facilities are provided. Other boat mooring areas which experience water quality problems because of inadequate flushing and facilities include the channel behind the Eastpoint Breakwater and the Sportsman's Lodge in Eastpoint (Livingston, 1988).

As noted in Chapter III, Clark (1989) several areas on the Gulf shoreline of Apalachicola Bay to be eroding. The erosion in all of these areas is considered non-critical because many of these sites are on land owned by the public, and because on the private areas existing regulatory controls are considered adequate to protect the shore (DNR, 1990). DNR (1990) does note that since shoreline recession appears to have accelerated in recent years in this area, close attention needs to be given to the strategic siting of structures here. With the exception of St. George Island State Park where sand fencing efforts to encourage dune growth were conducted in the late 1970s and early 1980s, there has been no major structural efforts to curb shoreline erosion problems.

Since the 1985 hurricanes caused extensive erosion on the bay-shore of St. George Island, there has been a trend toward constructing seawalls to protect the shoreline. Construction activities which do not take into account the basic physics of beach dynamics tend to create problems which require further construction or continual maintenance (USEPA, 1976). Building a seawall is drastic measure which according to Pilkey et al., (1984) can over the long-term harm the shoreline.

As noted in Chapter II, aquatic preserve management plans provide management guidance for state sovereignty submerged lands which are beyond the jurisdiction of the Local Government Comprehensive Planning Act. Therefore, if coordinated properly the management plan for an aquatic preserve can serve as the waterward extension of local government comprehensive plan. Franklin County's and Apalachicola's plans were approved by the state in 1991 and 1990 respectively. Both these plans are required to be consistent with both the State Comprehensive Plan and the Regional Comprehensive Plan prepared by the Apalachee Regional Planning Council. The State and Regional Plans both contained extensive set of policies relating to the protection of the aquatic resources of the Apalachicola estuary.

BASINWIDE MANAGEMENT

The high productivity of the Apalachicola estuary is a result of the overall good quality of water in the bay, the physical form of the bay, the salinity regime in the estuary as defined by the flow of the river, and nutrient and detrital transport from the river's floodplain (Livingston, 1984). Consequently, the use and management of the Apalachicola-Chattahoochee-Flint (ACF) river basin can significantly impact the resources of the aquatic preserve. In general, the Apalachicola River has very good water quality (Hand et al., 1988) and therefore it appears that pollution from up basin sources are not deleteriously impacting the water quality in the Apalachicola estuary.

As noted earlier, flow from the Apalachicola River has a profound influence on both the estuary's salinity regime and nutrient input cycle. Salinity is considered to be the single most important determination of the distribution of organisms in the estuary (Livingston, 1983) and nutrients transported from the Apalachicola River floodplain are integral to the ecological functioning of the estuary since detritivores occupy key positions in the bay's food web (Livingston, 1983). In a typical year flow in the Apalachicola River ranges from below 10,000 cubic feet per second (cfs) to above 80,000 cfs. Upstream rainfall has a much greater influence on Apalachicola River flows than Florida rainfall because the majority of the basin is in Georgia and Alabama (Meeter et al., 1979; Leitman et al., 1983).

The state of Georgia recently proposed to re-allocate a significant portion of the active storage pool at Lake Lanier from hydropower to water supply (COE, 1989). This proposal met with significant opposition from both property owners at Lake Lanier and downstream water users. Opposition was based on the lack of time to thoroughly review the documents, doubts as to whether a proper assessment of the environmental and economic impacts downstream had been accomplished, potential consumptive water losses, continued water quality problems at West Point reservoir, and potential impacts on the environ-mental resources of Apalachicola River and Bay. Lake Lanier recreational interests were also strongly opposed to the proposal because it would lead to lower lake levels.

Ultimately, a lawsuit based on failure to meet the requirements of the National Environmental Policy Act was filed by the State of Alabama and the State of Florida filed a motion to intervene into the suit in support of Alabama. Instead of resolving the dispute in court, however, a stay was filed and the three states and the Corps of Engineers are presently attempting to negotiate a settlement to the dispute. A key aspect of Florida's demands in this settlement is that the water resources of the ACF basin be managed from a basin-wide perspective.

Because of the quantity of water withdrawn for irrigation, and since irrigation withdrawals tend to be highest when flow is the lowest, irrigation has the potential to significantly affect low-flow levels in the Apalachicola River. Hayes et al., (1983)

found that increased pumping for irrigation in the Dougherty Plain (including the Flint River and Lake Seminole) would reduce the base flow of streams. This issue is currently under closer review by the USGS.

Because of the relationship between flow in the basin and the ecology of the estuary it is important that the basin be managed from a system-wide perspective for all uses, including water supply to the estuary. The first effort to manage the basin as a system was proposed by the Northwest Florida Water Management District in 1977 (NWFWMD, 1977), but it received no support. In 1979, when the Apalachicola estuary was declared a National Estuarine Sanctuary conditions which required basin-wide management of water resources were connected to the release of federal funds. Florida, Georgia, Alabama, and the Corps of Engineers were to pursue a Level B, or basin-wide, study of the water resources in the basin. In 1981, the U.S. Water Resources Council (WRC) gave highest priority to this proposal among "new starts". This ranking quickly became worthless with the abolishment of the WRC by the Reagan Administration.

Interest in system-wide management of the basin was revived in 1982 by DER in reaction to a proposal to remove rock shoals from the upper Apalachicola River. After considerable negotiations, threats of litigation and the Corps considering to invoke Section 404(t) of the Clean Water Act to override state decisions, an interstate Memorandum of Understanding was signed in 1983 by the three states to assess the water use in the basin, to develop a basin-wide drought management plan, and to develop a water management strategy for the system. In 1984 the interim water assessment for the basin was completed (Alabama et al., 1984), and in 1985 the interim drought management plan for the basin was completed (COE, 1985a). A plan of study for developing the long-term water management strategy was prepared in 1987 (COE, 1987). As part of the preparation of the water management strategy, an effort was to be made to define the freshwater needs of the Apalachicola estuary. Inclusion of this study component was significant because it acknowledged that along with upstream uses such as navigation, hydropower, and water supply, the estuary was a user of freshwater.

Unfortunately, this study effort has not resulted in a basin-wide water management strategy. A recent assessment of the progress of this effort (Leitman et al., 1989) concluded that the outlook for system-wide management of water resources in the ACF basin was bleak unless the present course of actions is altered. With the widespread outcry to the recent proposal to re-allocate water in storage at Lake Lanier and the subsequent lawsuit, it is still conceivable that basin-wide strategy may be prepared.

CHAPTER V

SITE SPECIFIC MANAGEMENT ISSUES

In the preceding Chapter, uses of the Apalachicola Bay Aquatic Preserve area and impacts associated with these uses were reviewed. Usage was reviewed relative to four general categories: commercial and recreation harvesting of marine resources; commercial navigation; adjacent land uses and their attendant facilities (e.g., docks, marinas, etc.); and, management of the river basin. In this Chapter the relationship between these uses and their associated impacts and the jurisdiction of the Aquatic Preserve Program is reviewed.

The major issues identified in Chapter IV relating to commercial and/or recreational fishing which also relate to the use of state-owned sovereignty submerged bottoms were aquaculture, private leases, and, oyster relaying and reef construction. Although the issues of oyster aquaculture and leasing are within the jurisdiction of the Aquatic Preserve Program, they also fall within the jurisdiction of other programs within the Department of Natural Resources and are being handled through these programs. The issue of the private leases has been dealt with both by the Governor and Cabinet sitting as the Board of Trustees of the Internal Improvement Trust Fund and through the courts. Therefore, the issue will not be dealt with any further through this plan. Activities related to the relaying of oyster shells and the construction of oyster bars fall under the preview of the Department of Natural Resource's Shellfish Environmental Assessment Section which has staff, expertise, funding, and authority relating to this issue. Therefore, there is no need for the Aquatic Preserve Program to be involved with this issue.

All of the problems associated with the maintenance of commercial navigation channels are associated with federally maintained navigation channels and therefore, by statute are exempt from the jurisdiction of the Aquatic Preserve Program.

With regard to past problems associated with adjacent land-uses, many of these have been addressed through Franklin County having been designated as an area of critical state concern, the adoption of land use ordinances by Franklin County, and through the county's and city of Apalachicola's recently adopted local government comprehensive plans. The major land use issues relating to the management of the Apalachicola Bay Aquatic Preserve deal with the construction of shoreline protection structures and the demand for single-family docks along the bay.

The issue of shoreline protection structures can be handled through the aquatic preserve program if the structure is built within the boundaries of the aquatic preserve (i.e., below mean high-water). If a landowner on an eroding shoreline,

however, chooses to build a shoreline stabilization structure above the mean-high water line, the structure falls outside the jurisdiction of the aquatic preserve program. Even though, this structure will ultimately lie below mean-high water and effect the adjacent shoreline.

The issue of shoreline structures has been reviewed by the Shoreline Stabilization Subcommittee of the Technical Advisory Committee to the NWFWMD's Surface Water Improvement and Management program. This subcommittee concluded that the cumulative effects and continued construction of shoreline structures poses a serious threat to the environmental integrity of surface waters. Therefore, this Subcommittee recommended that:

1. In areas where shoreline stabilization structures are allowed, compliance with prescribed design and construction standards could be better accomplished by better coordination between state and local permitting programs. Specific recommendation included a better defining of conditions in which variances are granted, prohibiting backfilling behind shoreline structures, and conducting public information and demonstration programs;

2. Strict penalties should be attached to violations to provide incentives to follow permitting standards;

3. Critical zones which would limit or prohibit shoreline stabilization should be established along undeveloped shorelines and exemptions and variances should be eliminated within these critical zones; and,

4. Government land purchases and tax incentive programs should be implemented to discourage the construction of shoreline protection structures;

Steps should be taken through the aquatic preserve program to follow through on these recommendations.

With regard to the management of the water resources of the Apalachicola-Chattahoochee-Flint River basin from a system-wide perspective, there is no authority within the program to assure that adequate water is provided to maintain the ecological integrity of the estuary.

In considering the aquatic preserve program's involvement in site specific management issue at Apalachicola Bay, it must also be remembered that another arm of DNR, the Apalachicola National Estuarine Research Reserve, has both a strong and active presence in the estuary and has a mission which is similar to that of the aquatic preserve programs. Therefore, any management initiatives taken through the aquatic preserve program should either be closely coordinated or conducted in conjunction with the research reserve.

MANAGEMENT INITIATIVES

This section of the management plan contains a management initiative to address the management issue identified above which falls within the jurisdiction of the Aquatic Preserve Program. Adoption of this initiative will provide additional guidance not addressed directly by statute or rule, for handling this issue. The specific management initiative is:

1. Promote the prevention of erosion on the shoreline of St. George Island by stipulating that in the permit-review process native wetland vegetation (emergent and submergent) be used for shoreline stabilization either alone or in conjunction with riprap.

CHAPTER VI

MANAGEMENT AREAS

INTRODUCTION

This chapter divides the aquatic preserve into separate management areas where general or special rule criteria and allowable uses are defined for each area. The management areas are classified and delineated based on the types and locations of existing and planned uses of the adjacent uplands, as well as on the types, occurrence and characteristics of the resources (natural and historical) on submerged lands. The various management areas delineated may be classified similarly or differently as these factors vary along the preserve.

The purpose of this chapter is threefold: 1) to provide a better understanding for property owners and the general public of the applicable rule criteria and typical kinds of uses allowed on the state-owned submerged lands within the aquatic preserve, 2) to provide local planners with a guide for land use decisions, and 3) to provide the staff of the Bureau of Submerged Lands and Preserves, and other agencies with a continuity of direction in regards to the management of aquatic preserves. In summary, the intent of this chapter is to both afford habitat protection and clearly delineate allowable public and private uses of the aquatic preserve.

Prior to providing the criteria for specific resource management areas, it is important that the intent, jurisdiction, and limitations of Florida's Aquatic Preserve Program be reiterated. Section 258.36, F.S., states that "it is the intent of the Legislature that state-owned submerged lands in areas which have exceptional biological, aesthetic, and scientific value... be set aside forever as aquatic preserves or sanctuaries for the benefit of future generations." The program has jurisdiction over the use of state sovereignty submerged lands within the boundaries of a given preserve. Activities which are not within the boundaries of the aquatic preserve (i.e., adjacent upland land uses) or which do not directly affect the sovereignty submerged bottom (i.e., regulation of commercial fishing or water quality) are not within the jurisdiction of the Aquatic Preserve Program.

There are a number of differences between the rules governing uses of state-owned sovereignty submerged lands within an aquatic preserve relative to those not within an aquatic preserve. The principle difference is that submerged lands within an aquatic preserve must be managed with the intent of protecting them for future generations. Consequently, any proposed use must be shown to be in the public interest before it can be authorized, and an applicant must demonstrate that no other alternative exists which would allow the proposed activity to be constructed or undertaken outside the boundaries of the aquatic preserve.

MANAGEMENT AREA CLASSIFICATIONS

A key component of the management program for an aquatic preserve is the division of the preserve into management areas. The classification of management areas in an aquatic preserve is based upon both the resource value of submerged bottoms within the preserve, and the existing or anticipated future land use on the adjacent uplands as designated in the local government comprehensive plan(s). As in the delineation of upland land uses through zoning, the intention of delineating a preserve into management areas is to guide development activities on the state-owned submerged lands to areas where it is more appropriate, and to provide standards to allow development actions to be compatible with resource conservation goals.

The designated land use is incorporated into the classification of management areas because use of the adjacent uplands has a direct bearing on the intensity of demand for uses of state-owned submerged bottoms. The Aquatic Preserve Program has no jurisdiction over the designated use of the adjacent uplands. The incorporation of the designated land use into the management area classification is primarily an acknowledgement of how local government has chosen to have a certain area developed; however, this upland designation also serves as a tool in designating compatible uses of the submerged bottoms in accordance with the upland uses. A change in designation by the local government, will not necessarily result in a change in the management area classification. Specific land use categories to be incorporated in the classification of management areas include:

Agriculture (AG): This category represents state-owned sovereignty submerged bottoms adjacent to land designated on an approved Future Land Use Map for a county and/or municipality as agriculture. It is intended to accommodate private areas with sparse populations used primarily for agricultural and/or forestry purposes.

Single-Family (SF): This category represents state-owned sovereignty submerged bottoms adjacent to land designated on an approved Future Land Use Map for a county and/or municipality as single-family residential. It is intended to include areas using the adjacent portion of the aquatic preserve solely for private, recreational activities.

Multi-Family (MF): This category represents state-owned sovereignty submerged bottoms adjacent to land designated on an approved Future Land Use Map for a county and/or municipality as multi-family residential. It is intended to include areas where more than one private residence are using the adjacent portion of the aquatic preserve solely for private, recreational activities. The associated residences include townhouses, trailer parks, condominiums, apartments, and any other group of multi-family dwellings. They may also include a group of single-family property owners,

as in the case of a homeowners association, that desires to construct any of the above-mentioned structures for the mutual benefit of the group.

Public Recreation (PR): This category represents state-owned sovereignty submerged bottoms adjacent to land designated on an approved Future Land Use Map for a county and/or municipality as public usage or preservation and which is utilized for the purposes of public recreation. It is intended to include areas where structures are used by the general public at no charge, and in federal, state, county, or municipal parks that charge a nominal fee. Military structures, while not always open to the public, are considered in this category since the military serves the public.

Preservation (P): This category represents state-owned sovereignty submerged bottoms adjacent to land designated on an approved Future Land Use Map of a county and/or municipality as preservation. The land may either be in public or private hands.

Commercial-Industrial (CI): This category represents state-owned sovereignty submerged bottoms adjacent to land designated on an approved Future Land Use Map for a county and/or municipality as commercial or industrial. The category is also intended to incorporate uses associated with structures that charge fees or generate revenue. Examples of commercial uses includes private marinas that charge fees; yacht clubs that charge membership fees; private businesses such as fish houses; and, establishments such as restaurants.

Open-water (OW): This category represents state-owned sovereignty submerged bottoms within an aquatic preserve which are of a distance of greater than 500 feet from land.

Classifications of management areas are also derived from the resource value of the sovereignty submerged bottoms adjacent to the upland property. As noted above, resource value is also to be incorporated into the classification of management areas. Each of the land use classifications noted above is assigned a second code letter to define the resource value of its submerged bottoms. An area within the preserve is designated as a **primary resource protection area ("1")**, if it is judged to be of high value.

The methodology used for determining whether the communities present at a site constitute a primary resource protection area shall be consistent with the latest methodology approved by the Bureau of Submerged Lands and Aquatic Preserves. Areas that are characterized by the absence of the above resource attributes will be designated as a **secondary resource protection area ("2")**. A "1" designation

essentially incorporates those areas defined as Resource Protection Areas 1 and 2 by Section 18-20.003, F.A.C.; and, a "2" designation incorporates those areas defined as Resource Protection Area 3.

For example, if an area within the preserve is determined to be a primary resource protection area, and if the adjacent land is zoned as a single-family residential neighborhood, it would be classified as a SF/1 management area.

For each area designated a specific management area classification within the Apalachicola Bay Aquatic Preserve, a set of criteria will be listed in regard to use of that area. The minimum criteria are those provided in Chapter 18-20, F.A.C. Where specific resource protection needs are warranted, more stringent criteria than those listed in Chapter 18-20, F.A.C. will be set. If more stringent criteria are found to be necessary, the classification scheme accommodates this by labeling those areas with an additional letter. Therefore, if more stringent criteria is provided for the SF/1 area noted above, the area would then be classified as SF/1a. If an area does not contain the additional letter, the minimum criteria in Chapter 18-20, F.A.C., applies. Areas where more stringent criteria apply are referred to as **special management areas**. Upon approval of this management plan by the Board of Trustees, the Apalachicola Aquatic Preserve management plan will be incorporated into Chapter 18-20 F.A.C. rule by reference; therefore, new or more stringent criteria in this plan will have the force and effect of rule upon adoption of this plan into rule.

In the next section, the minimum criteria in Chapter 18-20, F.A.C. is provided. Then in the following section, the management areas are delineated providing boundaries, descriptions, and allowable uses for each area. Any specific criteria for special management areas and a rationale for these criteria are also provided. Finally, Figure 17 provides a map of the management areas within the Apalachicola Bay Aquatic Preserve. The intention of providing this map is to give a general guidance and understanding of where management areas lie within the aquatic preserve. However, determination of what management classification provided to a specific site will be based on the definitions above. In the event that a site visit concludes that the management area for a specific site is different from that shown on Figure 17, the determination made during the site visit will be judged as the correct determination.

MINIMUM CRITERIA FOR ALLOWABLE USES

Chapter 18-20, F.A.C. (Appendix A), provides the minimum standards in regard to utilization of the state-owned sovereignty submerged bottoms within an aquatic preserve. These minimum standards are reviewed below by designated use.

Section 18-20.004 (1)(f), F.A.C. provides that structures to be built in, on, or over sovereignty lands are limited to those necessary to conduct water dependent activities.

Utility Easements:
Section 18-20.004 (3)(c), F.A.C. provides that utility cables, pipes, and other such structures shall be constructed and located in a manner that will cause minimal disturbance to submerged land resources such as oyster bars and submerged grassbeds and do not interfere with traditional uses. It will be the policy within the Apalachicola Bay Aquatic Preserve to encourage the placement of utilities in designated corridors or existing easements.

Private residential single docks:
Section 18-20.004 (5)(a), F.A.C. provides that all docks within an aquatic preserve shall meet the following standards and criteria.

1. No dock shall extend beyond 500 feet waterward of the mean or ordinary high water line or 20% of the width of the water body at that particular location. **No dock shall extend over more than 150 feet of marsh.** This shall be considered as special management criteria that will apply to all management areas where private residential single docks are permitted.

2. Areas of significant biological, scientific, historic, and/or aesthetic value require special management considerations. Modifications to docks in these areas may be more restrictive and are determined on a case-by-case analysis.

3. The number, lengths, drafts, and types of vessels allowed to utilize the proposed facility may be stipulated.

4. Where local governments have more stringent standards and criteria for docking facilities, the more stringent standards for protection and enhancement of the aquatic preserve shall prevail.

In addition, Section 18-20.004 (5)(b), F.A.C. provides that private residential single docks shall conform to the following specific design standards and criteria:

1. An access dock must not exceed a width of 4 feet.

2. Must be designed and constructed to ensure maximum light penetration.

3. May extend from the shoreline to a maximum depth of -4 feet mean low water (MLW).

4. When the water depth is -4 feet MLW at an existing bulkhead, the maximum dock length from the bulkhead shall be 25 feet, subject to modifications accommodating shoreline vegetation overhang.

5. Wave break devices shall be designed to allow for maximum water circulation and built in such a manner as to be part of the dock structure.

6. The size of the terminal platform shall not exceed 160 square feet.

7. New dredging of any type, including prop dredging, is strongly discouraged.

Private residential multi-slip docks:

In addition to meeting the standards for all docking facilities noted above, Section 18-20.004 (5)(c), F.A.C. provides that private residential multi-slip docks shall conform to the following specific design standards and criteria:

1. The area of sovereignty submerged land preempted by the docking facility shall not exceed the square footage amounting to ten times the riparian waterfront footage of the affected water body of the applicant, or the square footage attendant to providing a single dock in accordance with the criteria for private residential single docks, whichever is greater. A conservation easement or other such restriction acceptable to the Board must be placed on the riparian shoreline, used for the calculation of the 10:1 threshold, to conserve and protect shoreline resources

2. Docking facilities and access channels shall be prohibited in Resource Protection Areas 1 and 2, except as allowed pursuant to Sections 258.42 (3)(e)(1), F.S., while dredging in Resource Protection Area 3's shall be strongly discouraged.

3. Water depths adjacent to and within the facility shall have a minimum of one foot of clearance between the deepest draft of a vessel and the bottom at MLW.

4. Main access docks and connecting or cross walks shall not exceed 6 feet in width.

5. Terminal platforms shall not exceed 8 feet in width.

6. Finger piers shall not exceed 3 feet in width and 25 feet in length.

7. Pilings may be utilized as required to provide adequate mooring capabilities.

8. Specific provisions of Section 18-20.004 (5)(d), F.A.C. for commercial industrial, and other revenue generating/income related docking shall also apply to private residential multi-slip docks.

Commercial-Industrial docking facilities and marinas:
Section 18-20.004 (5)(d), F.A.C. provides that commercial, industrial, and other revenue generating/income related docking shall conform to the following specific design criteria and standards:

1. Docking facilities shall only be located in or near areas with good circulation, flushing, and adequate water depths.

2. Docking facilities and access channels shall not be located in Resource Protection Area 1; however, main access docks may be allowed to pass through Resource Protection Area 1 that are located along the shoreline, to reach an acceptable Resource Protection Area 2, provided that such crossing will generate minimal environmental impact.

3. The siting of docking facilities shall take into account the access of the boat traffic to avoid marine grassbeds or other aquatic resources in the surrounding area.

4. The siting of new facilities within the aquatic preserve shall be secondary to the expansions of existing facilities when such expansion is consistent with other standards.

5. The location of new facilities and expansion of existing facilities shall consider the use of upland dry storage as alternative to multiple wet slip docking.

6. Marina siting will be coordinated with local governments to insure consistency with local plans and ordinances.

Exceptions to the standards and criteria for any docking facility may be considered, but only upon demonstration that such exceptions are necessary to ensure reasonable riparian ingress and egress.

Spoil Disposal:
Section 18-20.004 (3)(d), F.A.C. provides that spoil disposal within an aquatic preserve shall be strongly discouraged and may be approved only where the applicant has demonstrated that there is no other reasonable alternative and that the spoiling activity may be beneficial to, or at a minimum, not harmful to the quality and utility of the preserve.

Lease, or transfer of lands, (Private Leases):
Section 18-20.004 (1)(b), F.A.C. provides that there shall be no further sale, lease or transfer of sovereignty lands within an aquatic preserve unless such transaction is in the public interest. Section 18-20.004 (2), F.A.C. specifically defines the public interest test (see Appendix A for a copy of Chapter 18-20, F.A.C.). Section 18-20.004 (1)(e), F.A.C. states that lease, easement, or consent may be authorized for only the following activities: a public navigation project; maintenance of an existing navigation channel; installation or maintenance of navigation aids; creation or maintenance of a commercial/industrial dock, pier, or marina; creation or maintenance of private docks; minimum dredging of navigation channels attendant to docking facilities; creation or maintenance of shore protection structures; installation or maintenance of oil and gas transportation facilities; creation, maintenance, replacement, or expansion of facilities required for the provision of public utilities; and, other activities which are a public necessity or which are necessary to enhance the quality or utility of the preserve and which are consistent with the Florida Aquatic Preserves Act (Section 258.35, F.S. through Section 258.46, F.S.). Section 18-20.004 (1)(f), F.A.C. provides that structures to be built in, on, or over sovereignty lands are limited to those necessary to conduct water dependent activities.

Piers: follow standards of private residential single docks or private residential multi-slip docks in accordance with the appropriate dock requirement for each management area's designated uses. In addition, the following applies to all piers:

(a) no temporary or permanent vessel mooring shall be permitted; at least one well displayed "no docking" sign shall be placed and maintained on each side of the pier; and railings shall be placed around the entire perimeter of the pier; and,

(b) dredging is strictly prohibited when associated with pier construction or maintenance.

Ramps: may be permitted only on a case-by-case basis, after site inspection to assess the type and amount of shoreline or benthic vegetation or other habitat that

would be impacted; the amount of filling of submerged lands required; and the accessibility to the ramp from water or land access.

MANAGEMENT AREAS

This section defines the management areas for the Apalachicola Bay Aquatic Preserve, and is intended to be used as a general guide for allowable uses in the preserve. Final determination of allowable uses will be made by the Bureau of Submerged Lands and Preserves's staff on a case-by-case basis.

In addition to what is listed under allowable uses, certain activities are generally permissible in all management areas, in accordance with general rules. These include certain shoreline stabilization structures, maintenance dredging for public channels, and channel markers.

MANAGEMENT AREA AG/1

(agriculture/primary resource protection area)

Boundaries: The mainland along St. Vincent Sound from the western boundary of the aquatic preserve to Green Point excluding a segment zoned residential, and marshes surrounding East Bay extending from the main stem of the Apalachicola River to eastern edge of East Bay opposite Tank Island, with the exclusion of lands owned by the State of Florida or zoned as conservation by the county.

Description: Lands zoned as agriculture/primary resource protection areas along St. Vincent Sound's mainland shore receive this designation by virtue of the existence of the existence of oyster bars and a saltmarsh consisting of black needlerush (Juncus romerianus) and smooth cordgrass (Spartina alterniflora) along its shore. East Bay's shore receives a primary resource protection designation by virtue of a marsh consisting of fresh and brackish species (i.e., bullrushes (Scirpus spp.), cattails (Typha domingensis), sawgrass (Cladium jamaicense) and brackish water forms of cordgrass (Spartina spp.) and needlerush (Juncus)) and by virtue of the existence of beds of fresh and brackish species of submerged grasses consisting of widgeon grass (Ruppia maritima), ribbon or tape grass (Vallisneria americana), and sago pond weed (Potomogeton spp.).

Allowable Uses: Utility easements (in designated corridors), private residential single docks and piers.

MANAGEMENT AREA SF/1

(single-family/primary resource protection area)

Boundaries: Much of the western portion of St. George Island, Cat Point, portions of the eastern shore of East Bay, a short segment of the shore of St. Vincent Sound, and much of the Apalachicola Bay waterfront of the city of Apalachicola.

Description: Portions of the shore of St. George Island are designated as primary resource protection areas by virtue of the existence of salt marshes consisting of black needlerush and smooth cordgrass and seagrass beds consisting of shoal grass (Halodule wrightii) manatee grass (Syringodium filiforme), and turtle grass (Thalassia testudinum). Cat Point and the short segment of shore in St. Vincent Sound are designated as a primary resource protection areas by virtue of the existence of oyster bars off shore and the existence of a salt marsh composed of black needlerush and smooth cordgrass along the shore. The waterfront off the City of Apalachicola is designated as a primary resource protection area by virtue of the existence of a marsh consisting of fresh and brackish species including bullrushes, cattails, sawgrass, and brackish water forms of cordgrass and needlerush.

Allowable Uses: Utility easements (in designated corridors), private residential single docks and piers.

Not Allowed: Dredging of old mosquito ditches in areas where DNR has jurisdiction, unless it becomes part of an approved arthropod control plan.

MANAGEMENT AREA SF/2

(single-family/secondary resource protection area)

Boundaries: Portions of the eastern shore of East Bay and the shore of St. George Island.

Description: Those portions designated as SF/2 are those which do not contain the resource attributes noted for SF/1. The bottom habitat in these areas consists of tidal flats composed of sand and sandy clay off of St. George Island and sand to clayey sand off of East Bay.

Allowable Uses: Utility easements, private residential single docks and piers.

Not Allowed: Dredging of old mosquito ditches in areas where DNR has jurisdiction unless it becomes part of an approved arthropod control plan.

MANAGEMENT AREA CI/1

(commercial-industrial/primary resource protection area)

Boundaries: Portions of the shore of East Bay (i.e., areas in the Eastpoint Urban Service Area) and Apalachicola Bay in proximity to the town of Eastpoint.

Description: The shore in the vicinity of Eastpoint is designated as a primary resource protection area by virtue of the existence of oyster bars off shore and existence of sea grass beds consisting of Widgeon and ribbon grasses and sago pond weed in East Bay.

Allowable Uses: Utility easements (in designated corridors), docks and piers. Note: a commercial dock, however, may be permitted to pass over a primary resource protection area in order to reach a secondary resource protection area.

MANAGEMENT AREA CI/2

(commercial-industrial/secondary resource protection area)

Boundaries: The Apalachicola River waterfront of the city of Apalachicola, portions of the waterfront in proximity to Eastpoint, and a segment of the bay shore of St. George Island near the St. George Island bridge.

Description: The bottom habitat off the city of Apalachicola, the city of Eastpoint, and St. George Island in proximity to the bridge consist of sand, sandy clay, and clayey sand.

Allowable Uses: Utility easements, commercial docks and piers, marinas, ramps.

MANAGEMENT AREA PR/1

(public recreation/primary resource protection area)

Boundaries: The Apalachicola Bay waterfront off of a public park in the city of Apalachicola.

Description: The waterfront off the city of Apalachicola is designated as a primary resource protection area by virtue of the existence of a marsh consisting of fresh and brackish species including bullrushes, cattails, sawgrass, and brackish water forms of cordgrass and needlerush.

Allowable Uses: Utility easements (in designated corridors) public docks (meeting the requirements of a private residential single dock), ramps.

MANAGEMENT AREA PR/2

(public recreation/secondary resource protection area)

Boundaries: Battery Park and a portion of the city of Apalachicola's waterfront between the boat basin and where Highway 98 enters into the city.

Description: The bottom habitat off of this area consists of sand, sandy clay, and rubble.

Allowable Uses: Utility easements, public docks (meeting the requirements of a private residential multi-slip dock), ramps.

MANAGEMENT AREA P/1

(preservation/primary resource protection area)

Boundaries: Portions of the Apalachicola Bay shore of Cape St. George or Little St. George Island, portions of the shore of St. Vincent Island along St. Vincent Sound, public lands in East Bay, and much of the waterfront up Scipio Creek and on the land between Scipio Creek and the city of Apalachicola.

Description: The area along the bayshore of Little St. George Island and St. Vincent Island are designated as a primary resource protection area by virtue of salt marshes consisting of black needlerush and smooth cordgrass. Along Little St. George Island beds of submerged seagrass which include shoal, manatee, and turtle grass are also found. Oyster bars are found nearshore of St. Vincent Island. East Bay's shore receives a primary resource protection designation by virtue of a marsh consisting of fresh and brackish species (i.e., bullrushes, cattails, sawgrass, and brackish water forms of cordgrass and needlerush and by virtue of the existence of beds of fresh and brackish species of submerged grasses consisting of widgeon grass), ribbon or tape grass, and sago pond weed. The waterfront in the Scipio Creek area is designated as a primary resource protection area by virtue of the existence of a fresh to brackish water marsh.

In the past, mud flats have not been accorded the same protection as seagrass beds because the microalgae which are produced there are not as visible as the grasses, but in reality the microalgae may be more productive. Emphasis will be placed on protecting productive mud flats, however their designation as primary or secondary protection areas will be determined by field sampling.

Allowable Uses: Private residential single docks. Other structures in the public interest may be constructed.

MANAGEMENT AREA P/2

(preservation/secondary resource protection area)

Boundaries: Portions of the shores of Little St. George Island and St. Vincent Island which are not designated as primary resource protection areas and the waterfront in the vicinity.

Description: The bottom habitat in these portions of the preserve consist of sand, sandy clay, and clayey sand.

Allowable Uses: Utility easements, private residential single docks and piers. Other structures in the public interest may be constructed.

MANAGEMENT AREA OW/1

(open water/primary resource protection area)

Boundaries: Scattered areas throughout Apalachicola Bay proper and in St. Vincent Sound.

Description: Areas designated as primary resource protection areas in either Apalachicola Bay or St. Vincent Sound are so designated by virtue of the presence of oyster bars or seagrasses.

Allowable Uses: Utility easements (in designated corridors). NOTE: this designation does not affect the harvesting of oysters or the planting of oyster bars.

MANAGEMENT AREA OW/2

(open water/secondary resource protection area)

Boundaries: Scattered areas throughout Apalachicola Bay proper and in St. Vincent Sound as well as the open water areas in East Bay.

Description: The bottom habitats in the open water sections of Apalachicola Bay vary considerably and are discussed earlier in the report.

Allowable Uses: Utility easements, spoil disposal from federal projects, private leases.

SF 1 - Single Family/Primary Resource Protection Area
SF 1 and SF 2 - Single Family/Primary and Secondary Resource Protection Area
P 1 - Preservation/Primary Resource Protection Area
P 1 and P 2 - Preservation/Primary and Secondary Resource Protection Area
P 2 - Preservation/Secondary Resource Protection Area
PR 1 - Public Recreation/Primary Resource Protection Area
PR 2 - Public Recreation/Secondary Resource Protection Area
AG 1 - Agriculture/Primary Resource Protection Area
CI 1 - Commercial-Industrial/Primary Resource Protection Area
CI 2 - Commercial-Industrial/Secondary Resource Protection Area
OW 1 - Open Water/Primary Resource Protection Area
OW 2 - Open Water/Secondary Resource Protection Area

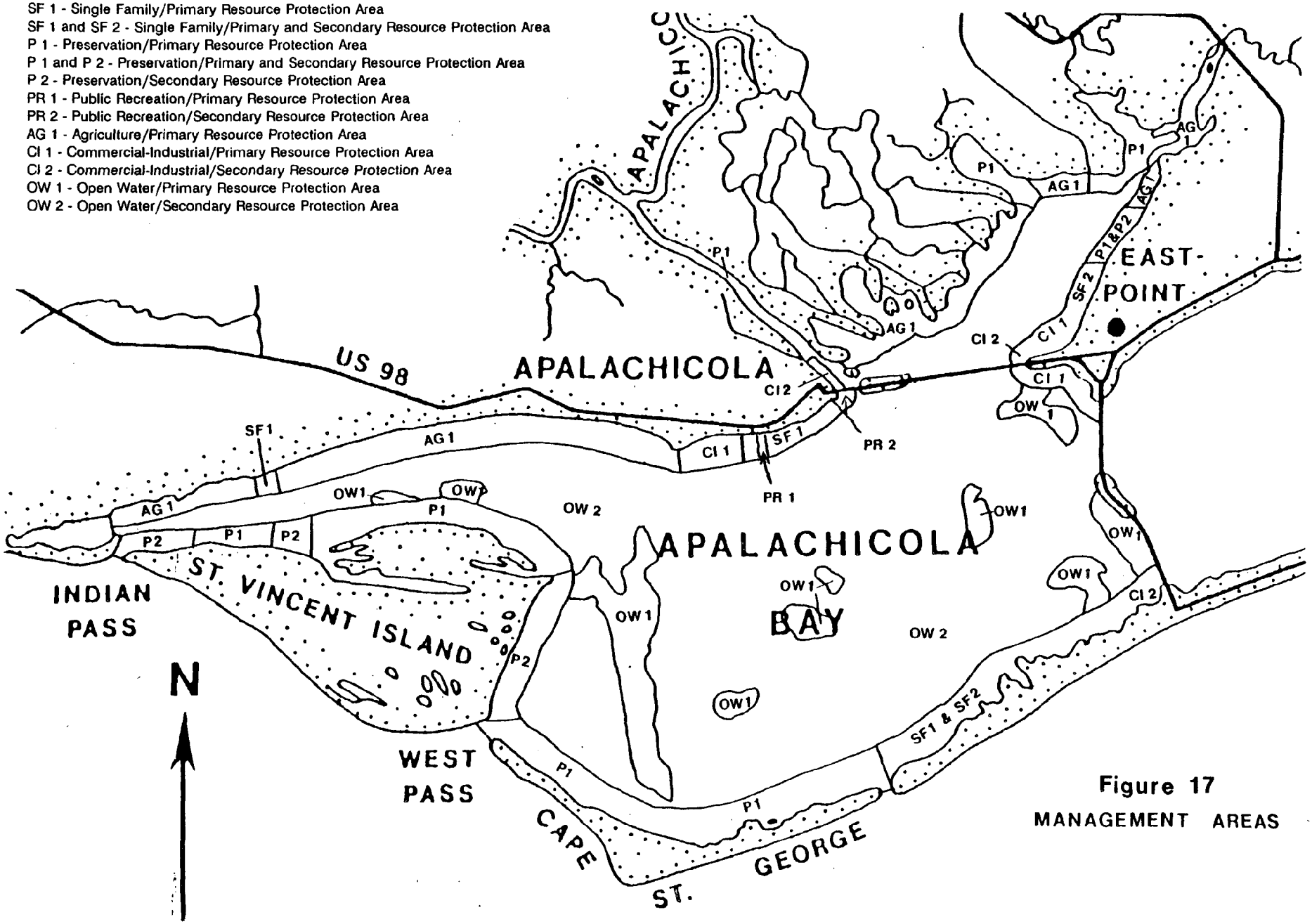


Figure 17
MANAGEMENT AREAS

CHAPTER VII

MANAGEMENT ACTION PLAN

The objective of this chapter is to establish guidelines which allow for the management and protection of the Apalachicola Bay Aquatic Preserve's natural resources for the benefit of future generations (Section 258.35, F.S.). Many of the authorities needed to manage and protect natural resources in an aquatic preserve are vested to entities outside the Bureau of Submerged Lands and Preserves. Therefore, coordination is a key component of the implementation program for managing aquatic preserves. For instance, the regulation of land use practices on the adjacent uplands is critical to the long-term protection of the aquatic resources of the preserve and no authority is vested in the program to manage growth. Instead, this authority is centered in county and city government and is guided by Franklin County's and the city of Apalachicola's Local Government Comprehensive Plans. These plans are currently undergoing state review.

It would improve the chances of the management goals and concepts of this management plan being attained if they are consistent with local plans. As noted earlier, Policy 21.4 of the Conservation/Coastal Management Element of the County's Draft Comprehensive Plan states that "prior to the adoption of any land development regulations pursuant to Section 163.3202, F.S., the county shall review and incorporate, where appropriate, policies recommended in the Apalachicola Bay Aquatic Preserve Management Plan, the National Estuarine Research Reserve Management Plan, the Northwest Florida Water Management District's Surface Water Improvement and Management Plan, and the Lower Apalachicola River Environmentally Endangered Lands Management Plan."

To date, the aquatic preserve has had a limited presence in the Apalachicola Bay Aquatic Preserve and this limited presence can be attributed at least partially to the existence of the Apalachicola National Estuarine Research Reserve and the fact that many of the charges and goals of the Aquatic Preserve Program and the Estuarine Research Reserve Program are the same. In fact, many of the tasks listed in this chapter as the duties of the aquatic preserve staff are already being conducted by staff of the Apalachicola Estuarine Research Reserve.

To effectively manage a natural resource, one must be knowledgeable about how the resource functions and what composes the resource, be able to transmit this knowledge to people who use and/or can potentially impact the resource, and be willing to take necessary actions to manage and protect the resource. Therefore, the management strategies for an aquatic preserve must consist of a variety of programs including direct hands-on management of resources, resource protection, environmental education, and research. The emphasis of the Aquatic Preserve

Program in resource management is to conduct management activities and to coordinate the network of federal, state, regional, and local agencies with the authority to manage and protect natural resources. Through both of these strategies a cohesive management program that leads to the long-term conservation of the natural system may be attained.

For all of the following goals, objectives and tasks, the Department of Natural Resources will, when appropriate and practical, participate with other agencies and organizations dedicated to protecting the local resources. In order to avoid duplication of effort the Department will initiate programs only when they do not overlap or compete with programs operated by other governmental agencies or non-profit corporations.

RESOURCE MANAGEMENT PROGRAM

In general, the role of the Aquatic Preserve Program in resource management includes: 1) serving as an informed source on the ecological functioning and cultural resources within the preserve; 2) overseeing those activities that affect the natural resources within the preserve; 3) ensuring that accurate information is used in resource-related permitting, management, and planning decisions; 4) ensuring that all laws and rules regarding the natural resources are obeyed and that any violations are enforced by the appropriate authorities; 5) conducting on-site surveys for specific activities; 6) coordinating with other resource management and enforcement agencies; 7) educating the public on the inherent values associated with natural resources; 8) conducting or cooperating with other entities to conduct pertinent research projects; 9) developing, and periodically updating, a comprehensive management program. In conducting resource management activities, the focus of preserve staff should be on both the impacts of an individual action as well as the cumulative impacts of all changes and actions on the natural system.

Specific activities conducted by aquatic preserve staff in regard to resource management may include collecting and storing resource data and inventories; mapping the natural resources; monitoring of natural resources; identifying resource restoration needs and implementing a resource restoration program; and providing technical input and comments into environmental permitting and land use planning decisions.

In regard to data collection and inventories the predominant role of aquatic preserves will be to organize and review data collected by other state and federal environmental agencies, other sections of the DNR, universities, and other research entities. To the extent possible, information should be stored in computers in a format defined by the central office. Staff will conduct an assessment of ongoing monitoring activities to assess its adequacy in monitoring the environmental climate

of the preserve. Whenever possible, staff should conduct additional monitoring activities to augment existing monitoring programs conducted by other agencies.

Resource Management Goal

To conduct those resource management actions necessary to conserve and enhance the natural resource-oriented values of the preserve for future generations.

Resource Management Objective 1:
Initiate implementation of a broad-based management program at the Apalachicola Bay Aquatic Preserve which focuses on the management and protection of natural resources, environmental education, and research.

Task 1-1:
Seek the necessary staff and funds to implement all of the tasks listed in this resource management master plan.

Task 1-2:
Review, update, and revise as appropriate the tasks and programs in the master plan at a minimum of once every two years.

Resource Management Objective 2:
Establish and maintain close communication and coordination with all federal, state, regional, and local governmental agencies which have authority in natural resource management decisions that can impact the Apalachicola Bay Aquatic Preserve once staff is brought on to manage the preserve.

Task 2-1:
Assure that all state, federal, regional, and local government agencies which have authority in resource management decisions in the aquatic preserve are aware of the goals of the Aquatic Preserve Program, its authorities, and what actions are considered acceptable and not acceptable within or in close proximity to the aquatic preserve by providing them with copies of the management plan and all subsequent amendments to it.

Task 2-2:
To understand the authorities of the various federal, state, regional, and local agencies in regard to resource management and determine which staff people in these agencies are responsible for activities within or in close proximity to the aquatic preserve.

Task 2-3:
Establish and maintain communication with staff of the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Geological Survey, U.S.

Coast Guard, Florida Department of Environmental Regulation, Florida Game and Fresh Water Fish Commission, Florida Department of Natural Resources, Florida Department of Community Affairs, the Northwest Florida Water Management District, the Apalachee Regional Planning Council, the Franklin County Health Department, Franklin County's and the city of Apalachicola's Planning and Zoning Department, and other entities which have authority in regard to resource management and protection in the aquatic preserve.

Task 2-4:
Serve as a regular monitoring liaison for agencies with resource management authority and report any problems to specific agencies with jurisdiction to deal with the problem.

Task 2-5:
Coordinate closely with the Florida Department of State, Division of Historical Resources on all issues relating to historical and archaeological resources within the aquatic preserve.

Task 2-6:
Develop a Memorandum of Understanding with all government entities having jurisdictional authority in natural resource management decisions which can affect the Apalachicola Bay Aquatic Preserve.

Resource Management Objective 3:
Be actively involved in all resource management decisions which can potentially impact the natural resources of Apalachicola Bay Aquatic Preserve.

Task 3-1:
Review and provide comments for all permits relating to construction activities on sovereign submerged lands within the aquatic preserve.

Task 3-2:
Review and provide comments on all upland land use actions including comprehensive plans, county or municipal ordinances, local development regulations, or specific development proposals which have the potential to impact the natural resources of the aquatic preserve.

Task 3-3:
Review and provide comments on all Administrative Rules developed by state resource management agencies or the Marine Fisheries Commission regarding the protection and management of the natural resources of the aquatic preserve.

Task 3-4:
Review and provide comments on all permit applications that could potentially impact the natural resources of the aquatic preserve including permits for the maintenance dredging of the existing navigation channels, modifications to channels, and construction of marinas, docks, and other waterfront structures.

Resource Management Objective 4:
Provide increased management and protection emphasis to areas within the Apalachicola Bay Aquatic Preserve which either are integral to maintaining the biological productivity of the aquatic preserve, contain outstanding resource values, are in need of restoration or special management programs, or are important habitat to state and federally designated species.

Task 4-1:
Delineate areas within the aquatic preserve where different management emphasis is necessary. Delineation of areas should incorporate both the resource values of the site and reflect land-use on adjacent uplands. These delineations should be periodically reviewed and amended.

Task 4-2:
Develop and periodically amend specific management programs which detail approved and unapproved uses for each management area.

Resource Management Objective 5:
To regularly monitor and inventory the natural and historical resources within the Apalachicola Bay Aquatic Preserve.

Task 5-1:
Prepare and regularly update a map of natural habitats and historic resources within and adjacent to the aquatic preserve.

Task 5-2:
Regularly monitor designated species and their associated habitats within or in close proximity to the aquatic preserve. Any existing or potential future problems should be identified.

Task 5-3:
Evaluate water quality monitoring data relevant to the management and protection of the aquatic preserve which is collected by state and federal resource management agencies and through other research and monitoring efforts, or by staff of the aquatic preserve.

Task 5-4:
Coordinate water quality monitoring efforts at the Apalachicola Bay Aquatic Preserve with those efforts being conducted through the Surface Water Improvement and Management Program and the Department of Environmental Regulation's ambient monitoring program.

Task 5-5:
Monitor traditional uses within the aquatic preserve including commercial and recreational fishing, boating, and beach-going to define extent of use and foresee any potential problems.

Task 5-6:
Annually prepare a report describing the state of the environment of the aquatic preserve. This report should discuss the findings of the resource monitoring program; most recent water quality data and any trends in water quality; any changes in resource community boundaries; status of designated species within the aquatic preserve; permit applications within the preserve; land development trends on adjacent uplands; and any enforcement actions necessary.

Resource Management Objective 6:
Focus on the impacts of resource utilization from a cumulative perspective as well as from the impacts of individual actions.

Task 6-1:
Through use of tools such as the local comprehensive plans, zoning maps, and development permits assess all proposed development actions both from the perspective of the individual action and from a cumulative impact perspective.

Task 6-2:
To inventory the present and potential future effects of human activities on the natural resources of the preserve. Specific activities to focus upon include cumulative effects of septic systems; effects of stormwater runoff from urban and forestry sources; and, effects of commercial fishing activities.

Task 6-3:
To consider the use of mitigative actions in association with any development activity that will degrade the natural resources of the aquatic preserve.

Resource Management Objective 7:
To implement those on-site management actions determined as necessary to maintain resource values of Apalachicola Bay Aquatic Preserve for future generations.

Task 7-1:
As necessary, prepare and implement plans to restore disturbed sites within the aquatic preserve.

Task 7-2:
As necessary, develop and implement specific programs to remove or eradicate undesired exotic animal and plant species.

RESOURCE PROTECTION PROGRAM

The role of aquatic preserves in resource protection includes direct enforcement of state laws and rules; coordinating with other enforcement staff in the Division of State Lands and other divisions and agencies having enforcement authority; and, reviewing and commenting on permits. In regard to direct enforcement, the Bureau of Submerged Lands and Preserves has regional staff to deal with enforcement issues concerning aquatic preserves. If these staff are unavailable, the option of using Marine Patrol staff also exists. Any prosecution actions will be handled by DNR legal staff. On-site staff are intended to only serve as technical support on enforcement issues. Violations of Chapter 18-20, F.A.C. are violations of civil law and as such are subject to all civil penalty limitations.

In serving as technical support, staff is expected to evaluate development proposals in aquatic preserves in regard to adverse impacts on natural and cultural resources and consistency with established laws and rules; conduct field assessments and prepare comments and recommendations to appropriate agencies; maintain good communication with local, regional, state, and federal environmental regulatory agencies; and, notify appropriate authorities of violations and illegal activities.

Other agencies with enforcement authority which can be used to protect the natural resources of an aquatic preserve include the Department of Environmental Regulation, the Game and Fresh Water Fish Commission, and local law enforcement officers.

Resource Protection Goal
To ensure compliance with all laws, rules, ordinances, and permit conditions relating to the protection of natural resources.

Resource Protection Objective 1:
To assure timely response to all violations of federal, state, and local laws, rules, ordinances, and permit conditions in the Apalachicola Bay Aquatic Preserve.

Task 1-1:
To develop an understanding of which agencies have enforcement authority in the aquatic preserve area for natural resource related issues and develop a network of communication and coordination among these agencies.

Task 1-2:
To establish a scheduled program in coordination with other agencies with enforcement authority to systematically monitor the aquatic preserve for resource-oriented violations which could potentially impact the natural resources of the aquatic preserve. Any violations spotted in this effort should be immediately reported to the appropriate enforcement entities.

Task 1-3:
To regularly monitor all permitted actions within the aquatic preserve during their construction phase to assure compliance with permit conditions. Once construction is completed, a letter shall be sent to the permitting entity stating that the project was completed and whether it is in compliance with the agreed upon permit conditions.

Task 1-4:
Provide technical support to federal, state, or local enforcement entities involved in resource-oriented enforcement actions within the aquatic preserve.

Resource Protection Objective 2:
Minimize potential damage to aquatic resources through the review of applications for use of state-owned land in the aquatic preserve.

Task 2-1:
Develop a standardized method to inventory submerged vegetation, emergent vegetation, and other biological resources at a project site.

Task 2-2:
Coordinate with the regional DNR planner in order to process field staff comments in a timely manner.

RESEARCH AND MONITORING PROGRAM

Marine research conducted within the DNR is normally the responsibility of the Division of Marine Resources. Nevertheless, because of the nature and purpose of aquatic preserves, some management related research projects should also be associated with this program. The two key components of a research program are research and monitoring. Research is the systematic collection and analysis of experimental and/or field observations that produce knowledge. And, monitoring

is the systematic sampling and measurement over time of variables which describe the abundance and distribution of biological resources, the distribution and concentrations of physical, geological or chemical properties, or the location and rates of significant processes.

Research and monitoring conducted through the Aquatic Preserve Program shall focus on management solutions specific to a site or to the program in general. The overall program's involvement with research can vary from actually conducting a research project to providing in-kind support to certain research projects to contracting an outside entity to do necessary research. The role and emphasis of a specific preserve in research and monitoring is contingent on the classification of the preserve. Preserves established for either biological or scientific purposes should emphasize research and monitoring activities more than do preserves designated for aesthetic purposes. As noted earlier, Apalachicola Bay Aquatic Preserve was established for biological/scientific purposes. Research conducted within aquatic preserves must be compatible with protection of natural resources and receive the clearance of aquatic preserve field staff and the central office staff.

Research and monitoring associated with an aquatic preserve will emphasize either providing a better understanding of the functioning and interrelationships of the preserve's natural systems; monitoring the status of the preserve over time; or, providing information to allow for the wise use and management of the preserve.

Staff of each preserve will keep close coordination with all research projects and monitoring activities ongoing within the preserve, as well as outside research conducted by universities, by the Division of Marine Resources, or by independent research entities whose work is pertinent to the management of the preserve. Efforts will also be taken by the Central Office to assure that research funding for aquatic preserves under state programs such as Sea Grant and the Surface Water Improvement and Management Act are consistent with previously identified and approved research needs for the preserve. The entities currently involved in environmental monitoring in the Apalachicola Bay Aquatic Preserve are the Florida Department of Environmental Regulation (DER), the Department of Natural Resources, the Apalachicola National Estuarine Research Reserve, the Northwest Florida Water Management District, and work conducted through the Biology Department at Florida State University.

The Apalachicola Bay Aquatic Preserve is located within the Apalachicola Bay National Estuarine Research Reserve. This Reserve is operated by both the National Oceanic and Atmospheric Administration and the Florida DNR. The research programs at the Estuarine Research Reserve and the aquatic preserve will be closely coordinated. Apalachicola Bay is also located within 20 miles of Florida State University's Turkey Point Marine Institute.

Research and Monitoring Goal

To have the necessary research and monitoring activities conducted so that the ecological functioning of the preserve is understood, so the preserve can be managed and used in an ecologically sound and wise manner, and so that the preserve can be maintained in its natural condition for future generations.

Research Objective 1:
Promote the scientific investigations and monitoring activities necessary in Apalachicola Bay to understand the status and basic functioning of the bay, enhance the management of its natural resources, and guide the wise management and utilization of those resources.

Task 1-1:
Establish and maintain communication and coordination links between the aquatic preserve staff and existing research and monitoring entities including Florida State University, DNR's Marine Resources Laboratory, and the Florida Department of Environmental Regulation.

Task 1-2:
In coordination with the scientific community, establish a prioritized list of research and monitoring needs for the aquatic preserve. This list should be updated at a minimum of every two years.

Task 1-3:
By offering assistance either through logistical support or funding (as available) encourage the conducting of priority research projects.

Task 1-4:
As available funds and staff time and expertise permit, conduct priority research and monitoring activities.

Task 1-5:
Coordinate with the Apalachicola National Estuarine Research Reserve, the Department of Environmental Regulation, and the Department of Health and Rehabilitative Services to design and implement a research and monitoring program to detect pollutants entering the Bay from onsite sewage disposal systems on St. George Island.

Research Objective 2:
Staff should be knowledgeable about the ecological functioning of the bay by obtaining a basic understanding of all past and ongoing research projects and monitoring activities done within Apalachicola Bay Aquatic Preserve or in other areas whose results are applicable to the management and protection of the preserve.

Task 2-1:
To obtain and serve as a repository for all past monitoring data collected within the aquatic preserve. The existing monitoring programs should be assessed in regard to parameters monitored, sampling methods, sampling frequency, and station location in coordination with the scientific community to assure that they accurately portrays the environmental climate of the preserve. If necessary, means of modifying or expanding the existing monitoring program should be examined.

Task 2-2:
To obtain, review, and serve as a repository for all existing scientific literature, government reports, historical accounts, and available maps and photos of the aquatic preserve.

Task 2-3:
To regularly review the scientific literature relevant to the ecological functioning, protection, and management of the aquatic preserve.

Task 2-4:
To establish a library containing information on plant and animal species and communities found with the aquatic preserve.

Research Objective 3:
To conduct and maintain through regular monitoring a resource inventory of submerged vegetation, emergent vegetation, oyster bar location, designated species and their habitats, birds and their habitats, and other important resource features.

Task 3-1:
Conduct initial inventories using existing literature, information, current research studies, and any other tools which are necessary.

Task 3-2:
As part of the everyday operations of the preserve, monitor the presence of designated species, wading birds, and other important biota.

Task 3-3:
Once every two years re-visit the inventory and update as appropriate.

Research Objective 4:
To coordinate the use of research findings into both management decisions and resource education programs.

Task 4-1:
Staff should serve as a link between historical and ongoing research and monitoring activities in the preserve and current resource management and use decisions. Staff should make key scientific information available to decision-makers.

Task 4-2:
Staff should serve as a link between historical and ongoing research and monitoring activities in the preserve and resource education programs. Materials used in resource education programs relating to the preserve should be reviewed by staff for accuracy and updated periodically to reflect current research findings.

ENVIRONMENTAL EDUCATION/INFORMATION PROGRAM

The role of the Aquatic Preserve Program in environmental education is mainly to coordinate and augment existing programs conducted out of the local school system(s), the Florida Department of Education, or other state agencies. Education programs are conducted at aquatic preserves in an effort to meet the overall program goal of maintaining aquatic preserves at their current level of environmental quality for future generations. The target population of education programs at Apalachicola Bay Aquatic Preserve includes nearby upland landowners and developers, commercial and recreational resource users, students at all grade levels, organized groups, and local, regional, and state government agencies.

The involvement of aquatic preserve staff in public education will focus on the development of both programs in the school system and to the public at large. Specific areas of involvement may include developing informational pamphlets, brochures, or booklets; conducting interpretive tours; conducting lectures or classes; development of public service announcements for television and radio; and, development of video programs and other teaching aids that can be used by public school systems in their daily instruction to students.

Environmental Education/Information Goal:

To educate people so that they will use the environment in ways that preserve it, consider environmental issues when planning and making decisions which could affect the environment, and take part in decisions affecting nearby natural resources. In general, the intent of aquatic preserve education programs is to make the public informed and responsible users of natural resources.

Education Objective 1:
To provide assistance to environmentally oriented education programs at public and private schools at all grade levels from kindergarten through university classes.

Task 1-1:
In coordination with staff of the Apalachicola National Estuarine Research Reserve prepare classroom units relating to the natural resources of Apalachicola Bay.

Task 1-2:
To periodically lead or assist in classroom field trips into the aquatic preserve.

Task 1-3:
To develop a specimen collection of species commonly found in the preserve to be used by public and private schools in their environmental education programs.

Task 1-4:
In coordination with staff of the Apalachicola National Estuarine Research Reserve participate in programs designed to educate environmental education instructors.

Task 1-5:
In coordination with the National Estuarine Research Reserve develop a reference library of material relevant to the natural resources of Apalachicola Bay and make the contents available for loan to educators.

Education Objective 2:
To provide and/or assist in environmental education programs to the community at large.

Task 2-1:
To conduct or assist in seminars, forums, or classes for public discussion of relevant resource management, utilization, and regulation issues. Seminars should involve both commercial and recreational resource users and should seek to involve resource users.

Task 2-2:
Develop brochures, pamphlets, and/or booklets in coordination with staff of the Apalachicola National Estuarine Research Reserve for public dissemination which describes both the purpose of and activities conducted at the aquatic preserve and the general functioning of the preserve's ecosystem.

Task 2-3:
Develop a network of signs to be placed at strategic access points to the aquatic preserve designed to educate the general public about ecological

functioning of Apalachicola Bay, the role of the general public in conserving natural resources, and aquatic preserve program.

Task 2-4:
Periodically prepare newspaper articles or radio announcements designed to educate the general public about the ecological functioning of the preserve and/or topical resource management, utilization, and regulation issues. Through this vehicle the findings of recent research efforts should be disseminated to the public at large.

Task 2-5:
Provide reference material to nearby public libraries regarding the description, management, and utilization of the natural resources of the aquatic preserve. Efforts should be made to encourage public libraries to have a special section relating to local natural resources.

Task 2-6:
To conduct and/or sponsor cultural events including art and photography exhibitions, storytelling sessions, and musical events relating to the management and protection of natural resources.

CHAPTER VIII

MANAGEMENT COORDINATION NETWORK

This chapter provides an overview of the federal, state, regional, and local agencies that have jurisdiction or hold interest in the management of the Apalachicola Bay Aquatic Preserve. Much of the authority necessary to protect and manage the natural resources within and adjacent to the Apalachicola Bay Aquatic Preserve exists outside the Bureau of Submerged Lands and Aquatic Preserves. Therefore, the Preserve's management action plan (Chapter 7) includes several objectives and tasks that direct staff to coordinate with entities which have the necessary jurisdiction. Resource Management Objective 2 provides that the Aquatic Preserve staff should "establish and maintain close communication and coordination with all federal, state, regional, and local governmental agencies which have authority in natural resource management decisions that can impact the Apalachicola Bay Aquatic Preserve." Resource Management Objective 3 further provides that staff "be actively involved in all resource management decisions which can potentially impact the natural resources of Apalachicola Bay Aquatic Preserve." And, Resource Protection Objective 1 provides that staff should "assure that all violations of federal, state, and local laws, rules, ordinances, and permit conditions in the Apalachicola Bay Aquatic Preserve are responded to in a timely manner."

FEDERAL AGENCIES

Many federal agencies have property interests, land and wildlife management programs, research activities, construction activities, and regulatory programs existing or potentially existing within the Apalachicola Bay Aquatic Preserve. Listed below are the major federal agencies and their program involvement within the Preserve.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) administers three programs which directly affect the Apalachicola Bay Aquatic Preserve. The Division of Ecological Services, headquartered in Panama City, reviews dredge and fill requests and other federal level permitting under the Fish and Wildlife Coordination Act.

The USFWS is also charged with the protection and recovery of endangered species and bird rookeries. Field personnel could become involved in using available recovery techniques. Their Office of Biological Services contracted to have a profile of the estuary published (Livingston, 1984) and are conducting field studies on sturgeon and striped bass in the system. They are currently pursuing the

construction of an anadromous fish hatchery on the Apalachicola River and have prepared a natural resources inventory for the ACF basin under contract to the Corps (Barkuloo et al., 1987). The USFWS also manages St. Vincent National Wildlife Refuge, a 12,358 acre barrier island adjacent to the preserve.

Under a provision in the Fish and Wildlife Coordination Act, the USFWS must be consulted before the Corps of Engineers can submit a plan for congressional approval which relates to water diversion, channel deepening, or modifications to streams or other bodies of water.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (COE) regulates activities in waters and wetlands under four separate, but related laws and their subsequent amendments: Rivers and Harbors Act of 1899, Federal Water Pollution Act of 1972, Clean Water Act of 1977, and Marine Protection, Research, and Sanctuaries Act of 1972.

The COE's major responsibilities which relate to the Apalachicola Bay Aquatic Preserve are the maintenance of authorized navigation channels, pollution abatement, maintenance of water quality, and enhancement of fish and wildlife. The COE also provides technical guidance and planning assistance for development of the nation's water resources. Under Section 404 of the Federal Water Pollution Control Acts Amendments of 1972, the COE has regulatory authority over dredge and fill activities in coastal wetlands.

The COE has authority over maintenance of six navigation channels within or in close proximity to the Apalachicola Bay Aquatic Preserve: the Apalachicola-Chattahoochee-Flint waterway, the Gulf-Intracoastal Waterway, Sikes Cut, Two Mile Channel, East Point Channel and Breakwater, and the Scipio Creek channel and boat basin. In conjunction with maintaining the navigation channels the COE has conducted or financed a number of studies to determine the effects of these projects on the aquatic ecosystem including WAR (1975), Taylor (1978), USGS (1984), COE (1985), Raney et al. (1985), Isphording (1985), CSA (1985), and Barkuloo, et al. (1987).

In December, 1982 a Memorandum of Understanding (MOU) between DNR, DER and the COE was executed. The MOU established a process whereby the proprietary concerns of the Trustees, stated in Chapter 253, F.S., is integrated into the DER/COE joint permitting process.

The COE has also served as a member of Interstate Coordinating Committee for management of water resources in the Apalachicola-Chattahoochee-Flint basin and was involved in an effort to develop a basin-wide water management strategy for the basin. The Corps has recently submitted a conceptual plan to members of congress to get funding to continue this effort.

U.S. Geological Survey

The U.S. Geological Survey (USGS) of the Department of the Interior has the responsibility to perform surveys, investigations, research pertaining to topography, geology, and mineral and water resources, and to collect and publish water resources data. The USGS conducted a four year study on the Apalachicola River system which has provided valuable insight into the interrelationship between the river and estuary (Mattraw and Elder, 1984; Elder, 1986).

The USGS operate several streamflow gaging stations in the ACF basin also collect water quality data at several stations in the basin.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is responsible for the control and abatement of six types of pollution: air, water, noise, solid waste, toxic waste, and radiation. The DER is the state agency responsible for pollution control in Florida in lieu of a federal program. In the Apalachicola basin the EPA was involved in the Nation's largest land restoration project to date. The original hydrology was restored to approximately 8,500 acres in the lower Apalachicola River floodplain which had been damaged by converting floodplain into agricultural land.

United States Coast Guard

The Coast Guard is charged with the protection of the Nation's coastline. In the preserve, the Coast Guard is involved in the regulation of boating safety, search and rescue, and the surveillance of narcotics contraband. Additionally, the Coast Guard regulates the construction of structures, such as bridges, causeways, and aerial utilities, which may pose navigation hazards, and oversees safety issues associated with commercial navigation.

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA), Office of Coastal and Resource Management, administers the National Estuarine Research Reserve Program which includes the Apalachicola Bay National Estuarine Research Reserve (see discussion under Department of Natural Resources). Management, research, and education activities within the aquatic preserve will be conducted in conjunction with ANERR.

NOAA's Office of Oceanography and Marine Assessment, Ocean Assessment Division (OAD) conducts research, assessment, and monitoring activities on environmental quality issues in estuaries. Through its National Status and Trends Program, OAD is conducting a nationwide monitoring program to assess chemical contamination in estuaries throughout the country. Through its National Coastal

Pollutant Discharge Inventory, OAD determines the sources and analyzes the quality of discharged pollutants in estuaries. OAD also has a National Estuarine Inventory which characterizes the physical and hydrological features of the Nation's estuaries and coastal areas. NOAA also operates the weather station in Apalachicola, Florida and collects tidal data from stations within or near the preserve.

National Marine Fisheries Service

The National Marine Fisheries (NMFS), U.S. Department of Commerce records commercial fish landings, enforces national fishery laws, and protects vital fishery habitats. The Environmental Assessment Branch of NMFS comments on permit applications, at the federal level, which may adversely impact fishery habitats. NMFS also has enforcement officers checking for illegal fishing activity.

STATE AGENCIES

Many state agencies have property interests, land and wildlife management programs, research activities, regulatory authority and construction activities within the Apalachicola Bay Aquatic Preserve. The interactions of these program with the management of the Apalachicola Bay Aquatic Preserve is outlined below:

Department of Natural Resources

The Division of Marine Resources has several programs relevant to aquatic preserves. The Marine Research Laboratory in St. Petersburg has several projects including resource protection area mapping, a survey of the status of oyster bars, and fishery habitat utilization studies which generate valuable resource management information.

The Division of Marine Resources also administers a permitting program for the collection of certain marine species and the use of certain chemicals. The Bureau of State Lands and Aquatic Preserves receives notification of issuance of permits within aquatic preserves.

The Division of Marine Resources' Shellfish Environmental Assessment Section (SEAS) is responsible for the classification and management of shellfish harvesting areas. A SEAS field support office and the laboratory support facility are located in Apalachicola. SEAS performs four primary tasks: conducting shoreline surveys to locate and evaluate potential pollution sources; establishing and monitoring water quality monitoring stations; red tide monitoring; and, managing shellfish harvesting areas for the purpose of protecting public health. Several drogue and dye studies have been conducted by DNR in Apalachicola Bay with the assistance of the U.S. Food and Drug Administration. Through the Shellfish Laboratory the DNR also

operates a program to construct and rehabilitate oyster reefs. Through this program the DNR has employed the Franklin County Seafood Workers Association to assist in informing the local industry of the project, in selecting relay and harvest areas, and to be responsible for paying project participants.

The Apalachicola National Estuarine Research Reserve (ANERR), which is under the Division of Marine Resources, is the governmental entity in which aquatic preserve staff interact the most frequently. ANERR's office is located in Apalachicola and its staff is actively involved in resource management, research and monitoring, and environmental education. Many of the tasks listed as part of the program of operating the Apalachicola Bay Aquatic Preserve in Chapter 8 are already being conducted by ANERR.

The Division of Law Enforcement's Marine Patrol, District 2 has a detachment located in Carrabelle, Florida. The detachment includes 22 people. The Marine Patrol regulates and enforces safe boating laws and enforces all commercial and recreational fishing laws.

The Division of State Lands, in addition to the work related to aquatic preserves, is charged with overseeing uses, sales, leases, or transfers of all state-owned lands. The aquatic preserve staff interact with other staff of State Lands in all transactions concerning submerged lands within the preserve including education, research, and acquisition of privately titled submerged lands or contiguous uplands important to the integrity of the preserve.

The Division of Resource Management is responsible for the management of aquatic plants, mineral resources, oil and gas exploration, and geologic studies. It also supervises state Navigation Districts and Canal Authority.

The Division of Beaches and Shores is responsible for managing erosion control, hurricane protection, coastal flood control, shoreline and offshore rehabilitation the regulation of work and activities likely to affect the physical condition of the beach and shore, and in the preparation of beach restoration management plans.

The Division of Recreation and Parks oversees operations at the Cape St. George State Reserve, and St. George Island State Park.

Marine Fisheries Commission

The Marine Fisheries Commission (MFC) has been delegated rule making authority with respect to marine life, and regulates the harvesting of all marine life (except designated species), subject to final approval by the Governor and Cabinet. Their authority covers gear specifications, prohibited gear, bag limits, size limits, species that may not be sold, protected species, closed areas, quality control codes, harvesting seasons, special considerations related to egg-bearing females, and

oyster and clam relaying. The MFC is required to make annual recommendations to the Governor and Cabinet regarding marine fisheries research priorities, which can in turn directly influence research efforts and priorities at the preserve.

Florida Game and Fresh Water Fish Commission

The Florida Game and Fresh Water Fish Commission (FGFWFC) has several programs directly related to resource management at the Preserve. The Office of Environmental Services reviews projects which may affect local fish and wildlife habitat. They have developed an inventory of terrestrial and aquatic habitats in the basin under a grant from the Florida Office of Coastal Management (Edmiston and Tuck, 1987) and conducted a long-term fisheries ecology study on the Apalachicola River (Ager et al., 1987). They are also lead management agency for the Lower Apalachicola River Environmentally Endangered Lands tract. FGFWFC is the state coordinator of the Non-Game Wildlife and Endangered Species Program in Florida. The Division of Wildlife is also responsible for designating Critical Wildlife Management Areas to protect designated species. And, the FGFWFC has law enforcement officers working in the area.

Department of Environmental Regulation

The Department of Environmental Regulation (DER) has a broad range of responsibilities and receives it's authority from State Law and from delegation from the EPA. Generally, the DER responsibilities include water management, water quality, potable water, air quality, coastal management, wetland protection, power plant siting, and hazardous and solid wastes.

These responsibilities are accomplished through the following regulatory mechanisms: (1) establishment of state standards designed to protect natural systems and prevent harmful pollutants from entering these systems; (2) application of these standards through the permitting of potential sources of pollution and monitoring discharges for compliance; and (3) initiation of enforcement action for non-compliance with these standards.

The DER's rules significant to the aquatic preserve management program are Chapters 17-4, 17-301, 17-302, and 17-312, F.A.C. Authority for these rules is based in Chapter 403, F.S. Chapters 17-301 and 17-302, F.A.C., addresses water quality standards with the most stringent category being "Outstanding Florida Water". As an aquatic preserve, Apalachicola Bay was automatically designated an Outstanding Florida Water. Through this designation, ambient conditions become the water quality standard for the preserve, thereby providing a legal means of preventing any degradation to the preserve's water quality. Chapter 17-4, F.A.C., addresses permit requirements and Chapter 17-312, F.A.C., covers dredge and fill activities.

The DER Office of Coastal Management is charged with coordinating activities related to coastal management and reviewing federal actions for consistency with the State Coastal Management Program. The Office of Coastal Management also awards grants for research and management planning. Through this grant program several studies, resource documents, and management programs have been developed for the preserve area including: a dredge material disposal plan (Leitman et al., 1986); a resource inventory (Edmiston and Tuck, 1987); an assessment of the impacts of Sikes Cut on the ecology of the estuary; the monitoring of bottom sediments as part of a state-wide program; and, funds to develop several land use ordinances including a county storm-water management program.

Department of Community Affairs

The Department of Community Affairs (DCA) is responsible for coordinating Developments of Regional Impact (DRI), designating Areas of Critical State Concern (ACSC), and overseeing the local planning process.

DRI's are major developments that may affect more than one county and require regional review from neighboring local governments, the regional planning council, and state agencies. A residential and proposed commercial development on the western portion of St. George Island was designated a DRI in 1977. Specific plans for the commercial area have not been approved by the county or state. A second DRI, Greenpoint, was sited east of Eastpoint, several miles from the boundary of the aquatic preserve.

The ACSC program is intended to protect areas of the state where land development has, or may potentially endanger natural resources. Through the Apalachicola Bay Protection Act of 1985 the entire area surrounding the aquatic preserve was designated an ACSC. After this area was designated, a Resource Planning and Management Committee (RPMC) was established. The RPMC evaluates the resources and the local government's land use practices, and makes recommendations to local governments on how to improve land use practices to ensure orderly, well planned growth that will protect critical resources. Under ACSC designation local governments are required to notify DCA of any application for development permits, and the entire land development process requires state intervention and approval.

The DCA also oversees the development of Local Government Comprehensive Plans for counties and municipalities. Local governments are required to adopt land development regulations which are consistent with the adopted local comprehensive plan within one year after submission of their plan for review and approval by the DCA.

Department of Agriculture and Consumer Services

The Department of Agriculture and Consumer Services (DACS) is responsible for regulating pesticide usage, overseeing forestry operations, and overseeing designated plant species. DACS oversees forestry operations in the Apalachicola River valley and Tate's Hell Swamp to assure that operations are consistent with Best Management Practices and is involved in the management of the Lower Apalachicola Environmentally Endangered Lands tract.

Department of Transportation

The Department of Transportation (DOT) is responsible for the planning and construction of State Roads in Franklin County. The DOT also updates a state-wide aerial photographic survey every four years.

Department of State

The Department of State, Division of Historical Resources (DHR) has responsibility for protecting archaeological and historical sites. This includes cultural resources located on state-owned sovereignty submerged lands.

Department of Health and Rehabilitative Services

The Department of Health and Rehabilitative Services (HRS) administers septic tank and mosquito control programs at a state level. Proper installation and maintenance of septic tank systems in the watersheds of the preserve is essential to the protection of estuarine water quality, especially in an estuary where oysters are harvested.

Although mosquito control serves a useful public function, the effects of pesticides in the waters of the preserve can be a primary concern. DNR staff are involved in the management programs developed by the Florida Coordinating Council on Mosquito Control, and subsequent policy recommendations resulting from this group will be evaluated for their potential effects on the aquatic preserve.

Office of Planning and Budgeting

The Office of Planning and Budgeting in the Executive Office of the Governor is responsible for administering project reviews applicable to Florida's Coastal Management Program and the Federal consistency program in conjunction with DER. This process incorporates all projects in the state that involve federal permitting, federal assistance, or direct federal activity. Each project must undergo this additional review to determine if the project is consistent with the established programs, policies, and rules of the State.

Florida Sea Grant

Florida Sea Grant is a State University System program with administrative offices at the University of Florida. By using seminars, workshops, demonstrations, publications, and personal contacts, Marine Extension Agents working for Sea Grant inform the public of current issues of the sea and coast. The Sea Grant program is actively involved in Apalachicola Bay and has sponsored research (Blake and Roderick 1984; Conner et al., 1982; Graham et al., 1978; Livingston 1974; 1978, Livingston et al., 1975; 1976), an oyster management seminar (Andree, 1983), and a resource atlas for the estuary (Livingston, 1983). These and other Sea Grant publications are used in education programs within the preserve.

REGIONAL AGENCIES

In addition to state and federal agencies, two regional agencies have a major role in the use and management of the preserve: The Northwest Florida Water Management District and the Apalachee Regional Planning Council.

Northwest Florida Water Management District

The Northwest Florida Water Management District (NWFWMD) administers permitting programs for consumptive water use, management and storage of surface water well drilling and operation, regulation of artificial recharge facilities, and works of the district. This includes withdrawal of water from rivers, streams, and wells. The types of water uses permitted by the NWFWMD which could affect the Apalachicola Bay Aquatic Preserve include irrigation and public water supply.

The water management district is also involved in various studies on water supply and management that may be of use to the preserve. Under the Surface Water Improvement and Management (SWIM) program they are currently initiating a study effort to define the freshwater needs of the Apalachicola estuary. The NWFWMD also sits on the Technical Advisory Committee for the Interstate Coordinating Committee for management of the ACF system.

Through the Save Our Rivers program the NWFWMD is also involved in acquiring and managing lands. Through this program 35,000 acres of the floodplain in the middle and lower Apalachicola River have been purchased.

In 1987 the Florida Legislature directed water management districts through the SWIM act to develop and implement plans to improve the water quality and related aspects of the state's surface waters. The Apalachicola River and Bay are the two top priority designated SWIM water bodies under the NWFWMD's program. A SWIM Plan for these water bodies has been approved by the NWFWMD's governing board.

Apalachee Regional Planning Council

The Apalachee Regional Planning Council (ARPC) serves as a regional planning body for the local government of Franklin County. Among its duties, the ARPC : aids local governments with planning expertise; is the regional representative for the DRI review process; serves as a clearinghouse for state and federal projects and programs; conveys information from the local governments to the state and federal levels; assists local governments in getting grant aids; and prepares and administers the Regional Policy Plan.

The DRI review of projects which affect the preserve will be reviewed by both the central office staff and field personnel. DRI's for marinas, subdivisions adjacent to the preserve, and commercial or industrial developments will be reviewed closely for their potential impact on the preserve.

LOCAL GOVERNMENT

The Apalachicola Bay Aquatic Preserve is contained entirely within Franklin County, and its northern boundary is adjacent to the city of Apalachicola. No other incorporated areas lie adjacent to or within the preserve's boundaries. The key area of interaction between county and/or municipal government and the Apalachicola Bay Aquatic Preserve is in the area of land use on the adjacent uplands and its associated impacts on and uses of the aquatic resources of the Preserve. To this end, there are two basic areas of concern: local government comprehensive plans and local ordinances and regulations.

Local Government Comprehensive Plans

Local (municipal and county) governments are required by the Local Government Comprehensive Planning Act of 1975 (Section 163.3161, F.S.), (as amended by Chapter 85-55, Laws of Florida, to the Local Government Comprehensive Planning and Land Development Regulation Act) to develop and adopt comprehensive plans to guide their future development. The plans are to be composed of elements relating to different governmental functions (i.e., housing, physical facilities, conservation, land use, coastal zone protection, etc.). These plans must meet the approval of state agencies and be consistent with minimum standards set in Chapter 9J-5, F.A.C.

The coastal management element of the LGCP, along with the land use and conservation elements, establishes long range plans for orderly, and balanced development, with particular attention to the identification and protection of environmental resources in the planning area. Conformance with the criteria, policies, and practices of a local government comprehensive plan is required for all development within the local government jurisdiction.

Local Development Codes

The local development and zoning codes (e.g., building codes) provide the major local regulation that defines what an owner can do on a particular parcel of property. The zoning prescribes the allowable uses and the intensity of those uses. Certain land uses and land use intensities adjacent to an aquatic preserve can lead to profound impacts on the resources of the preserve.

Within one year after the approval of their Local Government Comprehensive Plan, local governments are required to amend their land development regulations to be consistent with the provisions of the plan.

OTHER ORGANIZATIONS

This section reviews organizations that have an interest in the Apalachicola Bay Aquatic Preserve, but are non-govern-mental entities. This includes environmental interest groups (i.e., Audubon Society, Sierra Club, Florida Defenders of the Environment, Chipola Basin Protective Group, Friends of the Reserve, and Native Plant Society), fishing and sport interest groups (i.e., Florida League of Anglers, Organized Fishermen of Florida, S.E. Fisheries Association, Franklin County Seafood Workers Association), universities that have research activities in the preserve (Florida State University, University of Florida, University of South Florida), recreational groups (Apalachee Canoe Club) and other interest groups or individuals.

In the past, some of these groups have made substantive contributions to the management and protection of the preserve. The Florida Defenders of the Environment sponsored a conference which provided the first compilation of research in the basin in 1976 (Livingston and Joyce, 1977) and currently has a staff position dedicated solely to management and protection of the river and bay system. The Departments of Oceanography, Geology and Biological Sciences, Florida State University have had numerable theses and dissertations devoted towards better understanding the ecology and physical morphology of the estuary, as well the biology of individual species which inhabit the estuary. Significant research has also been conducted by professors at the University, including the research efforts of Dr. R.J. Livingston, who has been collecting continuous field data since 1972. His research has included comprehensive analyses of the changes in system functions over space and time, populations and community response, sources of energy flows, and trophic interrelation-ships. Livingston (1984) provides the most recent synthesis of this work. He was also instrumental in organizing the 1976 conference discussed above, and has been closely involved with decision-makers in Franklin County in an effort to integrate his research findings into county land use decisions.

Effective management of the preserve will be enhanced by continued support from organized groups, associations, and individuals. Citizen support organizations are particularly valuable through the provision of technical, non-technical, and financial assistance. The relationship of non-govern-mental entities to the preserve will include the coordination of activities such as scientific research, environmental education, and other activities relating to the protection, management or improved understanding of the preserve.

CHAPTER IX

STAFFING AND FISCAL NEEDS

Historically, the Aquatic Preserve Program has been largely dependent on federal coastal zone grant funds for its operation, and as a result, the funding of both field positions and central office positions has been limited.

In order for the Apalachicola Bay Aquatic Preserve to be managed in accordance with goals, objectives, and tasks set forth in this plan, adequate funding, staffing, and equipment are essential. Currently there is no legislative funding for staffing at the Apalachicola Bay Aquatic Preserve. Instead, management is conducted on a part-time basis by the manager of the Alligator Harbor Aquatic Preserve and permitting is handled by District staff in Pensacola. Many of the tasks discussed in the management action program for the Apalachicola Bay Aquatic Preserve, however, are already being conducted by staff of the Apalachicola National Estuarine Research Reserve.

Because of the overlapping focus of the Research Reserve and aquatic preserve programs, it is anticipated that the above program can be implemented with part-time assistance from staff at the St. Joseph Bay and/or Alligator Harbor Aquatic Preserves and/or by sharing a staff position with the Research Reserve. This time estimate does not include staff-time by DNR and other state agency employees involved intermittently in the various tasks necessary to manage and conserve the natural resources of the aquatic preserve. An annual review of the accomplishments of the program relative to the tasks listed in Chapter VII will help to determine if the initial staffing estimate is adequate to meet the legislative intent of the program.

A budget covering projected staff time, equipment, travel, and other expenses for this area is found in Table 5. The budget is required to fulfill the short-range needs of the preserve as described in this management plan, and accomplish the Department of Natural Resources goal of on-site management of all aquatic preserves by 1991, as expressed in the Agency Functional Plan.

TABLE 5

ESTIMATED BUDGET FOR FY 1991-1992 FOR THE APALACHICOLA BAY AQUATIC PRESERVE

SALARY	FIRST YEAR	SECOND YEAR
ES II (including benefits) (15 hours per week average)	$ 12,000	$ 12,365
Subtotal	$ 12,000	$ 12,365
OPERATING CAPITAL OUTLAY		
Charged to the St. Joseph Bay and Alligator Harbor aquatic preserves.		
OPERATING EXPENSES		
Travel, Gas, Phone	$ 4,500	$ 4,500
TOTAL COST	$ 16,500	$ 16,865

CHAPTER X

RESOURCE AND ACTIVITY MONITORING PROGRAM

To ensure that this management plan is effectively implemented, on-site staffing is imperative. The position of a preserve manager will be necessary in order to institute programs targeted at (1) monitoring the status of natural resources, (2) monitoring usage of the aquatic preserve, and (3) tracking progress and accomplishments that are directed at retaining the original integrity and value of the preserve.

RESOURCE MONITORING

In managing an aquatic preserve it is important to regularly review whether the efforts of the Aquatic Preserve Program and other federal, state, and local programs to protect the natural resources are meeting their objectives. Therefore, the status of the natural resources in the preserve will be monitored on a regular basis. Features which should be monitored include, but should not be limited to, trends in water and sediment quality (including monitoring point or non-point sources of pollution), areal coverage, location, and health of salt marshes and seagrass communities, recreational and commercial harvesting of marine resources, and development trends on adjacent uplands. As Resource Management Task 5-5 of the Apalachicola Bay Aquatic Preserve Management Action Plan (Chapter VII) provides, the preserve manager shall annually prepare a report describing the state of the environment of the aquatic preserve. This report will be the heart of the resource monitoring program. It should discuss the findings of the resource monitoring program; most recent water quality data and any trends in water quality; any changes in resource community boundaries; status of designated species within the aquatic preserve; permit applications within the preserve; land development trends on adjacent uplands; and any enforcement actions necessary.

To monitor changes in the natural resources, use of a regional geographic information system (GIS) is highly recommended. A GIS is a computer-based system that is used to capture, edit, display, and analyze geographic information. The first GIS programs were developed about 20 years ago to manage large collections of natural resource and environmental information. Since their development, they have been used in other areas such as utilities mapping, inventory management, and land use planning; however, their most important function continues to be natural resource management. For the Apalachicola Bay Aquatic Preserve, the GIS will be developed and used in coordination with the Apalachicola River and Bay National Estuarine Research Reserve.

Future use of a GIS system at the Apalachicola Bay Aquatic Preserve could include the periodic inventory, compilation, and analysis of temporal and spatial data concerning the present state of the natural resources within the preserve. Historical aerial photography could be computerized for comparison with later data to conduct a temporal analysis of resource abundance. Detailed monitoring of any re-vegetation or restoration efforts could also be computer analyzed. The on-line access to these natural resource data bases will facilitate informed management decisions concerning the use and protection of submerged lands and their resources. Cooperation and file sharing is possible with other agencies handling data with identical or similar systems.

ACTIVITY MONITORING

As human interaction in and around the aquatic preserve increases, additional pressures are to be expected in the form of recreational and development activities. Monitoring the type of use of activities and their compatibility, their frequency of occurrence, as well as proven and expected detrimental effects on the preserve's natural resources, will provide a foundation to amending the policies of the aquatic preserve to protect its natural resources.

ACCOMPLISHMENTS AND PROGRESS MONITORING

For this management plan to be effectively implemented, it is necessary to monitor the accomplishments of the on-site program on a regular basis. Therefore as noted above, staff of the Apalachicola Bay Aquatic Preserve will be required to annually submit a report to the main office and the Franklin County Commission on the state of the natural environment of the aquatic preserve, what was done in the previous year toward the tasks listed in Chapter VII, and what are needs and directions of the aquatic preserve for the coming year. This report should be closely keyed to the tasks listed in Chapter VII and will serve as the basis for judging the adequacy of staffing and funding estimates listed in Chapter IX.

Specific information which should be included in the annual state of the preserve report includes any noted change in acreage or health of seagrasses and salt marshes; numbers of permits applied for, issued, and denied; whether any exemptions to standards were granted; number of structures built adjacent to the preserve; any changes in water quality within the preserve and whether any violations were uncovered.

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CHAPTER 18-20
FLORIDA AQUATIC PRESERVES

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18-20.001 Intent.

(1) All sovereignty lands within a preserve shall be managed primarily for the maintenance of essentially natural conditions, the propagation of fish and wildlife, and public recreation, including hunting and fishing where deemed appropriate by the board, and the managing agency.

(2) The aquatic preserves which are described in 73-534, Laws of Florida, Sections 258.39, 258.391, 258.392 and 258.393, Florida Statutes, future aquatic preserves established pursuant to general or special acts of the legislature, and in Rule 18-20.002, Florida Administrative Code, were established for the purpose of being preserved in an essentially natural or existing condition so that their aesthetic, biological and scientific values may endure for the enjoyment of future generations.

(3) The preserves shall be administered and managed in accordance with the following goals:

(a) To preserve, protect, and enhance these exceptional areas of sovereignty submerged lands by reasonable regulation of human activity within the preserves through the development and implementation of a comprehensive management program;

(b) To protect and enhance the waters of the preserves so that the public may continue to enjoy the traditional recreational uses of those waters such as swimming, boating, and fishing;

(c) To coordinate with federal, state, and local agencies to aid in carrying out the intent of the Legislature in creating the preserves;

(d) To use applicable federal, state, and local management programs, which are compatible with the intent and provisions of the act and these rules, and to assist in managing the preserves;

(e) To encourage the protection, enhancement or restoration of the biological, aesthetic, or scientific values of the preserves, including but not limited to the modification of existing manmade conditions toward their natural condition, and discourage activities which would degrade the aesthetic, biological, or scientific values, or the quality, or utility of a preserve, when reviewing applications, or when developing and implementing management plans for the preserves;

(f) To preserve, promote, and utilize indigenous life forms and habitats, including but not limited to: sponges, soft coral, hard corals, submerged grasses, mangroves, salt water marshes, fresh water marshes, mud flats, estuarine, aquatic, and marine reptiles, game and non-game fish species, estuarine, aquatic and marine invertebrates, estuarine, aquatic and marine mammals, birds, shellfish and mollusks;

(g) To acquire additional title interests in lands wherever such acquisitions would serve to protect or enhance the biological, aesthetic, or scientific values of the preserves;

(h) To maintain those beneficial hydrologic and biologic functions, the benefits of which accrue to the public at large.

(4) Nothing in these rules shall serve to eliminate or alter the requirements or authority of other governmental agencies, including counties and municipalities, to protect or enhance the preserves provided that such requirements or authority are not inconsistent with the act and this chapter.

Specific Authority 120.53, 258.43(1) FS. Law Implemented 258.35, 258.36, 258.37, 258.39, 258.393 FS. Chapter 80-280 Laws of Florida. History—New 2-23-81, Amended 8-7-85, Formerly 16Q-20.01, Transferred from 16Q-20.001.

18-20.002 Boundaries and Scope of the Preserves.

(1) These rules shall only apply to those sovereignty lands within a preserve, title to which is vested in the board, and those other lands for which the board has an appropriate instrument in writing, executed by the owner, authorizing the inclusion of specific lands in an aquatic preserve pursuant to Section 2(2) of Chapter 73-534, Laws of Florida, Sections 258.40(1) and 258.41(5), Florida Statutes, future aquatic preserves established through general or special acts of the legislature, and pursuant to Rule 18-20.008, Florida Administrative Code. Any publicly owned and maintained navigation channel authorized by the United States Congress, or other public works project authorized by the United States Congress, designed to improve or maintain commerce and navigation shall be deemed to be excluded from the

provisions of this chapter, pursuant to Subsection 258.40(2), Florida Statutes. Furthermore, all lands lost by avulsion or by artificially induced erosion shall be deemed excluded from the provisions of this chapter pursuant to Subsection 258.40(3), Florida Statutes.

(2) These rules do not apply to Boca Ciega Bay, Pinellas County or Biscayne Bay Aquatic Preserves.

(3) These rules are promulgated to clarify the responsibilities of the board in carrying out its land management functions as those functions apply within the preserves. Implementation and responsibility for environmental permitting of activities and water quality protection within the preserves are vested in the Department of Environmental Regulation. Since these rules are considered cumulative with other rules, a person planning an activity within the preserves should also consult the other applicable department rules (Chapter 18-21, Florida Administrative Code, for example) as well as the rules of the Department of Environmental Regulation.

(4) These rules shall not affect previous actions of the board concerning the issuance of any easement or lease; or any disclaimer concerning sovereignty lands.

(5) The intent and specific provisions expressed in 18-20.001(e) and (f) apply generally to all existing or future aquatic preserves within the scope of this chapter. Upon completion of a resource inventory and approval of a management plan for a preserve, pursuant to 18-20.013, the type designation and the resource sought to be preserved may be readdressed by the Board.

(6) For the purpose of clarification and interpretation, the legal description set forth as follows do not include any land which is expressly recognized as privately owned upland in a pre-existing recorded mean high water line settlement agreement between the board and a private owner or owners. Provided, however, in those instances wherein a settlement agreement was executed subsequent to the passage of the Florida Coastal Mapping Act, the determination of the mean high water line shall be in accordance with the provisions of such act.

(7) Persons interested in obtaining details of particular preserves should contact the Bureau of State Lands Management, Department of Natural Resources, 3900 Commonwealth Blvd., Tallahassee, FL 32303 (telephone 904-488-2297).

(a) The preserves are described as follows:

1. Fort Clinch State Park Aquatic Preserve, as described in the Official Records of Nassau County in Book 108, pages 343-346, and in Book 111, page 409.

2. Nassau River — St. Johns River Marshes Aquatic Preserve, as described in the Official Records of Duval County in Volume 3183, pages 547-552, and in the Official Records of Nassau County in Book 108, pages 232-237.

3. Pellicer Creek Aquatic Preserve, as described in the Official Records of St. Johns County in Book 181, pages 363-366, and in the Official Records of Flagler County in Book 33, pages 131-134.

4. Tomoka Marsh Aquatic Preserve, as described in the Official Records of Flagler County in Book 33, pages 135-138, and in the Official Records of Volusia County in Book 1244, pages 615-618.

5. Wekiva River Aquatic Preserve, as described in Section 258.39(30), F.S.

6. Mosquito Lagoon Aquatic Preserve, as described in the Official Records of Volusia County in Book 1244, pages 619-623, and in the Official Records of Brevard County in Book 1143, pages 190-194.

7. Banana River Aquatic Preserve, as described in the Official Records of Brevard County in Book 1143, pages 195-198, less those lands dedicated to the U. S. A. prior to the enactment of the act, until such time as the U. S. A. no longer wishes to maintain such lands for the purpose for which they were dedicated, at which time such lands would revert to the board, and be managed as part of the preserve.

8. Indian River — Malabar to Sebastian Aquatic Preserve, as described in the Official Records of Brevard County in Book 1143, pages 199-202, and in the Official Records of Indian River County in Book 368, pages 5-8.

9. Indian River — Vero Beach to Fort Pierce Aquatic Preserve, as described in the Official Records of Indian River County in Book 368, pages 9-12, and in the Official Records of St. Lucie County in Book 187, pages 1083-1086.

10. Jensen Beach to Jupiter Inlet Aquatic Preserve, as described in the Official Records of St. Lucie County in Book 218, pages 2865-2869.

11. North Fork, St. Lucie Aquatic Preserve, as described in the Official Records of Martin County in Book 337, pages 2159-2162, and in the Official Records of St. Lucie County in Book 201, pages 1676-1679.

12. Loxahatchee River — Lake Worth Creek Aquatic Preserve, as described in the Official Records of Martin County in Book 320, pages 193-196, and in the Official Records of Palm Beach County in Volume 1860, pages 806-809.

13. Biscayne Bay — Cape Florida to Monroe County Line Aquatic Preserve, as described in the Official Records of Dade County in Book 7055, pages 852-856, less, however, those lands and waters as described in Section 258.165, F. S., (Biscayne Bay Aquatic Preserve Act of 1974), and those lands and waters within the Biscayne National Park.

14. Lignumvitae Key Aquatic Preserve, as described in the Official Records of Monroe County in Book 502, pages 139-142.

15. Coupon Bight Aquatic Preserve, as described in the Official Records of Monroe County in Book 502, pages 143-146.

16. Cape Romano — Ten Thousand Islands Aquatic Preserve, as described in the Official Records of Collier County in Book 381, pages 298-301.

17. Rookery Bay Aquatic Preserve, as described in Section 258.39(31), FS.

18. Estero Bay Aquatic Preserve as described in Section 258.39(28), Florida Statutes.

19. Pine Island Sound Aquatic Preserve, as described in the Official Records of Lee County in Book 648, pages 732-736.

20. Matlacha Pass Aquatic Preserve, as described in the Official Records of Lee County in Book 800, pages 725-728.

21. Gasparilla Sound — Charlotte Harbor Aquatic Preserve, as described in Section 258.392, F.S.

22. Cape Haze Aquatic Preserve, as described in Section 258.39(29), F.S.

23. Cockroach Bay Aquatic Preserve, as described in Section 258.391, F.S.

24. St. Martins Marsh Aquatic Preserve, as described in the Official Records of Citrus County in Book 276, pages 238-241.

25. Alligator Harbor Aquatic Preserve, as described in the Official Records of Franklin County in Volume 98, pages 82-85.

26. Apalachicola Bay Aquatic Preserve, as described in the Official Records of Gulf County in Book 46, pages 77-81, and in the Official Records of Franklin County in Volume 98, pages 102-106.

27. St. Joseph Bay Aquatic Preserve, as described in the Official Records of Gulf County in Book 46, pages 73-76.

28. St. Andrews State Park Aquatic Preserve, as described in the Official Records of Bay County in Book 379, pages 547-550.

29. Rocky Bayou State Park Aquatic Preserve, as described in the Official Records of Okaloosa County in Book 593, pages 742-745.

30. Yellow River Marsh Aquatic Preserve, as described in the Official Records of Santa Rosa County in Book 206, pages 568-571.

31. Fort Pickens State Park Aquatic Preserve, as described in the Official Records of Santa Rosa County in Book 220, pages 60-63, in the Official Records of Escambia County in Book 518, pages 659-662, less the lands dedicated to the U. S. A. for the establishment of the Gulf Islands National Seashore prior to the enactment of the act, until such time as the U. S. A. no longer wishes to maintain such lands for the purpose for which they were dedicated, at which time such lands would revert to the board and be managed as part of the preserve.

32. For the purpose of this section the boundaries of the Lake Jackson Aquatic Preserve, shall be the body of water in Leon County known as Lake Jackson in Sections 1, 2, 3, 5, 10, 11 and 14, Township 1 North, Range 1 West and Sections 11, 12, 13, 14, 15, 21, 22, 23, 26, 27, 28, 29, 32, 33, 34, and 35, Township 2 North, Range 1 West lying below the ordinary high water line. Such lands shall include the submerged bottom lands and the water column upon such lands, as well as all publicly owned islands, within the boundaries of the preserve. Any privately held upland within the boundaries of the preserve shall be deemed to be excluded therefrom; provided that the Board may negotiate an arrangement with any such private upland owner by which such land may be included in the preserve.

33. Terra Ceia Aquatic Preserve, as described in Section 258.393, Florida Statutes.

34. Future aquatic preserves established pursuant to general or special acts of the legislature.

Specific Authority 120.53, 258.43(1) FS. Law Implemented 258.39, 258.391, 258.392, 258.393, 258.40, 258.41, 258.42, 258.43, 258.44, 258.45 FS. History—New 2-23-81, Amended 8-7-85, Formerly 16Q-20.02, Transferred from 16Q-20.002.

18-20.003 Definitions. When used in these rules, the following words shall have the indicated meaning unless, the context clearly indicates otherwise:

(1) "Act" means the provisions of Section 258.35 through 258.46, F.S., the Florida Aquatic Preserve Act.

(2) "Activity" means any project and such other human action within the preserve requiring board approval for the use, sale, lease or transfer of interest in sovereignty lands or materials, or which may require a license from the Department of Environmental Regulation.

(3) "Aesthetic values" means scenic characteristics or amenities of the preserve in its essentially natural state or condition, and the maintenance thereof.

(4) "Applicant" means any person making application for a permit, license, conveyance of an interest in state owned lands or any other necessary form of governmental approval in order to perform an activity within the preserve.

(5) "Beneficial biological functions" means interactions between flora, fauna and physical or chemical attributes of the environment, which provide benefits that accrue to the public at large, including, but not limited to: nutrient, pesticide and heavy metal uptake; sediment retention; nutrient conversion to biomass; nutrient recycling and oxygenation.

(6) "Beneficial hydrological functions" means interactions between flora, fauna and physical geological or geographical attributes of the environment, which provide benefits that accrue to the public at large, including, but not limited to: retardation of storm water flow; storm water retention; and water storage, and periodical release;

(7) "Biological values" means the preservation and promotion of indigenous life forms and habitats including, but not limited to: sponges, soft corals, hard corals, submerged grasses, mangroves, saltwater marshes, fresh water marshes, mud flats, marine, estuarine, and aquatic reptiles, games and non-games fish species, marine, estuarine, and aquatic mammals, marine, estuarine, and aquatic invertebrates, birds and shellfish.

(8) "Board" means the Governor and Cabinet sitting as the Board of Trustees of the Internal Improvement Trust Fund.

(9) "Channel" means a trench, the bottom of which is normally covered entirely by water, with the upper edges of its sides normally below water.

(10) "Commercial, industrial and other revenue generating/income related docks" means docking facilities for an activity which produces income, through rental or any other means, or which serves as an accessory facility to other rental, commercial or industrial operations. It shall include, but not be limited to docking for: marinas, restaurants, hotels, motels, commercial fishing, shipping, boat or ship construction, repair, and sales.

(11) "Department" means the State of Florida Department of Natural Resources, as administrator for the board.

(12) "Division" means the Division of State Lands, which performs all staff duties and functions related to the administration of lands title to which is, or will be, vested in the board, pursuant to section 253.002, F.S.

(13) "Dock" means a fixed or floating structure, including moorings, used for the purpose of berthing buoyant vessels either temporarily or indefinitely.

(14) "Essentially natural condition" means those functions which support the continued existence or encourage the restoration of the diverse population of indigenous life forms and habitats to the extent they existed prior to the significant development adjacent to and within the preserve.

(15) "Extreme hardship" means a significant burden, unique to the applicant and not shared by property owners in the area. Self-imposed circumstances caused to any degree by actions of any person subsequent to the enactment of the Act shall not be construed as an extreme hardship. Extreme hardship under this act shall not be construed to include any hardship which arises in whole or in part from the effect of other federal, state or local laws, ordinances, rules or regulations. The term may be inherent in public projects which are shown to be a public necessity.

(16) "Fill" means materials from any source, deposited by any means onto sovereignty lands, either for the purpose of creating new uplands or for any other purpose, including spoiling of dredged materials. For the purpose of this rule, the placement of pilings or riprap shall not be considered to be filling.

(17) "Lease" means a conveyance of interest in lands, title to which is vested in the board, granted in accordance with specific terms set forth in writing.

(18) "Marina" means a small craft harbor complex used primarily for recreation.

(19) "Oil and gas transportation facilities" means those structures necessary for the movement of oil and gas from the production site to the consumer.

(20) "Person" means individuals, minors, partnerships, corporations, joint ventures, estates, trusts, syndicates, fiduciaries, firms, and all other associations and combinations, whether public or private, including governmental entities.

(21) "Pier" means a structure in, on, or over sovereignty lands, which is used by the public primarily for fishing, swimming, or viewing the preserve. A pier shall not include a dock.

(22) "Preserve" means any and all of those areas which are exceptional areas of sovereignty lands and the associated water body so designated in Section 258.39, 258.391, and 258.392, F.S., including all sovereignty lands, title to which is vested in the board, and such other lands as the board may acquire or approve for inclusion, and the water column over such lands, which have been set aside to be maintained in an essentially natural or existing condition of indigenous flora and fauna and their supporting habitat and the natural scenic qualities and amenities thereof.

(23) "Private residential single dock" means a dock which is used for private, recreational or leisure purposes for a single family residence, cottage or other such single dwelling unit and which is designed to moor no more than two boats.

(24) "Private residential multi-slip dock" means a docking facility which is used for private recreational or leisure purposes for multi-unit residential dwellings which shall include but is not limited to condominiums, townhouses, subdivisions and other such dwellings or residential areas and which is designed to moor three or more boats. Yacht clubs associated with residential developments, whose memberships or utilization of the docking facility requires some real property interest in the residential area, shall also be included.

(25) "Public interest" means demonstrable environmental, social, and economic benefits which would accrue to the public at large as a result of a proposed action, and which would clearly exceed all demonstrable environmental, social, and economic costs of the proposed action. In determining the public interest in a request for use, sale, lease, or transfer of interest in sovereignty lands or severance of materials from sovereignty lands, the board shall consider the ultimate project and purpose to be served by said use, sale, lease, or transfer of lands or materials.

(26) "Public navigation project" means a project primarily for the purpose of navigation which is authorized and funded by the United States Congress or by port authorities as defined by Section 315.02(2), F.S.

(27) "Public necessity" means the works or improvements required for the protection of the health and safety of the public, consistent with the Act and these rules, for which no other reasonable alternative exists.

(28) "Public utilities" means those services, provided by persons regulated by the Public Service Commission, or which are provided by rural cooperatives, municipalities, or other governmental agencies, including electricity, telephone, public water and wastewater services, and structures necessary for the provision of these services.

(29) "Quality of the preserve" means the degree of the biological, aesthetic and scientific values of the preserve necessary for present and future enjoyment of it in an essentially natural condition.

(30) "Resource management agreement" means a contractual agreement between the board and one

or more parties which does not create an interest in real property but merely authorizes conduct of certain management activities on lands held by the board.

(31) "Resource Protection Area (RPA) 1" — Areas within the aquatic preserves which have resources of the highest quality and condition for that area. These resources may include, but are not limited to corals; marine grassbeds; mangrove swamps; salt-water marsh; oyster bars; archaeological and historical sites; endangered or threatened species habitat; and, colonial water bird nesting sites.

(32) "Resource Protection Area 2" — Areas within the aquatic preserves which are in transition with either declining resource protection area 1 resources or new pioneering resources within resource protection area 3.

(33) "Resource Protection Area 3" — Areas within the aquatic preserve that are characterized by the absence of any significant natural resource attributes.

(34) "Riparian rights" means those rights incident to lands bordering upon navigable waters, as recognized by the courts of this state and common law.

(35) "Sale" means a conveyance of interest in lands, by the board, for consideration.

(36) "Scientific values" means the preservation and promotion of certain qualities or features which have scientific significance.

(37) "Shore protection structure" means a type of coastal construction designed to minimize the rate of erosion. Coastal construction includes any work or activity which is likely to have a material physical effect on existing coastal conditions or natural shore processes.

(38) "Sovereignty lands" means those lands including, but not limited to: tidal lands, islands, sandbars, shallow banks, and lands waterward of the ordinary or mean highwater line, to which the State of Florida acquired title on March 3, 1845, by virtue of statehood, and of which it has not since divested its title interest. For the purposes of this rule sovereignty lands shall include all submerged lands within the boundaries of the preserve, title to which is held by the board.

(39) "Spoil" means materials dredged from sovereignty lands which are redeposited or discarded by any means, onto either sovereignty lands or uplands.

(40) "Transfer" means the act of the board by which any interest in lands, including easements, other than sale or lease, is conveyed.

(41) "Utility of the preserve" means fitness of the preserve for the present and future enjoyment of its biological, aesthetic and scientific values, in an essentially natural condition.

(42) "Water dependent activity" means an activity which can only be conducted on, in, over, or adjacent to, water areas because the activity requires direct access to the water body or sovereignty lands for transportation, recreation, energy production or transmission, or source of water and where the use of the water or sovereignty lands is an integral part of the activity.

Specific Authority 258.43(1) FS. Law Implemented 258.37, 258.43(1) FS. History—New 2-25-81. Amended 8-7-85. Formerly 16Q-20.03. Transferred from 16Q-20.003.

18-20.004 Management Policies, Standards and Criteria. The following management policies, standards and criteria are supplemental to Chapter 18-21, Florida Administrative Code (Sovereignty Submerged Lands Management) and shall be utilized in determining whether to approve, approve with conditions or modifications or deny all requests for activities on sovereignty lands in aquatic preserves.

(1) GENERAL PROPRIETARY

(a) In determining whether to approve or deny any request the Board will evaluate each on a case-by-case basis and weigh any factors relevant under Chapter 253 and/or 258, Florida Statutes. The Board, acting as Trustees for all state-owned lands, reserves the right to approve, modify or reject any proposal.

(b) There shall be no further sale, lease or transfer of sovereignty lands except when such sale, lease or transfer is in the public interest (see Section 18-20.004(2) Public Interest Assessment Criteria).

(c) There shall be no construction of seawalls waterward of the mean or ordinary high water line, or filling waterward of the mean or ordinary high water line except in the case of public road and bridge projects where no reasonable alternative exists.

(d) There shall, in no case, be any dredging waterward of the mean or ordinary high water line for the sole or primary purpose of providing fill for any area landward of the mean or ordinary high water line.

(e) A lease, easement or consent of use may be authorized only for the following activities:

1. a public navigation project;

2. maintenance of an existing navigational channel;

3. installation or maintenance of approved navigational aids;

4. creation or maintenance of a commercial/industrial dock, pier or a marina;

5. creation or maintenance of private docks for reasonable ingress and egress of riparian owners;

6. minimum dredging for navigation channels attendant to docking facilities;

7. creation or maintenance of a shore protection structure;

8. installation or maintenance of oil and gas transportation facilities;

9. creation, maintenance, replacement or expansion of facilities required for the provision of public utilities; and

10. other activities which are a public necessity or which are necessary to enhance the quality or utility of the preserve and which are consistent with the act and this chapter.

(f) For activities listed in paragraphs 18-20.004(1)(e)1.—10. above, the activity shall be

designed so that the structure or structures to be built in, on or over sovereignty lands are limited to structures necessary to conduct water dependent activities.

(g) For activities listed in paragraphs 18-20.004(1)(e)7., 8., 9. and 10. above, it must be demonstrated that no other reasonable alternative exists which would allow the proposed activity to be constructed or undertaken outside the preserve.

(h) The use of state-owned lands for the purpose of providing private or public road access to islands where such access did not previously exist shall be prohibited. The use of state-owned lands for the purpose of providing private or public water supply to islands where such water supply did not previously exist shall be prohibited.

(i) Except for public navigation projects and maintenance dredging for existing channels and basins, any areas dredged to improve or create navigational access shall be incorporated into the preempted area of any required lease or be subject to the payment of a negotiated private easement fee.

(j) Private residential multi-slip docking facilities shall require a lease.

(k) Aquaculture and beach renourishment activities which comply with the standards of this rule chapter and Chapter 18-21, Florida Administrative Code, may be approved by the board, but only subsequent to a formal finding of compatibility with the purposes of Chapter 258, Florida Statutes, and this rule chapter.

(l) Other uses of the preserve, or human activity within the preserve, although not originally contemplated, may be approved by the board, but only subsequent to a formal finding of compatibility with the purposes of Chapter 258, Florida Statutes, and this rule chapter.

(2) PUBLIC INTEREST ASSESSMENT CRITERIA

In evaluating requests for the sale, lease or transfer of interest, a balancing test will be utilized to determine whether the social, economic and/or environmental benefits clearly exceed the costs.

(a) GENERAL BENEFIT/COST CRITERIA:

1. any benefits that are balanced against the costs of a particular project shall be related to the affected aquatic preserve;

2. in evaluating the benefits and costs of each request, specific consideration and weight shall be given to the quality and nature of the specific aquatic preserve. Projects in the less developed, more pristine aquatic preserves such as Apalachicola Bay shall be subject to a higher standard than the more developed urban aquatic preserves such as Boca Ciega Bay; and,

3. for projects in aquatic preserves with adopted management plans, consistency with the management plan will be weighed heavily when determining whether the project is in the public interest.

(b) BENEFIT CATEGORIES:

1. public access (public boat ramps, boatslips, etc.);

2. provide boating and marina services (repair, pumpout, etc.);

3 improve and enhance public health, safety, welfare, and law enforcement;

4. improved public land management;

5. improve and enhance public navigation;

6. improve and enhance water quality;

7. enhancement/restoration of natural habitat and functions; and

8. improve/protect endangered/threatened/unique species.

(c) COSTS:

1. reduced/degraded water quality;

2. reduced/degraded natural habitat and function;

3. destruction, harm or harassment of endangered or threatened species and habitat;

4. preemption of public use;

5. increasing navigational . hazards and congestion;

6. reduced/degraded aesthetics; and

7. adverse cumulative impacts.

(d) EXAMPLES OF SPECIFIC BENEFITS:

1. donation of land, conservation easements, restrictive covenants or other title interests in or contiguous to the aquatic preserve which will protect or enhance the aquatic preserve;

2. providing access or facilities for public land management activities;

3. providing public access easements and/or facilities, such as beach access, boat ramps, etc.;

4. restoration/enhancement of altered habitat or natural functions, such as conversion of vertical bulkheads to riprap and/or vegetation for shoreline stabilization or re-establishment of shoreline or submerged vegetation;

5. improving fishery habitat through the establishment of artificial reefs or other such projects, where appropriate;

6. providing sewage pumpout facilities where normally not required, in particular, facilities open to the general public;

7. improvements to water quality such as removal of toxic sediments, increased flushing and circulation, etc.;

8. providing upland dry storage as an alternative to wetslip; and

9. marking navigation channels to avoid disruption of shallow water habitats.

(3) RESOURCE MANAGEMENT

(a) All proposed activities in aquatic preserves having management plans adopted by the Board must demonstrate that such activities are consistent with the management plan.

(b) No drilling of oil, gas or other such wells shall be allowed.

(c) Utility cables, pipes and other such structures shall be constructed and located in a manner that will cause minimal disturbance to submerged land resources such as oyster bars and submerged grass beds and do not interfere with traditional public uses.

(d) Spoil disposal within the preserves shall be strongly discouraged and may be approved only

structures shall be constructed and located in a manner that will cause minimal disturbance to submerged land resources such as oyster bars and submerged grass beds and do not interfere with traditional public uses.

(d) Spoil disposal within the preserves shall be strongly discouraged and may be approved only where the applicant has demonstrated that there is no other reasonable alternative and that activity may be beneficial to, or at a minimum, not harmful to the quality and utility of the preserve.

(4) RIPARIAN RIGHTS

(a) None of the provisions of this rule shall be implemented in a manner that would unreasonably infringe upon the traditional, common law and statutory riparian rights of upland riparian property owners adjacent to sovereignty lands.

(b) The evaluation and determination of the reasonable riparian rights of ingress and egress for private, residential multi-slip docks shall be based upon the number of linear feet of riparian shoreline.

(c) For the purposes of this rule, a private, residential, single docking facility which meets all the requirements of Rule 18-20.004(5) shall be deemed to meet the public interest requirements of Rule 18-20.004(1)(b), Florida Administrative Code. However, the applicants for such docking facilities must apply for such consent and must meet all of the requirements and standards of this rule chapter.

(5) STANDARDS AND CRITERIA FOR DOCKING FACILITIES

(a) All docking facilities, whether for a single or multi-slip residential or commercial, shall be subject to the following standards and criteria:

1. no dock shall extend waterward of the mean or ordinary high water line more than 500 feet or 20 percent of the width of the waterbody at that particular location whichever is less;

2. certain docks may fall within areas of special or unique importance. These areas may be of significant biological, scientific, historic and/or aesthetic value and require special management considerations. Modifications may be more restrictive than the normally accepted criteria. Such modifications shall be determined on a case-by-case analysis, and may include, but shall not be limited to changes in location, configuration, length, width and height;

3. the number, lengths, drafts and types of vessels allowed to utilize the proposed facility may also be stipulated; and

4. where local governments have more stringent standards and criteria for docking facilities, the more stringent standards for the protection and enhancement of the aquatic preserve shall prevail.

(b) Private residential single docks shall conform to the following specific design standards and criteria:

1. any main access dock shall be limited to a maximum width of four (4) feet;

2. the dock decking design and construction will insure maximum light penetration, with full consideration of safety and practicality;

3. the dock will extend out from the shoreline no further than to a maximum depth of minus four (— 4) feet (mean low water);

4. when the water depth is minus four (— 4) feet (mean low water) at an existing bulkhead the maximum dock length from the bulkhead shall be 25 feet, subject to modifications accommodating shoreline vegetation overhang;

5. wave break devices, when necessary, shall be designed to allow for maximum water circulation and shall be built in such a manner as to be part of the dock structure;

6. terminal platform size shall be no more than 160 square feet; and

7. dredging to obtain navigable water depths in conjunction with private residential, single dock applications is strongly discouraged.

(c) Private residential multi-slip docks shall conform to the following specific design standards and criteria:

1. the area of sovereignty, submerged land preempted by the docking facility shall not exceed the square footage amounting to ten times the riparian waterfront footage of the affected waterbody of the applicant, or the square footage attendant to providing a single dock in accordance with the criteria for private residential single docks, whichever is greater. A conservation easement or other such use restriction acceptable to the Board must be placed on the riparian shoreline, used for the calculation of the 10:1 threshold, to conserve and protect shoreline resources and subordinate/waive any further riparian rights of ingress and egress for additional docking facilities;

2. docking facilities and access channels shall be prohibited in Resource Protection Area 1 or 2, except as allowed pursuant to Section 258.42(3)(c)1., Florida Statutes, while dredging in Resource Protection Area 3 shall be strongly discouraged;

3. docking facilities shall only be approved in locations having adequate existing water depths in the boat mooring, turning basin, access channels, and other such areas which will accommodate the proposed boat use in order to insure that a minimum of one foot clearance is provided between the deepest draft of a vessel and the bottom at mean low water;

4. main access docks and connecting or cross walks shall not exceed six (6) feet in width;

5. terminal platforms shall not exceed eight (8) feet in width;

6. finger piers shall not exceed three (3) feet in width, and 25 feet in length;

7. pilings may be utilized as required to provide adequate mooring capabilities; and

8. the following provisions of Rule 18-20.004(5)(d) shall also apply to private residential multi-slip docks.

(d) Commercial, industrial and other revenue generating/income related docking facilities shall conform to the following specific design standards and criteria:

1. docking facilities shall only be located in or near areas with good circulation, flushing and adequate water depths;

2. docking facilities and access channels shall be prohibited in Resource Protection Area 1 or 2, except as allowed pursuant to Sections 258.42(3)(e)1., Florida Statutes; while dredging in Resource Protection Area 3 shall be strongly discouraged;

3. the docking facilities shall not be located in Resource Protection Area 1 or 2; however, main access docks may be allowed to pass through Resource Protection Area 1 or 2, that are located along the shoreline, to reach an acceptable Resource Protection Area 3, provided that such crossing will generate minimal environmental impact;

4. beginning July 1, 1986 new docking facilities may obtain a lease only where the local governments have an adopted marina plan and/or policies dealing with the siting of commercial/industrial and private, residential, multi-slip docking facilities in their local government comprehensive plan;

5. the siting of the docking facilities shall also take into account the access of the boat traffic to avoid marine grassbeds or other aquatic resources in the surrounding areas;

6. the siting of new facilities within the preserve shall be secondary to the expansions of existing facilities within the preserve when such expansion is consistent with the other standards;

7. the location of new facilities and expansion of existing facilities shall consider the use of upland dry storage as an alternative to multiple wet-slip docking;

8. marina siting will be coordinated with local governments to insure consistency with all local plans and ordinances;

9. marinas shall not be sited within state designated manatee sanctuaries; and

10. in any areas with known manatee concentrations, manatee warning/notice and/or speed limit signs shall be erected at the marina and/or ingress and egress channels, according to Florida Marine Patrol specifications.

(c) Exceptions to the standards and criteria listed in Rule 18-20.004(5), Florida Administrative Code, may be considered, but only upon demonstration by the applicant that such exceptions are necessary to insure reasonable riparian ingress and egress.

(6) MANAGEMENT AGREEMENTS

The board may enter into management agreements with local agencies for the administration and enforcement of standards and criteria for private residential single docks.

(7) In addition to the policies, standards and criteria delineated in subsections (1) through (6), the provisions of the following management plans apply to specific aquatic preserves and are incorporated herein by reference. Where regulatory criteria in 18-20, F. A. C., may differ with specific policies in the management plans listed herein, the general rule criteria shall prevail.

	Date Adopted
Alligator Harbor	September 23, 1986
Banana River	September 17, 1985
Cockroach Bay	April 21, 1987
Estero Bay	September 6, 1983
Charlotte Harbor (Cape Haze, Gasparilla Sound-Charlotte Harbor, Matlacha Pass and Pine Island Sound)	May 18, 1983
Indian River-Malabar to Vero Beach	January 21, 1986
Indian River Lagoon (Vero Beach to Fort Pierce and Jensen Beach to Jupiter Inlet)	January 22, 1985
Loxahatchee River-Lake Worth Creek	June 12, 1984
Nassau River-St. Johns River Marshes and Fort Clinch State Park	April 22, 1986
North Fork of the St. Lucie River	May 22, 1984
St. Joseph Bay	June 2, 1987
St. Martins Marsh	September 9, 1987
Terra Ceia	April 21, 1987
Wekiva River	August 25, 1987

Specific Authority 258.43(1) FS. Law Implemented 258.41, 258.42, 258.43(1), 258.44 FS. History—New 2-25-81, Amended 6-7-85, Formerly 16Q-20.004, Transferred from 16Q-20.004, Amended 9-4-88.

18-20.005 Uses, Sales, Leases, or Transfer of Interests in Lands, or Materials, Held by the Board.

Specific Authority 258.43(1) FS. Law Implemented 253.02, 253.12, 258.42 FS. History—New 2-25-81, Repealed 6-7-85, Formerly 16Q-20.05, Transferred from 16Q-20.005.

18-20.006 Cumulative Impacts. In evaluating applications for activities within the preserves or which may impact the preserves, the department recognizes that, while a particular alteration of the preserve may constitute a minor change, the cumulative effect of numerous such changes often results in major impairments to the resources of the preserve. Therefore, the department shall evaluate a particular site for which the activity is proposed with the recognition that the activity may, in conjunction with other activities adversely affect the preserve which is part of a complete and interrelated system. The impact of a proposed activity shall be considered in light of its cumulative impact on the preserve's natural system. The department shall include as a part of its evaluation of an activity:

(1) The number and extent of similar human actions within the preserve which have previously affected or are likely to affect the preserve, whether considered by the department under its current authority or which existed prior to or since the enactment of the Act; and

(2) The similar activities within the preserve

which are currently under consideration by the department; and

(3) Direct and indirect effects upon the preserve and adjacent preserves, if applicable, which may reasonably be expected to result from the activity; and

(4) The extent to which the activity is consistent with management plans for the preserve, when developed; and

(5) The extent to which the activity is permissible within the preserve in accordance with comprehensive plans adopted by affected local governments, pursuant to section 163.3161, F.S., and other applicable plans adopted by local, state, and federal governmental agencies;

(6) The extent to which the loss of beneficial hydrologic and biologic functions would adversely impact the quality or utility of the preserve; and

(7) The extent to which mitigation measures may compensate for adverse impacts.

Specific Authority 258.43(1) FS. Law Implemented 258.36, 258.43, 258.44 FS. History—New 2-25-81, Formerly 16Q-20.06, Transferred from 16Q-20.006.

18-20.007 Protection of Riparian Rights.

Specific Authority 258.43(1) FS. Law Implemented 258.123, 258.124(8), 258.44 FS. History—New 2-25-81, Repealed 6-7-85, Formerly 16Q-20.07, Transferred from 16Q-20.007.

18-20.008 Inclusion of Lands, Title to Which Is Not Vested in the Board, in a Preserve.

(1) Lands and water bottoms which are within designated aquatic preserve boundaries, or adjacent thereto and which are owned by other governmental agencies, may be included in an aquatic preserve upon specific authorization for inclusion by an appropriate instrument in writing executed by the agency.

(2) Lands and water bottoms which are within designated aquatic preserve boundaries or adjacent thereto, and which are in private ownership, may be included in an aquatic preserve upon specific authorization for inclusion by an appropriate instrument in writing executed by the owner.

(3) The appropriate instrument shall be either a dedication in perpetuity, or a lease. Such lease shall contain the following conditions:

(a) The term of the lease shall be for a minimum period of ten years.

(b) The board shall have the power and duty to enforce the provisions of each lease agreement, and shall additionally have the power to terminate any lease if the termination is in the best interest of the aquatic preserve system, and shall have the power to include such lands in any agreement for management of such lands.

(c) The board shall pay no more than $1 per year for any such lease.

Specific Authority 258.43(1) FS. Law Implemented 258.40, 258.41 FS. History—New 2-25-81, Formerly 16Q-20.08, Transferred from 16Q-20.008.

18-20.009 Establishment or Expansion of Aquatic Preserves.

(1) The board may expand existing preserves or establish additional areas to be included in the aquatic preserve system, subject to confirmation by the legislature.

(2) The board may, after public notice and public hearing in the county or counties in which the proposed expanded or new preserve is to be located, adopt a resolution formally setting aside such areas to be included in the system.

(3) The resolution setting aside an aquatic preserve area shall include:

(a) A legal description of the area to be included. A map depicting the legal description shall also be attached.

(b) The designation of the type of aquatic preserve.

(c) A general statement of what is sought to be preserved.

(d) A statement that the area established as a preserve shall be subject to the management criteria and directives of this chapter.

(e) A directive to develop a natural resource inventory and a management plan for the area being established as an aquatic preserve.

(4) Within 30 days of the designation and establishment of an aquatic preserve, the board shall record in the public records of the county or counties in which the preserve is located a legal description of the preserve.

Specific Authority 258.43(1) FS. Law Implemented 258.41 FS. History—New 2-25-81, Formerly 16Q-20.09, Transferred from 16Q-20.009.

18-20.010 Exchange of Lands. The board in its discretion may exchange lands for the benefit of the preserve, provided that:

(1) In no case shall an exchange result in any land or water area being withdrawn from the preserve; and

(2) Exchanges shall be in the public interest and shall maintain or enhance the quality or utility of the preserve.

Specific Authority 258.43(1) FS. Law Implemented 258.41(5), 258.42(1) FS. History—New 2-25-81, Formerly 16A-20.10, Transferred from 16Q-20.010.

18-20.011 Gifts of Lands. The board in its discretion may accept any gifts of lands or interests in lands within or contiguous to the preserve to maintain or enhance the quality and utility of the preserve.

Specific Authority 258.43(1) FS. Law Implemented 258.42(5) FS. History—New 2-25-81, Formerly 16Q-20.11, Transferred from 16Q-20.011.

18-20.012 Protection of Indigenous Life Forms. The taking of indigenous life forms for sale or commercial use is prohibited, except that this prohibition shall not extend to the commercial taking of fin fish, crustacea or mollusks, except as prohibited under applicable laws, rules or regulations. Members of the public may exercise their rights to fish, so long as not contrary to other statutory and regulatory provisions controlling such activities.

Specific Authority 258.43(1) FS. Law Implemented 258.43(1) FS. History—New 2-25-81, Formerly 16Q-20.12, Transferred from 16Q-20.012.

18-20.013 Development of Resource Inventories and Management Plans for Preserves.

(1) The board authorizes and directs the division to develop a resource inventory and management plan for each preserve.

(2) The division may perform the work to develop the inventories and plans, or may enter into agreements with other persons to perform the work. In either case, all work performed shall be subject to board approval.

Specific Authority 258.43(1) FS. Law Implemented 253.03(7), 253.03(8) FS. History—New 2-25-81, Amended 6-7-85, Formerly 16Q-20.13, Transferred from 16Q-20.013.

18-20.014 Enforcement. The rules shall be enforced as provided in Section 258.46.

Specific Authority 258.43(1) FS. Law Implemented 258.46 FS. History—New 2-25-81, Formerly 16Q-20.14, Transferred from 16Q-20.014.

18-20.015 Application Form.

Specific Authority 253.43(1) FS. Law Implemented 258.43 FS. History—New 2-25-81, Repealed 6-7-85, Formerly 16Q-20.15, Transferred from 16Q-20.015.

18-20.016 Coordination with Other Governmental Agencies. Where a Department of Environmental Regulation permit is required for activities on sovereignty lands the department will coordinate with the Department of Environmental Regulation to obtain a copy of the joint Department of Army/Florida Department of Environmental Regulation permit application and the biological survey. The information contained in the joint permit application and biological assessment shall be considered by the department in preparing its staff recommendations to the board. The board may also consider the reports of other governmental agencies that have related management or permitting responsibilities regarding the proposed activity.

Specific Authority 253.43(1) FS. Law Implemented 258.43 FS. History—New 2-25-81, Formerly 16Q-20.16, Transferred from 16Q-20.016.

18-20.017 Lake Jackson Aquatic Preserve. In addition to the provisions of Rules 18-20.001 through 18-20.016, the following requirements shall also apply to all proposed activities within the Lake Jackson Aquatic Preserve. If any provisions of this Rule are in conflict with any provisions of Rules 18-20.001 through 18-20.016 or Chapter 73-534, Laws of Florida, the stronger provision for the protection or enhancement of the aquatic preserve shall prevail.

(1) No further sale, transfer or lease of sovereignty lands in the preserve shall be approved or consummated by the Board, except upon a showing of extreme hardship on the part of the applicant or when the board shall determine such sale, transfer or lease to be in the public interest.

(2) No further dredging or filling of sovereignty lands of the preserve shall be approved or tolerated by the Board of Trustees except:

(a) Such minimum dredging and spoiling as may be authorized for public navigation projects or for preservation of the lake according to the expressed intent of Chapter 73-534, Laws of Florida; and

(b) Such other alteration of physical conditions as may be necessary to enhance the quality or utility of the preserve.

(3) There shall be no drilling of wells, excavation for shell or minerals, and no erection of structures (other than docks), within the preserve, unless such activity is associated with activity authorized by Chapter 73-534, Laws of Florida.

(4) The Board shall not approve the relocations of bulkhead lines within the preserve.

(5) Notwithstanding other provisions of this act, the board may, respecting lands lying within the Lake Jackson basin:

(a) Enter into agreements for and establish lines delineating sovereignty and privately owned lands;

(b) Enter into agreements for the exchange and exchange sovereignty lands for privately owned lands;

(c) Accept gifts of land within or contiguous to the preserve.

Specific Authority 258.39(26) FS. Law Implemented 258.39(26), 258.43 FS. History—New 6-7-85, Formerly 16Q-20.017, Transferred from 16Q-20.017.