

CONSERVATION ELEMENT

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CONSERVATION ELEMENT

INTRODUCTION

The town's favorable location on the Gulf of Mexico continues to attract tourists year after year. The Gulf-front beaches provide an attractive place for recreational pursuits but also critical habitat for nesting sea turtles, overwintering and nesting shorebirds, and other wildlife. The continuing challenge to the town is to identify the proper balance between human use and the protection of natural resources, and then to establish programs of stewardship, education, incentives, and regulation to maintain that balance.

Estero Island (the entire Town of Fort Myers Beach) is bounded on the southwest by the Gulf of Mexico and on the northeast by Matanzas Pass and Estero Bay. Figure 1 illustrates the town's location and adjoining preserved areas. The town's land mass is about 1,466 acres in size. Topography ranges from sea level at the coast to natural elevation of about 6 feet; higher elevations result from activities of man (including pre-Columbian landfilling).

Estero Island is part of the Gulf barrier chain, which is a system of lagoons and islands formed by erosion and movement of sand along the shoreline driven by wave energy (also known as

littoral drift). In geological terms it is a relatively young and still dynamic system that consists primarily of sand and shell deposits.

Fort Myers Beach has a humid, subtropical climate with an annual average temperature of 74 degrees. Average annual rainfall is about 45 inches, the majority of which occurs during the summer months. Monthly averages are low during the winter and spring and as high as 9 inches in the summer.

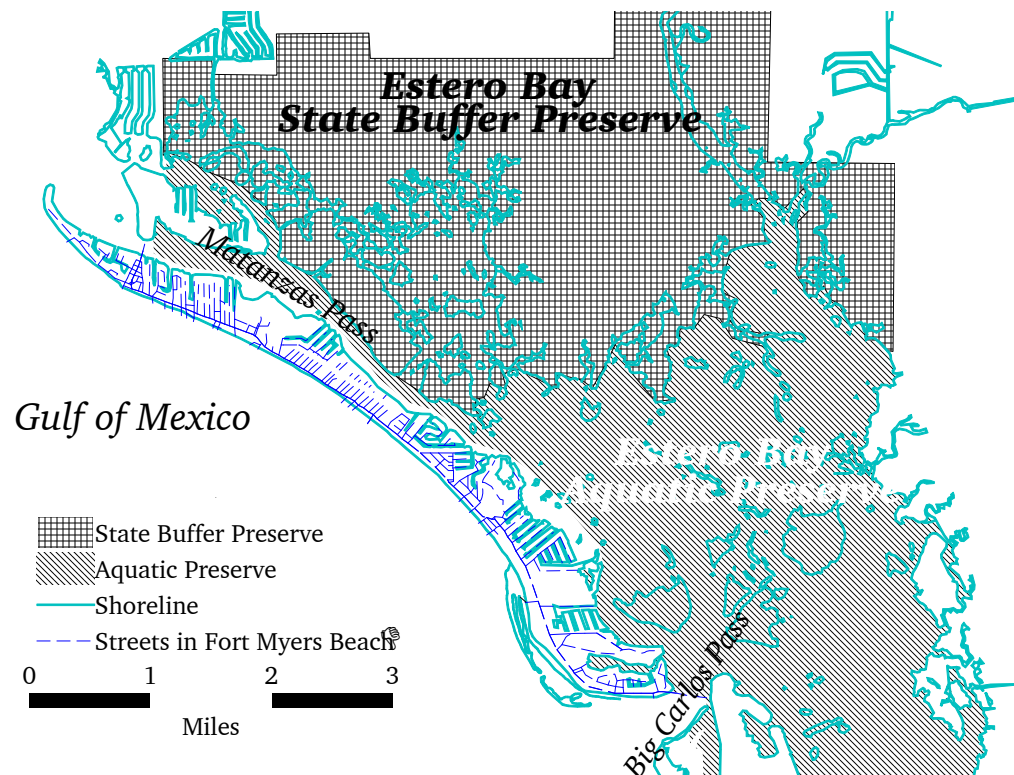


Figure 1, Estero Bay Aquatic Preserve and State Buffer Preserve

SURFACE WATER CLASSIFICATIONS

Fort Myers Beach is surrounded by exceptional surface water resources that are important environmentally as well as economically. The island protects inland areas from wave energy, providing an estuary for seagrasses and mangroves, both of which provide food and shelter for a variety of wildlife. It also protects a small harbor and anchorage for human use.

Florida's surface waters are classified into five classes according to their "present and future most beneficial uses," as shown in Table 6-1.

Table 6-1 — Classes of Surface Waters

Class I: Potable water supplies

Class II: Shellfish propagation or harvesting

Class III: Recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife

Class IV: Agricultural water supplies

Class V: Navigation, utility, and industrial use

Source: Section 62-302.400 FAC

Class I surface waters are generally of the highest quality and subject to the most stringent protective measures. Because of their intended uses, Class II and III waters may, for certain uses and water quality parameters, receive equal or even greater protection. Class II waters are further divided into three categories by the Florida Department of Environmental Protection (DEP) on the basis of their safety for harvesting shellfish for human consumption. These classes include areas approved or conditionally approved for shellfish harvesting (safe for human consumption), prohibited for shellfish harvesting (polluted and potentially unsafe), or lacking significant shellfish

resources. These classes apply to shellfish such as oysters and scallops that feed by filtering microscopic particles from the water, and are thus capable of filtering bacteria, viruses, and red tide organisms from the water and concentrating these organisms in their tissues. These shellfish can also concentrate dissolved contaminants such as heavy metals and organic compounds from polluted waters.

Special consideration is also given to waters classified as "Outstanding Florida Waters" (OFWs) or "Outstanding National Resource Waters," which are defined by Chapter 62-302, *FAC*, as:

Outstanding Florida Waters - waters designated by the Environmental Regulation Commission as worthy of special protection because of their natural attributes; and

Outstanding National Resource Waters - waters designated by the Environmental Regulation Commission that are of such exceptional recreational or ecological significance that water quality should be maintained and protected under all circumstances...

Finally, the Florida Legislature has declared as "aquatic preserves" certain submerged lands and associated waters that are of "exceptional biological, aesthetic, and scientific value."

These preserves are "set aside forever... for the benefit of future generations." (Section 258.36, *FS*). The Town of Fort Myers Beach is separated from the Estero Bay Aquatic Preserve only by the Matanzas Pass navigation channel.

Estero Bay's tributaries have been designated as Outstanding Florida Waters, including Hendry Creek, Big Bayou, Mullock Creek, Estero River (both branches), Halfway Creek, Spring Creek (both branches), Imperial River, Oak Creek, and Leitner Creek (see Chapter 62-302.700(9)(i)(12) *FAC* for precise boundaries).

Figure 2 generally depicts the town's surface water features, plus underwater contours at 6-foot intervals.

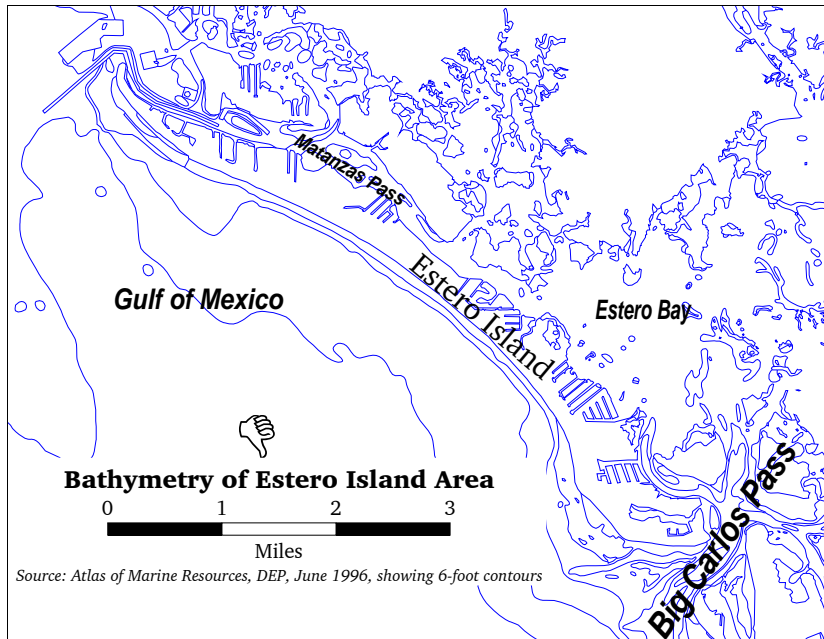


Figure 2, Bathymetry of Estero Island Area

The following sections summarize conditions of major surface waters features. They are presented as separate systems, but these distinctions are somewhat artificial; from an ecological standpoint, Lee County's surface waters (and ground waters with which they are hydrologically connected) are actually part of a larger interconnected system.

ESTERO BAY

This system consists of Estero Bay itself; the adjoining barrier islands including Estero island; and its contributing watershed which includes land surrounding the Imperial and Estero Rivers (both OFWs) and the Ten Mile Canal, which flows into Hendry Creek. Estero Bay is a shallow subtropical lagoon (11,300 acres)

separated from the Gulf by the barrier islands. Seagrass beds are common in the bay; however, high turbidity (cloudiness) restricts seagrasses to shallow depths. Estero Bay has no major rivers flowing into it, and only weak tidal exchanges due to restricted inlets. Some of the land surrounding Estero Bay, especially Fort Myers Beach, is heavily developed.

Water Quality

Estero Bay is classified as Class III/Outstanding Florida Waters. Water quality in Estero Bay is generally considered to be fair to good; however, degradation has occurred in recent years (Godschalk and Associates 1988; Lee County 1994). Nutrient and turbidity levels have increased. Estero Bay sediments are enriched in cadmium, lead, and zinc. The freshwater inflow pattern has been altered. Water quality problems are attributed to urbanization of the watershed (shown in Figure 3), which increases pollutants levels and turbidity in the bay. Urbanization in the enter watershed that drains into Estero Bay was projected to increase by over 130% (based on number of dwelling units) from 1986 to 2010 (Godschalk and Associates, 1988). Actual growth has been much higher than projected in Bonita Springs and Estero. Environmental quality in Estero Bay is particularly vulnerable to future degradation due to poor flushing, the bay's small volume of water, and increasing urbanization of the watershed (Godschalk and Associates, 1988).

The bay continues to be a major anchorage for pleasure boats. An informal survey by the DEP indicated that 40% of the boats are anchored permanently and lived on; the remainder are moored temporarily for storm protection or as part of a recreational outing. Some boats dump raw sewage into the bay because they do not have proper sanitary equipment as required by the Florida Clean Vessel Act. In August 1997, the Florida Marine Patrol inspected boats in the anchorage. They made 14 arrests and gave 28 written warnings and 22 verbal warnings.

Nonpoint pollution sources to Estero Bay (those without specific discharge points) were identified by the Lee County Division of Natural Resources Management and DEP, as shown in Table 6-2. These sources will continue to affect water quality in Estero Bay. The following nonpoint source pollutants were identified: nutrients, bacteria, sediments, pesticides, other chemicals, debris, oxygen depletion, salinity, metals, habitat alteration, flow alteration, and thermal pollution. Reactions to the increasing urban pressure have included fish kills, algal blooms, weeds, turbidity, odor, decline in the fishery, and swimming prohibitions.

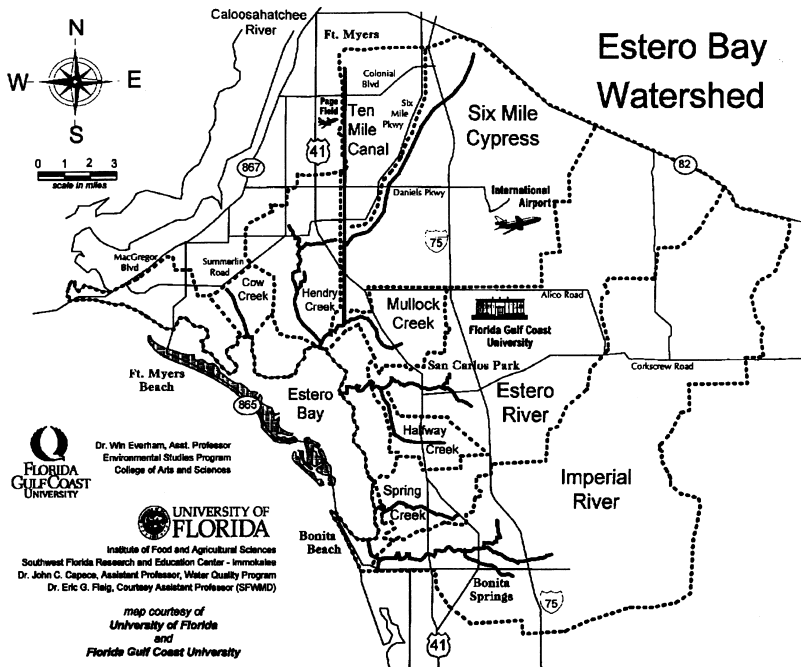


Figure 3, Estero Bay watershed boundaries (further studies in progress)

The Lee County Environmental Laboratory (a branch of Lee County government) has been monitoring water quality in south Estero Bay since 1981 to determine if the closing of Big Hickory Pass degraded water quality. Results as of 1990 indicated good water quality, although urbanization has increased somewhat since the 1990 report.

Table 6-2 — Nonpoint Source Categories Affecting Estero Bay Watershed, 1994

<i>Agriculture:</i>	Irrigated crop production, specialty crops, rangeland
<i>Resource Extraction:</i>	Surface mining
<i>Silviculture:</i>	Forest management (minimal)
<i>Hydromodification/ Habitat Alteration:</i>	Channelization
<i>Dredging:</i>	Dam construction, flow alteration
<i>Bridge construction:</i>	Removal of riparian vegetation, streambank modification, wetland dredging/filling
<i>Urban Stormwater:</i>	Municipal, industrial
<i>Construction:</i>	Highway/road/bridge construction, land development
<i>Other Miscellaneous:</i>	Marinas, waste storage/storage leak tanks, highway maintenance and runoff,
<i>Land Disposal:</i>	Wastewater, landfills, septic tanks, hazardous wastes, utility installations, contaminated sediments, recreational activities, upstream impoundments, groundwater withdrawal

Source: Lee County - 1994 Nonpoint Source Assessment, Lee County Division of Natural Resources Management and Florida DEP

Current Conservation Programs

Estero Bay State Buffer Preserve

The Estero Bay State Buffer Preserve currently consists of 6,346 acres on the north and east sides of Estero Bay. This land has been purchased by the state of Florida after decades of disputes over the environmental impacts of a massive residential community that had been proposed there in the 1970s, which ironically was to be known as "The Estuaries." A management plan has been prepared by DEP for the entire buffer preserve, which contains many environmental and cultural assets including four archaeological sites.

A larger area is also being considered for state purchase, a total of 16,000 acres comprised of wetland and other natural communities that adjoin Estero Bay (including mangrove swamps and other saltwater marshes and salt flats). These communities provide important nutrients to the bay, contributing substantially to its biological productivity. These wetlands serve to help maintain high water quality in the Estero Bay Aquatic Preserve. The 6,346-acre buffer preserve is made up of the initial purchase of this larger area. The prospects for further acquisition dim every month due to strong urbanization pressures.

Estero Bay Aquatic Preserve

Estero Bay was the state's first aquatic preserve, designated in 1966. The Preserve consists of almost 10,000 acres from the Skybridge to Bonita Beach Road. It supports a remarkable diversity of plant and animal life, which in turn supports a variety of human activities such as commercial fishing and tourism. The vegetation of the shallow waters is dominated by seagrasses and mangroves, which trap sediments with their roots, thereby reducing erosion and stabilizing the shoreline. These plants also serve as cover for many animals, from birds roosting or nesting in the mangroves to small crabs camouflaged

among the seagrass blades. Leaves of these plants break off and become the substrate for microscopic organisms. This decaying plant matter, known as detritus, serves as the first link in the estuarine food chain. More than 40% of the endangered species or threatened species found in the state occur within southwest Florida's estuaries, including the manatee and bald eagle.

Estero Bay Agency on Bay Management

The Estero Bay Agency on Bay Management (ABM) is one of the results of a settlement agreement for the completion of permitting for the new Florida Gulf Coast University. The ABM is a non-regulatory advisory body whose directive is to develop scientific data and make recommendations for the management of Estero Bay and its watershed. The ABM will also comment to regulatory agencies on issues affecting Estero Bay and its watershed through an annual report. Later in 1997, the ABM is expected to complete a land use analysis of the Estero Bay watershed.

This agency is currently staffed by the Southwest Florida Regional Planning Council (SWFRPC). Members are from Lee County legislative delegation, chambers of commerce, citizen and civic associations, Lee County, South Florida Water Management District (SFWMD), Florida Game and Freshwater Fish Commission (FGFWFC), DEP, SWFRPC, the university, commercial and recreational fishing interests, citizens, and other interested parties. The Town of Fort Myers Beach has a representative on this agency.

The ABM will also review an Estero Bay management and improvement study as it is developed (another aspect of the university settlement). SFWMD has begun work on plans for the Caloosahatchee River watershed and the Estero Bay watershed; they are administering over \$200,000 in state funds to develop an Estero Bay Watershed Plan to maintain and improve water quality in Estero Bay. The plan will collect water quality data

and develop goals and standards to improve water quality, and will include a freshwater inflow study.

Charlotte Harbor National Estuary Program

In 1995, the Charlotte Harbor estuary was selected for inclusion in the National Estuary Program (NEP) administered by the EPA. The Charlotte Harbor NEP is also administered by the SWFRPC, with technical assistance from the Mote Marine Laboratory in Sarasota.

This program includes the watersheds of the Peace River, the Myakka River, and the Caloosahatchee River, all of which feed freshwater into the coastal areas of southwest Florida including Matlacha Pass, Pine Island Sound, Charlotte Harbor, and Estero Bay. This entire area including Lemon Bay is the focus of the Charlotte Harbor National Estuary Program (see Figure 4).

The purpose of the NEP is to compile existing data and develop a plan of watershed and waterbody activities that will restore or maintain the water quality and biological functions of the

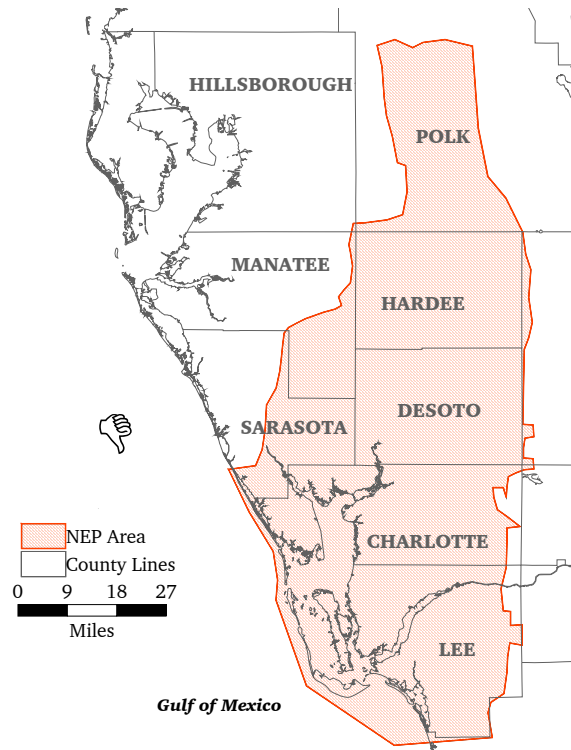


Figure 4, Charlotte Harbor National Estuary Program

estuary. Because of the many entities that affect the NEP area, coordinated efforts such as this can help maintain the estuary’s productivity and overall integrity.

The NEP planning process will take three years. The goals, policies, and implementing actions of the NEP will be contained in a Comprehensive Conservation and Management Plan (CCMP). Some demonstration and research activities may also be conducted. Implementation of its goals will be carried out by appropriate local, regional, and state governments after the completion of the planning period.

Other Surface Water Management Activities

As is apparent, the waters around Estero Island are the focus of numerous studies. In addition, the SFWMD has identified several water bodies in Lee County as potential “SWIM” water bodies, including the Caloosahatchee River Estuary, Estero Bay, and Pine Island Sound/Matlacha/Ding Darling.

Florida’s Surface Water Improvement and Management (SWIM) Act of 1987 requires each of the five water management districts to identify those surface waters most in need of restoration or preservation. The act mandates the development of management plans (“SWIM plans”) for each waterbody so identified, including detailed schedules of implementation. This means that the plan focuses primarily on maintaining and protecting existing water quality and natural systems, and enhancing and restoring water quality or natural systems when necessary and feasible.

Projects included under SWIM plans include establishing water quality targets, determining the loading capacity of major pollutants (including nutrients), identification of point and non-point sources of pollutants, habitat protection and land acquisition, regulatory enforcement, compliance monitoring, and public education.

Coastal Drainage Issues

Coastal communities like the Town of Fort Myers Beach must respond to flooding that arises from two different sources. One source of flooding is unrelated to rainfall and stormwater; it occurs when the Gulf of Mexico and Estero Bay rise to unusual heights due to strong on-shore winds. Often this type of flooding occurs without rainfall. Another source is caused by stormwater runoff utilizing an inadequate conveyance system. Drainage on the island is hampered by low relief and slope and increased area impervious surface due to development. Both of these flooding sources are analyzed in the Stormwater Management Element of this plan.

WILDLIFE AND NATIVE COMMUNITIES

The Town of Fort Myers Beach has several remaining native coastal habitats. These habitats are an important resource which perform a number of vital functions. Coastal wetlands, mangrove swamps, and tidal marshes improve water quality, act as storm buffers, provide shelter for wading birds, and perform a vital role in the important and complex estuarine food chain which is the foundation of a multi-million dollar fishing industry (3rd largest seafood landing in state of Florida).

Upland habitats are important as well in that they provide habitat for a number of endangered species such as the bald eagle and perform flood control functions and buffer the area's waterways from pollutants found in stormwater runoff. The town is fortunate to have some areas set aside as publicly owned reserves which not only perform some of the functions mentioned above but also provide for outdoor recreation and education. The challenge facing the town is to ensure that its preserve areas continue to provide the functions and values needed to maintain the quality of life enjoyed by residents and visitors, as well as their benefits to wildlife.

CONSERVATION AREAS

There are a variety of local, state, and federal efforts protecting wildlife and native communities. Important "critical wildlife areas," preserves, and buffer preserves near Fort Myers Beach.

Little Estero Island Critical Wildlife Area

The FGFWFC establishes Critical Wildlife Areas (CWA) at the request of, or with the concurrence of, the owner of property where such an important area is located. The purpose is to prohibit human disturbance to wildlife during critical periods (for example, when shorebirds are nesting, or are concentrating during overwintering times). "Establishment Orders" for CWAs define the area to be protected and the time of year when protected wildlife may not be disturbed (limited to April 1 through August 31 on Little Estero Island). FGFWFC is responsible for posting closed areas and clearly marking the places closed to trespass during periods when nesting is actually taking place.

Human disturbances are a serious problem for nesting and overwintering birds. Each disturbance adds up; on a busy weekend, these birds may spend a great deal of effort flying around and "defending" their area. Valuable energy is expended that is needed for bearing young or preparing for the long flights back to summer breeding grounds. Sometimes people take their dogs out onto the sand bars and allow them to run free (where animals find great sport chasing birds); small planes sometimes fly low over Little Estero Island, chasing away the very birds they are trying to watch. When disturbances become too great, many species of birds will simply abandon the area.

Little Estero Island is the only CWA in Lee County. This area includes the island itself (now joined to the mainland) and the wetlands and lagoons that have formed behind the island. The northern boundary is the Holiday Inn's riparian line (an

extension of their southerly property line gulfward); the easterly line is the mean high water line of the old developed shoreline.

These habitats provide nesting areas for birds such as the least tern and snowy plover, and prime nesting habitat for sea turtles. During the winter months over 150 species of birds have been known to frequent the area for feeding and resting. The habitat of Little Estero Island is rare, known as coastal dune scrub. This habitat is home to such flora as sea oats, beach berry, seagrape, beach elder, and bay cedar. Non-native species can also be found such as Australian pines and Brazilian pepper. Wildlife is abundant. Marsh rabbits, raccoons, prairie warblers, herring gulls, skimmers, red-breasted merganser, ruddy turnstone, whimbrel, and white ibis have all been seen on Little Estero Island.

Due to the tidal accretion of sand, the southern portion of the island's channel has been filled in. The continual accretion of sand is creating another channel further south, which may again be entirely filled in with new sand.

Problems on the island are mainly due to human activity. Watercraft, domestic pets, and people are a disturbance to wildlife on the island. Every time a bird takes flight for fear of a person, boat, or dog, its energy is reduced for tending to its young, resting, and feeding.

FGFWFC has funding available for signage on the island to inform residents and visitors of the uniqueness and fragility of the island habitat. Enforcement of the rules is another issue. Voluntary enforcement and possible citizen volunteer "patrols" would be an ideal way to educate residents and visitors of the rules of the island and why they are needed.

Matanzas Pass Preserve

The Matanzas Pass Preserve is located behind Fort Myers Beach Elementary School, providing the students with a living classroom. The Fort Myers Beach Library, Bay Oaks Recreation Center, and public beach access are conveniently located nearby. The preserve is one of the few remaining undeveloped open spaces in the town that provide significant wildlife habitat (along with Bowditch Point and Little Estero Island). In addition it has one of the few remaining mangrove forests on Estero Island. The site provides pedestrian access for viewing Matanzas Pass and part of the Estero Bay Aquatic Preserve.

History

The Matanzas Pass Preserve occupies land once owned by John Dunning, a Fort Myers Beach resident and noted nature photographer, who purchased the property from the Martha Redd estate for \$125,000 in October, 1974 to save the property from future development. Dunning donated 21 acres of the property and sold 20 acres to the Nature Conservancy in 1975. (Later surveys revealed the property is actually 56 acres.) The Nature Conservancy acquired the rest of this tract through grass-roots fund-raising in 1977, an effort that involved all segments of the Fort Myers Beach population. In 1994, the property was donated to Lee County, and name was changed from Matanzas Pass Wilderness Preserve to simply Matanzas Pass Preserve. In 1995, the Estero Island Historic Society's San Castle Cottage was relocated to a newly acquired area at the entrance and will now serve as a local historical museum and a small interpretive center for the preserve.

Vegetation and Wildlife

Approximately 65 percent of the Matanzas Pass Preserve is a tidal mangrove community. The uplands support live oaks, cabbage palms, sea grapes, and other hammock vegetation. The

mangrove fringe is dominated by red mangrove (*Rhizophora mangle*) and includes black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*) and buttonwood (*Conocarpus erectus*), which is a mangrove associate. Mangrove communities perform numerous ecologically important functions and are among the most productive ecosystems in the world.

Additional functions of mangrove systems which contribute to the value of these areas include:

- Providing habitat for a wide range of mammals, birds, reptiles, amphibians, fish, and invertebrates. This includes those species and subspecies classified by FGFWFC as endangered, threatened, or of special concern (see later discussion and listing).
- Providing critical nursery habitat for fishes and invertebrates, thus representing economically vital resources for industries such as commercial fishing and shrimping;
- Helping stabilize intertidal sediments; and
- Providing possible protection for landward edges from hurricane-driven waves.

Existing Conditions

The renovation of the Estero Island Historic Society's San Castle Cottage was completed in early 1997. The existing trail system consists of approximately 1,640 feet of foot trails and 1,055 feet of elevated boardwalk. The trail is essentially a single loop that travels through primarily mangrove on the bay side with habitat communities on the inland side varying from mangrove to transitional uplands. The pass is visible along most of the boardwalk and at the Rotary Pavilion. The pavilion and boardwalk are in need of repair from vandalism and age (Lee County Division of Parks and Recreation, 1996).

Restoration Plan

The preserve has been heavily damaged by invasive, non-native plants. A great deal of work has already occurred removing non-native plants. In October 1995, the Lee County Division of Parks and Recreation cleared approximately 18.3 acres of a dense canopy of Australian pine with an understory of Brazilian pepper and air potato (*Dioscorea bulbifera* L.) as well as areas of mahoe (*Hibiscus tiliaceus*) and seaside mahoe (*Thespesia populnea*).

Objectives of the restoration plan include:

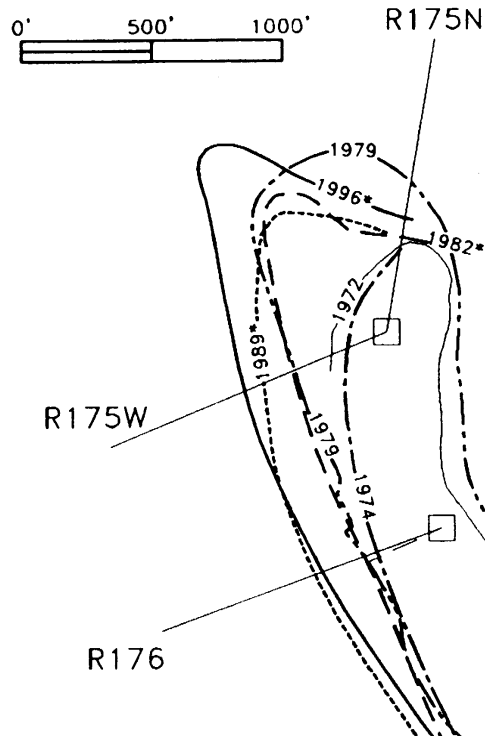
- Design and establish a native plant community that likely existed on the site before displacement by invasive exotics. In doing so, native wildlife species may be supported, and the balance of the natural ecosystem may be restored;
- Design and establish buffers between private residences along Nature View Court and Donora Boulevard and the Matanzas Pass Preserve restoration site;
- Minimize cost; and
- Minimize long-term maintenance.

The restoration plan of the preserve is being implemented in three phases: preparing the site; revegetating the site; and managing the site. Future improvements include extending foot trails, repairing and extending boardwalks, providing a canoe/kayak access point, and adding a fishing pier/observation deck. A \$100,000 state grant was received in 1997 to improve the boardwalk and add a canoe/kayak launch; this grant is being matched with \$33,335 from the local tourist tax.

Bowditch Point Regional Park

Lee County purchased the 16-acre northern end of Estero Island in the late 1980s when development was imminent. Following a series of public workshops, the county prepared a master plan and has developed the first phase of a regional park there. The only further park development is planned is a 78-space public parking lot (the only parking spaces at present are for maintenance staff and handicapped patrons).

The site is surrounded by water on three sides. The bay side has suffered erosion from continued dredging for the main navigation channel; the beach side has been accreting at a rapid rate. A seawall originally built for shoreline protection is now located far inland.



Extensive wetlands have formed between the original uplands and the beachfront. Beach renourishment will not be needed because continued natural accretion of the beach is anticipated (see recent shoreline changes in Figure 5).

Although Bowditch Point is well known for its peaceful beach, it continues to be a haven for wildlife. The only known gopher

Figure 5, Bowditch shoreline changes, '72-'96

tortoises burrows remaining on Estero Island are found at Bowditch Point. Sea turtle nesting is not common but occasionally occurs on the beachfront. Over forty species of resident and migratory birds have been identified at Bowditch in recent years, including the threatened bald eagle and six species of birds identified by the state as of “special concern.” The shoreline is heavily used by migratory birds.

PROTECTED SPECIES

Fort Myers Beach hosts a diversity of wildlife, both in its preserves (public and private) and in areas which still retain habitat despite urban development. In addition to wildlife commonly found throughout southwest Florida, there are a number of species which are protected (or “listed”) as endangered, threatened, or “of special concern.” The U.S. Endangered Species Act and the Florida Wildlife Code use slightly different definitions, which may be summarized as follows:

- *Endangered Species:* any species which is in danger of extinction throughout all or a significant portion of its range (summary from ESA);
- *Threatened Species:* any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (summary from ESA); and
- *Species of Special Concern:* any species that could easily become threatened unless “appropriate protective or management techniques are initiated or maintained” (Florida Wildlife Code). “Special concern” is a designation applied by the state of Florida and not used by the federal government.

In addition, marine mammals such as dolphins are protected by the federal Marine Mammal Protection Act.

Several listed wildlife species of particular concern to the town are listed in Table 6-3, followed by a discussion of some of the most important species. A complete inventory of listed plant and animal species which are known to occur, or which are likely to occur, in Lee County is now being created by the Lee County Division of Planning.

Table 6-3 — Species and subspecies classified as endangered, threatened, or species of special concern

	<u>Scientific Name</u>	<u>Common Name</u>
Mammals, Endangered:	<i>Trichechus manatus</i>	West Indian manatee
Birds, Special Concern:	<i>Ajaia ajaja</i>	roseate spoonbill
	<i>Egretta thula</i>	snowy egret
	<i>Dichromanassa rufescens</i>	reddish egret
	<i>Egretta caerulea</i>	little blue heron
	<i>Egretta tricolor</i>	tri-colored heron
	<i>Eudocimus albus</i>	white ibis
	<i>Haematopus palliatus</i>	American oystercatcher
	<i>Pandion haliaetus</i>	osprey
	<i>Pelecanus occidentalis</i>	brown pelican
	<i>Rynchops niger</i>	black skimmer
Birds, Threatened:	<i>Charadrius melodus</i>	piping plover
	<i>Characrius alexandrinus</i>	SE snowy plover
	<i>Sterna hirundo</i>	least tern
	<i>Haliaeetus leucocephalus</i>	bald eagle
Reptiles, Endangered:	<i>Crocodylus acutus</i>	American crocodile
	<i>Chelonia mydas</i>	green turtle
	<i>Lepidochelys kempii</i>	Kemp's ridley turtle
	<i>Dermochelys coriacea</i>	leatherback turtle
	<i>Eretmochelys imbricata</i>	hawksbill turtle
Reptiles, Threatened:	<i>Caretta caretta</i>	loggerhead turtle
Fish, Special Concern:	<i>Centropomus undecimalis</i>	common snook

Source: Matanzas Pass Preserve Resource Management Plan, Lee County Division of Parks and Recreation, 1996; FDEP; Turtle Time Inc.

Bald Eagles

The bald eagle is classified as threatened by both the State of Florida and the Federal government. Florida is home to the second largest breeding population of bald eagles in the nation, and Lee County provides habitat for a substantial portion of that population. During the 1993-1994 nesting season, there were 32 active nests in Lee County. No nests are currently located within the town, but Estero Bay is frequently used as feeding ground for eagles, and they are often seen flying over Estero Island.



Figure 6, Bald Eagle

Protection of bald eagle nest sites is considered a critical issue, since some of these sites could be located on lands which are subject to development pressure. At present, the eagles frequently seen flying over Estero Island probably nest around the bay on the mainland; the nearest known nests are on the Estero Bay State Buffer Preserve. The town relies on Lee County's ordinance which specifically protects bald eagle nesting habitat, which was adopted in 1986. An Eagle Technical Advisory Committee was established to monitor and create management plans for all known eagle nests in Lee County. The county cooperates with the Florida Game and Fresh Water Fish Commission and U.S. Fish and Wildlife Service (USFWS) in their enforcement of state and federal regulations regarding the bald eagle.

The “Habitat Management Guidelines for the Bald Eagle in the Southern Region” prepared by the USFWS provides guidance for protecting bald eagles during development activities. The guidelines recommend the establishment of a primary protection zone with a radius of 750 to 1500 feet around active nests in which no development should occur. A secondary zone extending an additional 750 feet to a mile from the outer edge of the primary zone should not be disturbed during the nesting season (October through May). In addition to protecting nest sites, consideration should be given to maintaining adequate future nesting habitat, particularly along coastal areas. No nest trees may be touched in any way by development activities unless the nest site has been de-classified by FGFWFC.

In Lee County, bald eagles usually build nests in stands of mature slash pine along coastal bays, estuaries, and rivers. Suitable eagle nesting habitat should be identified and protected by public acquisition or by offering incentives to landowners to maintain their property in a condition suitable for eagle nesting.

West Indian Manatees

Listed as endangered by both the USFWS and FGFWFC, these large marine mammals are found throughout Lee County’s surface waters. The manatee’s range extends from the panhandles’ Big Bend on the west coast, south to the Keys, and north again to Jacksonville.

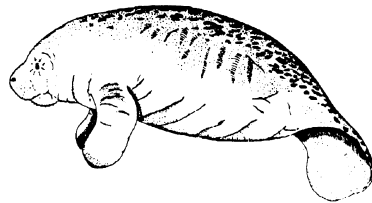


Figure 7, West Indian Manatee

Manatees are typically found in shallow water that has an abundance of seagrasses and other aquatic vegetation. During the winter, Lee County has one of the largest populations of manatees in the state. Manatees are especially attracted to

Florida Power and Light’s warm-water discharge from their power into the Orange River (near its confluence with the Caloosahatchee River).

San Carlos Bay, Matanzas Pass, and Estero Bay are important to manatees. Manatees may be found feeding on the abundant seagrass beds of San Carlos Bay and Estero Bay, resting and mating in quiet canals and creeks of Fort Myers Beach and San Carlos Island, searching man-made canals for artificial freshwater sources, and using the channels and waterways as travel corridors to move north and south from the Caloosahatchee to Estero Bay and points south.

Historically, manatee mortality in the Lee County has been high. In 1996, manatee mortality in Southwest Florida increased dramatically, when 145 were found dead in Lee County alone. Research conducted by the DEP, Mote Marine Laboratory, the University of Miami, and others finally determined that the manatees died of a respiratory infection caused by brevetoxins (toxins associated with *Gymnodinium breve*), a red tide organism (Steidinger, 1996). Though manatees and red tide have coexisted for millennia, four specific conditions—early manatee aggregation, mid winter dispersal, high salinities in the affected areas’ waters, and high concentrations of *G. breve*—combined to produce the circumstances which led to the 1996 die-off (Steidinger, 1996). Time will tell if such a series of events will occur in the future with equally catastrophic results.

Table 6-4 illustrates the causes and quantities of manatee fatalities in Lee County from 1974 to 1997, and Figure 8 shows the locations near Fort Myers Beach where carcasses were found.

Table 6-4 — Lee County Manatee Mortality, Causes and Quantities, 1974-1994

Year	Water Craft	Other Human	Perinatal	Other Natural	Undetermined	Total
1974	0	0	0	0	0	0
1975	0	0	1	0	0	1
1976	1	0	2	0	1	4
1977	2	0	2	0	7	11
1978	2	0	0	2	5	9
1979	0	1	1	1	1	4
1980	2	0	2	1	2	7
1981	4	1	3	3	7	18
1982	3	0	1	38	6	48
1983	1	1	4	3	6	15
1984	1	0	6	2	10	19
1985	5	0	4	3	4	16
1986	3	0	2	1	9	15
1987	3	0	2	1	4	10
1988	8	0	5	2	4	19
1989	0	0	5	2	9	16
1990	5	0	6	6	10	27
1991	7	0	6	2	3	18
1992	2	1	4	3	9	19
1993	5	1	5	3	3	17
1994	10	1	9	4	9	33
1995	8	1	9	6	7	31
1996	14	0	7	50	74	145
1997	9	0	7	15	12	43

Source: Florida Department of Environmental Protection

Boat-related manatee mortality in Lee County is high, with ten deaths—almost one per month—being at least indirectly attributable to manatee/boat collisions. As the county’s boating population increases, the number of boating-related manatee deaths will also increase unless preventative actions are taken.

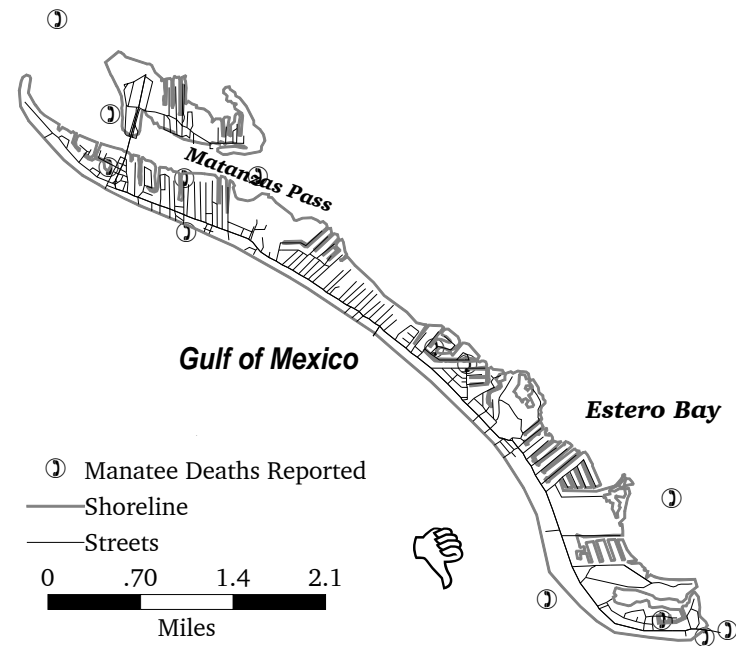


Figure 8, Reported Locations of Manatee Deaths

The DEP is establishing speed zones in intracoastal waterways and other surface waters that manatees are known to frequent. County and state governments have previously passed some basic manatee protection speed zones for certain portions of the county, including the Caloosahatchee. The current effort is expected to be completed in late 1998, to be followed by a Manatee Protection Plan with more extensive speed zones in 1999. The town should cooperate with Lee County and DEP in drafting the new manatee plan. By the year 2000, the SWFRPC’s marina siting study should be completed and can be incorporated into the Lee County Manatee Protection Plan.

Sea Turtles

Five of the world's eight sea turtle species (the loggerhead, green turtle, leatherback, hawksbill, and Kemp's ridley) are found in Florida's coastal waters. Three species (the loggerhead, green, and leatherback) nest regularly along the state's beaches. The loggerhead population that nests in Florida is the second largest in the world, accounting for 35-40% of loggerhead nesting worldwide (FMRI, 1995). In particular, southern Florida hosts approximately 90% of loggerhead nesting efforts. In Lee County, nearly all nests (Table 6-5) are loggerhead nests, although an occasional green turtle and one Kemp's ridley nest have been documented. Sea turtles that nest along Florida's beaches are protected under Florida Statutes (Chapter 370.12). All are protected under the U.S. Endangered Species Act of 1973. The loggerhead is listed as "threatened" while the green, hawksbill, Kemp's ridley, and leatherback are listed as "endangered."



Figure 9, female loggerhead

Each year, sea turtles migrate from their feeding grounds, hundreds or even thousands of miles away, to congregate near nesting beaches. Genetic research has provided evidence that most female sea turtles return to the beaches where they were born. Under cover of night, the females come ashore, crawl towards the dune vegetation area, dig a nest cavity with their rear flippers, deposit approximately 100 eggs, cover and camouflage the site, and return to the sea.



Figure 10, hatchling

A female may return three to six times to nest during one season. After a two-month incubation period, the hatchlings emerge as a group at night and scramble to the Gulf waters. Thirty to fifty years later, the female survivors will return to nest. Nesting season begins May 1 and ends October 31.



Figure 11, hatchlings scampering toward the water [photos courtesy Turtle Time Inc.]

Table 6-5 — Lee County Sea Turtle Data, 1989-1997

<u>Year</u>	<u>All Nests</u>	<u>Disorientation Cases</u>	<u>Strandings</u>
1989	199	1	96
1990	478	8	17
1991	559	1	26
1992	448	6	24
1993	487	6	24
1994	695	4	21
1995	703	3	33
1996	687	12	65
1997	not available	not available	35

Source: Florida Marine Research Institute and Turtle Time Inc.
 Note: 1997 stranding data is through 7/17/97 only

Despite national and international protective legislation, sea turtle populations have suffered worldwide decline, primarily as a result of human interference. Some causes include:

- habitat alteration and degradation including beach armoring (seawalls or rocks);
- mechanical beach raking and beach driving;
- entanglement in a variety of fishing gear, crab lines, gill nets, and shrimp trawls;
- increased coastal boating resulting in boat strikes;
- ingestion of plastics and other non-biodegradable debris;
- commercial exploitation or poaching;
- predation of eggs by red ants or raccoons;
- increased human night activity on beaches;
- beach equipment and furniture obstructing nesting sites;
- artificial lighting; and
- coastal development and beach renourishment activities that compact or alter the temperature of the sand.

Turtle Time, Inc., a state-licensed nonprofit organization, has been monitoring sea turtle activity on Fort Myers Beach since 1989. Table 6-6 show the results of that monitoring for all of Estero Island.

A “false crawl” in Table 6-6 refers to a turtle emerging onto a beach and returning without having nested. Contributing factors are: lights, seawalls, human disturbances, dogs, raccoons, pooled water, compacted sand, beach furniture, and exotic vegetation such as Australian pines. Table 6-7 provides more complete data on “false crawls” and total sea turtle nests at various locations along the Estero Island beachfront.

Disoriented nests refer to emerging hatchlings orienting in the wrong direction (away from the Gulf waters). This often results in their death.

Table 6-6 — Estero Island Sea Turtle Data, 1989-1997

<u>Year</u>	<u>Nests</u>	<u>False Crawls</u>	<u>Nests Disoriented</u>
1989	5	-	-
1990	15	52	1
1991	13	36	0
1992	18	35	0
1993	20	40	0
1994	27	25	1
1995	46	35	0
1996	30	53	6
1997	28	66	2

Note: false crawls not tracked in 1989

Turtle Time identifies all false crawls and actual nests by their geographic location on Estero Island. Figure 12 shows the 9 monitoring zones plus a graphic representation of those portions of the beach that are most heavily used for sea turtles nests since 1989. The bar nearest the beach shows the ratio of successful nests per mile of shoreline during that seven-year period. The bar further from shore shows the ratio of false crawls per mile for the same period, at the same scale.

The beach from Palm to Strandview Avenues has by far the highest density of successful turtle nests, ranging from 45 nests per mile in Zone 4 to 62 nests per mile in Zone 5.

The next beach segment to the south (Zone 6, from Strandview to Sterling Avenue), has a surprisingly low ratio of nests per mile (12). However, sea turtles frequently try to nest there, with 58 false crawls per mile during the same period. The likely cause of these poor results is the alteration of nesting habitat such as the number of seawalls and rock revetments, and extensive outdoor lighting. As a general pattern, the density of successful nests and false crawls is lower at both ends of Fort Myers Beach, although Zone 9 at the southerly end is becoming increasingly important in recent years.

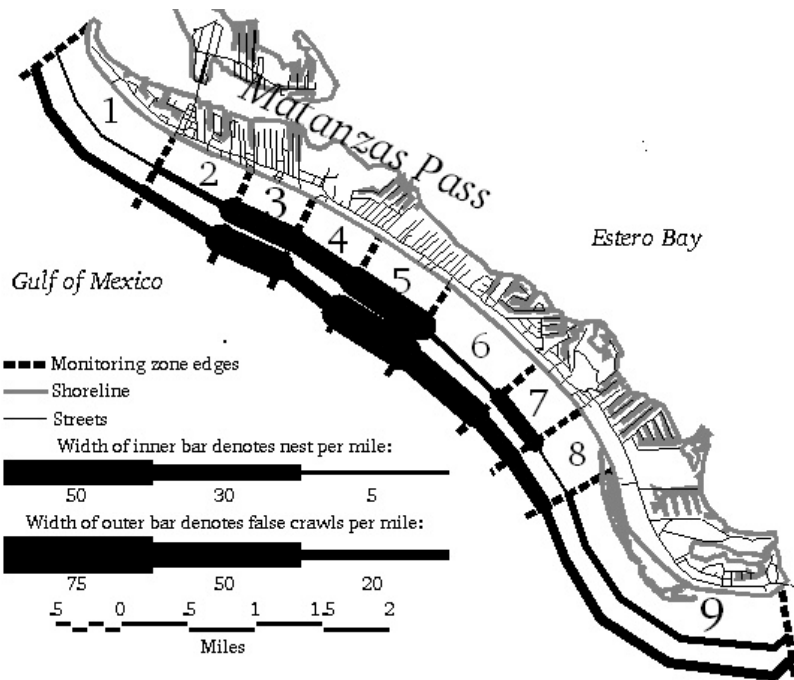


Figure 12, Cumulative Sea Turtle Nesting Density, 1989-1996

The total number of nests has been increasing since 1989, but there are significant problems along the beaches of Estero Island that negatively affect sea turtles. A good indication of interference to nesting is the number of “false crawls” where a turtle emerges from the Gulf but does not nest. It is not safe to assume that turtles who are unable to nest at Fort Myers Beach will simply lay their eggs elsewhere. Prime nesting habitat is very limited, and even more so in view of turtles’ tendency to return to their natal beach to nest. In fact, individual turtle populations are genetically distinct; the elimination of suitable habitat will cause a further decline in turtle populations.

Table 6-7 — Estero Island Sea Turtle Data, 1989-1997

	<i>Monitoring Zone Numbers</i>									
	1	2	3	4	5	6	7	8	9	all
	<i>Total Number of Nests</i>									
1989	0	0	0	1	3	1	0	0	0	5
1990	0	2	2	1	4	1	1	1	3	15
1991	0	0	4	1	4	1	2	0	1	13
1992	0	0	3	2	2	3	3	0	5	18
1993	1	2	4	4	5	1	1	0	2	20
1994	2	0	5	1	10	0	5	1	3	27
1995	3	5	7	7	10	1	5	0	8	46
1996	3	1	1	9	6	2	1	1	6	30
1997	<u>1</u>	<u>0</u>	<u>2</u>	<u>11</u>	<u>1</u>	<u>2</u>	<u>0</u>	<u>2</u>	<u>9</u>	<u>28</u>
totals:	10	10	28	37	45	12	18	5	37	202
	<i>False Crawls (non-nesting emergences)</i>									
1989	-	-	-	-	-	-	-	-	-	-
1990	7	5	7	4	9	7	2	6	5	52
1991	4	5	4	0	8	4	4	1	6	36
1992	0	0	4	2	7	5	7	1	10	36
1993	4	0	2	1	5	20	1	3	4	40
1994	1	0	3	3	4	5	4	2	3	25
1995	3	3	6	7	8	1	1	1	5	35
1996	7	2	5	4	12	7	1	5	9	52
1997	<u>5</u>	<u>1</u>	<u>1</u>	<u>6</u>	<u>3</u>	<u>8</u>	<u>12</u>	<u>14</u>	<u>16</u>	<u>66</u>
totals:	31	16	32	27	56	57	32	33	58	342

Notes: false crawls weren't tracked in 1989

Some causes of declining turtle populations, such as commercial exploitation, are beyond the town's influence. However, many others can be controlled through proper stewardship by local residents and by official actions of the town. The local issues affecting sea turtle nesting and hatching success include:

- **Artificial lighting.** Artificial lighting on beaches during the nesting season disrupts critical nocturnal behaviors including nest-site choice and sea-finding ability of both hatchlings and nesting females. As a rule, any artificial light source that is visible from the nesting beach may disorient sea turtles. Even distant lighting, such as that now used to light the sports fields at Bay Oaks Park, can disorient turtles. Lee County passed a Sea Turtle Protection Ordinance in 1989 (Ordinance No. 89-09, which is now a town ordinance). It provides standards for existing and new coastal development, prohibiting lights along beaches during the nesting season. In 1996, the Florida Department of Environmental Protection established new guidelines for the creation of local regulations that control beachfront lighting. The current local regulations should be updated to the standards of the state model. Of the many environmental disturbances initiated by humans, excessive light is among the most serious threats to turtle survival; fortunately it is also the most manageable. Solutions using the best available technology include low-pressure sodium lighting; shielding, redirecting, or recessing light; minimizing the number and wattage of lights; or using 25-watt yellow bug lights. Ground-level barriers of vegetation can also be effective. The goal for lighting near nesting beaches is: No point source of light or any reflective surface of the light fixture can be directly visible from the beach, and areas seaward of a frontal dune must not be directly, indirectly, or cumulatively illuminated. Consistent monitoring for compliance, with timely follow-up checks, is imperative for a successful sea turtle protection program.
- **Mechanical beach scraping.** This activity removes vegetation and detritus (natural marine material such as seaweed) that contributes to dune formation. Sometimes

the dune is actually scraped away. The use of a tractor-pulled box blade is illegal but common.

- **Sand compaction.** Tractors and trucks can contribute to sand compaction, which interferes with nesting and hatching turtles. Compacted sand drains poorly, which causes further compaction. (Other physical characteristics of the beach that also determine the success of embryonic development are salinity and thermal and hydric environments.) Nests constructed in severely compacted sand often are improperly shaped, insufficiently deep, and have poor respiratory gas exchange, resulting in decreased hatching rates and possibly affecting the strength and survivorship of the hatchlings. Beach-dune preservation, stabilization, and restoration would greatly enhance the beauty, economic value, and well-being of the beach.
- **Beach equipment.** Sea turtles can become entangled in beach furniture that interferes with access to suitable nesting areas, which often are located up the beach in the vegetation. Sea turtles are unable to crawl backward, and thus must expend tremendous energy trying to extricate themselves. Several hotels have converted to lightweight beach furniture which is removed at the end of each day. A significant decrease in beach litter has been noticed in these areas. Storage of concessions stands, jet skis, tables, chairs, tents, and kiosks can also be a barrier to nesting habitat.
- **Water run-off.** Many gulf-front properties drain their roofs, parking lots, and swimming pools directly onto the beach. This flow of water almost always erodes the beach, sometimes pollutes the Gulf of Mexico, and on occasion floods turtle nests. (This issue and possible solutions are discussed further in the Stormwater Management Element.)

Dolphins

Bottlenose dolphins are among the most popular wildlife in this area. These marine mammals reside worldwide in warm oceanic and brackish waters, where their carnivorous diet includes fish and the occasional crustacean. Local dolphins are often called porpoises, which are actually another species of toothed whale that prefers cooler water and tends to be smaller and have a blunt snout and triangular teeth. Adding to the confusion, visitors to local restaurants are sometimes dismayed to find “dolphin” on the menu, which actually refers to an unrelated fish that is also known as “mahi-mahi.”



Figure 13, Dolphin (*Tursiops truncatus*) [photo courtesy Project Pod]

Coastal bottlenose dolphins (the ones frequently seen in Estero Bay) have a range of about 8 to 10 miles. However, any one particular dolphin has a particular home range. Open-ocean (or pelagic) bottlenoses have much larger home ranges. These two populations – coastal and pelagic – do not interbreed and are sometimes considered to be separate species.

Dolphins have reputation for being friendly and sometimes swim along with passing boats. This behavior sometimes encourages boaters to feed or even unintentionally harass dolphins, both of which are unlawful. The federal Marine Mammal Protection Act was passed in 1972 to regulate human interaction with marine mammals. The initial thrust was to reduce the number of dolphins killed in tuna nets. In 1992 this statute was strengthened to prevent the harassment and feeding of marine mammals.

The National Marine Fisheries Service (NMFS) recommends that boaters stay at least 50 yards away from dolphins. This distance isn't in the statute, but boaters can be certain of not harassing dolphins by maintaining that distance. The NMFS is the primary branch of government responsible for enforcing the statute, although any law enforcement agency can do so if knowledgeable about its provisions.

Distance is particularly important when calves are involved. If calves are scared away from their mothers or separated from them by over-eager boaters, the calves can become easy targets for sharks. Matings, restings, and feedings can also be completely disrupted by onlookers who don't have proper knowledge of these behaviors.

Feeding dolphins encourages them to approach boats for handouts, putting them at greater risk of propellor injuries. It also encourages mothers to teach their young to beg rather than hunt. Additionally, the food people give to dolphins can be contaminated and lead to sickness and death.

Dolphins are important to tourism, especially as part of the gradual shift away from aquariums and zoos and toward “eco-tour” or out-in-the-wild experiences. Maintaining a safe distance ensures the safety of dolphins and is the best way to see their whole range of behaviors in a relatively short time. Boaters who approach dolphins too closely often see nothing but fleeing animals.

Gopher Tortoises

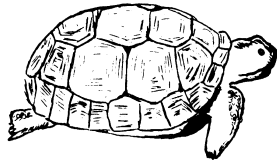


Figure 14, *Gopher tortoise*

Once abundant throughout the southeastern United States, the gopher tortoise (*Gopherus polyphemus*) is now principally found in southern Alabama, Georgia, and all of Florida. It is listed as a species of special concern by FGFWFC; habitat loss from a variety of land use activities is its principal threat. Gopher

tortoises prefer dry, well drained soils for their burrows, such as are found in beach scrub, coastal dunes, and oak hammocks. Unfortunately these same areas are highly prized for urban development. Although once abundant at Fort Myers Beach, gopher tortoise burrows are now rare, with several remaining in protected areas at Bowditch Point.

The gopher tortoise is considered a keystone species on which the survival of many other animals depend. In fact, beyond sheltering the tortoise, a gopher tortoise burrow may provide shelter for any of more than 360 different animal species, including the listed indigo snake, gopher frog, and burrowing owl. Gopher tortoises, like sea turtles, regularly live 50 years or more.



Figure 15, *Gopher tortoise emerging from burrow*

Although relocation of tortoises is permitted, this should be undertaken as the final alternative on a development site. Establishment of protection zones or conservation areas are the first choice for the long-term protection of gopher tortoises.

Protective Measures

Lee County has attempted to take additional steps that would protect certain species and their habitats. The county has passed various ordinances protecting species and environmentally sensitive lands within the county for the purpose of protecting these important natural resources from the potential adverse impacts of future land development activities. Environmentally sensitive lands protected include wetlands; Outstanding Florida Waters (OFWs), Class I and Class II water bodies, and adjacent uplands; scrub habitats; portions of the barrier islands; and wildlife corridors.

Due to the public's requests for additional environmental protection for wildlife and native habitats, the town can adopt additional ordinances or acquisition programs, and attempt to provide local direction or legislation addressing listed species and the habitats upon which they depend. The town should adopt land use policies that clearly require that all applicable permits from jurisdictional agencies be acquired prior to the issuance of local approval for land use activities which may affect listed wildlife species. The town may also support public education through brochures, newspaper articles, public presentations, and workshops; and it may wish to increase its involvement with non-profit organizations such as Turtle Time, Ostego Bay Foundation, and the Friends of Matanzas Pass Preserve which are all actively involved with such measures.

WETLANDS

Tidal Marshes

Tidal marshes are found along gradually sloping, low-energy coastlines. In south Florida, mangrove swamps are much more common in the tidal zone than tidal marshes. An exception is the tidal marsh surrounded by Little Estero Island, where typical plant species include sea grape, beach berry, sea oats, bay cedar, and some mangroves.

Mangrove Swamps

These brackish or salt-water swamps are found along Matanzas Pass and surrounding all of Estero Bay. Florida is the only state in which all three species of mangroves occur. The red mangrove is an intertidal species that is typically found growing along the waters' edge, identifiable by its tangled network of reddish prop roots. The black mangrove is also an intertidal species which is usually located inland of red mangroves. They occur in the part of the system that has less tidal flushing and circulation. The black mangrove can be identified by its numerous finger-like projections, called pneumatophores, that protrude from the soil around the tree trunks. The white mangrove typically occupies the highest elevations farther inland than the red and black mangroves, although it can be interspersed

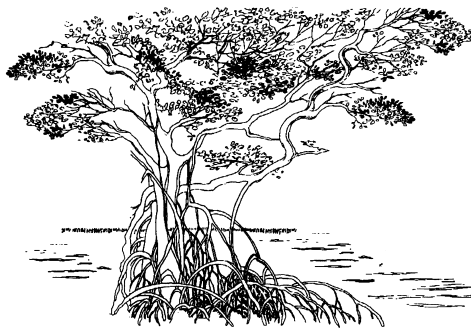


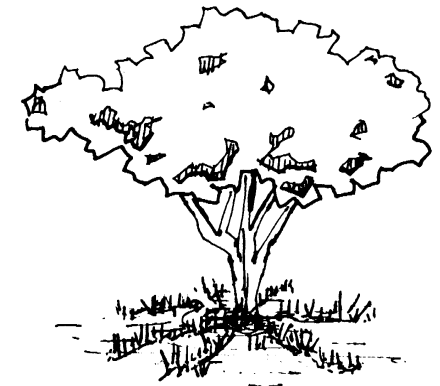
Figure 16, Red mangrove tree

throughout the swamp. White mangroves differ from the red and black mangroves in that they have neither an aerial root system nor pneumatophores. Identification is best accomplished by examining the leaves, which are elliptical, light yellow-green, and have two distinguishing glands at

the base of the leaf blade where the stem starts.

It is interesting to note that, while other coastal habitats are known to have experienced significant declines in aerial extent, mangrove forest acreage has increased by approximately 10% between 1945 and 1982 (Harris et al., 1983).

However, during that same period, most mangrove forests **Figure 17**, Black mangrove tree at Fort Myers Beach were eliminated because of dredge-and-fill activities along Matanzas Pass.



There are only about 105 acres of wetlands remaining on Estero Island, almost entirely forested with mangrove trees. They have been given a separate category on the Future Land Use Map in this comprehensive plan to ensure their protection. Except for occasional spoil piles from previous dredging activities, these mangrove forests are in good condition. Daily tidal flows are almost unimpeded, although freshwater flows from adjoining uplands have been reduced from historic conditions. Management needs are limited to protection from future dredging and filling; removal of exotic vegetation that will encroach from adjoining uplands; and occasional removal of trash and debris that is dumped or floats in on high tides.

Environmental Values and Functions

The animals that rely on tidal marshes for habitat include the salt marsh snake, diamondback terrapin, Florida clapper rail, seaside sparrow, black-necked stilt, Marian's marsh wren, sharp-tailed sparrow, marsh rabbit, marsh rice rat, and raccoons. Many wading birds feed on the small crustaceans and fishes abundant in salt marshes. The salt flats are used as corridors by

raccoon, opossum, rabbit, and bobcat, which come to the estuarine edges to feed.

Mangrove swamps provide habitat for a multitude of forage species including mosquitoes, small fishes, bivalve and gastropod molluscs, fiddler crabs, amphipods, and other small crustaceans. Birds comprise the most diverse and numerous group of larger animals inhabiting mangrove swamps. Herons including the little blue, green, tri-colored, great blue, and both the yellow-

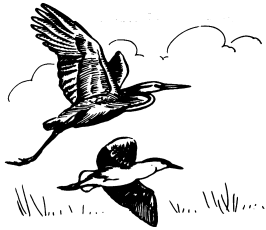


Figure 18, Great blue heron (above) and black-crowned night heron

crowned and black-crowned night herons nest in mangrove habitats, as do the snowy, reddish, cattle, and great egrets. Roseate spoonbills, white ibis, wood storks, and double-crested cormorants also nest in mangroves. Other species characteristic of these swamps include the red-shouldered hawk, osprey, belted kingfisher, turkey vulture, black vulture, pileated woodpecker, fish crow, mangrove cuckoo, blue-gray gnatcatcher,

Carolina wren, prairie warbler, and boat-tailed grackle. Many species are abundant in mangrove habitats as seasonal residents such as the cardinal or migrants including the robin, American redstart, palm warbler, black-throated blue warbler, and black and white warbler.

In addition to wildlife habitat, coastal wetlands provide many other environmental benefits, including buffering of storm tides and winds, shoreline stabilization, biological filtration, and assimilation of nutrients and other pollutants contained in upland runoff. However, the most significant function of coastal wetlands is the production of food for estuarine and coastal waters. Detritus is the broken-down plant material produced by wetland plants. Detritus from mangroves, tidal marsh, and salt flats forms the base of the food web which supports virtually the entire estuarine and near shore marine communities.

Mullet, redfish, spotted sea trout, snook, tarpon, mangrove snapper, stone crab, blue crab, pink shrimp, oysters and clams are but a few species sought by commercial or sport fishermen which are dependent upon this nutrient base. Mangrove wetlands may significantly contribute to the estuarine system via heavy utilization by wading birds and other predators of forage fishes, fiddler crabs, and other primary consumers of mangrove detritus.

Threats to Habitat

About half of the salt marsh habitat that once adjoined the Charlotte Harbor estuary has been lost in the past 30 to 45 years, primarily due to the dredging of manmade finger canals and the construction of other facilities for residential and commercial purposes (Harris et al. 1983). In addition, many miles of existing shoreline along the rivers and (to a lesser extent) the Harbor proper have been sea-walled or otherwise hardened. If undertaken, restoration of these areas to their natural condition will be difficult and expensive process.

Destruction of coastal wetlands has been a significant factor in the deterioration of South Florida's natural resources. Filling for residential or commercial use encroaches on the edges of the bays and tidal streams by replacing productive mangrove swamp or tidal marsh with upland habitat, greatly impacting the productivity of the estuarine system. Dredging of boat basins and channels has a similar impact. The use of seawalls, rip-rap and other forms of shoreline stabilization replaces the estuarine edge and results in a direct loss in the amount of detritus produced and available to estuarine organisms. Ditching for mosquito control has had a significant impact in that the mangrove ditching may have actually created more mosquito habitat, the associated fill has clogged natural tidal channels, and has encouraged the invasion of exotic species such as Brazilian pepper and Australian pines.

Although state and federal regulations offer considerable protection, these habitats continue to be conditionally disturbed by the above activities and by the destruction of adjacent upland communities which have historically provided clear freshwater inflow. Some recent changes to local, state, and federal regulations and guidelines in recent years have been harmful. For example, the 1995 Mangrove Trimming and Preservation Act, which amended Section 403 FS, provided numerous exemptions and general permitting criteria which allowed the alteration of mangroves in natural and man-made waterways, including aquatic preserves and State-owned lands. Though the Act was further amended during the 1996 Legislative Session to provide better protection for mangrove systems, significant damage occurred as a result of this brief-lived but unfortunate legislation. If the state continues to enact such legislation, it will again fall upon local governments to implement more stringent regulations before the functions of these habitats are forever altered.

HABITAT TYPES IN ESTUARIES AND BAYS

The Charlotte Harbor and Estero Bay estuaries are created by the mixing of fresh water rivers and the oceans, and are typically highly productive systems. Their general characteristics include typically shallow depth (less than 20 feet), good mixing of the water column, and flushing by tides and freshwater inflow. Salinity varies from fresh-water to normal sea water, and may fluctuate seasonally. Mangroves, salt marshes, seagrass beds, phytoplankton, tidal flats, and oyster bars all play significant roles in estuarine ecology. Wildlife resources are abundant and diverse, with many commercial or sport fishes and crustaceans inhabiting these areas permanently or as juveniles. Many wading birds, waterfowl and shorebirds winter, feed, and nest in these areas or on landward fringes and islands.

Seagrass Meadows

Seagrass meadows (or seagrass beds) are underwater fields of flowering vascular plants that grow on the bottoms of coastal bays and estuaries. Major seagrass concentrations are found in Estero Bay. Several types of seagrasses are found in area coastal waters and illustrated here, including:

- Turtle grass (*Thalassia testudinum*) is the most common of the Florida seagrasses and characteristically has a deeper root structure than the other (see Figure 19).
- Shoal grass (*Halodule wrightii*) is an early colonizer of disturbed areas and usually grows in water too shallow for other species (see Figure 20).
- Manatee grass (*Syringodium filiforme*) is easily recognizable because its leaves are cylindrical (see Figure 21).
- Widgeon grass (*Ruppia maritima*) grows in both fresh and saltwater and is widely distributed through Florida estuaries (see Figure 22). [sketches courtesy Florida Marine Research Institute]
- Star grass (*Halophila englemannii*) and paddle grass (*Halophila decipiens*) also may occur in this area.

Seagrass meadows are highly productive habitats. They serve as nursery areas for many popular fish species. A single square yard of seagrass can harbor 3,000 marine worms and 1,500 amphipods (small shrimp-like organisms); both are important food sources for fish. Seagrass meadows provide critical feeding habitat for sea turtles and the West Indian manatee, and foraging habitat for resident and migratory coastal birds. Over 80 species of birds feed on the fish and invertebrates found among Florida's seagrasses.

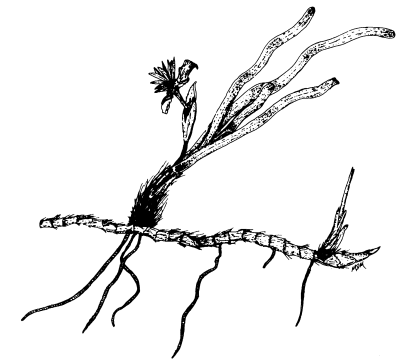


Figure 19, Turtle grass

Seagrasses stabilize marine sediments. Without the grass cover, waves and currents would resuspend sediments, clouding the water and reducing sunlight needed for plant growth. The plants remove nutrients from the water and convert them into forms usable by higher organisms.

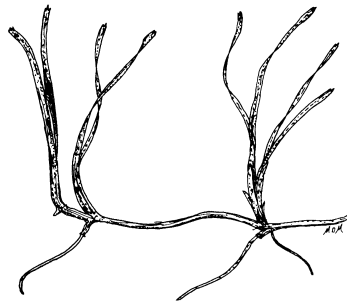


Figure 20, Shoal grass

In 1990, the Lee County Environmental Laboratory conducted a baseline study to assess the status of the bay and provide a point of reference for future research. The study indicates healthy seagrass beds are abundant in most of the bay, with turbidity restricting seagrasses to fairly shallow depths.

Increased motor boat traffic in shallow waters with seagrasses can damage seagrass beds in two ways:

- motors can re-suspend bottom sediments which can settle out onto seagrasses, effectively shading the seagrasses and reducing their growth or eventually burying entire seagrass beds; and
- propellers can cut furrows into seagrass beds; this is known as “prop scarring” or, when intentional, “prop dredging.” These furrows take many years to recover.

To help combat these problems, the town may consider an ordinance restricting access over certain seagrass beds within the town limits by motorized boats,

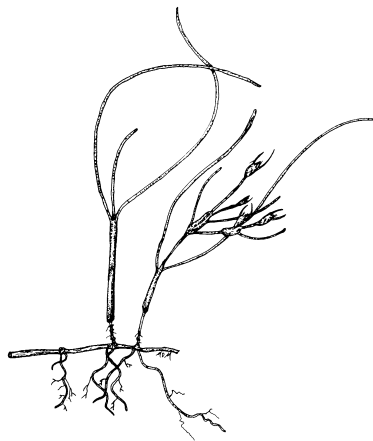


Figure 21, Manatee grass

or marking seagrass beds clearly so that boaters can avoid them.

Motor boats are not the only source of impacts to seagrass beds. Drainage and the introduction of sewage pollutants and storm water runoff increases the suspended load in Estero Bay. The loss of natural filtration of nutrients also has probably increased phytoplankton production. All of these factors tend to eliminate seagrass meadows in the deeper waters.

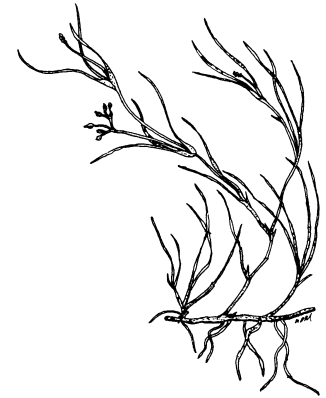


Figure 22, Widgeon grass

Tidal Flats

Tidal flat areas are periodically inundated flats located at the mouths of rivers, near inlets, along the shoreline of the Harbors and bays, immediately waterward of tidal marshes or mangrove forest, or in dredge spoil disposal areas. They range from transient unstable areas used primarily by shorebirds and wading birds, to stable mudflats with extensive algal, mollusc, crustacean, and worm communities. Cuban shoalgrass, turtlegrass, red mangrove saplings, cordgrass, or other plants may occur sporadically, but these flats are generally devoid of vascular vegetation. Fiddler crabs, spider crabs, horseshoe crabs, quahog clams, oysters, slipper shells, barnacles, moon snails, various sponges, and numerous additional molluscs, crustaceans, and worms are often abundant in such habitats.

Soft Bottoms

The bottoms of estuaries and bays are generally made up of unconsolidated sediments. These unvegetated soft bottoms are colonized by animals that live on or in the sediments (called “benthic” animals, or “benthos”), including fish and many invertebrates such as clams, worms, and blue crabs which are an important component in the estuarine food web.

Oyster Bars

Reefs or bars built by successive generations of the American oyster (*Crassostrea virginica*) and other marine encrusting organisms are conspicuous features of tidal creeks and shallow waters. Oysters and other shellfish may be harvested from surface waters classified by the State of Florida as Class II waters. However, in Lee County, waters south of the Caloosahatchee River are permanently closed for shellfish harvest (Rodriguez, DEP, 3/94).

Tidal Creeks

Tidal creeks in Lee County are typically small, natural flowways that usually drain from freshwater marshes and wet prairies into larger estuaries and bays. Typically these creeks have tidal marsh vegetation along their banks and mangroves at their mouths, and may contain oyster reefs and islands of marsh and mangrove vegetation. Tidal creeks represent a complex of wetland habitats that function as an integrated and unique habitat type.

Open Water

Lee County’s coastal waters support a diverse array of plants and animals. Estevez and co-workers (1981) reviewed existing information on the biological diversity of the Charlotte Harbor Estuary and tabulated the number of species that have been reported for the estuary, or that probably occur in the estuary. The presence of 1,122 species from several groups of plants and animals have been verified in various surveys of Charlotte Harbor. While this list does not cover all groups of plants and animals that occur in the county’s coastal area, it does illustrate that the coastal area supports an impressive diversity of flora and fauna.

Of particular value to the coast are the benthic invertebrates and fishes that live in coastal and estuarine waters. Benthic invertebrates are the invertebrate animals (e.g., clams, worms, crabs, etc.) that live on or in the bottom of the rivers, bays and harbors and “make their living” by feeding on detritus, bacteria, algae and other aquatic organisms, and which in turn constitute an important food source for fishes. The number of species (diversity) and types of species of benthic invertebrates can also be used to assess the health and environmental quality of aquatic ecosystems.

Table 6-8 summarizes DEP Marine Fisheries Information System’s annual landings summary for selected “indicator” fish and shellfish species in Lee County from 1986 through 1991.

Table 6-8 — DEP Annual Landings Summaries for Lee County from 1986 through 1991

<i>Year</i>	<i>Indicator Fish Species¹ (lbs)</i>	<i>Indicator Shellfish Species² (lbs)</i>
1986	2,326,475	4,529,389
1987	6,045,288	4,577,582
1988	5,952,885	4,495,520
1989	6,245,295	3,865,447
1990	6,444,250	3,555,052
1991	6,165,342	3,309,797

¹Indicator Fish Species include specific species of grouper, jack, mullet, pompano, spotted sea trout, and sheepshead.

²Indicator Shellfish Species include specific species of crab, lobster, scallops, and shrimp.

Source: Florida Department of Environmental Protection Marine Fisheries Information Systems, 1986-1991.

Environmental Functions and Values

An estuary is a semi-enclosed water body having an open connection to the sea with a measurable dilution of sea water from freshwater inflow. It is a zone of ecological transition between fresh and saltwater systems, and is the ecological heart of the coastal area.

Estuaries and bays provide extensive habitat for fish and wildlife and are among the most productive areas on earth. These areas provide feeding, breeding, and nursery grounds for most of the commercially important fish and shellfish such as shrimp, blue crabs, mullet, sea trout, and redfish. As discussed in greater detail above, it is estimated that nearly 70% of Florida’s recreational and commercial fisheries species are dependent on estuaries for at least a part of their life cycle, usually as juveniles. Because juvenile fish can tolerate waters of low salinity, but many of their predators cannot, estuaries and bays act as nursery areas, providing refuge for the young fish.

The town’s estuaries provide habitat for a number of listed bird species. Most of the actively nesting bald eagles in the county are found in close proximity to the estuaries, and the food supply they provide. Pelicans and ospreys can be seen fishing the areas productive waters, while egrets, herons and roseate spoonbills wade the shallow waters in search of food.

Seagrasses stabilize bottom sediments, carry on primary productivity, provide food directly to manatees, sea turtles and sea urchins, and provide refuse, habitat, and food organisms for shrimp, crabs, and fish. Benthic communities, including oyster beds, play a large role in the nutrient and sediment cycles of the bay. Filter-feeders take suspended particles, ingest them, and extrude them as pellets that settle to the sediments. Nutrients stored in the sediments can be used and even re-suspended by burrowing organisms. After becoming concentrated in the tissues of oysters and other filter feeders, various contaminants may find their way up the “food chain” when these organisms are ingested by a variety of predators, including humans.

Recreational opportunities offered by the bay and estuaries are almost endless. Boating, fishing, water skiing, sailing, swimming, bird watching and aesthetically pleasing vistas are some of the benefits derived from these systems.

Threats

Threats to the estuarine environment generally include point and non-point sources of pollution, changes in the quantity and timing of freshwater inputs, destruction of habitat from dredge and fill activities, and shoreline stabilization such as seawalls. Seagrass meadows are severely damaged by “prop scarring” when boats are run across shallow areas with seagrasses. High sediment loads resulting from dredging, improper disposal of dredge spoil, and poor land management practices can literally bury seagrass meadows. Seagrasses are also lost as a result of shading from docks constructed over seagrass meadows.

Dredging of mud and salt flats for boat basins and channels, and eliminating the “ugliness” and “unpleasant odors” associated with these habitats, are often cited by developers as reasons to destroy tidal flats. As with other land-water interface communities, destruction of adjacent uplands or wetlands can also have significant impacts on the preservation and productivity of tidal flats.

Another threat to living marine resources is the indiscriminate collecting of live shells. The occasional shell taken for a collection or souvenir will have a negligible effect, but the wholesale collection of shells for potential resale can deplete a locally valuable resource. Many communities have regulations against the collection of more than a few live shells, but without active education or enforcement, a simple regulations will not protect this type of resource. A successful beach patrol would use a code enforcement office and a knowledgeable volunteer on weekly patrols to observe violations of shelling restrictions, reduced lighting for sea turtles, and other beach regulations. The code enforcement officer would follow up on observed violations during the following week.

COASTAL UPLANDS

The 1988 Lee County Coastal Study recommended the need for the conservation of “Rare and Unique (RU) Uplands.” RU uplands are native upland habitats which are limited in distribution either naturally or due to overdevelopment. These uplands are defined in the Lee Plan to include the following habitat types: sand scrub; coastal scrub; those pine flatwoods which can be categorized as “mature” due to the absence of severe impacts caused by logging, drainage, and exotic infestation; slash pine/midstory oak; tropical hardwood; live oak hammock; and cabbage palm hammock. The Coastal Study inventoried only a part of Estero Island’s vegetative habitats (due to the extensive development), but did identify 117 acres of coastal scrub and 4 acres of oak hammock.

Coastal Strand

The coastal strand is a thin strip of fragile herbaceous and woody vegetation that lies between beach dune systems and more forested coastal areas (often called maritime forests). This important community often is composed of saw palmetto, oak, seagrape, cabbage palm, Spanish bayonet, and other plants.

Coastal Hammocks

Coastal hammocks are heavily forested areas on barrier islands. In some places, coastal hammocks look like traditional mainland hammocks, with cabbage palms and live oaks. In other areas, these hammocks take on a tropical appearance and may include Hercules club, wild lime, saffron plum, prickly apple, Florida coontie, sea grape, gumbo limbo, and strangler fig. The maritime oak hammock at the Matanzas Pass Preserve is the only intact system of this type remaining on Estero Island.

Dunes and Beaches

Beaches and sand dunes are dynamic systems which are in a constant state of change, exhibiting both erosion and accretion (building up) trends at various times as a result of wind, waves, tides, storms. Dunes can easily be destroyed by human activity, and can also be rebuilt and enhanced.

Dunelands include the active dunes, sand ridges, troughs, and flats lying behind the beach berms that mark the upper limit of the dry beach. Many of the dunes at Fort Myers Beach have been removed by development or by continuing management practices that inhibit their restoration by natural processes. Bounded at their seaward edge by the upper line of the beach at the annual highest tide mark, or a coinciding vegetation line, dunelands extend landward as far as the land is subject to active gain or loss if sand because of the sea or wind. Dunes are fairly narrow at Fort Myers Beach and in some areas no longer exist at all. Figure 23 shows an example of a healthy mature dune at Fort Myers Beach, and Figure 24 shows a new dune emerging at Bowditch Point Regional Park.

Dunes on Estero Island are generally low lying and are dominated by plants which are salt tolerant and able to grow in the dry, nutrient sparse habitat. Plant species present on the dunelands include sea oats (*Uniola paniculata*), with beach elder (*Iva imbricata*), beach berry (*Scaevola plumieri*), and railroad vine (*Ipomoea pescaprae*).

Wildlife uses dunes for foraging and nesting habitat include ghost crabs and raccoons. Sea turtles also frequently use the dune areas for nesting. The beaches and dunes of Estero

Island perform a vital role in that they serve as the primary source of natural protection for Gulf-front property against storms and hurricanes, and protect important public facilities like Estero Boulevard from inundation during extreme tides. Where the dunes have been removed by human activity or destroyed by natural factors, the town should establish a strong policy to re-create dunes.

The beach itself is the unvegetated face of the shoreline that extends from the upper edge of the beach berm (the lower edge of the dunes) seaward to the low water mark. The beach system consists not only of the foreshore area, but also of the unvegetated submerged near shore area out to depths approaching 40 feet. Beaches are unique environments occupied by animals that have adapted to the constant motion of the sand, gravel, or shell. Coquina clams and sand fleas fight for position and filter seawa-



Figure 23, Mature sand dune at Fort Myers Beach (dune photos courtesy of Turtle Time Inc.)

ter for microscopic prey just below the sand's surface. A variety of shorebirds and wading birds like sandpipers and herons search for prey along the waters' edge. A number of rare and endangered species utilize beaches for foraging or as nesting habitats including least terns, American oystercatchers, and loggerhead and green sea turtles.



Figure 24, *Emerging sand dune at Bowditch Point*

Environmental Functions and Values

Perhaps the most important function of the beach and dune areas is to continuously adapt to the changing hydrogeologic conditions operating at the beach. Sand movement is the key to the continuous adjustment of the beach. Moving sand can be washed over the island, adding height, or be blown into the backshore and be trapped by plants. During major storms, the stored sand can move off the upland beach and form an offshore

bar that reduces the impact on the remaining beach. Gentler post-storm waves can move the offshore bar back onto the beach face. Practices such as removal of dune vegetation, dune destruction, stabilization of the submerged beach, and stabilization of the exposed beach all interfere with the natural system of sand movement, collection, storage, and use. Two main factors are responsible for the coastal erosion problem along the coast: human activities that either increase erosion or increase the impact of erosion, and rising sea level.

Maintained in a natural state, beaches and dunes provide the temporary storage of sand required for the natural processes of shoreline building and erosion that are critical to the existence of barrier islands. The deep roots of sea oats and other native vegetation stabilize active dunes, providing moderate protection from shoreline erosion.

These coastal ecosystems also provide habitat for a number of plant and animal species, many of which thrive nowhere else. Terns, gulls, plovers, and sandpipers are common along the sandy beach where they feed on small fish and invertebrates. Many shorebirds nest on the open beach and in the dunes, including the following listed species—least tern, roseate tern, piping plover and southeastern snowy plover. The threatened loggerhead sea turtle uses the beach and dunes as nesting habitat. The scrubby back-dunes are occupied by beach mice, raccoon, skunk, and occasionally by gopher tortoises. In addition, the coastal hammocks play key roles in the migration of many birds that summer to the north. They rely upon the fruits and berries of the hammock species during their biennial trips along the coast.

Coastal areas, in particular beaches, are among the most desired natural resources in the state. This is due mainly to the ideal recreational opportunities afforded by these areas, as well as their scenic, and aesthetic values that make them attractive places to live.

Threats to Habitat

Coastal uplands are subject to a number of threats, including removal of beneficial native vegetation, development, shoreline hardening, recreational use, introduction and encroachment of exotic vegetation, and treasure hunting.

Some practices that have been forbidden in many coastal communities are still common at Fort Myers Beach. For instance, dunes sometimes recreate themselves even when they had been removed during the development process. This restoration ought to be valued and assisted, but many property owners at Fort Myers Beach continually destroy the re-emerging dunes. This activity destroys sea turtle nesting habitat and eliminates a natural blockage that protects upland property from extreme tides, in addition to eliminating a valued scenic resource.

Whenever native dune plants are removed, either intentionally as an end unto itself (collection, site preparation, etc.), or incidentally due to pedestrian or other forms of traffic, the ability of the dune system to collect and hold sand is reduced and erosion results. Total habitat destruction may occur. Dune vegetation (such as sea oats) acts as a buffer to the more landward, less salt tolerant plants, and removal of seaweed vegetation can cause salt spray damage to the less resilient species. Thus, removal of dune vegetation may have an ecological ripple effect in addition to the direct physical impacts.

Another frequent but unfortunate practice at Fort Myers Beach is the direct drainage of stormwater onto the beach. Many older buildings have drains from their parking lots and buildings emptying through pipes onto the beach. This causes severe erosion following every rain, in addition to the pollutants that untreated stormwater carries into the Gulf of Mexico. This issue is discussed further in the Stormwater Management Element of this plan.

Invasion of coastal uplands by exotic vegetation such as Brazilian pepper and Australian pine can result in the displacement and replacement of the diverse native plant communities of these habitats with dense monocultures of these exotic species. Australian pines (*Casuarina equisetifolia*), while favored for their shade they provide on the open beach, replace the native dune vegetation which can actually accelerate the erosion of dunes since their shallow roots do not hold the soil together like the deep roots of sea oats and other native species.

In the past, little attention was given to the coastal hammock species in many areas as island tracts were cleared to provide housing. Outright elimination of the coastal hammocks has been a long-term trend. While undeniably better than outright clearing, selective clearing can open the canopy and expose the hammock to wind, salt spray, increased drying, and other debilitating factors.

In addition to causing stress to dunes and dune plants, recreational uses of beaches frequently displace shorebirds and wading birds that, to various extents, rely upon beach habitat for foraging, nesting, overwintering, or as a resting point along migratory flyways. The human demand for beaches is so great that people often use even isolated beaches, which can cause further displacement of wildlife.

Occasionally group events such as beach volleyball tournaments are held directly on the beach. If held during sea turtle nesting season, several precautions must be taken. State and local permits are often required. The same restrictions against beach lighting that apply to upland development must be observed on the beach itself; even light from beach fires would be harmful during nesting season. Coordination with those monitoring sea turtle nests is critical to avoid damage to existing nests.

Attempts to stabilize the exposed and submerged portions of beaches through the use of artificial structures such as rock revetments, sea walls, and groins limits the beaches natural

ability to adapt continuously to changing conditions; sand or stabilized beach is not free to be moved and stored under favorable conditions, and may remain vulnerable to loss under storm conditions. Most attempts at stabilization, particularly on a lot-by-lot basis, actually increase the erosion problem while impeding public enjoyment of the beach and reducing or eliminating important habitat areas. As provided by the Federal Emergency Management Agency's *Coastal Construction Manual*:

Bulkheading on an individual lot basis should be avoided. Because of the abrupt vertical transition in profile, bulkheads generally promote toe scour and this can lead to beach loss and steepening at sediment-starved beaches. Experience has shown that erosion accelerates at adjacent unprotected areas, possibly resulting in the flanking of individual bulkheads. (FEMA, 1986).

Because of the drawbacks associated with groins, seawalls, revetments, or jetties, many coastal communities have undertaken restoration or renourishment programs to stabilize beaches.

Though often used interchangeably, the terms “beach restoration” and “beach renourishment” connote different philosophies of beach management. True beach *restoration* involves the removal of seawalls, groins and other structures in order to re-establish a natural dynamic equilibrium. Beach *renourishment* (or simply beach nourishment) replaces the sand lost by erosion with sand from another (preferably remote) source. If beach nourishment resulted in a self-maintaining beach, the beach could then be said to have been restored. In most cases, beach renourishment needs to be repeated periodically, resulting in a beach that is artificially maintained but not restored.

The result of a good renourishment program is a more natural beach than that provided by structural techniques. The beach is suitable for recreational purposes, and can function quite similarly to a natural beach, even being used by nesting sea turtles

and shorebirds if the replacement sand is truly beach-compatible. Such projects may be abandoned at any time without leaving an array of permanent structures littering the beach, and may be re-initiated from time to time if needed.

The costs of renourishment are directly related to the distance the replacement sand must be moved—the closer the source, the lower the price. From a design standpoint, the replacement sand should come from an area that will not eventually starve the beach, and environmental considerations should preclude the use of estuarine materials. Thus it is economically advantageous to use the closest sands, and strategically important to use distant sands. The most likely prospects at this point are offshore and coastal inlet sources.

The economics and need for beach renourishment at Estero Island are discussed in the Coastal Management Element of this comprehensive plan.

AIR QUALITY

Air quality is monitored by the Florida Department of Environmental Protection (DEP) which currently maintains four monitoring devices in Lee County. Two devices monitor airborne particulate matter (PM) and two monitor ozone, with one of the ozone stations now located at Fort Myers Beach near the elementary school.

Ozone is a gas that is a variety of oxygen. High concentrations occur in a layer of our atmosphere, shielding the earth against harmful ultraviolet rays from the sun. But ground-level ozone is a major component of smog, resulting from products such as solvents and from burning fuels such as gasoline. High ozone levels near the ground can cause many kinds of breathing problems and can damage vegetation.

“Particulate matter” includes dust, smoke, soot, and other tiny bits of solid material. They are produced by burning (diesel fuel, garbage incineration, and fireplaces); by construction activities; and by many agricultural and industrial operations. Particulate pollution can cause eye, nose, and throat irritation and other health problems.

Current Levels

Table 6-8 provides a summary of DEP’s air quality data since 1984. Air quality is generally good, due to the predominantly residential nature of the area and absence of major sources of emissions. Lee County, including Fort Myers Beach, is listed as an “attainment area” by the U.S. Environmental Protection Agency (EPA), which means that air quality is within the limits established through the Clean Air Act.

In mid-1997, the EPA announced new standards for ozone and particulate matter. The existing ozone standard evaluated levels over 1-hour periods; the new standard will be 0.080 ppm over any 8-hour period (phased in over the next 3 years). It is not clear whether current ozone levels at Fort Myers Beach will meet the new standard.

There will now be a PM_{2.5} standard to measure fine particles (smaller than 2.5 micrometers in diameter). The previous standard had grouped these fine particles with coarser particles up to 10 micrometers. Fine particles come mainly from vehicle exhaust and combustion, while coarse particles are mainly windblown dust.

Future Impacts

DEP does not routinely monitor or inspect facilities for which it has issued air quality permits (though it does require monitoring reports and will respond to complaints from neighboring property owners). If the town ever approves any facilities that may

harm air quality, it may wish to establish local monitoring procedures to supplement those provided by the state.

Table 6-8 — Concentration of Ozone and Airborne Particulate Matter, 1984-1996

	Ozone* <i>(ground-level hourly maximums, measured at Fort Myers Beach)</i>	PM** <i>(annual averages, measured at the Fort Myers Water Treatment Plant on Princeton St.)</i>	PM₁₀**
1996	0.089	N/A	17
1995	0.089	22	16
1994	0.093	24	13
1993	0.082	26	N/A
1992	0.083	28	N/A
1991	0.083	28	N/A
1990	0.085	31	N/A
1989	0.104***	31	N/A
1988	0.102***	31	N/A
1987	0.101****	31	N/A
1986	0.101****	33	N/A
1985	0.080****	30	N/A
1984	0.081****	32	N/A

Sources: FDEP, 1997.

* The ozone standard has been 0.120 ppm (235 µg/m³)

** The standard for inhalable particulate matter is an annual average of 50 µG/m³ (and a maximum of 150 µG/m³ averaged over any single day). PM levels can be measured for different size particles; “PM” measures all particles, and “PM₁₀” is the measurement of all particles smaller than 10 micrometers (microns).

*** Measured at Cape Coral

**** Measured at Fort Myers

Air quality in the town may also be affected by activities in adjacent communities, such as the urbanized areas of Lee or Collier Counties. The town may wish to involve itself in the site selection and permitting processes for any point-source pollutant generators, as there are no specific procedures that guarantee that the town’s concerns would be addressed.

NATURAL HISTORY AND GEOLOGY

Estero Island is a barrier island, essentially a linear island of sand that parallels the coastline. In general, barrier islands form through growth of spits from headlands and subsequent breaching by inlets, emergence of underwater shoals, or drowning and isolation of mainland dunelines caused by rising sea levels. Florida's peninsular Gulf of Mexico barrier islands, including Estero Island, occur on elevated portions of the underlying surface (Johnson and Barbour, 1991).

The islands bounding Estero Bay originated from sediments deposited at the mouths of rivers and creeks, including the Caloosahatchee River, when rising sea levels flooded this area approximately 5,000 years ago. The islands here appear to have been at their present positions since the rate of sea level rise decreased approximately 3,500 years before present (Johnson and Barbour, 1991).

SOILS

The *Soil Survey of Lee County* was issued in 1984 by the U.S. Soil Conservation Service (now known as the Natural Resource Conservation Service). It mapped 9 distinct soil types on Estero Island. The general soils of Estero Island are considered "soils of the swamps and sloughs" and occur as the map unit pattern of Isles-Boca-Pompano. These are nearly level, poorly drained, deep and moderately deep, sandy soils; some have a loamy subsoil and some are sandy throughout. Under non-urban conditions, these soils would generally be suitable for wildlife habitat and rangeland (SCS, 1984).

Table 6-9 provides the percentage of each soil type on the island. Note that most soils have been classified as "urban lands" to reflect severe alterations from their natural state (even in 1984).

Table 6-9 — Soil Types Found on Estero Island

<u>Soil Name</u>	<u>Percent</u>	<u>Soil Name</u>	<u>Percent</u>
Canaveral fine sand	0.04%	Kesson fine sand	5.97%
Canaveral -Urban land complex	56.17%	St. Augustine sand, organic substratum-Urban land	0.04%
Captiva fine sand	1.59%	Urban land	17.13%
Beaches	6.77%	Matlacha gravelly fine sand	3.19%
Wulfert muck	8.37%	ALL SOIL TYPES:	100%

Source: *Soil Survey of Lee County, Florida, Soil Conservation Service, 1984.*
(A description of each soil type as provided by the Soil Conservation Service is included in an appendix to this document.)

Soil erosion is a natural process by which rocks and soils are weathered by water and wind. Rain and wind carry soil particles away. Natural processes and human activities can hasten this process. Clearing large areas of land for urban development exposes the soil to wind and water and thus accelerates erosion. Soil erosion represents the loss of an important natural resource and threatens the quality of surface waters.

Severe localized erosion occurs as a result of poor land development practices such as clearing an area during pre-development site preparation, then leaving the site exposed to wind and water erosion over a period of months. Fill slopes of development sites and side slopes of excavations and ditches, if not stabilized, can cause sedimentation in swales and receiving waters. This problem is especially critical when fill material is placed next to waterways or wetlands in which sedimentation can result in destruction of aquatic habitats, displacement of dependent fauna, obstruction of navigation channels, and possible release of pollutants (nutrients, metals, or pesticides).

To counter these problems, typical land development codes regulate the clearing of property until permits have been issued for development projects. Throughout all construction activities,

staked haybales or filter cloth should be placed between the development site and any adjacent swales, surface waters, or wetlands. All slopes, including those associated with single-family residential development, should be sodded or planted immediately after final grading. When preparing the new land development code, the town will determine what kind of stronger measures should be included to minimize erosion during the construction process.

Soil erosion also occurs when sand is lost from the beachfront. Although human activities can worsen erosion, much beach erosion is a result of natural causes because barrier island beaches and dunes naturally dissipate wave energy and act as a repository for shifting sands as well as serving as an upland buffer from erosion and flooding. Beach erosion is addressed further in the Coastal Management Element.

Estero Island has no commercially valuable mineral deposits. The land's value as coastal real estate far surpasses the value of the underlying sand or shell and extraction activities would be incompatible with current levels of urban development.

GROUNDWATER

Groundwater resources (underground water) are limited due to saltwater intrusion that moves down from tidal waters and up from deeper aquifers. The town relies on Florida Cities Water Company for its potable water, which is pumped from wellfields on the mainland. Florida Cities operates two wellfields and treatment plants south of the Caloosahatchee River on the mainland; its Green Meadows plant in east Lee County has the capacity to expand to serve all anticipated customers in its service area. The Utilities Element of this plan analyzes the capacity of these sources to serve additional customers.

Lee County has been designated as part of the SFWMD's "Critical Water Supply Problem Area." This designation is made where

water resource problems are critical or are expected to become critical over the next 20 years. Lee County is considered a "Reduced Threshold Area" where there is a history of substandard water quality, potential for movement of saline water into groundwater, or lack of water to serve future needs. More stringent permitting requirements are applied in such areas. In an effort to address these water supply concerns, SFWMD developed a *Lower West Coast Water Supply Plan (LWCWSP)* in 1994. The planning area included 4,300 square miles in southwest Florida, including all of Lee County.

Aquifers

The Surficial Aquifer System of underground water-bearing rocks can be divided into two aquifers, the water table and lower Tamiami aquifers, separated by leaky confining beds. Water quality is generally good, except that it is susceptible to saltwater intrusion (where seawater moves in from the coast to replace freshwater that is being pumped out of the ground). The Green Meadows plant of Florida Cities Water draws from the surficial aquifer. In many barrier islands, a thin lens of fresh water rests near the surface above more saline water, making some fresh water available for domestic use, but this source cannot support intense urbanization and is susceptible to contamination and saltwater intrusion.

The mid-Hawthorne aquifer lies below the surficial system throughout most of Lee County, but is not extensively used due to poor productivity. The aquifer also experiences a degradation of water quality further south and east. In addition, isolated areas of high salinity occur along the coast, and generally the barrier islands have poor quality water in this aquifer. This aquifer once provided all of the water for the City of Cape Coral and Pine Island. Elsewhere, the aquifer is only used occasionally for agricultural irrigation and remote homesites.

The Floridan aquifer system is deeper yet and is capable of high yields, but it produces only non-potable water in Lee County. High salinity and hardness increase with depth, making desalination necessary for acceptable potable uses. Florida Cities, among other utilities, does treat and utilize this aquifer for some potable use.

Aquifer Recharge

Estero Island is not a significant recharge area for any of the major aquifers that are used for public water supply. The only aquifer directly below the island where water moves fairly freely is the lower Hawthorn, part of the deep Florida aquifer system which is recharged to the north of Lee County.

The only discrete areas of groundwater recharge where land uses are directly regulated are wetlands. Many agencies regulate uses in wetlands: the U.S. Army Corps of Engineers, DEP, and SFWMD. Through the new Environmental Resource Permitting program, the permitting criteria of the DEP and water management districts have become standardized, with the lead authority typically falling to the districts. Destruction or alteration of wetlands is contingent upon demonstrating compliance with minimum standards and compensating for wetland loss. Compensation typically consists of the creation of new wetlands or restoration of previously damaged wetlands. The Corps derives its authority to regulate wetland impacts through Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

Though the permitting processes described above are fairly effective in protecting wetlands, their effectiveness at protecting recharge areas is compromised by a number of weaknesses, including exemptions for wetlands below one half acre in size, minimal upland buffer requirements, exemptions for mining proposals, and the fact that aquifer recharge, though acknowl-

edged as one of the functions of wetlands, is not addressed through specific permitting criteria.

Mineral Content

One of the basic measures of groundwater quality is mineral content, which largely determines its suitability for domestic, agricultural, or industrial use. The mineral content of groundwater is determined primarily by the composition and solubility of soil and rock that come into contact with the water, and the length of time the water is in contact with these materials.

Because mineral content can be defined as the sum of all of the dissolved inorganic ions and compounds, a measure of the mineral content of groundwater can be obtained by measuring the concentration of major inorganic constituents in the water, such as total dissolved solids (TDS), chloride, sulfate, and hardness (calcium and magnesium). Chapter 62-520 of the *Florida Administrative Code* establishes standards for the quality of drinking water distributed by public water systems (standards for private wells have not been developed on a statewide basis). Florida's secondary drinking water regulations include standards for TDS, chloride, and sulfate in public water supplies (500, 250, and 250 milligrams per liter (mg/l) respectively). These are identical to the EPA-recommended levels for drinking water. A standard is not provided for hardness, but water having a hardness concentration greater than 180 mg/l is considered very hard and can cause excessive soap consumption and scale build-up in water heaters.

Ground Water Contamination

Potential point sources of groundwater contamination in the town include leakage from sewer lines, effluent from any remaining septic tanks, and quasi-industrial sites such as boat-yards. Flowing artesian wells also can contaminate other layers of groundwater, because lower quality water flowing under

artesian pressure from deeper aquifers can mix with the generally better quality water of the shallower systems. The use of fertilizers and pesticides, and saltwater intrusion along the coastal shoreline, are both considered potential “nonpoint” or indirect sources of contamination.

Point source dischargers to groundwater are required to perform water quality testing on samples collected from monitoring wells and to submit groundwater quality data to DEP. There are no permitted point source discharges in the Town of Fort Myers Beach at the time this plan was prepared.

Current and Projected Water Needs and Sources

In 1996 there were 7,710 dwelling units within the town. The Future Land Use Element forecasts total housing units to increase to 8,738 at build-out at some time before the year 2020. From 2008 through build-out, an additional 175 dwelling units will require an additional 45,500 gallons per day of potable water. These additional demands are a minute portion (0.1%) of the supply increases being planned by Lee County Utilities by 2030 (source: Lee County’s Water Supply Facilities Work Plan, as updated in July 2008). For full details, see the Utilities Element.

GOALS - OBJECTIVES - POLICIES

Based on the analysis of the conservation issues in this element, the following goals, objectives, and policies are adopted into the Fort Myers Beach Comprehensive Plan:

GOAL 6: To protect the natural resources in and around the town from further damage and improve their future health and sustainability through regulations, education, enforcement, timely management, public improvements, and cooperation with other entities with similar goals.

OBJECTIVE 6-A ESTUARIES AND BAYS – Improve the condition and function of estuaries and bays surrounding Estero Island, including their components such as seagrass meadows, tidal flats, soft bottoms, oyster bars, tidal creeks, and open water.

POLICY 6-A-1 Estuaries are the ecological transition between fresh and saltwater systems. They provide extensive habitat for fish and wildlife including the feeding, breeding, and nursery ground for most of the commercially important fish and shellfish and many species of local and migratory birds, while offering a broad array of recreational opportunities. The Town of Fort Myers Beach will take all feasible steps to protect its marine and estuarine habitats and finfish/shellfish resources to ensure their long-term viability and productivity for scientific, commercial,

sport, and recreational purposes. The town shall take a leadership role in enacting ordinances and facilitating resolution of jurisdictional problems.

POLICY 6-A-2 The town will cooperate closely with other governmental agencies in formulating, monitoring, and enforcing regulations to protect the healthy functioning of the estuary, including but not limited to:

- i. controlling point and non-point sources of pollution including drainage, sewage pollution, and stormwater runoff;
- ii. avoiding hardened shoreline stabilization such as seawalls;
- iii. maintaining proper quality and timing of freshwater inputs;
- iv. protecting habitats from dredge-and-fill activities;
- v. protecting sea grasses from “prop scarring” and excessive shading from docks; and
- vi. protecting important uplands adjacent to wetlands.

POLICY 6-A-3 In cooperation with other jurisdictions, evaluate the effectiveness of existing regulations and enforcement techniques in preserving the bay and estuary system. Recommend and support such additional measures as necessary to ensure their sustainability, such:

- i. Marking existing channels crossing through seagrass beds to help boaters avoid damaging them (and their boats);
- ii. Establishing permitting criteria for activities within the town’s 1000-foot jurisdiction beyond Estero Island to protect seagrass beds, oyster bars, soft bottoms, and other benthic communities

from damage from docks, boat ramps, navigation channels, etc. These criteria would be coordinated with other regulatory agencies to ensure that every effort is made to locate these facilities away from valuable environmental resources. If permits are issued without concurrence from the town, the town may choose to withhold local building permits if a better location or technique could avoid damage to seagrass beds, oyster bars, or other sensitive benthic communities.

- POLICY 6-A-4 Encourage the organization of a local task force to coordinate and reconcile efforts of various organizations, governments, and businesses to promote long-term sustainability of the estuary. Potential perspectives include eco-tourism, water quality, habitat protection, commercial and recreational uses, and economic development. The task force would promote cooperative activities, assess needs, and recommend methods of coordinating reporting and enforcement of violations. The task force would make recommendations to the town regarding issues such as:
- i. Establishing restricted areas and other methods of controlling boat traffic in Estero Bay, particularly around rookery islands and seagrass beds.
 - ii. Locating a suitable launching point on the Gulf for use by personal water craft to reduce traffic on the bay side.
 - iii. Adopting a ban on the commercial collection of live shells.
 - iv. Recommending capital projects to improve water quality.

- v. Recommending regulations to protect local waters.

- POLICY 6-A-5 Maintain or improve estuarine water quality in accordance with policies under Objective 8 below.
- POLICY 6-A-6 Regularly examine activities that may be within the town's jurisdiction to determine whether more stringent regulations or other actions are needed to ensure the functioning and long-term viability of natural systems.
- POLICY 6-A-7 Participate actively in the Agency on Bay Management, the Charlotte Harbor National Estuary Program, and other entities attempting to improve the environmental health of Estero Bay.
- POLICY 6-A-8 Actively encourage the purchase of the full 16,000 mainland acres adjoining Estero Bay to become an expanded Estero Bay State Buffer Preserve.

OBJECTIVE 6-B WILDLIFE AND NATIVE HABITATS – Improve the viability of existing native coastal and upland habitats and establish additional areas for nature preserve and conservation uses.

- POLICY 6-B-1 **CONSERVATION PROGRAMS**
GENERALLY – The town will cooperate with local, state, and federal regulatory agencies in establishing and managing natural reserves, preserves, and critical wildlife areas. This cooperation will include increasing public awareness, allowing appropriate access, properly protecting natural resources, and documenting and reporting violations of laws and regulations.
- POLICY 6-B-2 **LITTLE ESTERO ISLAND CRITICAL WILDLIFE AREA** – In cooperation with state agencies, the town will aid in the stewardship

of the Little Estero Island Critical Wildlife Area through activities such as:

- i. Prohibit commercial activities within the defined boundaries of Little Estero Island.
- ii. Support legislative measures as necessary to protect the long-term future of the preserve.
- iii. Inform residents and visitors of the uniqueness and fragility of the island's habitats, and identify funding for measures such as designating pedestrian trails and dune walkovers, adding information and interpretive signs, producing educational brochures, and conducting seminars to encourage proper use.
- iv. Sponsor a volunteer task force to work with the Florida Game and Fish Water Fish Commission to oversee the daily stewardship of Little Estero Island through activities such as:
 - Identify potentially destructive practices (such as mowing or raking on the shoreline, litter, boat traffic, low-flying airplanes, disturbances from vehicles and dogs, etc.) and determine appropriate methods to address them.
 - Inform residents and visitors of the uniqueness and fragility of the island's habitats; plant shoreline vegetation to replace vegetation damaged by visitors or other unnatural causes; place and maintain interpretive signs; produce educational brochures; and conduct seminars to encourage proper use.
 - Promote voluntary enforcement and possible citizen "volunteer patrols" to educate residents and visitors of the

rules of the island and why they are needed.

- Develop guidelines to protect the fragile environment of the preserve and, where appropriate, urge their adoption as land development regulations or part of the town's code of ordinances.

POLICY 6-B-3 MATANZAS PASS PRESERVE – Prepare for the transition of the long-term maintenance responsibility of the Matanzas Pass Preserve from Lee County to a partnership among the county, the town, and a local non-profit organization such as the Friends of the Matanzas Pass Preserve:

- i. Reinforce and support the efforts of the non-profit organization to expand the voluntary community-based portion of the operation and maintenance of the preserve. Assist their efforts to implement the restoration plan (which includes site preparation, revegetation, and long-term management) and future improvements including new foot trails, repairing and extending boardwalks, providing a canoe/kayak access point, and adding a fishing pier/observation deck. This assistance may take the form of seeking grant funds, lending technical assistance, providing equipment (either directly or through leases with the county), or partial funding.
- ii. Negotiate an agreement with the county that assigns responsibilities for the long-term maintenance, restoration, and improvement of the preserve, that reflects its status as both a county-wide and local

amenity and its importance as natural habitat.

- POLICY 6-B-4 **UPLAND HABITATS** – Preserve all remaining coastal strand and hammocks, and improve the existing habitat through removal infestations of exotic plants and replanting with native species. When these habitats are in private ownership:
- i. Land uses must not result in the degradation of the values and functions of adjoining and nearby wetlands.
 - ii. Beaches seaward of the 1978 Coastal Construction Control Line are designated on the Future Land Use Map as “Recreation” to preclude their use for further urban development.
 - iii. Known remaining coastal hammocks are designated on the Future Land Use Map as “Recreation” to preclude their use for further urban development.

POLICY 6-B-5 **ADJACENT DEVELOPMENT** – Development adjacent to aquatic and other nature preserves, wildlife refuges, and recreation areas shall protect the natural character and public benefit of these areas including, but not limited to, scenic values for the benefit of future generations.

POLICY 6-B-6 **RESOURCE MANAGEMENT PLANS** – The town will participate with other agencies in preparing and implementing water management plans such as the Charlotte Harbor Management Plan, Surface Water Improvement and Management (SWIM) plans, Estero Bay Aquatic Preserve Management Plans, and similar efforts. The town will reevaluate its policies for protecting and enhancing natural resources upon a

review of newly adopted or revised plan by other agencies.

POLICY 6-B-7 **INVASIVE EXOTIC PLANTS** – Invasive exotic plants may not be used to meet landscaping requirements for new development. Prohibited species shall be identified in the land development regulations.

- POLICY 6-B-8 **SEAWALLS** – The town shall encourage planting of mangroves or placement of rip-rap in artificial and natural canal systems to replace existing seawalls in need of repair. Buildback of vertical seawalls will not be permitted along natural waterbodies if one or more of the following conditions exist:
- i. Buildback would cause excessive shoreline erosion or endanger shorelines of surrounding properties.
 - ii. Buildback would threaten wetlands.
 - iii. Buildback would be a threat to public safety or block access to state-owned land or beaches.
 - iv. Buildback would be waterward of the existing seawall alignment on adjacent shorelines.

POLICY 6-B-9 **ACQUISITION OF ADDITIONAL SITES** – The town will strive to expand the opportunities for conservation and public appreciation of natural resources through acquisition of additional areas with rare or unique ecological or botanical features, or which provide access to such areas, through activities such as the following:

- i. Identify specific sites that would be desirable for public acquisition;
- ii. Support the efforts of other entities acquiring land that will contribute to the

- conservation effort (for example, aquatic preserve buffer areas, Bunche Beach, etc.)
- iii. Consider alternative means of land acquisition, such as supporting the efforts of non-profit conservation land trust or acquiring development rights in lieu of full acquisition.
- iv. Accept donations of land for nature preserves or other resource conservation areas with the following general conditions: if such lands contain ecologically valuable habitat and/or if public ownership of such lands would expand existing or provide increased preservation or resource conservation areas.
- v. When acquiring property, determine the best entity to be responsible to implement a long-range management plan.

- POLICY 6-B-10 INFORMATION SHARING** – Share information, data, and maps with other entities involved with conservation land acquisition and management through measures such as:
- i. Cooperating with Lee County in the following activities:
 - Maintaining a central clearinghouse for environmental studies and recommendations from public and private information sources;
 - Compiling, maintaining, and regularly updating vegetation mapping, sitings of listed species, data regarding their habitat, and water resources data.
 - Updating the Lee County Habitat Inventory Map using the county’s Geographic Information System.

- ii. Cooperate with Lee County and FGFWFC in maintaining an inventory of all native communities and natural habitats to aid in land-use decision-making, development approvals, and ranking of potential acquisitions.

OBJECTIVE 6-C PROTECTED SPECIES – Increase cooperation with local, state, and federal agencies in protecting wildlife species listed as endangered, threatened, or of special concern, and conserve the habitats upon which they depend in order to maintain balanced, biologically productive ecosystems.

- POLICY 6-C-1 PROTECTIVE MEASURES GENERALLY** – The town shall assist in the application of state and federal regulations regarding listed species through activities such as:
- i. Provide information regarding listed species on properties undergoing development review.
 - ii. Withhold development approval until such time as all applicable state and federal permits pertaining to such species have been obtained and copies provided to the town.
 - iii. Cooperate with local, state, and federal agencies in developing species-specific Habitat Conservation Plans as authorized by the Endangered Species Act. Until such plans are developed, the town’s criteria for approval of development proposals shall be consistent with the provisions of the listed species guidelines promulgated by the FGFWFC.
 - iv. Cooperate with Lee County and other agencies in the establishment of

mitigation parks and banks to allow this form of mitigation for local impacts to listed wildlife species and native communities.

- v. Support public education on the value of wildlife, native communities, and other natural resources through such means as brochures, newspaper articles, public presentations and workshops, and the placement of interpretive displays and development of observation trails at appropriate park sites.
- vi. Encourage and provide technical assistance to volunteer and non-profit organizations such as Turtle Time, Ostego Bay Foundation, Estero Bay Buddies, and the Friends of the Matanzas Pass Preserve in their conservation efforts.

POLICY 6-C-2 BALD EAGLES – Maintain Lee County’s ordinance protecting bald eagle nesting habitat in case bald eagles begin nesting on Estero Island, and urge adherence during development activities to “Habitat Management Guidelines for the Bald Eagle in the Southern Region” prepared by the U.S. Fish and Wildlife Service which recommends a primary protection zone with a radius of 750 to 1500 feet around active nests in which no development should occur, and a secondary zone an additional 750 feet to a mile from the outer edge of the primary zone to remain undisturbed during the nesting seasons. Nest trees should not be touched in any way by development activities unless the nest site has been de-classified by the FGFWFC.

POLICY 6-C-3 MANATEES – Recognizing that the waters of the town provide important habitat for the endangered West Indian manatee, the town will cooperate with local, state, and federal agencies in the establishment of manatee protection programs, including restriction of activities known to adversely affect manatees. The town shall cooperate in the designation, marking, and enforcement of slow-speed manatee protection areas. The town shall cooperate with Lee County in preparing and implementing a manatee protection plan, particularly in providing educational materials and programs to inform the town’s boating population of the presence of manatees and of how to avoid destruction of manatee habitat and avoid manatee/boat collisions. The town supports the incorporation of the SWFRPC’s 1995 marina siting study into Lee County’s Manatee Protection Plan.

POLICY 6-C-4 GOPHER TORTOISES – The town’s policy is to protect gopher tortoise burrows wherever they are found. If unavoidable conflicts make on-site protection infeasible, then off-site mitigation may be provided in accordance with FGFWFC requirements.

POLICY 6-C-5 SEA TURTLES – The town shall prepare and adopt a new sea turtle ordinance by the end of 1998 to supersede Lee County’s existing Sea Turtle Protection Ordinance. The new ordinance shall provide standards for coastal uses and development and shall prohibit, during sea turtle nesting season, any point source of light or any reflective surface of a light fixture being visible from the beach; also, areas seaward of a frontal dune must not be directly, indirectly, or cumulatively

illuminated. Other beach activities to be regulated include:

- i. Beach raking, scraping, and other activities that unnecessarily compact the sand and/or damage dunes or prevent the re-creation of dunes;
- ii. Unauthorized vehicular traffic on the beach;
- iii. Storage of beach furniture, cabanas, jet skis, sailboats, and other equipment on the beach that may interfere with sea turtle nesting;
- iv. Drainage of swimming pools, parking lots, and building roofs into point discharges directly onto the beach.

OBJECTIVE 6-D WETLANDS – Preserve all remaining wetlands; protect them from further degradation; and improve their condition and natural functions.

POLICY 6-D-1 Wetlands include tidal marshes, salt flats, and mangrove swamps that provide valuable habitat, buffering from storms, shoreline stabilization, and production of food for estuarine and coastal waters. The town will cooperate with state and federal agencies in the formulation, monitoring, and enforcement of regulations restricting activities that contribute to the destruction of wetlands and/or of the adjacent upland communities that cleanse stormwater inflows. Such potentially destructive activities include: construction fill that encroaches on edges of canals and bay waters, dredging of boat basins and channels, use of seawalls, rip rap, and other similar forms of shoreline stabilization, ditching for mosquito control,

and any filling or removal of mangrove systems.

POLICY 6-D-2 The Future Land Use Map provides a close approximation of wetland boundaries. Wetland regulations in this plan and in the land development regulations include all wetlands, even in not specifically shown on the Future Land Use Map, that are identified as wetlands in accordance with F.S. 373.019 (17) through the use of the unified state delineation methodology described in FAC Chapter 62-340, as ratified and amended by F.S. 373 4211. If the Future Land Use Map is incorrect due to a clear factual error, an administrative process is contained in Chapter 15 to establish the precise boundary of any wetland.

POLICY 6-D-3 In accordance with F.S. 163.3184(6)(c), the town will not undertake an independent review of the impacts to wetlands resulting from development in wetlands that is specifically authorized by a state Environmental Resource Permit or exemption. However, no development approval shall be issued by the town for any project which impacts wetland resources until all requisite permits from other agencies have been obtained and provided to the town. All conditions placed on such permits shall be incorporated into the final development approval issues by the town. Violations of such conditions shall be prosecuted through the town's code enforcement procedures.

POLICY 6-D-4 The following activities in and near wetlands may be desirable and are not forbidden by this comprehensive plan:

- i. Activities necessary to prevent or eliminate a public hazard, such as elimination of a dangerous curve in a road, dredging in order to clean up a spill of hazardous waste, or removal of underwater obstructions to boat traffic.
- ii. Activities which provide a direct benefit to the public at large which would exceed any public loss as a result of the activity, such as removal of exotic species, restoration of natural hydroperiods, impacts associated with the maintenance of existing drainage works, or providing water access that is open to the public.
- iii. Resource-oriented activities such as passive recreation, outdoor education, or other uses where protection of wetland functions and values is the primary attraction.
- iv. Structures or facilities that will improve the functional value of wetlands or provide “no-impact” use for observation, education, research, or passage (walking or non-motorized boats); these could include such structures as public boardwalks, observation decks, or launching areas for non-motorized watercraft.

OBJECTIVE 6-E DUNES AND BEACHES – Protect and improve dunes and beaches as recreation areas, valuable habitat, protection from storms, and areas of high scenic and aesthetic value. The effect of the town’s efforts may be a noticeable transition from today’s

manicured and compacted beach towards a naturally appearing and functioning beach. This transition will be accomplished through education, regulation, and assistance in physical restoration activities.

POLICY 6-E-1 For any beachfront development approved after the adoption of this plan and for all public beach areas within the town, state-approved dune walk-over structures shall be required at appropriate crossing points. These same structures are also encouraged wherever pedestrians will be crossing dune areas.

POLICY 6-E-2 All coastal construction projects, including beach restoration and renourishment, shall protect sea turtle nesting areas by limiting construction in dune and beach areas to non-nesting periods (except under emergency conditions). In historic shorebird nesting areas, construction must be completed prior to shorebird nesting. Protection zones shall be marked around sea turtle nests and shorebird nesting areas to ensure that construction activities landward of the dune and beach system are limited to the actual construction site.

POLICY 6-E-3 The town will implement the following measures to promote the restoration of beach and dune systems:

- i. Initiate a program to recreate a dune line and plant appropriate vegetation such as sea oats wherever sand dunes have been destroyed.
- ii. Require the use of indigenous plant species for public and private dune restoration or renourishment projects.
- iii. Require that lots and parcels created after the adoption of this plan shall be of

sufficient size and dimension to ensure a 50-foot buffer between any structures (except dune cross-overs) and the landward edge of the primary dune. This buffer shall remain in its natural state except for the minimum disturbance necessary to accommodate dune cross-overs.

- iv. Undertake a management and maintenance program to control invasive exotic vegetation as a cooperative effort of the town and its citizenry.
- v. Consider erosion control taxing/benefit units, grants, and other cost-sharing funding mechanisms to provide funds for beach renourishment and management projects (see Coastal Management Element for strategies on beach renourishment).

POLICY 6-E-4 The following activities are prohibited to protect dunes and beaches:

- i. Removal of dune vegetation and stabilization of submerged and exposed beach by artificial means other than replenishment with compatible sand.
- ii. Excavation or destructive alteration of beach and dune systems. (Minimal disturbance necessary to accomplish approved beach restoration or renourishment activities or construct dune cross-overs is allowable under this policy.)
- iii. Operation of motor vehicles on beaches and dunes (except in association with law enforcement activities, emergency medical services, public land/resources management, state-licensed sea turtle monitoring, once-daily delivery and pickup of beach equipment, minimal

cleaning of litter and of excessive accumulations of natural debris, or as necessitated by an approved restoration, renourishment, or emergency project).

- iv. Any construction activity seaward of the Coastal Construction Control Line not specifically approved by the DEP.
- v. Construction of artificial shoreline hardening structures except the emergency use of such structures constructed in compliance with Chapter 161, *F.S.* If a hardened structure is absolutely necessary along the beach, rip-rap revetments are preferred. New seawalls are not permitted.

OBJECTIVE 6-F AIR QUALITY – Continue to meet or exceed federal air quality standards based on monitoring results from state agencies.

POLICY 6-F-1 Ensure that the town’s land development regulations do not include any disincentives to the use of clean alternative energy sources such as active and passive solar technology.

POLICY 6-F-2 Reduce automobile emissions through programs developed in the Transportation Element to reduce single-occupant automobile trips. Mobility alternatives include increased ridership on the trolley system; introduction of an electric tram system throughout the Island, incentives for visitors to park off-island or park once on-island; a water taxi or water shuttle system; and an interconnected system of bicycle and pedestrian paths.

POLICY 6-F-3 Establish criteria for any new facility that would require an air quality permit including monitoring procedures to supplement those provided by the state, and enter into

agreements with Lee County and other relevant agencies to ensure that the town's concerns are addressed during the permitting stages of potential point source pollution generators.

OBJECTIVE 6-G SOIL EROSION – Conserve and protect soils to reduce water and air pollution from wind and water erosion.

- POLICY 6-G-1 The town shall implement the following measures to ensure conservation of native soils and prevention of erosion and its polluting impacts:
- i. To reduce airborne pollutants and protect tidal waters from dust caused by wind erosion, adopt requirements for protecting cleared land during construction.
 - ii. Land clearing prior to issuance of a building permit or development order.....
 - iii. An erosion control plan shall be submitted and approved by the town prior to the issuance of a development order. Such plan shall reference the property's topography, vegetation, and hydrology and utilize the best management practices such as the use of staked hay bales or filter cloth between the development site and adjacent swales, surface waters, or wetlands; sodding, seeding, or mulching immediately after final grading; and maintenance of vegetation following development activities in order to reduce the erosion by wind or water.

OBJECTIVE 6-H WATER QUALITY – Improve the water quality and economic value of the water bodies surrounding the Town of Fort Myers Beach beyond the levels existing in 1997.

- POLICY 6-H-1 As an integral part of the Estero Bay estuary system, the town shall take all feasible measures in an intergovernmental effort to protect, maintain, and improve water quality in Estero Bay.
- POLICY 6-H-2 No garbage or untreated sewage shall be discharged into tidal waters.
- POLICY 6-H-3 Maintain or improve estuarine water quality by requiring new development or redevelopment to meet the following standards:
- i. Development shall not degrade the estuarine quality of Estero Bay below those standards established by the state for Class II Outstanding Florida Waters.
 - ii. Development shall not degrade surface or ground water quality below state standards established in Chapter 62-302 *FAC* for surface water; Chapter 52-520, for ground water; and Chapter 10D-6 for bathing places.
- POLICY 6-H-4 In cooperation with Lee County and other agencies, encourage continued water quality monitoring and identify sources of non-point water pollution, especially those found to be occurring from within the town. Develop a program to reduce or eliminate those pollution sources that may include education, regulation, and incentives, and follow-up enforcement.

POLICY 6-H-5 The town will implement the measures adopted in the Stormwater Management Element to reduce the polluting impacts of stormwater runoff.

POLICY 6-H-6 The town shall comply the requirements of the National Pollutant Discharge Elimination System by prohibiting the discharge of runoff, wastewater, or other potential sources of contamination into surface waters which results in the degradation of the quality of the receiving water body below the applicable standards.

OBJECTIVE 6-I WATER SUPPLY – Insure continued supplies of drinking water of sufficient quantity and quality to meet the projected demands of all consumers and the environment.

POLICY 6-I-1 Incorporate into the land development code measures applicable to new development and redevelopment to encourage water and wastewater management such as low-volume irrigation systems, xeriscape landscaping techniques, potential hook-ups to re-use water systems, and use of other conservation and recycling techniques.

POLICY 6-I-2 The town will cooperate with emergency water conservation measures of the South Florida Water Management District.

POLICY 6-I-3 The town will continue to purchase bulk water from Lee County Utilities in lieu of providing an independent supply of potable water. Lee County Utilities considers the Town of Fort Myers Beach to be part of its potable water service area and has demonstrated its ability to expand raw water supply and treatment facilities to meet anticipated growth consistent with the

2005–2006 Lower West Coast Water Supply Plan Update (prepared by the South Florida Water Management District).

OBJECTIVE 6-J GROUNDWATER – Maintain the quality of groundwater resources and improve as necessary to meet state or federal standards.

POLICY 6-J-1 Commercial excavation and mining activities are prohibited in the Town of Fort Myers Beach due to potentially detrimental effects to groundwater, surface water, wildlife habitats, and surrounding land uses and values.

POLICY 6-J-2 The Town of Fort Myers Beach opposes offshore gas and oil exploration and excavation activities which may be reasonably expected to threaten the quality of coastal beaches and estuarine ecosystems; or would place oil- or gas-related facilities on coastal beaches, islands, or wetlands; or would require the placement of oil or gas storage facilities on the island.

POLICY 6-J-3 The dredging of additional tidal canals is prohibited.

POLICY 6-J-4 The town shall support Lee County’s programs to property dispose of hazardous wastes.

POLICY 6-J-5 The town shall require connection to central water and sewer systems to eliminate demands on groundwater and reduce the potential for contamination from septic tanks.

POLICY 6-J-6 Identify any remaining septic tanks and require their use be discontinued.

Appendix A — Literature Cited

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Appendix B — Estero Island Soil Types

Canaveral fine sand soils are nearly level and moderately well-drained and somewhat poorly drained on ridges. Under natural conditions, depth to water table is eighteen to forty inches for two to six months and recedes to greater than forty inches from February to July. Available water capacity is very low, permeability is very rapid and natural fertility is low. Vegetation includes cabbage palm (*Sabal palmetto*), Brazilian pepper (*Schinus terebinthifolius*), seagrape (*Cocoloba uvifera*), wild coffee (*Psychotria nervosa*), and an understory of vines and herbaceous plants. For recreational uses, this soil is rated as severely limited (soil properties are unfavorable, and limitations can be offset only by combination of costly soil reclamation, special design, intensive maintenance and limited use). It is also rated as having only fair potential for wild herbaceous plants (this element can be established, improved or maintained in most places and requires moderately intensive management for satisfactory results).

Canaveral urban land complex soils have generally been modified by grading and the construction of impervious surfaces. These soils accommodate buildings, roads, parking lots, and drainage facilities. Like Canaveral fine sand, this soil complex is rated as severely limited for recreational uses and as having only fair potential for wild herbaceous plants.

Captiva fine sand includes 5 to 10 percent of Canaveral and Kesson soils and scattered areas of ponded Captiva fine sand and is described as nearly level, poorly drained soil. Slopes are smooth to concave and range from zero to one percent. Under natural conditions, depth to water table is about ten inches for one to two months and ten to forty inches for ten to eleven months. This soil may be under standing water for several days in some years. Available water capacity is low and permeability is very rapid. Natural vegetation includes cabbage palm, Brazilian pepper, sand cordgrass (*Spartina bakeri*), leather fern (*Acrostichum danaeifolium*) and wax myrtle (*Myrica cerifera*). For recreational uses, this soil is also rated as severely limited. However, it has fair potential for the wildlife elements of grasses and legumes, wild

herbaceous plants, and hardwood trees; good potential for the wildlife elements of wetland plants and shallow water areas; fair potential as habitat for woodland wildlife; and good potential as habitat for wetland wildlife.

Beaches are narrow strips of nearly level, mixed sand and shell fragments along the Gulf of Mexico. These areas are covered with daily saltwater tides and are subject to movement by wind and tides. Salt-tolerant plants are the only vegetation. Beaches are suitable for recreation.

Muck soils are nearly level, very poorly drained, and located in marsh areas. Slopes range from 0 to 1 percent. These soils are generally not suitable for cultivated crops or citrus, but Gator muck is well suited for vegetable crops or sugar cane if drained. These soils are vulnerable to flooding and have severe limitations for urban development.

Kesson fine sand includes ten to fifteen percent areas of Captiva and Wulfert soils, soils with organic surface layers and soils disturbed with loamy material. This soil is described as nearly level, very poorly drained soil in broad tidal swamps which is subject to tidal flooding. Slopes are smooth and range from zero to one percent. Depth to water table fluctuates with the tide, available water capacity is low, permeability is moderately rapid to rapid and natural fertility is low. Natural vegetation includes black mangrove (*Avicennia germinans*), red mangrove (*Rhizophora mangle*), sea-oxeye daisy (*Borrchia arborescens*) and saltwort (*Batis maritima*). For recreational uses, this soil is also rated as severely limited. It has fair potential for the wildlife habitat elements of wetland plants and shallow water areas and fair potential as habitat for wetland wildlife (USDA/SCS, 1984).

St. Augustine sand, organic substratum-Urban land complex are areas of St. Augustine sand, organic substratum, and areas of Urban land. The areas of the St. Augustine soil and of Urban land are so intermingled that it was not practical to map them separately at the scale used for mapping (USDA/SCS, 1984). About 50 to 65 percent of each mapped area is St. Augustine sand, organic substratum, and about 20 to 35 percent is Urban land that is covered by houses and other buildings and streets and other

forms of pavement. The St. Augustine soil is in marshes and mangrove swamps. It consists of gray to pale brown sand, with about 25 percent multicolored shell fragments, overlying organic layers. Slopes are smooth to slightly convex and range from 0 to 2 percent. The depth of the water table varies with the amount of fill material and the extent of artificial drainage within any mapped area. However, in most years, the water table 24 to 48 inches below the surface of the fill material for 2 to 4 months. It is below a depth of 48 inches during extended dry periods. The available water capacity is low in the fill material and high in the underlying organic material. Permeability is estimated to be rapid. Natural fertility is low. Most of the natural vegetation has been removed. There are scattered weeds in vacant lots. The soil is poorly suited to most plants unless topsoil is used. The soil is severely limited for most kinds of community development and related uses.

Urban land soils consist of areas that are more than 85 percent covered by buildings, parking lots, roads, and other man-made structures. Unoccupied areas are mostly lawns, vacant lots, and playgrounds.

Matlacha gravelly fine sand, is nearly level, somewhat poorly drained, and was formed by fill and earthmoving operations. Permeability is estimated to be rapid in the fill and underlying surfaces. The water table varies with the amount of fill material and the extent of artificial drainage. The available water capacity is variable, but it is estimated to be low. It is poorly suited for plants unless topsoil is spread over the area to provide a suitable root zone. Most of the natural vegetation has been removed. The existing vegetation consists of the South Florida slash pine and various scattered weeds. The soil has severe limitations for septic tanks and recreational uses and moderate limitations for building sites.

Appendix C — Federal Legislation

The following is an assessment of existing federal regulations that affect the natural environment at Fort Myers Beach.

The **Endangered Species Act** (ESA) was adopted by Congress in 1973. The act establishes criteria for the listing of plants and animals as threatened or endangered. The ESA also provides a permitting program which helps ensure that ecosystems upon which listed species rely are conserved during development activities. The Act also provides the impetus for the creation of species-specific Habitat Conservation Plans intended to address the long-term viability of populations of endangered or threatened species.

The **Marine Mammal Protection Act of 1972** gives the U.S. Department of the Interior the responsibility for the management and protection of marine mammals found within the territorial boundaries of the United States, including the West Indian Manatee.

The **Coastal Zone Management Act (CZMA) of 1972** establishes a cooperative state and federal program to manage coastal zones in the United States. Implementation of the CZMA may be delegated to individual states which adopt their own programs which meet the criteria of the federal program. The Florida Coastal Management Program, which was approved in 1982, is administered by the Florida Department of Community Affairs.

The **Clean Water Act** establishes a permitting program and criteria for the discharge of pollutants into the country's waters, including minimum water quality standards. The Act focuses primarily on surface waters, and provides the greatest protection for wetlands of any federal legislation.

The **Rivers and Harbors Act (1899)** regulates all activities affecting the navigable waters of the United States, including the approval of dredging and filling activities in wetlands. This regulation affects the construction of bridges, roads, wharves, and just about every activity which could be interpreted as affecting navigable waters. The primary enforcement agency is the U.S. Army Corps of Engineers which may solicit comments from other agencies during its review of activities which fall under this Act.

The **Clean Air Act (1970, 1990)** establishes emission standards for point source emitters of airborne pollutants as well as motor vehicles. It also sets pollution controls which require communities and industry to meet ambient air quality standards for a number of air pollutants.

The **National Flood Insurance Act of 1968** establishes the National Flood Insurance Program (NFIP) which makes federally-subsidized flood insurance available in communities which adopt and adequately enforce floodplain management ordinances that meet NFIP requirements. The Act also required that the Federal Emergency Management Agency establish flood risk zones in all flood prone areas.

The **Coastal Barrier Resources Act (1982)** prohibits new federal expenditures for new or expanded development on undeveloped coastal barriers which are included within the Coastal Barrier Resources System.

The **Marine Turtle Protection Act (1991)** strengthened marine turtle protection measures by requiring states to consider turtle protection in all permit applications for coastal construction and excavation.

The **Safe Drinking Water Act of 1974** charges the U.S. Environmental Protection Agency with ensuring that drinking water meets established criteria.

Appendix D — State Legislation & Policies

The **Florida Endangered and Threatened Species Act** and the **Preservation of Native Flora of Florida Act** establishes criteria for the listing, protection, and management of plant and animal species considered to be endangered, threatened, or of special concern.

The **Florida Wildlife Code**, also known as Chapter 39, *FAC*, restricts the pursuit, molestation, harm, harassment, capture, or possession of a listed species. The Code establishes a permitting program for such activities, including permits for the “incidental take” (lawful killing “incidental to” otherwise allowable activities) of individual animals.

The **Florida Manatee Sanctuary Act** establishes protective measures for the endangered West Indian manatees and establishes manatee sanctuary areas throughout the State.

The **Water Resources Act** establishes state water policy and implementation measures, which include the creation of the five regional water management districts. This act also mandates the formulation of a state water use plan.

The **Florida Water Quality Assurance Act** requires the Florida Department of Environmental Protection to maintain a statewide groundwater quality monitoring network and database.

The **Florida Safe Drinking Water Act** establishes a statewide framework for regulating drinking water quality.

The **1984 Groundwater Protection Rule** establishes guidelines for the restoration, conservation, and management of the state’s groundwater resources. Florida was the first state in the nation to adopt such a rule.

The **Florida Solid Waste Management Act (1988)** requires each county and city to include recycling programs in their comprehensive plans and to develop and initiate recycling programs with the goal of reducing the waste stream by 30% by the end of 1994.

Chapter 161, FS, and Chapter 62B-33, FAC, establish the state’s beach and shore preservation regulations including structural requirements, Coastal Construction Control Line (CCCL) guidelines, and sea turtle protection regulations.

Chapter 163, FS (Local Government Comprehensive Planning and Land Redevelopment Act) requires that each city and county prepare and adopt a comprehensive plan containing mandatory elements that address growth management issues including conservation and coastal zone management.

Chapter 253, FS, regulates aquatic preserves.

Chapter 258, FS, regulates state-owned lands.

Chapter 370, FS, and Chapter 16N-35, FAC, established the state’s salt water fishing license requirements.

Chapter 373, FS, regulates wetlands.

Chapter 403, FS, establishes water quality standards.

Chapter 40E, Florida Administrative Code (FAC) provides for Environmental Resource permits and exemptions.

Rule 9J-5, FAC establishes the minimum criteria for local government comprehensive plans, and is used by the Florida Department of Community Affairs to determine whether such plans fulfill the requirements of the state’s Growth Management Act. This rule prescribes the minimum requirements for each element of the comprehensive plan.

The **Surface Water Improvement and Management (SWIM) Act of 1987** requires each of the state’s five water management districts to identify those surface waters most in need of restoration or preservation. The act mandates the development of management plans (“SWIM plans”) for each water body so identified, including detailed schedules of implementation.

The **Mangrove Trimming and Preservation Act** was enacted during the 1995 legislative session and amended during the 1996 session. This act provides standards for the selective trimming of mangrove trees and establishes a permitting program to allow such activities. The 1995 version allowed trimming of mangroves by private persons on publicly owned lands, preempted local permitting programs, and prohibited the adoption of local standards more stringent those provided within the act. The 1996 amendments restored protection of publicly owned mangroves, relaxed the preemptions of local authority, and provided clarification regarding the trimming standards.

Appendix E — Local Programs and Agencies

The following is a summary of local organizations involved in the protecting the coastal environment of Fort Myers Beach.

Turtle Time

Turtle Time, Inc. was established in 1989 as a non-profit organization dedicated to the continued survival of the loggerhead sea turtles. Turtle Time is licensed by the state and the U.S. Fish and Wildlife Service to monitor sea turtle nesting activities on the beaches of Bowditch Point south to the Collier County line. During nesting season, volunteers patrol this area daily looking for signs that turtles have crawled onto the beaches. When they spot signs of a crawling turtle, they investigate and see if a nest was dug and eggs laid. Nests are marked with the yellow “Sea Turtle Nest” sign and their locations recorded. If necessary, the nests will be fenced off to keep out natural predators such as raccoons. Nests can be moved to better locations if necessary to save them but only as a last resort. Volunteers also aid turtles in distress and assist the hatchlings when necessary.

Ostego Bay Foundation

The Ostego Bay Foundation is actively involved with local environmental protection. The foundation participates in Estero Bay water quality sampling, monitoring of seagrasses and sediments, tidal flow studies (mapping), POD (dolphin research), setting up manatee programs, support for Florida Marine Institute, all done by volunteers. This includes a FEMA-certified oil spill co-op first responder team. The foundation is housed in the Ostego Bay Foundation Marine Science Center on San Carlos Island. Public education exhibits including aquariums, near shore tank, fossils, endangered species, mangroves, and shells.

Friends of Matanzas Pass Preserve

Friends of Matanzas Pass Preserve is an outgrowth of the citizens’ movement that resulted in the acquisition of this preserve, its ultimate transfer to Lee County, and the ongoing restoration activities there. The non-profit group stresses the many reasons why the preserve is important to our ecological system and organizes the opportunities for educational use and for “hands-on” involvement in managing and caring for the preserve.

Estero Island Historic Society

The Estero Island Historic Society is actively preserving the heritage of Fort Myers Beach. The society presents a slide show of the history of Fort Myers Beach and is responsible for the restoration of the historic San Castle cottage. The cottage was saved from destruction and moved to its current location at the entrance to the Matanzas Pass Preserve. It has been refurbished and now serves as the society’s Historic Cottage and Nature Center, a free museum and interpretive center for the preserve.

Caloosahatchee River Citizen’s Association

The SFWMD has begun work on watershed plans for the Caloosahatchee River watershed and Estero Bay watershed. The Caloosahatchee River Citizen’s Association, a not-for-profit public organization, meets monthly to help create the Caloosahatchee River watershed plan.

Coastal Advisory Council

The Coastal Advisory Council was created in 1995 by Lee County Resolution #95-12-02. The council was created to advise the Lee County Board of County Commissioners, staff, and the various advisory boards about projects affecting beach and shore preservation. The advisory council informs the Board of County Commissioners about the best roles they can play in conserving the beaches of Lee County.

Randell Research Center

The Randell Research Center is being created by the Florida Museum of Natural History at Pineland on northern Pine Island. The site is a 200-acre internationally significant archaeological site where enormous shell mounds overlook the waters of Pine Island Sound. The site was once occupied by the Calusa Indians and is now listed on the National Register of Historic Places. The domain of the Calusa Indians included all of Estero Bay including Mound Key, also the site of a significant ceremonial site. The center will house ongoing research programs in archaeology, history, and ecology, and programs in environmental and heritage education.