CITY OF TARPON SPRINGS

COASTAL PLANNING AREA AND CONSERVATION ELEMENT

Original Analysis and Document Prepared By
MANGROVE SYSTEMS, INCORPORATED
October 10, 1989

Updates Prepared By
THE CITY OF TARPON SPRINGS
PLANNING AND ZONING DIVISION
February 2019

COASTAL PLANNING AREA AND CONSERVATION ELEMENT CITY OF TARPON SPRINGS

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Revision Dates:	September 17, 1991	Ordinance No. 91-03
	August 5, 1997	Ordinance No. 96-28
	August 5, 2008	Ordinance No. 2007-49
	September 16, 2008	Ordinance No. 2008-07
	August 17, 2009	Ordinance No. 2008-32
	June 15, 2010	Ordinance No. 2010-15
	June 13, 2013	Ordinance 2013-02
	February 6, 2018	Ordinance 2017-26
	June 12, 2018	Ordinance 2018-30
	February 12, 2019	Ordinance 2018-28

I. INTRODUCTION

A. Purpose

This inventory and Analysis for the Coastal Planning and Conversation Element of the City of Tarpon Springs Comprehensive Plan is prepared in accordance with the requirements of State Law.

Under the 1985 Growth Management Act, all local governments are required to prepare and adopt Comprehensive Plans. The legislation and regulations specify requirements for each Element of the Comprehensive Plan. Each Element must be supported by collected and analyzed data. The supporting information can be achieved by the use and analysis of valid existing data, or by undertaking original research and reporting on and analyzing that research.

For the Conservation and Coastal Planning Area Element of the City of Tarpon Springs Comprehensive Plan, the data collection included both original research and a review of previously existing documentation. This Inventory and Analysis Report presents a complete review of all matters to be considered in the Conservation and Coastal Planning Area Element and will serve as a basis for the formulation of the Goals, Objectives and Policies of the Element.

The purpose of the conservation portion of this element is to provide a guide for the conservation, use, and protection of natural resources located within the City. The element is intended to protect and enhance the public health, safety and welfare, and the quality of the environment.

In addition, the element establishes a plan and policy direction concerning conservation of natural resources and will provide a basis for decision-making by City officials. As growth occurs in Tarpon Springs, the need for protection and management of the City's natural resources will increase.

The City's natural resources are identified and analyzed. A description of these resources and their significance to the City as well as the region, is also presented. Policies to maintain and enhance these resources as well as shape growth patterns of the City are included.

B. Methodology

Several different methods were used in the preparation of the Inventory and Analysis Report for the Tarpon Springs Conservation and Coastal Management Element. A major literature review of historical, environmental, utilities, engineering, planning and miscellaneous material was undertaken. The literature considered is identified in the bibliography of this report (Appendix B).

Interviews were then conducted with Tarpon Springs staff, other consultants serving the City, and staff of other agencies including: Pinellas County; the Tampa Bay Regional

Planning Council; the Florida Departments of Community Affairs, Environmental Regulation, and Natural Resources; the Southwest Florida Water Management District; and the U.S. Army Corps of Engineers. These interviews provided detailed information about various considerations for the Conservation and Coastal Management Element, including infrastructure, the natural environment, planning and land use controls, ownership and usage, etc.

Reviews of City maps and aerial photographs were then undertaken to establish different land use categories and to establish conservation areas within the City. The mapping and photography reviewed included 1985 Pinellas County aerials, and 1986 aerials available from Mangrove Systems, Inc. Other mapping included the existing Comprehensive Land Use Plan, the Zoning Ordinance Map, property mapping, utilities and road mapping, and mapping prepared by the Pinellas Planning Council.

Following review of the maps and aerial photographs, field inspections were undertaken to confirm and enhance the information obtained from the existing maps. Included in the field inspections were a generalized land use survey and detailed on-site investigations of sensitive areas.

On completion of the field investigations, data collection was deemed to be complete and analysis of the data began. The analysis was oriented towards considering the use or preservation/conservation of the sensitive areas in the City of Tarpon Springs, and the use or preservation/conservation of the City's various shorelines.

The purpose of the analysis was to provide input to the formulation of the Goals, Objectives and Policies that govern the future use of the preservation/conservation areas and the City's shoreline. This report contains the Inventory and Analysis prepared in support of the Conservation and Coastal Management Element of the City of Tarpon Springs Comprehensive Plan. This Inventory will provide a full and complete basis for the Goals, Objectives and Policies section of the report.

The entire area within the City of Tarpon Springs was analyzed from the perspective of the Conservation and Coastal Management Elements.

Where appropriate, this baseline data has been periodically updated by City of Tarpon Springs to reflect current conditions, up to date resources and mapping technology, and relevant changes to Florida Statutes (2007).

C. Environmental Setting

The City of Tarpon Springs is located in northwest Pinellas County in west central Florida (Figure 1). The climate is moderate with wet, hot summers and relatively mild winters with occasional freezes. The City is located at the juncture of two major subdivisions of the U.S. Gulf of Mexico coast, the Big Bend Drowned Karst and the Central Barrier Coast regions (Beccasio et al. 1982). The former section is characterized by low energy coastlines with broad expanses of coastal marsh and an extensive continental shelf. The latter section is characterized by higher energy coastlines with

offshore barrier islands. Lagoons and bays with tidal marshes and mangrove forests separate the barrier islands from the mainland.

D. Current Situation

The study area is largely urbanized with residential, retail, commercial and industrial land uses prevalent. Tourism at the historic sponge docks on the Anclote is an important part of the local economy. As of April 1, 2006, the population of the City of Tarpon Springs was 24,161 (Bureau of Economic and Business Research, University of Florida, Gainesville).

The lower Anclote River (western section) is included in the Pinellas County Aquatic Preserve and is located at the north end of the study area. Portions of the river are heavily developed, largely for commercial fishing and related support industries. Other portions of the shoreline are relatively undisturbed with natural shoreline and tidal marshes intact. Water quality problems exist in this portion of the river as a consequence of point source discharge and from urban stormwater runoff.

St. Joseph's Sound is located in the west portion of the study area. This estuary is part of the Pinellas County Aquatic Preserve. Most of the shoreline is developed for residential use. Some natural coastal marshes (saltmarsh and mangrove) exist along the shoreline but most of these are moderately affected by mosquito ditching. Water quality problems in the Sound are primarily linked to urban stormwater runoff.

Most of the large tracts of freshwater wetlands are part of Anderson Park (a Pinellas County park) on the west shore of Lake Tarpon. This lake covers much of the east boundary of the study area. Small pockets of freshwater wetlands occur elsewhere around the City. Few natural upland areas remain. Some of these are considered sensitive habitat by various environmental agencies and groups.

E. Study Areas Boundaries

The study area is generally bounded on the west by the Intracoastal Waterway, to the north by the Pasco County Line to the east by the shore of Lake Tarpon, and to the south by Klosterman Road (including a one outparcels extending southward). The maps in the series accompanying this narrative illustrate these boundaries.

II. COASTAL MANAGEMENT DATA AND ANALYSIS REQUIREMENTS

A. Existing Land Uses in the Coastal Area

1. Coastal Planning Area Defined

For the purposes of this Element the Coastal Zone was originally defined as that area lying 1,500 feet landward of the shoreline mean high tide water mark. The “Coastal

Zone", now referred to as the "Coastal Planning Area", (see appendix C) is defined by five separate areas:

(a) The Working Waterfront
(b) The FEMA Velocity Zone Area
(c) Anclote River Floodway and Adjacent Lands (1,500 foot buffer)
(d) The Bayou Residential Corridors
(e) The Lake Tarpon Shoreline

The Coastal Planning Area is demonstrated in Figure 2. All references to "Coastal Zone" are now replaced with "Coastal Planning Area". There is some overlap between these sub-areas, as shown on the revised Figure 2.

2. Land Use

The Tarpon Springs Coastal Planning Area is primarily urbanized with a mix of residential, commercial, and industrial uses. Existing land uses were inventoried on a citywide basis. An existing land use map can be found in the Future Land Use Element. However, a generalized discussion of the land use types is provided below.

a) Gulf of Mexico Shoreline (FEMA Velocity Zone)

The shoreline facing the Gulf of Mexico from Klosterman Road on the South to the Anclote River on the north is characterized by a homogeneous group of urbanized residential land uses ranging in density from 2 units to 15 units per acre. Although a majority of the uses are single family, some higher density multifamily uses dot the shoreline between the Gulf and Florida Avenue. Two major open spaces in this area are Sunset Beach and Fred Howard Park. Due to the existing urbanization additional major open space preservation is not going to occur.

b) Anclote River Shoreline (Anclote River Floodway & Adjacent lands)

The Anclote River shoreline is characterized by a mix of land uses in terms of both type and intensity. The southern shoreline is residential from the mouth of the river to the bayous. East of the bayous begins the City's historic sponge dock area. This area is important economically to the City from a tourist standpoint and is characterized by a mix of retail shops, restaurants, commercial fishing uses, packing houses, pleasure and commercial docking facilities, boat yards and boat building.

The north Anclote shoreline is characterized by a mix of lower density residences, undeveloped acreage, fish camps, pleasure and commercial docking facilities, and industrial uses. The industrial uses include the former Stauffer Chemical and a number of boat yards and boat building facilities. The fish camps include hookup facilities for trailers.

c) Other Uses

An important segment of the City's commercial district, **The Working Waterfront** , including the Sponge Docks) is located in the Coastal Planning Area. Due to the area's heavy urbanization and low elevation, standing water and street flooding occurs during frequent rains. The lack of retention facilities can also be attributed to the area's age. **The Bayou Residential Corridors** are almost exclusively residential and are also low lying areas prone to urban flooding from rain events as well as storm surge from hurricanes and tropical storms. Many structures within this area are identified as significant structures on the Florida Master Site File Inventory. These areas were some of the first areas established in the City of Tarpon Springs.

The Lake **Tarpon Shoreline Area** is characterized as primarily low to medium density residential. One existing commercial structure, the Tarpon Turtle, was recently demolished and re-constructed to meet current FEMA requirements as well as removing all on-site septic systems.
Several mobile home parks are present in the Coastal Planning Area. However, due to existing development patterns additional mobile home facilities are not expected to occur. (See Figure 3). Two mobile home parks within the Coastal Planning Area have been razed for redevelopment . The trend toward redevelopment of mobile home parks is expected to continue.

d) Shoreline Conflicts

(1) Gulf of Mexico

The existing Gulf of Mexico shoreline, where not modified by existing urban development, is a low energy tidal swamp which includes marshes, mangroves, seagrass meadows and other related wetlands. These areas provide protection from storms, absorption of stormwater runoff, and absorption of pollutants and sediments. The major conflict with the character of this shoreline occurs from the area's heavy urbanization and is related to the following types of activities:

* dredging and filling
* seawalling
* removal of coastal vegetation
* direct stormwater discharge
* multi-slip docking facilities

The existing vegetative communities of the Gulf shoreline provide wave absorption during heavy storms. The dredging, filling, and seawalling of these communities will negate their natural function. The shoreline's character does not lend itself to seawalling, and, fortunately, the number of existing seawalls are minimal. In addition, some protection of existing natural shoreline functions is provided by the 30 foot setback from the shoreline required by the City's Aquatic

Lands Ordinance. However, a wetland buffer in areas not adjacent to the shoreline is also necessary to protect these communities from encroachment.

The water depth required for boats associated with multislip docking facilities is in direct conflict with the Gulf shoreline shallow depth and seagrasses. Intensive boating access in this area also leads to what is known as prop dredging and scouring. Single slip facilities, boardwalks, and piers can be designed to minimize environmental damage.

Direct stormwater discharge into the Gulf is a major source of non-point pollution. Wetlands can be used for filtering but pretreatment is necessary. Where filtering cannot occur, prior to direct discharge into the Gulf, greater on-site retention is necessary. The following recommendations are made to reduce Gulf of Mexico shoreline conflicts:

* Restrict dredge and fill activities
* Restrict seawalling of the Gulf shoreline
* Maintain the 30 foot aquatic Lands buffer along the Gulf shoreline for principal buildings. In cases where existing seawalls have effectively eliminated the natural shoreline function, permit a limited exemption from this rule for accessory structures, as defined in Policy 2 of this Sub-Element,
* Impose a 15 foot buffer around wetlands, both isolated and aquatic
* Restrict multislip (3 or more) docking facilities along the Gulf shoreline
* Restrict direct stormwater discharge
* Utilize wetland communities as a positive outfall after on-site pre-treatment

(2) Anclote River

Along the south shoreline of the Anclote River uses range from light commercial to heavy boat works. The boat yards conflict with the prevalent tourist related economy of the sponge docks. The expansion of boat yards and upland dry storage marinas should be restricted and eventually phased out along the north side of Dodecanese Boulevard in order to promote expansion of the tourist oriented light commercial uses. Packing houses and marine oriented fishing establishments should be allowed to continue along the west side of Island Drive.

Tarpon Springs is a nineteenth century riverfront city and much of the earliest development occurred along the shoreline of the Anclote River and its tributary bayous. Much, if not most, of this early development included seawalls which have created a vertical grade change between land and water. This alteration effectively eliminated

the estuarine functions these shorelines formerly provided. For the approximately 60 percent of the river and bayou shoreline which remains in a vegetated state, the application of FDEP beach and shoreline protection standards and the 30-foot shoreline buffer will help preserve remaining natural functions.

e) Water-Dependent and Water-Related Uses

Several water-dependent uses occur in Tarpon Springs: recreational (swimming beach, boat ramps, fishing access areas, charter and sightseeing operations); and commercial (marinas, boatyards, sponge docks, fish houses, Coast Guard station, and commercial dockage to support marine fisheries and fish and marine products processing plants). Water-related uses that occur in Tarpon Springs include motel/hotels, restaurants, and parks. As of 2007 the water-dependent and related facilities identified within the City limits are listed in Table 1 and are generally located on Figure 4. Areas which offer public access to coastal areas are noted in Table 2 as well and shown on Figure 15.

f) Need for Water Dependent and Water-Related Uses

Due to the sensitive nature of the Gulf Coast shoreline and the Pinellas County Aquatic Preserve, wet slip marina facilities should be located along the Anclote River west of the Alternate U.S. 19 bridge where access to deep water and the river channel is present and the river is presently developed with water dependent uses. All locations in the river must comply with the regulations for the Pinellas County Aquatic Preserve as enforced by the Department of Environmental Protection. Additionally, the wet slip marina facilities must not be located in areas known for habitation by the West Indian Manatee (Florida Power plant discharge of heated water and occasionally in lower portions of the Anclote River). Posting of Manatee warning signs as well as seasonal speed zones could reduce potential impacts to this species and should be considered when reviewing applications for wet slip marinas. Adequate sites for the expansion of these facilities are present abutting the river channel and deep water on the north side of the Anclote River. Dredging of shallow areas to create access to deep water and for alteration of environmentally sensitive land will not be permitted.

Accommodations for docking, sponge display, sponge cleaning, and auction should be maintained along the City's historic sponge dock area. This is part of the traditional economic base of the area and will contribute to the current tourist oriented economic base.

A working waterfronts committee was formed in December 2006 to respond to an ongoing decline in the commercial fisheries industry within Tarpon Springs. While the areas along Island Drive along the south side of

the Anclote River have been designated for commercial fishing and related industries these areas are not suitable for permanent dockage of larger commercial fishing boats. The lack off sufficient dockage for shrimpers and larger fishing vessels is creating a downward spiral for the industry. Without adequate dockage these vessels are forced out of the area. As goes these vessels, so goes the fish-houses, wholesale and retail outlets, and other support industries such as boat yards and marine-ways. Many of the properties that have served these uses for many years are under pressure to accommodate recreational boating needs. The working waterfront committee shall continue to evaluate all aspects of this industry and formulating strategies to keep commercial fisherman active in Tarpon Springs.

The expansion of boat yards should be restricted to the Island Avenue industrial area on the north side of the Anclote River and existing industrially designated lands. The need for water related recreational uses are provided by the Recreation and Open Space Element of this plan.

Table 1 Water Dependent and Water Related. Uses

NAME	ADDRESS	FACILITIES	WET SLIP/DRY DOCK/ PARKING
Anclote Isle Marina	331 Anclote Road	D	70/0/0-12
Anclote Marineways	1062 Island Ave.	R	
Anclote Harbor Marina	523 Anclote Rd.	D, R	30/280/25
Anderson Park	39669 US 19 Nort	BR	0/0/60
Belle Habour	307 Anclote Rd.	D	20/105/ 15
Bayshore Cove MHP		D, FB	10/0/60
Beckett Bridge	and Lower	FB	0/0/8
The Landings Marina	21 Oscar Hill Rd.	BR, D, B, S, R	30/95/30
Cox Seafood	Blvd.	CS	
Craig Park	100 Beekman Lan	BR, FB, B, D	20/0/20
Dolphin Deep Sea Fishing	Dodecanese Blvd.	FC	
Duckworth Boatworks	1051 Island Ave	R	
Ericson Marine	435 Roosevelt	B, D, R	50/0/20
Ervin Park	Lake Tarpon	BR	0/0/20
Mar Mar Marina	761 Anclote Rd.	D, R	13/0/?
George Saroukos Boatworks	US Alt 19	R	
Gulf Marine Ways, Inc.	950 Dodecanese	D, R	13/3/-
Holiday Seafood		CS	2/0/2
Howard Park	1700 Sunset Blvd.	FB	0/0/60
Em & Em Marina	1092 Island Ave.	D	26/0/12
Tarpon Springs Yacht Services	1058 Island Ave	R	
Miss Milwaukee Fishing	948 Roosevelt	FC	
Neptune Marine	1046 Island Ave	Upland storage	3/0/0
Pelican Point Restaurant and Seafood	933 Dodecanese	CS /R	3/0/16
Port Tarpon Marina & Restaurant	531 Anclote Rd.	D, R	60/400/50
Pinellas Avenue Bridge/ Catchell Powell Bridge	North of Dodecanese	FB	0/0/10
Riverside Drive		FB	
Riverview Lane		BR	Private
Spring Boulevard		BR	
St. Nicholas Boat Line	693 Dodecanese I	Sponge Tours	
Stamas Yacht	300 Pampas Ave	R	
Sunset Beach	Gulf Rd.	BR, FB, D	0/0/25
Sunset Avenue Boat Ramp	Guld Rd.	BR	0/0/10
Marker 25 Marina	1155 Anclote Rd.	D, R	12/0/30
Tarpon Dry Dock	Dodecanese	R	
Tarpon Springs City Marina	100 Dodecanese	D, FC	21/0/10
Tarpon Springs Sponge Dock	Dodecanese	D	0/0/80
Tarpon Springs Yacht Club	350 South Spring	D	13/0/10
The Tarpon Turtle	1513 Lake Tarpon	D, BR	12/0/55
US Hwy 19 Bridge		FB	
Turtle Cove Marina	601 Roosevelt	S/D	10/135/43
Whitcomb Bayou	Whitcomb Blvd.	FB, BR	0/0/8
WATER RELATED LISTING:			
Church of the Bayou	Whitcomb Blvd.		
Dodecanese Blvd. Retail Area	Dodecanese Blvd.		

KEY: **BR** - boat ramp **B** - bait **R** - boat building and repair
S - dry storage **L** - lift **FB** - fishing bank/bridge/dock
FC - fishing charter **D** - dock **CS** - commercial seafood dock

Source: Fla. Dept. of Natural Resources, Docking Facilities Inventory. * = Pinellas County. Updated locally February 2007

Table 2 Summary of Coastal Recreational Facilities

TYPE	PUBLIC	PRIVATE	TOTAL
Saltwater fishing pier	0	0	0
Saltwater beach (feet)	600	0	600
Saltwater bridges, fishing (linear feet)	2,800	0	2,800
Saltwater seawall, fishing (linear feet)	9,200	0	9,200
Saltwater boat ramp (sites)	11	1	12
Saltwater marina slips	369	23	352
Saltwater dry storage slips	738	0	738

Source: Florida Dept. of Natural Resources.
Pinellas County Marina Inventory, June 2006

g) Redevelopment Needs

The most obvious areas in need for redevelopment in the coastal area are those that have existing structures below the FEMA base floor elevation requirements. Enforcement of the FEMA regulations will ensure that all new structures are built according to FEMA requirements and will work well in reducing the amount of drainage that can occur during a storm or flood.

However, there are older areas which have developed at low elevations prior to FEMA regulations taking affect which deserve special consideration. The most notable area is the sponge docks. Many of the structures in the sponge docks predate the 1930's, and preservation and enhancement of the character of this area is desirable. Where feasible, flood-proofing, combined with minimal elevations of commercial buildings should be encouraged or mandatory when redevelopment occurs in the historic waterfront areas. This will ensure that new structures can be harmoniously integrated with older existing structures without damaging the existing urban street pattern in the Sponge Docks. Residential uses should be limited to above ground floor retail.

There are no areas which have been severely damaged by past storms in need of redevelopment.

h) Economic Base

The major components of the current economic base in the coastal area are located along the Anclote River. This area primarily consists of the Sponge Docks which is the principal tourist attraction in Tarpon Springs. Within this Sponge Dock area, tourist attractions can be found ranging from Restaurants and Curio Shops to boat rides and sponge diving exhibitions.

Also, in the Anclote River a variety of marine activities can be found. These activities primarily occur on the north side of the Anclote River and range from commercial marinas and boatworks to seafood processing plants and some light industrial uses.

An analysis of the economic base of the coastal area adjacent to the Gulf of Mexico indicates that the primary purpose is to provide residential land uses for seasonal and permanent residents.

3. Effect of Future Land Use Upon Natural Resources

The combined analysis of existing vegetative cover, and existing land use and zoning, clearly identify the future needs to preserve and conserve the remaining areas of native vegetation that function as wildlife habitat, aquifer recharge areas, and benefit the water quality of the adjacent estuarine areas. Figure 19 shows existing vegetative cover wildlife habitat and marine resources. The resources identified in Figure 19 were inventoried through the use of 1999 SWFWMD inventory maps based upon the Florida Land Use Cover and Classification System (FLUCCS). Detailed descriptions of each FLUCCS category are provided in the Conservation section beginning on page 48 of this element. Additionally, the National Wetlands Inventory and SWFWMD Lands Inventory is provided by Figure 20.

The City has very few areas of upland vegetation remaining. As development pressures continue on remaining vacant lands it is critical to strike a balance between private property rights and preserving remaining wildlife habit and natural resources. Of particular importance for wildlife habitat are areas of xeric oak and pine located in close proximity to the coastal area. Estuarine salt marsh and mangrove forest which provide wildlife habitat, benefit water quality by filtration of upland runoff, and dissipate wave energy during severe storm events should be preserved.

Prior to development of any wetlands or areas of significant upland habitat as defined in Future Land Use Policy 1.1.12, an environmental analysis should be performed to identify environmental sensitivity of uplands or wetlands and the ability of uplands to support wildlife habitat.

Those areas that are developable, as long as the natural vegetation, character, and environmental sensitivity are considered, may be developed through the use of clustering and reservation of open space implemented through flexible zoning techniques such as planned unit developments, transfer of density rights, tree protection and other regulations.

Those areas of the City which contain environmentally sensitive uplands or wetlands (mostly the latter) should be preserved in their natural state, where possible, through the use of the transfer of density/intensity rights as established by the Future Land Use Map Series and the use of vegetative buffers and

setbacks in order to protect vegetation, wildlife, ground-water and surface water quality as well as provide natural buffers between land uses and reduce air and noise pollution. The Future Land Use Element should identify significant density / intensity bonuses as well as specific "receiving areas" for private property owners willing to sell the development rights for these properties. Remaining undeveloped areas that may be suited for preservation are identified in the following paragraphs.

The coastal area of the City adjacent to St. Joseph's Sound should be preserved. Major areas of mangrove forests and coastal saltmarshes are located: south of Point Alexis; south of Piney Point in the Lake Avoca area; at Round Point; and in the Snead Creek area north of Klosterman Point.

All wetlands which are located along the Anclote River should be designated for preservation. One area of particular importance is located within the Oakbrooke-Cheezum Annexation (Ordinance 85-26), adjacent to the north shore of the Anclote River between Pinellas Avenue and U.S. Highway 19. This large expanse of salt marsh is dominated by needle rush (Juncus roemerianus) and traversed by the Seaboard Coast Line Railroad. Local planning efforts should concentrate on preservation of wetlands within this area. In 2001 this 70+ acre parcel was acquired for permanent preservation and is now managed as North Anclote Nature Park.

An area located north and east of Salmon Bay on Lake Tarpon contains the largest remaining stand of palustrine hardwood forest and cypress forest within City jurisdiction. This forested freshwater system is designated for preservation on the City Comprehensive Land Use Map and zoned for Land Conservation (LC). Local planning efforts should focus on preserving this wetland system and preferably on conserving the contiguous upland habitat as identified on Figure 19, however further study is necessary to determine quality and viability for restoration of wildlife habitat.

Another area for potential future wetland preservation is located west of the City landfill. Peripheral disturbances to this system have occurred in conjunction with landfill operations, as well as the presence of the Pinellas Trail (formerly the Seaboard Coast Line Railroad), these features have served effectively to isolate the area from development pressure. Overall quality of the wetlands and potential habitat should be evaluated prior to any potential development to assess the impacts of the capped landfill on the surrounding area.

The last major area of remaining brackish water marsh, dominated by sawgrass (Cladium jamaicense), is located around the West Winds Subdivision. This area has suffered from disturbances such as ditching and impoundment, and invasion by nuisance species such as cattails. Even with the existing disturbances, the area is sufficiently large to afford wildlife habitat and water quality benefits. The proximity of the Tarpon Springs Golf Course, which is located along the eastern

margin of the system, effectively increases the functional habitat area by providing additional open space and limiting future development pressure.

Smaller areas of wetlands are also depicted Figure 19. Most of these areas are compartmentalized relics of large systems which have since been developed. These areas are characterized by cypress forests and herbaceous palustrine marshes in the eastern portion of the City. A small area of brackish water marsh dominated by leather ferns (Acrostichum spp.) is located northeast of Hidden Lake. This is the last remaining area of other smaller wetlands. These areas provide wildlife habitat and water quality benefits as well as locally attenuating stormwater during storm events.

The temperate hammock forest surrounding Hidden Lake has been designated for preservation. The area provides a unique wildlife habitat in the City, particularly in close proximity to Hidden Lake. The area is currently zoned as a land conservation district. Planning efforts should concentrate on maintenance of this area in the existing condition. Generally, these areas are located contiguous with wetland preservation and conservation areas and provide a buffer habitat to wetland areas as well as supplying intrinsic habitat value.

Local mechanisms exist to reduce disturbances to these areas. The future land use element of the Comprehensive Plan should incorporate land-use classification and zoning to reduce development intensity in and around these areas. Local planning efforts should closely focus on these areas and should coordinate at the County, state and federal levels to achieve the desired goals as outlined herein. Specific intergovernmental planning strategies designed to protect sensitive habitats are discussed at the end of this document in the section on Special Coastal Planning Efforts. Specific development criteria for properties identified in figure 19 are provided in the Future Land Use Element.

The City should adopt as a goal a "no net loss" of wetlands. All development which potentially impacts these remaining wetlands should be required to mitigate in the following priority: 1) onsite 2) directly adjacent to the proposed development site, and 3) within the applicable watershed as identified by the Southwest Florida Water Management District (Figure 23). In all cases, the proposed development must fulfill an overall public benefit.

B. Archaeological and Historical Resources

A separate Historic Element is utilized to inventory, analyze, and provide policy recommendations for the conservation of archeological and historical resources. That element is included in this comprehensive plan.

C. Estuarine Pollution

1. Current Conditions

The Anclote River estuary and St. Joseph's Sound are both classified as Class III water bodies (FDER Chapter 17-3.161). Designated uses for this classification are recreation and propagation and maintenance of healthy, well balanced populations of fish and wildlife (FDER Chapter 17-3.081). Water quality standards applicable to Class III waters are found in Chapter 17-3, FDER regulations.

Water quality in St. Joseph's Sound can be generally characterized as fair to good. The Areawide Water Quality Management Plan (TBRPC 1978) identified bacterial contamination from stormwater runoff and sewage and industrial discharges as the principal water quality problem in St. Joseph's Sound. Principal pollution sources to St. Joseph's Sound from the study area appear to be stormwater runoff (contributing sediments, nutrients, oils and greases) via direct addition and via ditches and swales.

Water quality in the Anclote River can also be characterized as fair to good. Problems are mainly excessively high nutrient levels from sewage discharge and agricultural and suburban stormwater runoff (TBRPC 1978). Principal pollution sources are the City of Tarpon Springs Wastewater Treatment Plant (contributing nutrients and bacteria), stormwater runoff from urbanized, industrial and agricultural areas (contributing sediments, nutrients, oils and greases, and possibly toxins from industrial areas), and non-point addition from the Stauffer Chemical Company.

Additional nutrient loading to the Anclote River from Pasco County is a potential problem where septic tank waste is disposed of from pump trucks in permitted disposal fields. One such area is located just north of County Road 76 and east of the intersection of Anclote Road. While no direct pumping in waters of the State is permitted, general drainage in the area is through ditches which ultimately drain into the Meyers Cove area of the Anclote River.

2. Known Point Sources of Estuarine Pollution

Known surface water discharge point sources and descriptions are listed in Table 3. A 1986 report by the Tampa Bay Regional Planning Council (1986) noted that the Stauffer Chemical Company ceased operation in 1982, thus the thermal pollution point source may no longer exist but the site is listed here because the same report noted that the site could still represent a non-point source of heavy metal, nutrient, and oil and grease input from runoff and groundwater seepage.

3. Non-Point Sources of Estuarine Pollution

The Areawide Water Quality Management Plan (TBRPC 1978) and the planning document, The Future of Tampa (TBRPC 1985) both identified urban stormwater runoff as the Tampa Bay region's major cause of non-point source water pollution; the amount of urbanization and development within the study area indicates that this is probably the

principal water pollution problem. No studies characterizing the quantity or quality of stormwater runoff into estuarine waters adjacent to the Tarpon Springs study area have yet been performed. In general, there are several sources of this type of water pollution (TBRPC 1978):

- Pollutant deposited on streets and parking lots such as oil, grease, metals, sediment, etc
- Construction activities creating sedimentation problems
- Erosion from exposed ground surfaces (i.e., unpaved streets, un-vegetated lots, etc.)
- Lawn and landscape maintenance activities (i.e., fertilizers, pesticides lawn and tree clippings, etc.)
- Domestic pet litter, particularly dog
- General trash, litter and organic debris
- Atmospheric pollutant conditions

Additionally, runoff from industrial areas is expected to result in estuarine pollution problems, but the available data do not permit differentiation between industrial and urban non-point pollution sources. Control programs should thus be developed to address both of these problems; it is not possible to develop individual control programs for industrial and urban stormwater runoff.

4. Impacts of Future Land Use

Area master plans (Pinellas County Comprehensive Plan) and the existing City Comprehensive Plan project continuing increases in population to the year 2030. These increases can be expected to create additional natural resource management problems. This increases demand on traffic and utility facilities as well as increases the number of land uses locating in the Coastal Planning Area. These uses would normally be expected to have a negative impact on estuarine systems, however, this impact is minimized due to the already urbanized coastal area (mostly infill to occur) where public facilities and infrastructure are already in place and the requirement that future development meet up to date state, regional, and local regulations, pertaining to open space, stormwater management, and wetlands protection. The positive impacts of having infrastructure already located on the Coastal Planning Area include the elimination of septic tanks and stormwater retention capacity in some of the less intensive areas.

The impacts that must be monitored include the following:

* Increases in urban stormwater runoff as more natural areas are developed
* Additional pressure to dredge and fill in wetland areas
* Loss of sensitive upland habitat (xeric hammocks, sand pine communities, longleaf pine/turkey oak communities)

* Decline in wildlife populations in natural areas within the City limits caused by increased human use of the areas (automobile and boat traffic)

5. Analysis

The 1986 TBRPC report (TBRPC 1986a) identified the following four major areas requiring attention in the Anclote River:

a. Sewage collection and treatment;
b. Wellfield withdrawals from the Floridian aquifer;
c. Point source discharges;
d. Urban stormwater runoff.

More specific to the study area, the following items were identified by this report:

- Urban runoff from the City of Tarpon Springs
- Petroleum hydrocarbon discharges from vessels
- Discharges from seafood processing plants
- Discharges from the Stauffer Chemical Company plant site
- Poor flushing of Kreamer and Whitcomb Bayous

Table 3 Point Source Discharge

Table 3. Point source discharges and effluent characteristics, City of Tarpon Springs. Source: Areawide Water Quality Management Plan (TBRPC 1978), (Master Drainage Study, Dames & Moore, 1993

DOMESTIC:

				Effluent Characteristics (allowable discharge limits):								
				800		Susp. Solids		Nitrogen		Phosphorus		
Map Designation	Name	Treatment Process	Design Capacity	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	Receiving Water Body
1	City of Tarpon Springs	AWT										
	Wastewater Treatment Plant	NPDES Permit # FL00300406	4.0 mgd	209	6	209	6	209	6	105	3	Anclote River

INDUSTRIAL:

	Name	Industry	Design Capacity	Effluent Type	Receiving Water Body
2	Stauffer Chemical Company	elemental and ferro-phosphorus	unknown	thermal/ industrial site runoff	Anclote River
3	Pinellas Concrete Products	concrete products	0.0025 mgd	truck wash and batch spray to filter to evaperation/percolation pond	No significant discharge
4	Suncoast Paving, Inc	asphalt	0.015	scrubber underflow discharges to pond	No significant discharge

STORMWATER:

	Name	Description	Receiving Water Body
5	Pointe Alexis/ Harborwatch	control structure/underdrain serving a stormwater retention lake	un-named tidal ditch emptying into St. Joseph's Sound
6	City of Tarpon Springs	NPDES Permit #FL000005	
	Whitcomb Blvd	(2) 36" outfall pipe	Whitcomb Bayou
	Grand Central	36" outfall pipe	St Joseph Sound
	Banana to Spring Blvd	36" outfall pipe	Spring Bayou
	Arfaras	42" outfall pipe	Anclote River
	Bath St to Spring Blvd	45" outfall pipe	Spring Bayou
	Rivo Place	36" outfall pipe	Anclote River

The City of Tarpon Springs Waste Water Treatment Plant was brought on-line for advanced wastewater treatment (AWT) in 1987 and is currently permitted for 4.0 million gallons per day (mgd) Annual Average Daily Flow (AADF). The plant is currently operating at approximately 2.2 mgd. The Plant is permitted to discharge effluent to 2.74 million gallons of AADF in to the Public Access Re-Use System tank located within the treatment plant property. When this tank is full the out-flow is discharged into the Anclote River. Tidal flushing of the Anclote River minimizes the impacts of the discharged effluent.

Marinas are another source of pollution to the estuary. Marinas should be designed to allow maximum flushing of the boat basin. The use of dry storage for power boats and upland fueling facilities should be encouraged, as these reduce the amount of heavy metals and petroleum products released to the estuary. The water of the marina and surrounding waters should be of sufficient depth to allow the operation of boats without disturbing bottom sediments or causing propeller damage to marine seagrass beds. The best possible marina siting and construction options should be employed from project inception. Excavation of marina basins from upland areas, and marina plans which minimize or eliminate dredging, can reduce impacts to existing bottom communities.

The Areawide Water Quality Management Plan (TBRPC 1978) described in detail the various measures which could be taken to reduce non-point source pollution measures. These include an expanded street sweeping program, increased efforts to control illegal dumping in or near drainage facilities, cleanup of existing illegal trash dumping areas, and making proper disposal of trash such as grass clippings and yard debris more convenient to area residents. Diversion of stormwater into and through dewatered and disturbed wetlands in the study area should be encouraged for all new development and redevelopment within the area. There are wetlands within the study area which have been severely impacted by mosquito ditching (e.g. those located northwest of the Tarpon Springs golf course). These systems would be ideal for restoration and incorporation into a citywide stormwater management system. Additionally, all stormwater discharged into these wetlands must meet SWFWMD drainage and water quality standards.

Isolated cypress areas or wetlands are particularly vulnerable to large influxes of nutrients and pollutants commonly found in stormwater discharge. Therefore, these isolated wetlands should only be used for filtering or storing stormwater runoff after demonstrating pre-treatment measures in accordance with FDEP and SWFWMD standards.

The Regional Planning Council also recommended in its 1986 report (TBRPC 1986a) that a water quality monitoring program with permanently

established stations should be implemented within the lower Anclote River. The City should be supportive of this effort as it would generate much needed data to assist with estuarine management efforts in the lower Anclote estuary and St. Joseph's Sound. This program would enable a more accurate assessment of the magnitude of non-point and point source addition of pollutants from industrial areas, thus allowing development of plans to minimize or eliminate estuarine pollution from these sources.

6. State, Regional, and Local Regulatory Programs to Reduce Estuarine Pollution

State pollution regulation is largely vested in the Florida Department of Environmental Protection. The FDEP regulates dredge and fill of waters of the state and adjacent wetlands. Dredge and fill permitting is done in accordance with similar federal permitting. FDEP also regulates discharges of pollutants into natural or artificial bodies of water. FDEP establishes water quality standards, sets minimum treatment requirements, issues permits, licenses operations of wastewater treatment plants, administers construction grants for sewage treatment plants and regulates discharges of stormwater. A special permit program can be used to obtain long term permits for dredging deep water ports.

FDEP and the water management districts regulate the withdrawal, diversion, storage and consumption of water, with the water management district responsible for most of the permitting and operational aspects. FDEP also certifies the siting of power plants and must consider the cooling water needs and environmental aspects of the proposed power plant.

FDEP is responsible for selling or leasing state-owned submerged lands if the sale or lease is "not contrary to the public interest." The proposed use of the conveyed or leased submerged land must not "interfere with the conservation of fish or wildlife, or other natural resources." Deeds or leases may contain restrictions on dredging and filling.

The FDEP is also responsible for managing the Pinellas County aquatic Preserve. This preserve is state-owned submerged land, which the state wishes to maintain in "an essentially natural condition." Special requirements pertain to the sale or lease of state-owned submerged land within the Aquatic Preserve. A management plan for this preserve will be prepared. All of St. Joseph's Sound adjacent to and within the study area, including the Anclote River, is part of this Aquatic Preserve.

FDEP also regulates exploration, drilling and production of oil, gas or other petroleum products, including drilling in estuaries. FDNR is responsible for the prevention and control of pollutants spilled into or upon coastal waters, estuaries, tidal flats, beaches and lands adjoining the seacoasts of the state.

FDEP is the chief land purchasing agent and land manager for the State. The State, through several land acquisition programs, often purchases environmentally sensitive lands which are vital for estuarine water quality.

The Florida Department of Agriculture and Consumer Services administers an arthropod control program (mosquito control). This program sets limits on the types and amounts of oil and chemicals used to control mosquitoes. Special exceptions to State dredge and fill requirements are given to mosquito control projects. The program provides financial aid to counties or mosquito control districts.

The principal regional agency involved in controlling estuarine pollution is the Southwest Florida Water Management District. The District is responsible for the flood control and drainage structures, and therefore responsible for the quantity and timing of much of the freshwater delivered to the estuary. The District is also responsible for certain regulatory activities delegated from FDEP; chief among these is stormwater permitting. The District was also assigned responsibility for regulating agricultural activities in wetlands under the Warren Henderson Act. The districts have a land acquisition program, the "Save Our Rivers Program," which allows the District to purchase environmentally sensitive lands (particularly wetland and riparian habitat) and by preserving them, improve the quality of the freshwater entering the estuary. The recently enacted Surface Water Improvement and Management (SWIM) Act gives the District jurisdiction over estuarine and marine waters.

Regional planning councils, with the Florida Department of Economic Opportunity, have some control over land use and development regulations through local comprehensive plan reviews and the Development of Regional Impact (DRI) program. Should the comprehensive regional policy plan call for stringent controls of pollution, then the consistency requirements between the regional and local plans would invoke strong local controls of pollution. The DRI process can require reviews of certain large developments' impacts on significant state and regional resources such as aquatic preserves or Outstanding Florida Waters. The impacts can be mitigated through conditions on the development order issued by the local government. The regional planning council has appeal rights if it feels that the development order does not adequately address the regional concerns.

Soil and water conservation districts are established pursuant to state law, but are usually countywide in a real extent, and they have their own taxing authority. The soil districts' purpose is to control soil erosion. These erosion prevention efforts assist in maintaining estuarine water quality by reducing the sediment loads of waters flowing into the estuary.

Pinellas County and the City of Tarpon Springs, through regulatory powers, regulate numerous activities which impact estuarine water quality. They enforce septic tank regulations and utility hookups, have standards for package sewage treatment plants, regulate stormwater and drainage, control the disposal of domestic solid waste including yard debris, control removal and trimming of mangroves and other shoreline vegetation through tree ordinances, control land use through zoning and comprehensive planning, and enforce site planning and subdivision requirements.

D. Disaster Preparedness

1. Inventory

Coastal and conservation areas have a particular vulnerability to certain natural disasters, primarily hurricanes and other violent storms. Disaster preparedness in Tarpon Springs is the responsibility of the City, Pinellas County and the Tampa Bay Regional Planning Council.

Because a hurricane or tropical storm is the most likely potential disaster to befall Tarpon Springs, this section of the Inventory and Analysis Report deals with disaster preparedness for hurricanes. The data procedures and plans established for hurricanes can be equally applied to other natural or man-made disasters.

Most of the City of Tarpon Springs is in a hurricane evacuation zone. The SLOSH map that forms the basis for preparing the evacuation zones is shown in Figure 5. This model also forms the basis of establishing the Coastal High Hazard Area (CHHA) as defined by Florida Statutes. The City of Tarpon Springs utilizes the Tampa Bay Regional Planning Council Evacuation Maps.

The only primary shelter within Tarpon Springs is the Tarpon Springs Middle School with a capacity of 2,600. The City also operates its own employee shelter to accommodate primary personnel, their families, and their pets during an evacuation.

According to the Tampa Bay Regional Planning Council's 2006 Hurricane Evacuation Plan, the Tarpon Springs permanent population requiring evacuation in 2004 totaled 21,718 persons, which is 92% of the 2005 permanent population. A population breakdown by evacuation zone is provided by Table 4.

Table 4 Evacuation Levels and Population, City of Tarpon Springs

Evacuation Zone	Population
A	6,124
B	5,393
C	6,263
D	2,377
E	1,562
Total	**21, 718**

Source: TBRPC 2006 Hurricane Evacuation Levels
Population based upon BPERS Data

EMERGENCY SHELTER ANALYSIS, COUNTYWIDE

Evacuees will seek refuge from a storm in a variety of ways; some will leave the area completely; others will stay with friends and relatives in less vulnerable areas of the County; some will check into hotels and motels; and some will rely upon public shelters. According to the Tampa Bay Regional Planning Council's 2006 Tampa Bay Region Hurricane Study, it is estimated that approximately 15% of the evacuating population will seek refuge in public shelters.

Sheltering is managed on a countywide basis by Pinellas County Emergency Management. A complete list of hurricane evacuation shelters for Pinellas County can be found in Table 5 of the **Coastal Element of the Pinellas County Comprehensive Plan**. Current and projected shelter deficits for Pinellas County are shown in Table 5. Shelter deficits are realized if evacuation levels D and E are called. Given projected shelter demand to 2011, and if no further shelter space was added, the deficit would be reached at evacuation levels C, D, and E. In addition to new construction, Pinellas County continues to apply to the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program for funding to strengthen existing structures for use as shelters. FEMA provides funds for building hardening projects where the building can be retrofitted to meet the requirements of ARC 4496 (American Red Cross Hurricane Evacuation Shelter Guidance).

Table 5 Pinellas County Public Shelter Deficit

PINELLAS COUNTY
PUBLIC SHELTER DEFICIT

YEAR	EVACUATION LEVEL				
	A	B	C	D	E
2006	0	0	0	14,806	21,244
2011	0	0	675	16,525	23,066

Source: Tampa Bay Region Hurricane Evacuation Study, 2006
Pinellas County Emergency Management Department, 2007

The City of Tarpon Springs will continue to coordinate with Pinellas County in the identification of potential shelters, especially focusing on the need for shelter space to accommodate for level C, D, and E evacuations and meeting Pinellas County's objective

of reducing the existing deficit of public shelter spaces within the County by 5% by 2012. The City will maintain its policy of a "no net increase in residential density in the Coastal High Hazard Area" (Policy 2.3.1, FLUE). Additional strategies to address sheltering needs are identified below;

- The donation of land for public facilities.
- The donation or use of private structures as hurricane shelters.
- The provision of a countywide impact fee for the upgrading of existing shelters equal to a proposed development's anticipated demand.
- The use and design of public facilities and institutions as emergency shelter space.
- The provision of on-site shelters where a development's anticipated demand exceeds available shelter space.
- The provision of funds for the purpose of training public hurricane shelter managers.
- Provisions for the limitation of density.
- The establishment and maintenance of a public information program.
- The provision for the elevation of roadways above the anticipated category 3 hurricane event making evacuation possible.
- Improvements to the capacity of evacuation routes.
- The provision of funds to be used for the purpose of procuring communications equipment.
- The posting of evacuation routes.

2. Evacuation Routes and Evacuation Times

The major evacuation routes for Pinellas County and the region are provided by Figure 6. Local evacuation routes are identified in Map 9 of the Transportation Element. According to the County's Hurricane Evacuation Plan, a traffic control point is to be established by the Tarpon Springs Police Department at the intersection of SR 582 (Keystone Road) and U.S. 19. There are various local and collector roadways which can be used by City residents to access SR 582 (Keystone Rd.), and the only bridges affected are on Riverside Drive and Whitcomb Boulevard. The closure of either or all three of these bridges would not isolate segments of the City since other routes are available. The major evacuation route for Tarpon Springs is SR 582 (Keystone Road) which is currently operating at a Level of Service F. However, two important factors must be considered which help to offset this situation. One is that during evacuation both lanes will be used to evacuate as incoming traffic is prohibited, thereby increasing the roadway capacity to an acceptable level of service. The second is that according to Pinellas County Transportation Element the following improvements to Keystone Road will be made to eliminate the Level of Service deficiency and maintain a smooth flow of traffic at all times:

1. Intersection improvement at U.S. 19 & East Lake Road

2. Construct 4LD Arterial between U.S. 19 and East Lake Road.
3. Construct 2LD Arterial between E. Lake Rd. and the Hillsborough County line.

The central factor in an effective evacuation is timing. Factors to be considered when ordering an evacuation are as follows:

- Mobilization Time
- Travel Time
- Delay Time
- Roadway Inundation Time
- Arrival of Gale Force Winds
- Pre-Landfall Hazard Time

Due to the fact that much of the area around Tarpon Springs is low lying and a majority of the City falls within evacuation zones, evacuation timing is especially crucial. The following clearance times for Pinellas County were estimated and reported in the 2006 Tampa Bay Region Hurricane Evacuation Study. These estimates present a range of time depending upon time of year (low season vs. high season) and intensity of background traffic.

Table 6 Clearance Times In-County Movements

	YEAR 2006	YEAR 2011
Level A	16.5 - 21.5 hours	16.5 – 21.5 hours
Level B	18.5 - 24 hours	18.75 – 24 hours
Level C	19.25 - 24 hours	19.25 – 24 hours
Level D	20.5 - 25.25 hours	20.5 – 25..25 hours
Level E	23 - 28 hours	23.25 – 28 hours

2006, Tampa Bay Regional Hurricane Evacuation Study

These clearance times consider only the time necessary for anticipated external trips to cross the county line.

For more extensive discussion of regional and state hurricane evacuation times, including contra-flow operations refer to the Tampa Bay Region Hurricane Evacuation Study, 2006.

Measures which can be utilized to maintain necessary evacuation times include the following steps:

- Allow for earlier evacuation notice
- Encouraging residents within evacuation zones to utilize "host homes" nearby that are not located within evacuation zones.
- Coordinate with Pinellas County to schedule improvements to the evacuation route (Keystone Road - SR 582)

- Utilize the Tarpon Springs Fire Department to educate the general public on Hurricane Evacuation procedures
- Post evacuation routes
- Restrict future land use density increases on vacant parcels in evacuation Level A
- Restrict the development of new nursing facilities, hospitals, and Residential Living Facilities (ACLF's) is excess of 15 residents from evacuation Level A and Level B
- Require new Mobile Home Parks to provide on site shelter space

3. Special Needs of Evacuation Population

The elderly (65 years and older) population can require special assistance with evacuation during a storm. According to the U.S. Census Bureau, in 2000, 24.8% of the City's population was estimated to be 65 or older. These persons are dispersed throughout the City, and the reasons for their special assistance needs range from mere age to illnesses or handicaps.

Hospitalized patients can be found at the following locations:

Table 7 Hospitals and Nursing Home Beds

LOCATION	EVACUATION LEVEL	# OF BEDS
Helen Ellis Hospital (Formerly Tarpon General)	None	168
Tarpon Bayou Center (515 Chesapeake)	B	120
Penisula Health Care Nursing Home (900 Beckett Way)	D	120
TOTAL BEDS		408

Source: 1988 Tampa Bay Region Hurricane Study, Technical Data Report Update (updated locally 2006)

As indicated, these facilities are presently located outside of evacuation Level A. Generally, these types of facilities are the most difficult to evacuate and should be located outside evacuation Level A territory.

Per the City of Tarpon Springs Emergency Management Implementation Guide 2006, these facilities have arranged for their own evacuation needs with "sister" facilities located outside of evacuation areas. In the event that these facilities cannot provide for their own needs the following procedures may be utilized to assist in evacuation.

The patients to be evacuated have been divided into 3 categories to allow a more efficient evacuation. The first, patients who may be discharged immediately, based on their medical condition, or in the case of nursing homes through prior arrangements with relatives. This will reduce the number of patients to be evacuated and also make room for evacuees in

sheltering hospitals and nursing homes. The second category, patients to be evacuated by car, van or bus, in a sitting position. Buses will be provided, as indicated in the Comprehensive Hurricane Evacuation Plan for Tarpon Springs, to assist in the movement of this category of patient. Where possible, buses with wheelchair lifts will be provided. The third category, patients who must be evacuated by ambulance, van or bus, on stretchers or backboards. Buses will also be utilized to augment other transportation resources to move this category of patient.

In addition to these three categories discussed above, hospitals may also have an individual in a very critical condition, whom a doctor feels that any evacuation may result in death. In this situation, vertical evacuation may be used as a last resort for critical patients.

One group of persons needing assistance in evacuating during hurricanes and one which is sometimes overlooked is the home invalids. These people can be stranded during emergencies because of medical conditions. The Pinellas County Emergency Management Department has developed a program to account for and assist these persons requiring special evacuation provisions. Forms are given to each Local Emergency Planning office (Tarpon Springs Fire Department) so they can be double checked and then entered into computers. These lists are then updated twice per year to insure adequate manpower and equipment are available to evacuate those persons needing special assitance, and their location is known.

The final group of persons requiring special assistance in evacuation are those residents located in Adult Congregate Living Facilities. Of the seven (7) existing facilities, three (3) are located in evacuation Level A. Again, these facilities should locate outside evacuation Level A because they need the most assistance, are located closest to the oncoming storm, and have the least amount of time to evacuate.

The locations of nursing homes, hospitals, and congregate care facilities can be found in Figure 7.

4. Post Disaster Redevelopment

The City of Tarpon Springs participates with Pinellas County in the Countywide Emergency Management Plan, adopted in 1994, which includes post-disaster redevelopment plans and policies. Pinellas County is initiating an update to the Post Disaster Redevelopment Plan in 2007. The City of Tarpon Springs will participate in the update and amend this element as necessary to implement the results of the planned updated.

a) Coastal High Hazard Area Defined

The area subject to the most severe damage and the most vulnerable during a storm is the Coastal High Hazard Area. For the purposes of this Element the Coastal High Hazard Area (CHHA) is defined as the evacuation zone for a Category 1 hurricane . No Coastal construction control lines exist within the jurisdiction of Tarpon Springs. Figure 8A shows the Coastal High Hazard Area for the Tarpon Springs Study Area as of 2005, according to Pinellas County GIS records. For the purposes of establishing land use policies, both Pinellas County identified CHHA (Figure 8) and the SLOSH model map (Figure 5) shall be referenced. The SLOSH model map, however, is deemed more accurate because it does not follow established property lines, roads, or political boundaries and is purely based on topography and other geographical features.

b) Existing and Proposed Land Uses in Coastal High Hazard Area

(1) Existing Uses

The Coastal High Hazard Area is characterized by a mix of uses including industrial, commercial and residential development with allowable maximum densities ranging from 2 to 15 units to the acre. Traditionally the residential area was zoned for single family uses (R-100). However, during the early to mid 80's the majority of larger vacant parcels were intensified to allow for multifamily development. The intensification also included a minimum setback of 100 feet from the Gulf Coast Shoreline. This requirement of a 100 foot minimum setback should be retained for those tracts large enough to comply with the regulation. Existing platted single family lots in individual ownership should be required to comply with the 30 foot setback of the City's Aquatic Lands Ordinance.

Figure 9 identifies current land uses within the CHHA. Figure 10 identifies the designated future land uses within the CHHA.

If a structure is damaged by fire, natural elements, or force beyond the control of the owner, to an amount greater than fifty percent (50%) of its actual value as determined by the tax assessor on the day immediately preceding such loss, said structure shall be only rebuilt, reused, or reconstructed strictly in compliance with the regulations of the Tarpon Springs Code Book of Ordinances. All structures or portions thereof to be rebuilt or reconstructed shall be in strict conformity to the building code of the City of Tarpon Springs.

In the event of damage as stated in the previous paragraph, some structures could be required to be relocated or structurally

modified in accordance with the building code of the City of Tarpon Springs and Federal Emergency Management Agency (FEMA) requirements. Public acquisition of storm damaged property can be considered based upon available grants, programs, and budgetary constraints.

Two major open spaces are also present in the Coastal High Hazard Area; Fred Howard Park and Sunset Beach.

Two additional major open spaces acquired within the CHHA originally designated for medium density residential include the "Olsham property" and "North Anclote Nature Park". These properties have been permanently removed as developable lands and could have supported over 1,500 potential dwelling units within the CHHA.

Other residential development / redevelopment since 2000 within the CHHA include:

1. Anclote Manor Hospital redeveloped at 4 units per acre
2. Vacant parcels along canals north of Meres Blvd and West of Alternate 19 were approved for development consistent with their future land use of 15 units per acre.
3. Vacant parcel located on the east side of Alternate 19 on the Anclote River approved for development at 15 units per acre, consistent with designated future land use.
4. Vacant parcel located east of Alternate 19, on the north bank of the Anclote river approved for development at 5 units per acre consistent with designated future land use.
5. Vacant parcel located on US 19, south bank of Anclote River, approved for residential development below underlying land use density.

(2) Future Uses

A majority of the Coastal High Hazard Area is already developed with commercial, industrial and urban residential uses. Vacant parcels within the CHHA are identified in Figure 11 and are shown with designated future land use.

Normally, if the amount of acreage in the Coastal High Hazard Area was predominantly vacant a density reduction to 4 units to the acre would be considered. However, since the area is already primarily developed, no changes to the existing land uses are proposed except as proposed for the Community Redevelopment Area, as discussed below.

Two areas within the City's Community Redevelopment Area are located within the CHHA. The first is located north of Athens Street, along N. Alternate 19 to the Anclote River. The second is located along S. Alternate 19, north of Meres Blvd up to Oakwood Street. Both of these areas are intended for eventual redevelopment at increased densities consistent with urban downtown development. The City intends to require ground floor commercial with residential above. It is also anticipated that the City will adopt a "no net increase" in residential units within the CHHA, taking into consideration those large parcels that were previously available for development within the CHHA that have been permanently acquired for open space. The City's CRA redevelopment plan is more fully discussed in the Future Land Use Element. The CRA boundary is identified on Figure 8.

c) Structures with a History of Repeated Damage in Coastal Storms

The St. Joseph's Sound abutting Tarpon Springs shoreline is a low energy Coastal Planning Area which includes salt marshes, mangrove forests, seagrass meadows and other related wetland and plant communities. Approximately one mile west of this low energy Coastal Planning Area there are three barrier islands, Anclote Key, Three Rooker Bar, and Honeymoon Island. Beyond these islands is the open Gulf of Mexico. Due to this unique coastal configuration much of the damaging wave energy normally generated during coastal storms is absorbed. The barrier islands are undeveloped and act as a buffer against waves which can be generated from as far as the western Gulf of Mexico. No development of these islands is proposed.

Damage that occurs from coastal storms is due to flooding of low lying coastal areas from tidal surges, heavy rains, overland drainage from inland (Anclote River Basin) areas, and wave action. Due to conformance with FEMA regulations, the structures in the Coastal Planning Area have received minimal damage due to flooding. The only structures with a history of repeated damage are located in the sponge dock area. This area includes structures built below FEMA Flood Elevation requirements which frequently flood during coastal storms due to high tide, storm surges and heavy rains. However, these structures are of a historic and cultural value to Tarpon Springs and relocation or re-development would not be feasible unless the structures were completely destroyed. As of 2006, the City had 67 structures identified as "repetitive loss" structures per FEMA definitions.

In the Coastal High Hazard Area, the following structures can expect to receive extensive damage in the event of a storm:

- Seawalls, Seabreeze Isle Subdivision

- Sea Breeze Island Subdivision
- Causeway and Beach, Fred Howard Park
- Seawall, Windrush Bay
- Sunset Beach and Causeway
- Existing Units Windrush North and Windrush Bay
- Existing Units Island Club
- Existing Units Tarpon Cove/Mariner Village
- Pointe Tarpon , multifamily units
- *Existing commercial structures along Dodecanese Blvd and the general Sponge Docks area
- Existing homes within the Bayou Residential Corridors
- River Village mobile home subdivision
- Chesapeak Pointe Mobile Home Park
- Existing industrial buildings along Island Way, north side of the Anclote River
- Older residential homes located in low lying areas along the Anclote River, Bayous, and tributary shorelines.

d) Coastal or Shore Protection Structures

The western coastline abutting Tarpon Springs, St. Joseph's Sound, currently has only three areas that include structures (seawalls) designed to protect the shoreline. Due to the low energy coastline in Tarpon Springs and the buffering mangrove forests and native vegetation these structures are not necessary to stabilize the shoreline. These structures have a tendency to accelerate erosion and scouring and to damage adjacent properties by refracting wave energy that would normally have been absorbed.

The structures abutting St. Joseph's Sound are at Seabreeze Island Subdivision, Windrush Condominiums, and two single family residences south of Sunset Beach. These structures have been used to expand land over environmentally sensitive areas. This practice can not continue unless there is a clear overriding public health, safety and welfare issue to be resolved.

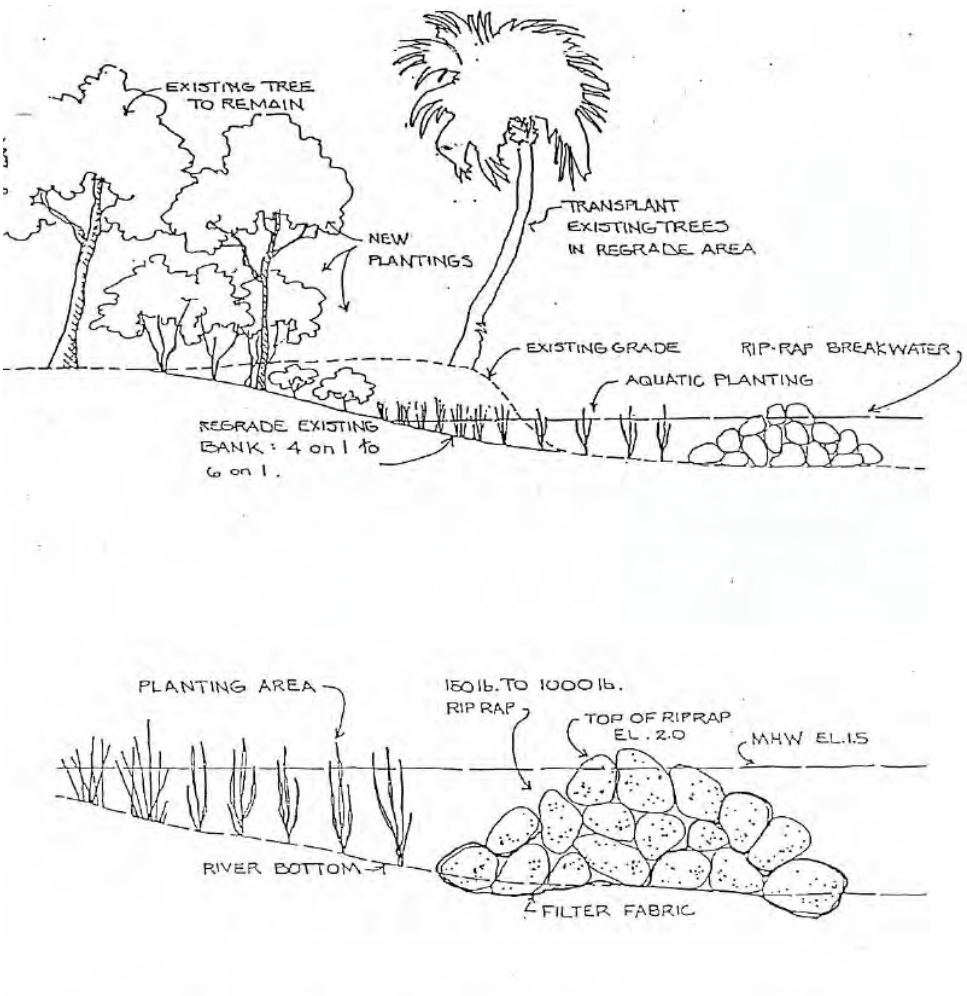
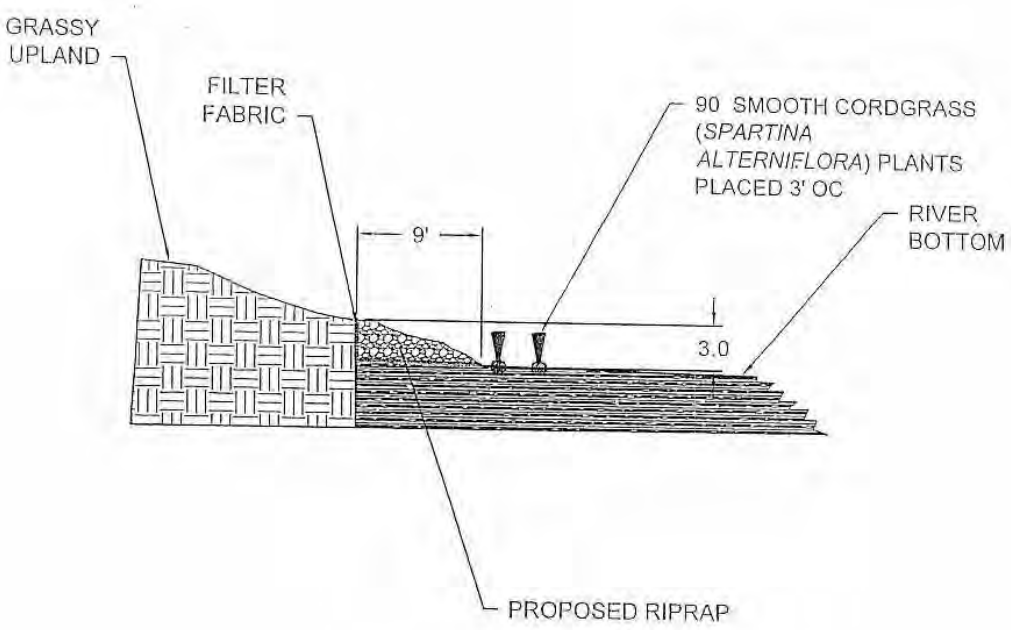


Figure 12 a agrams of shoreline stabilization designs using vegetation d installation of riprap. Source: Mangrove Systems, Inc. 1987.



Spartina alterniflora (Smooth Cordgrass) is a perennial deciduous grass which is found in intertidal wetlands, especially estuarine salt marshes. It grows 1-1.5 m tall, and has smooth, hollow stems which bear leaves up to 20-60 cm long and 1.5 cm wide at their base, which are sharply tapered and bend down at their tips. The flowers are a yellowish-green, turning brown by the winter. It has deep roots, which, when broken off, can result in vegetative asexual growth.

S. alterniflora is noted for its capacity to act as an environmental engineer and is used extensively for shoreline protection and tidal marsh restoration. It grows out into the water at the seaward edge of a salt marsh, and accumulates sediment and enables other habitat-engineering species, such as oysters, to settle. This accumulation of sediment and other substrate-building species gradually builds up the level of the land at the seaward edge, and other, higher-marsh species move onto the new land.

Additionally, the plants provide food and cover to a number of marsh birds and mammals as well as nursery habitat for fish species and attachment points for many invertebrates..

Figure 12 b

The shoreline abutting the Anclote River has many more areas that have seawalls including the length of the sponge dock area. These structures have been used to stabilize the shoreline from erosion caused by the natural meandering of the river and by boat wakes. Other seawalls have been used to increase the amount of access (water frontage) to the river and to create additional upland acreage sacrificing environmentally sensitive areas.

Alternatives to seawalling entire shorelines are shown by Figures 12a and 12b. These alternatives and other similar alternatives as may from time to time be established by SWFMD and ACOE utilize the natural characteristics of an area which stabilize shorelines, provide habitats for animals and cleanse the water as well as allow access to the water by man-made structures such as docks and piers.

Erosion currently poses a particular problem along the City's Bayous. An existing seawall along Spring Bayou is severely deteriorated and some segments should be closed or replaced. Because the area is entirely seawalled an alternative method to repair does not appear economically feasible. In addition, this seawall doubles as a catwalk providing access to Craig park, the Golden Crescent, and the location of the cross throwing during the Epiphany celebration. Thus, the seawall has historic and nostalgic value. The south side of Whitcomb Bayou has severely eroded over the years and threatens to undermine Whitcomb Boulevard. This area has not been seawalled but much of the native vegetation has been lost or destroyed. Alternative forms of erosion control to seawalling should be utilized in this location. Grants and alternative funding sources should be investigated for the stabilization of both of these areas.

e) Infrastructure in Coastal High-Hazard Areas

The limits of the Coastal High Hazard Area as defined by Pinellas County in 2005, along with roads, sewers, potable water, and re-claimed water utility systems are shown by Figures 13 and 14

Due to the unique nature of the City’s geography, coupled with a very old development history, there are public roads, water lines, and sewer lines located within the Coastal High Hazard. By nature of their location, these areas were developed during the early history of the City. A significant portion of the population is reliant upon existing infrastructure and removal or relocation is not practical.

The other major public infrastructure investments in the Coastal High Hazard Area are Fred Howard Park and Sunset Beach. Both include man-made causeways which would receive extensive damage in the event of a storm. Sewage collection lines and associated lift stations will eventually be provided to areas currently on septic tanks.

This investment is predicated upon the benefit to the environment which will occur by phasing out old septic systems.

Relocation of the park sites is not a feasible alternative.

f) Beaches and Dunes

No significant beach or dune areas are located in the study area. There are small beach areas at Sunset Beach and at Fred Howard Park. These two areas are too heavily used to represent significant wildlife habitat. Also, these areas were created by dredge and fill operations and are not the result of natural coastal processes. Anclote Key represents the northern extent of the Gulf coast barrier island system and is not proposed for development.

g) Public Access

Private and public access facilities were inventoried as a part of the discussion on water dependent and water related uses (see Table 1). A more detailed inventory can be found in Table RO-4, of the Recreation and Open Space Element. In addition, there are numerous public rights-of-way and paper streets which provide access to the shoreline and are shown in Figure 15. These access points must eventually be categorized in terms of their appropriateness for public use. The list of public rights-of-way are provided below and shown by Figure 15.

1. Phillips Road
2. Sunset Drive (improved at water)
3. Grand Central Court
4. Mandalay Drive (conservation easements)
5. Sunkissed Drive (conservation easements)
6. Coburn Drive
7. Beach Drive
8. Curlew Road
9. Florida Avenue (improved at water)
10. Riverview Drive
11. Lucille Drive
12. Imperial Drive
13. Lake Drive
14. Dodecanese Blvd
15. Roosevelt Blvd (improved at water)
16. Hope Street (improved at water)
17. US Alternate 19 (improved at water)
18. Safford Avenue
19. US 19 North (improved at water)
20. Pineapple Street (improved at water)
21. Myers Lane
22. Lake Tarpon Avenue (improved at water)
23. Grand View Drive

h) Infrastructure in the Coastal Planning Area

This section summarizes the existing and needed infrastructure in the Coastal Planning Area. As demonstrated by earlier sections, the City of Tarpon Springs is primarily urbanized, and approximately 1/2 of the study area is in the Coastal Planning Area. Greater detail on the public infrastructure is provided by the Transportation, Sanitary Sewer, Potable Water, Drainage, Groundwater Aquifer Recharge, and Capital Improvement Elements. Figures 16, 17, and 18 demonstrate roads, water lines, sewer lines, and re-claimed water lines located within the Coastal Planning Area.

1. Inventory of Existing Facilities

a) Roads, Bridges and Causeways

A large number of local roads do serve the City's shoreline areas, and pass through or around various conservation areas. Some of these roads are in jeopardy from flood hazards or other ramifications of the sensitive nature of the areas they serve.

Arterial and collector roads located in the City's Coastal Planning Area are summarized as follows:

ARTERIAL ROADS

U.S. Highway 19 North - 6 lane divided
U.S. Highway 19 Alternate -2 & 3 lane undivided

COLLECTOR ROADS

CR 47 (Anclote Road) -2 lane undivided
Riverside Drive -2 lane undivided
Spring Boulevard -2 lane undivided
Whitcomb Boulevard -2 lane undivided
Florida Avenue -2 lane undivided
Gulf Road -2 lane undivided
Meres Boulevard -2 lane undivided
Martin Luther King Jr (Lake) Street -2 lane undivided
E. Live Oak Street – 2 land undivided

Bridges and Causeways located in the Coastal Planning Area are summarized as follows:

BRIDGES

U.S. Highway 19 Bridge - 4 lane divided - 300' length
U.S. Highway 19 Alternate Bridge - 2 lane undivided - 270' length Beckett Bridge - 2 lane undivided - 300' length Bayshore Bridge - 2 lane undivided - 40' length Whitcomb Bayou Bridge - 2 lane undivided - 40' length

CAUSEWAYS

Fred Howard Park Causeway - 2 lane undivided - 2400' length Sunset Beach Causeway - 2 lane undivided - 800' length

b) Sanitary Sewer Facilities

The City of Tarpon Springs is served by a 4 MGD sewer treatment facility located in the Coastal Planning Area. Local sewer mains serve virtually the entire City, including development in or adjacent to the shoreline and conservation area. Figure 16 identifies Sanitary Sewer Service and Sewer Improvement Areas that are located within the Coastal Planning Area. Many of these sections of the City and County are in the Coastal Area and Coastal High Hazard Area. However, sewer services are planned for these areas. The Plant is permitted to discharge effluent to 2.74 million gallons of AADF in to the Public Access Re-Use System tank located within the treatment plant property. When this tank is full out-flow is discharged into the Anclote River. For a more detailed description and analysis of the sewer planning areas refer to the sanitary sewer sub-element of the Utilities Element.

A conflict exists between the requirements of an EPA grant, which requires the provision of sanitary sewer service throughout the City's service area, and the extension of these services into Coastal Areas. This conflict is furthered by the detrimental environmental considerations of private or communal sewer systems in that groundwater seepage from septic tanks or package plant evaporation/percolation ponds can contribute to surface and groundwater pollution. Two package treatments plants have been removed from operation, the Leisure Lake Village MHP plant and the Linger Longer MHP plan.

Since the majority of the Coastal Area is developed, withholding the extension of services to restrict growth is not a viable alternative.

c) Potable Water Facilities

The City is responsible for providing potable water within the entire Planning Area. Currently the City relies for 80% of it potable drinking water needs on the regional provider Tampa Bay Water, through Pinellas County Utilities. At the time of the 1997 EAR, the City owned and operated three municipal wells that collectively produced 350,000 gallons per day (gpd). The municipal wells produced almost 10% of the city's water in 1987. The remaining 90% was purchased from the Pinellas County Water System (PCWS), which was scheduled to end in October, 1991. Over the last three years, the City investigated and analyzed the use of fresh water wells and Reverse Osmosis (RO) Treatment of brackish water from wells to help the City become totally self-sufficient in its potable water supply. The City created the Alternative Water Supply Plan; this plan has become the "roadmap" to the creation of a reverse osmosis treatment facility. In a March, 2006 referendum, residents approved a $45 million bond to fund the Alternative Water Supply Project. The city will continue to pay for water from Pinellas County until the plant goes online. The proposed site for the location of the plant is not located within the Coastal Planning Area. For additional information on water needs refer to the Potable Water Sub-Element of the Utilities Element.

d) Drainage Facilities

The City of Tarpon Springs lies in an area of Pinellas County with low elevation. The elevation varies from 15 feet above mean sea level (msl) in the west to 40 feet above msl in the east. The general natural drainage patterns which occur in the City consist of four movements toward surface water bodies. In the north, drainage is toward the Anclote River; in the east, it is toward Lake Tarpon; in the west, it moves toward the Gulf of Mexico; and in the central part of the City, it moves toward the bayous.

Many of the low-lying areas around the bayous flood at high tide. In addition, drainage structures leading into the Anclote River and the bayous backup during high tide. Drainage structures that exist were mostly installed in the downtown area in the 1920's and are inadequate to provide proper drainage for the current level of development in this area. However, the low elevation of the City and the cost of replacing these older drainage structures make many drainage improvements cost prohibitive. Flooding due to tidal influence may not have a feasible cost effective solutions.

Other drainage systems in the Coastal Area consists of privately maintained and operated retention/detention pond facilities. These

facilities are located in more recently developed areas on the west side of the study area along the Gulf Coast Shoreline.

The City of Tarpon Springs conducted a master drainage plan in 1990 and has established priority projects for the City. For more in depth analysis and detail refer the Drainage Sub-Element of the Utilities Element.

e) Coastal or Shore Protection Structures & Beach Re-nourishment Projects

Public shore protection structures exist in the Anclote River adjacent to the Tarpon Springs Sponge Dock areas and Spring Bayou adjacent to Craig Park. The only publicly owned shore protection structures on the Gulf of Mexico are protecting the causeway leading to Sunset Beach and the southern end of Fred Howard Beach.

No beach renourishment projects are occurring or proposed in Tarpon Springs due to the unique low energy coastline and lack of barrier island beaches within its jurisdiction.

f) Other Utilities

Other local utilities include Progress Energy, Inc., Duke Energy, Inc. Brighthouse Networks, City of Clearwater Gas, Verizon, Wide Open West (WOW!), and Frontier Communications. The construction of these utilities through shoreline and conservation areas could cause some environmental impairment. However, most of these utilities occur exclusively within existing rights of way or dedicated utility easements and once these utilities are in place, they generally do not present an on-going hazard.

2. Future Needs

a) Roads, Bridges, and Causeways

Table 2 the within the Transportation Element provides the existing traffic volume, existing volume capacity, and projected levels of volume for arterial and collector roadways located within the Tarpon Springs Planning Area. Within the Coastal Planning Area, the only deficient LOS segment is Alternate 19 from Tarpon Avenue to Anclote Blvd. This segment includes the Anclote River Bridge.

Table 3 of the Transportation Element demonstrates future LOS to 2025 as provided by the Pinellas County MPO. No roadway segments within the Coastal Planning Area are anticipated be

operating as a failing LOS. Future Transportation Projects from 2006/7 - 2010/11 from the Pinellas County MPO Transportation Improvement Program are identified in Table 4 of the Transportation Element. Construction projects located within the Coastal Planning Area are resurfacing of Alternate 19 from Tarpon Avenue to Pasco County line, Tarpon Avenue and Pinellas Avenue streetscaping projects, various street re-bricking projects, and sidewalk improvement.

The Beckett Bridge (bascule draw bridge) has been identified by Pinellas County for eventual replacement. This bridge provides a critical link for evacuation populations in the western ½ of the City of Tarpon Springs.

The causeways at Fred Howard Park and Sunset Beach will not be widened or improved.

b) Sanitary Sewer Facilities

The following table summarizes the existing demand upon, existing capacity of, and estimate of the future demand upon the City's sanitary sewer facility:

Table 8 Treatment Plant Demand / Capacity

Existing Capacity	Existing Demand	2030 Demand
4.0 MGD	2.2 MGD	5.75 MGD

Source: City of Tarpon Springs

The City anticipates adding and additional capacity of 1.0 MGD either to the existing treatment plant or at a new facility to accommodate growth to 2030 and maintain a 25% reserve capacity. Annual improvements are also proposed to the sanitary sewer collection system. Details can be found in the Sanitary Sewer and Capital Improvement Elements.

c) Potable Water Facilities

The following table summarizes the estimates of potable water demand:

Table 9 Potable Water Demand

Existing Demand	Projected Demand 2015	Projected Demand 2030
3.3 MGD	3.6 MGD	5.75 MGD

Source: City of Tarpon Springs Utilities Dept. 2007

A majority of the City's current potable water needs (3.3 MGD) are furnished by Pinellas County (approximately 80%). The remainder is provided through the City's wells. From 2004 -2006 the City investigated and analyzed the use of fresh water wells and Reverse Osmosis (RO) Treatment of brackish water from wells to help the City become totally self-sufficient in its potable water supply. The City created the Alternative Water Supply Plan; this plan has become the "roadmap" to the creation of a reverse osmosis treatment facility. In a March, 2006 referendum, residents approved a $45 million bond to fund the Alternative Water Supply Project. The city will continue to pay for water from Pinellas County until the plant goes online. The projected capacity of the system at the completion of Phase I (estimated 2010) will be 6.5 MGD. Additional capacity to 9.0 MGD is planned for as needed in the future. The proposed RO plant will supply water for the City of Tarpon Springs' needs well past the year 2030 and it will have excess capacity to sell to other utility providers in the area. The proposed location of the RO plant is outside of the CHHA and the Coastal Planning Area. However, it is anticipated that transmission lines will be located with the CHHA and Coastal Planning Area. For a more detailed analysis of water supply planning needs refer to Section IV E of the Conservation Sub-Element.

d) Drainage Facilities

As stated previously, the City experiences street flooding and standing water in older sections of the City during frequent rains. For a more detailed description of city maintained drainage facilities and required improvements refer to the Drainage Sub-Element of Utilities Element.

e) Coastal or Shore Protection Structures

As stated previously, erosion and the repair of erosion control structures along the City's Bayou presents a potentially serious problem. In June of 1999, the City of Tarpon Springs applied to the Federal government under Section 103 of the River and Harbor Act of 1962, for a study to be conducted of the erosion problems at Spring and Whitcomb Bayous. After a three year collaborative effort from the City, County, FDEP, USACOE, and NOAA Fisheries the City entered into an agreement with the US Army Corps of Engineers for a feasibility study in 2003. The City and County entered into a cost sharing agreement for the feasibility study. After a brief interruption due to funding constraints the feasibility study resumed and is expected to be completed in October 2007. The City is currently securing funding to go forward with construction in fiscal year 2008.

III. SUMMARY RECOMMENDATIONS - COASTAL MANAGEMENT

The following is a summary list of issues and recommendations identified by the Coastal Management analysis of this report:

- Re-define the Coastal Planning Area per the definitions section of Rule 9J-5.003 of Florida Administrative Code
- The Coastal Planning Area occupies 1/2 of the study area
- The City's Coastal Planning Area is primarily urbanized
- The Gulf of Mexico Shoreline is a low energy, Coastal Planning Area which can provide protection from storms and should be managed as follows:
  - Restrict dredge and fill activities
  - Restrict Seawalling
  - Maintain the 30 foot Aquatic Lands buffer along the Gulf shoreline for principal buildings. In cases where existing seawalls have effectively eliminated the natural shoreline function, permit a limited exemption from this rule for accessory structures, as defined in Policy 2 of this Sub-Element
  - Restrict multislip (3 or more) docking facilities along the Gulf shoreline
  - Restrict direct stormwater discharge into the Gulf where there is no access to an existing channel
  - Utilize wetland communities as a positive outfall after on-site pre-treatment

- Restrict the expansion of boatyards and dry storage marinas within the traditional tourist oriented area of the Sponge Docks. Areas on the south side of the Anclote that have traditionally been recognized waterfront industrial and working waterfront properties may be considered for dry storage marinas on a conditional basis after reviewing compatibility and impact upon adjoining properties.
- Promote the expansion of the tourist oriented light commercial uses along the sponge dock area
- Continue to locate packing houses and marine oriented fishing establishments along the west side of Island Drive
- Locate wetslip marina facilities along the Anclote River west of the Alternate U.S. 19 bridge where access to deep water and the river channel is present
- Make accommodations for docking, sponge display, sponge cleaning, and auction along the sponge dock area
- Restrict the expansion of boatyards to the Island Avenue industrial area on the north side of the river
- Conduct a design study for preservation of the historic sponge dock area
- Conserve and preserve wetland vegetative communities.
- Implement the recommendations of the Historic Element
- Include the restoration of wetlands as part of the Master Drainage Study

- Utilize wetlands for stormwater filtering in accordance with the discussion in Section II.C.5. of the Coastal Management Element
- Work with Pinellas County to prioritize the multilaning of SR 582 (Keystone Rd.)
- Restrict nursing facilities, hospitals, and congregate living/care facilities from evacuation Level A
- Define the Coastal High Hazard Area as the evacuation zone for a Category 1 hurricane as established by the Tampa Bay Regional Hurricane Evacuation Study
- Existing seawalls in the Coastal High Hazard Area should be replaced with other stabilization techniques in the event they are destroyed in excess of 50% replacement cost
- Restrict the intensification of single family areas in the Coastal High Hazard Area above 4 du/acre
- No changes to the existing Coastal High Hazard Area land uses
- Repair the Spring Bayou Seawall
- Stabilize erosion of Whitcomb Bayou by alternative forms of erosion control
- Phase out septic tanks in the Coastal Planning Area
- Prioritize and categorize existing street rights-of-way that provide shoreline access for public use

IV. CONSERVATION DATA AND ANALYSIS REQUIREMENTS

A. Natural Resources

Figure 19 demonstrates the various natural resource communities for the study area. This map and all descriptions are based upon the Florida Land Use Cover and Classification System. Each distinct community is given a standard numerical value. Commonly occurring communities within the Planning Area are described in each section below. Additionally, Figure 20 identifies lands classified by the National Wetlands Inventory and the SWFWMD Land Inventory.

1. Wetlands, Marine and Estuarine, Freshwater

Wetlands are those areas where the water table is at, near or above the land surface for a significant portion of most years. The hydrologic regime is such that aquatic or hydrophytic vegetation usually is established, although alluvial and tidal flats may be non-vegetated. Wetlands are frequently associated with topographic low lying areas. Examples of wetland include marshes, mudflats, emergent vegetation areas and swamps.. Shallow water areas with submerged aquatic vegetation are usually, but not always, classed as water and not include in the wetlands category.

612 - Mangrove Swamps: composed of one or more of three species of mangrove trees: red mangrove (Rhizophora Mangle, black mangrove (Avicennia germinans), and white mangrove (Laguncularia racemose). Animals characteristic of the mangrove forests are: the mangrove tree crab, Aratus pisonii; one or two species of fiddler crab, Uca spp.; the coffee bean snake, Nerodia fasciata compressicauda; and the diamondback terrapin, Malaclemys terrapin. Bird use of these mangrove areas may be characterized as heavy,

with many species observed using or know to use these areas for feeding, roosting, or nesting. These species may include: double-crested cormorant, brown pelican, herons and egrets, roseate spoonbills and white ibis. Mammals include marsh rabbits, hispid cotton rat, house mouse, raccoon and river otter. Some of the mangrove forests in this study area are disturbed as the result of mosquito ditching. Many of the mangroves in the area are stunted by winter freezes, as the study area is at the approximate northern limit of extensive mangrove forest on the west coast of Florida. These forests are nonetheless valuable as wildlife and fisheries habitat.

615 - Stream and Lake Swamps (Bottomland): these diverse forested communities are composed of an overstory of red maple (Acer rubrum), American elm (Ulmus americana), loblolly bay (Gordonia lasianthus), sweet bay (Magnolia virginiana), cypress (Taxodium disctichum, T. ascendens) laurel oak (Quercus laurifolia), water oak (Q. nigra) and southern magnolia (Magnolia grandiflora). The understory includes was myrtle (Myrica cerifera), buttonbush (Cephalanthus occidentalis),royal fern (Osmunda regalis), asplenium fern (Thelypteris spp.), swamp fern (Blechnum serratulum), sedges (Carex spp.), and bluestem (Sabal minor). These communities serve many of the same functions and support many of the same animals as cypress forests.

620 – Wetland Coniferous Forests: Wetland Coniferous Forests are wetland which meet the crown closure requirements for coniferous forests (see 400 and 410) and are the result of natural generation. These communities are commonly found in the interior wetlands in such places as river flood plains, bogs, bayheads, and sloughs.

621 - Cypress Forests: dominated by one or both of two species of cypress, bald cypress (Taxodium distichum) and pond cypress (Taxodium ascendens). Common understory plants include buttonbush, St. John's-wort (Hypericum spp.) and sedges. Cypress areas are valuable as aquifer recharge areas, as natural areas which retain and filter stormwater runoff, and as habitat for many species of snakes (common water snakes, water moccasins, common garter snake), tree frogs, turtles (mud turtles, snapping turtles, chicken turtles) and birds (mockingbird, great horned owl, white ibis, green-backed heron and red-winged blackbird).

630 – Wetland Forested Mixed: This category includes mixed wetlands forest communities in which neither hardwoods or conifers achieve a 66 % dominance of the crown canopy composition.

641 - Freshwater Marsh: these are mainly small (1-2 acres) "depression" marshes, dominated by pickerelweed (Pontederia cordata) and/or arrowhead (Sagittaria lancifolia). They are typically fringed by shrubs and herbs such as dahoon holly (Ilex cassine), fetterbush (Lyonia lucida), sand cordgrass and beakrushes (Rhychospora spp.).

6411 - Sawgrass Marshes: these coastal fresh to brackish water marshes are dominated by stands of sawgrass (Cladium jamaicense). Other vegetation includes leather fern (Acrostichum denaeifolium), cattails, sand cordgrass (Spartina bakeri), black rush, swamp fern and marsh elder (Iva frutescens). These areas are important as feeding and nursery habitat for many species of estuarine fishes and shellfish (e.g., mullet, snook,

blue crab) and to many species of birds (clapper rail, marsh hen, night herons, moorhens, coots). Most of the sawgrass marshes in the area have been disturbed by mosquito ditching.

6412 - Cattail Marshes: dominated by one or more species of Typha, these marshes frequently occur in disturbed wet areas and are valuable chiefly as cover for various species of birds.

6421/6422 - Estuarine Tidal Marshes: composed of emergent herbaceous plants such as black rush (Juncus roemerianus), smooth cordgrass (Spartina alterniflora), marsh hay cordgrass (Spartinapatens) and sand cordgrass (Spartina bakeri). Succulent dicots such as glasswort (Salicornia virginica) and saltwort (Batis maritima), the shrub marsh elder (Iva frutescens) and scattered mangroves may also occur in these habitats. Typical invertebrates are fiddler crabs, the mud crab (Panpoeus herbstii), grass shrimp (Palaemonetes pugio), snails of the family Cerithiidae, marsh clams (Polymesoda caroliniana) and marsh periwinkles (Littorina irrorata). Wildlife include small fish such as killifish, mullet, snook, the diamondback terrapin (an estuarine turtle), numerous species of birds (clapper rail, ducks, herons and egrets, and osprey), otters and small rodents such as the hispid cotton rat. Some of the saltmarsh areas within the study area have been disturbed by mosquito ditching and/or impounding. Salt marshes in the area are important as wildlife feeding and nursery areas, and as fishery habitat.

651 - Sand Flats: devoid of vegetation, except for occasional patches of drift algae. The infaunal assemblage is composed of species of polychaetes (bamboo worms, plumed worms, lugworms), clams (Tellina spp., Macoma sp., Mercenaria, Macrocallista, Ensis), moon snails (Pollinices duplicatus and Sinum perpectivum), amphipods and cumaceans. Occasionally, species of epifauna may occur, such as the mud snail Nassarius vibex, the crown conch Melongena corona, and shrimp (Penaeus sp.). Sand flat areas are used by several species of fish (spotted seatrout, flounder, blennies) as
as feeding areas by shorebirds (dowitchers, willets, ibises, plovers and sandpipers) when exposed at low tide, and by wading birds (herons, egrets, spoonbills) when covered by water.

911 - Seagrass Beds: composed of one or more of five species of seagrass: turtle grass (Thalassia testudinum), manatee grass (Syringodium filigorme), shoal grass (Halodule maritima). Benthic green algae such as Caulerpa spp. may also be present, as may various species of drift red algae (Acanthophora, Hypnea, Gracilaria, Laurencia). A diverse faunal assemblage is associated with grass beds. Infauna consists of many species of polychaetes worms, clams (cockles and tellins), amphipods, cumaceans, and alpheid shrimp. Epifauna consists of: a variety of penaeid (Penaeussp.) and caridean (Hippolyte, Palaemonetes, Periclimenes, Tozeuma spp.) shrimp; small fishes such as mosquitofish, pipefish, and gobies; ophiuroids ("brittle stars"), crabs, snails (Mitrella sp., Busycon, Fasciolaria, Nassarius sp. and Cerithium sp.); and a few species of polychaetes. Several species of larger fish use the grass beds as feeding areas or shelter, such as mullet, pinfish and spotted seatrout. Birds, such as ospreys and brown pelicans, feed on the fishes utilizing the grassbeds. The West Indian manatee utilizes seagrass beds as feeding areas. A report by the Regional Planning Council (TBRPC 1986b) documented a

historical decline in seagrass cover in the study area. These seagrass areas are valuable as habitat and nursery area for a variety of species of finfish and shellfish of recreational and commercial importance.

2. Transitional Areas

Transitional areas occur in areas where wetlands grade into upland communities and in some cases have a recognizably distinct vegetative community. The three major types of transitional associations in the study area are:

320 - Shrub and Brushland: these transitional habitats include shrubs such as marsh elder and groundsel bush, and ground cover such as coastal water hyssop (Bacopa monnieri), sand cordgrass and leather fern. They are transitional areas between uplands and saltmarsh areas, and most of these areas have been heavily invaded by Brazilian pepper, an exotic shrub. These communities are valuable as feeding habitat and cover for birds and small mammals.

422 - Brazillian Pepper: these are transitional areas dominated by Brazilian pepper, a relative of poison ivy. There are very few wetland areas in the study area which do not have a few individuals of Brazilian pepper present. These areas offer some cover to various species of birds but in general have little to no wildlife value.

643 - Wet Prairie: dominated by sand cordgrass, spike rushes (Eleocharis spp.), beakrushes, yellow-eyed grass (Xyris spp.) and St. John's-wort. These communities occur in transitional areas of both estuarine and freshwater marshes, and are not abundant in the study area. They are buffer zones between uplands and wetlands, and are used as cover and feeding habitat by animals resident in adjacent communities.

3. Uplands

The principal upland community in the study area is Oak/Pine/Hickory (FLUCS code 423). There are several other upland classifications which, while small in total area, are significant in terms of rarity or wildlife habitat value. These include the longleaf pine/xeric oak community, the xeric oak community, and the sand pine community.

411 – Pine Flatwoods: These forests are quite common throughout much of Northern and Central Florida. Originally, longleaf pines were common on drier sites while slash pines, which are less fire-resistant, were confined to moister sites; wildfire being the contributing factor in this distribution. However, fire control and artificial re-forestation have extended the range of slash pine into former longleaf sites. The pine flatwoods class is dominated by either slash pine, longleaf pine or both and less frequently pond pine. The common flatwoods understory species include saw palmetto, wax myrtle, gallberry and a wide variety of herbs and brush.

412 - Longleaf Pine/Xeric Oak: these are dominated by turkey oak (Quercus laevis) and sand live oak (Quercus geminata). Bluejack oak (Quercus incana) may also be present,

along with slash pine and sand pine. Few longleaf pine appear to occur in the study area, possibly due to logging (and replacement with faster growing slash pine) or destruction by fire. These communities serve many of the same wildlife habitat functions as sand pine associations. Also, these xeric plant communities serve as aquifer recharge areas.

413 - Sand Pine: dominated by sand pine (Pinus clausa). These are found on the prehistoric sand dunes east of the city. Other vegetation includes turkey oak, sand live oak and saw palmetto. Many of the animals of the oak/pine forest also occur in the sand pine communities. In addition, the gopher tortoise, a species of special concern, may use sand pine areas as locations to dig burrows where open, herbaceous areas for feeding are nearby.

414 - Pine/Mesic Oak: these are found fringing hydric forests (cypress and stream and lake swamps) and some coastal marshes, and consist of an overstory of slash pine, live oak, laurel oak and American elm, with an understory of wax myrtle, cabbage palm (Sabal palmetto), swamp fern and saw palmetto (Serenoa repens). These communities provide additional habitat for many of the species of wildlife that utilize the adjacent wetland habitats.

421 - Xeric Oak: xeric oak or xeric hammocks are dominated by sand live oak, bluejack oak and turkey oak. The understory includes saw palmetto and wax myrtle. This association occurs at one site on the west central coastline of the study area. It serves many of the same wildlife habitat functions as the other xeric communities described above.

423 - Oak/Pine/Hickory: a mixed forest of slash pine (Pinus elliottii), sand live oak and live oak (Quercus virginiana) with sand pine and turkey oak occasionally present. Understory species include saw palmetto, greenbriars, wax myrtle, bracken fern (Pteridium aquilinum) and staggerbush (Lyonia fruticosa). These communities occur throughout the study area, and include a range of subcommunities which grade from those dominated by pines to those dominated by oaks with tree cover ranging from 100% canopy closure to scattered individual trees. Oak/pine forests have a more dense and more closed canopy than do pine flatwoods. Animals characteristic of these communities include many species of spiders and insects, lizards (six-lined racerunner and southeastern five-lined skink) snakes (black racer, yellow rat snake, pygmy rattlesnake), numerous birds (cardinal, blue jay, mockingbird, red-bellied woodpecker, towhee, shrike, kestrel, red-shouldered hawk, great horned owl) and mammals (armadillo, opossum, pocket gopher, hispid cotton rat, Florida mouse, bobcat).

425 - Temperate Hardwood: sometimes also referred to as low hammock or temperate hammock. This association occurs around Hidden Lake. It consists of an overstory of live oak, laurel oak, cabbage palm, sweet bay and black gum (Nyssa sylvatica), with some wax myrtle and slash pine present. This site probably serves as roosting and feeding habitat for a number of species of birds (cardinal, bluejay, red-winged blackbird, warblers).

434 – Hardwood Conifer Mix: This class is reserved for those forested areas in which neither upland conifers nor hardwoods achieve a 66 percent crown canopy dominance.

4. Surface Water and Drainage Basins

Surface waters include lakes, streams, rivers, reservoirs, and bays as described by the FLUCCS below with more detailed description following.

510 - Streams and Waterways: This category includes rivers, creeks, canals and other linear water bodies. Where the water course is interrupted by a control structure the area will be placed in the Resevoirs category (530)

520 - Lakes: The Lakes category includes extensive inland water bodies, excluding reservoirs. Islands within the lake too small to delineate will be included in the water area.

530 - Reservoirs: Reservoirs are artificial impoundments of water. They are used for irrigation, flood control, municipal and rural water supplies, recreation and hydro-electric power generation.

540 - Bays and Estuaries: Bays and estuaries are inlets or arms of the sea that extend into the land and, as such, are properly classified in this system only when they are included within the land mass of Florida.

Two drainage basins occur within the City of Tarpon Springs study area, a portion of the Anclote River watershed and the Lake Tarpon watershed. The study area encompasses portions of the lower segment of the Anclote River watershed as defined by the Tampa Bay Regional Planning Council (TBRPC 1986) and the western portion of the Lake Tarpon watershed. Figure 21 shows a delineation of the Anclote River watershed.

The two major estuarine water bodies in the study area are portions of the Anclote River and the northern part of St. Joseph's Sound. St. Joseph's Sound connects directly with the Gulf of Mexico south of Anclote Key. The Anclote River is the sole freshwater source for these two estuarine areas.

No other significant streams or creeks contribute freshwater to the estuary, but numerous man-made and natural swales and ditches are found in the study area. These smaller features represent both additional estuarine habitat and non-point pollution sources, depending on the degree of urbanization and hardening (hard surfaces, such as seawalls) along the course of the swale or ditch.

Smaller estuarine, tidally influenced surface water bodies within the study area are Whitcomb Bayou, Kreamer Bayou, Tarpon Bayou, Spring Bayou, Minetta Bayou and Sunset Lagoon. These connect directly or indirectly with the Anclote River. Lake Avoca is a small, tidally influenced, estuarine area connecting directly with St. Joseph's Sound. The bayous and Sunset lagoon are urbanized with extensive shoreline hardening and very little intertidal shoreline vegetation. Lake Avoca is surrounded by residential

development but most of the shoreline is vegetated with intertidal plants such as salt marsh and mangrove species, with little or no seawalling. These water bodies have been analyzed by the FDER within the 305(b) report as part of the larger systems they connect with, i.e. Anclote River, St. Joseph Sound, and Lake Tarpon. Therefore, a separate section analyzing the water quality for each will not be included since referral to the larger water bodies will provide data on their water quality.

Freshwater bodies in the study area include Hidden Lake, a small portion of the southern tip of Salt Lake, Salmons Bay (an extension of Lake Tarpon) and portions of the west half of Lake Tarpon. Freshwater springs occur in Spring Bayou and along the west shore of Lake Tarpon (see section on Groundwater in this element for further discussion of springs).

All estuarine watershed submerged lands contiguous with St. Joseph Sound and the Anclote River and the freshwater of Lake Tarpon within the City of Tarpon Springs are part of the Pinellas County Aquatic Preserve designated by the Department of Natural Resources, and are classified as Outstanding Florida Waters pursuant to Chapter 403.061(27)(a) F.S. (1987) and further defined by Florida Department of Environmental Regulation and Chapter 17-3.041(4)(f) F.A.C. These areas are subject to special protection by the State due to the outstanding natural attributes of the water body.

Anclote River

According to a report issued by FDER in July of 1988 (305(b) Water Quality Assessment for the State of Florida, July 1988), the Anclote River had an average overall water quality of "good." This rating is the highest of the four (4) ratings used in the report and it is based on 1970-1987 STORET data.

A report issued by the National Oceanic and Atmospheric Administration (McNulty et al, 1972) presents the following data for the Anclote River:

Location:	Lat 28 degrees 12'50"N, Long 82 degrees 40'00"W
Watershed Area:	72.50 sq. miles (188 sq. km), approximately
Mean Discharge:	83.3 cubic feet per second (cf/s)
maximum:	3,890 cfs (recorded 30 July 1960)
minimum:	0.4 cfs (recorded 19 May 1956)

A report issued by the Tampa Bay Regional Planning Council (TBRPC 1986a), presented a detailed summary of the hydrology, geology and surface water quality of the river. This report identified the Anclote River as a water body of regional significance.

Table 10 Average Water Quality Parameters and comparison to Anclote River

CONSTITUENT (units)	STREAM	ANCLOTE RIVER*	ESTUARY
Turbidity (JTU)	10.1	ND	10.0
Secchi depth (m)	1.1	1.2	0.8
Color (PT-CO)	100.0	ND	31.0
Dissolved Oxygen (mg/1)	6.2	5.6	7.0
BOD 5(mg/l)	2.0	1.8	1.9
ph	7.1	7.7	7.9
Suspended Solids (mg/1)	8.0	11.1	28.0
Total Organic Carbon (mg/1)	16.0	27.6 (DOC)	10.0
Organic Nitrogen (mg/1)	0.84	0.42 (TKN)	0.54
Ammonia Nitrogen (mg/1)	0.19	0.15	0.13
Nitrate and Nitrite Nitrogen (mg/1)	0.31	0.10	0.09
Total Phosphorous (mg/1)	0.53	0.12	0.21
Chlorophyll a (ug/1)	6.0	11.6	8.0

*Values represent spatial and temporal averages of all available comparable data.
Source: TBRPC 1986. ND = No Comparable data available.

An important aspect of water quality management in the study area is understanding the links and connections that exist in the natural system. Degradation of water quality in the Anclote River itself will ultimately result in water quality degradation downstream in the adjacent estuarine areas (the Anclote River Estuary, St. Joseph's Sound, and Anclote Anchorage to the north). This leads to declines in valuable habitat such as seagrass beds, and consequently to declines in recreational and commercial fisheries as well as aesthetic problems (e.g., algal blooms, odor problems, anoxic sediments).

St. Joseph Sound

St. Joseph Sound is located adjacent to northern Pinellas County and the Anclote Anchorage. A chain of barrier islands extends from the southern tip of Pinellas County to the Anclote Anchorage, however, adjacent to Tarpon Springs the chain becomes broken and the Gulf of Mexico is open to the west and north.

Much of a report issued by the FDER in April, 1987 (Clearwater Harbor/St. Joseph Sound, Intensive Survey Documentation, April, 1987) uses Clearwater Harbor to the south as a comparison. This report focuses more upon all the waters of St. Joseph Sound, including offshore and nearshore, as opposed to just the estuary (nearshore) in the 305(b) report. Clearwater Harbor is more urbanized, altered, and closed to tidal influence than St. Joseph Sound, however, a comparison of the two connecting waterbodies will help to provide a good analysis of St. Joseph Sound.

Water quality has historically been worse in Clearwater Harbor than St. Joseph Sound. This is due to restricted tidal flow, fingerfill development, urbanization, and three man made causeways in Clearwater Harbor. Nevertheless, St. Joseph Sound receives

significant nonpoint source nutrient loadings from residential land use activities. No point source discharges have been identified which empty into St. Joseph Sound.

According to a study conducted in the mid-1970's by the Tampa Bay Regional Planning Council the water quality in St. Joseph Sound was considered good. More recent data on water quality for St. Joseph Sound was collected by Continental Shelf Associates, Inc. during seven different survey periods from November, 1983 through August, 1984. the water quality data obtained in this study is summarized below for different parameters.

Dissolved Oxygen (D.O.):

In St. Joseph Sound, the nearshore areas during the warm months experienced D.O. levels that sometimes fell below the state standard of 4.0 mg/liter for Class III surface waters, and during the July survey these areas had mean D.O. concentrations below the 5.0 mg/l standard. These substandard D.O. values in the nearshore areas of St. Joseph Sound are primarily the result of alga/productivity (FDER, April, 1987).

Nitrification - Inhibited Biochemical Oxygen Demand (BCOD):

BCOD values for open waters were low, ranging from 0.75 mg/1 to 2.29 mg/1 for November, 1983 through July, 1984, and from 2.43 mg/1 to 4.07 mg/1 for August, 1984.

Within St. Joseph Sound, the nearshore sampling stations always had higher BCOD values than the offshore station. This reflects input from tributaries, point source discharges, and stormwater runoff (Continental Shelf Assoc., Inc., 1984).

Total Phosphorous (T.P.):

In the open water of St. Joseph Sound estuary mean T.P. concentrations ranged from low (0.04 mg/1) to moderately high (0.3 mg/1). These values generally increased southward, with the highest concentrations recorded in Clearwater Harbor whose mean T.P. value for the entire study period was approximately twice that for St. Joseph Sound.

Organic Nitrogen (O.N.):

Mean O.N. concentrations (mg/1) for the entire study period for different sections of St. Joseph Sound are shown below. These values are compared with the average value for estuaries within the State of Florida.

St. Joseph Sound	**State Average for Estuaries**
Offshore 0.59 Inshore 0.77	0.54

The data shows that the O.N. levels in the inshore areas of St. Joseph Sound were significantly higher than the open waters of the Sound and the State average for estuaries.

Nitrite plus Nitrate:

The constituents in the open water were consistently low (0.02 mg/1), whereas in the nearshore waters of St. Joseph Sound the values were somewhat higher (0.02 - 0.06 mg/1), although still lower than the State average for estuaries (0.09 mg/1).

Chlorophyll-a:

St. Joseph Sound had consistently lower levels of chlorophyll-a than Clearwater Harbor. Mean concentrations for Clearwater Harbor were approximately twice the mean concentrations in St. Joseph Sound (5.92-18.48 mg/1 - Clearwater Harbor).

This study conducted by Continental Shelf Assoc., Inc. revealed that the water quality nearshore in St. Joseph Sound was declining. All of Clearwater Harbor (offshore and nearshore) on the other hand was found to be declining.

Excessive development and poor stormwater management in drainage areas abutting the St. Joseph Sound estuary will result in degradation of water quality within the Sound and abutting Anclote Anchorage to the north in Pasco County.

Lake Tarpon

According to the July, 1988 report (305(b) Water Quality Report) issued by FDER, Lake Tarpon had an overall water quality of "good." This rating is the highest of the four (4) ratings used in the report and it is based on STORET data obtained between 1970-1987.

More recently, two reports were published for Lake Tarpon by Pinellas County Department of Environmental Management and South West Florida Water management District. These reports stemmed, in part, from an algal bloom which occurred in 1987. Since that time, the SWMWMD has designated Lake Tarpon as a lake requiring restoration under the recently enacted Surface Water Improvement Management Act (SWIM).

The following excerpt is taken from the SWIM plan for Lake (July 2001)_"Executive Summary" and gives a good synopsis of the water quality and other conditions in Lake Tarpon. Goals of the SWIM plan follow the executive summary.

> With a surface area of approximately four square miles (2,534 acres), Lake Tarpon is the largest freshwater lake in the three county (Pinellas, Hillsborough, Pam) Tampa Bay area. In addition to being classified as an Outstanding Florida Water by *the* Florida Department of Environmental Protection, the lake was formally designated as a state Fish Management Area by a Special Resolution of the Pinellas Board of County Commissioners in 1963. This sport fishery, along with historically good water quality and the existence of two regional County parks on its shore make Lake Tarpon a significant environmental, economic and recreational resource for the Tampa Bay area.
>
> However, in recent years, Lake Tarpon and its associated natural resources have begun to exhibit signs of ecological stress. In the summer of 1987, this stress was represented by a major blue-green

algae bloom that covered about 80 percent of the lake. The bloom persisted for much of the summer and impeded recreational and aesthetic uses of the lake during the prime recreational season. This algae bloom was seen as an indication that the trophic state (or productivity) of the lake was increasing.

The algae bloom of 1987 and citizen concerns regarding the health of the lake prompted the Pinellas County Board of County Commissioners to pass Pinellas County Resolution 87-275, creating the Lake Tarpon Management Committee (LTMC). The LTMC was originally made up of representatives from the agencies charged with protecting the lake and its resources, including the Southwest Florida Water Management District (District), and of various representatives from local government, citizens groups and the development community.

Coincident with these events, during the late 1980's, concern for the quality of lakes, streams and estuaries throughout the State was increasing and this prompted the Legislature to pass the Surface Water Improvement and Management (SWIM) Act of 1987. The threat to the health of the lake represented by the algae bloom and its ecological, environmental and recreational importance prompted the District to include the fake as the seventh ranked waterbody on the District's SWIM Priority Waterbody List.

Subsequently, with assistance from the LTMC, the first Lake Tarpon SWIM Plan was developed and approved in 1989. This first SWIM Plan focused on diagnostic studies since little was known about water quality, hydrology and ecology of the lake. The diagnostic studies, completed in 1992, characterized existing water quality and hydrological and ecological conditions of *the* lake and established a scientific basis for setting a number of management goals for the lake and its watershed.

The 1994 revision of the Lake Tarpon SWIM Plan noted that there were still problems in Lake Tarpon including recreational user conflicts, increases in biomass of certain noxious aquatic plants, possible groundwater loading of nitrates from as yet undetermined sources and pollutant loading from areas developed prior to implementation of stormwater treatment regulations.

Pinellas County has monitored Lake Tarpon water quality monthly since 1987, and in 1993, they noted a decline in water quality. This, along with requirements in their Growth Management Plan, prompted the County to initiate the development of a comprehensive watershed management plan for the lake Tarpon drainage basin. Therefore, this third revision of the Lake Tarpon SWIM Plan was deferred until the *Lake Tarpon Drainage Basin Management Ran* (PBS&J 1998) was completed. The *Lake Tarpon Drainage Basin Management Plan* (DBMP) was prepared with input from and consistent with the goals of the LTMC.

The primary concern with Lake Tarpon continues to be declining water quality as demonstrated by long-term water quality data collected by Pinellas County. Declining water quality can lead to the increase of undesirable blooms of algae, loss of more desirable rooted aquatic plants, changes to the fish community structure and other adverse ecological changes. This revision of the Lake Tarpon SWIM Plan, which is based on the DBMP (PBS&J 1998) identifies management issues, strategies and goats for maintaining and where feasible, restoring the hydrological and ecological integrity of the lake and its watershed.

Strategies to improve and protect water quality are aimed at reducing external nutrient loading through stormwater retrofit projects. Hydrologic and habitat restoration projects in the Brooker Creek watershed are identified which will improve the ecological condition of the natural systems and may assist in lowering external nutrient loads. Additionally, harvesting hydrilla after chemical treatment and an enhanced lake fluctuation schedule may be evaluated to determine whether they are feasible strategies for further improving water quality. Public education, although difficult to measure direct benefits to the lake, is necessary to inform the public about lake and watershed management issues and to solicit public support and volunteers to assist in the management of Lake Tarpon.

This revised Lake Tarpon SWIM Plan provides details for projects that implement the above strategies and for projects that will be used to refine the District and County's understanding of the lake system. The Lake Tarpon SWIM Plan serves as the guidance document for coordinating the efforts of the District, Pinellas County and the State of Florida to restore and protect Lake Tarpon.

LAKE TARPON SWIM PLAN GOALS

The goals of the Lake Tarpon SWIM Plan focus on the issues identified by Pinellas County and the LTMC in the DBMP (PBSU 1998). These goals and the District's PLRG are listed below.

- Maintain the mean annual chlorophyll-a concentration at or below 14 ggn.
- Maintain the mean annual mutti-parametric TSI value at or below 55.
- Limit the areal coverage of hydrilla to 100 acres or less and, limit the areal coverage of cattails to 60 acres or less.
- Expand the coverage of desirable endemic submerged aquaticvegetation to 600 acres and maintain the areal coverage of emergent aquatic vegetation at 120 acres or more. (Note: cattail should not account for more than 60 acres of this coverage.)
- Maintain a fish community balance of F/C = 3.0-6.0(e .g., the ratio of forage fish biomass to carnivorous fish biomass)
- Maintain indices of Relative Stock Density for major sport fish species of: 20-40 percent > 14 inches for largemouth bass; 40-60 percent > 6 inches for bluegill; 40-60 percent > 7 inches for red-ear sunfish; and 40-60 percent > 9 inches for black crappie
- Manage water levels to improve water quality and aquatic vegetation while maintaining the existing degree of flood control provided by the Lake Tarpon Out-Fall Structure.
- Restore hydrologic and ecologic functions *of* wetlands and tributaries in the Lake Tarpon and Brooker Creek watersheds where opportunities for such restoration exist.
- The PLRG for Lake Tarpon is established as a 8.08 ton reduction in total nitrogen and a 1.22 ton reduction in total phosphorus on an annual basis.
- Provide educational opportunities through programs such as Florida Yards and
- Neighborhoods, related to other goals of the Lake Tarpon SWIM Plan.

Lake Tarpon Management strategies are identified beginning on page 6 of the 2001 SWIM plan. Priority Projects are identified in the SWIM plan beginning on page 12. To the maximum extent possible, the City of Tarpon Springs shall coordinate and participate with other governmental entities in adopting the management strategies and completing the priority projects.

5. Commercially Valuable Minerals

No mineral deposits of commercial value are known to occur within the study area.

6. Soils, Sediments and Soil Erosion

a) Marine and Estuarine Sediments

Submerged sediments in the Coastal Planning Area of the study area are similar to those of most of the Florida west coast, according to a report

issued by the University of South Florida Geology Department (Davis et al. 1982). These sediments are relatively homogenous in texture and composition, with small scale variation caused by the abundance of shell or organic matter. The dominant terregenous sediment is fine quartz sand. These dandy subtidal sediments allow for the establishment of the extensive seagrass beds which exist in St. Joseph's Sound and Anclote Anchorage.

b) Terrestrial Soils

Four major soil associations occur in the study area:

Astatula - St. Lucie	well draining soils with high erodibility and low flood hazard characteristics
Myakka - Immokalee - Pomello	poorly draining soils with generally high erodibility and moderate to severe flood hazard characteristics
Astor	swamp soils with very severe flood hazard characteristics
Tidal swamp - tidal marsh	swamp soils with very severe flood hazard characteristics

The latter three associations are characteristic of low-lying coastal land. Urbanization and construction on these solid types are associated with moderately severe to very severe constraints due to flooding and low bearing capacity.

c) Soil Erosion

The Pinellas County agent of the Soil Conservation Service noted that no natural solid erosion problems of significance currently exist in the study area. The principal soil erosion problem involves soil/sediment runoff from construction sites. Best management practices should be employed at construction sites to minimize off-site transport of sediments. Sediments contained in stormwater runoff are a principal component of non-point course water pollution (see section on Estuarine Pollution).

A field inspection along the Anclote River revealed some bank erosion problems along portions of the river. Most of this appears to be the result of waves from boat wakes impacting the shoreline. Other marine sediment erosion problems are associated with seawall construction and shoreline hardening. Impact of waves on seawalls causes scouring of sediments at the seaward base of the wall. Use of riprap at the base of the seawall and,

where possible, setting seawalls above mean high water, can help alleviate these problems in future development. Use of "soft" shoreline stabilization techniques (use of vegetation, combined with grading the shoreline to a more gentle slope), rather than seawall construction, should be encouraged to solve shoreline erosion problems. Use of a breakwater design, coupled with littoral shelf plantings (Figure 12) is useful where planting alone cannot reduce erosion. Off-road and recreational vehicle use in certain areas (e.g., north of Howard Park and on the relic sand dune areas north of Lake Tarpon) is also a cause of soil erosion and such vehicle use in these areas should be discouraged or prevented.

7. Floodplains

As noted, a portion of the study area lies within the Anclote River watershed. Much of the watershed in the study area is developed and urbanized.

Much of the study area lies within the 100-year floodplain as defined by the National Flood Insurance Program (Flood Zone A; see Figure 22). These areas, much of which are presently developed, can be considered flood-prone. Because of this, and because of urbanization, flooding during storm events could be of great significance to the area in terms of the amount of property damage that could result from a major storm event.

Undisturbed floodplains have great ecological value as wildlife habitat, and have important functions for stormwater runoff filtration, and aquifer recharge. These functions have been severely reduced due to urbanization within the study area. Of importance to the region is development in upper portions of the Anclote River, where undisturbed floodplains still exist. Although these areas are outside of the Tarpon Springs study area, development in them could affect water quality and flood-prone conditions of the study area. City leaders should participate in County, regional and state planning efforts and programs in order to prevent potential future flooding and/or water quality problems in the study area resulting from upriver development.

8. Groundwater

Two aquifers have been identified which are utilized as groundwater sources in Tarpon Springs: the surficial aquifer (non-artesian water table aquifer) and the Floridan Aquifer. The unconsolidated sand and shell deposits of the surficial aquifer overlie the sandy clay and marl of the Hawthorn and Tarpon Limestone Formations which together comprise the upper confining unit of the Floridan Aquifer. The Hawthorn Formation is relatively absent in the study area. Although variable, the thickness of the confining layer in the study area is generally 25' or less; there is no significant confining layer within three miles of the coast. As a result, in

this area the Floridan Aquifer is under water table conditions which allows groundwater to discharge into springs, sinkholes, lakes and rivers where the potentiometric surface is at or above land surface. During low flood periods, it has been estimated that the Anclote River base flow results from such discharge (Geraghty and Miller 1979).

The main source of freshwater in Pinellas County, including Tarpon Springs, is rainfall which collects in topographic depressions (lakes, streams, swamps, etc.), infiltrates into the surficial aquifer, and leaks into the deeper Floridan aquifer. The average annual (1951-1980) rainfall at Tarpon Springs is 51.6"/year. The water budget present in Table 2 was developed for Pinellas County based on findings by Hutchinson (1984).

Aquifer recharge rates are low to moderate in Tarpon Springs, between 2" and 10" per year. More significant recharge areas are likely to occur in the eastern region of the City along relic dune ridges. Because of the proximity of Tarpon Springs to salt and brackish water and consequent infiltration of saltwater into the aquifer, the amount of fresh groundwater from either aquifer system is severely limited.

Table 11 Water Budget for Pinellas County

Total rainfall	53 inches
Evapotranspiration from land surface	25
Direct runoff to streams	6
Recharge to surficial aquifer	22
Evapotranspiration from water table	14
Contribution to base streamflow	6
Vertical leakage to Florida Aquifer	2

Source: The Surficial Aquifer in Pinellas County, Florida. U.S. Geological Survey Water Resources Investigation Report 84-4289, page 13.

The surficial aquifer is unconfined and therefore water levels fluctuate in response to recharge and discharge. Groundwater in the surficial aquifer contains relatively high amounts of dissolved minerals, and particularly along the coast where the saturated thickness is less than 20', is susceptible to saltwater intrusion. Currently, domestic wells pump from this aquifer, but rates are usually low (about 10-20 gpm) and yield nonpotable water which is typically used for irrigation.

The second water-bearing zone, located 50-100' below in the upper Tampa Limestone Formation of the Floridan Aquifer, is limited by saltwater as well. Data from the U.S. Geological Survey monitor well in Tarpon Springs located at Lewis and Harrison Streets indicate that saltwater occurs at approximately 90' below sea level. It has been further estimated that the depth to the 250 mg/1 isochlor in the study area ranges from 100' near the coast to 300' in the interior sections of Tarpon Springs (Water Resources Atlas of Florida 1984). The City's existing well system is currently utilizing a thin freshwater lens overlying this

saltwater wedge contained in the limestone as a potable water source. However, this represents a small percent of the needed potable water supply for the City.

Specific capacity of these wells were found to be between 15 gpm and 70 gpm before saltwater intrusion occurred, which restricts use as a municipal water source (CH2M Hill 1978). Additional areas within this aquifer have been identified which could supply potable water within the City limits.

Potential problems which could further reduce the available fresh groundwater supplies include: increased and unmonitored withdrawal from existing domestic and municipal wells which will allow intrusion of saltwater; overdevelopment of recharge and storage (wetland) areas, which reduces total aquifer recharge; and the location of municipal land fill or hazardous waste sites in proximity to existing or future well locations.

Another hydrogeological feature present in the study area are submarine springs and sinkholes. The former are springs which discharge below sea level in coastal marine environments. Tarpon Springs, located in Spring Bayou, was the principal outlet for Lake Tarpon. Historically, most of the water discharged from the lake through the Lake Tarpon sink, a 250' x 300' long sink located 10' below the lake surface when the lake stage is 2' above mean sea level. This sink forms the eastern end of an underground conduit system that connects to Tarpon Springs. Due to the cyclic flow of water into and out of the lake through this system, which allowed saltwater intrusion to occur during periods of non-discharge, the sink was completely levied off in May 1969. Another sink, Knights Sink (located 0.2 mile south of the City of Tarpon Springs limits) is connected to the same underground conduit system as the Lake Tarpon sink. Because of their direct hydrological connection to the Florida Aquifer, careful planning is needed to avoid contamination of these sinkhole areas.

9. Other Habitats and Their Animal Associations

654 - Oyster Bars: found in some shallow portions of the study area, these are composed of the eastern oyster (Crassostrea virginica). Additional components of the oyster community are the clumps of coon oysters (Ostrea frons) epiphytic on the prop roots of red mangroves. Other animals associated with oyster communities are small crustaceans (amphipods, isopods, tanaids), mud crabs (Panopeus meridionalis, P. herbstii, Eurypanopeus depressus), the porcelain crab (Petrolisthes sp.), oyster drills (Urosalpinx and Calotrophon), the crown conch and the mussel, Brachiodontes exustus. These habitats are used as residence and foraging areas by small fish (killfish, sheapshead, gobies and toadfish). Only a few species of birds use oyster bars regularly; however, the American oystercatcher relies on them as feeding areas. Wading birds and shorebirds also forage on these areas at low tide.

10. Wildlife

Species of wildlife observed or expected to occur in the study area are listed in Tables 1-4 of Appendix D (fish, herpetofauna, birds, and mammals, respectively).

11. Endangered or Threatened Species and Species of Special Concern

Tarpon Springs contains habitats utilized, or which on occasion may be utilized, by several endangered species. Exhibit "A" of Appendix D contains updated lists of these species and their status as determined by the Florida Fish and Wildlife Commission (FFWC). Reasons for population declines and specific habitat requirements are discussed briefly below. Nesting locations of the southern bald eagle, eastern brown pelican, and heron nesting colonies were supplied by the National Audobon Society and the FFWC.

Five species of marine turtles could be encountered in the waters off Tarpon Springs. These are the leatherback turtle (Dermochelys coriacea), Atlantic green turtle (Chelonia mydas mydas), Atlantic hawksbill turtle (Eretmochelys imbricata imbricata), Atlantic ridley turtle (Lepidochelys kempi) and loggerhead turtle (Caretta caretta caretta). The first four are listed as endangered species by both the USFWS and the FGFWFC, and the Atlantic loggerhead is designated as threatened by both agencies. Population declines of sea turtles are primarily due to over harvesting, entanglement in shrimp trawls, and destruction of sandy beach nesting areas. Of these species, only the Atlantic loggerhead turtle commonly exists in the vicinity of the study area; however, it has not yet been documented to nest north of Caladesi Island on the Florida Gulf Coast.

The gopher tortoise, Gopherus polyphemus, inhabits drier areas such as beach scrub, liveoak hammocks, and sandhill communities. It is designated by the FGFWFC as a species of special concern. In the study area, scattered populations probably occur in these habitats, primarily in coastal situations. The long burrows excavated by these tortoises are host to many species, including other species with special status such as the indigo snake, the gopher frog and the Florida mouse. Loss of xeric upland habitat is the main reason for the decline in the populations of both the tortoise and the gopher frog. Preservation of suitable upland habitats, and proper site planning and density control, should minimize future impacts to these species.

The eastern indigo snake, Drymarchon corais couperi, inhabits dry sandy areas, pine flatwoods and moist tropical hammocks throughout peninsular Florida and the Florida Keys. In drier areas, it will utilize the burrows of the gopher tortoise as shelter. The snake is attractive to collectors because of its large size and gentle nature. Over-collection and habitat loss have contributed to its listing as a threatened species by the USFWS and FGFWFC.

The short-tailed snake, Stilosoma extenuatum, is endemic to central peninsular Florida, but collections in or near the study area have come from Pinellas and

Pasco Counties. Habitat preference appears to be longleaf pine and turkey oak communities. The life history of this snake is not well known. The species is a burrower, not usually seen above ground.

The southern bald eagle, Halieatus leucocephalus, and the peregrine falcon, Falco peregrinus, have suffered population declines presumable due to the effects of pesticide residues on clutch development. No documentation of bald eagle nests exists in the study area, but frequent use of Lake Tarpon, the Anclote River and adjacent Gulf coast for foraging activities by this species commonly occurs. Nesting sites in the vicinity of the study area are primarily on the eastern shore of Lake Tarpon. One active nest, Pi07 in T27 R16 S9, has a designated secondary zone which may encompass a portion of the study area in the vicinity of Richard Erving Park.

Although no breeding records exist for the peregrine falcon in Florida, the coastal portion of the study area provides optimum wintering habitat, offering a dependable supply of waterfowl and shorebirds, which are major prey items. Wintering peregrine falcons arrive in Florida by September or October and usually depart by May.

The wood stork, Mycteria americana, inhabits freshwater and brackish marshes in the study area. Primary feeding areas are pools and depressions in marshes where small fish concentrate. There are no documented nesting colonies in Pinellas County.

Two shorebirds listed in Exhibit "A" of Appendix D which may occasionally use sandy coastal portions of the study area are the least tern and Southeastern snowy plover. The least tern is an opportunistic breeder which requires sandy, unvegetated nesting substrate such as sand spits, islands, dunes, and gravel-covered rooftops. Because of its preference for isolated expanses of dry sandy beach for nesting, the snowy plover is not typically a major inhabitant of the Tarpon Springs coast. Adequate protection of coastal and spoil island areas with barren sand should afford protection to these species.

Of the members of the heron family, the little blue heron, tri-color heron, snowy egret, and reddish egret populations appear to be declining as a result of wetland habitat destruction. These species primarily utilize the coastal and estuarine mangrove/marsh habitat associated with the Anclote River and St. Joseph's Sound for both nesting and feeding. In addition, several colonial waterbird rookeries containing these species occur in the study area (Table 12). Protection of these nesting colonies and their critical habitat is a paramount concern of the FGFWFC.

Table 12 Waterbird Rookeries, Tarpon Springs

COLONY	LOCATION	OBSERVED SPECIES	NO. OF NESTS
1	Anclote River, between markers 32 and 34 near Stauffer Chemical plant	little blue heron brown pelican snowy egret night heron ibis double-crested cormorant	undetermined undetermined 100 12 undetermined undetermined
2	Anclote River, near marker 45 north of Chesapeake Point	double-crested cormorant great blue heron great egret	71 7 79
3	Anclote River, spoil island inside river mouth, adjacent to power plant intake channel	great blue heron	27
*4	Anclote River, outside of river mouth, spoil islands south of main channel	double-crested cormorant great blue heron American oystercatcher	138 1 1
5	Klosterman Point, south of Curlew Pl.	great blue heron	1

* outside of study area

Sources: Florida Audubon Society; Florida Game and Fresh Water Fish Commission (1986 counts).

Two mammal species of special concern, the Florida mouse and Sherman's fox squirrel, may utilize xeric upland habitat in the study area. The fox squirrel inhabits primarily longleaf pine/turkey oak communities, and the Florida mouse generally inhabits early successional stages of sand pine scrub, but it can be found in the same habitats as fox squirrel. Although severely limited by development, small areas of these habitats are present in the study area, suggesting that these two species may occur.

The only mammal listed as endangered by the FGFWFC that may occasionally occur in the study area is the West Indian Manatee. In winter, they may be found in the vicinity of the power plant discharge canal at the mouth of the Anclote River and the lower portions of the river which provide thermal refuge. As the most common man-induced cause of manatee mortality is boat collisions, posting of manatee warning signs and seasonal speed zones could reduce potential impacts to this species.

12. Air Quality

Climate in the study area is subtropical. Winter temperatures in the area range from 32 degrees = 75 degrees F while summer temperatures range from 70

degrees to 95 degrees F. The rainy season, a time of year during which afternoon thundershowers routinely occur, is generally from June through September.

Air pollution is an important consideration in the study area due to the importance of tourism to the region's economy, and the relatively large proportion of senior citizens in the population. Pinellas County maintains a permanent air quality monitoring station in the study area. Data and analyses by the County indicate that hydrocarbon and ozone pollution from automobile traffic is the greatest local pollution source. Other significant air pollution sources are industrial and utility plants, producing particulates and sulfur dioxide. Particulate loads and hydrogen sulfide levels occasionally exceed U.S. Environmental Protection Agency maximum standards in the Tarpon Springs area.

The Pinellas County Comprehensive Plan called for the following planning strategies for air pollution abatement countywide. Those having applicability to the study area are:

* Most harmful pollutants found in excess in the County can be assimilated by tolerant plants (which are indigenous to Pinellas), or can be settled to the earth and there chemically converted into harmless compounds. Open space and buffer areas therefore must be planned along highways near shopping or residential areas. Planning standards for buffers and open space along arterials and elsewhere can have multiple benefits for air and water quality. Tree planting along roads is recommended as a minimal tool to buffer already developed roadsides.

* Mass transportation, although limited countywide due to residential sprawl a and the lack of centralized destination points, can be facilitated in the relatively undeveloped north county by requiring future non-residential use concentration at major intersections along pre-planned mass transit routes.

* The schedule for abatement of auto emissions was substantially relaxed by the 1977 Clean Air Act Amendments. Manufacturers were allowed until 1981 instead of 1977, as originally required, to achieve emissions standards for hydrocarbons and carbon monoxide. However, these emissions controls can eventually decrease the air pollution problems of the area, if automobile use is controlled. Local enforcement of standards for vehicle emission control through inspection and maintenance programs is an important part of this strategy.

13. Analysis

The various upland communities in the study area are more subject to development pressure than are wetland areas due to the more stringent regulations protecting the latter. Certain upland communities in the study area are rapidly disappearing throughout the state; these are the sand pine, the longleaf pine/xeric oak, and the xeric oak communities. These provide valuable

wildlife habitat and harbor several endangered or threatened species, or species of special concern as noted above.

Previous studies (TBRPC) 1986b) have documented a historical decline in the areas of submerged land vegetated by seagrasses. It is generally maintained that this decline is the result of declines in water quality and clarity, caused by coastal development. This postulated decline in water quality would reduce the amount of sunlight penetrating to the bottom, causing death and decline in acreage of seagrasses. Efforts to reduce or eliminate addition of water pollutants from point and non-point sources should be strongly encouraged. These efforts should include:

* implementation of the non-point source control measures described in the Estuarine Pollution section of this element and further detailed in the Areawide Water Quality Management Plan (TBRPC 1987); and

* investigation of spray irrigation of wastewater effluent at the Tarpon Springs Golf Course.

Additionally, channels for boat traffic should be well marked and educational signage should be posted at boat ramps and marinas urging boaters to avoid shallow areas vegetated by seagrasses in order to minimize impacts to grassbeds from propeller damage.

Further water quality problems (increased nutrients and sediment, decreased dissolved oxygen and water clarity) in the lower Anclote River are likely to occur as development continues along the middle and upper reaches of the river. These problems could contribute to loss of seagrass acreage in the lower river and adjacent estuary if measures are not taken to minimize or prevent water quality degradation upriver. Although these potential problems are outside of the jurisdiction of the City of Tarpon Springs, they would nonetheless impact the City's natural resources. The City should participate in broader regulatory programs administered by the County, the Regional Planning Council, and the state in order to address this issue.

B. Commercial Uses of Natural Resources

The major commercial use of natural resources in the study area is commercial fisheries. A summary of commercial marine products permits issued in Pinellas County was generated by Florida Fish and Wildlife Commission and is presented in Table 13. Discussions of the major marine fishery species landed in the study area follow.

Table 13 License and Permit Summary; Pinellas County 2006-2007

PERMIT TYPE	NUMBER
Blue Crab	102
Commercial Dive Permit	6

Crawfish / Lobster	17
Incidental Take	7
Marine Life ByCatch	1
Marine Life Non Transfer Dive	2
Marine Life Transferable Dive	6
Pompano	10
Purse Seine	11
Restricted Species **	572
Retail Dealer	217
Saltwater Products	693
Special Activity	2
Sponge	50
Stone Crab	114
Wholesale Dealer	93

** Restricted Species: Amberjacks, Black Drum, Bluefish, Cobia, Blue and Stone Crab, Crawshish/Spiny Lobstere, Dolphin, Flounder, Grouper, Hogfish, Spanish and King Mackeral, Striped and Silver Mullet, Permit, African and Florida Pompano, Seabass, Sheepshead, Shrimp, Snapper, Spotted Sea Trout, Gray Tiggerfish, Tripletail, Wahoo, Tropical marine fish and plant species designated as "Marine Life". FWC

Source: Florida Fish and Wildlife Conservation Commission Marine Fisheries Information System

1. Scallops

Two species of scallops occur in the study area, bay scallops (Argopectenirradians) and calico scallops (Argopecten gibbus). Bay scallops spawn offshore in spring and early summer, with some spawning occurring year round. Larvae of both species are planktonic for one to two weeks, then become sessile. Bay scallop larvae attach to seagrasses for several weeks prior to metamorphosis to the adult form. Calico scallop larvae require a hard substrate in water 60' - 240' deep offshore for attachment prior to becoming mobile juveniles. Both species reach sexual maturity within their first year.

Bay scallops occupy the same general areas each year, whereas calico scallop beds are variable, depending on where postlarvae are distributed by water currents. The maximum life span of scallops is about two years; most die at 12-14 months, after one spawning season. Scallops are filter feeders, consuming phytoplankton. Bay scallops occur in most Florida estuaries and large populations occur where seagrass meadows are extensive, including Anclote Anchorage. Where abundant, bay scallops also support recreational fisheries. There is no closed season on bay scallops except in Pinellas County, where they may be taken only from August 15 through December 31. Because bay scallops reach their maximum size in late July or early August, regulation by a January through July closed season would regulate minimum size as well (FDNR). In

2006 only 267 pounds of scallops were harvested on the west coast of Florida (Fish and Wildlife Research Institute).

2. Pink Shrimp

Pink shrimp (Penaeus duorarum) are the most economically significant in the State. Spawning occurs in the open Gulf, year round in southern Florida but only in the summer months further north in Tampa Bay. After several molts, postlarvae enter estuaries where they become bottom feeders in mangrove, saltmarsh and seagrass areas. The estuarine phase of the growth is the most critical in the life cycle of the pink shrimp. These areas provide postlarval, juvenile and subadult shrimp with food and protection from predation. Research indicates that the shrimp yield depends on the survival of the estuarine marches, mangroves and seagrass meadows in their natural state (Fishery Management Council 1981). Areas such as the marsh-or mangrove-water interface and seagrass meadows offer a rich food source for juvenile pink shrimp, which feed on detritus, algae and microfauna, and afford protection and cover from predators.

As they become older, pink shrimp emigrate to the Gulf and become predatory and omnivorous in their feeding habits. Sexual maturity is reach in about one year. The majority of commercial pink shrimp are caught at depths of 66-90 feet, and the catch is greatest in southwestern Florida. Shallow grass beds provide a source of smaller animals for the live bait fishers. There are State and local size standards but no catch limit for pink shrimp in Florida. The season permissible for catch varies according to area. The Florida catch accounts for approximately 97% of the total annual value of pink shrimp caught in the Gulf of Mexico. In 2006 Pinellas County landed 674,000 pounds of Pink Shrimp (Florida Fish and Wildlife Research Institute.

3. Rock Shrimp

Rock shrimp (Sicyonia brevirostris) are not dependent on estuaries during any part of their life cycle, which is apparently passed entirely in offshore waters and primarily in depths of 60-270 feet. Spawning occurs year round; no information has been reported regarding larval development, feeding habits, or migration patterns. Sexual maturity is reached in approximately one year. Adult rock shrimp are apparently nocturnal, generalized carnivores. In Florida, rock shrimp are harvested mainly from sandy bottoms at depths of 60-132 feet. Rock shrimp are most frequently taken as incidental bycatch, especially with pink shrimp. A small scale directed fishery does exist and both catch and effort have been increasing steadily (Fishery Management Council 1981). In 2006 Pinellas County landed 101,000 pounds of Rock Shimp (Florida Fish and Wildlife Research Institute).

4. Stone Crab

The stone crab (Memippe mercenaria) has recently become an important commercial and recreational fishery resource in Florida where the principal fishing areas are northern Florida where the principal fishing areas are northern Florida Bay and waters off Collier County, but a limited fishery does exist in the study area. Most fishing occurs in coastal waters near shore. Spawning occurs year round in Florida Bay, but only from April through September in more northern areas such as the study area. The planktonic larvae live near the water surface for approximately two to four weeks. The postlarvae then become benthic and attain the adult form at about six weeks. The larvae feed on zooplankton while juveniles and adults are opportunistic carnivores, feeding on clams, oysters and mussels. Juvenile stone crabs do not burrow, living instead in areas that offer both food and protection such as seagrass beds, sponges, soft corals and Sargassum mats. Reproductive maturity occurs at about one year, at which time males are of harvestable size but females are not. Thus, female crabs may spawn more than once prior to entering the fishable population. Adult stone crabs live in burrows most often constructed in or near seagrass meadows. The commercial stone crab season extends from October 15 to May 15; only the claws may be kept, and must be of a minimum size (2.75" propodus length, or 4.25" overall length). Other regulations govern permits and traps. In 2006, Pinellas County landed 76,000 pounds of Stone Crab claws (Florida Fish and Wildlife Research Institute).

5. Blue Crab

Blue crabs (Callinectes sapidus) are most abundant in bays and river mouths in Florida. They prefer muddy bottoms in waters to about 100 feet deep. Females migrate offshore to waters of higher salinity for spawning, which occurs year round except in northern portions of the state. The planktonic larvae remain in higher salinity water for 30-50 days. The postlarvae and first few juvenile stages settle to the bottom and migrate (using tidal currents) back towards the estuaries. Juveniles occupy shallow areas in the estuary such as seagrass meadows while adults prefer deeper regions. Adults reach commercial size (5" carapace width) at one to one and a half years, and may live as long as three to four years. Larvae eat both phyto- and zooplankton; adult blue crabs are scavengers but prefer live prey such as small fish, oysters and clams. There is no closed seadon on blue crab in Florida. Crabs taken must measure 5" across the carapace, and egg-bearing females may not be sold. Since the late 1950s, the volume of blue crab landings of Florida's west coast have exceeded those of the east coast. In 2006 Pinellas County landed 489,000 pounds of Blue Crab (Florida Fish and Wildlife Research Institute).

6. Sponges

Sponges are sessile animals which obtain nutrition by filter feeding. Reproduction can be by spawning, or by asexual means such as fragmentation

(small pieces breaking off and forming new sponges). Marine sponges are stenohaline, preferring nearly full-strength seawater (generally at or above 32 ppt salinity). Commercial species harvested in the study area include the sheepswood sponge (Hippospongia), the grass sponge (Spongia graminae) and the yellow sponge (Spongia barbata).

The harvest of marine sponges (several species) was historically a major facet of the local economy in the study area until the late 1940s, when many of the commercial sponge beds were destroyed by a pathogenic fungal infection. The industry collapsed partly due to this natural phenomenon and partly due to the increased use of synthetic sponges. At present, the commercial sponge industry in the study area is reviving, due to declining sponge yields in the Mediterranean as a result of water pollution, and resulting in an increased market for sponges landed in the study area. In 2006, Pinellas County landed 54,000 pounds of Sponge (Florida Fish and Wildlife Research Institute).

7. Finfish

a) Striped Mullet

Spawning of striped mullet (Mugil cephalus) occurs between October and January in offshore waters. Floating eggs typically hatch within two days, and the developing planktonic larvae move into estuarine nursery areas as juveniles where they remain until sexual maturity, approximately two to three years. Larvae and small juveniles feed on zooplankton, while juveniles and adults are herbivorous, feeding on diatoms, algae and benthic detritus. With the exception of the seaward spawning migration in the fall, mullet remain in and are directly dependent on the estuary. The gillnet fishery is the predominant commercial group utilizing the mullet resource. In 2006, Pinellas County landed 418,000 pounds of Mullet (Florida Fish and Wildlife Research Institute).

b) Gulf Menhaden

Gulf menhaden (Brevoortia patronus) are abundant in the northern Gulf of Mexico and commercial harventing efforts are concentrated in that region. Spawning probably occurs in coastal inshore areas. Planktonic larvae are selective carnivores, and migrate inshore and enter the estuarine nursery areas as juveniles. Juveniles develop a specialized gill raker and alimentary tract complex for feeding via non-selective omnivorous filtering. Movement into and established residence in the estuary is an integral part of the menhaden life cycle. Menhaden are used in the manufacture of margarine, catfood, and cosmetics. In 2006, Pinellas County landed 1,616 pounds of Menhaden (Florida Fish and Wildlife Research Institute).

c) Grouper and Related Species

(1) Red Grouper

Red grouper (Epinephelus morio) commonly occur offshore on the Gulf coast, and are found in more nearshore habitats in the Keys. Spawning occurs in the spring over the continental shelf. Juveniles develop in coastal areas and tend to move offshore with age. This is an economically important species or the west Florida coast. In 2006, Pinellas County landed 2,166,000 pounds of Red Grouper (Florida Fish and Wildlife Research Institute).

(2) Goliath Grouper

The jewfish (Epinephelus itajara) is the largest of the groupers and can attain lengths in excess of eight feet and weight over 700 pounds. Spawning occurs in offshore waters during July and August. Juveniles and young adults inhabit coastal and estuarine seagrass beds and mangroves. Although occasionally occurring inshore, Goliath Grouper tend to frequent offshore habitats. Goliath Grouper are protected from commercial and recreational fishing.

(3) Gag Grouper

The gag grouper (Mycteroperca microlepsis) and the red grouper are the major groupers contributing to the commercial and recreational fishery. The gas grouper is the most frequently caught inshore grouper on the peninsular Gulf coast. Spawning occurs between January and March, in offshore waters of the continental shelf. Juveniles inhabit nearshore and estuarine nursery areas. Also found offshore, adult gag groupers do take residence in nearshore habitats. In 2006, Pinellas County landed 488,000 pounds of Gag Grouper (Florida Fish and Wildlife Research Institute).

C. Conservation and Recreational Uses of Natural Resources 9J-5.013(1)(b)

1. Recreational Fisheries

Many of the marine and estuarine species listed in the Commercial Uses Section form an important component of the recreational fishery landings, as well. In addition to those species, the following are taken almost exclusively in recreational fisheries.

a) Clams

Three species of clams occur in significant abundance in southwest Florida: the norther quahog (Mercenaris mercenaria), southern quahog (Mercenariacampechensis), and the sunray venus clam (Macrocallista nimbosa). All are found in estuarines and coastal waters from the mean

high tide level to depths of 50', and are most common on shallow flats. However, no approved shellfish harvesting waters occur in Tarpon Springs.

Sandy bottoms are the preferred substrate. Clear water is also important as excessive silt in the water can smother the animals. In bays, clams are found in close association with seagrasses and algae. The northern quahog did not historically occur on the west coast of Florida, but introductions appear to have established successful populations in Tampa Bay. Quahogs spawn between April and August; sunray venus clams spawn from July through December. Planktonic larvae remain in the water column for about two weeks before settling and burrowing into the sediments. Southern quahogs grow to commercial size most rapidly, reaching minimum size in one to one and a half years. Northern quahogs require two to three years, and sunray venus clams five to six years. Quahogs may live more than 15 years.

Clams are suspension feeders, filtering detritus and microorganisms from the water column. Thus, they may accumulate pathogens and toxins in the presence of red tides or polluted water. State law regulates clam harvesting according to water quality standards; also, certain kinds of harvesting equipment are prohibited because they cause excessive damage to sensitive areas such as seagrass meadows (Godcharles 1971). In 2006, only 3,843 pounds of clams were landed on the west coast of the Gulf of Mexico (Florida Fish and Wildlife Research Institute).

b) Snook

The common snook (Centropomus undecimalis) is an essentially tropical species and sensitive to cold-induced mortality. The northern limit of their range is located just north of the Crystal River. Spawning, possibly lunar induced, occurs at and near tidal passes from lat May through July. Eggs and larvae are transported to estuarine and brackish nursery areas by currents. Juveniles live in the upper reaches of the estuary primarily in brackish streams, ditches and tidal freshwater creeks. Snook are essentially non-migratory, but do exhibit a residential range within the estuary and a net movement to the passes during the spawning season. Snook feed on fish and crustaceans. A closed season on snook exists in January and February and between June 1st and August 31st. A possession limit of two fish and a minimum size limit of 24" have been imposed. This action has been implemented in an effort to promote recovery of a declining population. A 1981 population estimate indicated a reduction to one-third the number of fish from the 1977 estimate. No commercial taking of snook is allowed.

c) Tarpon

Tarpon (Megalops atlantica) support an important recreational fishery in Florida. Spawning occurs from May through August in waters adjacent to offshore currents, along the outer continental shelf. Larvae are transported or migrate inshore developing into juveniles upon reaching estuarine nursery areas. Planktivorous juveniles inhabit isolated, often stagnant, pools which fringe the estuary. Adults feed on fish, crustaceans and polychaete worms. Sexual maturity is reached at about seven years of age; weighing approximately 60 pounds, these fish have become an important part of the sport fishery. Gulf coast stocks exhibit a faster growth rate than do east coast fish.

d) King Mackerel

The king mackerel (Scomberomorus cavalla) is one of the most economically important finfish, both commercially and recreationally, in Florida. Spawning occurs in waters over the outer continental shelf and in adjacent offshore currents between May and September. Little is known of juvenile forms; most inshore collections have been incidental in shrimp trawls. Adults undertake mass migrations. Evidently, there are several populations of kingfish in Florida and some mixing occurs. The Gulf stock is apparently composed of fishes which winter between Cape Canaveral and Key West. These fishes move into the Gulf in the spring, exhibiting a northward movement, and spend the summer in the northern Gulf as far west as Texas. A return to southeast Florida is demonstrated in the fall and winter. Another population of king mackerel, which is off the southeast coast in the springs, apparently moves down the Atlantic coast into the area to spawn. Adults feed on small schooling jacks, menhaden and other schooling herring-like fishes, shrimp and squid. In 2006, Pinellas County landed 4,614 pounds of King Mackeral (Florida Fish and Wildlife Research Institute).

e) Spanish Mackerel

The Spanish mackerel (Scomberomorus maculatus) also supports a large recreational and commercial fishery in Florida. Whereas king mackerel are not commonly associated with nearshore areas, Spanish mackerel frequently enter saline embayments during their migrations. Spawning occurs over the inner continental shelf from May through September. Juveniles are poorly know, although they are captured inshore in shrimp trawls. Separate stocks are presumed for each coast of Florida. Fishes wintering in Florida Bay migrate into the northeastern Gulf in the spring and return by the following winter. Spanish mackerel feed heavily on menhaden and commonly east anchovies, small jacks, squid and shrimp. There is a 12" minimum size limit imposed by the State on the fishing of Spanish mackerel. In 2006, Pinellas County landed 9,156 pounds of Spanish Mackeral (Florida Fish and Wildlife Research Institute).

f) Red Drum

Red drum (Sciaenops ocellata) inhabit estuarine and nearshore Gulf of Mexico waters. Spawning occurs in coastal nearshore areas beginning in September and continuing through February. Larvae are transported to estuarine nursery areas by currents, where they remain during the summer, developing into juveniles which leave the estuary at the onset of cold weather. As the fish mature, they apparently prefer to spend more time in the shallow nearshore Gulf. Redfish are primarily bottom feeders with a preference for crabs and shrimp. They exhibit secondary mideater and surface feeding. Commercial harvest is currently banned. Red Drum are permitted for recreational fishing only with a slot limit as well as catch limits per person.

g) Spotted Seatrout

The spotted seatrout (Cynoscion nebulosos) is very closely tied to the estuarine environment. Spawning occurs within the estuary and possibly in those waters immediately adjacent to the mouth of the estuary. Generally a spring and summer spawner, with peak spawning occurring from April through July, south Florida stocks apparently spawn year round with a major peak in the spring and a minor peak in the fall. Essentially non-migratory, seatrout exhibit a random residential range within the estuary. Tagging studies have shown that most fish move less than 30 miles.

Each estuary appears to have a unique breeding stock, each stock having slightly different morphological racial traits. Habitat preference appears to be seagrass beds. Spotted seatrout feed on fish, shrimp and other crustaceans, and become more piscivorous as they mature. A 12" minimum size limit is imposed.

h) Gulf Flounder

Spawning of Gulf flounder (Paralichthys albigutta) occurs offshore in all and winter when adults migrate offshore from estuarine and coastal nearshore waters. The buoyant eggs usually hatch within two days, and larvae move to inshore and estuarine nursery areas. During this time, the symmetric larvae undergo a metamorphosis in which the skull contorts and the right eye moves around to the left of the body. Juveniles typically inhabit shallow estuarine grass beds where they feed largely on marine worms, crustaceans and fish. Adults are capable of protective coloration changes to blend with the surrounding bottom, feeding almost exclusively on fish and crustaceans. An 11" minimum size limit is imposed on the taking of Gulf flounder. In 2006, Pinellas County landed 428 pounds of flounder (Florida Fish and Wildlife Research Institute).

2. Managed Natural Areas

Four major managed natural areas and a state Aquatic Preserve occur within or adjacent to the study area: Fred Howard Park (Pinellas County park); Anderson Park (Pinellas County park); Sunset Beach Park (City of Tarpon Springs park), North Anclote Nature Park (City of Tarpon Springs park); and the Pinellas County Aquatic Preserve.

a) Fred Howard Park

Fred Howard Park is technically outside of the prescribed study area and is not discussed extensively here. Its proximity to the study area, however, makes it highly accessible to many of the area's residents.

b) Anderson Park

Anderson Park, a 128-acre Pinellas County park, is located in the eastern portion of the study area along the shores of Lake Tarpon. It is a multiple-use park, largely recreation oriented (boating, hiking and picnicking). The north half of the park and lake shoreline of the park are vegetated with cypress and hydric hardwoods. The remainder of the park is mesic pine and oak forest. Park wildlife is primarily urban-type mammals (oppossum, armadillo, squirrels and mice) and small birds.

c) Sunset Beach Park

Sunset Beach Park is a city-owned and operated 9-acre facility that permits access to St. Joseph's Sound. No significant natural areas occur within the park. Its major use is recreational (picnicking) and water access. More information on this park and on Anderson Park is provided in the Recreation and Open Space Element.

d) North Anclote Nature Park

North Anclote Nature Park provides nature trails, kayak landings, and fishing piers. Recent completion of the Elfers Spur of the Pinellas Trail provides convenient access via bicycle and walking.

e) Pinellas County Aquatic Preserve

The waters and submerged lands of Pinellas County are part of the state-operated Pinellas County Aquatic Preserve. Included with the Aquatic Preserve are all coastal estuarine areas within the City of Tarpon Springs as well as the waters and submerged lands of the Anclote River. A management plan for this preserve is currently being developed. The state Aquatic Preserve Program is administered by the Florida Department of Natural Resources. The program's primary purpose is to protect natural

aquatic areas regarded as particularly pristine or valuable to the public interest (i.e., for recreational and commercial uses). Pinellas County waters are also designated as Outstanding Florida Waters (OFW). The OFW program is administered by the Florida Department of Environmental Regulation and its purpose is also to protect waters of the state regarded as pristine or valuable to the public interest for recreational or commercial uses. The program is implemented by the placing of more stringent standards on various types of development on or near discharges to OFWs.

f) Artificial Reefs

The artificial reefs program of the State of Florida is administered by the Bureau of Marine Science and Technology under Section 370.013 of the Florida Statutes. Approximately $110,000 in grants was awarded in 1979 and 1980, the first two years of the newly adopted program (FDNR 1981). The principal types of fish that inhabit the artificial reefs in the southwest Florida area coastal waters are grouper, snapper, Spanish mackerel, king mackerel and amberjacks. Artificial reefs are located off Anclote Key, outside of the limits of the study area, but these reefs are used by residents of the study area.

Florida's coastal waters contain more artificial reefs than any other state (Seaman 1982). Scientific development and deployment of artificial reefs has been a slow process with little research and funding. Without considerable volunteer efforts to secure materials and free labor, many of the artificial reefs of southwest Florida would not exist. The largest group of organizations which have promoted an artificial reef program is in Pinellas County.

The conservation of the previously mentioned natural resources is important to the quality of life in Tarpon Springs. These resources can be protected by requiring new development to comply with up to date drainage and environmental rules and regulations. Existing development that contributes to the degradation of natural resources must comply with new regulations (bring site up to code) if expansion of floor area or addition of parking exceeds thresholds set up in the Tarpon Springs Land Development Code. Stepped up enforcement of existing regulations will help protect these resources. Also, the areas that have been identified under Schedule A will be further protected as stated elsewhere in this element.

D. Hazardous Wastes and Known Pollution Problems of Surface Water Bodies

Hazardous waste is defined in Rule 9J-5.003(34) FAC, which states "Hazardous waste" means solid waste, or a combination of solid wastes, which, because of its quantity, concentration, or infectious characteristics, may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible

illness or may pose a substantial present or potential hazard to human health or the environment when improperly transported, disposed of, stored, treated, or otherwise managed.

This definition differs somewhat from that employed by the U.S. Environmental Protection Agency (USEPA) which defines hazardous wastes as wastes which have any of the following properties: ignitable, corrosive, reactive, or toxic.

The USEPA has identified approximately 300 specific chemical compounds that exhibit one or more of the four properties of a hazardous waste. In addition, the EPA has assembled a list of industrial process wastes that are comprised of either one or more of the 300 specific chemical compounds or exhibit one of more of the four properties of a hazardous waste. The State of Florida has adopted the EPA's definition of hazardous wastes as well as the lists.

Wastes are generated not only by large industrial firms but also by small commercial operations, by various consumer services and by individual households. The management and control of the waste problems are the concern of the federal, state, county and local governments, ranging from federal laws regarding the disposal of nuclear wastes to local regulations banning disposal of certain wastes in incinerators. The federal government regulates large quantity waste generators (Ch. 40 CFR, Part 261-265), although enforcement in Florida is carried out by FDER.

There are specific wastes or categories of waste that may exhibit one or more of the characteristics of a hazardous waste but are <u>not</u> legally defined, according to the EPA definition, as a hazardous waste at this time. These include radioactive wastes, sewage effluent and household wastes. In addition, some wastes that are generated in small monthly quantities (less than 1,000 kg (approximately 2,200 pounds/month) are exempted from certain federal and state regulations. Although these small quantity generators must manage their wastes in ways defined by FDER, these generators are not required by federal law to:

* Maintain records of wastes generated;
* Inform either the USEPA or FDER that they are generating hazardous wastes;
* Manifest or "track" their wastes if they are shipped off-site.

The hazardous wastes generated by these smaller quantity generators have the same potential for creating problems if mismanaged as do the wastes produced by larger quantity generators.

The problems associated with hazardous waste mismanagement can be separated into the following categories:

Past Mismanagement:	Hazardous waste management practices that have resulted in areas where hazardous wastes have been deposited and present the potential for

	significant environmental and human health concern. These areas are frequently called uncontrolled sites or abandoned dumps.
On-going Mismanagement:	Hazardous waste management practices that can result in contaminated land, air, and water.

These two categories are interrelated because on-going mismanagement can create future uncontrolled sites.

Cleanup and site restoration of uncontrolled sites is costly. County, State and Federal governments can save substantial amounts of money by preventing uncontrolled sites from developing. And by doing so, the adverse environmental and health effects resulting from such mismanagement practices can be avoided.

Many small quantity generators mismanage their wastes by disposing them in sanitary landfills. Although Florida statutes prohibit disposal of hazardous wastes onto the land, the City of Tarpon Springs landfill still unknowingly accepts small quantities of hazardous wastes on a regular basis. This occurs when households and small quantity generators deposit unmarked containers of hazardous waste into solid waste dumpsters or trash cans. The waste is eventually deposited at the landfill. These wastes can accumulate, creating the potential to transform the landfill into an uncontrolled site.

Effective solutions to the problem of hazardous waste mismanagement require an understanding of the constraints facing hazardous waste generators, including the ability of the generator to become aware of and to understand the federal and state regulations that govern them. The constraints include the ability of generators to pay for proper management of their hazardous wastes. For discussion purposes, it is useful to divide generators into two categories:

Larger Quantity Generators: (more than 1 ton/month)	These generators are typically larger firms or public agencies that are staffed with technical and legal personnel who understand federal and state hazardous waste regulations. These generators typically can afford to manage their wastes properly.
Smaller Quantity Generators: (less than 1 ton/month)	These generators are typically smaller firms or public agencies. If privately owned, they tend to be non-manufacturing firms. These generators

typically do not have a staff that is knowledgeable of federal and state hazardous waste regulations. Further, the costs for proper hazardous waste management are usually more burdensome than for the larger generators.

No large quantity (over one ton per month) generators appear to exist within the study area, based on information from the FDER Hazardous Waste Section.

Groundwater at the region of the Stauffer Chemical plant is being monitored; arsenic and fluoride have been detected in groundwater samples from some of the test wells around the plant. Drums of a phosphorus/sand mixture have also been found on this site according to the FDER Enforcement Section (personal communication). No hazardous wastes, according to the federal EPA/state FDER definition, exist on this site.

Numerous small quantity generators (less than one ton per year) exist within the study area. Substances produced and potential sources may include:

Table 14 Small Quantity Waste Generators

SUBSTANCE	POTENTIAL SOURCE
Waste oils and greases	service stations, auto repair facilities, garages, trucking companies
Lead-acid batteries	auto repair, service stations, battery shops
Photographic waste	photo shops and labs, hospitals
Spent solvent	industrial and marine service facilities
Acids or caustic	battery facilities
Electroplating rinse	electroplating facilities
Other ignitable waste	industrial facilities
Waste formaldehyde	industrial laboratories, hospitals, mortuaries
Ignitable paint waste	paint dealers and factories, marine facilities
Pesticide rinses	pest control firms, households
Heavy metal scrap	battery manufacturing facilities
Waste ammonia	blueprint shops
Corrosive plating waste	electroplating facilities
Wood preserving waste	lumber yards and mills
Waste pesticides	pest control firms, households

Chapter 17-31, Appendix 1, Florida Statutes, provides an extensive list of wastes and potential generators.

Due to lack of knowledge of federal and state hazardous waste regulations, many smaller generators are mismanaging their wastes. Part of the solution to the problem of on-going hazardous waste mismanagement is to identify all possible generators of hazardous waste and to inform them of their responsibilities as defined in federal and state regulations. An important part of any local government Hazardous Waste Assessment which may be undertaken involves the identification and education of potential hazardous waste generators in the area of concern.

The Tampa Bay Regional Planning Council has developed and adopted a Hazardous Waste Inventory and Management Plan and Hazardous Waste Needs Assessment for the Tampa Bay region. In general, surface waters and sediments of Tampa Bay appear to be relatively free of toxic contamination from metals and hydrocarbons, compared to estuaries in northern parts of the United States. However, the fact that up to 30% of the hazardous wastes generated in the Tampa Bay region are handled in an unacceptable manner (TBRPC 1985) indicates that the potential for water or land contamination does exist. The City of Tarpon Springs should work with Pinellas County, the Regional Planning Council and FDER to inventory hazardous waste generators within the City limits, and to develop a management plan in conjunction with similar efforts undertaken by the above government agencies. Elements of the management plan should be directed at the small quantity generators as these appear to be the major waste producers in the City, and should direct efforts to:

* Coordinate and seek support of Trade Associations, Industry Councils, and Chambers of Commerce;
* Encourage generators to testify on behalf of the needs assessment and location decisions;
* Advertise in trade journals, newspapers and other media resources the benefits of a long-term hazardous waste management program;
* Develop public information presentations (movies, slides, etc.) for continuing education;
* Encourage participation in "Amnesty Days."

The State Water Quality Assurance Act established the program known as Amnesty Days. The FDER contracts with the private sector to collect hazardous wastes on a one-time basis from homeowners, farmers, schools, state agencies and other one-time small quantity generators. There is no charge to the generators for this one-time service. The program is intended to raise public awareness of the need for proper waste management of hazardous waste as well as to reduce the hazardous waste accumulating throughout the state. The Act scheduled six Amnesty Days between May 1, 1984 and December 31, 1986. Collection points were established throughout the state.

Other known pollution problems of the surface water bodies, wetlands, floodplains, fisheries, wildlife habitat, marina habitat, and vegetative communities include:

* Tarpon Springs Wastewater Treatment Plan outfall
* Stormdrains at the northern terminus of Safford Avenue and Arfaras Street
* Runoff from urban land surfaces includes industrial, commercial, household, or roadway residues
* Sedimentation from Urban Stormwater Runoff
* Stormwater Runoff including:

    * Particles, aerosols, gases, and acids washed from the atmosphere by rainfall
    * Yard refuse and lawn maintenance including leaves, grass, dirt, pesticides, and fertilizers
    * Fuel and chemical spillage
    * Gasoline, oil, brake fluid, battery acid from automobiles and service stations
    * Street litter

E. Current and Projected Water Needs

The primary source for potable water use in the City of Tarpon Springs is the Floridian Aquifer. Approximately 81.3% of the City's water needs are purchased from the Pinellas County Water System (PCWS). The remaining potable water consumed is provided by municipal wells.

1. Current Water Needs

The City of Tarpon Springs distributed an 829,927,000 gallons of potable water in FY 2012. The primary potable water users are residential and commercial, with a small amount of industrial consumers. There are no agricultural consumers of potable water in the City of Tarpon Springs. The City has 835 commercial accounts of which 3 are identified as "significant users", Florida Power, Florida Hospital –North Pinellas, and Tarpon Springs High School. Commercial users account for approximately 25.4% of total consumption.

2. Projected Water Needs

Table 15 - Water Supply/Demand Analysis

DEMAND ANALYSIS							
UTILITY NAME	**2010**	**2015**	**2020**	**2025**	**2030**	**WUP (MGD)**	**PER CAPITA WATER USE (2003-2007)**
CITY OF TARPON SPRINGS *(SUPPLIED PARTIALLY THROUGH PINELLAS COUNTY UTILITIES)*							
Municipal Population Served	25,779	25,898	26,039	26,171	26,286		
Demand (MGD)	**2.836**	**2.849**	**2.864**	**2.879**	**2.892**		
Total Utility Service Area Pop.	28,913	29,056	29,224	29,384	29,525	1.38	110
Demand (MGD)	**3.18**	**3.196**	**3.215**	**3.232**	**3.248**		
PINELLAS COUNTY UTILITIES *(SUPPLIED PARTIALLY THROUGH TAMPA BAY WATER)*							
Municipal Population Served	136,017	139	143	148	155		
Demand (MGD)	0.015	0.015	0.015	0.016	0.017	1.343	107
Total Utility Service Area Pop.	392,354	393,748	395,477	397,145	398,684		
Demand (MGD)	41.982	42.131	42.316	42.495	42.659		
MUNICIPAL POPULATION	25,915	26,037	26,182	26,319	26,441		110*
TOTAL DEMAND (MUNICIPAL)	**3.18**	**3.196**	**3.215**	**3.232**	**3.248**		
TOTAL DEMAND (COUNTY)	45.162	45.327	45.531	45.727	45.907		
			**Weighted mean per capita of utilities serving within community jurisdiction*				
SUPPLY ANALYSIS							
EXISTING SOURCES							
	2010	**2015**	**2020**	**2025**	**2030**		
Total Permitted Quantities (MGD)	2.723	4.2	4.2	4.2	4.2		
Contract w/ Pinellas County for Supply	3.41	0	0	0	0		
TOTAL SUPPLY	**6.133**	**4.2**	**4.2**	**4.2**	**4.2**		
Water Supply Authority Quantities (MGD)	267.808	267.808	267.808	267.808	267.808		
	2010	**2015**	**2020**	**2025**	**2030**		
TOTAL WATER SUPPLY SURPLUS OR DEFICIT	**2.953**	**1.004**	**0.985**	**0.968**	**0.952**		
FUTURE SOURCE OPTIONS							

The City has historically received potable water from four City-owned and operated freshwater wells with a production capacity of approximately 1.02 MGD and wholesale finished water purchased from Pinellas County (County) for the remaining potable water supply. In recent years the City has desired to obtain independence in raw water supply, treatment and distribution in order to reduce dependence on outside suppliers (the County and, by extension, Tampa Bay Water) and to control distribution system disinfection practices. Furthermore, the proposed Alternative Water Supply Project will increase the regional water supply capability using an alternative water supply source. In particular, the regional water supplier required the City to convert to the use of chloramines from free chlorine as the distribution system disinfectant. This situation has, in the past, caused total coliform detections in the City distribution system. In response, the City has been forced to increase flushing in the system to adequately maintain chloramine residuals throughout the entire system.

The City staff initiated this move to City-specific supply and treatment independence with a self-authored report most recently updated in May 2005 entitled "Alternative Water Supply Plan (Plan)." This plan included bringing on-line additional freshwater wells along Disston Avenue and constructing a brackish water treatment plant with an average day finished water production capacity of 5.0 MGD and a maximum day

finished water production capacity of 6.4 MGD. It should be noted that the Plan referenced average day flow (ADF) capacity as opposed to the more commonly used maximum day flow (MDF) capacity used for potable water production. Subsequent to this effort, the City contracted with RosTek Associates Inc. (RosTek) to provide conceptual sizing and an independent
opinion of probable construction cost for a maximum day 6.5 MGD finished water production capacity reverse osmosis (RO) treatment facility. The initial facility sizing was for 5.0 MGD finished water production capacity facility with the ability to expand to the maximum 6.5 MGD finished water production capacity by adding membrane elements to the existing skids and increasing feedwater pumping capacity. This study was delivered to the City in December 2005 and included two options: a low total dissolved solids (TDS) raw water supply option (TDS equal to 3,300 mg/L), and a high TDS raw water supply option (TDS equal to 10,500 mg/L).

In early 2007, the City further pursued their desire to achieve water supply and treatment independence by releasing a Request for Proposals (RFP) to provide Owner's Representative services for the procurement of a 6.5 MGD finished water production capacity RO membrane treatment plant including raw water supply wells, a raw water transmission system, a membrane treatment facility, a finished water storage and transmission system, and a concentrate water transmission system using the Design-Build delivery method. In the summer of 2007, CDM Smith was selected and contracted to provide the requested services. These services also required the completion of a pilot study to confirm treatment process requirements as well as the preparation of a Pilot Plant Study Report and a Preliminary Design Report. CDM Smith conducted a seven month pilot study from November 2007 through June 2008 and completed the Pilot Plant Study and Preliminary Design Reports in July 2009. It should be noted that the Project was delayed by legal challenges by a local resident until March 2012 when the City ultimately prevailed. The City has secured a Cooperative Funding Grant from the Southwest Florida Water Management District (SWFWMD) for up to $20,185,000 and is projected to award the Design-Build contract by the Spring of 2013. The Grant requires completion of construction by December 2014. It should be noted that the City modified the desired maximum day finished water capacity of the Facility during the development of the Preliminary Design Report. The maximum day finished water production capacity of the Facility shall not be less than 6.4 MGD. Based on the City's projected growth and the amount of water the facility will produce, the City will have a healthy surplus of water through the current planning period.

3. Water Conservation

The City of Tarpon Springs will continue to rely upon Pinellas County to provide a majority of its water needs until completion of the City's RO plant. This water will in turn continue to come from the Floridian Aquifer. However, there are a few things that the City can do to reduce consumption rates through water conservation:

* Utilize sewage effluent re-use for irrigation purposes

* Adopt a water conservation program
* Require water conserving plumbing fixtures in the City Building Code
* Add capacity to the City's reclaimed water system

F. Special Coastal Planning Efforts

Several regional efforts have been undertaken which merit discussion in this section. City of Tarpon Springs coastal management and conservation efforts should attempt to coordinate with these regional plans and efforts.

1. Tampa Bay Regional Planning Council

The Agency on Bay Management, an advisory subcommittee of the Tampa Bay Regional Planning Council, is concerned with the coordination of all management and conservation efforts in Tampa Bay and the adjacent Gulf and bay waters. A significant document, which gave impetus to the formation of this committee, is "The Future of Tampa Bay," issued in 1985 (TBRPC). This document identified, in order of priority, 42 issued of major importance to the maintenance, management and restoration of the Tampa Bay estuary and adjacent waters and tributaries. The City should continue its involvement in the activities of the Agency in order to coordinate City planning efforts with the efforts of other municipalities in the region as well as with Agency efforts.

2. Southwest Florida Water Management District

The SWFWMD Strategic Plan 2007-2016 identified seven strategic priorities of which the following have specific impact upon the City of Tarpon Springs:

1. Meet present and future water needs.
2. Establish minimum flows and level for priority water bodies
3. Manage the districts watersheds (Figure 23) comprehensively
4. Manage water and related natural resources through regulation

As the City moves forward with the establishment of its own Reverse Osmosis water treatment plant close coordination will be required with SWFWMD for permitting and overall impact upon the water needs of the area. The Anclote River and Lake Tarpon are both considered priority water bodies for establishing and maintaining minimum flows. The City of Tarpon Springs should actively participate in the Tampa Bay / Anclote Watershed Management Plan update and be an integral part of its implementation.

3. Florida Department of Environmental Protection

The Florida Department of Environmental Protection is responsible for the management of the Tampa Bay Aquatic Preserves which includes the Pinellas County Aquatic preserve established July 1, 1976 and established as an

Outstanding Florida Water Body on March 1, 1979. The natural and spoil islands that are state-owned within the preserve are also managed as part of the preserve. The Pinellas preserve covers 336,265 acres of land and includes several endangered, threatened or species of special concern. The City of Tarpon Springs should engage in any specific planning efforts or management plans related to the Pinellas County Aquatic Preserve.

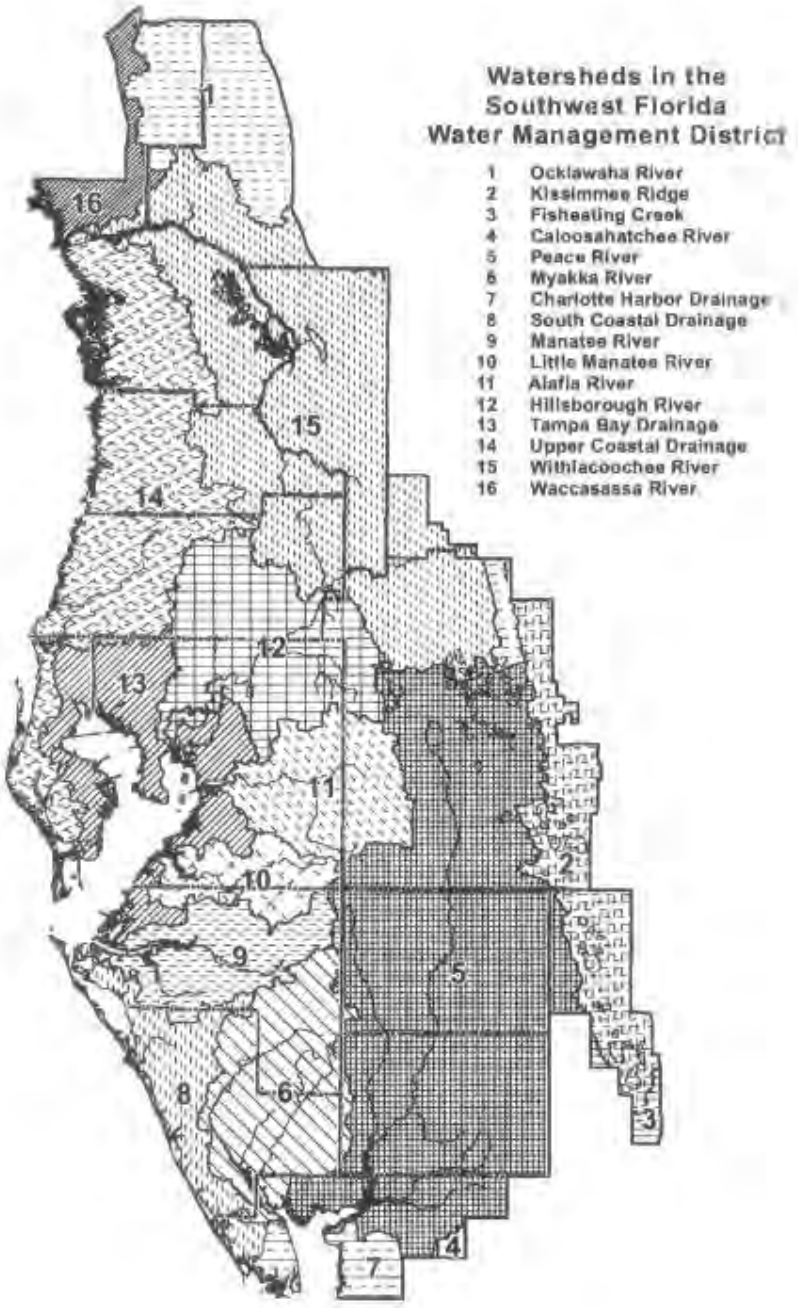
G. Energy Conservation / Alternative Energy Opportunities (HB 697)

The viability of alternative energy sources such as solar, wind, and water power varies depending on several factors including the geography and topography of a particular area. For this part of Florida, the most viable alternative energy resource is solar power. Progress Energy (supplier of the area's electrical power) does own or possess easements for transmission lines throughout the City. These transmission corridors could be utilized for solar power arrays in the future. For security purposes, these transmission corridors are not mapped.

Solar installations on individual homes offers direct benefits to the homeowner and reduces overall demand for electrical power and natural gas. These installations can be as simple as a solar system for heating water (pools and home water heaters) or more complex photovoltaic solar arrays that tie into the existing power grid. The ultimate in efficiency are complete "off-grid" home power systems. Solar pool and hot water systems are relatively inexpensive and cost recovery can be realized quickly, however photovoltaic systems are still cost prohibitive in most cases. The City of Tarpon Springs is exploring options to assist homeowners interested in installing photovoltaic systems.

Preservation and rehabilitation of existing housing and commercial buildings can be viewed as the ultimate in energy conservation. New construction requires raw materials and energy whereas, preservation and retrofitting existing buildings requires much less. The City's Historic Preservation Element provides Goals, Objectives and Policies for structures within the Historic District.

FIGURE 23


Watersheds in the
Southwest Florida
Water Management District
1 Ocklawaha River
2 Kissimmee Ridge
3 Fisheating Creek
4 Caloosahatchee River
5 Peace River
6 Myakka River
7 Charlotte Harbor Drainage
8 South Coastal Drainage
9 Manatee River
10 Little Manatee River
11 Alafia River
12 Hillsborough River
13 Tampa Bay Drainage
14 Upper Coastal Drainage
15 Withlacoochee River
16 Waccasassa River

V. SUMMARY RECOMMENDATIONS - CONSERVATION

The following is a summary list of issues and recommendations identified by the conservation analysis of this report:

* Minimize soil erosion during construction through best management practices
* Utilize "soft" shoreline stabilization techniques rather than seawall construction where feasible
* Restrict off roading on relic sand dunes and exposed areas
* Monitor development of the Upper Anclote River watershed in Pasco County
* Restrict unmonitored withdrawal of ground water from shallow wells
* Utilize tree planting and buffers to improve air quality
* Local enforcement (County) of vehicle emissions standards to improve air quality
* Institute effluent re-use for irrigation
* Erect signage at boat ramps, marinas, channels, regarding marine grass beds and manatees
* Identify small quantity hazardous waste generators in the City
* Continue to monitor the City landfill (closed)
* Restrict and more closely control illegal dumping at the landfill perimeter
* Require water conserving fixtures in the local Building Code
* Adopt a local water conservation plan
* Conserve and preserve the vegetative communities as indicated by Schedule A

VI. COASTAL MANAGEMENT GOALS, OBJECTIVES AND POLICIES

GOAL 1.0

The City Shall preserve, protect and enhance the natural and functional characteristics of the Coastal Planning Area

OBJECTIVE 1.1

Protect and improve the natural resources of all wetlands and areas of significant upland habitat as defined in Future Land Use Policy 1.1.12.

POLICY 1.1.1

Evaluate all wetland areas for potential preservation designation with a goal of "no net loss of wetlands". Development projects which may affect wetland areas must meet the following criteria and must also be consistent with Policies 1.6.6 and 1.6.7 of the Conservation Goals Objectives and Policies:

1. An overall public benefit is provided by the development and the mitigation plan provides an overall improvement to water quality within the applicable watershed.
2. Proposed mitigation shall be in the following order of priority.
    a. Mitigation on the same site of the development.
    b. Mitigation within the Planning Area Boundary

c. Mitigation within the applicable watershed as identified by Southwest Water Management District.

3. Mitigation plans which rely on 2.c. above shall also be required to perform some mitigation either on site, adjacent to the development, or within the Planning Area that improves water quality and/or wildlife habitat.

POLICY 1.1.2
Require a minimum 30 foot aquatic lands setback for non-water dependent uses along the City's shoreline with the exception of the historic Sponge Dock Area and accessory structures on parcels where an existing seawall has effectively eliminated the natural function of the shoreline. Accessory structures are defined as those detached from the principal building located on the same lot and customarily incidental and subordinate to the principal building or use. Accessory structures shall not include any structure having an impervious roof supported by columns or walls and intended for the shelter, housing, or enclosing of any individual, animal, process, equipment, goods, or materials of any kind

POLICY 1.1.3
Require a minimum 15 foot buffer zone adjoining all wetlands

POLICY 1.1.4
Require all development or redevelopment adjacent to wetlands or areas of significant upland habitat as defined in Future Land Use Policy 1.1.12 to assess the impact upon wildlife in order to evaluate and eliminate or minimize adverse impacts

POLICY 1.1.5
Require wetland mitigation on a 1:1 basis using the same type or more productive vegetation with at least an 80-85% natural cover rate, over a 2-5 year period

POLICY 1.1.6
Phase out the use of septic tanks in the Coastal Planning Area

OBJECTIVE 1.2
Restrict Dredge and Fill activities to those where no feasible alternatives exist;

POLICY 1.2.1
Restrict seawalling along the Gulf Coast shoreline, and require the replacement of seawalls in the Coastal High Hazard Area with stabilization techniques as exhibited by Figure 12 or 12b of this element in the event they are destroyed in excess of 50% of their replacement cost

POLICY 1.2.2

Require the examination of alternatives to dredging and filling; and determine that strict denial would effectively deprive the owner of all reasonable use of the land due to its unusual size, shape, topography, natural conditions, and location, or that an alternative would be technically impractical in terms of engineering, design and construction practices, or that the application is in the public interest

OBJECTIVE 1.3
Maintain, improve, and repair erosion control structures as needed in a manner which will protect coastal marine resources and habitat along the City's Bayous

POLICY 1.3.1
Identify design alternatives and funding sources for bayou erosion control

POLICY 1.3.2
Implement design alternatives in the Dames and Moore Master Drainage Plan to control urban run-off

POLICY 1.3.3
Consult proposed schedule of drainage improvements in the Master Drainage Plan when preparing the City's annual CIP.

POLICY 1.3.4
Maintain the existing manmade beach systems in a manner which protects against erosion and preserves the existing ecosystem

OBJECTIVE 1.4
Restrict direct stormwater runoff into the Gulf of Mexico

POLICY 1.4.1
Utilize wetlands for stormwater filtering in accordance with the discussion under Section II.A. 2.d, FDEP, SWFWMD, and Chapter 17-25 requirements for water quality, quantity, and use

POLICY 1.4.2
Require that post development runoff shall not exceed pre-development runoff for the 25 year frequency storm, 24 hour duration in order to limit adverse impacts of water quantity and quality resulting from development or redevelopment

GOAL 2.0
Reduce shoreline conflicts through the land use planning process.

OBJECTIVE 2.1
Due to its environmental sensitivity, restrict water dependent uses along the Gulf of Mexico shoreline to recreational fishing and swimming areas; which shall

have shoreline usage priority. Second priority shall be given to water related residential uses.

POLICY 2.1.1
Require a 100 foot setback from the Gulf Coast shoreline in the Coastal High Hazard Area for residential densities in excess of 5 du/acre;

POLICY 2.1.2
Prioritize Gulf of Mexico shoreline uses as follows:

- open spaces and recreation
- shoreline access for the public
- low to medium density residential uses

OBJECTIVE 2.2
To give water dependent uses priority along the Anclote River shoreline.

POLICY 2.2.1
Prioritize Anclote River shoreline uses as follows:

1. **North Bank of the Anclote River Working Waterfront (See Figure 2):**

Priority Uses
- Dockage for commercial fishing
- Marine products and fisheries
- Commercial Fishing Establishments, including wholesale and retail sales
- Boat ramps, public docks, fishing catwalks, charter diving and sightseeing operations
- Major boat repair and maintenance

Other acceptable uses
- Marinas, wet and dry slip
- Other water dependent industries or utilities
- Tourist oriented water dependent/related uses when combined with another priority use above
- Low-rise hotels when combined with another water dependent use
- Low to medium density residential uses when combined with another priority use above

2. North Bank of the Anclote River, not including the Working Waterfront (See Figure 2)

Priority Uses
- Marinas, Wet and Dry Storage

- Boat ramps, public docks, fishing catwalks, charter diving and sightseeing operations
- Shoreline Access for the public
- Boat ramps, public docks

Other Acceptable Uses

- Tourist oriented water related uses when combined with another priority use above
- Low-rise hotels and other forms of lodging
- Low to medium density residential uses when combined with another priority use above

3. South Bank of the Anclote River, not including the Working Waterfront (See Figure 2)

- Low Density Residential
- Shoreline access for the public

4. South Bank of the Anclote River, Working Waterfront (See Figure 2)

Priority Uses

- Tourist Oriented Water Related Uses
- Low-Rise Hotels and other forms of lodging
- Commercial Fishing Establishments, including wholesale and retail sales
- Water Dependent industries or utilities
- Public agency docking facilities
- Wetslip Marinas

Other acceptable uses

- Dry storage marinas, subject to compatibility review with existing and planned uses in the area, except for the area between Dodecanese Blvd and the Anclote River where such uses shall be prohibited.
- Low to medium density residential uses when combined with another priority use above.

OBJECTIVE 2.3

The City shall consider the following criteria when locating water dependent uses:

- Water depth
- Existing shoreline usage
- Need for dredging
- Approval from other affected government agencies

POLICY 2.3.1
Promote the expansion of the tourist oriented light commercial uses in the historic Sponge Dock Area

POLICY 2.3.2
Locate wetslip marina facilities along the Anclote River west of the Alternate U.S. 19 bridge where access to deepwater and the river channel exists:

POLICY 2.3.3
The City shall as a minimum use the following criteria for siting marinas:

- Adequate water depth to accommodate the proposed boat use. Sites that require no dredging or filling to provide access by canal, channel or road are preferred.

- Preference shall be given to the expansion of suitable existing marinas rather than new construction.

- Located in areas where there is adequate flushing of the basin to prevent stagnation and water quality deterioration.

- No adverse impact on archaeological or historic sites as defined by state and local comprehensive plans.

- Reasonable access to a large navigable water body.

- Sufficient upland area to accommodate all needed utilities and support facilities, such as parking spaces, rest rooms, dry storage, etc.

- Capacity of the surrounding roadways to handle boating traffic to and from the marina.

- Compatible land uses.

- Adequate wastewater treatment capacity in accordance with state standards.

- Marina development should be sensitive to the special requirements for developing in the following areas:

  a) Aquatic preserves
  b) Outstanding Florida Waters
  c) Class II waters

d) Areas approved or conditionally approved by the Division of Agricultural and Consumer Services (DACS) for shellfish harvesting, and
e) Other highly productive and/or unique habitats as determined by Fish and Wildlife Commission (FWC) based on vegetation and/or wildlife species.

- Consistency with Countywide Marina Siting Plan (if and when adopted by Pinellas County).

POLICY 2.3.4
No marina shall be constructed or expanded in areas determined by the Florida Fish and Wildlife Commission to be critical to the survival of the West Indian Manatee; (Objectives 9 and 10)

POLICY 2.3.5
The development of marinas shall be supported as a means of providing public water access to the extent that their development shall not adversely impact estuarine resources

POLICY 2.3.6
Evaluate standards for shoreline development in the Land Development Code to ensure compatibility with Objectives and Policies of Goal 2.

POLICY 2.3.7
Require the approval of the Pinellas County Water Navigation Board for docking facilities

POLICY 2.3.8
Forward copies of development proposals that may adversely impact environmentally sensitive areas in the Coastal Planning Area to other affected jurisdictions and agencies such as SWFWMD, Army Corps. of Engineering, FDEP, FWC, Pinellas County Water Navigation Board, and Tampa Bay Regional Planning Council

POLICY 2.3.9
Require development proposals within the Coastal Planning Area to be reviewed for consistency with the Pinellas County Comprehensive Land Use Plan

POLICY 2.3.10
Coordinate development proposals in the Coastal Planning Area with the Aquatic preserve policies of the Florida Department of Environmental Protection by requiring a copy of the development plan to be forwarded to FDEP whenever Aquatic preserves are affected

OBJECTIVE 2.4
Prioritize City owned right-of-way access to the shoreline based on compatibility with surrounding neighborhoods and environmental characteristics and categorize them for increased access or use based on the findings for all 23 rights-of-way identified in Section II.D.4 (g).

POLICY 2.4.1
Prohibit the vacating of all existing public rights-of-way, easements, and other dedications that provide access to the shoreline where increased accessibility is identified by the results of the study referenced by the associated objective, and maintain public access to other access points such as bridges, catwalks, beaches, etc.;

OBJECTIVE 2.5
Coordinate prioritization of shoreline uses with the requirements of the Historic Element

POLICY 2.5.1
Implement the recommendations of the Historic Element;

POLICY 2.5.2
To the maximum extent supported by stakeholders, implement cultural district / design guidelines for the Sponge Docks.

OBJECTIVE 2.6
Implement the level of service standards found in the Transportation Element, Recreation/Open Space, Sanitary Sewer, Potable Water, Drainage, and Solid Waste Elements;

POLICY 2.6.1
Comply with the infrastructure and funding recommendations of the Transportation Element, Recreation/Open Space, Sanitary Sewer, Drainage, Potable Water, Solid Waste, and Capital Improvement Elements

GOAL 3.0
Protect human life and limit public expenditures in areas subject to destruction by natural disasters and sea level rise.

OBJECTIVE 3.1
Restrict use of public expenditures in the Coastal High Hazard Area to the following:

- Maintenance and purchase of public open space
- Drainage improvements
- Elimination of existing septic systems
- Upgrading of existing collectors for evacuation purposes if necessary

- Post-disaster repair / replacement of existing public roadways and utilities

POLICY 3.1.1
Define the Coastal High Hazard Area as "the area defined by the Sea, Lake and Overland Surges from Hurricanes (SLOSH) model to be inundated from a category one hurricane" as reflected in the most recent Regional Evacuation Storm Tide Atlas.

POLICY 3.1.2
Restrict public investments such as roads, water, and sewer infrastructure, which would subsidize new private development in the Coastal High Hazard Area.

POLICY 3.1.3
The City shall consider the most current and credible sea level rise data when planning for infrastructure and capital improvement expenditures in the Coastal High Hazard Area.

POLICY 3.1.4
The City shall limit development within High Hazard Coastal Areas with dedicated City funds to the following conditions: those which are in need of stormwater improvements, those in need of restoration of natural resources, or existing public facilities in need of restoration or maintenance.

POLICY 3.1.5
Strategies for preparing for sea level rise, such as increasing road surface elevation standards, subsurface stabilization, stormwater management and drainage, and adjustment of bridge heights to allow for navigation, should be collectively assessed and implemented where appropriate.

OBJECTIVE 3.2
Achieve a Level of Service standard of 16 hours for an out of county evacuation for a Category 5 storm event:

POLICY 3.2.1
Restrict future land use density increases on vacant parcels in evacuation Level A to a maximum of 5 du/acre where shelter space is unavailable unless an acceptable mitigation plan can be implemented <u>in coordination with Pinellas County Emergency Management.</u>

POLICY 3.2.2
Provide early notice that evacuees leave the City entirely during storm preparation

POLICY 3.2.3
Restrict the development of new nursing facilities, hospitals and residential living facilities (ACLF's) with greater than 15 residents, in evacuation Levels A and B

POLICY 3.2.4
New mobile home parks shall provide on-site shelter space at the ratio of 10 to 20 square feet per park resident. Require other developments which choose to provide on-site shelter space to utilize the 10 to 20 square foot ratio per resident projected to seek public shelter. Twenty (20) square feet per resident projected to seek public shelter should be utilized where feasible, and shall be required at the time this standard is adopted locally by Pinellas County and the American Red Cross. The City shall coordinate with the Pinellas County Metropolitan Planning Organization during preparation of the Transportation Improvement Plan in order to schedule improvements to hurricane evacuation routes within Tarpon Springs

POLICY 3.2.5
The City shall continue to increase public awareness concerning the need for early evacuation from hurricanes in order to reduce or maintain hurricane evacuation times

POLICY 3.2.6
All hurricane evacuation routes shall be clearly posted within the City of Tarpon Springs

POLICY 3.2.7
The Tarpon Springs Fire Department shall implement a public awareness campaign by meeting with local civic groups, mobile home parks, convalescent centers, and/or other public and private organizations and groups, to discuss hurricane situations and/or procedures

POLICY 3.2.8
The Tarpon Springs Fire Department will update the existing Emergency Management Implementation Guide on an annual basis

POLICY 3.2.9
The City of Tarpon Springs shall give first priority to any available funds for road/traffic improvements that can improve evacuation level of service to new or existing hurricane evacuation routes.

OBJECTIVE 3.3
Participate in the Pinellas County Post Disaster Redevelopment Plan and other relevant emergency management resources to implement hazard mitigation measures to reduce the exposure of human life and public and private property to natural hazards including high tide events, storm surge, flash floods, stormwater runoff, and the related impacts of sea level rise.

POLICY 3.3.1
Comply with FEMA regulations

POLICY 3.3.2
Comply with the hazard mitigation annex of the Local Peacetime Emergency Plan and any applicable existing interagency hazard mitigation reports at the discretion of the Board of Commissioners.

POLICY 3.3.3
Consult with Tampa Bay Regional Planning Council to assist in development of a Post Disaster Redevelopment Plan by 2009.

POLICY 3.3.4
Require the removal, relocation or structural modification of any infrastructure that experiences repeated storm damage

POLICY 3.3.5
Coordinate with and participate in the 2007 update of the County Post Disaster Redevelopment Plan

POLICY 3.3.6
The City shall continue to monitor all current and credible sea level rise data and potential impacts of sea level rise on coastal system natural resources. Based on this data, the City shall evaluate and update the resource protection standards of the Land Development Code and the Comprehensive Plan as necessary, to protect and maintain natural features in areas of flood hazard and to reduce flood risk in coastal areas.

POLICY 3.3.7
The City will collaborate with the state and **will continue to participate in the Tampa Bay Regional Planning Council's One Bay Initiative** to develop strategies for responding to sea-level rise, including consideration of the effects of sea-level rise on potable water sources, saltwater intrusion, septic systems, wastewater treatment facilities and the water table.

POLICY 3.3.8:
Through implementation of the Comprehensive Zoning and Land Development Code, continue to ensure that development and redevelopment in the City will be consistent with or more stringent than the flood-resistant construction requirements in the Florida Building Code and applicable floodplain management regulations set forth in 44 C.F.R. part 60 including floodproofing and storm surge protection.

POLICY 3.3.9:
The City will continue to participate in the National Flood Insurance Program Community Rating System administered by the Federal

Emergency Management Agency **(FEMA) to reduce flood risk in coastal areas, to remove coastal real property from flood hazard areas as established by FEMA, to reduce losses due to flooding and claims made under flood insurance policies, and** to achieve flood insurance premium discounts for it City residents.

Policy 3.3.10
New development, redevelopment, and infrastructure in vulnerable areas shall use best flood prevention/mitigation practices to address the impacts of sea level rise.

OBJECTIVE 3.4
Direct population concentrations away from known or predicted coastal high hazard areas.

POLICY 3.4.1
Restrict the infill of vacant parcels in the Coastal High Hazard Area to 5 dwelling units per acre when a shelter deficit is demonstrated.

POLICY 3.4.2
Implement a policy of "no net increase" in residential density within the Coastal High Hazard Area, taking into account the cumulative effects of all previous land use amendments affecting residential density within the CHHA, as most currently defined. A tracking mechanism to implement this policy shall be implemented within the Future Land Use Element.

POLICY 3..4.3
Implement bonus densities tied to transfers of development rights for properties located within the Coastal High Hazard Area to property not located within the Coastal High Hazard Area.

POLICY 3.4.4
Require the removal, relocation or structural modification in accordance with up to date codes of any structure damaged more than 50% of its appraised value during a coastal storm.

POLICY 3.4.5
Current and credible sea level rise data should be considered when evaluating future land use amendment applications.

OBJECTIVE 3.6
Utilize the Emergency Management Implementation Guide as a basis to establish procedures for conducting post event damage assessments

POLICY 3.6.1
To establish damage assessment teams to consist of the Building Director, Fire Chief and other qualified City of Tarpon Springs personnel.

POLICY 3.6.2
Coordinate damage assessment and recovery operations with Pinellas County Emergency Management

POLICY 3.6.3
Institute immediate emergency repair and emergency cleanup actions needed to protect the public health and safety following a natural disaster

POLICY 3.6.4
Institute long range restoration activities following the actions in accordance with the Pinellas County Post Disaster Redevelopment Plan as adopted

OBJECTIVE 3.7
Ensure safe sheltering for all residents unable or unwilling to evacuate including those who are unable or unwilling to evacuate due to pets.

POLICY 3.7.1
Coordinate with Pinellas County Emergency Management and Pinellas County Schools when new facilities are constructed that may be utilized for shelter space in the event of an evacuation.

POLICY 3.7.2
Provide early and annual notification to residents of the availability of pet friendly shelters within Pinellas County and requirements to pre-register at the beginning of hurricane season.

Policy 3.7.3:
Coordinate with Pinellas County Emergency Management to secure funding to harden the First United Methodist Church ("the Church") structure located at 501 E. Tarpon Avenue and re-establish this site as a certified hurricane evacuation shelter. Funding sources shall be evaluated annually for inclusion in the annual update to the City's Capital Improvements Element (CIE). All such efforts are conditioned upon the Churches continued cooperation and reasonable to become and remain a certified hurricane evacuation shelter. The City shall in good faith work diligently to obtain the cooperation of the church.

VII. CONSERVATION GOALS, OBJECTIVES, AND POLICIES

GOAL 1. 0
It is the Goal of the City of Tarpon Springs to preserve, conserve, protect, and manage the City's wildlife, including endangered and threatened species and species of special concern, marine resources, natural resources, and energy resources;

OBJECTIVE 1.1
Require tree plantings, replacements, and buffers in the Land Development Regulation Code to improve air quality;

POLICY 1.1.1
Reduce the potential for automobile emissions through the following land development activities:

a) multi-use zoning techniques
b) buffer strip planting along roadway frontages
c) pedestrian access
d) bicycle access
e) accommodation for public transit

OBJECTIVE 1.2
Enforce vehicle emission standards in conjunction with Pinellas County;

POLICY 1.2.1
Continue to coordinate with abutting local governments in accordance with Policies of the Intergovernmental Coordination Element

OBJECTIVE 1.3
Restrict land development which degrades the City's surface and groundwater resources and do not comply with the water quality standards of SWFWMD, the Florida Department of Environmental Regulation, and Chapter 17-25;

POLICY 1.3.1
Regulate the unmonitored withdrawal of groundwater and coordinate the regulation of unmonitored groundwater withdrawal with the Water Management District (SWFWMD)

POLICY 1.3.2
Coordinate with Pasco County to monitor the development of the upper Anclote River watershed.

POLICY 1.3.3
Implement the policies of the Lake Tarpon Task Force as adopted by Pinellas County and the July 2001 Lake Tarpon SWIM Plan as adopted by SWFWMD.

POLICY 1.3.4
Restrict Land Use amendments that will adversely impact quantity and quality of water sources

POLICY 1.3.5
Enforce SWFWMD mandatory water restrictions during emergency situations or as otherwise adopted by SWFWMD

OBJECTIVE 1.4
Reduce the number of soil erosion activities

POLICY 1.4.1
Restrict off roading on relic sand dunes

POLICY 1.4.2
Monitor soil erosion problems during construction activities

POLICY 1.4.3
Require the utilization of soft shoreline stabilization techniques along the Gulf of Mexico, St. Joseph Sound, Anclote River and Bayou shorelines as an alternative to seawall construction (Figures 12a and 12b). Man-made canals and the historic seawall providing public access around Spring Bayou shall be exempt from this requirement.

POLICY 1.4.4
Require sites to be suitable in terms of soil types for the development proposed

POLICY 1.4.5
Restrict the use of fill and require the use of pilings in designated conservation areas

OBJECTIVE 1.5
Require the preservation of native vegetation during site development by implementing standards of the Land Development Code adopted by May, 1990

POLICY 1.5.1
Require the use of xeriscape and other water saving landscaping alternatives for new development adopted in the Land Development Code in May, 1990

POLICY 1.5.2
Require signage at boat ramps, marinas, channels, regarding the effect of poor boating practices on marine grass beds and manatees.

POLICY 1.5.3
Require archeological and environmental data as part of the development approval submittal package when property is identified in the historic element or the coastal element as potentially containing sensitive archaeological or environmental resources

OBJECTIVE 1.6
Conserve and preserve vegetative, wildlife and marine communities through the use of transfer of density rights in accordance with the Future Land Use Designation, flexible zoning techniques, tree protection, wetlands protection, and other regulations as established by the Land Development Code adopted in May 1990.

POLICY 1.6.1
Require use of the Planned Development performance zoning techniques to implement the clustering of uses as a mechanism to preserve open space and natural habitat areas.

POLICY 1.6.2
Utilize the transfer of development rights to protect areas identified as critical to providing critical habitat to protected wildlife species.

POLICY 1.6.3
Require the conservation and preservation of endangered and threatened species habitats as may be identified during environmental analysis of lands.

POLICY 1.6.4
To prohibit the destruction of threatened and endangered species through the protection of their habitat

POLICY 1.6.5
Designate properties eligible for acquisition through Federal, State, and Regional programs, including but not limited to the Conservation and Recreational Land Act (CARL); Save our Rivers Program (SOR); the Surface Water Improvement and Management Act (SWIM); and the Pinellas County Endangered Recreational Lands program;

POLICY 1.6.6
Preserve / conserve wetlands and areas of significant upland habitat as defined in Future Land Use Policy 1.1.12 in accordance with specific regulations related to wetlands protection, preservation of open space, planned development performance zoning, transfer of density/intensity rights, buffers and setbacks, tree protection, clustering of units within the least environmentally-sensitive areas, and other techniques adopted in the Land Development Code.

POLICY 1.6.7
Wetlands that are not designated as "Preservation" or "Recreation Open Space" on the Future Land Use Map shall require a future land use amendment to either of these two designations prior to issuance of any construction permits for adjacent upland development.

OBJECTIVE 1.7
Promote energy conservation through the use of incentives for solar power generation, green building standards, and preservation / renovation of existing viable structures (housing and commercial structures).

POLICY 1.7.1
By 2011, consider incentives for homeowners and businesses to install solar power/heating.

POLICY 1.7.2
Promote sustainable development by encouraging green housing that conserves natural resources and reduces monthly operating costs.

POLICY 1.7.3
By 2011, consider requirements or incentives in the form of density/intensity bonuses for LEED compliant projects.

POLICY 1.7.4
Ensure that Historic Preservation Design guidelines allow the rehabilitation of existing historic structures to utilize energy efficient materials as long as the historic integrity of the structure is maintained.

APPENDIX A

FIGURES

Pinellas County Area Map

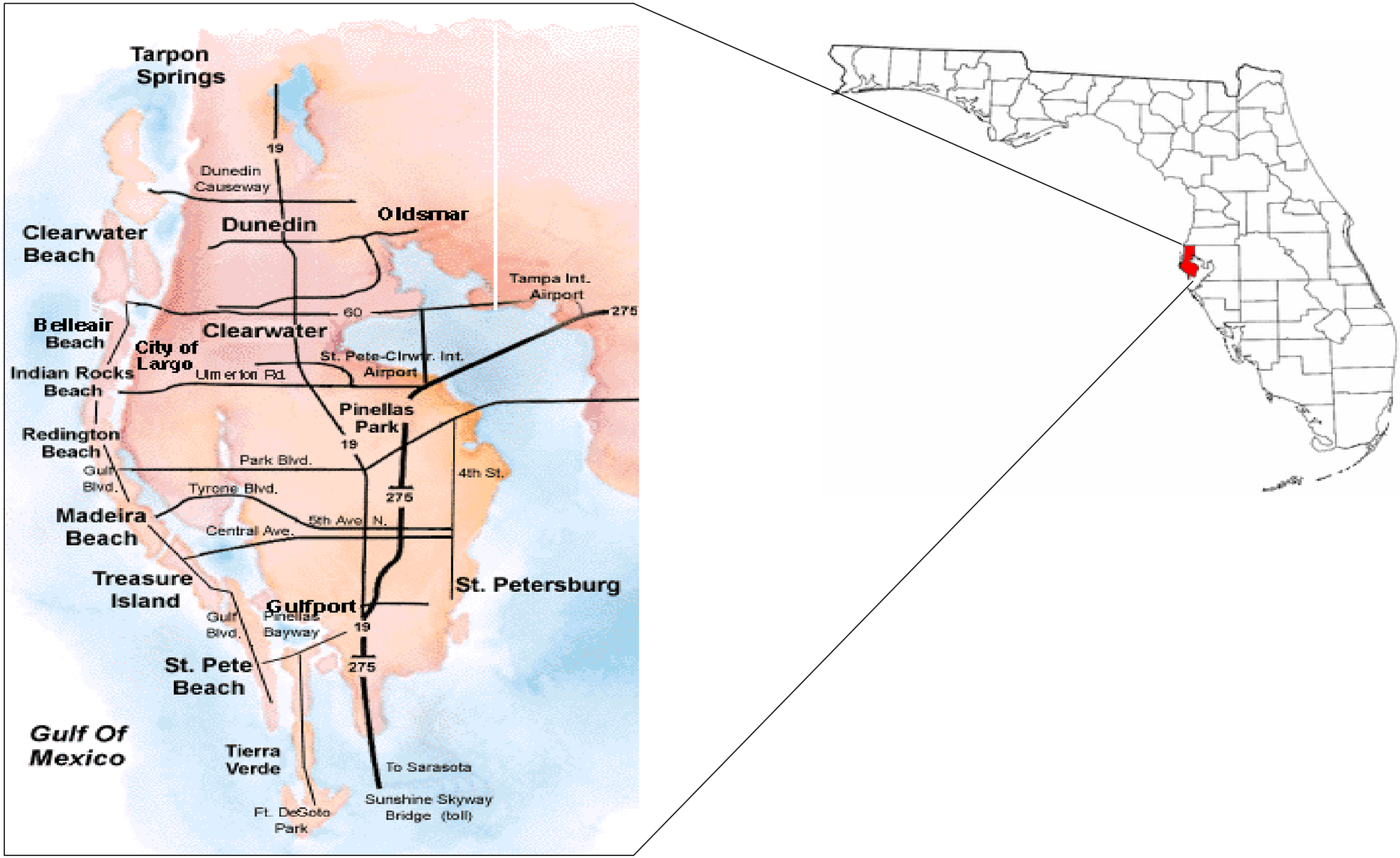


FIGURE 2 COASTAL & CONSERVATION ELEMENT

COASTAL PLANNING AREA

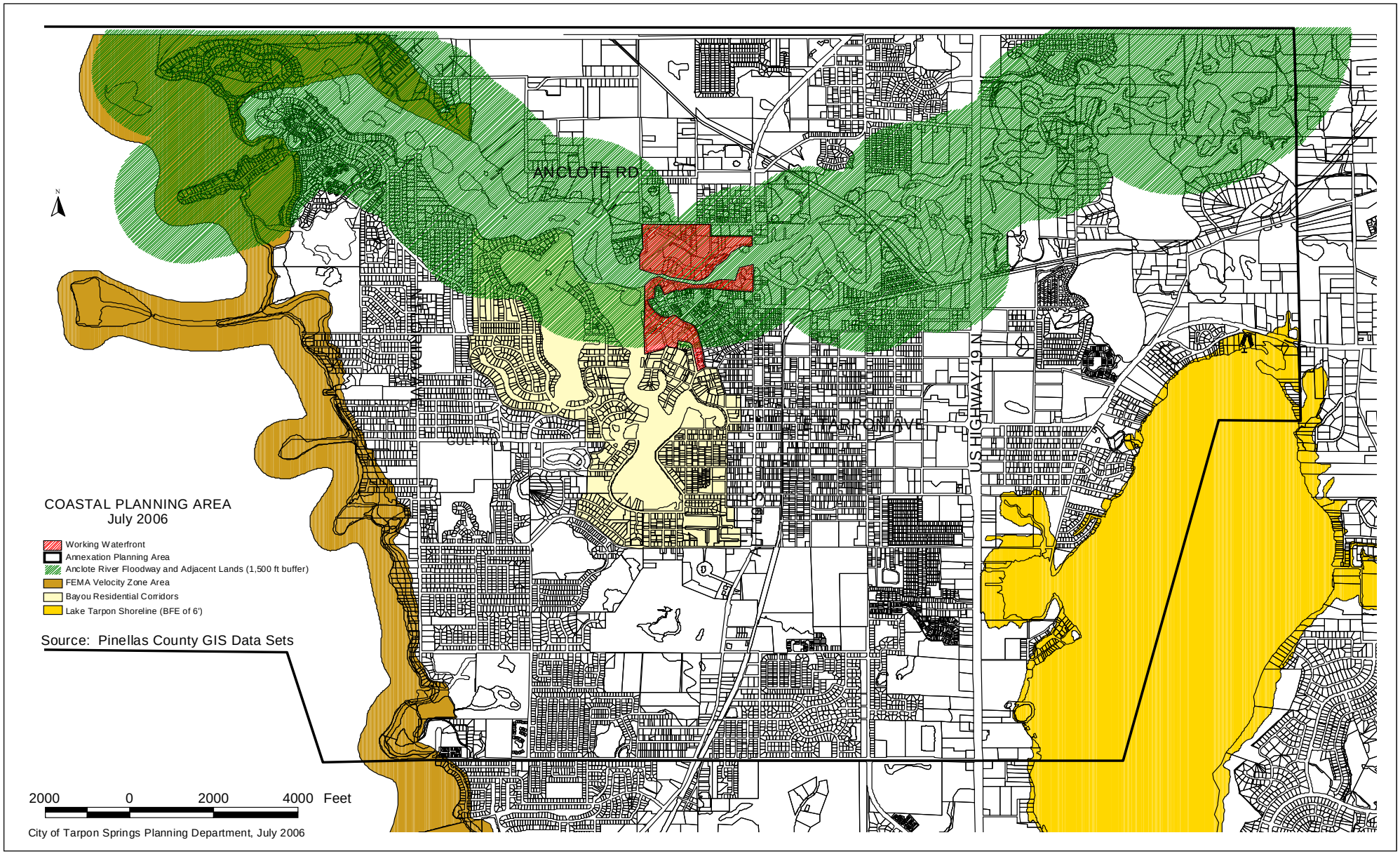


FIGURE 3 COASTAL & CONSERVATION ELEMENT

MOBILE HOME PARKS IN THE COASTAL PLANNING AREA

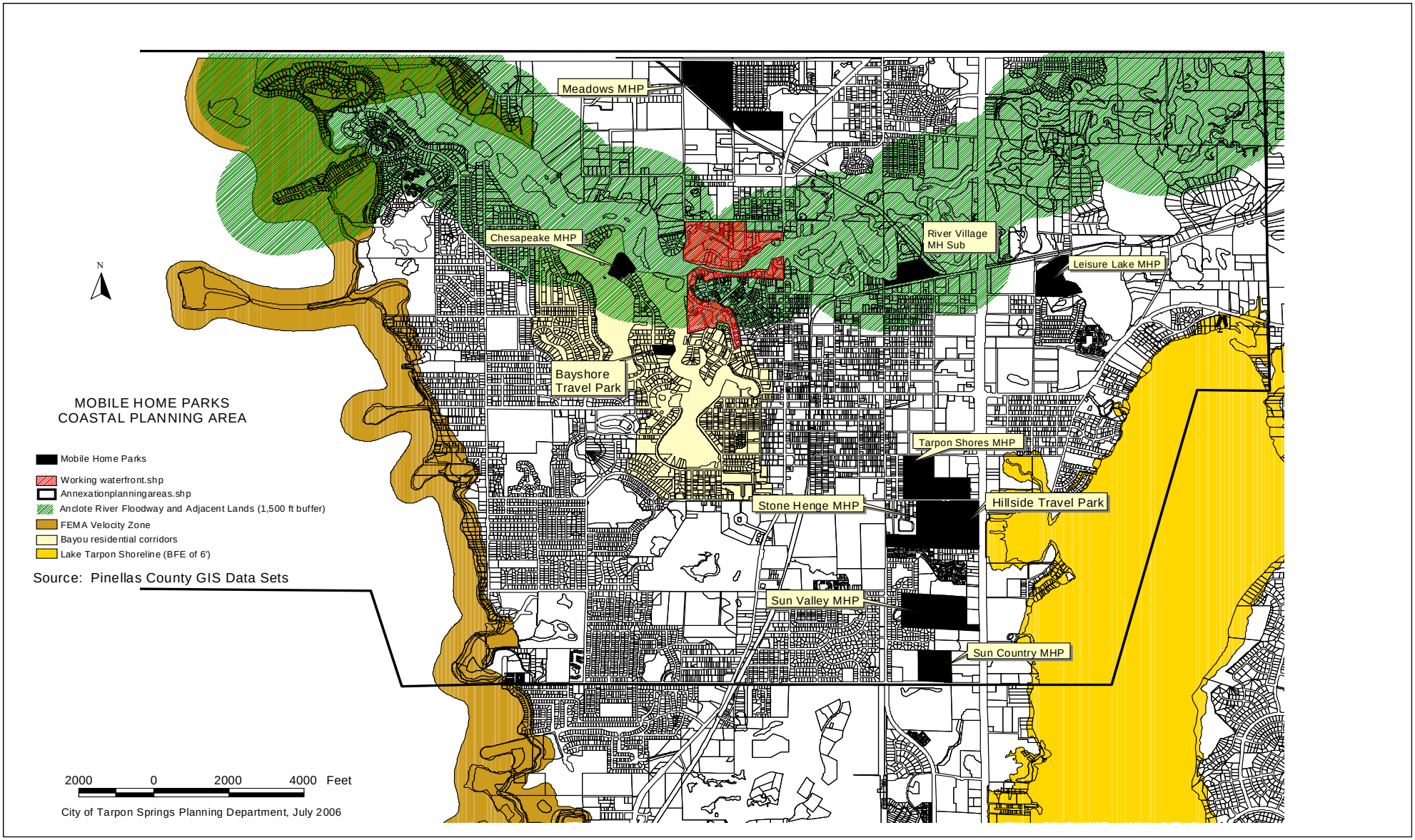


FIGURE 4 COASTAL & CONSERVATION ELEMENT

WATER DEPENDENT USES

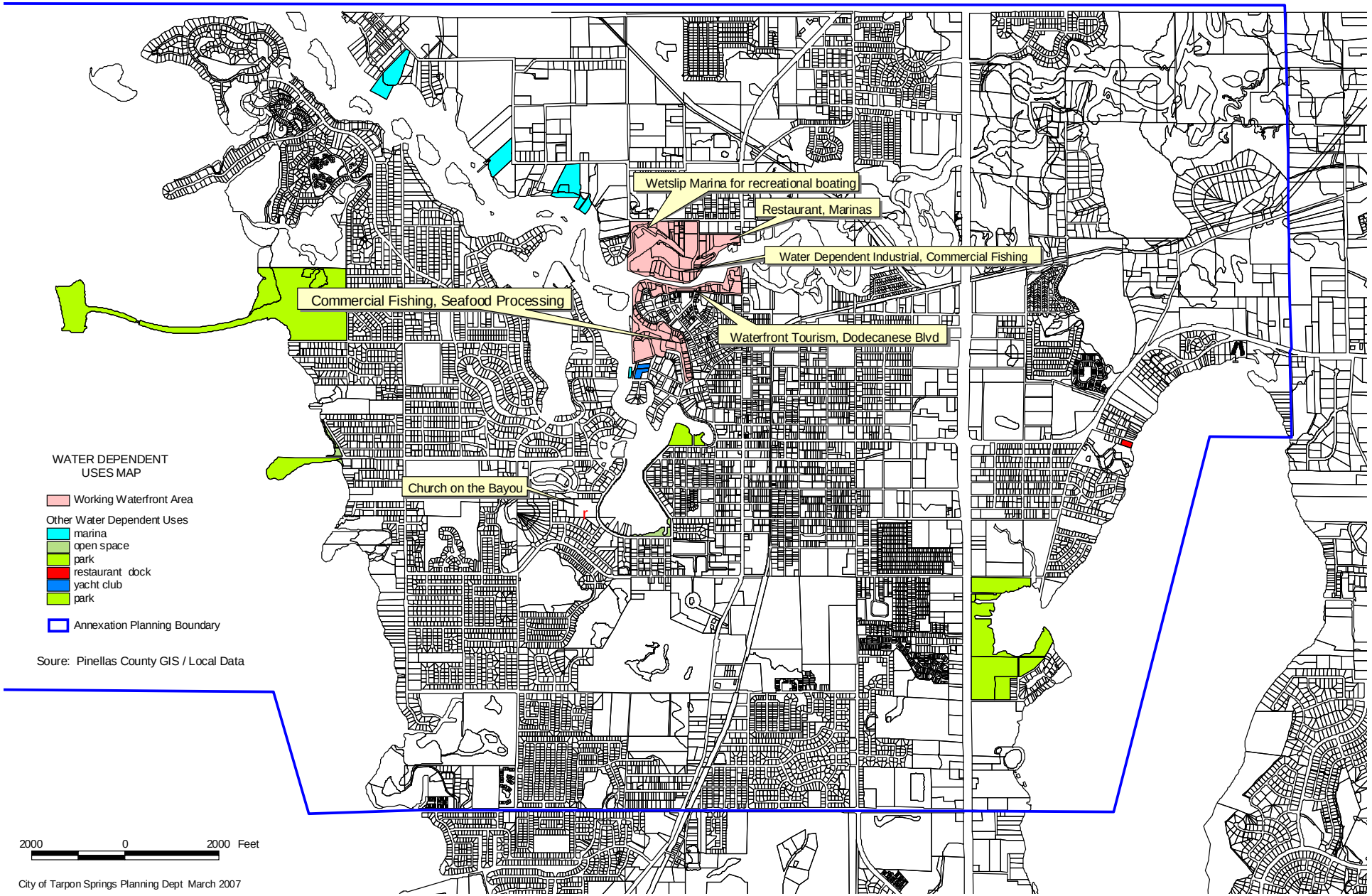
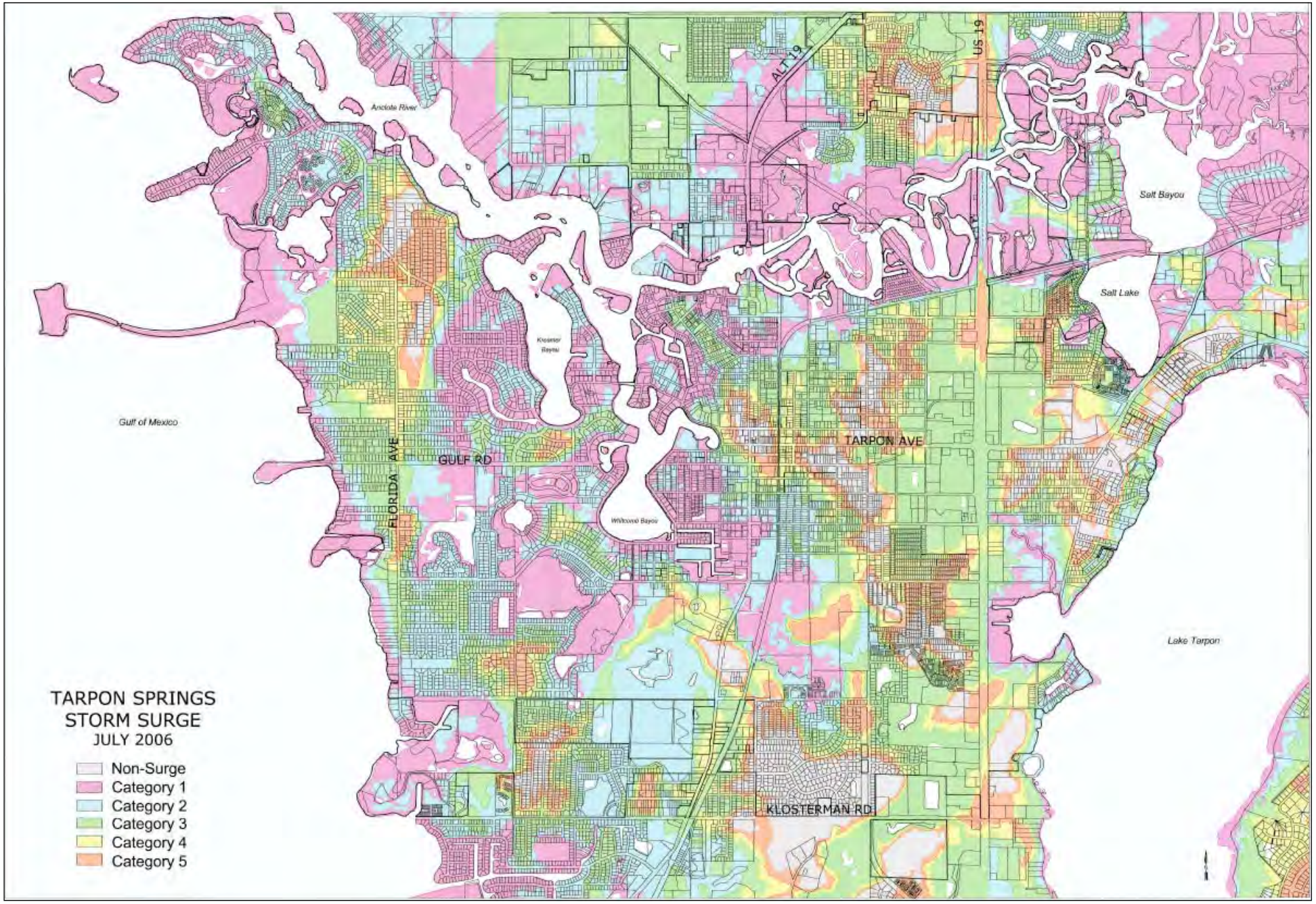


FIGURE 5 COASTAL & CONSERVATION ELEMENT

SLOSH MAP



SOURCE: PINELLAS COUNTY PLANNING DEPARTMENT

FIGURE 6 COASTAL & CONSERVATION ELEMENT

HURRICANE EVACUATION ROUTES

FIGURE 7 COASTAL & CONSERVATION ELEMENT

CONGREGATE CARE FACILITIES, COASTAL PLANNING AREA

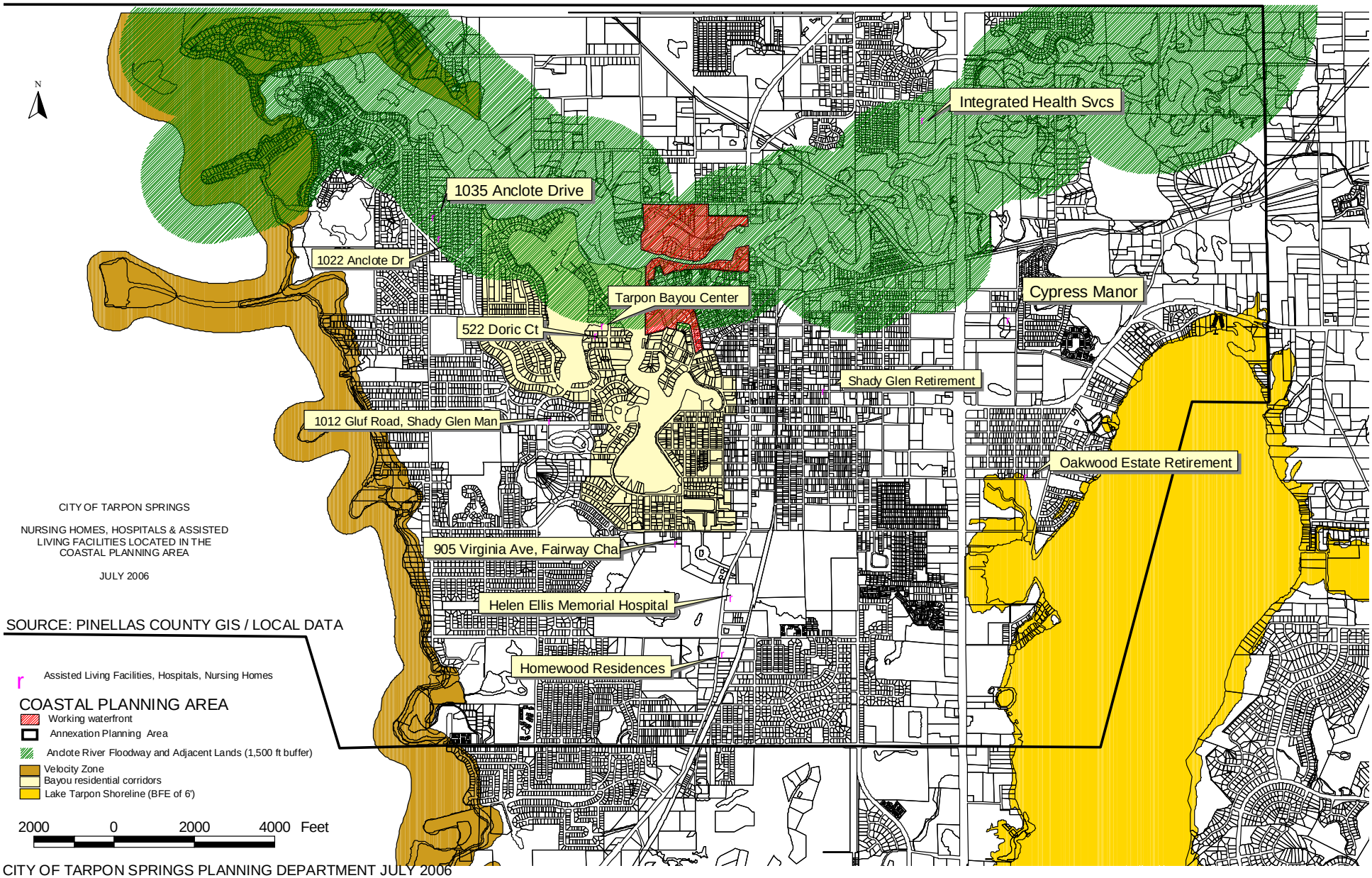


FIGURE 8 COASTAL & CONSERVATION ELEMENT

COASTAL HIGH HAZARD AREA

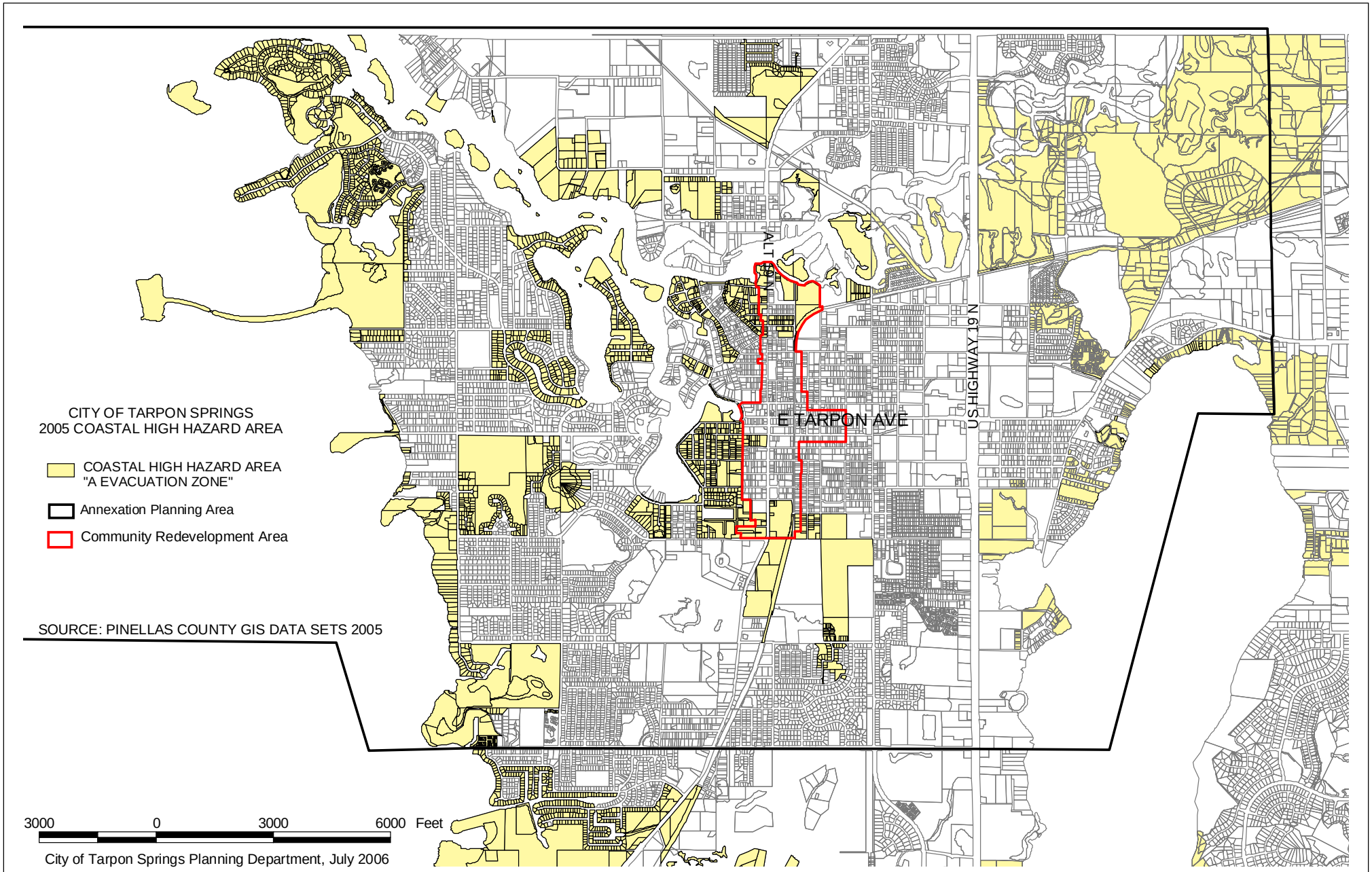


FIGURE 9 COASTAL & CONSERVATION ELEMENT

COASTAL HIGH HAZARD AREA, CURRENT LAND USE

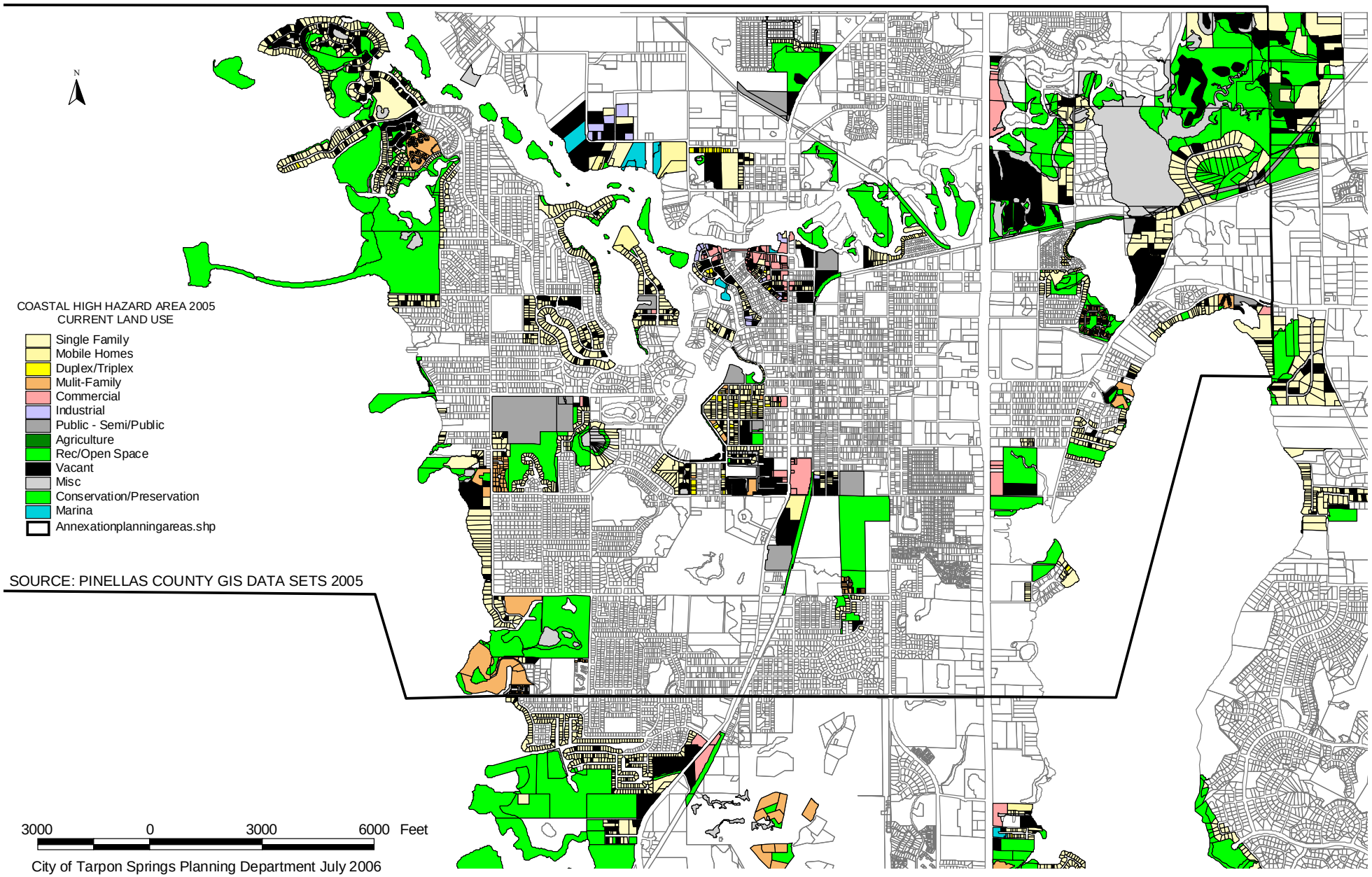


FIGURE 10 COASTAL & CONSERVATION ELEMENT

COASTAL HIGH HAZARD AREA, FUTURE LAND USE

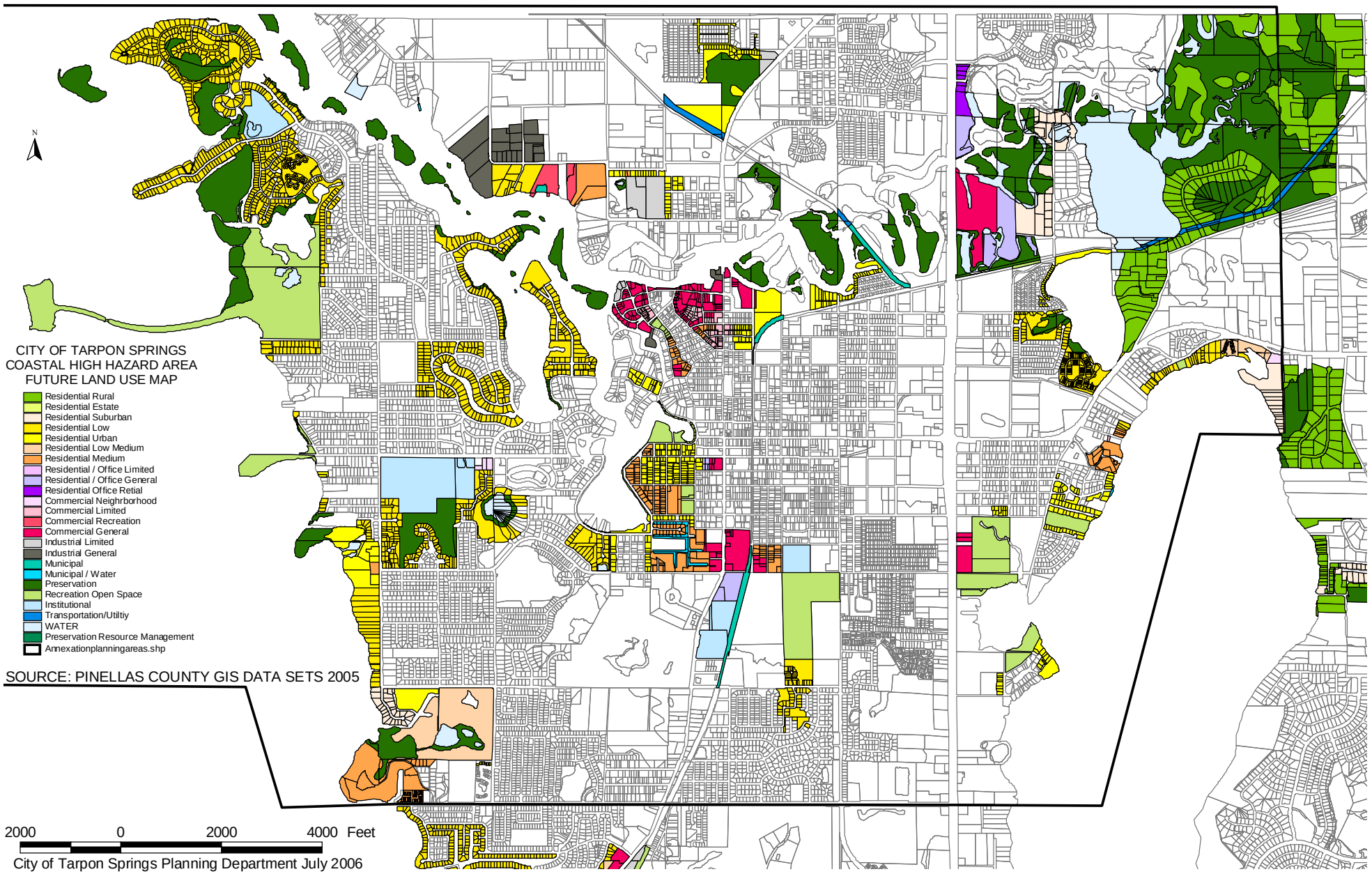
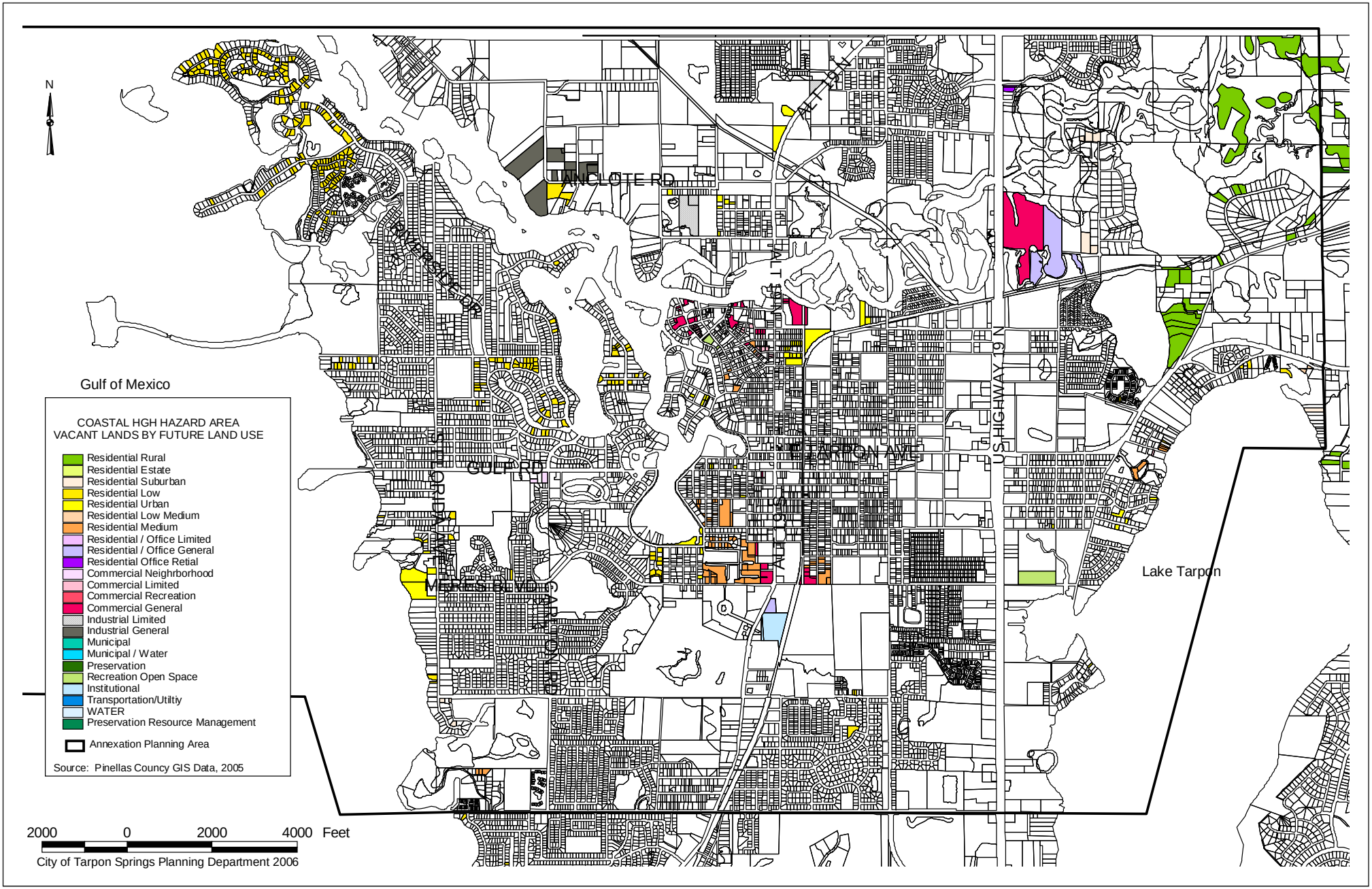
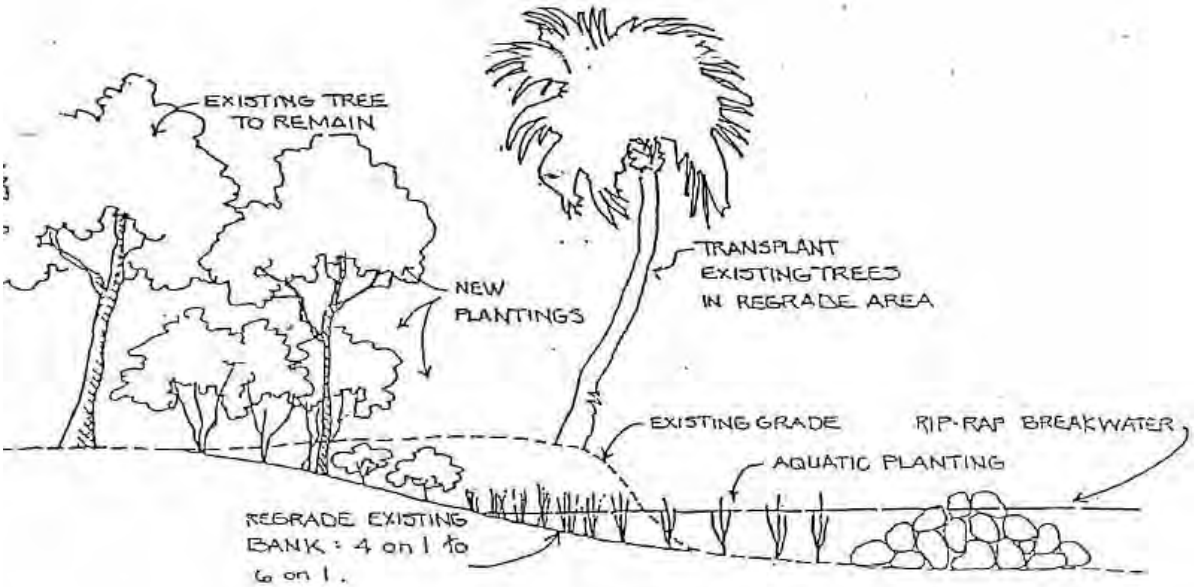


FIGURE 11 COASTAL & CONSERVATION ELEMENT

COASTAL HIGH HAZARD AREA, VACANT LANDS





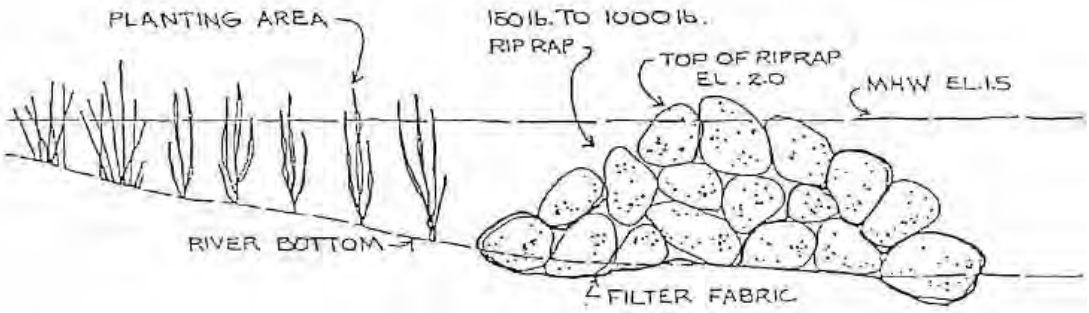


Figure 12 Diagrams of shoreline stabilization designs using vegetation and installation of riprap. Source: Mangrove Systems, Inc. 1987.

FIGURE 13 COASTAL & CONSERVATION ELEMENT

COASTAL HIGH HAZARD AREA, WATER & SEWER INFRASTRUCTURE

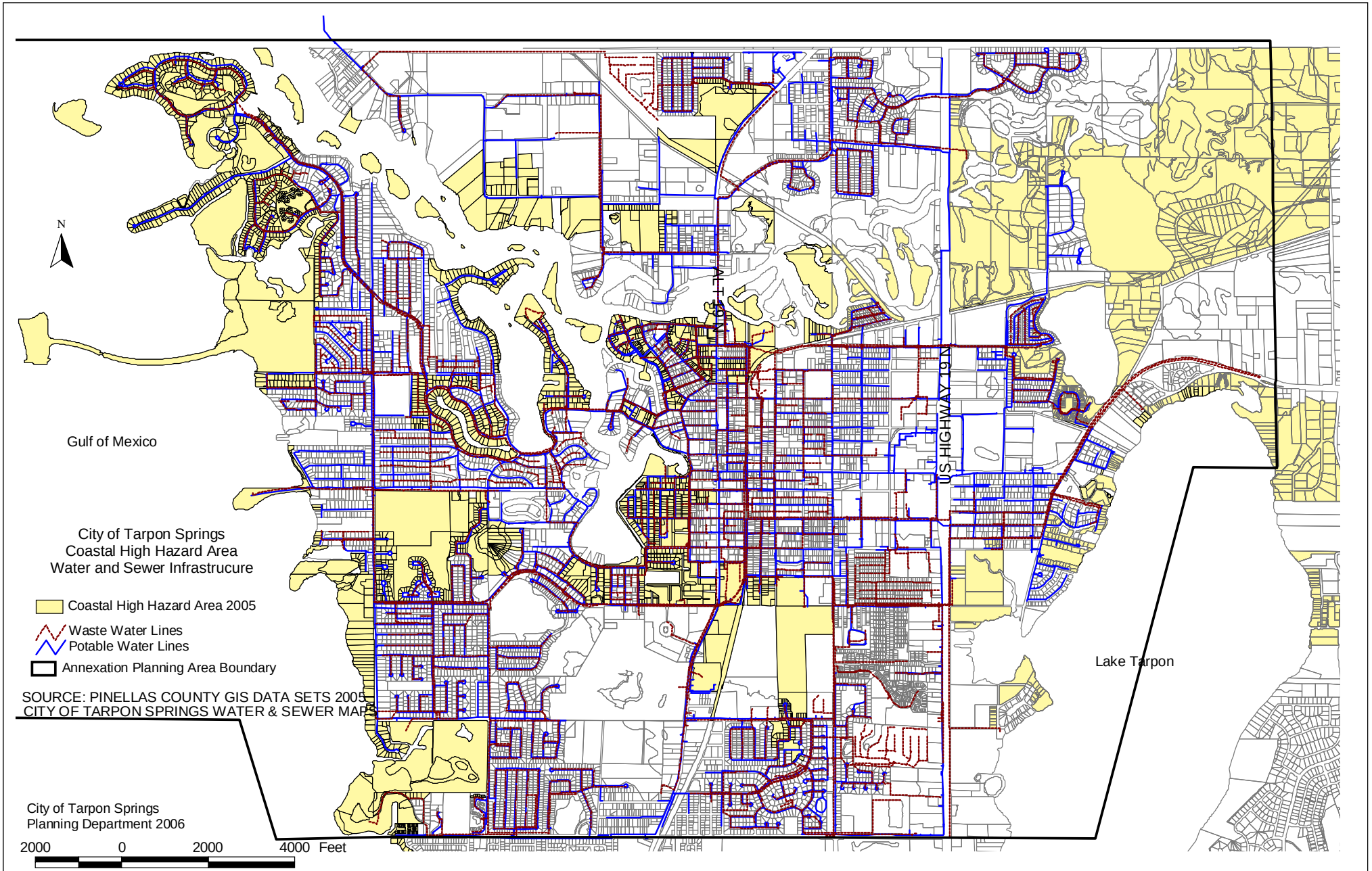


FIGURE 14 COASTAL & CONSERVATION ELEMENT

COASTAL HIGH HAZARD AREA, RE-CLAIMED WATER INFRASTRUCTURE

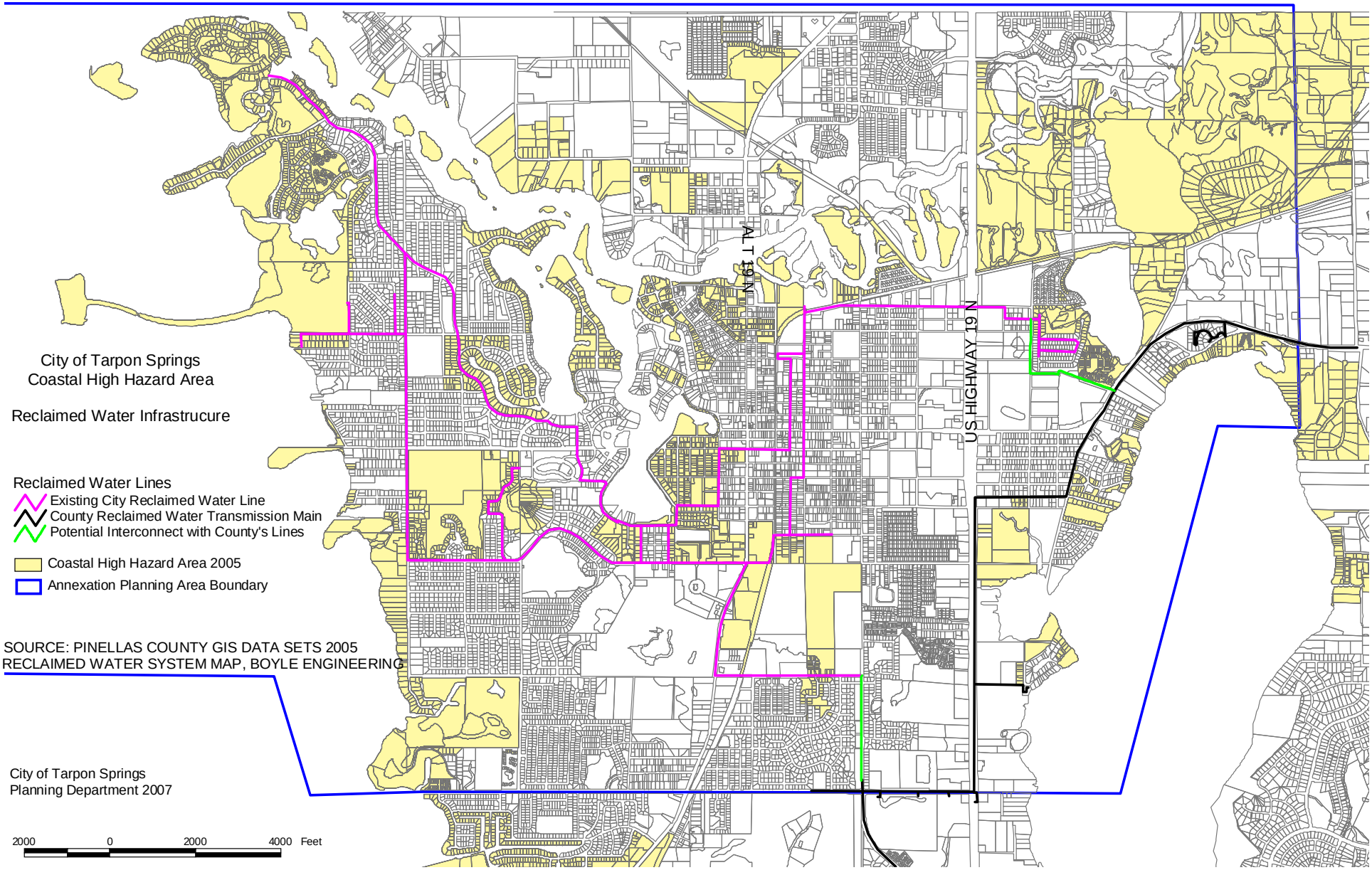


FIGURE 15 COASTAL & CONSERVATION ELEMENT

PUBLIC ACCESS POINTS TO WATER

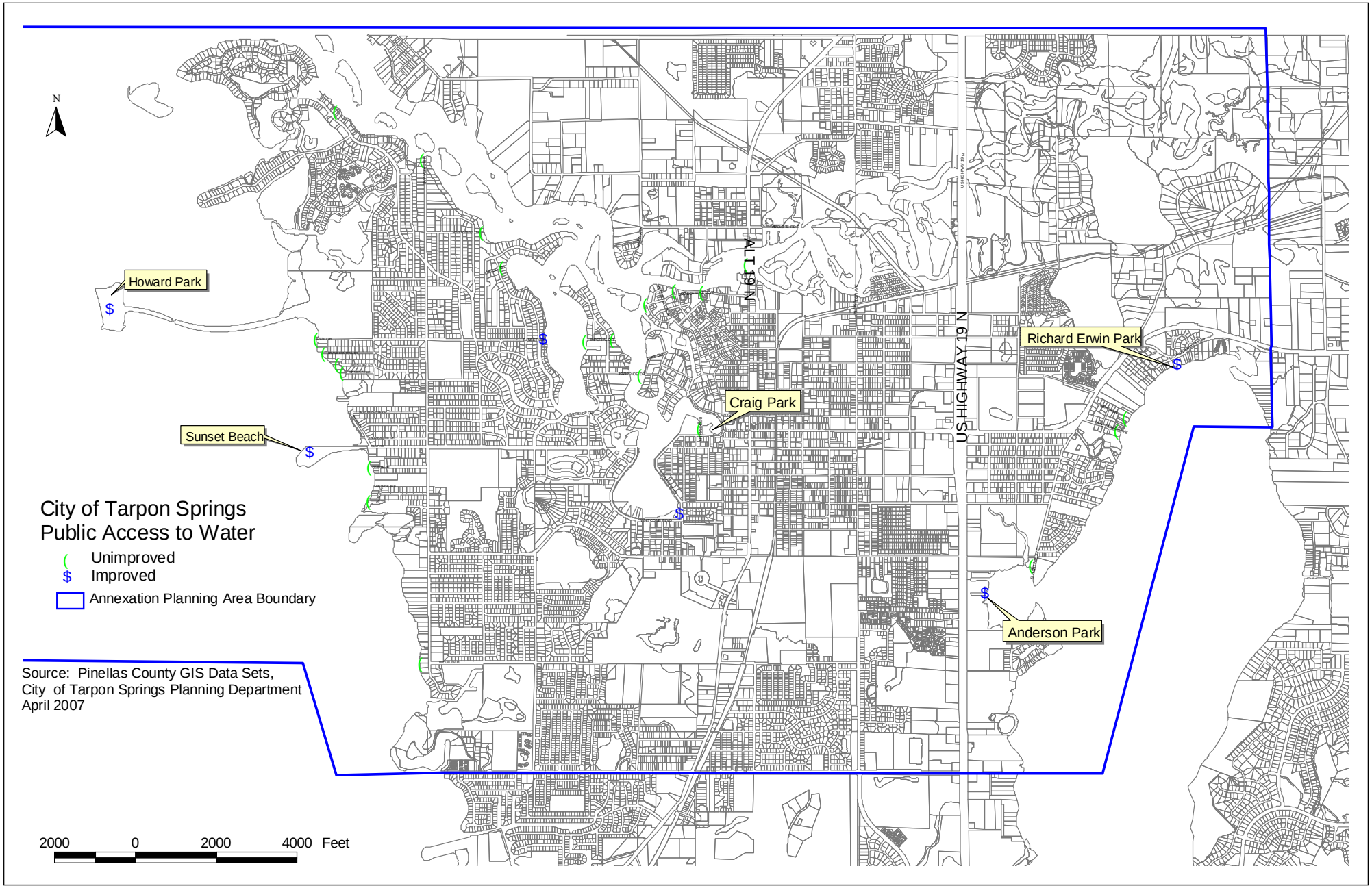


FIGURE 16 COASTAL & CONSERVATION ELEMENT

COASTAL PLANNING AREA, SEWER LINES

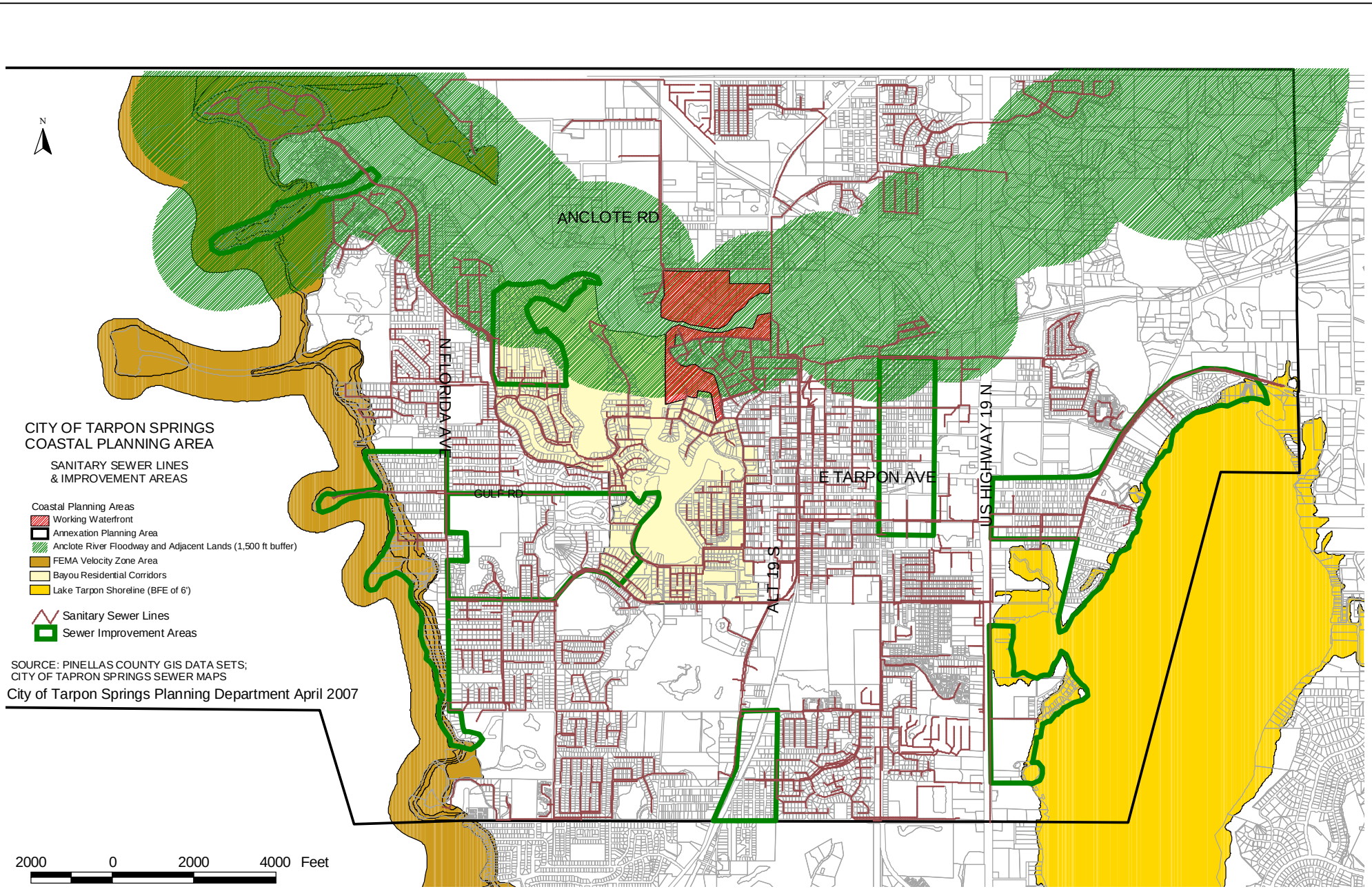


FIGURE 17 COASTAL & CONSERVATION ELEMENT

COASTAL PLANNING AREA, WATER LINES

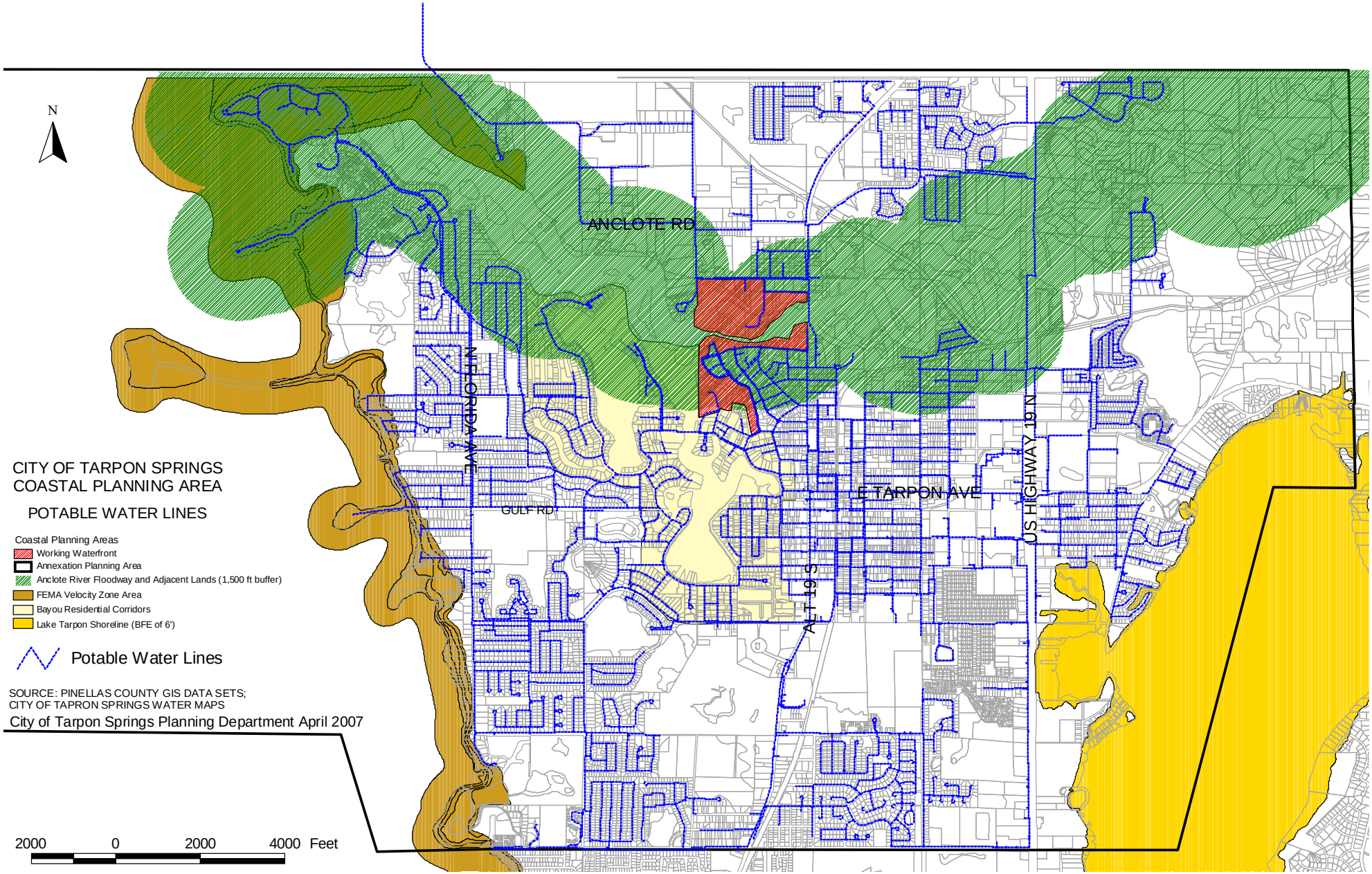


FIGURE 18 COASTAL & CONSERVATION ELEMENT

COASTAL PLANNING AREA, RECLAIMED WATER LINES

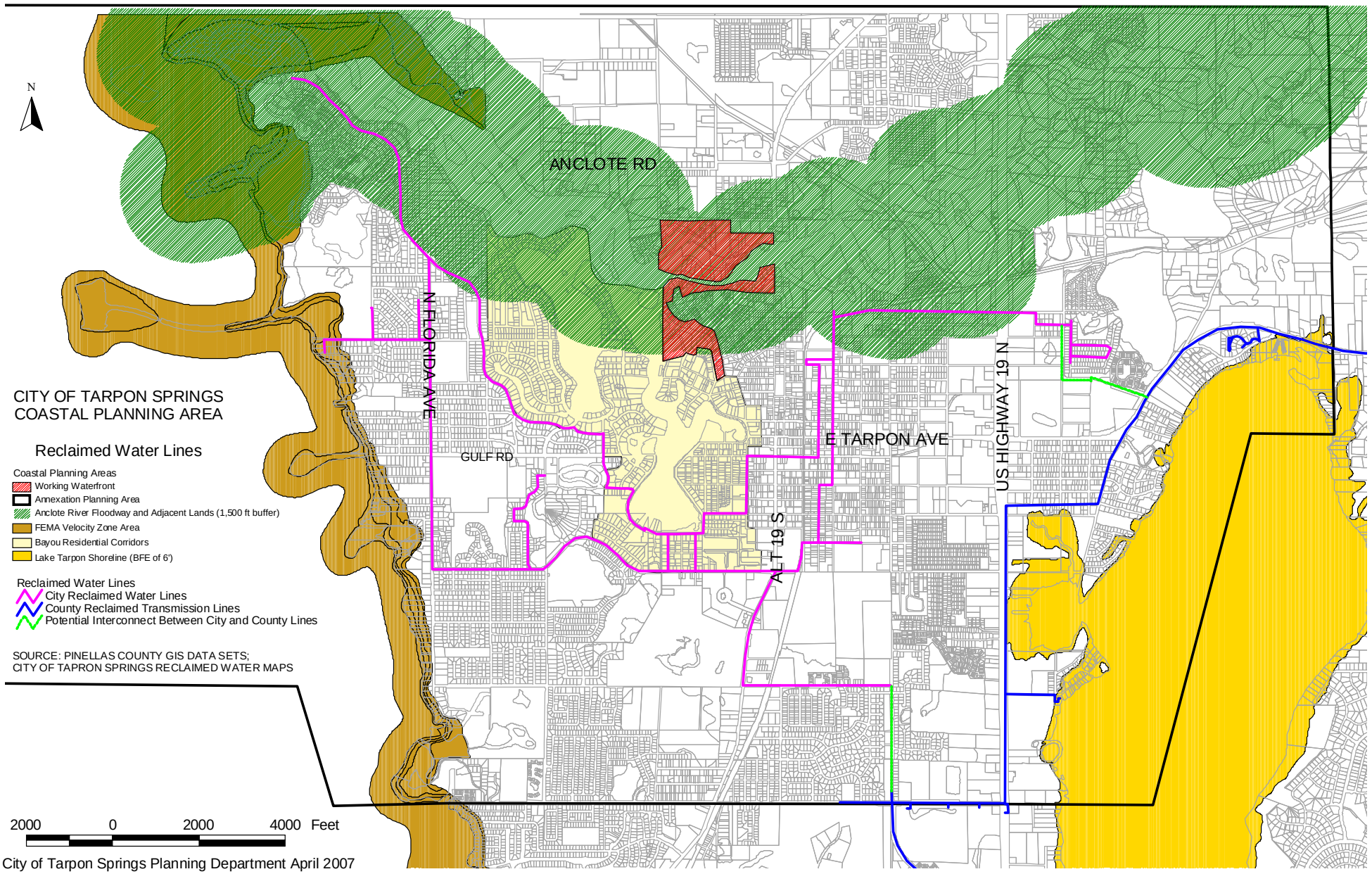


FIGURE 19 COASTAL & CONSERVATION ELEMENT

VEGETATIVE COVER, WILDLIFE HABITAT AND MARINE RESOURCES

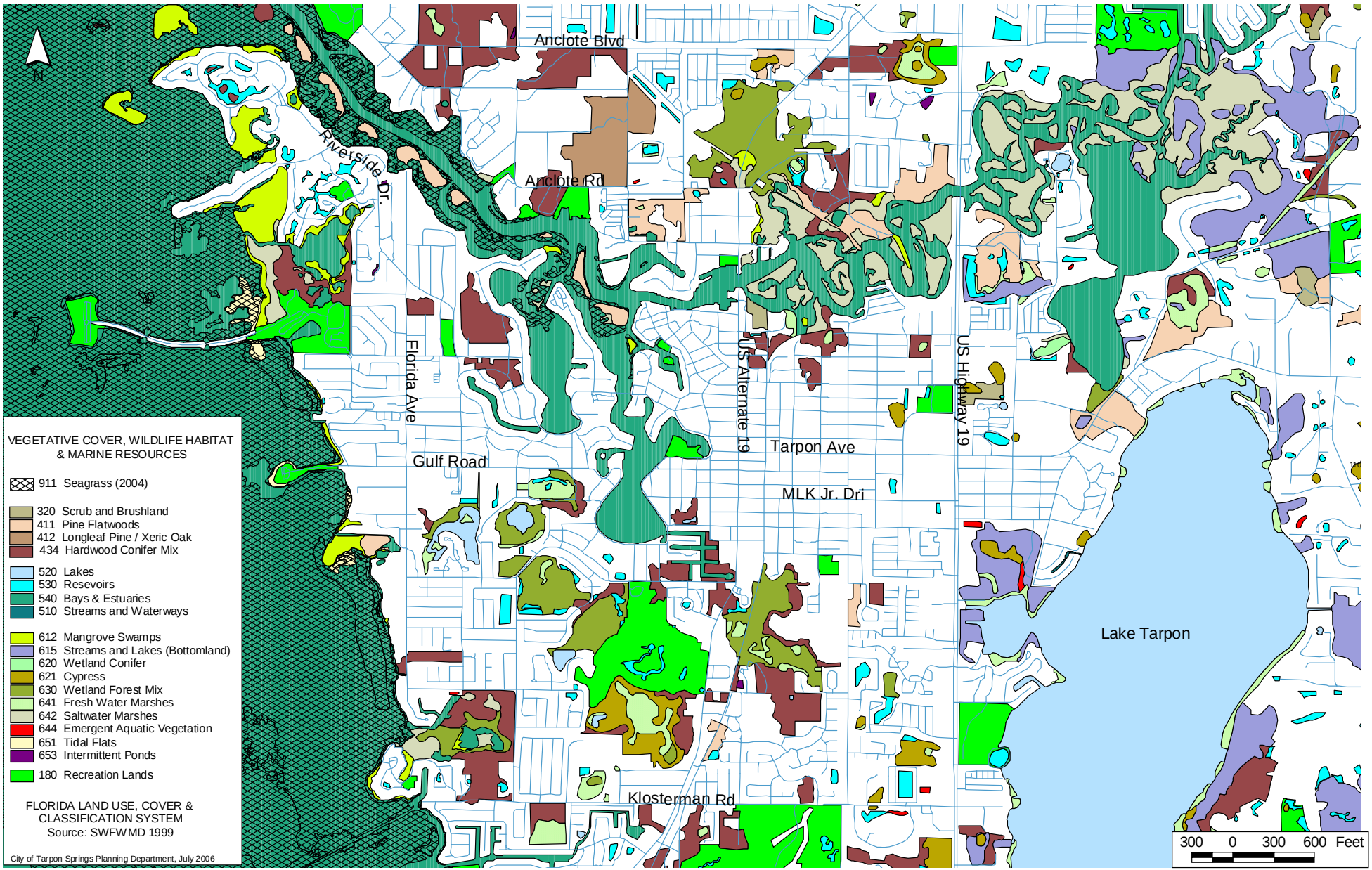


FIGURE 20 COASTAL & CONSERVATION ELEMENT

NATIONAL WETLANDS INVENTORY & SWFWMD LANDS

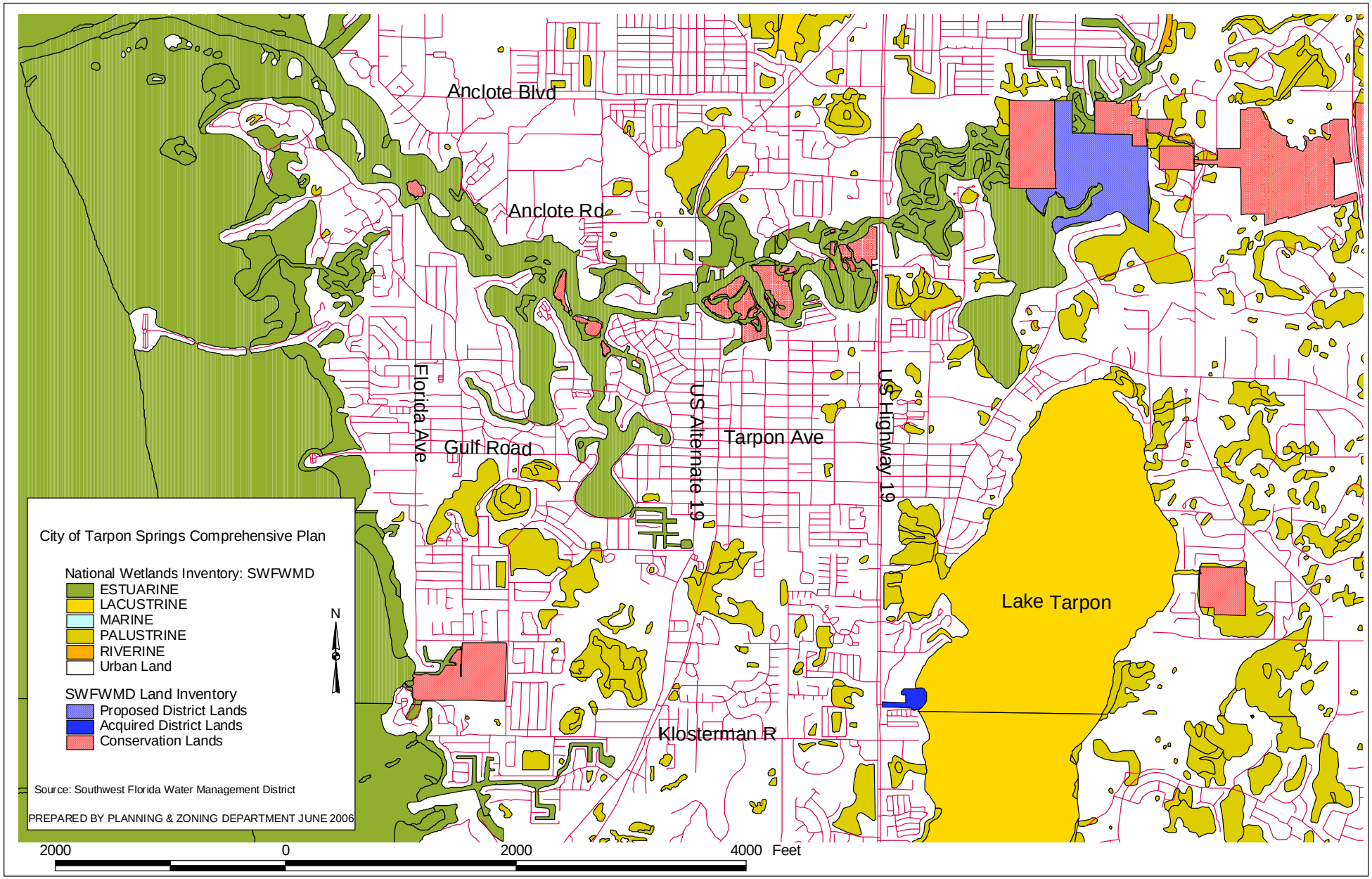


FIGURE 21 COASTAL & CONSERVATION ELEMENT

ANCLOTE RIVER AND SURROUNDING DRAINAGE BASINS / WATERSHEDS

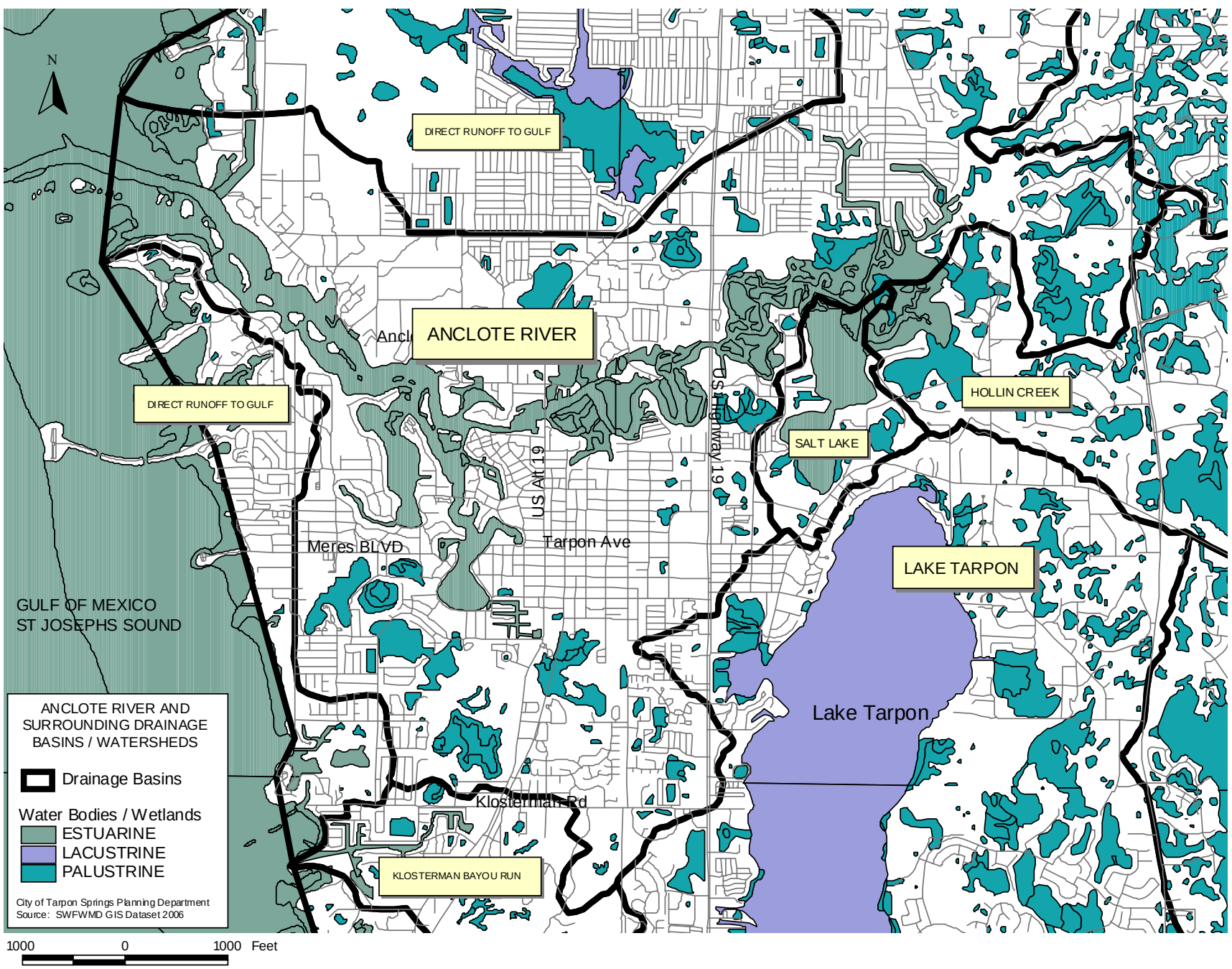
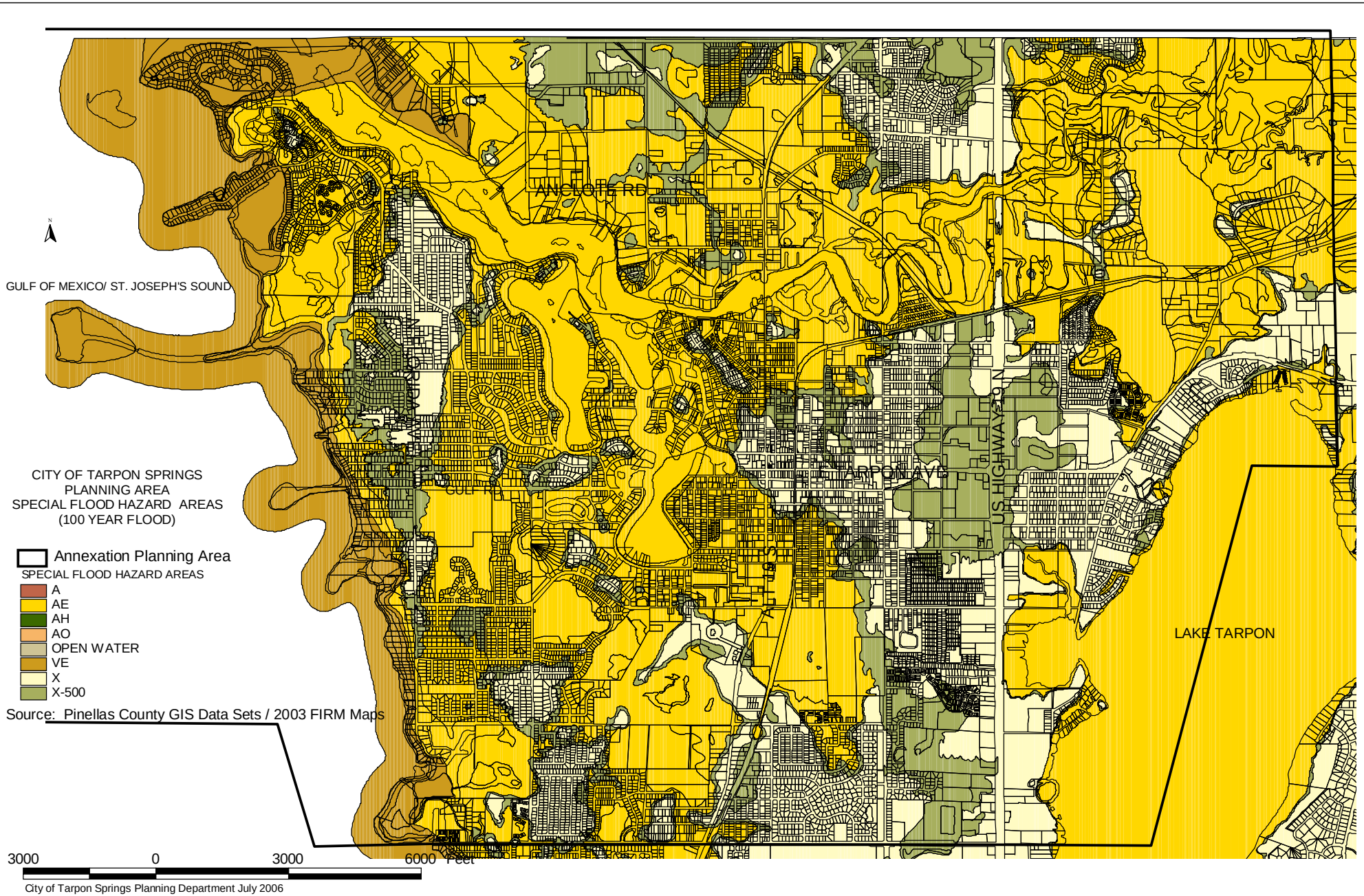


FIGURE 22 COASTAL & CONSERVATION ELEMENT

SPECIAL FLOOD HAZARD AREA MAP



APPENDIX B
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Biser, Kim. Fla. Dept. of Environmental Regulation; municipal point source discharges to Anclote River.

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APPENDIX C

Rule 9J-5 F.A.C. Coastal Planning Area Defined

Definitions

(18) "Coastal planning area" shall be an area of the local government's choosing when preparing and implementing all requirements of the coastal management element (except those requirements relating to hurricane evacuation, hazard mitigation, water quality, water quantity, estuarine pollution, or estuarine environmental quality); however, this area must encompass all of the following where they occur within the local government's jurisdiction: water and submerged lands of oceanic water bodies or estuarine water bodies; shorelines adjacent to oceanic waters or estuaries; coastal barriers; living marine resources; marine wetlands; water-dependent facilities or water-related facilities on oceanic or estuarine waters; or public access facilities to oceanic beaches or estuarine shorelines; and all lands adjacent to such occurrences where development activities would impact the integrity or quality of the above. When preparing and implementing the hurricane evacuation or hazard mitigation requirements of the coastal management element, the coastal planning area shall be those portions of the local government's jurisdiction which lie in the hurricane vulnerability zone. When preparing and implementing the requirements of the coastal management element concerning water quality, water quantity, estuarine pollution, or estuarine environmental quality, the coastal planning area shall be all occurrences within the local government's jurisdiction of oceanic waters or estuarine waters.

APPENDIX D

FISHES, AMPHIBIANS, REPTILES, BIRDS, AND, MAMMALS
TABLES 1, 2, 3, and 4

Species and Wildlife

Table 1. Fishes

Fishes observed or expected to occur in the Tarpon Springs area. Source: Proceedings, Tampa Bay Area Scientific Information Symposium 1985. Key: M = marine; E = estuarine; F = freshwater; M-E, F-E = utilize both habitats or migratory, using estuary during some part of the life cycle.

SCIENTIFIC NAME	COMMON NAME	HABITAT
Carcharhinus acronotus	blacknose shark	M
Carcharhinus limbatus	blacktip shark	M-E
Rhizopionodon terranovae	Atlantic sharpnose shark	M
Sphyrna mokarran	great hammerhead	M
Sphyrna tiburo	bonnethead	M-E
Dasyatis americana	southern stingray	M-E
Dasyatis sabina	Atlantic stingray	M-E
Dasyatis sayi	bluntnose stingray	M-E
Gymnura micrura	smooth butterfly ray	M-E
Aetobatus narinari	spotted eable ray	M
Rhinoptera bonasus	cownose ray	M-E
Lepisosteus osseus	longnose gar	F
Lepisosteus platyrhincus	Florida gar	F
Amia calva	bowfin	F
Elops saurus	ladyfish	M-E
Megalops atlanticus	tarpon	M-E
Myrophis punctatus	speckled worm eel	M-E
Ophichthus gomesi	shrimp eel	M-E
Brevoortia patronus	gulf menhaden	M-E
Brevoortia smithi	yellowfin menhaden	M
Dorosoma cepedianum	gizzard shad	F
Dorodoma petense	threadfin shad	F-E
Harengula jaquana	scaled sardine	M-E
Opisthonema oglinum	Atlantic thread herring	M-E
Anchoa hepsetus	striped anchovy	M-E
Anchoa mitchilli	bay anchovy	M-E
Synodus foetens	inshore lizardfish	M-E
Synodus intermedius	sand diver	M-E
Notemigonus crysoleucas	golden shiner	F
Ictalurus nebulosus	brown bullhead	F
Arius felis	hardhead catfish	M-E
Bagre marinus	gafftopsail catfish	M-E

Opsanus beta	gulf toadfish		M-E
Porichthys plectrodon	Atlantic midshipman		M-E
Gogiesox strumosus	Skilletfish	M-E	
Ogcocephalus radiatus	polka-dot batfish		M-E
urophycis floridana	southern hake		M-E
Hyporhamphus unifasciatus	halfbeak		M-E
Strongylura marina	Atlantic needlefish		M
Strongylura notata	redfin needlefish		M-E
Strongylura timucu	timucu	M-E	
Ardinia xenica	diamond killifish		E
Cyprinodon variegatus	sheepshead minnow		E
Floridichthys carpio	goldspotted killifish		E
Fundulus confluentus	marsh killifish		E
Fundulus grandis	gulf killifish		E
Fundulus seminolis	Seminole killifish		F
Fundulus similis	longnose killifish		E
Heterandria formosa	least killifish		F
Lucania parva	rainwater killifish	E	
Gambusia affinis	mosquitofish		E
Poecilia latipinna	sailfin molly		E
Membran martinica	rough silverside		E
Menidia peninsulae	peninsula silverside	E	
Menidia beryllina	tidewater silverside		F-E
Hippocampus erectus	lined seahorse		E
Hippocampuc zosterae	dwarf seahorse		E
Micrognathus criniger	fringed pipefish		E
Syngnathus floridae	dusky pipefish		E
Syngnathus louisianae	chain pipefish		E
Syngnathus scovelli	gulf pipefish		E
Centropomus undecimalis	snook		M-E
Centropristis striata	black sea bass		M
Diplectrum formosum	sand perch		M
Epinephelus itajara	jewfish		M-E
Epinephelus morio	red grouper		M
Mycteroperea microlepis	gag grouper		M
Serranus subligarius	belted sandfish		M
Lepomis gulosus	warmouth		F
Lepomis macrochirus	bluegill		F
Lepomis microlophus	redear sunfish		F
Lepomis punctatus	spotted sunfish		F
Pomoxis nigromaculatus	black crappie		F
Micropterus salmoides	largemouth bass		F
Pomatomus saltatrix	bluefish		M-E
Rachycentron canadum	cobia		M-E
Echeneis naucrates	sharksucker		M-E
Remora remora	remora		M-E
Caranx crysos	blue runner		M

Caranx hippos	crevalle jack	M-E
Chloroscombrus chrysurus	Atlantic bumper	M-E
Oligoplites saurus	leatherjacket	M-E
Selene vomer	lookdown	M
Trachinotus carolinus	Florida pompano	M-E
Trachinotus falcatus	permit	M-E
Lutjanus griseus	gray snapper	M-E
Lutjanus synagris	lane snapper	M-E
Lobotes surinamensis	tripletail	M-E
Diapterus auratus	Irish pompano	M
Diapterus plumieri	striped mojarra	E
Eucinostomus argenteus	spotfin mojarra	M-E
Eucinostomus gula	silver jenny	M-E
Haemulon plumieri	white grunt	M
Orthopristis chrysoptera	pigfish	M-E
Archosargus probatocephalus	sheepshead	M-E
Calamus arctifrons	grass porgy	M
Diplodus holbrooki	spottail pinfish	M
Lagodon rhomboides	pinfish	M-E
Bairdiella chrysoura	silver perch	M-E
Cynoscion arenarius	sand seatrout	M-E
Cynoscion nebulosus	spotted seatrout	M-E
Cynoscion nothus	silver seatrout	M-E
Leiostomus xanthurus	spot	M-E
Menticirrhus americanus	southern kingfish	M-E
Menticirrhus littoralis	gulf kingfish	M
Menticirrhus saxatilis	northern kingfish	M-E
Micropogonias undulatus	Atlantic croaker	E
Pogonias cromis	black drum	M-E
Sciaenops ocellatus	red drum	M-E
Chaetodipterus faber	Atlantic spadefish	M-E
Tilapia melanotheron	blackchin tilapia	E
Lachnolaimus maximus	hogfish	M
Nicholsina usta	emerald parrotfish	M
Mugil cephalus	striped mullet	M-E
Mugil curema	white mullet	M-E
Mugil trichodon	fantail mullet	M-E
Sphyraena barracuda	great barracuda	M-E
Sphyraena borealis	northern sennet	M
Sphyraena guachancho	guachanche	M
Astrocops y-graecum	southern stargazer	M-E
Paraclinus fasciatus	banded blenny	E
Paraclinus marmoratus	marbled blenny	E
Chasmodes saburrae	Florida blenny	M-E
Hypsoblennius hentzi	feather blenny	M-E
Bathygobius soporator	frillfin goby	E
Gobiosoma bosci	naked goby	E

Gobiosoma robustum	code goby	E
Microgobius thalassinus	green goby	E
Scomberomorus maculatus	Spanish mackerel	M-E
Scorpaena brasiliensis	barbfish	M
Prionotus scitulus	leopard searobin	M-E
Prionotus tribulus	bighead searobin	M-E
Ancylopsetta quadrocellata	ocellated founder	M
Etropus crossotus	fringed flounder	M
Paralichthys abligutta	gulf flounder	M-E
Achirus lineatus	lined sole	M-E
Trinectes maculatus	hogchoker	M-E
Symphurus plagiusa	blackcheek tonguefish	M-E
Monacanthus ciliatus	fringed filefish	M-E
Monacanthus hispidus	planehead filefish	M-E
Lactophrys quadricornis	scrawled cowfish	M-E
Sphoeroides nephelus	southern puffer	M-E
Chilomyeterus schoepfi	Striped burrfish	M-E

Table 2. Amphibians & Reptiles
Amphibians and reptiles observed or expected to occur in the study. Sources: Florida Game and Fresh Water Fish Commission; Vertebrates of Florida, H.M. Stevenson, 1976.

	SCIENTIFIC NAME	COMMON NAME
AMPHIBIANS		
	Siren lacertina	greater siren
	Siren intermedia	lesser siren
	Pseudobranchus striatus	dwarf siren
	Notophtalmus viridescens	spotted newt
	Amphiuma means	two-toed amphiuma
	Ambystoma opacum	marbled salamander
	amanculus quadridigitatus	dwarf salamander
	Desmognathusauriculatus	southern dusky salamander
	Desmognathus fuscus	northern dusky salamander
	Plethodon glutinosus	slimy salamander
	Scaphiopus holbrooki	eastern spadefoot toad
	Bufo terrestris	southern toad
	Bufo quercicus	oak toad
	Bufo marinus	marine toad
	Eleutherodactylus planirostris	greenhouse frog
	Hyla avivoca	bird-voiced tree frog
	Hyla femoralis	pine-woods tree

	frog
Hyla gratiosa	barking tree frog
Hyla squirella	squirrel tree frog
Hyla cinerea	green tree frog
Hyla chrysoscelis	southern gray tree frog
Hyla septentrionalis	Cuban tree frog
Limnaoedus ocularis	little grass frog
Pseudacris nigrita	southern chorus frog
Acris gryllus	southern cricket frog
Rana catesbiana	southern bullfrog
Rana grylio	pig frog
Rana pipiens	leopard frog
Rana areolata aesopus	gopher frog
Gastrophyryne carolinensis	eastern narrow-mouthed toad

REPTILES

Dermochelys coriacea coriacea	leatherback
Chelydra serpentina	common snapping turtle
Macroclemys temmincki	alligator snapping turtle
Sternotherus odoratus	stinkpot
Sternotherus minor	loggerhead musk turtle
Kinosternon bauri	striped mud turtle
Kinosternon subrubrum	common mud turtle
Terrapene carolina	box turtle
Malaclemys terrapin	diamondback terrapin
Chrysemys floridana	Florida cooter
Chrysemys concinna	River cooter
Chrysemys nelsoni	Florida red-bellied turtle
Deirochelys reticularia	chicken turtle
Gopherus polyphemus	gopher tortoise
Chelonia mydas mydas	green turtle
Eretmochelys imbricata imbricata	hawksbill
Caretta caretta caretta	loggerhead
Lepdidochelys kempi	Atlantic ridley
Trionyx ferox	Florida softshell

Anolis carolinensis	green anole
Anolis sagrei	brown anole
Sceloporus undulatus	eastern fence lizard
Ophisaurus ventralis	eastern glass lizard
Ophisaurus compressus	island glass lizard
Ophisaurus attenuatus	slender glass lizard
Cnemidophorus sexlineatus	six-lined racerunner
Scincella lateralis	ground skink
Eumeces inexpectatus	southeastern five-lined skink
Eumeces egregius	red-tailed skink
Regina alleni	striped swamp snake
Natrix cyclopion	green water snake
Natrix taxispilota	brown water snake
Natrix sipedon	common water snake
Natrix fasciata pictiventris	banded water snake
Nerodia fasciata compressicauda	mangrove water snake
Seminatrix pygaea	black swamp snake
Storeria dekayi	brown snake
Storeria occipitomaculata	red-bellied snake
Thamnophis sirtalis	common garter snake
Thamnophis sauritus	eastern ribbon snake
Rhadinaea flavilata	yellow-lipped snake
Diadophis punctatus	ring-necked snake
Farancia abacura	mud snake
Coluber constrictor	racer
Masticophis flagellum	coachwhip
Opheodrys aestivus	rough green snake
Drymarchon corais couperi	indigo snake
Elaphe guttata	corn snake
Elaphe obsoleta	rat snake
Pituophis melanoleucus	pine snake
Lampropeltis getulus	Florida king snake
Lampropeltis triangulum	scarlet king snake
Stilosoma extenuatum	short-tailed snake
Cemophora coccinea	scarlet snake
Tantilla coronata	crowned snake
Heterodon platyrhinos	eastern hog-nosed snake
Heterodon simus	southern hog-nosed snake
Micrurus fulvius	eastern coral snake
Agkistrodon piscivorous	cottonmouth
Sistrurus miliarius	pygmy rattlesnake
Crotalus adamanteus	eastern diamondback rattlesnake

Alligator mississippiensis	American alligator

Table 3. Birds

Birds observed or expected to occur in the study area. Source: Florida Game and Fresh Water Fish Commission. Residency: W = primarily winter; S = primarily summer; R = year round; M = during migration; A = accidental or occasional.
* = nests in study area.

SCIENTIFIC NAME	COMMON NAME	RESIDENCY, NESTING STATUS
Gavia immer	common loon	W
Podiceps auritus	horned grebe	W,A
Podilymbus podiceps	pied-billed grebe	R*
Pelecanus erythrorhynchos	white pelican	W
Pelacanus occidentalis	brown pelican	R*
Phalacrocorax auritus	double-crested cormorant	R*
Anginga anhinga	anhinga	R*
Fregeta magnificens	magnificent frigate bird	R
Ardea herodias	great blue heron	R*
Bubulcus striatus	green-backed heron	R*
Bulbucus ibis	cattle egret	R*
Casmeroides alba	great egret	R*
Egretta caerulea	little blue heron	R*
Egretta rufescens	reddish egret	R*
Egretta thula	snowy egret	R*
Egretta tricolor	tricolored heron	R*
Nycticorax nycticorax	black-crowned night heron	R*
Nycticorax violaceus	yellow-crowned night heron	R*
Ixobrychus exilis	least bittern	R*
Mycteria americana	wood stork	R
Plegadis falcinellus	glossy ibis	R
Eudocimus albus	white ibis	R*
Ajaia ajaja	roseate spoonbill	S
Branta canadensis	Canada goose	W,A
Anas platyrhynchos	mallard	W,R*
Anas fulvigula	mottled duck	R*
Anas strepera	gadwall	W
Anas acuta	northern pintail	W
Anas crecca	green-winged teal	W
Anas discors	blue-winged teal	W
Anas americana	American wigeon	W
Anas clypeata	northern shoeveler	W
Aix sponsa	wood duck	R*
Aythya americana	redhead	W
Aythya collaris	ring-necked duck	W
Aythya affinis	lesser scaup	W

Oxyura jamaicensis		ruddy duck		W
Lophodytes culcullatus		hooded merganser		W
Mergus serrator		red-breasted merganser		W
Cathartesaura		turkey vulture		R*
Accipiter striatus		sharp-shinned hawk		W
Buteo jamaicensis		red-tailed hawk		R*
Buteo lineatus		red-shouldered hawk		R*
Buteo platypterus		broad-winged hawk		M
Haliaeetus leucocephalus		bald Eagle		R
Circus Cyaneus		marsh hawk		R
Pandion haliaetus		osprey		R*
Pandion peregerinus		peregrine falcon		W
Falco columbarius	merlin		W	
Falco sparverius		American kestrel		W
Colinus virginianus		northern bobwhite		R*
Rallus longirostris		clapper rail		R*
Gallinula chloropus		common moorhen		R*
Fulica americana		American coot		W
Haemotopus palliatus		American oystercatcher		R*
Charadrius semipalmatus		semipalmated plover		W
Charadrius wilsonia		Wilson's plover		W
Charadrius vociferus		killdeer		R*
Pluvialis squatarola		black-bellied plover		W
Arenaria interpres		ruddy turnstone		W
Gallinago gallinago		common snipe		W
Numenius phaeopus		whimbrel		W
Actitis macularia		spotted sandpiper		W
Tringa solitaria		solitary sandpiper		W
Tringa melanoleuca		Greater yellowlegs		W
Tringa flavipes		lesser yellowlegs		W
Catoptrophorus semipalmatus		willet		R*
Calidris canutus		red knot		W
Calidris fuscicollis		white-rumped sandpiper		M
Calidris minutilla		least sandpiper		W
Calidris alpina		dunlin		W
Calidris pusilla		semipalmated sandpiper		W
Calidris mauri		western sandpiper		W
Calidris alba		sanderling		W
Limnodromus griseus		short-billed dowitcher		W
Limosa fedoa		marbled godwit	M	
Larus argentatus		herring gull		W
Larus delawarensis		ring-billed gull		W
Larus atricilla		laughing gull		R
Larus philadelphia		Bonaparte's gull		W
Sterna nilotica		gull-billed tern		A
Sterna forsteri		Forster's tern		W
Sterna hirundo		common tern		W

Sterna antillarum		least tern		S*
Sterna maxima		royal tern		R
Sterna sandvicensis		sandwich tern		W
Sterna caspia		Caspian tern		W
Rhynchops niger		black tern		M
Columba livia		black skimmer		R*
Zenaida macroura		mourning dove		R*
Columbina passerina		common ground dove		R*
Coccyzus americanus		yellow-billed cuckoo		W
Otus asio		screech owl		R*
Bubo virginianus		great horned owl	R*	
Strix varia		barred owl		R*
Caprimulgus carolinensis		chuck-will's-widow		S*
Caprimulgus vociferus		whip-poor-will		W
Chordeiles minor		common nighthawk		S*
Chaetura pelagica		chimney swift		S*
Archilochus colubris		ruby-throated hummingbird		R*
Ceryle alcyon		belted kingfisher		W
Colaptes auratus		northern flicker		R*
Dryocopus pileatus		pileated woodpecker		R*
Melaherpes carolinus		red-bellied sapsucker		W
Sphyrapicus varius		yellow-bellied sapsucker		W
Picoides villosus		hairy woodpecker		W
Picoides pubescens		downy woodpecker		R*
Tyrannus tyrannus		eastern kingbird		M
Tyrannus dominicensis		gray kingbird		S*
Miarchus crinitus		great crested flycatcher		S*
Sayornis phoebe		eastern phoebe		W
Tachycineta bicolor		tree swallow		W
Stelgidopteryx serripennis		rough-winged swallow		M
Hirundo rustica		barn swallow		M
Progne subis		purple martin		S*
Cyanacitta cristata		blue jay		R*
Corvus ossifragus		fish crow		R*
Troglodytes aedon		house wren		W
Cistothorus platensis		Carolina wren		R*
Minus polyglottos	sedge wren		W	
Dumetella carolinensis		gray catbird		W
Toxostoma rufum		brown thrasher		R*
Turdus migratorius		American robin		W
Polioptila caerulea		blue-gray gnatcatcher		W
Regulus calendula		ruby-crowned kinglet		W
Bombycilla cedrorum		Cedar waxwing		W
Lanius ludovicianus		loggehead shrike		R*
Sturnus vulgaris		European starling		R*
Vireo griseus		white-eyed vireo		R*
Vireo olivaceus		red-eyed vireo		S

Protonotaria citrea	prothonotary warbler	W
Dendroica coronata	yellow-rumped warbler	W
Dendroica discolor	prairie warbler	R*
Dendroice palmarum	palm warbler	W
Geothlypis trichas	common yellowthroat	W
Agelaius phoeniceus	red-winged blackbird	R*
Quiscalus major	boat-tailed grackle	R*
Quiscalus quiscula	common grackle	R*
Passer domesticus	house sparrow	R*
Carduelis tristis	American goldfinch	W
Cardinalis cardinalis	northern cardinal	R*
Pipilo erythrophthalmus	roufous-sided towhee	R*
Passerculus sandwichensis	savannah sparrow	W
Ammospiza caudacuta	sharp-tailed sparrow	W
Spizella passerina	chipping sparrow	W
Poocetes gramineus	vesper sparrow	W
Melospiza georgiana	swamp sparrow	W
Melospiza melodia	song sparrow	W
Ammondramus savannarum	grasshopper sparrow	W
Aimophila aestivalis	Bachman's sparrow	R*

Table 4. Mammals

Mammals observed or expected to occur in the study area. Source: Florida Game and Fresh Water Fish Commission.

SCIENTIFIC NAME	COMMON NAME
Didelphis marsupialis	oppossum
Blarina carolinenis	short-tailed shrew
Cryptotis parva	least shrew
Scalopus aquaticus	eastern mole
Pipistrellus subflavus	eastern pipistrelle
Myotis austroriparius	southeastern mvotis
Lasiurus seminolus	Seminole bat
Lasiurus cinereus	hoary bat
Lasiurus intermedius	yellow bat
Nycteciceus humeralis	evening bat
Plecotus rafinesquii	rafinesque big-eared bat
Tadarida brasiliensis	Brazilian free-tailed bat
Dasypus novemcinctus	armadillo
Sylvilagus palustris	marsh rabbit
Sylvilagus floridanus	eastern cottontail
Sciurus carolinensis	grey squirrel
Sciurus niger shermani	Sherman's fox squirrel
Glaucomys volans	southern flying squirrel
Oryzomys palustris	rice rat

Peromyscus polionotus		old-field mouse
Peromyscus gossypinus		cotton mouse
Peromyscus floridanus		Florida mouse
Sigmodon hispidus		hispid cotton rat
Ochrotomys nuttalli		golden mouse
Neotoma floridana		eastern wood rat
Rattus rattus		black rat
Rattus norvegicus		Norway rat
Mus musculus		house mouse
Neofiberalleni		round-tailed muskrat
Urocyon cinereoargenteus		gray fox
Procyon lotor		raccoon
Lutra canadensis		river otter
Spilogale putorius		spotted skunk
Mephitis mephitis		striped skunk
Lynx rufus	bobcat	
Canis familiaris		domestic dog
Felis domestica		domestic cat
Odocileus virginiana		white-tailed deer
Trichechus manatus		West Indian manatee
Delphinus delphinus		common dolphin
Tursiops truncatus		Atlantic bottle-nosed dolphin

EXHIBIT "A"

FLORIDA'S ENDANGERED SPECIES, THREATHENED SPECIES, AND SPECIES OF SPECIAL CONCERN

June 2006
FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION