



Flagler County Comprehensive Plan 2010-2035
Flagler County, Florida

Coastal Management Element
Data and Analysis



Transmittal Hearing: October 18, 2010

PAGE INTENTIONALLY BLANK

**COASTAL MANAGEMENT ELEMENT
DATA AND ANALYSIS**

Item	Page Number
I. INTRODUCTION	E-1
II. Natural Resources of the Coastal Planning Area	E-1
A. Vegetative Cover and Wetlands	E-1
B. Terrestrial and Aquatic Wildlife	E-3
III. Land Use Inventory and Analysis	E-8
A. Land Use Patterns	E-8
B. Water Dependent and Water Related Uses	E-11
C. Areas Needing Redevelopment	E-13
D. Economic Base	E-13
E. Analysis of the Impact of Projected Development	E-15
IV. Natural Resource Protection	E-18
A. Estuarine Pollution	E-18
B. Trend Analysis	E-23
C. Beach and Dune Systems	E-27
D. Archaeological and Historic Resources of the Coastal Area	E-30
V. Emergency Management	E-32
A. Hurricane Evacuation	E-32
B. Post Disaster Planning Concerns and Coastal High-Hazard Areas	E-36
VI. Public Access	E-38
VII. Coastal Area Infrastructure	E-41
List of Tables	
Table E-1: Endangered or Threatened Species	E-5
Table 2: Colonial Bird Rookeries, Flagler County	E-8
Table E-3 Future Land Use Coastal Areas 2010	E-11
Table E-4. Projected Top 10 Employment Growth 2009 to 2017	E-14

Flagler County Comprehensive Plan 2010-2035

Item	Page Number
Table E-5. Projected Top 10 Employment Decline 2009 to 2017	E-14
Table E-6 Future Land Use Development Analysis	E-15
Table E-7. Water Quality Index Results for Streams and Trophic State Index for Lakes and Estuaries	E-20
Table E-8. Water Quality Trends	E-23
Table E-9: Known Archeological and Historic Sites	E-31
Table E-10. Coastal Area Sites Potentially Eligible for the National Register of Historic Places	E-32
Table E-11. Population Residing Within CHHA Flagler County	E-33
Table E-12 Alternate Shelter Space	E-33
Table E-13. Vulnerability Analysis for Segments of Low Lying Coastal Roadways and Low Bridge Approaches	E-34
Table E-14. Existing Public Access Facilities	E-39
Table E-15. Summary of Coastal Recreation Facilities Supply	E-40
Table E-16. Population Change 2010 to 2035	E-42
Table E-17. Population Impacts on LOS	E-42
Table E-18. Summary of Roadway Deficiencies 2010 to 2035	E-43
 List of Maps	
Map E.1: Coastal Greenways	E-49
Map E.2: Wildlife and Marine Life Areas of Special Concern	E-51
Map E.3: Special Water Classification	E-53
Map E.4: Water Quality 2000	E-55
Map E.5: Areas Served by Centralized Sanitary Sewer Systems	E-57
Map E.6: Soil Limitations to Septic Tanks	E-59
Map E.7: Locations of Septic Tank Usage	E-61
Map E.8: Storm Surge Above Sea Level Rise	E-63
Map E.9: Hurricane Evacuation Zones	E-65

I. Introduction

Flagler County's eastern and western boundaries are coastline. The Atlantic Ocean forms the entire east boundary of the County and Crescent Lake forms a majority of the west boundary. This means that Flagler County must develop and adopt a Coastal Management Element as part of its comprehensive plan. Chapter 9J-5, Florida Administrative Code provides for a three-tier definition of the coastal area. The Coastal Planning Area is defined as encompassing: waters and submerged lands of oceanic or estuarine waterbodies, shorelines adjacent to oceanic waters or estuaries, coastal barriers, living marine resources, marine wetlands, water dependent facilities or water-related facilities on or adjacent to oceanic or estuarine waters, and public access facilities to oceanic beaches or estuarine shorelines. The other two tiers describe boundaries for two specific purposes: Coastal High Hazards and Hurricane Vulnerability. The minimum requirement for the Coastal High-Hazard Area is the evacuation zone for a Category 1 hurricane. The Hurricane Vulnerability Zone is defined in Rule 9J-5 as the area subject to evacuation in a 100-year storm or Category 3 storm event.

The inland boundary of the coastal planning area for the general case is as follows: The entire barrier island east of the Intracoastal Waterway and those portions of mainland Flagler County which lie within the Level 1 Hurricane Evacuation Zone and encompass oceanic and estuarine waters, beaches and beach accesses, the hurricane vulnerability zone and abutting lands.

II. Natural Resources of the Coastal Planning Area

The important aspect of coastal management is providing for the protection of natural resources. The land forms, vegetative communities and wildlife are all critical components of a viable, sustainable resource. The concern is with manmade development that occurred prior to the implementation of the various natural resource regulations. Often these older developments have negative impacts on soils, floodways, animal habitats and wetlands. The goal is to determine the amount of existing resources and to put in place appropriate regulations to ensure their continued success. This section will describe the biological resources of the coastal area. Beach and dune systems are examined in a subsequent section. There is no existing mining or extraction of mineral resources occurring in the coastal area, nor will there be in the 2010 to 2035 planning horizon.

A. Vegetative Cover and Wetlands

The following are summaries of the areas of vegetative cover in the coastal area. The description of these areas is based on information from the Florida Fish and Wildlife

Flagler County Comprehensive Plan 2010-2035

Conservation Commission, Florida Natural Areas Inventory, local Applications for Development Approval (ADA) and Developments of Regional Impact (DRI), St. Johns River Water Management District and the Center for Wetlands at the University of Florida.

Live oaks and laurel oaks dominate the upland hardwood forests. Other plants found in association with the oaks are cabbage palms, magnolia, American holly, saw palmetto, catbrier, mulberry, southern sumac, yaupon, soapberry, milk pea, cottonweed, buckthorn, verbena, ironweed and devil's walking stick among others.

The swamp hardwood community consists of black gum, red maple, redbay, sweetbay, loblolly bay, sweetgum, water oak, bald cypress and cabbage palm.

The Cypress Swamp community does not appear as pure stands but exists interspersed within the hydric hammocks and swamp hardwoods of the county. Flora found in this environment include bald cypress, pond cypress, common buttonbush, cinnamon fern, fall-flowering ixia and royal fern among others.

The pine flatwoods are typically slash pine and palmetto. Also present but not all inclusive are sand live oak, red bay, bracken fern, southern sumac, broomsedge, elephant's-foot and paintbrush.

Another vegetative community prevalent is the marsh. Most of the area consists of saltwater marsh with occasional isolated and interspersed freshwater marshes. The saltwater marshes can be divided into the upper salt marsh (also known as the pickleweed marsh) which is tidally flooded at regular intervals between November and March and less frequently the rest of the year. The low marsh, which is found below mean high water, consists of needlegrass and other vegetation capable of tolerating daily floodings. The freshwater marshes include Baker's cordgrass, goldenrod, umbrella grass, narrow-leaf pinweed and cattail.

The coastal barrier has two spatially limited vegetative communities: the dunes and the coastal strand. The dunes are vegetated (crest and backslope) by salt-tolerant plants such as sea oats, beach croton, gaillardia, beach sunflower, verbena, prickly pear cactus, and silk grass.

Landward of the dunes is the coastal strand. This area is a transition between the dunes and the pine flatwoods and swamp hardwoods. The strand supports saw

palmetto, pepper vine, muscadine grape, catbriar, wild olive, yaupon, bracken fern, myrtle oak, sand live oak, prickly pear cactus and hercules club.

There are several wetland communities in the coastal area of the county. Extensive ditching has altered many of the wetland areas associated with the mosquito control program. Many miles of mosquito ditches were constructed in the county for the purpose of eliminating mosquito-breeding sites. Results show a reduction from greater than 100 bites per minute in the early 1950s to less than 20 bites per minute in the 1980s. Ditching has virtually ceased but should selective ditching become a necessity in the future, such actions must be reviewed and approved by the applicable regulatory agencies.

B. Terrestrial and Aquatic Wildlife

Each of the vegetative associations discussed above is a wildlife habitat. The discussion below will address the wildlife or marine life associated with each of the habitats. The following animals have been identified as inhabitants of the hardwood hammocks: raccoons, opossums, armadillos, hispid cotton rats, eastern cottontails, least shrews, eastern moles, red-shouldered hawks, warblers, vireos, woodpeckers, southern toads, tree frogs, skunks, anoles, eastern diamondback rattlesnakes, rat snakes, and gopher tortoises. Common animals of the pinewoods include armadillos, eastern cottontail rabbits, hispid cotton rats, white tail deers, wild boars, skunks, raccoons, opossums, pileated woodpeckers, warblers, eastern diamondback rattlesnakes, pygmy rattlesnakes, rat snakes, oak toads, and pinewood tree frogs.

The beaches and dunes of the county are important nesting areas for the Atlantic loggerhead sea turtle. Other animals inhabiting beach and dune areas are semipalmated plovers, black-bellied plovers, ruddy turnstones, willets, least sandpipers, western sandpipers, sanderlings, least terns, royal terns, black skimmers, herring gulls, laughing gulls, ring-billed gulls, and raccoons. The secondary dunes provide habitat for gopher tortoises, eastern cottontails, raccoons, skunks, anoles, and black racers.

The several wetland communities also provide habitat for wildlife and marine life. The largest wetland habitats are the mosquito ditches. These ditches contain many species of small fish. As a result of the population of small fish and shallow waters, all of the wading birds known to the area use the mosquito ditches. In addition, wood ducks, mottled ducks, blue-winged teals, pintails and American coots inhabit the mosquito ditches either year round or seasonally.

The saltwater marsh areas are inhabited with red-shouldered hawks, clapper rails, marsh rabbits, rice rats, raccoons and bobcats.

Flagler County Comprehensive Plan 2010-2035

The freshwater swamps that do exist in the coastal area of Flagler County show inhabitation by deer, raccoon, bobcat, eastern grey squirrel, barred owl, horned owl, pileated woodpecker, wood duck, wood stork, limpkin, frogs, snakes and turtles.

Flagler County contains habitats used by several endangered species. Table 1 lists these species and their special status as determined by the Florida Game and Fresh Water Fish Commission and the U.S. Fish and Wildlife Service. The reason each species is imperiled and therefore given special status varies with the species. The various reasons are the impacts of development on these species as discussed below.

There are two species of fish listed in Table 1, the primitive looking shortnose sturgeon and Atlantic sturgeon. These were once common spring visitors to Atlantic estuaries and rivers but due to overfishing and the deterioration of water quality, few remain to be seen in the area. Sturgeons are bottom feeders whose diet consists mostly of worms, insect larvae, crabs and small fish.

The eastern indigo snake seems to be strongly associated with high, dry, well-drained sandy soils, closely paralleling the sandhill habitat preferred by the gopher tortoise; however, especially during the warmer months, indigos also frequent streams and swamps, and individuals are occasionally found in flatwoods. Gopher tortoise burrows and other subterranean cavities are commonly used as dens and for egg laying. In general, this snake has reached the threatened status as a result of a loss of habitat due to such uses as construction, forestry, farming and over-collecting for the pet trade. The snake's large size and docile nature made it sought after as a pet. Sightings have been confirmed but are limited to the Hammock Area and on the Grand Haven DRI Project.

The gopher tortoise seems to find the following habitat characteristics most suitable: the presence of well drained sandy soils, which allow easy burrowing; an abundance of herbaceous ground cover; and a generally open canopy and sparse shrub cover, which allow sunlight to reach the ground floor. The gopher tortoise is found in the coastal area of Flagler County in open pinelands or hardwoods, and in the sandy coastal strand plant communities.

The gopher tortoise and indigo snake share burrows and, as a result, share a common fate. These animals are declining in numbers mostly due to loss of habitat. Another threat to these animals comes from attempts to destroy another common cohabitant of the burrows, rattlesnakes. Site planning and density controls may help reduce the loss of habitat. Acquisition of upland areas for preservation may also help these species.

The Atlantic salt marsh snake is restricted to the brackish water environment of the saltwater marshes. The snake may tolerate saline environments ranging from brackish to full strength seawater.

The sea turtle species have suffered from over harvesting, entanglement in shrimp trawls, and disruption of nesting areas. The loggerhead turtle is the most common sea

Flagler County Comprehensive Plan 2010-2035

turtle in the South Atlantic Zone and it can be found mainly during the late spring and summer in ocean waters, bays, marshes, or rivers. Females of this sea turtle occasionally come ashore at night during the summer months and lay eggs above the high tide line of the beach. The northernmost beaches of Flagler County have extensive coquina rock outcrops and for the most part are not suitable for sea turtles. However, some beaches have had a fair number of nesting loggerheads come ashore and it is probable that this will continue in the future.

The American alligator is a large aquatic reptile that has been seen in Varn Lake and in most other water bodies larger than a small pond.

Table E-1: Endangered or Threatened Species			
Common Name	FGFWFC Status	USFWS Status	Tenure
Reptiles & Amphibians:	Threatened (T)	T	Permanent (P)
Eastern indigo snake			
Atlantic loggerhead turtle	T	T	Breeding (B)
Leatherback turtle	Endangered (E)	E	B
Atlantic Ridley turtle	E	E	P
American alligator	Species of Special Concern (SSC)	T (S/A)	P
Atlantic saltmarsh water snake	T	T	P
Gopher tortoise	SSC	Not recognized	P
Birds:	T	T	P
Florida scrub jay			
Least tern	T	Not recognized	P, B
Southeastern kestrel	T	Not recognized	Migrating (M)
Arctic peregrine falcon	E	Not recognized	M
Roseate tern	T	T	No information
Red-cockaded woodpecker	T	E	Presumed
Bald eagle	T	T	M
Florida sandhill crane	T	Not recognized	P
Wood stork	E	E	No information
Limpkin	SSC	Not recognized	P
Little blue heron	SSC	Not recognized	P
American oystercatcher	SSC	Not recognized	M
Black skimmer	SSC	Not recognized	No information
White ibis	SSC	Not recognized	No information
Tri colored heron	SSC	Not recognized	No information
Snowy egret	SSC	Not recognized	P
Mammals:	E	E	No information
Florida panther			
Florida black bear	T	Not recognized	No information
Florida mouse	SSC	Not recognized	No information
West Indian manatee	E	E	M
Right whale	E	E	M

Flagler County Comprehensive Plan 2010-2035

Common Name	FGFWFC Status	USFWS Status	Tenure
Fin whale	E	E	M
Fish: Shortnose sturgeon	E	E	M
Atlantic sturgeon	SSC	Not recognized	M
Common snook	SSC	Not recognized	No information

Source: Florida Game and Fresh Water Fish Commission, 1996

In Flagler County, scrub jays have been reported in Bulow; in the vicinity of Flagler Beach; 7 miles north of Flagler Beach; near Marineland and Matanzas Island.

The least tern has been sited in Flagler County. It has occasionally been observed along the ocean beaches, especially in the summer months. Five colonies of least terns have been observed in Flagler County.

The southeastern kestrel has been seen throughout the Hammock Dunes Site. They can be seen perched on electric lines along roadways and make their nests in hollow trees. Although numerous during the winter months, they migrate northward in the spring to breed. They prefer old stands of open woodland of which there are few in the coastal area.

Peregrine falcons and bald eagles have suffered population declines due to pesticide residues. Bald eagles do not nest in the coastal area of the county, but they have been seen on rare occasions moving throughout the area or foraging along the Intracoastal Waterway. The peregrine falcon is rarely seen and migrates northward to nest.

The American oystercatcher is occasionally seen flying or resting along the ocean beaches. It prefers to forage on shellfish found in mudflats and nests on sandy beaches. Unfortunately for these birds, beaches are popular for recreation and beachgoers discourage nesting activities.

The little blue heron and the snowy egret have been observed regularly foraging, standing, or resting along the Intracoastal Waterway, in salt marches and along the edges of lakes and ponds. Some nesting by these species occurs in the Graham and Black Branch cypress swamps. County efforts have been directed toward the protection of wetlands and woody vegetation on the water.

The limpkin prefers wading in wooded swamps and snails are its favorite food. It has been observed in Graham Swamp.

The sandhill crane is a large bird that prefers to forage and rest in open prairies and fields, and occasionally occurs in open pineland. Small numbers of cranes have been observed.

Flagler County Comprehensive Plan 2010-2035

The osprey has been seen on a fairly regular basis, flying and foraging along the Intracoastal Waterway.

The most endangered wading bird in the state is the wood stork. Wood storks have a unique feeding technique and require higher prey concentrations than other wading birds. Optimal water regimes for the wood stork involve periods of flooding, during which prey (fish) populations increase, alternating with dryer periods, during which receding water levels concentrate fish at higher densities coinciding with the stork's nesting season. This large wading bird is occasionally observed in small numbers along the Intracoastal Waterway in the winter months and early spring.

The red-cockaded woodpecker requires open stands of pines with a minimum age of 60 years. Longleaf pine is most commonly used, but other species of southern pine are also acceptable. Dense stands, stands that are primarily hardwoods, or that have a dense understory, are avoided. This bird has been sighted in Flagler County's coastal area; however, the fires of 1998 destroyed many acres of habitat.

The Florida mouse is a medium sized nocturnal rodent that has been sighted in sand pine scrub habitats of the coastal area. This rodent can also be associated with the pine-turkey oak habitat (of which there is very little in Flagler County). This mouse is restricted to Florida.

The endangered Pallid beach mouse has been sighted at the Bulow Plantation. Not much information is available on this small rodent.

One of the species listed, the Florida panther, may have formerly existed in the coastal area, but the possibility of this species recolonizing the coastal area is minimal.

There is also no evidence indicating that there exists a significant number of black bear. However, bear signs in the form of tracks and scratched tree trunks have been encountered. Sightings of these marks were reported in the Hammock area east of State Road A1A and along the Intracoastal Waterway to the west of State Road A1A.

The manatee inhabits both salt and freshwater habitats of sufficient depth (1.5 meters or more) throughout their range. They may be encountered in canals, sluggish rivers, estuarine habitats, and salt water bays. Manatees occur occasionally in Flagler County in the Intracoastal Waterway. Their visits are seasonal and occur most frequently during winter months but occasionally in warmer months also. A major cause of death in manatees is exposure to cold. The most common human induced cause of manatee deaths is boat collisions. Numerous actions could be taken to reduce the boat/manatee collisions including but not limited to the establishment of speed zones and appropriate siting of marinas.

The right whale is the most endangered whale occurring in the South Atlantic region. This species is present in the area during the late fall, winter, and early spring seasons.

Flagler County Comprehensive Plan 2010-2035

Recently, it has become apparent that the South Atlantic region is a calving ground for the right whales based on aerial sightings and beach strandings. The sperm whale is the most abundant endangered whale occurring in the South Atlantic region. Sperm whales are generally found in deeper offshore waters where they actively feed all year round.

Several other species listed in Table 1 occasionally transit the coastal area of the county.

The county contains five threatened bird rookeries. Protection of the least tern rookeries is important for the future of the imperiled colonial bird.

Table 2: Colonial Bird Rookeries, Flagler County					
Site Number	Latitude/ Longitude	Species	Date	Observations	Location Notes
1		Wading Birds	05/18/89	Site vacant	Spoil Island E of AIA, S of Marineland
2	29°37'N 81°12.46'W	Least tern	05/26/93	Approx. 20 nests	Rooftop, Publix, 298 Palm Coast Parkway
3	29°32.2'N 81°13.5'W	Least tern	07/11/90	18 adults, 3 young	Rooftop, Wadsworth Elementary, 4550 Belle Terre Boulevard
			05/26/93	4 adults, no young or eggs	
4	29°30.4'N 81°08.4'W	Least tern	05/12/93	Site vacant	Rooftop, Oceanlake Villa Condos (Beverly Beach)
5	29°30.23'N 81°08.42'W	Least tern	05/26/93	Approx. 26 nests	Rooftop, residence 2089 N. Central Ave., Flagler Beach
6	29°28.83'N 81°07.67'W	Least tern	05/26/94	Approx. 40 nests	Rooftop, Nations Bank of Flagler Beach, 300 S. Oceanside Blvd., Flagler Beach

Source: Florida Game and Freshwater Fish Commission, 1996

II. Land Use Inventory and Analyses

A. Land Use Patterns

The Coastal area consists of the unincorporated areas surrounded by the cities of Palm Coast, Marineland, Beverly Beach and Flagler Beach. There are five pockets that are currently under the jurisdiction of Flagler County. The following summarize the general data for the 5 coastal areas.

1. Coastal Area 1 (Barrier Island/Princess Place): This area contains approximately 10,155 acres. The boundaries of the area are: the Town of Marineland and St.

Flagler County Comprehensive Plan 2010-2035

Johns County on the north; the City of Palm Coast and I-95 to the west; the cities of Beverly Beach and Palm Coast to the south; and the Atlantic Ocean to the east.

2. Coastal Area 2 (Colbert Lane/Graham Swamp): This area contains approximately 4,792 acres. The boundaries of the area are: Palm Coast Parkway/Palm Coast on the north; the Intracoastal Waterway and Colbert Lane to the east; Moody Boulevard (SR 100) to the south; and Palm Coast/Old Kings Road to the west.
3. Coastal Area 3 (Bulow Creek): This area contains approximately 6,285 acres. The boundaries of the area are: SR 100 (Moody Blvd.) on the north; the Intracoastal Waterway to the east; Volusia County to the south; and I-95 to the west.
4. Coastal Area 4 (Airport Study Area): This area contains approximately 2,855 acres and comprises two pockets of unincorporated County surrounded by the City of Palm Coast. The boundaries of the area are: SR 100 (Moody Blvd.) on the north; Seminole Woods Parkway to the east; US 1 to the south; and Belle Terre Boulevard to the west.
5. Coastal Area 5 (Plantation Bay and Korona): This area contains approximately 4,936 acres and is located east of US 1, west and north of the Volusia County Line, west of Interstate-95, and south of the Palm Coast municipal boundary. The predominant use in this area is the Plantation Bay Development of Regional Impact (DRI).

The Coastal Area of Flagler County is the area that experienced tremendous growth during the 1990's and continued until the economic downturn of 2007. The area can be best characterized as low-density residential development with large areas of conservation and primarily strip-commercial retail. There are numerous parks and conservation areas that are owned by the State of Florida (Bulow Creek State Park, Bulow Plantation Ruins Historic State Park, Gamble Rogers State Park, North Peninsula State Park and Washington Oaks Garden State Park), the St. Johns River Water Management District (SJRWMD) (Graham Swamp Preserve), and Flagler County (Princess Place Preserve), as well as municipal parks that provide for preservation and protection of valuable natural resources. This makes the Coastal Area of Flagler County a very attractive area for development and new residents.

There are limited areas of industrial development located at the County Airport and along the west side of the Intracoastal Waterway. The issue of compatibility between the industrial and residential will be an issue in the future as the industrial areas develop so that Flagler County can expand its economic opportunities. The critical element is

providing methods of screening, buffering and design elements that protect existing residential developments and natural resources, while allowing for reasonable use of industrial properties.

This portion of the County is also the area that is home to 4 of the 5 cities within Flagler County. Palm Coast is the largest in area and population. This city provides for a majority of urban and suburban lands in the County. Flagler Beach and Beverly Beach are coastal cities that provide for low density residential and supporting retail services. Marineland is the smallest of the cities in regard to land and population. Marineland is a small town located at the northern most portion of the barrier island and is home to one of the oldest tourist destinations in Florida.

Major issues for the Coastal Area include the following:

1. Protection of the existing residential and commercial developments located in the Coastal Area. Protection means that there are sufficient regulations in place to ensure future development is compatible and complimentary to the existing land uses in the Coastal Area. It also means that the portions of the Coastal Area within the Coastal High Hazard Areas have sufficient restrictions to prevent intensification of uses that will be negatively impacted if a major emergency, such as a hurricane, occurs in the area.
2. Identification of public improvements to roads, potable water, sanitary sewer and stormwater to ensure that existing and future residents have a good quality of life. There is also the issue of addressing how to provide needed services, such as centralized water and sanitary sewer to older areas of Flagler County that are facing septic tank and water well failure. Lastly, there is an issue with stormwater management along the barrier island in older subdivisions that were approved prior to the implementation of current stormwater regulations.
3. Coordination with the adjoining cities to ensure efficiency and consistency in the delivery of services and compatibility with regard to planning. The Cities of Beverly Beach, Flagler Beach, Marineland and Palm Coast are facing pressures to develop and annex vacant lands to address these pressures. The City of Palm Coast is the primary urban center serving the coastal area since a majority of the County's population resides in the City. The City of Beverly Beach and the City of Flagler Beach are relatively constrained by either geographic limitations or policies established by the elected officials. This means that both of these cities will not experience significant expansion of land area or population. The Towne of Marineland is in a precarious situation since the area and population are very low, but there is an approved DRI that would greatly expand the population and demand for services.

Flagler County Comprehensive Plan 2010-2035

4. The Dunes Community Development District (CDD) is another important entity with regards to coordinating and planning. This quasi-governmental agency is in charge of the major utilities and services for a majority of the coastal residents in Flagler County. There have been discussions regarding the potential incorporation of this area as a new city. These discussions and analysis continue, but Flagler County is aware of its role and responsibilities to provide for safe and efficient delivery of services and will continue to coordinate and plan for the Dunes CDD.

The following tables summarize the amount of land by land use category as shown on the adopted Future Land Use Map for the 5 study areas that comprise the Coastal Area.

Land Use Categories	County	CA 1	CA 2	CA 3	CA 4	CA 5
Agriculture & Timberlands	92,086.97	3,211.84	937.27	3,078.02	416.39	1,253.60
Agriculture	63	63	0	0	0	0
Commercial: Low Intensity	22.19	0	7.07	4.01	11.11	0.00
Commercial: High Intensity	383.11	25.20	45.27	19.85	34.12	95.96
Conservation	44,781.97	1,987.27	2,403.38	1,269.93	338.57	227.39
Educational Uses	45.64	15.00	0	0	30.64	0
Industrial	1,479.97	0	47.77	0	1,106.59	0
Mixed Use: Low Intensity/Low/Med. Density	6,208.22	2,504.64	28.91	95.76	0.00	2553.21
Mixed Use: High Intensity/High Density	454.52	13.25	315.61	28.76	40.93	0
Recreation & Open Space	2,903.45	1,685.63	0	414.45	0.00	0.00
Residential: Low Density Rural Estate 1 du/acre	12,038.26	589.77	759.80	404.59	798.21	751.52
Residential: Low Density Single Family 1-3 du's/acre	670.86	18.50	135.27	468.75	0.00	48.34
Residential: Medium Density 4-7 du's/acre	471.22	7.53	0	442.35	0	6.37
Residential: High Density 8-10 du's/acre	14.42	14.42	0	0	0	0
Water bodies	286.38	18.75	111.59	58.06	77.51	0
Total	161,910.18	10,154.80	4,791.94	6,284.53	2,854.07	4,936.39

Source: Flagler County Planning and Zoning Department (NEFRC GIS Data)

B. Water Dependent and Water Related Uses

The protection of working waterfronts and protection of water-related public recreation are important aspects of managing the coastal resources of Flagler County. This is especially true given the limited opportunities for industrial and manufacturing businesses in Flagler County.

Flagler County Comprehensive Plan 2010-2035

Flagler County has extensive water-related recreational activities along the coast of the Atlantic Ocean, Intracoastal Waterway and Crescent Lake. These include parks, boat launches and marinas, ecological learning centers and passive enjoyment areas. There is a SeaRay boat manufacturing plant on the west side of the Intracoastal Waterway, immediately north of SR 100. There is a smaller industrial/commercial boat facility on the east side of the Intracoastal Waterway immediately north of Bing's Landing, a county-owned boat launching park. There are several marinas located along with Intracoastal Waterway that offer fuel, dockage, ship stores, launching and dry-storage.

The economic downturn has severely impacted the boating industry so demand for manufacturing, dockage and related services are in a downturn and not expected to return for the 2010-2015 planning horizon. The limited areas designated for industrial uses also indicates that this will not be a major land use in the 2015 to 2035 planning horizon.

The one component that maintains a constant demand is public boat ramps or launches. These are seasonal and used primarily during weekend hours during the spring and summer. Also beach access (parking and cross-overs, restrooms and showers) will always be in demand especially during the spring and summer months. Flagler County has committed resources for dredging Bing's Landing dredging, purchase of lands, and expansion of county and state beach facilities in the Schedule of Capital Improvements of the Capital Improvements Element.

It is important that the County use land use regulations and proper planning to protect the industrial opportunities available at the County Airport and the area immediately surrounding the SeaRay plant. These two industrial hubs hold great opportunities for potential economic development activities. It is equally important that the types of uses allowed in these areas do not result in negative impacts on adjoining natural resources.

The land use summary tables and map series show that the predominant shoreline land use is residential. The Future Land Use Plan Map foresees that residential will continue to be the predominant land use in this area of the county. Potential conflicts may arise from the siting of public use marinas, as public use marinas are sometimes operated in a manner incompatible with residential neighborhoods. Other water-dependent and water-related recreation facilities, such as beach access points, do not usually create conflicts when located near residential units if the access point is designated properly. Another source of shoreline use conflicts is the limited availability of upland sites bordering on the inter-lagoonal system. Since it is against established policy to alter wetlands to produce additional upland waterfront sites, the required edge/water

dependent development sites will have to be accommodated on the existing waterfront uplands.

C. Areas Needing Redevelopment

Most of the buildings in the coastal area have been built within the last twenty years. Flagler County's coastal areas have no concentrations of rundown structures nor blighted areas. There are isolated individual structures that should be rehabilitated or demolished; however, no neighborhood redevelopment plans are needed at the present time. These individual structures are located primarily in Jose Park, Artesia and Johnson Beach. Additional data on redevelopment needs is found in the Housing Element.

There are older subdivisions on the barrier island that are not designed to meet current requirements for drainage and site development. These are vested and have multiple owners. There will need to be a concentrated effort to address the stormwater flooding issues and other development issues. Although these areas do not appear to be fully blighted needing redevelopment, there are necessary improvement to alleviate the severe flooding.

D. Economic Base

Flagler is not as diversified within the manufacturing sector as some counties, but overall; this sector is strong in Flagler when compared to other Counties in this region and more diversified than St. Johns and Putnam Counties. Volusia still remains a major employer in manufacturing for this region, and it is obvious that many companies there employ workers from surrounding counties as well. This may be of significance to the local economy and should be examined further to discern the reasons which people may live in Flagler County, yet commute to work elsewhere.

The statistics and analysis contained here and in the NEFRC CEDS indicate that in the 2010 to 2015 planning horizon there will relative consistency with past employment trends and opportunities. This is based on the lack of significant change in the employment base within the County during this planning horizon. This trend is expected relative flat-line growth that is occurring throughout the United States. The projected trends indicate that Flagler County needs to ensure that the goals, objectives and policies in the Comprehensive Plan provide the regulatory framework for recruitment of the businesses and industries that will stabilize Flagler County's economy.

Flagler County Comprehensive Plan 2010-2035

Rank	Occupation	Employment		Annual % Change	Average Annual Openings			2009 Average Hourly Wage
		2009	2017		Growth	Separation	Total	
1	Retail Salesperson	6,642	7,903	2.37	158	195	353	13.19
2	Registered Nurse	3,648	4,726	3.69	135	56	191	29.35
3	Waiters and Waitresses	4,958	5,983	2.58	128	255	383	9.84
4	Food Preparation & Serving Workers, Including Fast Food	4,078	5,020	2.89	118	73	181	8.54
5	Customer Service Representatives	3,406	4,193	2.89	98	89	187	12.37
6	Nursing Aides, Orderlies, and Attendants	3,092	3,826	2.97	92	26	118	11.92
7	Office Clerks, General	4,218	4,808	1.75	74	75	149	11.00
8	Cashiers	6,819	7,389	1.04	71	318	389	8.54
9	Landscaping and Groundskeeping Workers	2,553	3,050	2.43	62	32	94	10.79
10	Child Care Workers	2,357	2,82	2.50	59	64	123	9.83

Source: Enterprise Flagler/Florida Agency for Workforce Innovation, Labor Market Statistics Center

Rank	Occupation	Employment		Annual % Change	Average Annual Openings			2009 Average Hourly Wage (\$)
		2009	2017		Growth	Separation	Total	
1	Photographic Process Operator	138	84	-4.89	0	5	5	9.19
2	File Clerks	475	314	-4.26	0	14	14	11.28
3	Farmworkers, Farms and Ranch Animals	127	93	-3.35	0	3	3	NA
4	Computer Operators	81	64	-2.62	0	1	1	18.64
5	Funeral Directors	55	45	-2.27	0	1	1	21.67
6	Baggage Porters and Bellhops	39	32	-2.24	0	1	1	8.48

Flagler County Comprehensive Plan 2010-2035

Rank	Occupation	Employment		Annual % Change	Average Annual Openings			2009 Average Hourly Wage (\$)
		2009	2017		Growth	Separation	Total	
7	Funeral Attendants	48	40	-2.08	0	1	1	9.61
8	Order Clerks	381	320	-2.0	0	8	8	11.17
9	New Account Clerks	124	106	-1.81	0	4	4	13.32
10	Farmworkers and Laborers, Crop, Nursery & Greenhouse	1,185	1,016	-1.78	0	31	31	10.00

Source: Enterprise Flagler/Florida Agency for Workforce Innovation, Labor Market Statistics Center

As with any projected trends, any change in the assumptions can result in significant change. Flagler County has determined that there is a need for flexibility in order to quickly adjust and respond to changes in the local, state and national economy. Target Industries are those industries sought by Flagler County. While all industry is valued and considered on a case by case basis, target industries may have additional advantages or assistance available.

Flagler County Targeted Industries:

1. Manufacturing (NAICS Codes 331-339)
2. Transportation and warehousing (NAICS Codes 481-493)
3. Wholesale trade (NAICS Codes 421-422)
4. Retail trade (NAICS Codes 441-454)
5. Information and data processing services (NAICS Codes 514)
6. Other professional services*
7. Corporate/regional/division headquarters*
8. Research and development facilities*

Source: Enterprise Flagler.

E. Analysis of the Impact of Projected Development

The following table summarizes the theoretical maximum development that could occur within the coastal areas of Flagler County. These total include lands that have been developed so the estimates are exaggerating the actual development that will occur during the 2010 to 2035 planning horizon.

Future Land Use Map Categories	Total Areas	Theoretical Maximum Development	
		Residential (DU's)	Commercial (sq. ft.)
Agriculture & Timberlands	8,897	1,779	
Agriculture	63	3	

Flagler County Comprehensive Plan 2010-2035

Table E-6 Future Land Use Development Analysis			
Future Land Use Map Categories	Total Areas	Theoretical Maximum Development	
		Residential (DU's)	Commercial (sq. ft.)
Commercial: Low Intensity	22	N/A	221,900
Commercial: High Intensity	220	N/A	2,204,000
Conservation	6,227	N/A	N/A
Educational Uses	46	N/A	N/A
Industrial	1,154		11,543,600
Mixed Use: Low Intensity/Low/Med. Density	5,183	36,279	51,825,200
Mixed Use: High Intensity/High Density	399	3,986	3,985,500
Recreation & Open Space	2,100	N/A	N/A
Residential: Low Density Rural Estate 1 du/acre	3,304	3,304	N/A
Residential: Low Density Single Family 1-3 du's/acre	671	2,015	N/A
Residential: Medium Density 4-7 du's/acre	456	3,194	N/A
Residential: High Density 8-10 du's/acre	14	144	
Water bodies	266	N/A	N/A

It is anticipated that the major portion of the population growth will occur east of U.S. #1 and within the urban service area. Much of this growth will likely occur in the City of Palm Coast, Matanzas Shores, River Club and Hammock Dunes DRI developments. Some alteration to wetlands may occur; however, mitigation for wetlands alteration is required.

Development on the barrier island will be more likely to displace native habitat. The dunelands, coastal strand, and hammock associations east of State Road A1A on the beach are the areas more likely to be developed. The beach and dunes seaward of the coastal construction control line are protected by existing regulation, but alteration of terrain and vegetation between the coastal construction control line and State Road A1A should be anticipated. Development is regulated by site plan approved standards contained in the Land Development Regulations.

The county protects beaches and dunes primarily through two ordinances, the coastal building code and the coquina rock protection ordinance. The coastal building code requires buildings to be sited so as not to interfere with the natural shoreline fluctuations and the storm buffering capability and stability of the dunes. The coquina rock protection ordinance prohibits the theft, vandalism and destruction of these rocks not

Flagler County Comprehensive Plan 2010-2035

only because the coquina outcropping is a unique geological formation to the Flagler Beach area but also because the coquina rock assists in protecting the beach from storm erosion.

These beach and dune protection measures appear to be effective. Through coordination and implementation of the coastal control requirements during the DRI review process the approved Hammock Dunes and Matanzas Shores DRI developments were required to preserve almost six miles of beachfront including provisions for limited access and restoration of more than 20 human-made dune cuts.

Large-scale dredge-and-fill of wetlands and submerged lands is not expected due to existing regulations. Some alterations for access and stormwater management will accompany the projected development.

The County's Land Development Regulations have established stormwater drainage provisions to ensure that:

1. new developments are required to manage runoff from the 25-year frequency, 24 hour duration design storm event on-site so that post-development runoff rates volumes and pollutant loads do not exceed pre-development conditions;
2. stormwater engineering design and construction standards for on-site systems are provided;
3. erosion and sediment controls are used during development; and
4. periodic inspection and maintenance of on-site systems is ensured as a condition of system permit approval.

There are several wetlands communities in the coastal area of the county. Extensive ditching has altered many of the wetland areas associated with the mosquito control program.

There are many miles of mosquito ditches constructed in the county to eliminate mosquito-breeding sites. Results show a reduction from greater than 100 bites per minute in the early 1950s to less than 20 bites per minute in the 1980s. Ditching has virtually ceased but should selective ditching become a necessity in the future, such actions must be reviewed and approved by the applicable regulatory agencies

Flagler County will not only continue to comply with current federal, state and regional regulation concerning dredge and fill but has also adopted additional protection, based on local characteristics which are recognized in the county's Wetlands Protection Ordinance.

The projected development will have impacts on species of special status. Since large-scale disruption of wetlands is not foreseen, impacts on the two fish species, most of the wading birds, and the peregrine falcon should be minimal. The woodstorks are still at risk from water level manipulations. Gopher tortoise and indigo snake habitat may experience a decline, especially on the coastal barrier.

In balancing growth and coastal resources, selected application(s) of a variety of mechanisms are being included but not limited to: buffer zones, restoration, limiting density and land use intensity, conservation easements, acquisition, density transfers, transfer of development rights, purchase of development rights or land exchanges.

An indirect impact of development, and the increased recreational use of the beaches, may affect the nesting of sea turtles on the beach. Furthermore, lights from beachfront developments often confuse turtle hatchlings. The increased use of the Intracoastal Waterway will affect the safety of the manatee.

The county has approved regulations aimed at protecting sea turtle nesting areas by prohibiting the disturbance of nests. Furthermore, beach renourishment projects shall protect sea turtle nesting areas by scheduling construction activities in such areas from November to May except during declared emergencies. Manatee protection by the county is anticipated to be the result of inter-governmental coordination in the development of a regional Manatee Protection Plan.

IV. Natural Resource Protection

A. Estuarine Pollution

Flagler County on its northern boundary contains part of the Matanzas River and on its southern boundary part of the Halifax River. These are connected to each other by the Intracoastal Waterway, which is an artificial channel created to establish a continuous waterway. Flagler County's Intracoastal Waterway is an inter-lagoonal canal. The waters that drain from the coastal areas into these lagoons reach the ocean via inlets. No inlets exist within Flagler County. The nearest inlet to the county is the Matanzas Inlet, which is approximately three miles from the northern county line. The Ponce de Leon Inlet is slightly over 25 miles from the southern county line.

Water enters the inter-lagoonal system from streams and canals. Within the county, Pellicer Creek, Club House Waterway, Cimmarron Waterway, and Cochise Waterway connect directly with the inter-lagoonal system while the St. Joe Canal and the Lehigh Canal connect indirectly with the inter-lagoonal system. The Little and Iroquois Canals connect with Bulow Creek.

Pellicer Creek is a relatively small creek that drains one of the watersheds in the Upper East Coast Basin. The Pellicer Creek watershed is predominantly forest with some wetlands.

Club House Waterway, Cimmaron Waterway and Cochise Waterway are all part of a type of waterfront canal layout known as an intertidal development. An intertidal development is constructed by dredge-and-fill between mean low and mean high water. These three salt-water canals are part of a system of canals at the City of Palm Coast. The canal network appears to be a combination of a comb-structured canal system and a finger canal system.

Runoff into the southern portion of the Bellaire Waterway drains into the Lehigh Canal and then travels into the southern end of Graham Swamp and ultimately ends up in the Intracoastal Waterway. The northern portion of the Bellaire Waterway meanders into the Ribbon Lakes and the Mulberry Branch. This portion of the Bellaire Waterway exits at the Intracoastal Waterway as well.

The Little Canal begins approximately at the common corner of sections 19, 20, 29 and 30 in township 12 south and range 31 east, runs eastward under I-95 then northeastward into Graham Swamp and the headwaters of Bulow Creek. The Iroquois Canal begins in the Gore Lake area and flows eastward under I-95 and Old Kings Road then joins with Little Canal.

The Florida Department of Environmental Protection (FDEP), in a report dated June 1986, classified the average overall water quality of the Intracoastal Waterway as fair. The FDEP report stated that the principal pollution sources were sewage treatment plants and nonpoint sources. Since that date, improvements to sewage plants have reduced pollution. The FDEP rated water quality in the Intracoastal Waterway as “good”.

The predominant shoreline land uses are residential and recreational. Much of Flagler County’s estuarine shore areas remain in woodland. Ocean front shorelines are principally occupied by single family development or vacant land. Future land uses planned for shoreline areas are largely residential. Conflicts may arise from the operation of public use marinas in proximity to residential areas, hours of operation, boat and automobile traffic or site maintenance. Setting operation and maintenance standards that respect the privacy of nearby residents, especially during night and

Flagler County Comprehensive Plan 2010-2035

evening hours can reduce conflicts. Similar conflicts can arise between residential use and other recreational uses.

Additional conflicts relating to marina siting arise from the limited number of suitable marina sites in Flagler County. Most of the estuarine shoreline is wetlands. Since it is contrary to established policy to alter wetlands to produce additional upland waterfront sites, the required edge/water dependent development sites will have to be accommodated on existing waterfront uplands.

Continued automobile access to the Atlantic Ocean beaches is another shoreline conflict. Long-term Flagler County residents have grown up enjoying the ability of driving along the beach. However, the ability to maintain auto access points requires breaks in the dune system. In severe storms, dune breaks allow storm tides to breach the dune wall and increase the threat to structures built behind the dune line. In many communities, the dune system is protected not just from cars, but from foot traffic. Over the long term, the community should reconsider the policy of auto traffic on the beach.

Dredge spoil disposal is a potential conflict. This has been addressed through a study prepared by the Florida Inland Navigation District. Three primary sites and three secondary sites have been identified for Flagler County's Intracoastal Waterway. These sites are located optimally along the waterway and have been selected to minimize environmental impacts and the effects on surrounding properties. These sites are shown on Dredge Spoil Disposal Locations map contained in the appendix. The first site is an expansion of an existing easement at approximately Mile 67.5. The second primary site is also the expansion of an existing easement located at ICWW mile 63.74. The third primary site is located at the abandoned Portland Cement Company in the southern part of the county. Additional information regarding these sites can be found in the report Long Range Dredged Material Management Plan for the Intracoastal Waterway in Flagler County, Florida prepared for the Florida Inland Navigation District

Known point sources of pollution with surface water outfalls are shown in the following table.

Table E-7. Water Quality Index Results for Streams and Trophic State Index for Lakes and Estuaries				
	Pellicer Creek (West)	Pellicer Creek (East)	Palm Coast	Tomoka Basin
WQI	54	46	54	54
pH	6.3	6.7	7.5	7.5
ALK	40	57	118	125

Flagler County Comprehensive Plan 2010-2035

BOD	--	1.2	1.4	1.3
TURB	3.0	2.5	7.6	6.8
DO	6.3	4.0	6.3	7.0
DOSAT	61	46	70	75
BD	92	89	89	92
ED	92	93	93	93
WATER BODY	Stream	Stream	Estuary	Estuary
SD	0.2	0.4	0.9	0.9
CHLA	0	1	4	5
TN	1.71	1.44	.81	1.30
TP	.17	.14	.11	.09
TC	--	--	75	21
FC	64	687	15	16
Color	600	700	36	46
TSS	2	2	20	20

Source: Florida Department of Environmental Regulation, 305(b) Technical Appendix, June 1994

For streams: 0-29 is good, 30-59 is fair, 60-100 is poor

For estuaries: 0-49 is good, 50-59 is fair, 60-100 is poor

1. Turbidity: According to Chapter 17-3.061 (3) (r) F.A.C. the maximum allowable turbidity is 29 Nephelometric Turbidity Units (NTUs) above natural background. It is anticipated that the Palm Coast Waterways will have a normal range of turbidities of 1 to 20 NTUs. In 1987 and 1995, overall turbidity values were within the allowable range of 29 NTU above background.
2. Total Phosphate and Orthophosphate: Many Florida waters have high natural concentrations of phosphate due to its phosphorus bearing rocks and soil. Expected maximum orthophosphate concentrations in surface waters of the coastal area are between .1 and .5 and up to 1.0 for the Marineland area. All values were well within these ranges. Total phosphate values were also acceptable ranging from a low of .01 to a high of .18. This range would rate a fair-good EPA surface water quality index.
3. Total Suspended Solids: Suspended solids were within the acceptable range. According to the St. Johns River W.M.D. Technical Appendix to 305(b) Quality Assessment (1994) the typical occurrence ranges between 2 and 26; repeated levels were between 2 and 20.
4. Total Nitrogen: According to Chapter 17-3.121 (19) nutrient concentrations are not to cause an imbalance in the natural populations of aquatic flora and fauna. No mg/l is specified. However, average nitrogen concentrations in surface waters for the Flagler County area range from .81 to 1.71 mg/l.

5. **Biochemical Oxygen Demand:** Biochemical Oxygen Demand (BOD) is “the quantity of dissolved oxygen, measured in milligrams per liter or parts per million, required to stabilize decomposable organic matter by aerobic biochemical action”. Chapter 17-3, F.A.C., states that “BOD-shall not be increased to exceed values which would cause dissolved oxygen to be depressed below the limit established for each class and, in no case shall it be great enough to produce nuisance conditions. Limit values were not available. BOD values in Flagler County range from 1.2 to 1.4 mg/l.
6. **Dissolved Oxygen:** F.A.C. Chapter 17-3 shows a requirement for predominantly fresh class III waters not to be less than 5 mg/l. For predominantly marine and class II waters concentrations are to average not less than 5 mg/l in a 24 hour period and never be less than 4 mg/l. Values below these have been recorded in this data. Lows of 1.40, 1.80, 2.70 and .30 have been recorded at stations #2, #6, #8, and #11 respectively. In general, low water levels, higher water temperatures, lower velocities, higher salinity and lower wave actions contribute to the lowering of dissolved oxygen concentrations. The manner in which the BOD, fecal coliform or nutrients varied in relation to the dissolved oxygen values indicated that “the mechanism controlling DO concentration in the waterways is a natural phenomenon, primarily climatic”.
7. **Total and Fecal Coliform:** For class III waters, Chapter 17-3, F.A.C. requires that fecal coliform shall not exceed a monthly average of 200/100 ml of sample nor exceed 400/100 ml of sample in 10% of the samples nor exceed 800/100 ml on any one day. Total coliform counts involve a particular group of bacteria that are used as indicators of possible sewage pollution. The greater the number of fecal coliform observed the higher the degree of indicated pollution. According to Chapter 17-3 FAC, counts are not to “exceed a total coliform bacteria count of 1,000 per 100 ml as a monthly average, nor exceed 1,000 per 100 ml in more than 20% of the samples examined during any month, nor exceed 2400 per 100 ml at any time.” Final recorded sample values for total and fecal coliforms were within standards.
8. **Chlorophyll:** This is a parameter used in the determination of the level of eutrophication. Chapter 17-3 FAC does not indicate a surface water quality standard. It has been known that when values reach 25 ug/l the water takes on a pea green color.

B. Trend Analysis

In general, urbanization in Flagler County is resulting in degradation of the surface water systems. This is most evident in the City of Palm Coast.

		Parameters				
Water Body	Meets Use?	Overall	WQI/TSI	Degrading	Improving	Stable, or no data
Tomoka Basin	Partial	Insuff. data	Fair	Insufficient data		
Palm Coast	Partial	Degrading	Fair	Chlorophyll	Alkalinity, Turbidity	All other parameters
Hulett Branch	Yes	Insuff. Data	Good	Insufficient data		
Pellicer Creek	Partial	Stable	Fair	None	None	All other parameters
Stevens Branch	Partial	Insuff. Data	Fair	Insufficient data		

Source: Northeast Florida District Water Quality Assessment, 1994 305 (b) Technical Appendix, Florida Department of Environmental Protection, pp 34-35

New Point Sources: The data and analysis for the Infrastructure Element indicates that there no new facilities using surface water discharge.

Exact locations of new wastewater treatment plants cannot be determined; however, the Future Land Use Element makes clear that county policies require central water and sewer systems for residential developments exceeding a density of one unit per acre. The General Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Aquifer Recharge Element further clarifies what requirements must be met should interim water and wastewater facilities and package plants be permitted in the Urban Service Area. One requirement is that a plan for short-term assimilation to the nearest area-wide system (including a method for financing tie-in) be submitted and approved by Flagler County.

Insufficient information on the type and specific location of new industries is available to project new industrial point sources of estuarine pollution. New development must meet standards for pre-treatment of discharges to reduce or eliminate pollution from new land uses.

Marina sites may be considered as a point source of estuarine pollution due to the potential for spills of petroleum products, disposal of untreated sewage, and concentrations of heavy metals in bottom sediments. Previous concerns over the use of tributyltin (TBT) paints which retard the fouling of boat hulls by marine organisms have been alleviated. Use of this paint is restricted to vessels over 65 feet in length.

Flagler County Comprehensive Plan 2010-2035

Reported concentrations of TBT in waters associated with dry dock discharges has prompted discussions to include TBT monitoring in federal National Pollution Discharge Elimination System (NPDES) permitting for dry docks under the Clean Water Act.

Analysis of Needed Remedial Actions: Wastewater treatment plants with histories of operation problems need to be repaired or replaced. Retrofit of existing facilities to dispose of effluent by means other than surface water outfall should be programmed as part of ongoing facility improvements. New surface water outfalls are discouraged due to the limited flushing that occurs in the lagoonal system of Flagler County. Special care must be taken when considering surface water outfalls in the north or south ends of the county as both these areas contain aquatic preserves and outstanding Florida waters.

Coastal high-hazard areas shall be flood proofed, raw sewage shall not leak from sanitary sewer facilities during flood events, and new septic tanks shall be fitted with back flow preventors.

For those areas where septic tanks have caused documented environmental problems, connections to centralized wastewater and water systems will be required within one year from the date of notice.

Direct discharge of untreated stormwater runoff into Class II or Outstanding Florida Water shall be prohibited.

As the amount of urbanized land in the county increases, the amount of non-point source pollution entering the lagoonal system will increase. The county should increase efforts to control illegal dumping in the drainage facilities, make proper disposal more convenient, clean up trash, and require home owners to dispose of grass clippings and other yard debris properly.

Marinas are another potential source of pollution to the lagoonal system. Marinas should be designed to allow maximum flushing of the boat basin. The use of dry storage should be encouraged, as this reduces the amount of heavy metals and petroleum products released to the waters. The water of the marina and the surrounding waters should be of sufficient depth to allow the operation of boats without stirring up bottom sediments.

Evidence from marinas in other parts of the state suggests that sediments below marinas are often contaminated. As these contaminants are trapped in sediments they

do not normally cause problems for other areas of the lagoonal system. However, if dredging disturbs sediments, the contaminants are released. Dredging and other activities that disturb the lagoonal system bottom should be carefully managed in marinas and near the mouths of the canals to insure that proper studies of contaminants are completed, siltation is minimized, and the dredged material is disposed of on upland sites.

Improper boating activities can cause water turbulence and cut trenches which disrupt the circulation patterns and further degrade the overall ecosystem. Establishment of proper navigational channels and no-wake zones can limit damage to waterways.

In an effort to control the impacts on estuarine water quality, wetlands and submerged lands, new (and where applicable, expanded) marinas and multislip docking facilities (three or more slips) should conform to the following criteria:

1. new public use marinas shall be allowed only in commercial zoning districts;
2. marinas and multislip docking facilities must provide vehicular parking and sewage pumpout facilities or contracted service. Overnight use requires on-shore sanitary facilities;
3. all parking, dry storage, and non-water dependent facilities should be built on existing uplands and shall not be built on functioning wetlands;
4. marinas and multislip docking facilities shall prepare hurricane plans which describe measures to be taken to control damage to marina sites, neighboring properties, and the environment; this hurricane plan shall be reviewed and approved by the Emergency Preparedness Director (also applies to expanded facilities);
5. dryslip use shall be encouraged in order to control impacts on water quality, and control the area's extent of disturbance of the inter-lagoonal system;
6. fueling facilities associated with marinas shall be designed to contain spills from onland equipment and shall be prepared to contain spills in the water. New or expanded facilities must have a fuel management/spill contingency plan prior to the operation of the marina fueling facility; and
7. new or expanded marinas shall not be located in aquatic preserves, Class II waters or Outstanding Florida Waters.

The county should protect its natural drainage features by ensuring that all future development implements stormwater management systems compatible with existing master surface water management plans.

State pollution regulation is largely vested in the Florida Department of Environmental Protection (FDEP). 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.

FDEP and the water management districts regulate the withdrawal, diversion, storage, and consumption of water with the water management districts responsible for most of the permitting and operational aspects.

The 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, marine or wildlife, or other natural resources”. Deeds or leases may contain restrictions on dredging or filling.

The FDEP is also responsible for managing aquatic preserves around the state. These preserves are state owned submerged lands that 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 preserves. The two aquatic preserves in Flagler County are the Tomoka Marsh Aquatic Preserve and the Pellicer Creek Aquatic Preserve.

The FDEP 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 that are vital for estuarine water quality.

The Department of Health and Rehabilitative Services administers a mosquito control program. This program sets limits on the types and amounts of oil and chemicals used to control mosquitos. 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 St. Johns River Water Management District. The district is responsible for flood control and drainage structures and therefore responsible for the quantity and timing of much of the fresh water delivered to the estuary. The district is also responsible for certain regulatory activities delegated from FDEP. Chief among these is stormwater permitting. The districts were 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 districts to purchase environmentally sensitive lands, and by preserving them improve the quality of the fresh water entering the estuary.

The Northeast Florida Regional Planning Council, along with the Department of Community Affairs, has 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 the council 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 area, extent, and they have their own taxing authority. The 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.

The county through its police power regulates numerous activities that impact estuarine water quality. The county controls land use through zoning and comprehensive planning, and enforces site planning and subdivision requirements.

C. Beach and Dune Systems

Beaches: Flagler County has approximately 18 miles of open ocean shoreline. Beach widths range from 30 feet (northern 3 miles of the county) to 150 feet above low tide in other parts of the county. The beaches are steeply sloping for the most part with a high content of shell fragments attributed mostly to a large offshore coquina outcrop known as "The Rocks".

A study by the Division of Beaches and Shores indicated that both temporary and permanent advance and recessions were taking place on the county's shoreline. Erosion was dominant for the period 1872-73 to 1923-24. Following this was a dominant accretional period from 1923-24 to 1956. The Division's 1972 and 1986-87 survey showed that the county has a net erosion of 421,500 cubic yards above mean sea level (NGVD). The larger part of this eroded material (86%) has been attributed to storm damage in the period between 1984 and 1986-87. Severe erosion occurs in the area around Marineland where shoreline recession is threatening the buildings.

Taking into consideration such primary concerns as flood risk, beach erosion, and evacuation difficulty, it was concluded that 8.2 miles of the Flagler shoreline (beginning at the Flagler-St. Johns Counties' line and running southward) are considered "high risk" areas in terms of developable land and that the remainder of the shoreline (down to Volusia County) was considered "moderate risk". The Thanksgiving Holiday storm of 1984 resulted in severe erosion to the shoreline of Nassau, St. Johns, and Flagler Counties. This storm resulted in the average loss of sand of 4.13 cubic yards per foot in Flagler County. Many of the dune walkovers were damaged with the greatest loss being in the Flagler Beach area.

Dunes: Flagler County has a single dune ridge with an average elevation of 10 to 15 feet in the northern 6.5 miles of the county. The dune ridge is broken in several places from that point south to a point about 6 miles north of Flagler Beach. A continuous dune line runs from there to the south county line. From a point beginning about 3 miles north of Flagler Beach and continuing south to the county line, a series of regular dune ridges appear behind the outer dune ridge. Most of these ridges are of elevation 10 to 15 feet but some exceed 20 feet.

Impacts of Coastal and Shore Protection Structures on the Beach: The county does not own nor maintain coastal or shore protection structures. The only beach erosion control structure is located in the city of Flagler Beach (between South 17th Street and South 19th Street) and consists of 1,500 feet of rock dumped as emergency protection for State Road A1A. These rocks were dumped by the Florida Department of Transportation following the "Thanksgiving Day Storm" of 1984, creating a simplified revetment. There is no countywide analysis of the impact of this revetment on the county's beaches.

Existing and Potential Beach Renourishment Areas: The U.S. Army Corps of Engineers in their Reconnaissance Report noted that of the entire 18 miles of ocean shoreline in

Flagler County Comprehensive Plan 2010-2035

Flagler County, special emphasis was placed on the portion of the shoreline located within the city limits of Flagler Beach due to its higher level of development and lack of protective dune structure.

Economic justification has been a major consideration in the development of Civil Works projects since the Flood Control Act of 1936. All significant aspects of the overall public interest, including engineering feasibility, economic, social, and environmental effects were considered. It was recommended that the Flagler County, Florida shore protection study be terminated due to a lack of economic justification for expanded feasibility scope studies.

Analysis of Beach and Dune Protection Measures: State and local government currently handle Beach and dune protection in Flagler County. The state administers the coastal construction control line program and thirty-year erosion setback. FDEP regulates all development seaward of the coastal construction control line to ensure that the proposed development has minimal impact on the beach and dune system and can survive a major storm. As a part of the coastal construction permitting process 30 years worth of erosion must be considered, and Florida law prohibits (with limited exceptions) construction of buildings that will be in the water in 30 years. FDEP's jurisdiction is limited to areas seaward of the coastal construction control line. The control line for Flagler County was originally set in 1972 and reset in 1988. State law also prohibits driving on dunes and picking seaoats.

The county protects beaches and dunes primarily through two ordinances: the coastal building code and the coquina rock protection ordinance. The coastal building code requires buildings to be sited so as not to interfere with the natural shoreline fluctuations and the storm buffering capability and stability of the dune shall not be diminished. The coquina rock protection ordinance prohibits the theft, vandalism and destruction of these rocks not only because the coquina outcropping is a unique geological formation to the Flagler Beach area but also because the coquina rock assists in protecting the beach from storm erosion.

These beach and dune protection measures appear to be working fairly well. For example, through coordination and implementation of the coastal control requirements during the DRI review process, the recently approved ITT Hammock Dunes and Matanzas Shores DRI developments were required to preserve almost six miles of beachfront including provisions for limited access and restoration of more than 20 human-made dune cuts.

D. Archaeological and Historic Resources of the Coastal Area

Most of the known archaeological and historic resources of the county occur in the coastal area. There are 39 total sites on the Florida Master Site File, as of 1998. Thirty of these are in the coastal area of the county. All are archaeological sites except for the Marine Studios located at Marineland, which is an historic structure site. Of the 29 archaeological sites, 24 are prehistoric and five are historic. The most often-encountered site type is the prehistoric shell midden. Table 12 is based on the Master Site File and lists the sites in the coastal area. The county does not identify or designate historic sites.

Site#	Map#	Name	Prehistoric (P) Historic (H)
8FL00002	2	Duponts Mound	(P)
8FL00003	3	Rhotan Midden	(P)
8FL00004	4	Rhotan Mound	(P)
8FL00005	5	Bon Terra Farm	(H)
8FL00006	6	Marineland Midden	(P)
8FL00007	7	Bulow Plantation Ruins	NR
8FL00010	10	Homestead Midden	(P)
8FL00011	11	Washington Oaks Midden	(P)
8FL00012	12	Wadsworth Midden	(P)
8FL00013	13	Eatman Mound	(P)
8FL00015	15	Palm Coast Midden	(P)
8FL00016	16	Benton Mound	(P)
8FL00017	17	Bellemead 4	(H)
8FL00018	18	Bellemead 5	(P)
8FL00019	19	Bellemead 6	(P)
8FL00020	20	Bellemead 7	(P)
8FL00022	22	Pond East	(P)
8FL00023	23	Pond West	(P)
8FL00024	24	Jungle Hut	(P)
8FL00025	25	Hernandez Mound	(P)
8FL00026	26	Mala Compra	(H)
8FL00027	27	Maker Midden	(P)
8FL00028	28	Big Mulberry Branch	(H)
8FL00030	30	Waterway Midden	(P)
8FL00031	31	Pirates Cove Midden	(P)
8FL00032	32	Southern Midden	(P)
8FL00037	37	F-7	(P)
8FL00038	38	F-8	(P)
8FL00039	39	F-9	(P)

Flagler County Comprehensive Plan 2010-2035

Table E-9: Known Archeological and Historic Sites

Site#	Map#	Name	Prehistoric (P) Historic (H)
8FL00041	41	Marine Studios	NR

Source: Florida Department of State, 1988

In 1987 the Historic Property Associates, Inc. of St. Augustine, Florida, conducted an historic properties survey. Of the historic buildings surveyed countywide, 17 were considered potentially eligible for the National Register of Historic Places. Those located in the coastal area are shown in Table 10.

As of January 1998, Flagler County has two sites listed on the National Register of Historic Places. These are Bulow Plantation Ruins and the Marine Studios (Map 6b). There are no designated historical districts.

Table E-10. Coastal Area Sites Potentially Eligible for the National Register of Historic Places

Address/Location	Locale	Date	Style
Northeast Flagler County	Princess Estate	1887	Masonry Vernacular

Source: Flagler County Historic Properties Survey, 1987

Impact of Future Land Use on Archaeological and Historic Resources: The archaeological and historic sites listed are protected to a limit by Florida law. Those properties on state-owned upland or submerged lands receive the highest level of protection. In order for a privately owned site to receive state protection, the proposed project must be a development of regional impact, electrical power plant, or a federally funded project. The state may also buy historic properties or designate an area of critical state concern based on historic importance.

Given the limited ability of state law to protect archaeological and historic sites on private property, all of these sites should be considered endangered, especially prehistoric sites on the shoreline (which are often higher ground, hence are preferred building sites).

Sites 8FL00002, 8FL00005, 8FL00010, 8FL00013, 8FL00015, 8FL00016, 8FL00022, 8FL00023, 8FL00024, 8FL00025, 8FL00027, 8FL00028, 8FL00030, and 8FL00031 are all located within the Palm Coast Community Development Zone, while site 8FL00039 is in Flagler Beach and sites 8FL00006 and 8FL00041 are at Marineland. Site 8FL00037 is on land under ICDC ownership. Sites 8FL00003 and 8FL00004 are in the vicinity of

the Princess Estate while 8FL00012 is actually on the estate. Site 8FL00026, which has recently been surveyed, is in the area of the Hammock Community.

Possible options to protect those sites which are not under state protection, not within approved DRIs or not within incorporated areas (those areas outside county jurisdiction) from development or redevelopment activities include: 1) changing the land use plan to reduce density around the sites, 2) using allowable lower density zoning of the sites within higher density plan areas, 3) purchasing the sites, 4) allowing transfer of development rights away from the sites, or 5) require the historic site be incorporated in required site open space.

More specifically, efforts will be made for historic resources on private property to be protected, preserved or used in a manner that will allow their continued existence.

As an alternative to preserving historic or archaeological sites, the owner may allow excavation of the site by the Division of Historic Resources or their approved alternate prior to development. Should a site be scientifically excavated, then development may proceed without preserving the site.

For any of those proposals to work, the county will have to review all proposed subdivision and site plans for the presence of known sites and the county land development regulations will have to specifically address protection of historic and archaeological resources.

Sites 8FL00011 and 8FL00032 are located in the Washington Oaks State Gardens and sites 8FL00007, 8FL00017, 8FL00018, 8FL00019, 8FL00020 and 8FL00038 are located in Bulow Creek State Park. These sites are protected to the maximum extent possible. Site 8FL00026 is a part of Bings Landing County Park

V. Emergency Management

A. Hurricane Evacuation

The following table provides a conservative estimate of the total seasonal population and permanent population residing within the CHHA to the year 2035. The permanent population is based on the traffic analysis zone data from the Central Florida Regional Planning Model. This shows that population within the CHHA is approximately 80% of the total unincorporated population. This is the highest level shown in the 25 years of the model, so it was used to provide conservative estimates for all of the 5-year planning periods. The seasonal and tourist population are county-wide estimates, but for planning purposes, these are assumed to be included in the County's jurisdiction. The Flagler County Peacetime Emergency Management Plan identifies that there is

Flagler County Comprehensive Plan 2010-2035

sufficient shelter space through the 2010-2015 planning horizon. The demand for shelter space will increase over the 2015-2035 planning horizon, but there are plans for potential expansion of shelter space to accommodate this increase in demand.

Table E-11. Population Residing Within CHHA Flagler County				
Year	Tourist Population	Seasonal Population	Permanent Population	Total Population within CHHA
2010	7,935	3,292	9,778	21,005
2015	8,978	3,724	11,297	23,999
2020	10,158	4,214	13,113	27,485
2025	11,493	4,767	14,881	31,141
2030	13,003	5,394	16,569	34,966
2035	14,712	6,102	18,145	38,959

Source: Flagler County Planning and Zoning Department,

There are a number of locations in Flagler County that are available for use as shelters during a hurricane event. The Flagler County Emergency Management office is tasked with maintaining an adequate inventory of hurricane shelters for current and future residents. Table 18 below lists the hurricane evacuation shelters that are currently available to County residents.

Table E-12 Alternate Shelter Space	
Bunnell Area	
Central Baptist Church State Road 100 Bunnell, FL 32010 437-2287	The Church of God Deliverance South Anderson Street Bunnell, FL 32010 437-3644
Church of God in Christ South Church Street Bunnell, FL 32010 - 252-2108	The Church of God (Korona) Star Rt. Box 102 Bunnell, FL 32010
Church of Jesus Christ of Latter Day Saints 500 West Pine Street Bunnell, FL 32010 437-2137	First Baptist Church of Bunnell S. Pine and East Moody Blvd. Bunnell, FL 32010 437-3364
First United Methodist Church of Bunnell Lambert Avenue Bunnell, FL 32010 437-3258	Flagler Church of Nazarene E. Highway 100 Bunnell, FL 32010 445-5331
Praise Assembly of God State Road 100 Bunnell, FL 32010	Kingdom Hall of Jehovah's Witness Trella Reed Bunnell, FL 32010 - 437-2121
Faith Temple Pentacostal Church 4 th Street Bunnell, FL 32010	St. James Baptist Church U.S. #1 South Bunnell, FL 32010

Flagler County Comprehensive Plan 2010-2035

437-2396	437-2134
St. Paul Baptist Church Espanola Bunnell, FL 32010 437-2188	St. Stephens Catholic Church State Road 100 Bunnell, FL 32010 445-2246
St. Thomas Episcopal Church 1 mile west of I-95 on S.R. 100 Bunnell, FL 32010 437-2697	
Korona Area	
St. Mary's Catholic Church U.S. #1 South Bunnell, FL 32010 439-2791	
<u>City of Palm Coast Area</u>	
First Baptist Church of Palm Coast 301 Palm Coast Parkway Palm Coast, FL 32037 445-2020	Mother Seaton Catholic Church Belle Terre Parkway Palm Coast, FL 32037 445-2246
Palm Coast United Methodist Church Belle Terre Parkway Palm Coast, FL 32037 445-1600	St. Mark by the Sea Lutheran Church 303 Palm Coast Parkway Palm Coast, FL 32037 445-3420
Temple Beth Shalom Casper Drive Palm Coast, FL 32037 445-3464	Trinity United Methodist Church 156 Florida Park Drive Palm Coast, FL 32037 445-4757
L.E. Wadsworth Elementary 4550 Belleterre Blvd. Palm Coast, FL 32037 445-1804 (presently under consideration as a primary shelter)	

Source: Flagler County Comprehensive Emergency Management Plan, 1998

The evacuees will seek shelter through a variety of means; some will leave the county; others will stay with friends and relatives in less vulnerable parts of the county; some will check into hotels or motels; and others will have to rely on public shelter.

The Study also provided data and analysis on the principal evacuation routes and the constraints on these routes. Palm Coast Parkway and S.R. 100 between I-95 and S.R. A1A are critical links for evacuation.

Table E-13. Vulnerability Analysis for Segments of Low Lying Coastal Roadways and Low Bridge Approaches

The main evacuation route leading inland from the coast is described as follows: STATE ROAD 100 FROM FLAGLER BEACH WEST TO BUNNELL		
Centerline Elevations (feet)	Vulnerability Analysis	Location/Distance
18.57	Cat. 4	Intersection with S.R. A1A
10.68	Cat. 4	500 feet W. of A1A
8.00	Cat. 4	1,000 feet of A1A
8.00	Cat. 4	2,000 feet of A1a
8.00	Cat. 4	E. bridge approach

Flagler County Comprehensive Plan 2010-2035

Table E-13. Vulnerability Analysis for Segments of Low Lying Coastal Roadways and Low Bridge Approaches

The main evacuation route leading inland from the coast is described as follows:

8.00	Flood Prone	W. bridge approach
15.00		2,000 ft. W. of Intracoastal
13.96		1 mile W. of Intracoastal Waterway
13.00		6,000 feet W. of bridge
12.00	Flood Prone	7,000 feet W. of bridge
17.56		10,000 feet W. of bridge
21.44		2 miles W. of Intracoastal Waterway
26.60		2 miles W. of Intracoastal Waterway
27.35		4 miles W. of Intracoastal Waterway
28.00		5 miles W. of Intracoastal Waterway
27.50		6 miles W. of Intracoastal Waterway
23.50		7 miles W. of Intracoastal Waterway
20.08		Intersection with US-1
7.38	Cat. 1 and Flood Prone	At St. Johns County line
9.19	Cat. 1 and Flood Prone	1 mile S. of County line
8.35	Cat. 3	2 miles S. of County line
7.47	Cat. 3	3 miles S. of County line
8.06	Cat. 4	4 miles S. of County line
10.85	Cat. 4	5 miles S. of County line
10.97	Cat. 4	6 miles S. of County line
12.20	Cat. 4	7 miles S. of County line
15.45	Cat. 4	8 miles S. of County line
11.68	Cat. 3	9 miles S. of County line
9.50	Cat. 2	10 miles S. of County line
9.41	Cat. 2	11 miles S. of County line
17.67	Cat. 2	12 miles S. of County line
21.84	Cat. 4	12 miles S. of County line
20.68	Cat. 5	14 miles S. of County line
18.57	Cat. 5	Intersection with SR-100

Centerline elevation on State Road A1A connecting from the Volusia County line north to Flagler Beach appears to be a constant 19 feet. It would take the surge of a Category 5 landfalling hurricane (striking 90 degrees relative to coastline) to overwhelm this route.

Another hurricane evacuation issue is clearance times. This term refers to the time required to clear the roadway of all vehicles evacuating in response to a hurricane situation. Clearance time begins when the first evacuating vehicle enters the roadway and ends when the last evacuating vehicle reaches an assumed point of stage. The 1998 Hurricane Evacuation Study found that in Flagler County, clearance time ranged from 6 and 3/4 hours for Category 1 hurricanes to 13 hours for a Category 4-5 hurricane. The minimum bridge clearance time from the coastal barrier is estimated at 6 hours for the S.R. 100 fixed bridge at Flagler Beach.

Two special need groups should be mentioned. The first group is the elderly. A large portion of the 65 and over age requires assistance in evacuating potential flood areas usually because of restriction on their operation of automobiles.

The other special need group is patients of medical institutions. There is one hospital and one nursing home in the county. Neither the Coastal Community Hospital nor the Meadowbrook Manor of Flagler nursing home is located in the hurricane vulnerability zone.

B. Post Disaster Planning Concerns and Coastal High-Hazard Areas

Following a major hurricane, there is a period of cleanup and rebuilding. The typical reaction is to rebuild everything to the condition that existed before the storm. Rebuilding to pre-storm conditions may be imprudent and result in repeated damage to the same structures. The vulnerability of certain areas to damage by hurricanes or other storms should not be ignored, rather it should be used to revise land use and capital facilities plans in order to reduce the inconvenience and dislocation caused by storms. In order to respond quickly after a storm with alternative land use and capital facility plans, it is necessary to examine in advance the areas, structures, and facilities most likely to be damaged and provide alternates to current land use plans and facility sites which can be adjusted following a storm event.

The minimum statutory boundary of the Coastal High-Hazard Area is the Level 1 evacuation zone. However, the minimum statutory boundary of the hurricane vulnerability zone is the Level 3 evacuation zone. Because of the orientation of the Florida Peninsula and the location of Flagler County on the northeast coast, the county has received fewer direct hits from hurricanes than does the rest of the state (National Weather Service Information). The most recent storm of hurricane intensity to strike the northeast Florida coast in the last 100 years was Hurricane Dora (1964). There is no data regarding areas that have historically experienced destruction or severe damage. FEMA designated "V" zones and there are no inlets in the county.

State Road A1A runs south from the St. Johns County line on the eastern edge of the barrier island. At the northern end of Washington Oaks State Gardens, A1A curves westward and runs south to approximately six miles to the northern end of Fox Cut. In the Fox Cut area the Level 1 evacuation zone runs along A1A down to the northern end of Painters Hill where A1A curves east. A1A continues to form the boundary of the coastal high hazard and for the most part down to the Volusia County line.

Segments of both Palm Coast Parkway S.R. 100 run toward the coastline through the level and flooding areas with the S.R. 100 fixed bridge being located entirely in the level flooding area. The Hammock Dunes Bridge will offer temporary relief to evacuations.

Flagler County Comprehensive Plan 2010-2035

No county owned or maintained coastal or shore protection structures exist at this time in Flagler County. The location of the CCCL as of 1988, shows that several areas on the coastline have structures in the coastal high-hazard area located seaward of the CCCL. This includes parts of Marineland, Beverly Beach, Flagler Beach and unincorporated enclaves where several motels, restaurants, and single-family structures are in the high-hazard area.

The Future Land Use Element indicates that a strong urban development activity in Flagler County occurs in the coastal area and is due to three factors:

1. proximity to recreation amenities on the Atlantic Ocean and Intracoastal Waterway;
2. excellent arterial access provided by State Road A1A, Interstate 95, and State Road 100; and
3. the provision of water and sewer services by the city of Flagler Beach and the City of Palm Coast.

For the coastal area, the year 2035 projected spatial distribution shows the densest concentrations being in the city of Flagler Beach and the incorporated Palm Coast communities of Palm Harbor, Woodlands, Matanzas Shores, Hammock Dunes, Sea Colony and River Club.

It is anticipated that most of the northern coastline areas contiguous to the high-hazard areas will have low density residential use (1 to 3 d.u./acre) while the southern coastline areas contiguous to the high-hazard areas from Beverly Beach through Flagler Beach down to the Volusia County line will have a medium to high density residential use (4 to 12+ d.u./acre). This comprehensive plan proposes few new public facilities in the coastal high-hazard area. The facilities proposed for the coastal high-hazard area are public access and recreation facilities. By their nature, these facilities must be located in the coastal high-hazard area.

Based on past experience, the area most likely to be severely damaged in a storm would be mobile home developments and the developed coastal barrier area. The barrier island area is subject to attack by frequent northeasters during winter and hurricanes and tropical storms during summer. On the coastal barrier there are three incorporated areas (Marineland, Beverly Beach, and Flagler Beach), several unincorporated enclaves, Washington Oaks State Gardens and Flagler Beach State Recreation Area. Most of the enclaves contain single family residences. Following a major storm the county has several options. The first item that must be decided is the threshold of damage beyond which the county will start to consider alternatives to the

existing situation. Damage equal to or greater than 50 percent of the value of the structure is the standard used by the National Flood Insurance Program and is a good standard for the county to use. Once a structure suffers damage greater than 50 percent of its value, the county requires the owner to comply with existing codes and regulations, including the CCCL. Structures seaward of the control line are recommended to be rebuilt landward of the control line. The county may also consider buying the most severely damaged structures and their lots. Because the majority of the most vulnerable structures are single family homes, the cost would be less than multi-family residential or commercial property.

The state owned property of the coastal barrier presents no problem in the regulation of structures. The vulnerable structures in this area are the park facilities and State Road A1A. Responsibility for repairing or replacing these facilities belongs to the state. S.R. A1A is a state road that runs very close to the shoreline at Marineland, and from Beverly Beach through Flagler Beach down to the Volusia County line. This state road has a potential to be washed out. It is used primarily for residential access and as a scenic drive. It is the only through street which traverses the length of the barrier island. In some areas, S.R. A1A is located on such a narrow neck of land that few options exist for re-siting the road. The current routing resulted in the road being placed mostly on filled wetlands. Options available to mitigate future storm damage to the road include:

1. armoring the shoreline adjacent to the road;
2. closing vulnerable sections to through traffic and diverting traffic to parallel streets; and
3. reconstruction of the roadway on a less vulnerable alignment.

Option 1 has high construction and maintenance costs and may induce environmental problems. Option 2 has a relatively low cost but would have extensive socio-economic impacts. If the damage is extensive, access to some lots may be disrupted and the scenic route would become disjointed. Option 3 would require a full investment analysis by the Florida Department of Transportation.

VI. Public Access

The following table summarizes the parks or facilities that offer public access to saltwater beaches and shorelines. The information shows that Flagler County is well supplied with access to coastal resources. Most of the access is supplied by the public sector; however, the majority of marinas are provided by the private sector.

Flagler County Comprehensive Plan 2010-2035

Table E-14. Existing Public Access Facilities			
Name	Map Number	Public Access Facilities	Available Parking
CITY OF FLAGLER BEACH			
N. 23 rd Street	P300	Walkover	10**
N. 22 nd Street	P301	Walkover	10**
N. 21 st Street	P302	Walkover	10**
N. 20 th Street	P303	Walkover	10**
N. 19 th Street	P304	Walkover	10**
N. 18 th Street	P305	Walkover	10**
N. 17 th Street	P306	Walkover	10**
N. 16 th Street	P307	Walkover	10**
N. 15 th Street	P308	Walkover	10**
N. 14 th Street	P309	Walkover	10**
N. 13 th Street	P310	Walkover	10**
N. 12 th Street	P311	Walkover	10**
N. 11 th Street	P312	Walkover	10**
N. 10 th Street	P313	Walkover	10**
N. 9 th Street	P314	Walkover	10**
N. 8 th Street	P315	Walkover	10**
N. 7 th Street	P316	Walkover	10**
N. 6 th Street	P317	Walkover	10**
N. 5 th Street	P318	Walkover	10**
N. 4 th Street	P319	Walkover	10**
N. 3 rd Street	P320	Walkover	10**
N. 2 nd Street	P321	Walkover	10**
Launch Ramp	P322	Drive Over	20**
Moody Blvd. - SR 100	P323	Walkover	20**
S. 2 nd Street	P351	Walkover	10**
Pier Walkover	P352H	Walkover	20**
S. 3 rd Street	P353	Walkover	20**
S. 4 th Street	P354	Walkover	20**
S. 5 th Street	P355	Walkover	20**
Boat Launch Ramp	P356	Drive Over	10**
S. 6 th Street	P357	Walkover	10**
S. 7 th Street	P358	Walkover	10**
S. 8 th Street	P359	Walkover	10**
S. 9 th Street	P360	Walkover	10**
S. 10 th Street	P361	Walkover	10**
S. 11 th Street	P362	Walkover	10**
S. 12 th Street	P363	Walkover	10**
S. 13 th Street	P364	Walkover	10**
S. 14 th Street	P365	Walkover	10**
S. 15 th Street	P366	Walkover	10**
S. 16 th Street	P367	Walkover	10**

Flagler County Comprehensive Plan 2010-2035

Name	Map Number	Public Access Facilities	Available Parking
S. 17 th Street	P368	Walkover	10**
S. 18 th Street	P369	Walkover	10**
S. 19 th Street	P370	Walkover	10**
S. 20 th Street	P371	Walkover	10**
S. 21 st Street	P372	Walkover	10**
S. 22 nd Street	P373	Walkover	10**
S. 23 rd Street	P374	Walkover	10**
S. 25 th Street	P375	Walkover	10**
S. 26 th Street	P376	Walkover	10**
S. 27 th Street	P377	Walkover	10**
S. 28 th Street	P378	Walkover	10**
Flagler Beach State Park	P380H	Walkover	40
Palm Drive	P384	Walkover	10**
Ocean Palm North	P386	Walkover	10**
Ocean Palm South	P387	Walkover	10**
County Line	P388	Walkover	10**
MID-COUNTY BEACHES			
Ocean Front Camping	Q210	Walkover	50*
Camptown	Q220	Walkover	90*
Beverly Beach	P230	Walkover	10**
NORTH COUNTY BEACHES			
Marineland	Q102	Walkover	50*
Quality Inn	Q106	Walkover	60*
Washington Oaks State Park	P110H	Walkover	40
Malacompra Road	P120H	Walkover & Drive Thru	144
16 th Road	P130H	Walkover & Drive Thru	0
Bay Drive (U)	P140	Walkover	0
Jungle Hut Road	P150	Walkover & Drive Thru	33
Varn Park	P170H	Walkover & Drive Thru	61

Note: P = Public, Q = Quasi-Public, ** = Parking adjacent road right of way, * = Parking adjacent but not public owned,

U = Undeveloped, H = Handicap access

Source: Department of Parks and Recreation, Flagler County and City of Flagler Beach

Type	Public	Private	Total
Saltwater Beach (miles) (10 sites)	6.09	6.23	12.32
Saltwater Fishing Piers (linear feet) (1 site)	400	0	400
Saltwater Fishing Board Walks (linear feet) (1 site)	0	80	80
TOTAL Non Boat Fishing (linear feet) (2 sites)	32555.2	32974.4	65529.6
Saltwater Boat Ramp Lanes (7 sites)	2	5	7
Saltwater Marina Slips (7 sites)	4	335	339

Flagler County Comprehensive Plan 2010-2035

Type	Public	Private	Total
Saltwater Dry Storage (slips)	0	220	220
Scenic Facilities or Roads (sites)	7	0	7

Source: DEP, Division of Recreation and Parks, 1986 Statewide Supply of Outdoor Recreation Resources and Facilities by Major Supplier in Florida, Berryman & Henigar, 1998

The county has a total of 68 total public access points, 66 dune walkovers (4 of these also have drive-thru capability), and launch ramps (with drive over ability). The access points are not distributed uniformly throughout the county. Most of the access points are in Flagler Beach.

The supply of parking for these facilities seems to be adequate. There are approximately 1,234 parking spaces within 100 feet of the access points. These spaces should accommodate around 10,000 beach goers in a day (assuming four persons per car, and a turnover rate of 2). The DNR's regional estimates showed an approximate 5% increase in total demand (thousands of user occasions) from 1985 to 1990 (6,815 - 7,173) and an approximate increase of 4% from 1990 to 1995 (7,173 - 7,450). Using DNR's estimates of user occasions, another increase of 15% occurring from 1995 to the year 2010 would still have adequate available parking spaces.

Flagler County's Recreation and Open Space Element provides information on the need for future saltwater beaches, non-boating fishing facilities and saltwater boat ramps through the year 2010. Regarding future needs for boat slips, the DNR study, "Towards a Proactive Statewide Marina Siting Program, indicates that most marina slips will be supplied by the private sector. Also, the Future Land Use Element includes a coastal land use analysis that discusses marina siting.

VII. Coastal Area Infrastructure

The following summarizes the existing and needed infrastructure serving the coastal area. This information is analyzed in greater detail in the Transportation Element; General Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Aquifer Recharge Element; and earlier sections of this element.

Flagler County is mandated to adopt and implement a concurrency management system that requires that adequate facilities and services be in place to meet the demand of future growth. The County has adopted minimum levels of service in the various elements of the comprehensive plan to ensure that there is a quantifiable measure for the adequacy of facilities and services. The Future Land Use Element must be coordinated with these other elements in order to assure that the future use of land will not result in degradation to the adopted levels of service and that the County

Flagler County Comprehensive Plan 2010-2035

maintains a financially-feasible method of funding growth-related improvements. The following summarizes the current and future conditions of these services and facilities.

Table E-16. Population Change 2010 to 2035						
	2010	2015	2020	2025	2030	2035
Total County	95,700	114,700	137,400	159,500	180,600	200,300
Unincorporated Population	12,221	14,121	16,391	18,601	20,711	22,681
Change in Unincorp. Population from previous 5-year period	n/a	1,900	2,270	2,210	2,110	1,970
Total Seasonal Population	106,927	127,402	151,771	175,760	198,997	221,114
Change in Season Population from Previous 5 year period		20,475	24,369	23,989	23,237	22,117

Table E-17. Population Impacts on LOS						
Projected Impact on LOS Standards	2015	2020	2025	2030	2035	Total 2015-2035
Potable Water (gpd)	237,500	283,750	276,250	263,750	246,250	1,307,500
Sanitary Sewer (gpd)	209,000	249,700	243,100	232,100	216,700	1,150,600
ROSE-Neighborhood (ac.)	2	2	2	2	2	10
ROSE-Community (ac)	6	7	7	6	6	31
ROSE-County-wide (ac)	614	731	720	697	664	3,426
Public Schools-Elementary (students)	277	331	323	308	288	1,527
Public Schools-Middle (students)	156	186	181	173	162	858
Public Schools High (students)	198	236	230	219	205	1,088

Potable Water: Flagler County provides retail/distribution services to the City of Beverly Beach. The eastern portion of the County is served by on-site wells or private and public entities, such as the Dunes Community Development District. The western

Flagler County Comprehensive Plan 2010-2035

portion of the County is served by on-site wells since there are not any publicly maintain centralized potable water systems operating in the area. Flagler County does not plan on the development of new facilities to address future needs. The County also does not plan for the expansion of the Beverly Beach distribution system. The County will continue to coordinate with the private and public potable water providers to ensure that potable water is provided to the residents at acceptable levels of service.

Sanitary Sewer: As with the potable water system, Flagler County only operates the Beverly Beach Wastewater system. The eastern portion of the County is served by on-site septic systems or centralized systems provided by other governments or private companies. The western portion is served entirely by on-site septic tanks. The County does not plan on the development of new facilities to address future needs. The County also does not plan for the expansion of the Beverly Beach collection and treatment system. The County will continue to coordinate with the private and public potable water providers to ensure that potable water is provided to the residents at acceptable levels of service.

Transportation: The recent annexations by the cities of Bunnell and Palm Coast have reduced the miles of roadways under the maintenance and control of Flagler County. The County realizes that the jurisdictional issues will need to be addressed as part of the development of a new transportation planning organization (TPO) or inclusion into an existing TPO. Regardless of the TPO issue, the analysis for the Transportation Element reflects that there are no roadway deficiencies for the 2010-2015 planning horizon. The analysis reflects that there will be deficiencies occurring in the 2015 to 2035 timeframe. The following tables summarize the deficiencies and the planning period when the deficiencies are estimated to occur.

Roadway	Segment		Adopted LOS	Date of Projected Deficiency
	From	To		
I-95 (SR 9)	VC Line	SR 100	C	2025
I-95 (SR 9)	SR 100	Palm Coast Pkwy	C	2025
CR 201	VC Line	SR 100	C	2030
SR A1A	Flagler Bch City Limits	Beverly Beach City Limits	D	2035
SR A1A	Beverly Beach City Limits	Mariner Drive	D	2035
SR A1A	Palm Coast Pkwy.	Malacompra Blvd.	D	2035
SR 100	Bunnell City Limits (west)	US 1	D	2025
SR 100	US 1	Bunnell City Limits (east)	D	2020
US 1	Old Dixie Hwy.	Seminole Wds. Blvd.	D	2030

A. Source: Flagler County Planning and Zoning Department

Flagler County Comprehensive Plan 2010-2035

The other modes of travel such as transit, bike and pedestrian are meeting current needs, but major updates will occur during the 2015 to 2035 planning horizon. The first phase of a Countywide Transits Needs Assessment was completed in 2007. The second phase is expected to be completed by 2011 and the third phase (Transit Development Plan or TDP) will follow the requirements as specified in Chapter 14-73, FAC. The County also identified the need to complete a comprehensive trails plan to be coordinated with the transit, school and recreation plans.

Solid Waste: Solid waste and recycling services are subject to interlocal agreement with Volusia County for disposal and private companies for collection. This will not change within the 2010-2015 planning horizon. There is adequate space for the disposal of solid waste at the Volusia County facility and this is anticipated to be the primary source for solid waste disposal until 2035. The County Commission also identified a need to seek out alternative methods of disposal and treatment to reduce the overall impacts to the environment and to provide for alternatives to the Volusia landfill.

Drainage: The County's adopted Land Development Code contains mandatory requirements for the provision of stormwater treatment. These regulations also include provisions for coordination with the SJRWMD to ensure regional standards are addressed. The result is a regulatory system that mandates that the pre-development condition is maintained in the post-development condition. This means that the quantity and the quality of the stormwater leaving the site is maintained in order to prevent degradation outside the development area. These standards will be in place and maintained to ensure that future development will not have an impact to the area. Existing drainage in the eastern part of the County is through a combination of retention and detention areas, local creeks and swamps and an extensive canal system that enters and leaves through the City of Palm Coast Development. The drainage system is adequate in terms of the quantity of water capable of being accommodated. This system requires annual maintenance that is programmed as part of the annual budget process. Drainage in the western part of the County for existing uses is through a combination of retention areas, and creeks and swamps. The Daytona North MSTU has been active in working with state and federal agencies to improve the existing drainage within this antiquated plat. The remainder of the area utilizes an existing systems based on rural and agricultural use. It is anticipated that these will remain. If a property is to be developed for non-agricultural use, then it must comply with the standards established in the Land Development Code. It is anticipated that the application of the County's Land Development Code will address any future development occurring in western Flagler County.

Flagler County Comprehensive Plan 2010-2035

Public Schools: Flagler County, the municipalities and the Flagler County School Board have an approved interlocal agreement in place that establishes the concurrency standards and procedures for the provision of public schools. These standards have been incorporated into the Public Schools Facilities Element of the Flagler County Comprehensive Plan. The analysis of the school age population projection for the 2010-2015 planning horizon reflects that there are adequate facilities in place to address the growth of the unincorporated areas. The 2015 to 2035 planning horizon shows that additional facilities for the entire County will require that a new elementary school and new K thru 8th grade school and a portion of a new high school will be needed. The exact funding sources have not been identified since the need is outside the 5-year limit of the Schedule of Capital Improvements, but it is anticipated that impact fees and developer exactions will be the primary source of funding. This is possible given that several DRIs have been required to either fund improvements or provide land for future school sites.

The Capital Improvements Element and supporting data and analysis reflect that there are not deficiencies currently identified for the 2010 to 2015 planning horizon for any of these facilities or services. This means that future growth until the year 2015 can be accommodated with the existing and planned facilities identified in the Capital Improvement Element. The 2015 to 2035 timeframe reflects a different situation where transportation and school facilities are projected to exceed the adopted levels of service. Flagler County shall continue to implement its concurrency system and will ensure that adequate capacity is properly planned and adequately funded.

Shoreline Protection Measures and Structures: The county does not own nor maintain coastal or shore protection structures. The only beach erosion control structure is located in Flagler Beach (between South 17th Street and South 19th Street) and consists of 1,500 feet of rock dumped as emergency protection for State Road A1A. The Florida Department of Transportation dumped these rocks.

The County is participating in a beach renourishment study that will provide for a comprehensive method of addressing previous loss of shoreline due to the scouring effect of the Atlantic Ocean. The study also includes specific recommendations and actions to prevent further impacts. This is important given the potential impacts to SR A1A if more of the beach is lost to erosion.

Special Restrictions on Siting Facilities in the Coastal Area: Federal and state law includes certain restrictions on funding public facilities in the coastal area. The United States Congress enacted the Coastal Barrier Resources Act that restricts the use of

Flagler County Comprehensive Plan 2010-2035

federal funds to build new infrastructure or expand existing infrastructure in designated parts of barrier islands. Although Florida contains at least 12 Coastal Resource Barrier System (CBRS) units, Flagler County contains no such designated unit. Further discussion of this program is therefore not necessary.

The Florida Legislature enacted a coastal infrastructure policy that limits the use of state funds to build facilities in coastal high-hazard areas, unless such expenditure was consistent with the local comprehensive plan. Local comprehensive plans required limiting development in coastal high-hazard areas, and the state will not construct any new or expanded facilities in the same areas.

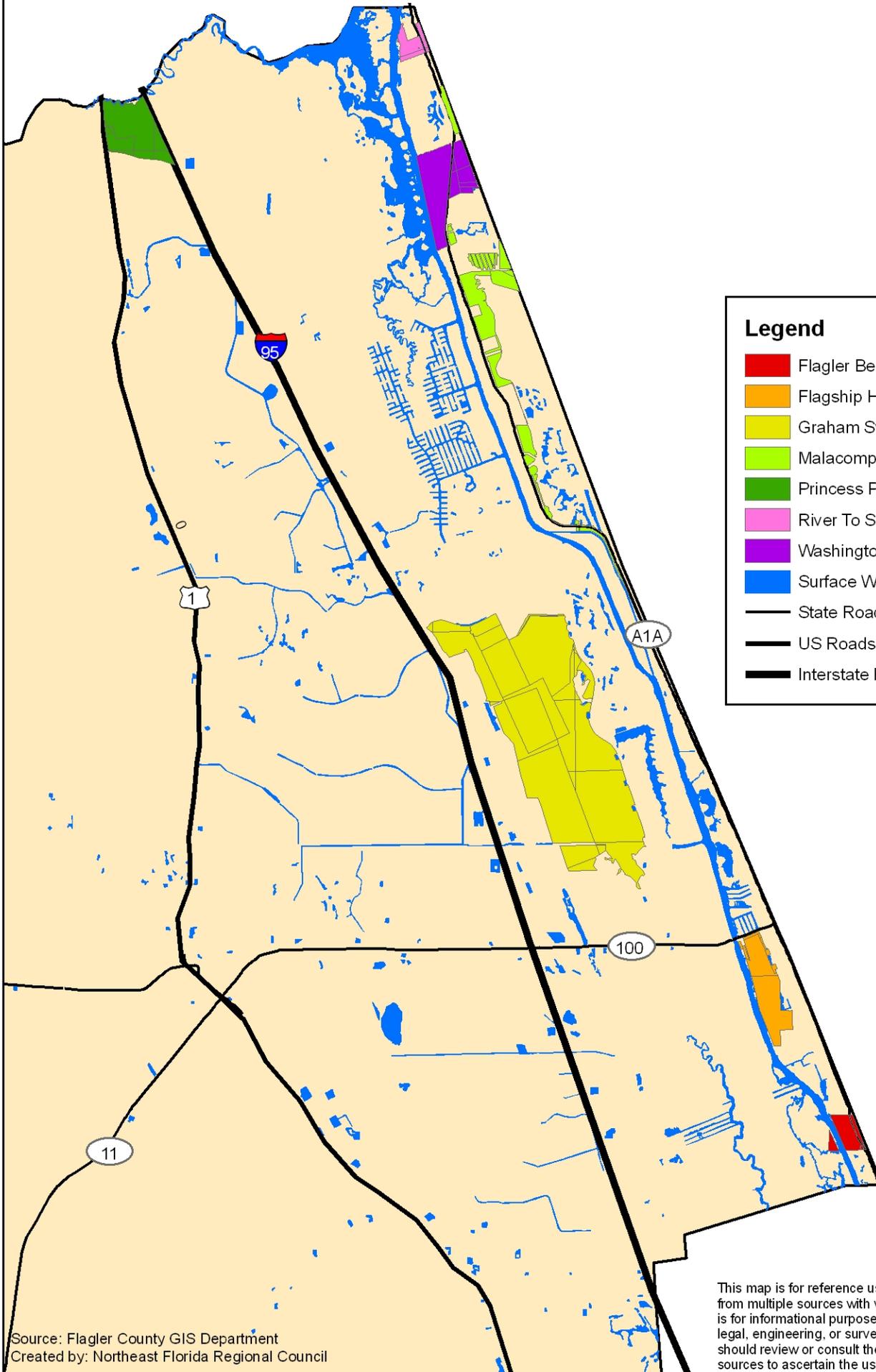
Flagler County Coastal Management Element Map Series

Item	Page Number
<u>List of Maps</u>	
Map E.1: Coastal Greenways	E-49
Map E.2: Wildlife and Marine Life Areas of Special Concern	E-51
Map E.3: Special Water Classification	E-53
Map E.4: Water Quality 2000	E-55
Map E.5: Areas Served by Centralized Sanitary Sewer Systems	E-57
Map E.6: Soil Limitations to Septic Tanks	E-59
Map E.7: Locations of Septic Tank Usage	E-61
Map E.8: Storm Surge Above Sea Level Rise	E-63
Map E.9: Hurricane Evacuation Zones	E-65

REMAINDER OF PAGE INTENTIONALLY BLANK

PAGE INTENTIONALLY BLANK

COASTAL GREENWAYS

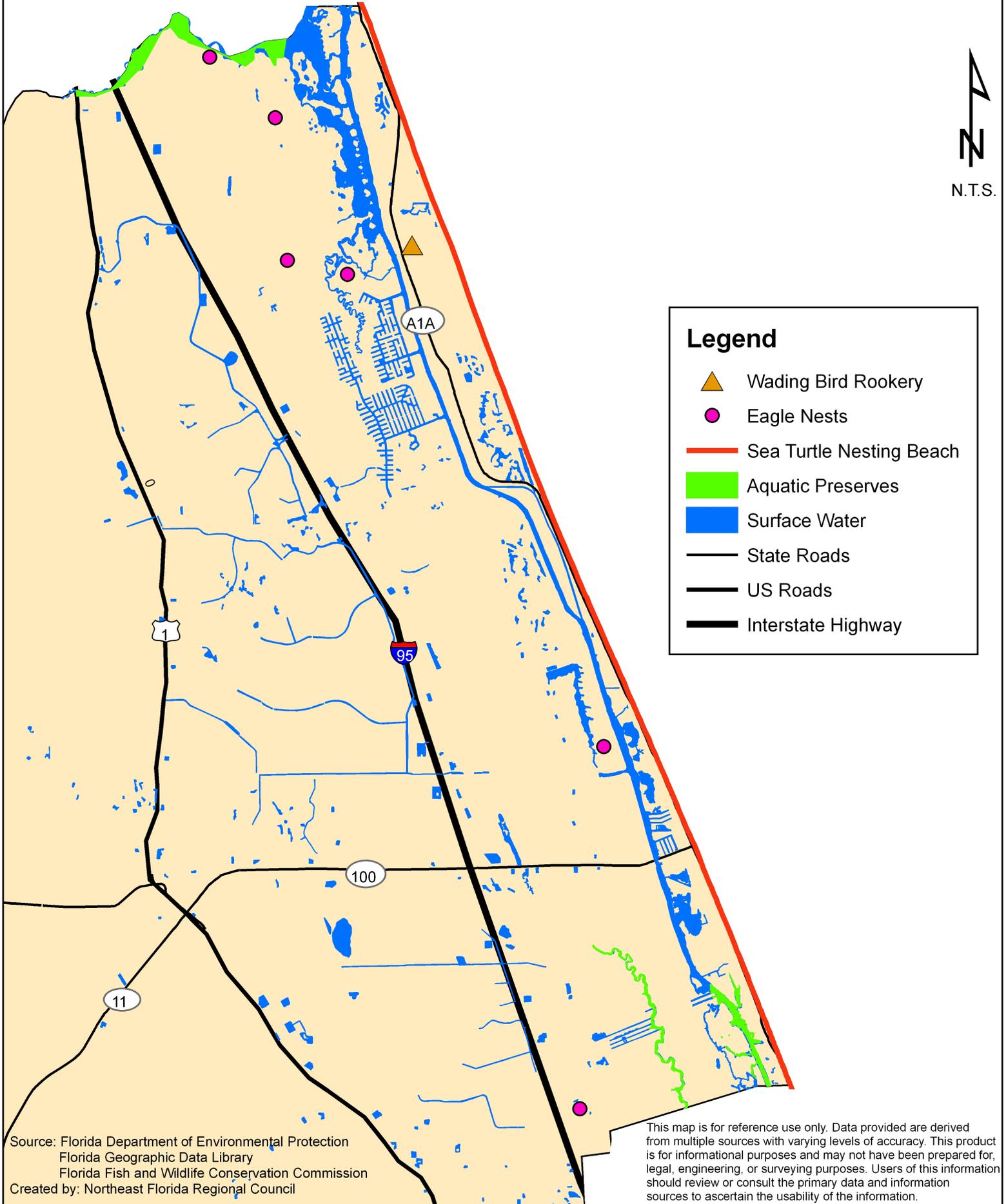


Legend

- Flagler Beach State Park
- Flagship Harbor Conservation Area
- Graham Swamp
- Malacompra Greenway
- Princess Place
- River To Sea
- Washington Oaks State Park
- Surface Water
- State Roads
- US Roads
- Interstate Highway

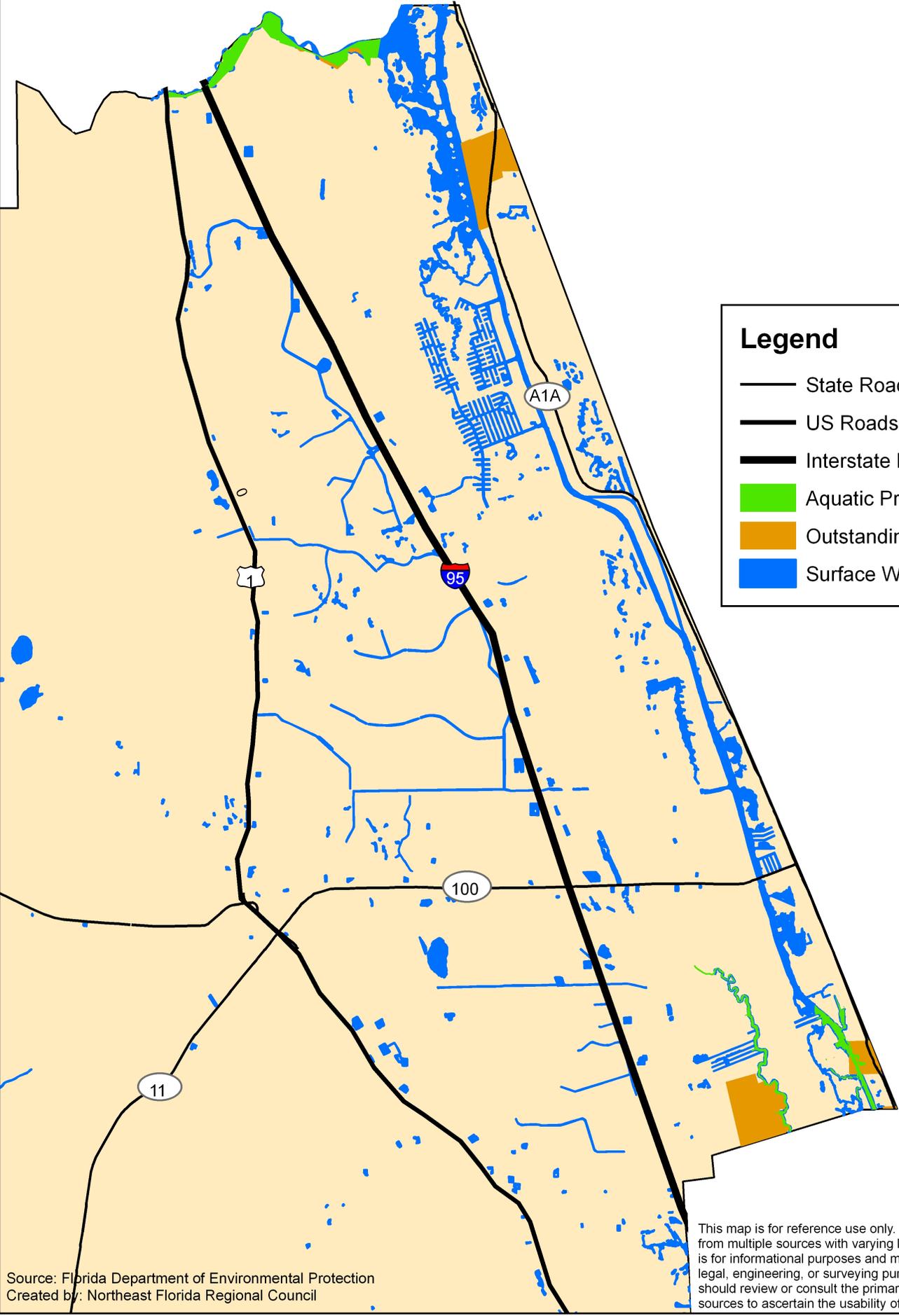
PAGE INTENTIONALLY BLANK

WILDLIFE AND MARINE LIFE AREAS OF SPECIAL CONCERN



PAGE INTENTIONALLY BLANK

SPECIAL WATER CLASSIFICATION



Legend

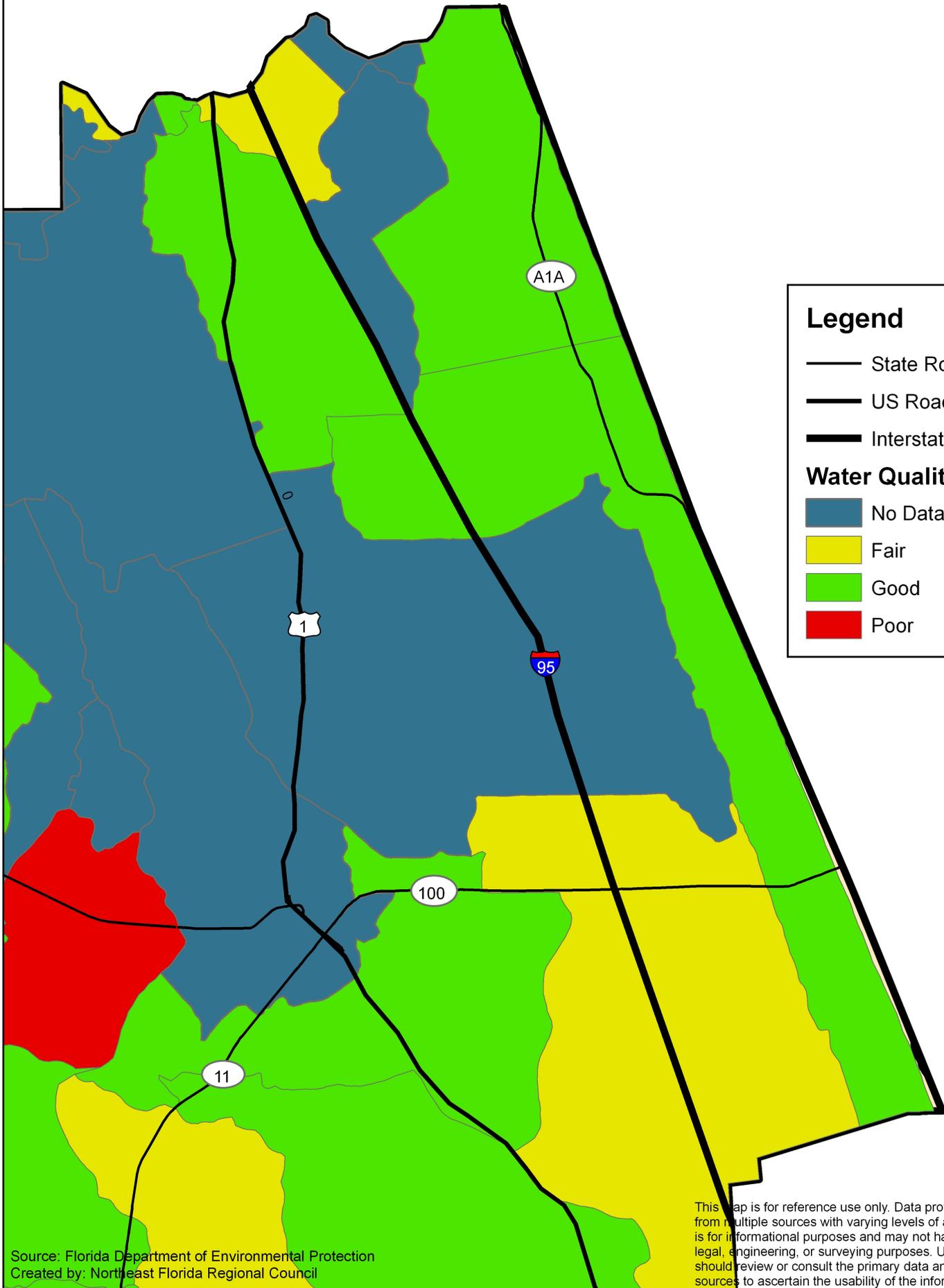
- State Roads
- US Roads
- Interstate Highway
- Aquatic Preserve
- Outstanding Florida Waters
- Surface Water

Source: Florida Department of Environmental Protection
Created by: Northeast Florida Regional Council

This map is for reference use only. Data provided are derived from multiple sources with varying levels of accuracy. This product is for informational purposes and may not have been prepared for, legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

PAGE INTENTIONALLY BLANK

WATER QUALITY 2000



N.T.S.

Legend

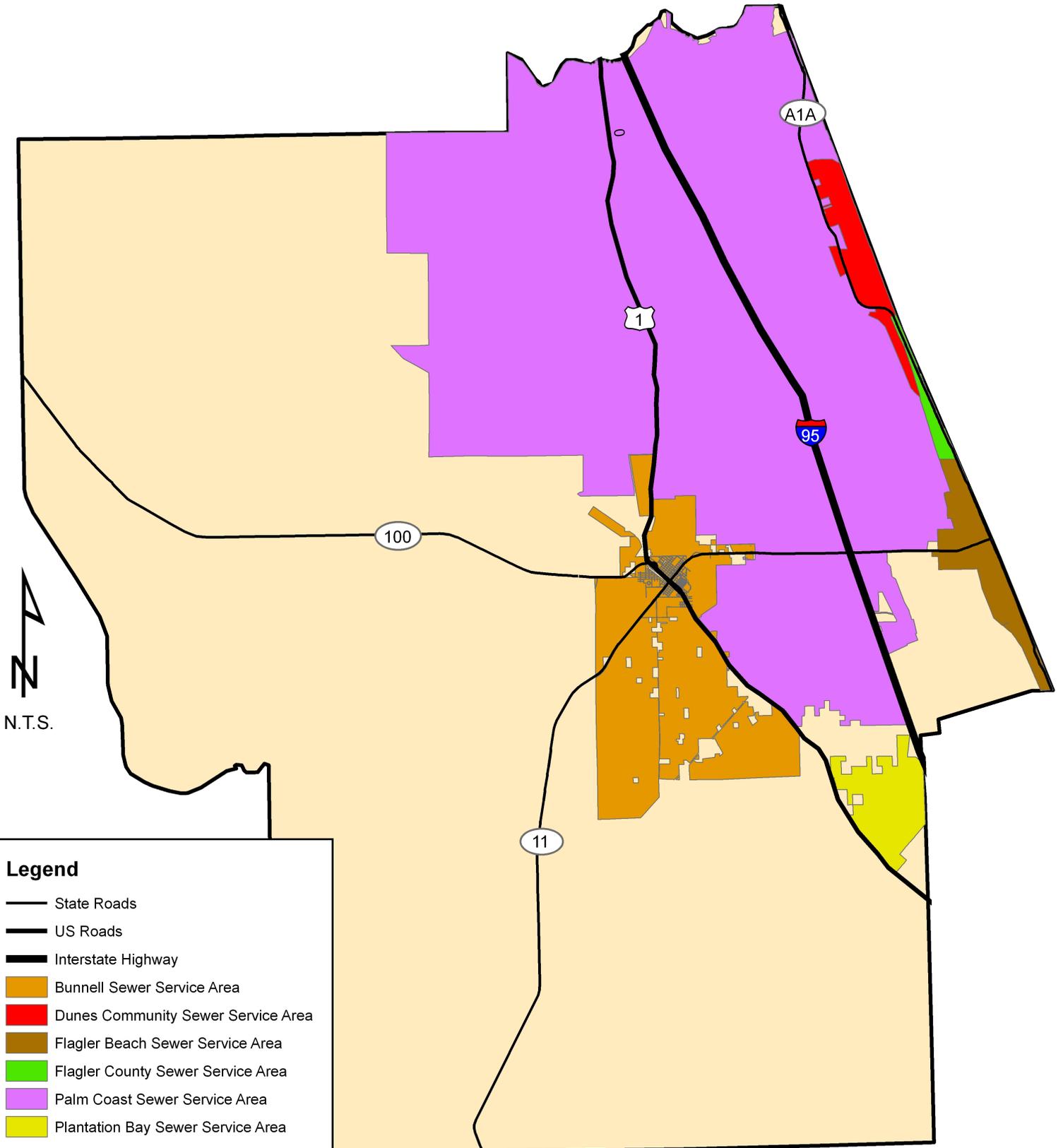
- State Roads
- US Roads
- Interstate Highway

Water Quality

- No Data
- Fair
- Good
- Poor

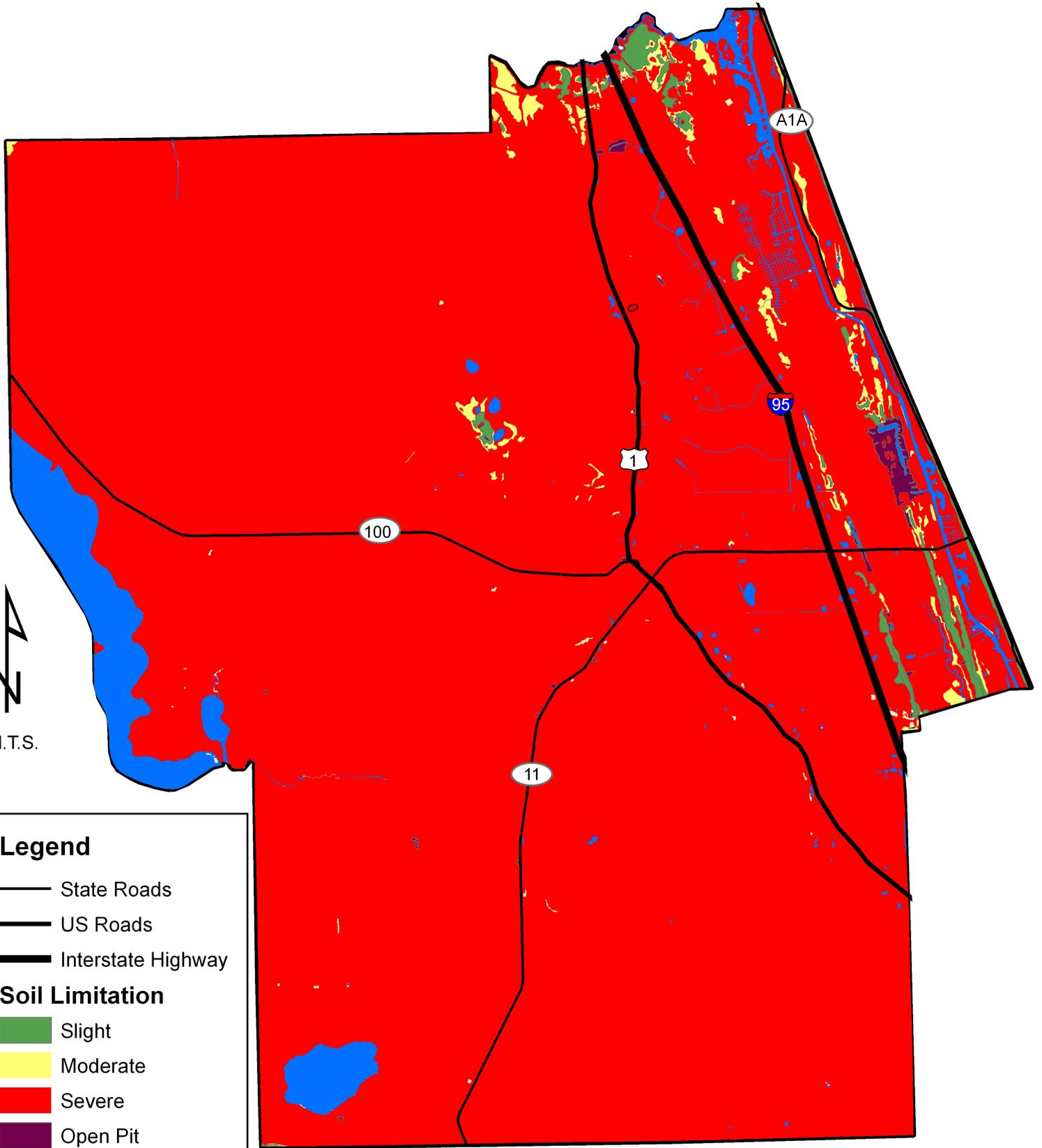
PAGE INTENTIONALLY BLANK

AREAS SERVED BY CENTRALIZED SANITARY SEWER SYSTEMS



PAGE INTENTIONALLY BLANK

SOIL LIMITATIONS TO SEPTIC TANKS



Legend

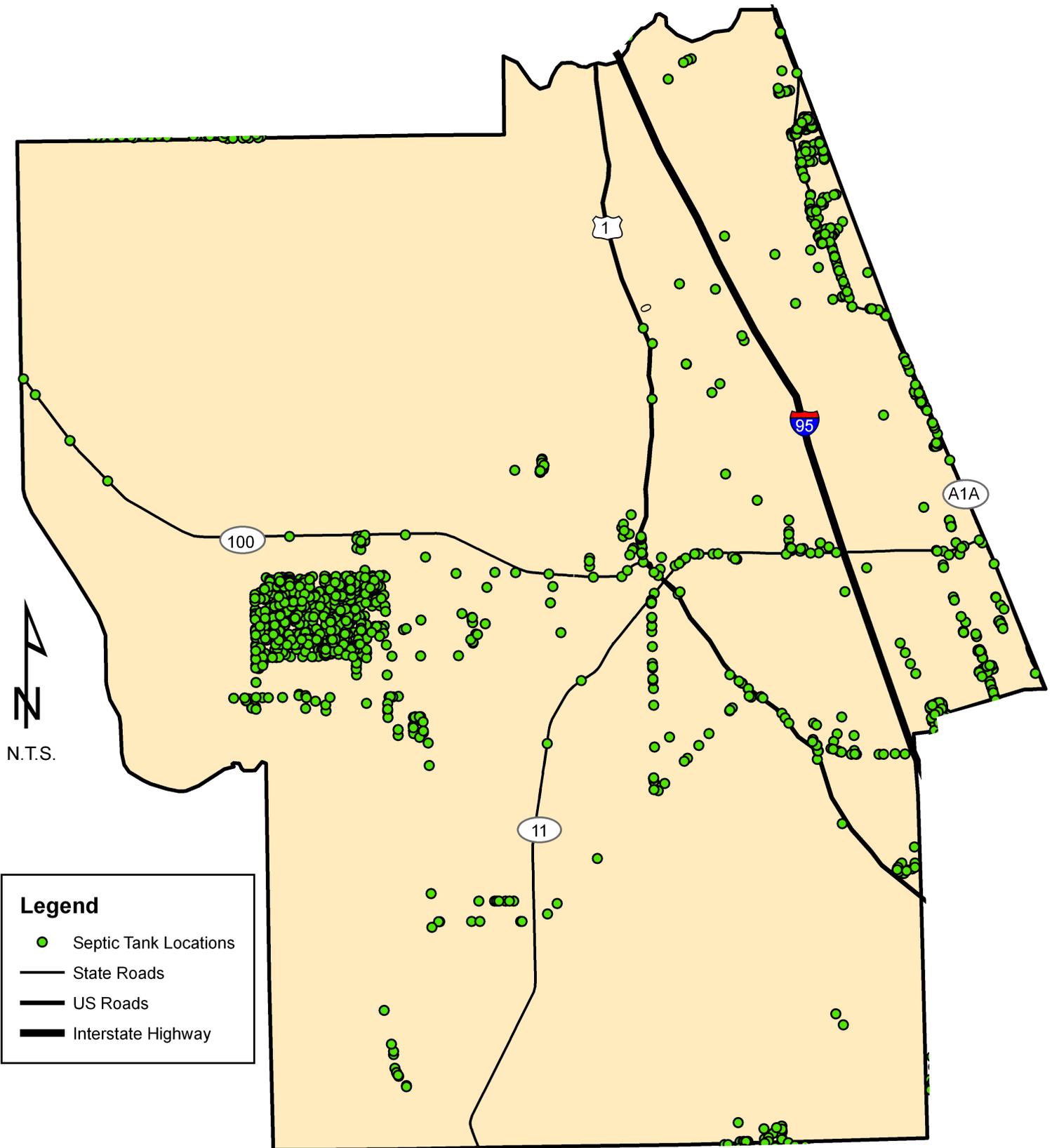
- State Roads
- US Roads
- Interstate Highway

Soil Limitation

- Slight
- Moderate
- Severe
- Open Pit
- Surface Water

PAGE INTENTIONALLY BLANK

LOCATIONS OF SEPTIC TANK USAGE

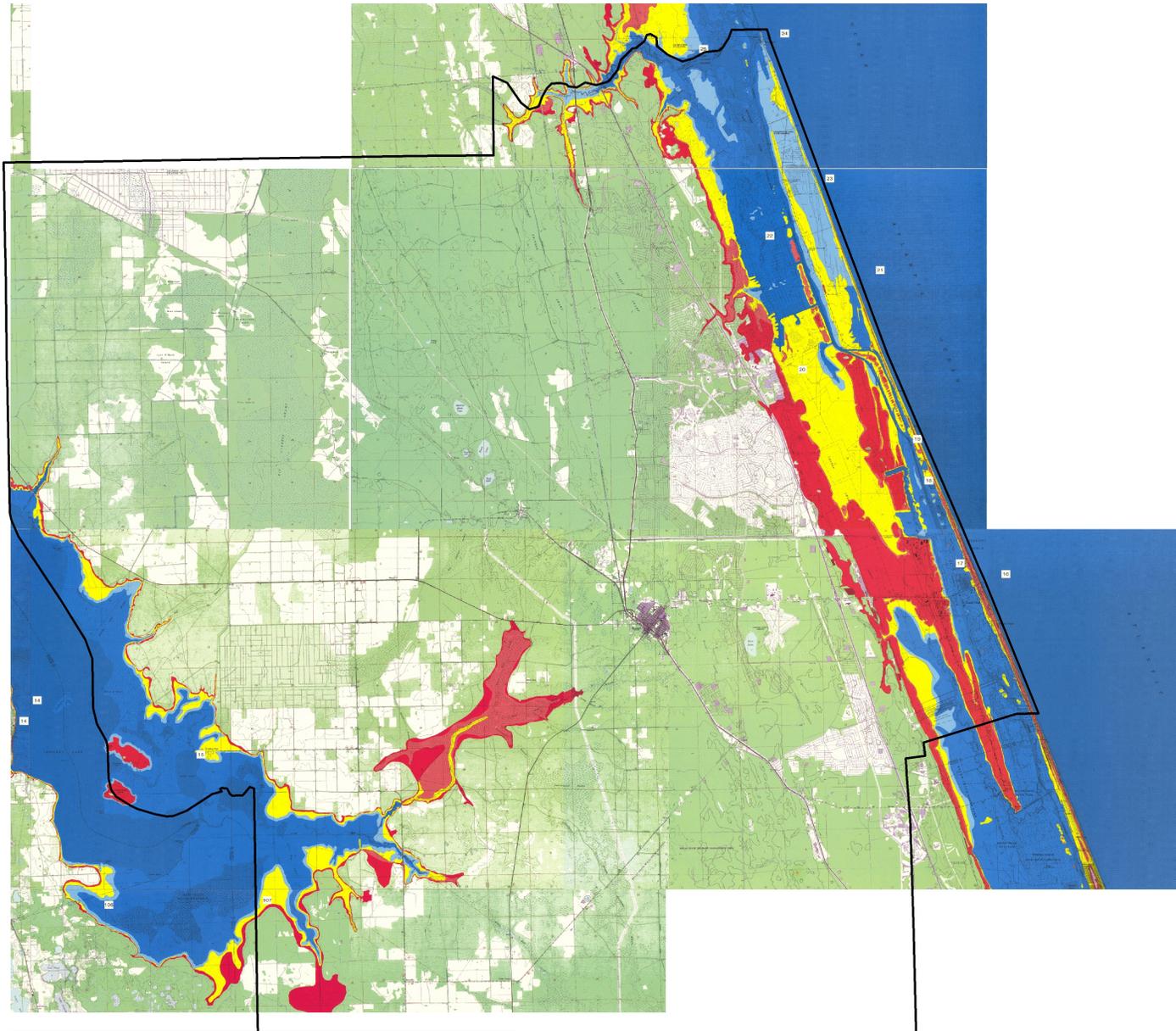


Legend

- Septic Tank Locations
- State Roads
- US Roads
- Interstate Highway

PAGE INTENTIONALLY BLANK

STORM SURGE ABOVE SEA LEVEL RISE



Legend

Storm Strength - Color - Surge in Feet

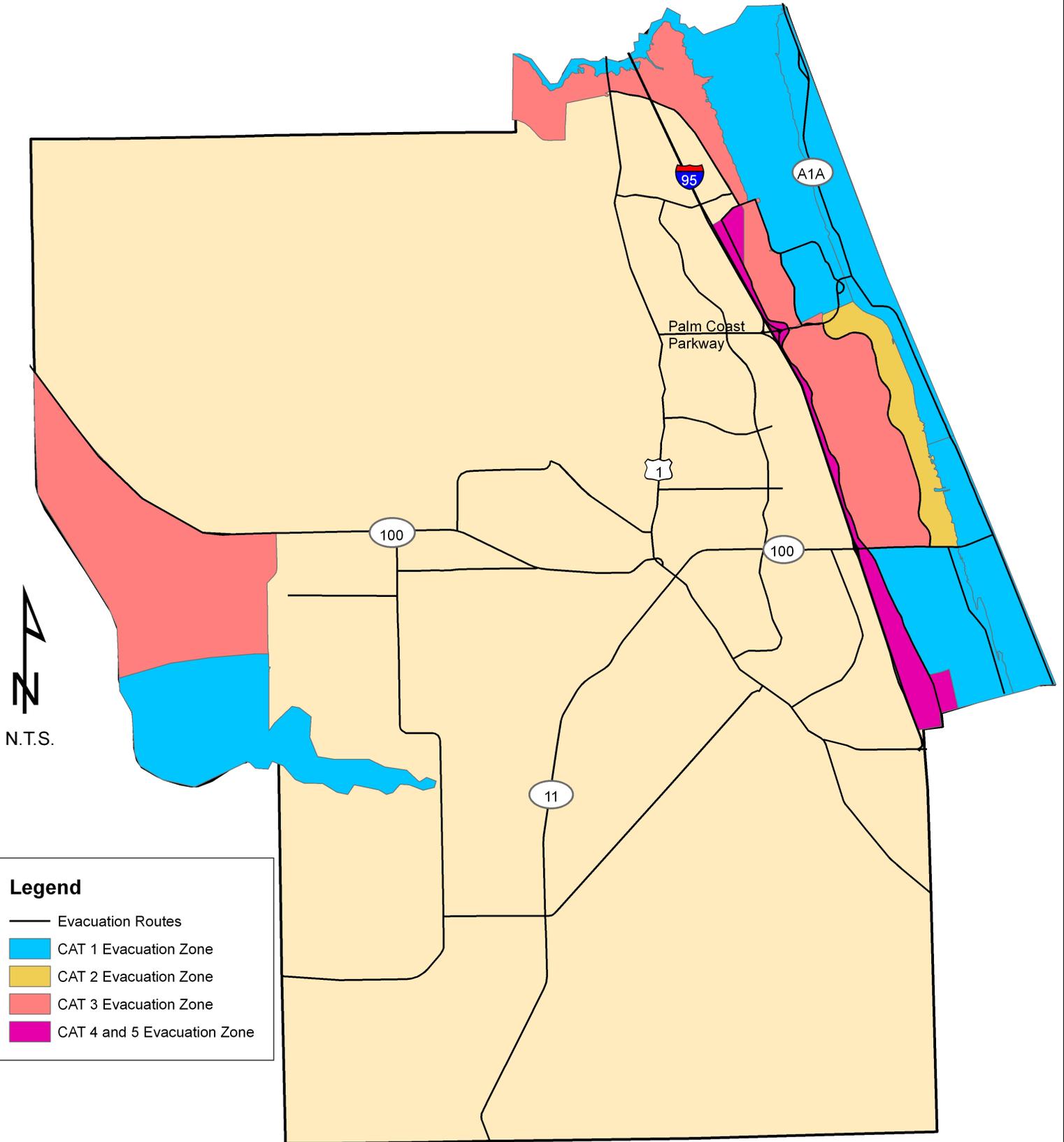
Category 1 - Blue - 5.4 to 7.5 feet

Category 3 - Yellow - 7.7 to 16.3 feet

Category 5 - Red - 21.0 to 23.0 feet

PAGE INTENTIONALLY BLANK

HURRICANE EVACUATION ZONES



Legend

- Evacuation Routes
- CAT 1 Evacuation Zone
- CAT 2 Evacuation Zone
- CAT 3 Evacuation Zone
- CAT 4 and 5 Evacuation Zone

PAGE INTENTIONALLY BLANK