

SECTION 2. NATURAL AND CULTURAL RESOURCES

Topography

Weedon Island is no longer an island – it is connected to the mainland by a land bridge north of Riviera Bay. The majority of Weedon Island is mangrove swamp; however the landward side is comprised of xeric hammock, pine/scrubby flatwoods, and ruderal communities.

Weedon Island Preserve ranges in elevation from 12 ft. below mean sea level (MSL) to 26 ft. above MSL (Figure 6). Located in the Gulf Coastal Lagoons of the Gulf Coastal Lowlands, Weedon Island Preserve is relatively flat. American Indian mound sites are located on and contribute to the higher elevations. Slopes of 0-5% percent are common. There are a few exceptions along the northwest shoreline of Riviera Bay which exhibit slopes of 5-12% (Vanatta, Jr. *et. al.*, 1972).

Geology

Weedon Island consists of two zones, an upper zone of unconsolidated deposits and a lower zone of consolidated rock. The upper zone, commonly referred to as surficial deposits, consists chiefly of beds and lenses of fine sand, gravel, sandy clay and clay, ranging in total thickness from <10 ft. to as much as 200 ft. The geologic units comprising the surficial deposits are the Hawthorne formation of Miocene age and the overlying differentiated deposits of Holocene age. The consolidated rocks consist mostly of beds of hard and soft limestone ranging in texture from densely crystalline to granular; gypsum and dolomite are commonly interbedded with limestone in the deeper zones. These rocks extend vertically to a depth of 10,000 feet or more (Weedon Island State Preserve Unit Management Plan, 1990).

Hydrology and Water Resources

There are three hydrological influences on the Preserve, namely semi-diurnal tides, the surficial aquifer, and the Floridan aquifer. Tidal waters and the Floridan aquifer flow are the predominant forces. The presence of the surficial aquifer is limited because of the peninsular geological features discussed above.

Waters flood and ebb from and to Old Tampa Bay through Papy's Bayou and Riviera Bay; therefore, water quality of Tampa Bay is of great significance to Weedon Island Preserve. Tidal height is greatest during severe weather associated with hurricanes and tropical storms. Since 1830, approximately 22 hurricanes and 32 tropical storms have passed within 50 miles of St. Petersburg.

The Floridan aquifer flows west and south from Hillsborough and Pasco counties, south through Pinellas County then under Weedon Island. The aquifer is located at a depth of approximately 20 ft. and extends to a depth of approximately 80 ft. Being located at the discharge area of the aquifer, any pollutants and/or reductions of volume would be evident and influence the Preserve. Very little

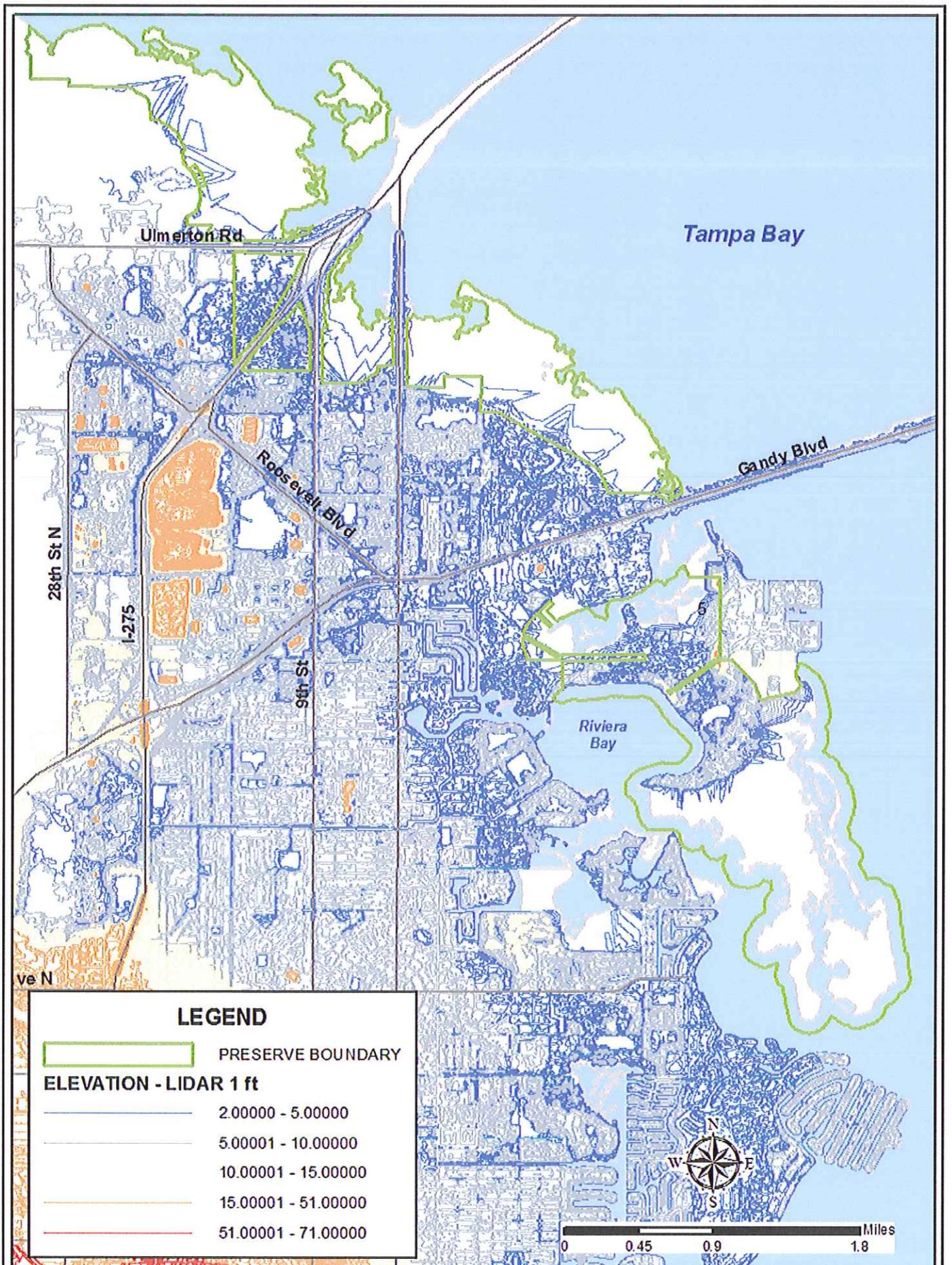


Figure 6. Topographical Map

of the surface water is retained long enough to percolate through the confining layers and thus to recharge the Floridan aquifer.

The surficial aquifer can be found at depths of 5 ft. or less throughout the Preserve. Since Weedon Island is located at the southern end of a narrow peninsula, the surficial aquifer is recharged primarily by local rainfall. Due to shallow soils, the surficial aquifer is depleted quickly by drainage, plant evapotranspiration and evaporation.

Low elevations and shallow soils make Weedon Island subject to frequent flooding, with higher elevations (>4 ft. MSL) subject to flooding following tropical storms and hurricanes. The lower elevations frequently flood following thunderstorms during the rainy season. These frequent floods drain off quickly from most areas of the uplands.

Dredge and fill developments of the land to the south, west and north of Weedon Island Preserve have increased the tidal flow into and out of Riviera Bay. This has, in turn, increased the shifting of sands along Papy's Bayou. The abundance of grass beds, marine tidal marsh and marine tidal swamp, have minimized the detrimental effects of tidal flow; however, additional increases of flow, stormwater drainage and/or contamination with pollutants could alter natural communities. Relatively recent suburban development has claimed the uplands west of Weedon Island. This development is subject to local and state permits that require avoidance, minimization, and mitigation of all wetland and, consequently, surface flow and stormwater impacts. There are two freshwater resources in the Preserve, a natural spring and a lake, both of which are located on PEF property (Figure 7). There have been no studies conducted on either of these freshwater resources.

Soils

Soil data were obtained from the 2007 United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey (Figure 8) and then grouped into three categories: xeric, mesic, and hydric. Xeric soils correspond to sandhill, scrub, and xeric hammock and occur at the highest elevations. Mesic soils correspond to pine flatwoods or mesic hammock communities. Hydric soils correspond to the various wetland habitats on site (see habitat descriptions section, below). The most common soils are hydric and support mangrove tidal swamps that dominate Weedon Island Preserve.

Xeric Soils

Astatula soils and Urban land, 0 to 5 percent slopes are excessively drained and nearly level to gently sloping. The water table is usually below 60 in. throughout the year. The surface layer is about 3 in. of dark-gray fine sand. The subsurface layers are yellowish-brown and yellow sand approximately 80 in. deep. This soil type supports longleaf pine and turkey oak hills. At the Preserve, xeric and maritime hammock communities are supported by Astatula fine sands.

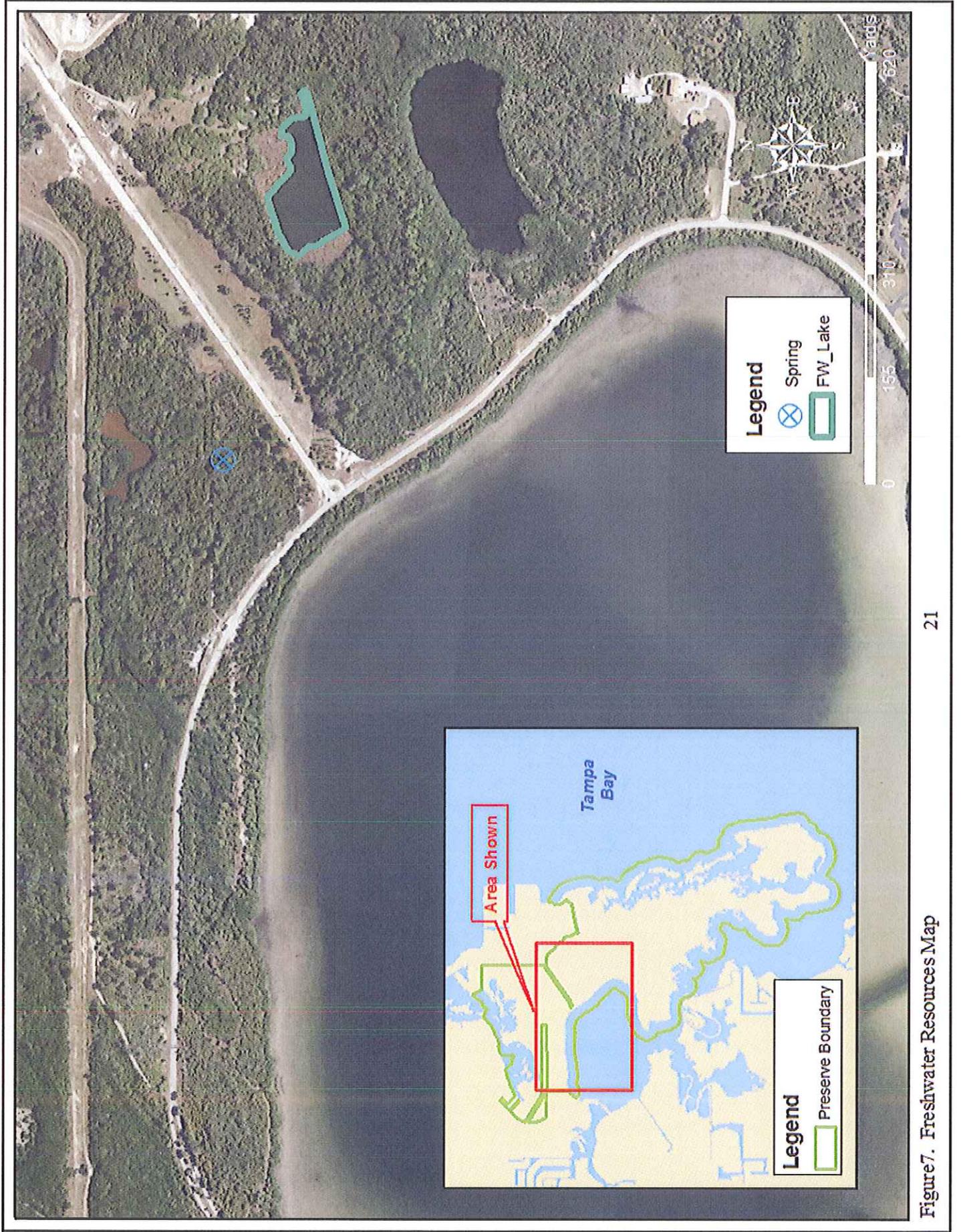


Figure 7. Freshwater Resources Map

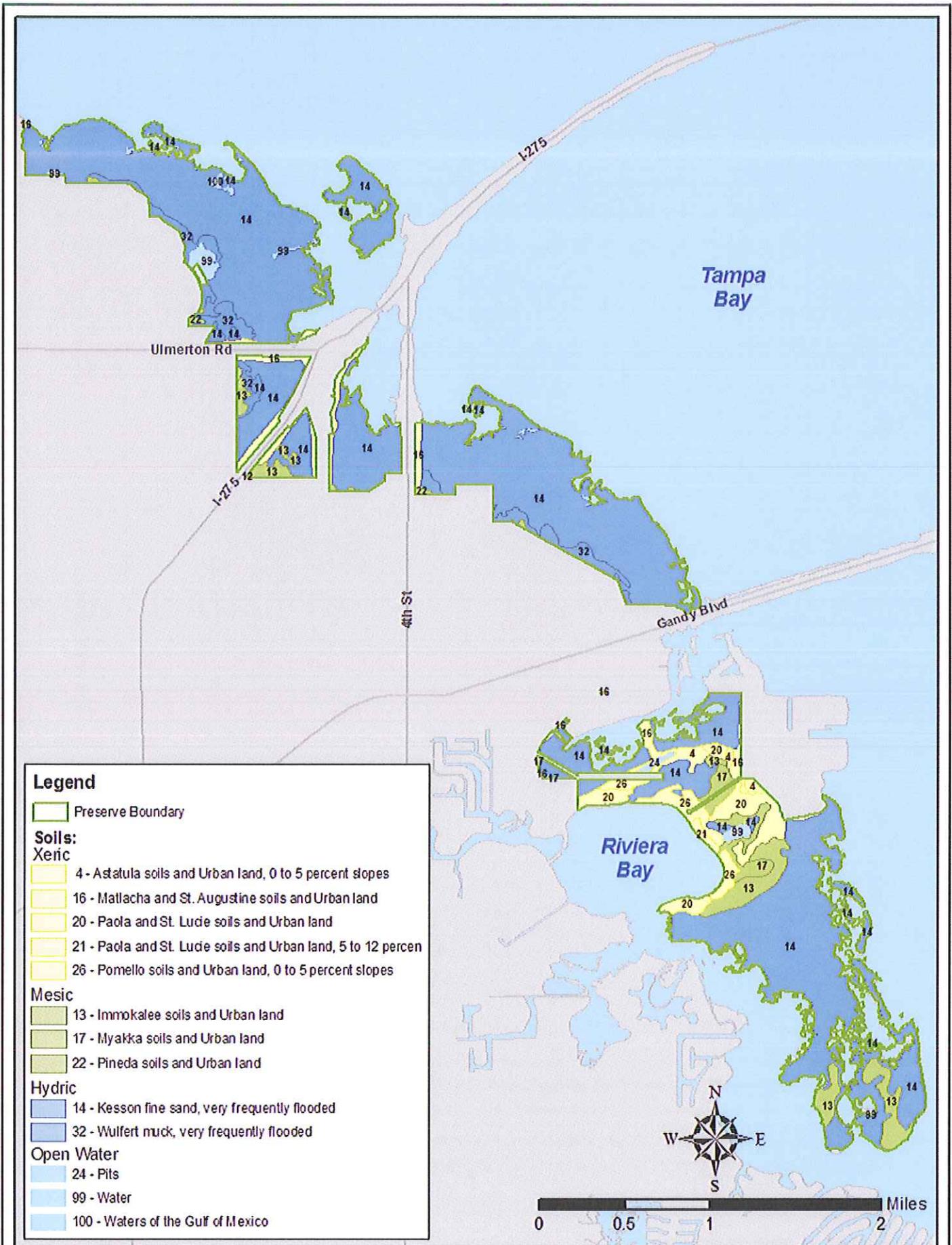


Figure 8. Soils Map

Paola and St. Lucie soils and Urban land 0 to 5 percent slopes are excessively drained, fine sandy soil formed from thick beds of marine sand and is nearly level to gently sloping. The water table is below 60 in. throughout the year. The surface layer is about 3 in. of gray fine sand. A 19-in. layer of loose white sand sits beneath the top layer. Below this is a one-inch discontinuous layer of brown weakly cemented fine sand. Twenty-eight inches of yellow fine sand with dark reddish round pebbles and root channels coated with dark brown fine sand and filled with fine white sand sits beneath the third layer. The fourth layer consists of very pale brown loose fine sand that extends to a depth of 80 in. On site, habitats found on this soil type include xeric and maritime hammocks, pine/scrubby flatwoods, a coastal berm and developed areas.

Paola and St. Lucie soils and Urban land 5 to 12 percent slopes are excessively drained, acidic sandy soils. The surface layer consists of about 3 in. of gray fine sand. Beneath this sits 55 in. of white loose fine sand. The third layer extends to a depth of 80 in. and consists of yellow loose fine sand. At the Preserve a xeric hammock and coastal berm are found on this soil type.

Pomello soils and Urban land 0 to 5 percent slopes are moderately well drained, acidic, sandy soils. The slope is nearly level to gently sloping. The water table is usually at a depth of 30 to 42 in. during wet periods. Fine sands are layered from the surface layer to a depth of up to 80 in. At the Preserve, xeric hammocks with a small area of pine/scrubby flatwoods are found on this soil type.

Mesic Soils

Immokalee soils and Urban land are very poorly drained and have a high density of fine sand that allows this soil to have a moderately rapid to rapid permeability. The high water table averages approximately 12 in. below the surface from June through November. The landform on this type of soil is flatwoods. Ross and Googe Islands are dominated by this soil type. Other habitats within this soil type are maritime hammock, pine/scrubby flatwoods, small areas of tidal marsh and ruderal areas.

Pineda soils and Urban land are poorly drained sandy marine sediments over loamy marine sediments. Small patches of this soil are found on the west edge of Weedon Island Preserve North, which support wetland forested mixed communities.

Matlacha and St. Augustine soils and Urban land are somewhat poorly drained material derived from dredge and fill projects. The majority of this soil type is found along roadsides. On the south side of Snug Harbor, the dredge materials now support a hammock community.

Myakka soils and Urban land are poorly drained, acidic sandy soil and nearly level. The water table is usually at a depth between 6 to 30 in. from June through November. Fine sands are layered from the surface layer to a depth of up to 80 in. On site these areas contain pine/scrubby flatwoods, xeric and maritime hammocks, and a small-developed area.

Hydric Soils

Kesson fine sand, very frequently flooded, is very poorly drained with a surface layer of black fine sand and shell fragments. The sub surface layers consist of light brownish gray fine sand, and shell fragments low in organic matter. This soil type supports the growth of salt marsh and mangrove swamp communities. The majority of this soil supports tidal swamps with some small areas of tidal marsh in the Preserve. Most of the tidal swamps are crisscrossed with mosquito ditches.

Myakka Fine Sand (tidal) is very poorly drained, acidic sandy soil and nearly level. The water table is usually near the surface and inundated at times due to tidal action. The surface is usually about 4 in. of black fine sand. This surface covers a 12-in. layer of loose gray fine sand. This layer is black on top, dark reddish brown in the middle and dark yellowish brown on the bottom. The next layer extends to a depth of about 84 in. and is comprised of lighter colored fine sand. This soil supports salt marsh communities. Within the Preserve, this soil is found only along the western edges of Weedon Island Preserve North. The communities growing there are tidal marshes and swamps.

Pits are areas where soils have been excavated for use as fill materials. The only area in the Preserve that fits this description is located just north of the PEF hot oil supply line.

Wulfert muck, very frequently flooded is very poorly drained and has a high density of muck covering fine sand that allows for rapid permeability. The high water table inundates the surface throughout the year. This soil type supports the tidal marshes in the Preserve.

Plant Communities and Cover Types

The natural communities that comprise the Weedon Island Preserve are predominantly estuarine, mangrove forest, and seagrass (Figure 9). The north part of Weedon Island Preserve is entirely comprised of intertidal zones of seagrass and mangrove islands. The larger islands within the Weedon Island Preserve complex, Gooze Island and Ross Island, contain 19 and 30 ac. of uplands, respectively. These upland areas are comprised of scrubby flatwoods and xeric hammock.

All communities were classified using the system described by Florida Natural Areas Inventory (FNAI, 2010). Documented FNAI resources in the Preserve are provided in Appendix 13. Listed below are the general descriptions of natural communities found the Preserve, as documented in more detail by the floristic survey conducted in 2005 (Appendix 13).

Xeric Hammock (83.5 ac.)

This community is an advanced successional stage of scrub or sandhill. The soils found in these areas (Astatula fine sand, Paola fine sand, Pomello fine sand, and St. Lucie fine sand) suggest that both sandhill and scrub could be supported. However, since fire has been excluded for many years, the areas are now dominated by xeric hammocks. Xeric areas where fire exclusion is approaching 30 years begin to take on hammock-like conditions. Hammock canopies are dense and thus reduce understory growth. Consequently, fuel loads are gradually reduced and fire is

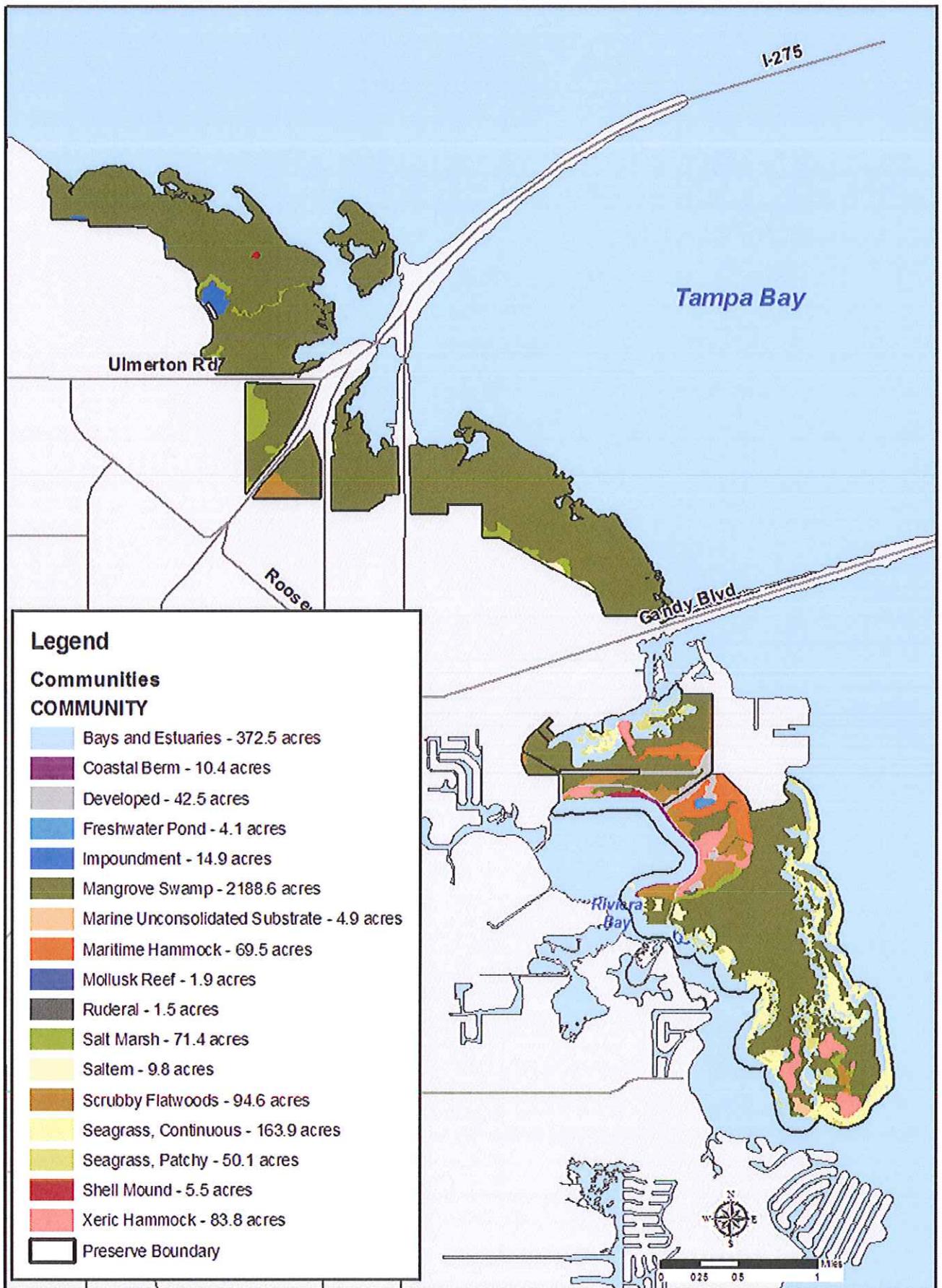


Figure 9. Weedon Island Preserve Natural Plant Communities - Boundaries field verified using FNAI descriptions

less likely to occur. These areas are predominantly associated with some of the Preserve's shell middens and burial mounds. The canopy plants includes live oak (*Quercus virginiana*), sand live oak (*Quercus geminate*), and cabbage palm (*Sabal palmetto*). Understories differ somewhat in each of the xeric hammocks found on Weedon Island Preserve, but common plants include saw palmetto (*Serenoa repens*), beautyberry (*Callicarpa americana*), and hog plum (*Ximenia americana*).

Maritime Hammock (69.5 ac.)

This community occurs on old coastal dunes that have been stabilized long enough for the growth of a forest. The generally mesic conditions of well developed maritime hammock communities inhibit natural fire. Fire introduction may alter the appearance. This community includes the final stage of succession in coastal areas. The flora in this community includes cabbage palm, red bay (*Persea borbonia*), laurel oak (*Quercus laurifolia*), live oak, marlberry (*Ardisia escallonioides*), and snowberry (*Chiococca alba*).

Shell Mound (5.5 ac.)

This anthropogenic community is composed mainly of shells discarded by generations of Native Americans. As the name suggests, shell and shell fragments are found mixed within the soil. Shell mounds are predominantly restricted to the hammocks, both maritime (north of PEF access road) and xeric (Ross Island). There is one exception, a narrow, exposed shell midden located along the north shore of Riviera Bay. This area is comprised of a relatively impenetrable layer of shell and sand, scattered cabbage palm, sand live oak, muscadine (*Vitis rotundifolia*), and smooth rattlebox (*Crotalaria pallid* var. *obovata*). Most of the shell middens on the Preserve are closely associated with hammock communities and therefore contain similar vegetative qualities. The common flora in this community is red bay, laurel oak, red cedar (*Juniperus virginiana*), hog plum, gray nicker (*Caesalpinia bonduc*), coinvine (*Dalbergia ecastaphyllum*), and smooth rattlebox.

Scrubby Flatwoods (94.6 ac.)

This community has an open canopy of widely-spaced pine trees with low, shrubby understory dominated by scrub oaks and saw palmetto. These areas dominate the uplands, particularly adjacent to the maintenance area and along the upland trail. This community can be difficult to distinguish in the field as a result of alterations to fire frequency and drainage. The mesic pine flatwoods that occur on site are approaching a more dry, xeric, condition – characteristics indicative of scrubby flatwoods. Topographically, these areas occur on high ridges in the pine flatwoods. A natural fire regime for scrubby flatwoods is 5 to 15 yr. Dominant flora found is laurel oak, live oak, sand live oak, cabbage palm, red bay, longleaf pine (*Pinus palustris*), slash pine (*Pinus elliotii*), saltbush (*Baccharis halimifolia*), rusty staggerbush (*Lyonia ferruginea*), pinewoods finger grass (*Eustachys petraea*), and switch grass (*Panicum virgatum*).

Marine Unconsolidated Substrate (4.9 ac.)

The southern tip of Googe Island supports this community type. This beach area is characterized as relatively open areas of subtidal, intertidal and supratidal zones which lack dense vegetation. The most common flora found in this community is cabbage palm, capillary hairsedge (*Bulbostylis ciliatifolia*), swamp flatsedge (*Cyperus ligularis*), coastalplain honeycombhead (*Balduinia angustifolia*), and partridge pea (*Chamaecrista fasciculata*).

Coastal Berm (10.4 ac.)

This community is found on the west side of Weedon Island bordering Riviera Bay. Coastal berms are ridges formed from storm deposited sand, shells, and debris. Typical vegetation includes cabbage palms, seagrape, live oak, and marsh elder. The berm grades into a narrow band of mangrove tidal swamp. Cabbage palm, gray nicker, coinvine, seashore dropseed (*Sporobolus virginicus*), and spotted beebalm (*Monarda punctata*) are commonly found on the Weedon Island coastal berm.

Mangrove Swamp (2188.6 ac.)

This community dominates the Preserve, comprising over 60 % by area. This community is characterized by dense mangrove forests. These areas contain extensive areas of dredged mosquito ditches. The vegetation contains red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), buttonwood (*Conocarpus erectus*), saltbush and marsh elder (*Iva frutescens*).

Salt Marsh (71.4 ac.)

This tidal community is largely herbaceous in the portion of the coastal zone protected from large waves by the gentle sloping topography of the shoreline as found in Tampa Bay. The salt marsh is found on Ross Island, the mainland of Weedon Island Preserve, and along the northern portions of the Preserve. The typical flora found in this community is black needle rush (*Juncus roemerianus*), smooth cordgrass (*Spartina alterniflora*), saltwart (*Batis maritima*), herb-o-grace (*Bacopa monnieri*), and shoreline seapurslane (*Sesuvium portulacastrum*).

Saltern (Salt Flat) (9.8 ac.)

There are three small patches of this community nestled in the salt marshes. Salterns develop at an elevation just high enough to receive fewer tidal inundations than adjacent seaward zones. Long periods between flooding prevent dilution and favor water loss by percolation and evaporation. The flatness across tidelands is formed by the daily ebb flow of tides, which act as a leveling agent. Erosion of adjacent uplands during storm tides contributes sand to the bordering saltern area. The common flora in this Weedon Island community include dwarfed black mangrove, saltwart, shoreline seapurslane, perennial glasswort (*Sarcocornia perennis*), and seaside heliotrope (*Heliotropium curassavicum*).

Seagrass (approximately 214 ac.)

This community occurs in subtidal zones in clear coastal waters where wave energy is moderate. Seagrasses beds most frequently occur on unconsolidated substrate of marl, muck or sand. Other factors that affect the establishment and growth of seagrass beds include water temperature, salinity, wave energy, tidal activity and available light. Species documented in the Preserve include turtle grass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*) and widgeon grass (*Ruppia maritima*).

Mollusk Reef (approximately 1.9 ac.)

Marine and estuarine mollusk reefs are faunal-based natural communities typically characterized as expansive concentrations of sessile mollusks occurring in intertidal and subtidal zones to a depth of several feet. In Florida, the most developed mollusk reefs are generally restricted to estuarine areas. In the Preserve, these are located just south of the fishing pier.

Altered and Unclassified Landcover Types

Developed (approximately 42.5 ac.)

The developed areas are comprised of roads, parking areas, buildings, and maintained lawns as part of recreational, business or residential area. Vegetation in this community includes Bahia grass, live oak, cabbage palm and longleaf pine.

Ruderal

There is a small 1.5-ac. area on Weedon Island that contains this highly disturbed community type that is not recognized by FNAI. Vegetation such as Bahia grass, lantana (*Lantana camara*), muscadine and sensitive plant (*Mimosa strigillosa*) dominate.

Freshwater Pond

There is a 4.1-ac. freshwater pond located within Weedon Island Preserve. The vegetation includes Carolina willow (*Salix caroliniana*) and cat-tails (*Typha spp.*).

Wildlife

Weedon Island Preserve supports diverse wildlife species; documented species include 178 birds, 41 butterflies, 20 reptiles, 12 mammals, 6 amphibians and 30 fish (Appendix 13). Birds have been surveyed regularly by staff and volunteers. Staff-led butterfly surveys were conducted with the help of County volunteers each Spring and Fall from 2002 through 2009.

Three formal surveys and studies that included documentation of wildlife have been conducted over the past ten years and recorded on the wildlife species lists (Appendix 13). In addition to these studies, the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI) has sampled both juvenile and adult fishes for over a decade. These studies are discussed in more detail in the research section.

Listed Species

The State's classification of endangered and threatened represents species, subspecies, or isolated populations native to Florida, and are few or depleted in numbers or so restricted in range that it is in imminent danger of extinction. Species of special concern are species, subspecies, or isolated populations facing a moderate risk of extinction in the future. (Rule 68A-27, F.A.C.)

Several listed floral and faunal species have been documented at the Preserve (Appendix 13). Presently, there are four state endangered, threatened, or commercially exploited plants along with 17 state endangered, threatened, or species of special concern wildlife species. Of the four listed plant species, one is federally listed, the Florida golden-aster (*Chrysopsis floridana*), which was planted in 2010 as detailed in the restoration section. Of the 17 listed wildlife species, four are federally listed as designated by the United States Fish and Wildlife Service (USFWS).

Exotic Species

Exotic species are non-indigenous species introduced into Florida either purposefully or accidentally. Exotic flora in natural areas can have detrimental effects to the native flora and fauna (Burks and Langeland, 2008). The Florida Exotic Pest Plant Council (FLEPPC), a non-regulatory organization of professional botanists and others, compiles lists of invasive exotic plants. Category I species are defined by FLEPPC as species that are invading and disrupting native plant communities. Category II species are defined by FLEPPC as species that have shown invasive properties and the potential to disrupt native plant communities.

The 2005 floristic survey identified 47 exotic species, of which 15 are Category I and 8 of which are Category II species. The mosquito-ditched areas in the Preserve have the highest densities of invasive exotics. Other areas of high densities include access roads, firebreaks, and areas where human activities have disturbed the soils. Propagules of exotic flora are widely dispersed through a variety of mechanisms, including by the wind, birds consuming fruits and seeds, and inflow of surface water.

Brazilian pepper, Australian-pine (*Casuarina equisetifolia*), rosary pea (*Abrus precatorius*), and guineagrass (*Panicum maximum*) are the most prevalent of the exotic species that have been observed in the Preserve.

Exotic fauna in natural areas can prey on or displace native species or negatively impact native plants and natural plant communities. Exotic faunal species that have been documented on the Preserve include greenhouse frog (*Eleutherodactylus planirostris*), Cuban treefrog (*Osteopilus septentrionalis*), Cuban brown anole (*Anolis sagrei*), Indo-Pacific gecko (*Hemidactylus garnotii*), and European Starling (*Sturnus vulgaris*).

Cultural Resources

Weedon Island has a cluster of shell middens and sand mounds, including a burial mound partially excavated by a team from the Smithsonian in 1923 - 24. Fewkes published a report on the findings entitled "Preliminary Archaeological Explorations at Weedon Island, Florida" in 1924. Fewkes surveyed the mound sites and produced an accurate map of the sites in the publication. The report noted several types of mounds at Weedon Island, namely middens, domiciliary mounds, and the sand burial mound. Recent research has confirmed the locations of some of these mounds (Weisman et al., 2008).

Shell Middens overlay most of two major relic sand dune ridges located at the southern part of the Preserve. The geomorphology of these mound sites elevate in ranges from 6 to 26 ft. above MSL, and form two semi-circular radiuses on the island. Other midden sites are located on Googe and Ross Islands. The aboriginal shell deposits are comprised mostly of shell, with some bone, lithic and pottery sherd artifacts in a layered stratigraphy.

Domiciliary Mounds comprised of sand, shell and some midden were reported by Fewkes, who noted that they probably were used for house structures.

The Sand Burial Mound viewed by Fewkes was approximately 4 feet in height and circular. Although Fewkes thought the mound a natural “eminence” used by the Indians, it most likely was artificially constructed. According to the report, there were three layers of internment and about one-third of the mound was excavated.

Recent human impacts in the past 100 years to the sites have affected the prehistoric mounds resulting in a loss of archaeological site integrity. Much of the land was impacted by the harvest of pine trees, construction of runway airfields, citrus groves, various roads, houses and businesses. More serious modifications include the dredging of miles of mosquito ditches, installation of a gas and oil pipeline corridor, construction of the power plant and construction of Weedon Drive. In addition to these impacts, the sites have been directly affected by intensive looting, especially in the cemetery area. The impacts to soils and sediments have contributed to the invasion of pioneer plants and invasive exotics resulting in increased bioturbation and further cultural feature degradation (Weisman et al., 2008).

Historic sites on Weedon Island are prevalent with many building remains and imprints from past activities such as airport runways and tower remains. Early settlers once occupied several of the islands and pilings from the buildings constructed during the 1920’s are intact.

The northern area of the Preserve is a low-lying tidal swamp area with shell mounds providing the only significant topographic variation. One significant shell mound with a maximum elevation of 3.3 feet follows the contours of the coast on Old Tampa Bay. Another major shell mound with human remains rises to the height of 8.2 feet and is located west of the shoreline and is surrounded by mangrove swamp. Both of these shell mound/middens have been impacted by heavy looting and consequently have been degraded. Despite the extensive looting activity, looter holes do not extend beyond 3 ft. allowing substantial amount of midden to remain intact. These sites are considered potentially eligible for listing on the NRHP and protective measures are recommended (see SEARCH Project No. 2269-07111).

Adjacent to these sites, a prehistoric pine dugout canoe was discovered and eventually excavated in 2011. The dugout was over 40 feet long and radiocarbon dated to 2 Sigma calibrated result of Cal A D 690 to 1010.