13.15 GRWMA Hydrology Assessment

Hydrology Assessment
of the
Guana River Wildlife Management Area

Report prepared for:
Florida Fish and Wildlife Conservation Commission

by

HDR Engineering, Inc.

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1.0 PROJECT WORK EFFORT DISCUSSION

1.1 Introduction

The Guana River Wildlife Management Area (GRWMA) encompasses almost 10,000 acres in St. Johns County. The Florida Fish and Wildlife Conservation Commission (FWC) requested HDR to analyze the impacts of the mosquito ditches that have been constructed in portions of the GRWMA. Specifically, HDR will attempt to determine if the mosquito ditches have had a negative impact on nearby wetlands. If the assessment finds negative impacts alternatives to restore the historic natural plant communities will be developed to the extent practical.

The work effort for this project will be completed through the performance of four work tasks that will assess the impacts to the wetlands and result in the restoration of the impacted areas. These tasks are:

Task 1. Assess Historic Changes in Ditched Wetlands
Task 2 Ground-Truthing and Characterization of Existing Conditions
Task 3. Hydrology/Hydraulic Evaluation
Task 4. Alternative Assessment

A discussion of each of these tasks is provided below.

1.2 Work Tasks

Task 1 – Assess Historical Changes in Ditched Wetlands

The FWC has indicated that sometime after 1960 and prior to 1975, approximately 22,000 feet of mosquito ditches were constructed within and along the perimeter of wetlands in a portion of GRWMA immediately south of SR 210 and east of the Intracoastal Waterway. Approximately 400 acres of wetland and uplands are directly associated with, and potentially impacted by the ditches. Mosquito ditch related impacts to these wetlands was assessed using historical and current aerial photography. For the purposes of this effort aerials from 1942, 1972, and 2007 was assessed. It is believed that the GRWMA wetlands may have been affected to an undetermined degree by the construction of the old Florida East Coast (FEC) Canal (constructed between 1883 and 1912) and by the Intracoastal Waterway (constructed between 1929 and 1935). The Intracoastal Waterway construction deepened and extended the existing Florida East Coast Canal. Because of the possibility that the GRWMA wetlands were impacted by this historical channelization, HDR attempted to differentiate pre- versus post-mosquito ditching changes in the wetlands.

Aerial photointerpretation was performed on historical aerial photography. Changes in the visual representation of wetland areas possibly attributable to the effects of channelization and ditching was documented. This includes the reduction in wetland

area, invasion and/or expansion of shrubby growth, and other signs of possible drying. To help isolate the effects of channelization and ditching from other potential agencies of change (e.g., altered fire regime or extreme rainfall/drought periods), similar but undisturbed wetlands in the Tolomato River Basin were selected and photointerpreted in conjunction with the ditched wetlands. Pertinent observations were coded on the aerial photographs and summarized in a written narrative. To the extent the data allowed, a qualitative assessment was made regarding the possible causes of detected changes.

Based on our discussions with FWC staff and our initial research historic data on water level elevations in and around the affected wetlands does not exist. Therefore, the assessment of hydroperiod impacts was based on a qualitative evaluation.

1942 Aerial Photograph

1918 Quad Map with Mosquito Ditches

Task 2 – Ground-Truthing and Characterization of Existing Conditions

HDR field biologists and engineers conducted field reconnaissance of the project site to assess existing site conditions. Wetland areas were delineated on 2007 aerial photographs. Vegetation mapping prepared by the Florida Natural Areas Inventory (FNAI) was also field checked for accuracy and suggested reclassification of natural community type (where appropriate) was provided. The goal was not to revise or correct the FNAI inventory but, if appropriate, point out differences as noted in the field. Hydrologically significant locations including culverts, bridges, mosquito ditches, major drainage flow paths, and low water crossings, were attributed in the field.

Task 3 - Hydrology/Hydraulics Evaluation

The evaluation of the hydrology and hydraulics of the GRWMA involved both the investigation of historic hydrology/hydraulics and the assessment of existing conditions. Existing watershed boundaries and connections were obtained through a review and assessment of surface water management permits (under the Management and Storage of Surface Waters [MSSW] or Environmental Resource Permit [ERP] process) which cover those areas adjacent to the site such as the Publix shopping center and the developments north of Palm Valley Road (SR 210). This was accomplished by accessing SJRWMD permit documents for those developments that would impact the site. The assessment also included drainage information for County Road 210 (Palm Valley Road) and Mickler Road.

The goal of the permit review was to determine potential locations where hydrologic or hydraulic connections to the GRWMA area exist and assess elevations of facilities and residential areas. This permit review provided the basis for a qualitative assessment of potential off-site areas that may have impacted water levels within the GRWMA.

HDR developed a basin and subbasin map for the site. This map was developed based on anecdotal and historical information as well as Light Detection and Ranging (LIDAR) data. The objective was to provide a general assessment of the primary flow paths for conveyance of water out of the site. An evaluation of flow paths from off site was accomplished to determine off-site flows to the GRWMA. The purpose was to establish flows that may be used in the assessment of alternatives.

Task 4 – Alternative Assessment

Tasks 1 through 3 above were designed to evaluate the historic hydrology of the area, prior to the placement of many of the roadways and residential areas which exist adjacent to the GRWMA, and to assess the primary flow paths through the wetland and marsh system to an eventual outfall into Jones Creek. The generally southerly flow appears to have been interrupted by open water wetlands and wet prairies where water was historically stored within the GRWMA. Mosquito ditching, especially in the northwest corner of the GRWMA near residential areas (S. Roscoe and Canal roads), appears to have created a connection between the GRWMA and the Intracoastal Waterway. This potential connection was assessed to determine if it resulted in the lowering of the water table. The mosquito ditches located south and east of the residential areas appear to surround historic wetlands and offer no extensive connection to a discharge point.

The alternative assessment portion of the project was to take the information developed in the previous tasks and assess whether alternatives exist that would result in the reestablishment of historic wetland hydroperiods. This was accomplished through the assessment of the changes that have occurred in the wetlands due to the ditching, the evaluation of options for restoration such as ditch blocks, ditch filling, or other hydrologic/hydraulic alterations would prove beneficial to the GRWMA.

2.0 ASSESSMENT OF DITCHED WETLANDS

2.1 Introduction

The purpose of the assessment of ditched wetlands is to provide information that will aid in the determination of the effects of historic mosquito ditching on the wetlands in the northwestern portion of the GRWMA. As noted previously, the area of study lies immediately south of Palm Valley Road (SR 210), east of the Intracoastal Waterway, and west of Guana River (Figure 1). The assessment of ditched wetlands comprised two tasks: (1) historical aerial photo-interpretation of wetlands physically impacted by mosquito ditching, and (2) field assessment of these same wetlands, as well as a select number of wetlands not directly impacted by the mosquito ditching. Aerial photographs flown in 1942, 1952, 1960, 1972, 1984, 1994, and 2007 were assembled. Although the assessment of potential effects of the mosquito ditching was based on the 1942, 1972, and 2007 photographs (as per the scope of work), all available historical imagery was inspected. In late February 2008, HDR environmental scientists conducted field assessments of wetlands directly affected by the ditching to assess their current ecological condition. Data collected included dominant and common plant species, presence of exotic or ruderal species, and any evidence of site-specific hydrologic stress. Focus was also directed to characterizing the physical and biological characteristics of the mosquito ditches and spoil mounds present within or immediately adjacent to each wetland.

According to Geographic Information System (GIS) mapping of the ditching provided by the FWC, approximately 22,000 feet of mosquito ditches were constructed in this section of the GRWMA (although approximately 1000 feet turned out not to have been ditched). The ditch network forms two groupings. One group, located in the northwest corner of the GRWMA property, falls within the southern half of Management Unit 4 (Pine Plantation). A second group, located about 1400 feet to the east and southeast of the northwest ditch group, falls within adjoining portions of Management Units 5 (Pine Plantation) and 10 (Tidal Marsh). The northwest group totals 5414 linear feet of ditches, including the ditch along the east side of South Roscoe Boulevard Extension, and a ditch that extends north-northwest from the Roscoe ditch (and possibly excavated at the same time the Roscoe ditch was created). The southeast group totals 14,515 linear feet and follows the perimeters of several finger-like extensions of tidal marsh west of Jones Creek. Mapping of the mosquito ditches prepared by the FWC Guana River Field Office shows an additional 1017 feet of ditch extending north of the tidal wetlands, glancing off the edge of a small freshwater depression marsh and terminating at the southern edge of a second freshwater depression marsh. Field reconnaissance was unable to confirm the presence of ditching in this area. The ditch network encompasses approximately a 400-acre area.

Figure 1. Study Area Showing the Mosquito Ditches

2.2 Historical Background on Mosquito Ditching in the Study Area

Historical aerial photography indicates the mosquito ditches were excavated sometime between 1972 and 1984. They were constructed by the Palm Valley Mosquito Control District, a unit of the Anastasia Mosquito Control District (AMCD). According to a representative from AMCD, the intent was to have mosquitofish (*Gambusia affinis*) and other larvivorous fish naturally populate the ditches and when water levels overtopped the ditch banks, the fish would spill over into the adjacent wetland and feed on the larvae of the saltmarsh mosquito (*Aedes* spp.). For wider salt marshes, two ditches were created, one on either edge of the wetland (known as "rim ditching"). Occasionally, for narrow marshes, a single ditch line was deemed sufficient for mosquito control. By placing the excavated spoil such that it left gaps of undisturbed marsh between adjacent spoil mounds, the flood waters could flow largely unimpeded to the low areas where the mosquito breeding was most likely to occur (Figure 2).

Figure 2. Example of Mosquito Ditch and Spoil Mound Configuration

In the GRWMA, rim ditching of wetlands was principally used. The ditches generally range from 8 to 18 feet in width and from less than a foot to nearly four feet in depth. Ditching created two parallel rows of circular spoil mounds or piles, one to either side of the ditch cut. These spoil mounds varied from 2 to 10 feet high with an average height of about five to six feet high. The mounds are generally about 30 feet in diameter, although some have diameters nearer to 20 feet. Because ditch maintenance was discontinued after the property was acquired by the Florida Department of Environmental Protection in

1984 (Mike Smith, Anastasia Mosquito Control District, pers. comm., Feb. 28, 2008), some variability in the size and shape of the ditches and spoil mounds is to be expected.

Nearly a century before the mosquito ditches were created, the ditched wetlands were impacted to an undetermined degree by the excavation of the old Florida East Coast (FEC) Canal between 1883 and 1912 (Figure 3). Between 1929 and 1935, this canal was deepened and extended and is now part of the Atlantic Intracoastal Waterway (Parkman 1983). Sometime between 1942 and 1952, spoil dredged from the Intracoastal Waterway was cast over a roughly 16-acre area now occupied by the East Coast Canal Estates (the subdivision south of SR 210 (Palm Valley Road) and west of South Roscoe Boulevard Extension). A small northerly extension of the Tolomato River tidal marsh was isolated from the river and appeared to have flooded some adjacent upland areas immediately northeast of the spoil area, creating an impoundment effect. Prior to 1960 the ditch along South Roscoe Boulevard Extension was excavated and a cross-drain under the road conveyed flow to the Atlantic Intracoastal Waterway (Tolomato River). At about the same time, a short ditch was extended northwest diagonally from the Roscoe ditch into the recently isolated tidal marsh extension, perhaps to drain off excess water. Years later (sometime between 1972 and 1984), the northwest cluster of mosquito ditches were tied into this ditch, and the short ditch was re-excavated as a mosquito ditch.

2.3 Overview of affected wetlands

The interiors and perimeters of five wetlands have been impacted by the northwestern mosquito ditch network. The natural community map of the GRWMA produced by FWC/FNAI identifies these as freshwater depression marshes (Spencer 2004). The interiors and perimeters of a large, linear tidal wetland (part of the Tolomato River estuarine system) has been impacted by the southeastern mosquito ditch network. These wetlands are identified on Figure 4.

Freshwater wetlands are underlain by Manatee fine sandy loam – frequently flooded, Parkwood fine sandy loam – frequently flooded, St. Johns fine sand – depressional, Floridana fine sand – frequently flooded, and several "wet spots" within Myakka fine sand soil areas. The tidal wetlands are underlain by Pellicer silty clay loam – frequently flooded. The Manatee, St. Johns, and Pellicer soils are very poorly drained and hydric, the Parkwood and Floridana soils are poorly drained and hydric, and the Myakka soils are poorly drained non-hydric (although the "wet spot" inclusions are probably hydric).

The FWC/FNAI map of natural plant community in the GRWMA identified four types of wetlands in the study area, three of which are freshwater wetland types and one a tidal wetland type: (1) basin marsh, (2) depression marsh, (3) tidal marsh, and (4) basin swamp. The following characterizations of these community types are taken nearly verbatim from the FWC/FNAI report (Spencer 2004).

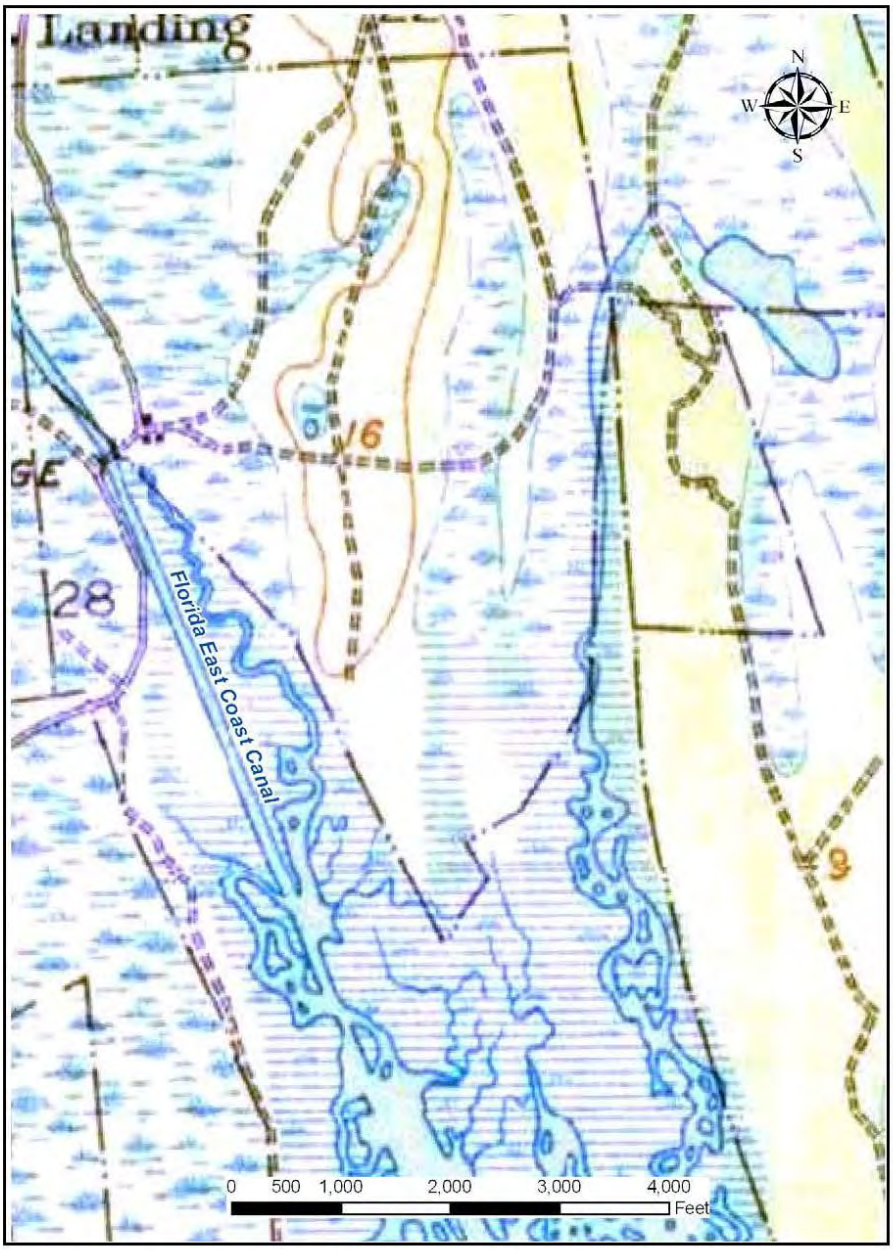

Figure 3. The Project Area on a 1918 Topographic Map

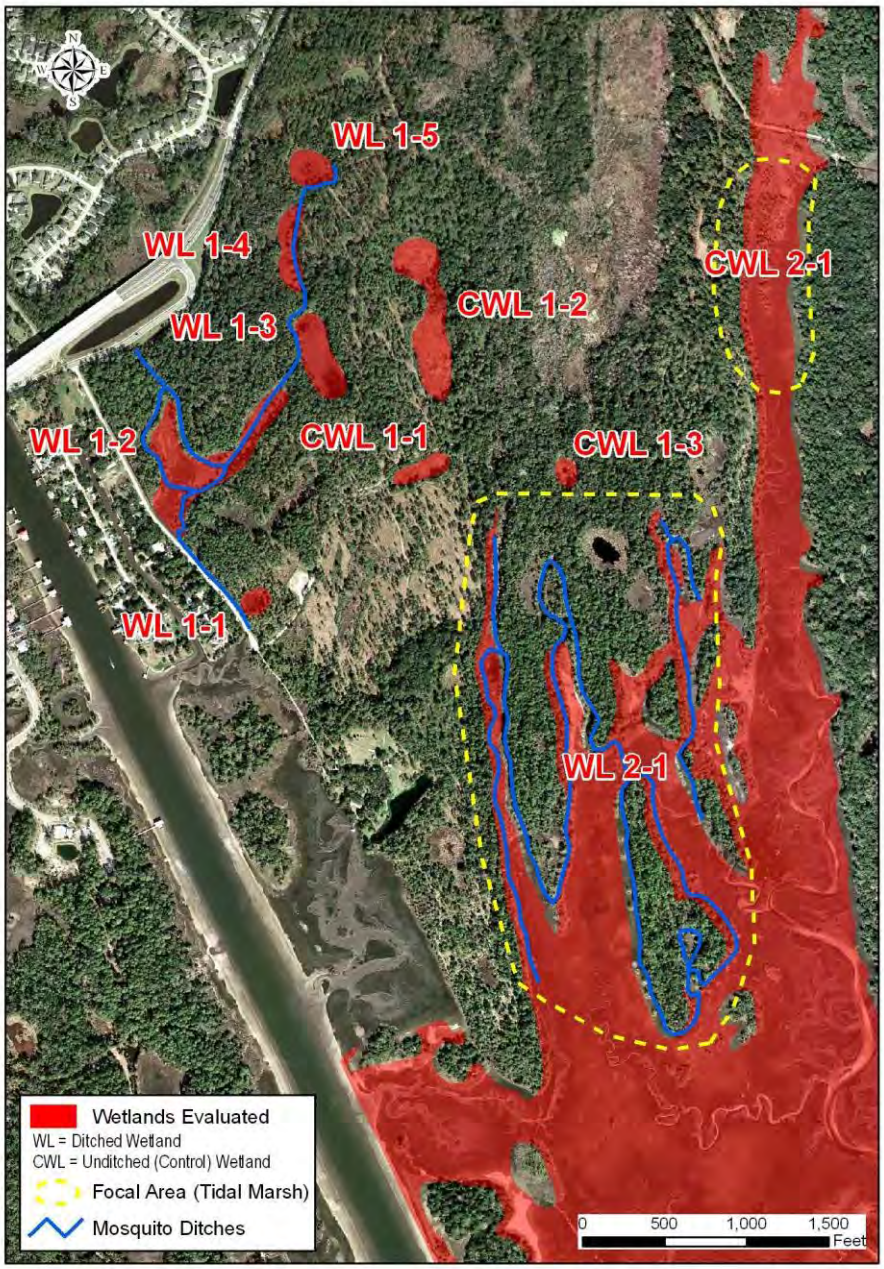

Figure 4. Wetlands Impacted by Mosquito Ditching

2.3.1 Basin Marsh

Basin marsh is an herb-dominated freshwater community that occurs in large irregularly shaped depressions. On the GRWMA these depressions are generally elongate, oriented north-south in ancient interdunal swales or inlets. Sand cordgrass (*Spartina bakeri*) is the dominant plant in this community, often occupying the entire marsh. Some basin marshes, however, have multiple zones of vegetation. Outer edges of marshes may have a sparse to moderately dense cover of wax myrtle (*Myrica cerifera*) and persimmon (*Diospyros virginiana*) over sand cordgrass, blue maidencane (*Amphicarpum muhlenbergianum*), redroot (*Lachnanthes caroliniana*), and various sedges. Moderately deep portions of basin marshes may support a dense cover of maidencane (*Panicum hemitomon*). Deepest portions of basin marshes support white water lily (*Nymphaea odorata*), duck potato (*Sagittaria lancifolia*) and pickerel weed (*Pontederia cordata*). Slash pine (*Pinus elliottii*), water oak (*Quercus nigra*), and red maple (*Acer rubrum*) may invade basin marshes that are hydrologically altered or fire suppressed. Dog fennel (*Eupatorium compositifolium*), fireweed (*Erechtites hieracifolia*), low panic grass (*Dichanthelium* spp.) and other weedy species may invade portions of basin marshes where the soil has been disturbed.

2.3.2 Depression Marsh

Depression marsh is an herb-dominated freshwater community that occupies shallow, generally rounded depressions. Vegetation often occurs in concentric bands along the hydrologic gradient. A canopy is generally absent, but may include an occasional slash pine *(Pinus elliottii)*, red maple *(Acer rubrum)*, or swamp tupelo *(Nyssa biflora)*. The shrub layer is typically sparse, but may reach coverage of 50% or more, depending on time since last fire. Buttonbush *(Cephalanthus occidentalis)* and persimmon *(Diospyros virginiana)* are the most common shrubs. Herb cover is 75 - 100%, principally represented by sand cordgrass *(Spartina bakeri)*, Virginia chain fern *(Woodwardia virginica)*, and maidencane *(Panicum hemitomon)*. Other herbs present in depression marshes are bluestem grass (Andropogon spp.), blue maidencane *(Amphicarpum muhlenbergianum)*, yellow-eyed grasses *(Xyris spp.)*, plume grass *(Erianthus giganteus)*, yellow hatpins *(Syngonanthus flavidulus)*, bladderworts *(Utricularia spp.)*, mermaid weed *(Proserpinaca pectinata)*, grassy arrowhead *(Sagittaria graminea)*, blue water-hyssop *(Bacopa caroliniana)*, horned beaksedge (*Rhynchospora inundata*), and southern cutgrass (*Leersia hexandra*). Fire suppression or burning only during winter months when the depressions hold water may allow establishment of a thick shrub layer, or allow pines to become established in the depressions. This may reduce the hydroperiod and lead to succession of the community to baygall or dome swamp. Pond spice (*Litsea aestivalis*) (state listed as Endangered) was found at two locations in depression marshes in the central portion of GRWMA.

2.3.3 Basin Swamp

Basin swamp is a freshwater forested wetland found in low, irregularly shaped depressions within mesic flatwoods or mesic hammock communities. This community is generally distributed toward the northern half of GRWMA. The open to moderately dense canopy (30 - 80% coverage) generally is dominated by red maple (*Acer rubrum*), slash pine (*Pinus elliottii*), swamp tupelo (*Nyssa biflora*), American elm (*Ulmus americana*), or pond cypress (*Taxodium ascendens*). Tall shrub cover is generally sparse to moderate (5 - 50%) coverage, and is usually dominated by red maple, wax myrtle (*Myrica cerifera*), and buttonbush (*Cephalanthus occidentalis*). Shiny lyonia (*Lyonia lucida*) replaces maple and buttonbush in some basin swamp. Highbush blueberry (*Vaccinium corymbosum*) is common in the tall and short shrub layer, particularly along the outer edge of the basin. Herbaceous cover generally is sparse to moderate (5 - 75 % coverage), dominated by sawgrass (*Cladium jamaicense*), Virginia chain fern (*Woodwardia virginica*), lizard's tail (*Saururus cernuus*), and sedges (*Rhynchospora miliacea, Carex gigantea*). Several of the basin swamps on GRWMA may have recently succeeded from basin marshes. These areas have a canopy of young red maple and a moderately dense cover of buttonbush, both of which frequently invade marshes that have not burned regularly. Areas with a canopy cover above 50% were generally described as basin swamp rather than basin marsh. Aggressive use of prescribed fire in these communities would result in a vegetative structure and composition more characteristic of basin marshes. Basin swamps also may be difficult to distinguish from dome swamps. On GRWMA, dome swamps are smaller than basin swamps and generally occur in circular depressions and lack red maple, elm and buttonbush. Fire tends to burn through dome swamps, which inhibits development of a shrub layer.

2.3.4 Tidal Marsh

Tidal marsh is present along the Tolomato River. Structure and composition are variable along a hydrologic and salinity gradient. Marsh edges have a moderate cover of shrubs including Christmasberry (*Lycium carolinianum*), yaupon holly (*Ilex vomitoria*), cabbage palm (*Sabal palmetto*), and red cedar (*Juniperus virginiana*). Inland portions of the marsh with little tidal influence are dominated by sand cordgrass (*Spartina bakeri*). Deeper areas with muck soils and some tidal influence are dominated by black needle rush (*Juncus roemerianus*). The upper marsh along the main river channel is dominated by salt grass (*Distichlis spicata*) and glasswort (*Salicornia virginica*) with patches of sea oxeye (*Borrichia frutescens*). Closer to the river are large expanses of smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*) each in nearly uniform stands creating bands of bright green-hued cordgrass and grey-hued needlerush along the river and tidal creeks.

2.4 Other Land Use/Land Cover Types

Other land cover types in the vicinity of the subject wetlands, according to the FNAI mapping, include mesic flatwoods, mesic hammocks, maritime hammocks, scrub, scrubby flatwoods, pine plantations, and ruderal (disturbed) areas. Based on HDR's field reconnaissance, some of pine plantation areas appear to be mesic flatwoods, the scrubby flatwoods would be more appropriately termed shrub and brushland, and a small area identified as scrub appears to be mesic flatwoods with a dense tree cover. Comprising the ruderal areas is an unpaved parking area used as a staging area by equestrian enthusiasts and, just south of the study area, a series of old spoil piles created from dredging operations in the Atlantic Intracoastal Waterway (the old Florida East Coast Canal). These spoil piles first appear on aerial photographs flown in 1952.

2.5 Assessment of Study Area Wetlands

The following section assesses wetland affected by mosquito ditching. The wetlands are grouped into two groups, one group associated with the northwestern network of mosquito ditches, and a second group associated with the southeastern ditch network (Figure 4, above). Representative photographs of each assessed wetland are reproduced in Appendix A. Topographic data was extracted from LIDAR data furnished by St. Johns County (Appendix B). The study area on 1952, 1960, 1984, and 1994 aerial photographs are reproduced in Appendix C.

2.5.1 Wetland 1-1

Wetland 1-1 is a tidally-influenced herbaceous wetland, approximately 0.57 acres in size and located just inside the GRWMA boundary where it abuts the East Coast Canal Estates subdivision (Figure 5). This wetland is identified on the FWC/FNAI natural community map as a depression marsh. Its topographic elevation mostly falls between 2 and 3 feet NGVD (vertical datum 1988). Although no mosquito ditches or associated spoil mounds are present in or adjacent to this wetland, the ditch along South Roscoe Boulevard Extension (which is an extension of the mosquito ditching network) cuts across its southwestern periphery, providing an outlet for surface flows from the wetland into Roscoe ditch. Approximately 2-3 inches of standing water was observed at the outlet.

Surrounding the wetland's open water core is a dense zone of saltmarsh cordgrass (*Spartina alterniflora*) with pockets of black needlerush (*Juncus roemerianus*). Some areas of saturated soils are supporting green algae, a sign of stagnant conditions. Many of the grasses within southwestern portion of the wetland adjacent to the outlet to the Roscoe ditch were dead. This area did have occurrences of sea blite (*Suaeda* spp.) and glasswort (*Salicornia virginica*). The landward edge of the marsh grades into a maritime forest consisting of saw palmetto (*Serenoa repens*), cabbage palm (*Sabal palmetto*), red cedar (*Juniperus virginiana*), and slash pine (*Pinus elliottii*). Numerous fiddler crab burrows were observed within exposed, saturated soils and a great blue heron (*Ardea herodias*) flew over the wetland during the field reconnaissance. Historically, this small wetland was located about 130 feet east of, and formed a small extension of, the

Tolomato River tidal marsh. Following the deposition of spoil dredged from the Atlantic Intracoastal Waterway, hydrologic connection was (and currently is) maintained via the ditch along, and the culvert that crosses under, South Roscoe Boulevard Extension. An estimated 550 square feet of the wetland's historical extent was displaced by ditch construction. Although the mapped soil type at the site is *Myakka fine sand* (a poorly drained non-hydric flatwoods soil), its depressional topographic setting suggests the wetland is underlain by that series' depressional variant or possibly *Manatee fine sandy loam – frequently flooded.*

The wetland appears to be in good condition. Despite the deposition of spoil dredged from the Atlantic Intracoastal Waterway which was followed by the slight rerouting of surface water discharge from the wetland, the only discernable impact from ditching is a slight reduction (less than 1%) in the wetland's surface area. Site hydrology appears unaffected and no exotic, ruderal, or other invasive plant species were observed.

2.5.2 Wetland 1-2

Wetland 1-2 is a tidally-influenced herbaceous wetland approximately 5.62 acres in size. It is located just within the GRWMA boundary opposite the East Coast Canal Estates subdivision. It is identified on the FWC/FNAI natural community map as a depression marsh. The wetland is situated between 1 and 2 feet NGVD (not including the spoil mounds). Mosquito ditches rim the wetland's western lobe and bisect its narrower eastern lobe. Historically, the wetland was a short extension of the Tolomato River tidal marsh, but deposition of spoil dredged from the Atlantic Intracoastal Waterway isolated it from the river's tidal marsh. As with Wetland 1-1, hydrologic connection to the Waterway is maintained by means of a drainage ditch along the periphery of the East Coast Canal

Estates subdivision and a cross-drain under South Roscoe Boulevard Extension. *Manatee loamy fine sand – frequently flooded* (a very poorly drained hydric soil that is associated with floodplains and poorly-defined drainageways) is mapped throughout the site. Saltmarsh cordgrass is the dominant species throughout the western half of Wetland 1-2. Black needlerush can also be found in pockets, but is dominant along the mosquito ditch banks. Cabbage palm, sea oxeye (*Borrichia frutescens*), slash pine, glasswort are located on pockets of saturated soils. Slash pine and cabbage palm are the dominant species along the periphery of the wetland's edge. The northwestern finger of this wetland has sandy soils with no standing water, patches of glasswort, sea blite, and black needle rush. Spoil mounds tended to be covered in pine needles, void of herbaceous species, and associated with red cedar, cabbage palm, and slash pine.

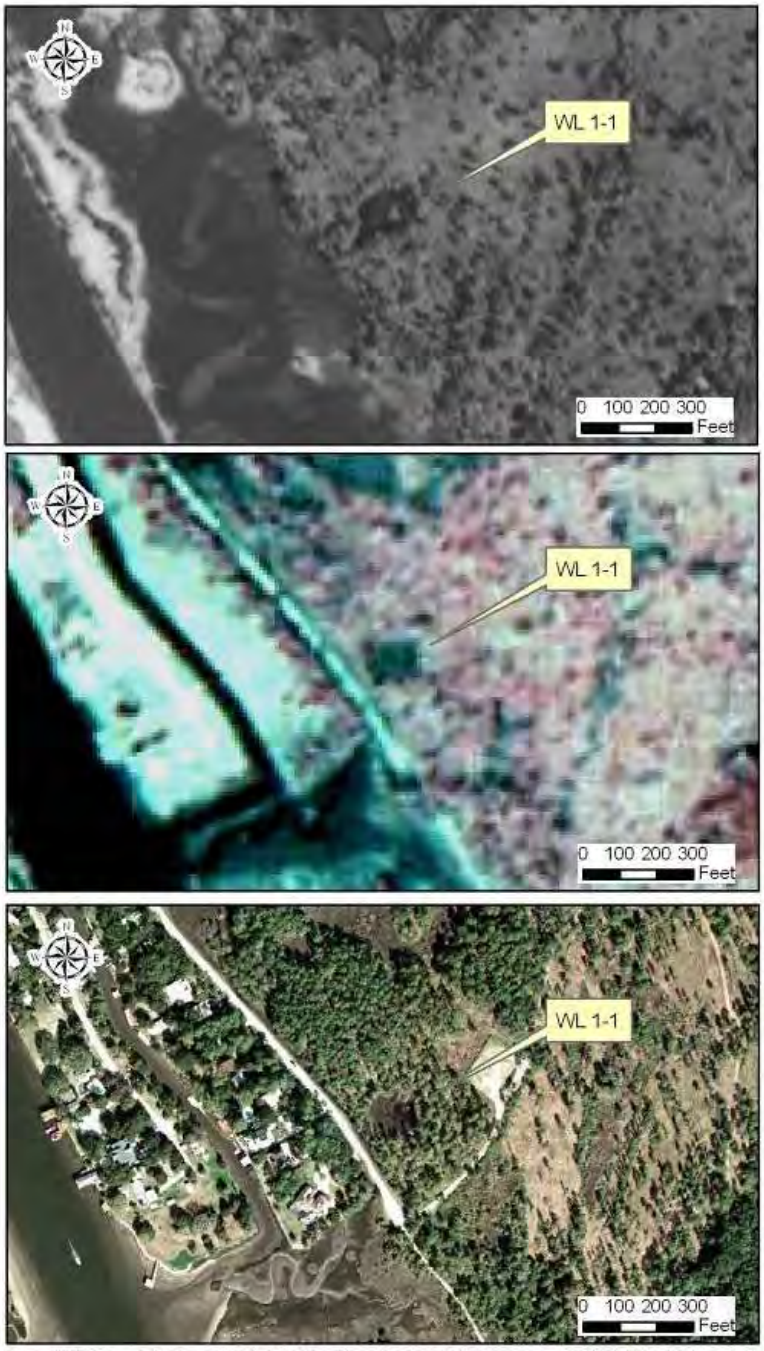

Figure 5. Wetland 1-1 on 1942 (Top), 1972 (Middle), and 2007 (Bottom) Aerial Photographs.

Comparison of historical (1942 and 1972) and current (2007) aerial photography reveals that Wetland 1-2, similar to Wetland 1-1, was affected by the construction of the Atlantic Intracoastal Waterway (Figure 6). As previously described in the historic overview of mosquito ditching, Wetland 1-2 (by 1952) was isolated from the river by spoil dredged from the Atlantic Intracoastal Waterway and this appeared to have created an impoundment effect that resulted in the flooding of nearby pine flatwoods uplands. With the creation shortly thereafter of the Roscoe ditch and cross-drain and short secondary ditch, this localized flooding was apparently alleviated. It was at least two decades later that the mosquito ditches were dug, resulting in the creation of an estimated 2800 feet of ditches and approximately 160 spoil mounds. As much as 3.5 acres of wetland's surface area (or 62%) were displaced as a result (including 1.0 ac of ditches and 2.5 ac of spoil mounds). Notwithstanding its reduced spatial extent, the deposition of spoil dredged from the Intracoastal Waterway, the temporary impoundment effect, and the eventual rerouting of surface water discharge to the Tolomato River, the wetland appears to be in good condition, supporting a plant community that would be expected for this wetland type.

Although the spatial extent of Wetland 1-2 has been diminished, this may have been offset to some extent. The ditches may have enhanced tidal circulation by providing improved opportunities for the utilization of marsh production by estuarine fauna. The configuration of the ditches, spoils, and the gaps left between the spoils do not appear to have impeded sheet flow or changed drainage patterns. Despite the ditching-related disturbances, no exotic, ruderal, or other invasive plant species have invaded the wetland.

2.5.3 Wetland 1-3

Wetland 1-3 is a tidally-influenced herbaceous wetland approximately 2.22 acres in size. It is located about 150 feet northeast of Wetland 1-2. The wetland is identified on the FWC/FNAI natural community map as a tidal marsh. It falls between 2 and 3 feet NGVD (not including the spoil mounds). A mosquito ditch and associated spoils penetrate the northwestern periphery of the wetland. The wetland is underlain by *St. Johns fine sand – depressional* (a very poorly drained hydric soil found in flatwoods depressions). The existence of a linear depressional feature roughly defined by the three foot contour interval (St. Johns County LIDAR data) may have hydrologically connected the wetland with Wetland 1-2 during extreme high tide events.

Saltmarsh cordgrass is the dominant ground cover. The southern portion of Wetland 1-3 has a large open water area surrounded by black needle rush with a sparse coverage of saltmarsh cordgrass within the shallows. The smaller open water area within the northern portion is dominated by saltmarsh cordgrass. Trees species along the banks of the mosquito ditch include cabbage palm, slash pine, oaks, red cedar, and dahoon holly (*Ilex cassine*). Herbaceous vegetation recruitment onto the spoil mounds has been hindered due a dense layer of pine needles. However, the spoil mounds normally did have slash pines, cabbage palms, and/or red cedar growing up within or adjacent to them. Black needlerush, glasswort, saltwort (*Batis maritima*), and marsh elder (*Iva frutescens*) are growing between the spoil mounds.

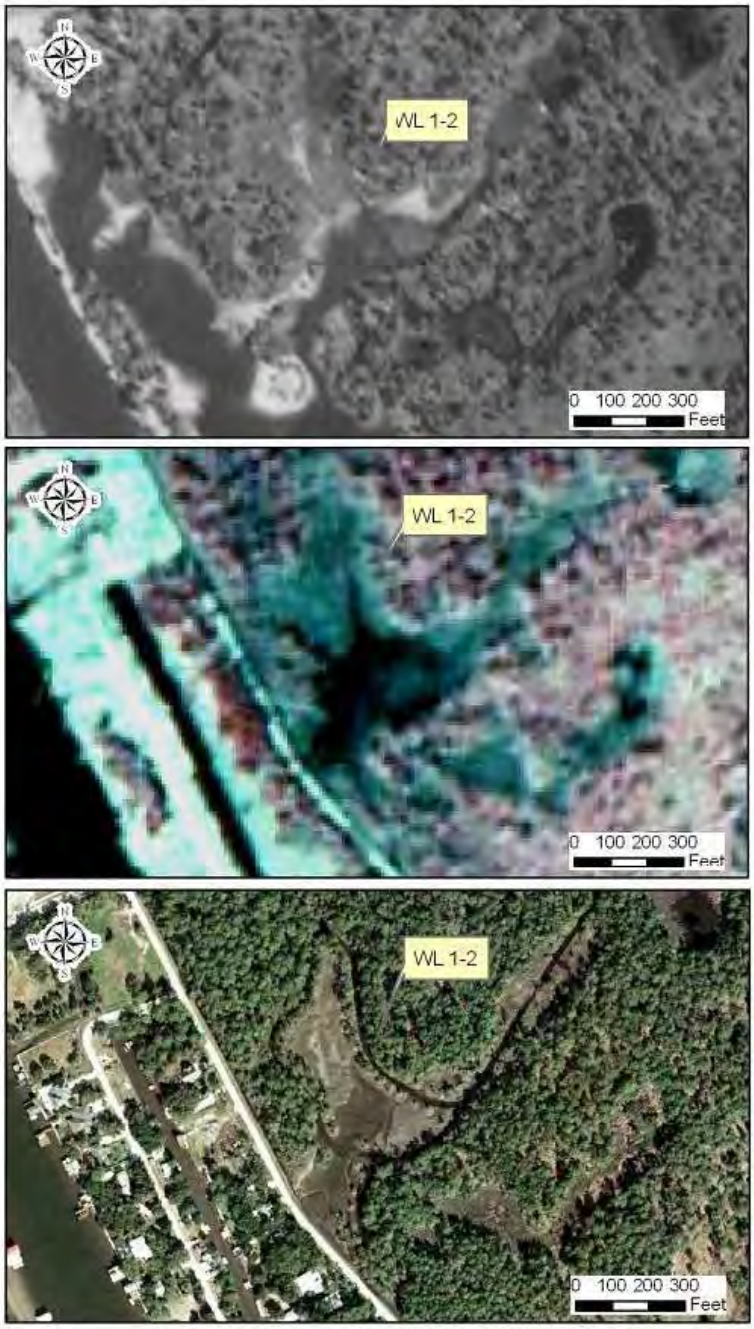

Figure 6. Wetland 1-2 on 1942 (Top), 1972 (Middle), and 2007 (Bottom) Aerial Photographs.

Comparison of the historical and current aerial photography (Figure 7) found that Wetland 1-3, except for a slight reduction in spatial extent, appears to have remained little changed over the years since 1942. Because the ditching only encroached on the northwestern periphery of the wetland, resulting in the creation of an estimated 170 ft of ditches and 12 spoil piles, only about one-quarter acre of its surface area appears to have been displaced (approximately 11% of its surface area). As indicated for the previous wetland, this impact has been offset by increased tidal circulation and improved feeding opportunities for estuarine fauna made possible by the ditching. The configuration of the ditches, spoils, and the gaps remaining between the spoils do not appear to have impeded sheet flow or changed drainage patterns. No exotic, ruderal, or other invasive plant species have invaded the ditched or unditched portions of the wetland, either in or alongside the ditches of atop the spoil mounds.

2.5.4 Wetland 1-4

Wetland 1-4 is a tidally-influenced herbaceous wetland, approximately 1.45 acres in size, and situated about 140 feet north of Wetland 1-3. It is identified on the FWC/FNAI natural community map as a depression marsh. Its topographic elevations range from 1 to 3 feet NGVD (not including the spoil mounds). A mosquito ditch longitudinally bisects the wetland's eastern half. *Parkwood loamy fine sand – frequently flooded* (a poorly drained hydric soil found on floodplains and poorly-defined drainageways) is mapped across the northern three-fourths of the site. *St. Johns fine sand – depressional* is mapped across the remainder of the site. The continuation of the same slight linear depression (roughly marked by the 3-foot contour interval) between Wetlands 1-2 and 1-3 may have enabled hydrologic connection between the latter wetland and Wetland 1-4. Wetland 1-4 is dominated by black needlerush. Sand cordgrass (*Spartina bakeri*) can be found near and within the water's edge, along with marsh elder. Spoil mounds, located around the entire perimeter, lack herbaceous coverage due to the heavy pine needle layer, but usually support a variable growth of slash pine, cabbage palm, oak, and red cedar.

Wetland 1-4 experienced a sizeable reduction in surface area as a consequence of mosquito ditching (Figure 8). However, in or before 1952, a series of short, water-filled ditches or ditch-like features (mostly less than 320 feet long and up to 15-20 ft wide) traversed much of the wetland in an apparent attempt to improve drainage. Traces of these ditches are still evident on some of the later imagery. By 1984, an estimated 520-foot long mosquito ditch was constructed along the wetland's eastern periphery, flanked by two rows of 13 spoil mounds. This activity displaced slightly over a half acre (approximately 30%) of the wetland's surface area. As indicated for the previous wetland, this impact has been offset by increased tidal circulation and improved feeding opportunities for estuarine fauna made possible by the ditching. The configuration of the ditches, spoils, and the gaps remaining between the spoils do not appear to have impeded sheet flow or changed drainage patterns. No exotic, ruderal, or other invasive plant species have invaded the ditched or unditched portions of the wetland, either in or alongside the ditches of atop the spoil mounds.

Figure 7. Wetland 1-3 on 1942 (Top), 1972 (Middle), and 2007 (Bottom) Aerial Photographs.

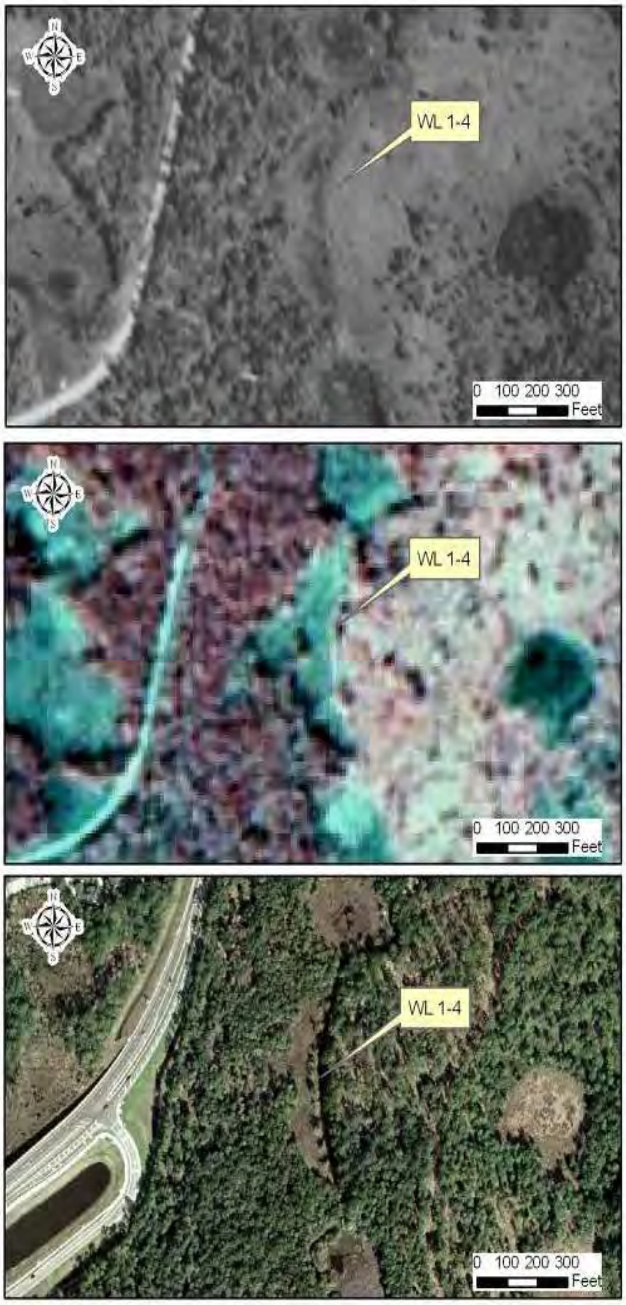

Figure 8. **Wetland 1-4 on 1942 (Top), 1972 (Middle), and 2007 (Bottom) Aerial Photographs.**

2.5.5 Wetland 1-5

Wetland 1-5 is tidally-influenced herbaceous wetland approximately 1.14 acres in extent and is situated about 110 feet north of Wetland 1-4. The wetland falls between 1 and 2 feet NGVD (not including the spoil mounds). A mosquito ditch tracks along its eastern and southern margins. *Parkwood loamy fine sand* – frequently flooded is mapped across most of the site, with a sliver of Smyrna fine sand (a poorly drained non-hydric flatwoods soil) along its eastern margin.

The vegetation includes several patches of saltmarsh cordgrass scattered throughout the site, and large areas of dead dog fennel and unidentified grasses with numerous, scattered small tree stumps (species undetermined) that appear to have died several years ago. A small open water area occupies the wetland's interior portion. Algal mats cover a zone immediately surrounding this open water area, possibly indicating stagnant conditions. A growth of red cedar, cabbage palm, oaks, and slash pine occupies the spoil mounds as well of the uplands surrounding the wetland.

Of the wetlands assessed during the project, this one appears to show signs of vegetative change that suggest environmental stress. In 1942 the site appears to have been a marsh with a few trees (Figure 9). However, by 1952 the site supported a closed canopy forest surrounding a small, open water interior. By 1960 the site appears to have supported a mixed scrub-shrub wetland, with some trees and possibly some marshy areas. Although vegetative cover on the 1972 aerial photograph is difficult to determine (given its lower resolution), the 1984 aerial photography, which was taken not long after the mosquito ditches were constructed, shows a water-filled wetland with no clear evidence of tree or shrub growth. The resultant ditch and spoil mounds displaced about 0.3 acres (nearly 30%) of wetland area. By 1994, the wetland looks no different that other depression marshes to the immediate southeast (e.g., CWL 1-2). It seems plausible that Wetland 1-5, prior to mosquito ditching, was a freshwater marsh that periodically experienced varying degrees of saltwater inundation associated with extreme high tide events. The saltwater probably moved up-basin through the same depressional trough that connects Wetlands 1-3 and 1-4. With the creation of the mosquito ditches, the site appears to be inundated, presumably with saltwater now being conveyed to the site by mosquito ditch. Such swings between freshwater and saltwater conditions, if these did indeed occur, might have resulted in a die-off of saltwater-intolerant vegetation. The tree stumps now present on the site may signify such a die-off. It is apparent that Wetland 1-5, while already showing signs of stress potentially related to salinity shifts, may have undergone a more extreme salinity shift after the mosquito ditching connected the site to the Tolomato River tidal marsh. Additional site visits will be needed at different stages in the tidal cycle and over multiple seasons to better understand the stresses this wetland is experiencing. Despite these impacts, no exotic, ruderal, or other invasive plant species have invaded the ditched or unditched portions of the wetland, either in or alongside the ditches of atop the spoil mounds.

Figure 9. Wetland 1-5 on 1942 (Top), 1972 (Middle), and 2007 (Bottom) Aerial Photographs.

Wetland 2-1 is an extensive estuarine tidal marsh complex that drains to the Tolomato River. It falls within the northernmost portion of a larger tidal marsh system that reaches south to St. Augustine Inlet, which in turn is part of the Guana-Tolomato-Matanzas estuary that extends from Duval to Flagler counties. This wetland is identified on the FWC/FNAI natural community map as a tidal wetland. For the purposes of this assessment, Wetland 2-1 specifically refers to a smaller focal area within this larger tidal marsh (Figure 4 above). Its elevation is generally below 1 feet NGVD (not including the spoil mounds). The larger tidal marsh, of which Wetland 2-1 is part, represents the dominant topographic feature in the northwestern quadrant of the GRWMA, covering approximately 2017 acres. The wetland extends approximately 7.35 miles north-south and varying between 60 feet to a mile in width. The Wetland 2-1 focal area approaches a half mile in width. Its northern limits terminate in a series of long finger-like projections. The wetland is inundated twice daily by tidal waters. Mosquito ditches are present at the very north end of the wetland, mostly running along the peripheries of its finger-like extremities. The wetland's northernmost projection is drained by Jones Creek, a sinuous tidal creek that discharges into Tolomato River. The projection's northern tip is linked by a ditch extending to Diego Pond. A flapgate water control structure at the west end of this pond allows tidal exchange between Diego Pond and Jones Creek while regulating overflows, water levels, and drawdowns in accordance with a water management schedule. Underlying the tidal marsh in *Pellicer silty clay loam – frequently flooded* (a very poorly drained hydric soil found in low tidal marshes along stream estuaries near the Atlantic coast).

Given the large size of Wetland 2-1, observations of existing conditions were recorded at three locations, the first located on the western periphery of the westernmost ditch-lined finger about 2000 feet south of its tip, the second approximately 1000 feet to the south, and the third approximately 500 feet east-northeast on the western periphery of a second ditch-lined tidal marsh finger. Wetland 2-1 is dominated by saltmarsh cordgrass with scattered clumps of black needlerush clumps, glasswort, and sea blite. An upland forest of cabbage palms intermixed with slash pine, red cedar, and dahoon holly lines the perimeter of the wetland. Upland islands within the marsh support a variable growth of pines, oaks, and cabbage palms. Wading birds apparently value these islands, as numerous wood storks and great egrets were observed foraging in the nearby tidal flats. The spoil mounds had very minimal herbaceous coverage due to a pine needle layer. Tree and shrub species growing atop them include cabbage palm, red cedar, oaks, and slash pine. Fiddler crabs burrows were numerous and a pile of mussel shells was observed on the saturated soils.

The ditch and associated spoil mounds have displaced an estimated 21 acres of wetland area. This includes approximately 16,550 feet of ditches and 950 spoil mounds. Compared to the massive extent of tidal wetlands in this section of the GRWMA, this loss is relatively minimal. In fact, this impact may have been offset to a degree, as the ditches probably enhanced tidal circulation and increased accessibility of the marsh to estuarine fauna. The configuration of the ditches, spoils, and the gaps left between the spoils do not appear to have impeded sheet flow or changed drainage patterns. Despite the ditching-related disturbances, no exotic, ruderal, or other invasive plant species have invaded the wetland. The condition of this wetland, despite the mosquito ditching, appears to be good.

Comparison of the 1942, 1972, and 2007 aerial photography generally corroborates this assessment (Figures 10a, 10b, and 10c). The spatial extent of Wetland 2-1 and the surrounding tidal marsh do not appear to have changed discernibly during this time frame (aside from the ditches and spoils). Salterns and upland islands have also remained in their general position. No exotic, ruderal, or other invasive species are present in the ditch or on the spoil mounds. However, there has been limited displacement of tidal creek channels, in part due to their being co-opted by nearby ditch sections.

2.6 Comparison to Unditched Wetlands

A reconnaissance of selected unditched wetlands was conducted during the two-day site visit to help isolate the effects of channelization and mosquito ditching from other potential factors that may have affected the ditched wetlands. In the northwestern cluster of wetlands, three unditched wetlands were visited (labeled as Control Wetlands 1-1, 1-2, and 1-3 on Figure 4 above), while in the southeastern cluster, an unditched lobe of the Tolomato River tidal wetlands (Control Wetland 2-1) was visited (see Figure 4, above). Data on dominant species and general site conditions were collected and this provided the basis for the comparison between ditched and unditched wetlands.

In the case of the northwestern group of wetlands, the presence of mosquito ditches and spoil mounds were not the only criteria distinguishing these wetlands from unditched wetlands. The northwestern group was unique from other non-tidal wetlands visited by HDR in that these wetlands were historically connected to varying degrees to the Tolomato River tidal marsh. The connection was closest with respect to Wetlands 1-1 and 1-2, although more tenuous with respect to Wetlands 1-3, 1-4, and 1-5. All five wetlands currently exhibit tidal influence as a result of mosquito ditching. Historically, Wetlands 1-1 and 1-2 were extensions of the tidal marsh, as is evident from the 1942 aerial photographs. As discussed previously, a shallow linear depression extending northward (up-basin) from Wetland 1-2 topographically linking this wetland with Wetlands 1-3, 1-4 and 1-5. This depressional feature may have facilitated tidal exchange between the Tolomato River tidal marsh (via Wetland 1-2) and these three wetland during extreme high tide events. Mosquito ditch construction probably heightened this connection and, in the process, increased the surface water salinity in Wetlands 1-3, 1-4 and 1-5. The unditched wetlands visited during field reconnaissance do not appear to share these hydrologic and topographic characteristics. The dominance of sand cordgrass and the general absence of black needlerush, saltmarsh cordgrass, and other plant species commonly associated with tidal marsh systems indicates the unditched wetlands are more freshwater in nature. Because of this, their value as control (or reference) wetlands was largely negated.

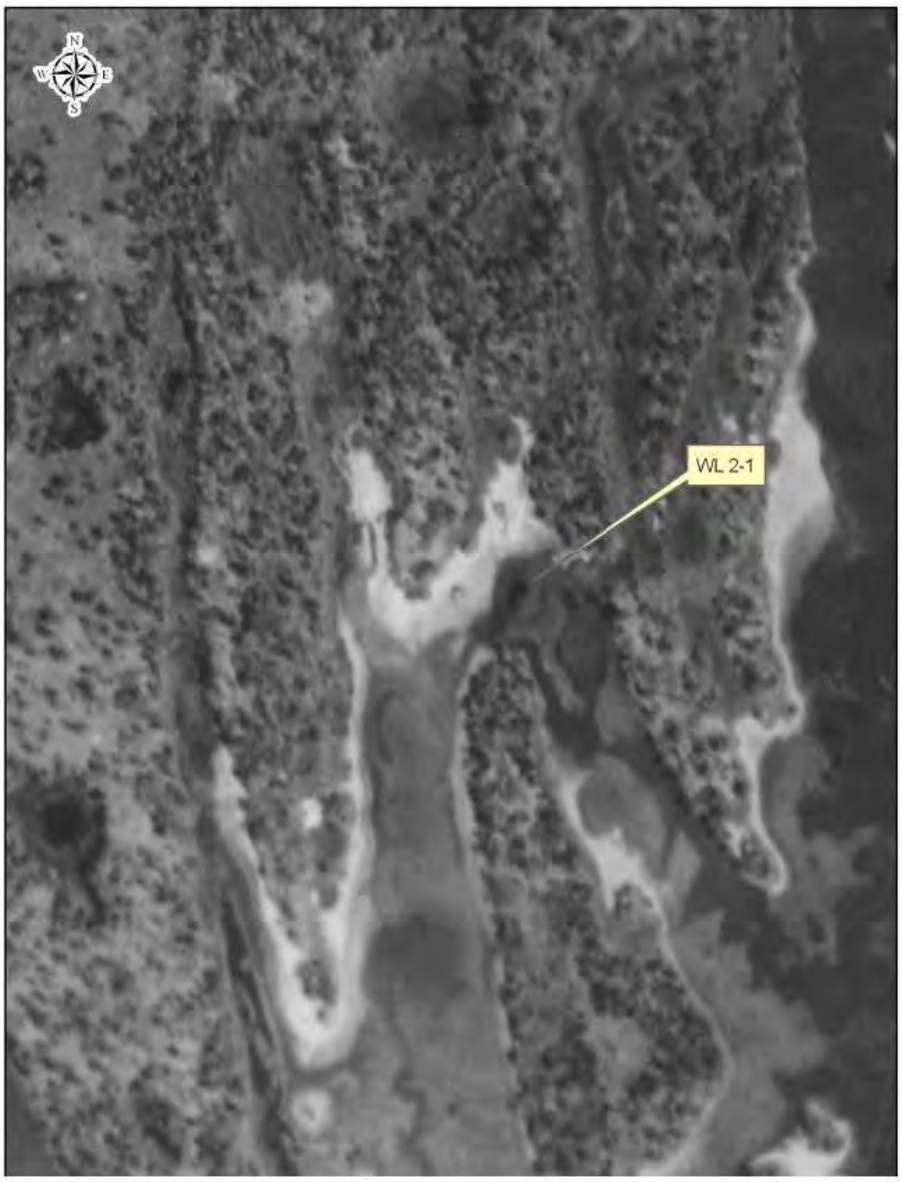

Figure 10a. Wetland 2-1 on 1942 Aerial Photograph.

Figure 10b. Wetland 2-1 on 1972 Aerial Photograph

Figure 10c. **Wetland 2-1 on 2007 Aerial Photograph**

2.7 Observations Regarding the GRWMA Natural Community Mapping

Based on the site reconnaissance, HDR concluded that four of the five wetlands in the northwestern cluster were misclassified in the FWC/FNAI natural community map. The map identified Wetlands 1-1, 1-2, 1-4, and 1-5 as depression marshes, which are typically sand cordgrass dominated, whereas two of these wetlands (Wetlands 1-1 and 1-2) are dominated by saltmarsh cordgrass admixed with black needlerush, another wetland (Wetland 1-4) is dominated by black needlerush, and a fourth wetland (Wetland 1-5) has a variable cover but included saltmarsh cordgrass. As indicated above, these wetland show variable degrees of tidal influence. Because tidal influence was not identified as one of the distinguishing characteristics of depression marshes (Spencer 2004), these wetlands should be reclassified as tidal wetlands. Wetland 1-3 was correctly identified as a tidal marsh.

2.8 Summary of Impacts of Mosquito Ditching on the Affected Wetlands.

Wetlands directly affected by mosquito ditching largely remain in good condition. The primary impacts appear to be displacement of wetland area by the ditches and spoil mounds. These impacts notwithstanding, the vegetation in the unditched portions of these wetlands appears largely unaffected. Drainage patterns, tidal circulation, and the configuration of marsh islands and salterns appear not to have been adversely affected. It can therefore be tentatively concluded that the mosquito ditching has had no adverse impact on the wetlands aside from spatial reduction and perhaps an elevation of surface water salinity levels in three of the wetlands (Wetlands 1-3, 1-4, and 1-5). Conversely, the mosquito ditching may have had some beneficial effects by increasing access of estuarine fauna to the upper sections of the larger tidal marsh and enhancing wetland productivity.

2.9 References Cited

Florida Department of Natural Resources
1991 *Guana River Marsh Aquatic Preserve Management Plan.*

Florida Fish and Wildlife Conservation Commission (FWC)
2002 *A conceptual management plan for the Guana River Wildlife Management Area: 2002-2007, St. Johns County, Florida.*

Parkman, Aubrey.
1983 *History of the waterways of the Atlantic Coast of the United States.* Navigation History Series NWS-83-10. National Waterways Study, U.S. Army Corps of Engineers Water Resources Support Center, Institute for Water Resources. Alexandria, VA.

Spencer, Shannon
2004 GRWMA plant community type mapping – analysis results. Florida Fish and Wildlife Conservation Commission and Florida Natural Areas Inventory. Tallahassee, FL.

3.0 HYDROLOGY ASSESSMENT

3.1 Introduction

The evaluation of the hydrology and hydraulics of the GRWMA involved both the investigation of historic hydrology/hydraulics and the assessment of existing conditions. The overall hydrology and hydraulics was assessed by examining MSSW or ERP permits for those areas adjacent to the site such as the Publix shopping center and the developments north of SR 210, field reviewing the hydraulic connections and regional surface water management systems, and evaluating the potential impact that changes to the system may produce.

3.2 Permit Review

The goal of the permit review was to determine potential locations where hydrologic or hydraulic connections to the GRWMA area exist and assess elevations of facilities and residential areas. The overall goal was to provide a qualitative assessment of potential off-site areas that may have impacted water levels within the GRWMA. Permit information from the local developments was assessed to determine location, elevation, and flow direction of the surface water management systems. Local permits were obtained from the St. John River Water Management District's Permit Information Database. Most of the developments adjacent to the site were permitted in multi-stage permits with phases or sub-divisions being permitted in a group. Some of the adjacent permits that were reviewed included:

- Crossroads Farms
- Plantation and Ponte Vedra
- Plantation Club
- Roscoe Culverts Extension
- Sawmill Lakes
- Shoppes at Palm Valley
- FDOT SR 210 Plans

Copies of the information from these permits that were reviewed are found in Appendix D.

A review of these permits generally found that surface water was directed away from the site. The only exception to this is the water that flows from Palm Valley Road towards the GRWMA property. Initially, it was believed that the Shoppes at PalmValley Road contributed water to the GRWMA site. However, a review of the permit application did not confirm the existence of a connection.

3.3 Field Assessment

The goal of the field assessment was to obtain visual verification of the information developed in the assessment of permit information and a review of historic basin and subbasin boundaries for the area immediately to the north of the GRWMA, primarily along Palm Valley Road. Palm Valley Road as well as the development bordering the northern end of the property were assessed. The results of this assessment follow:

S. Roscoe Boulevard Ext. Development

In general, the residential properties located along Roscoe Boulevard Extension and Canal Road drain either directly or through roadside swales to the Intracoastal Waterway. There is little or no opportunity for water from this single family residential area located along the northern entrance road to the GRWMA to contribute surface water to the GRWMA site. The general location of the developments which impact the GRWMA are shown in Figure 11.

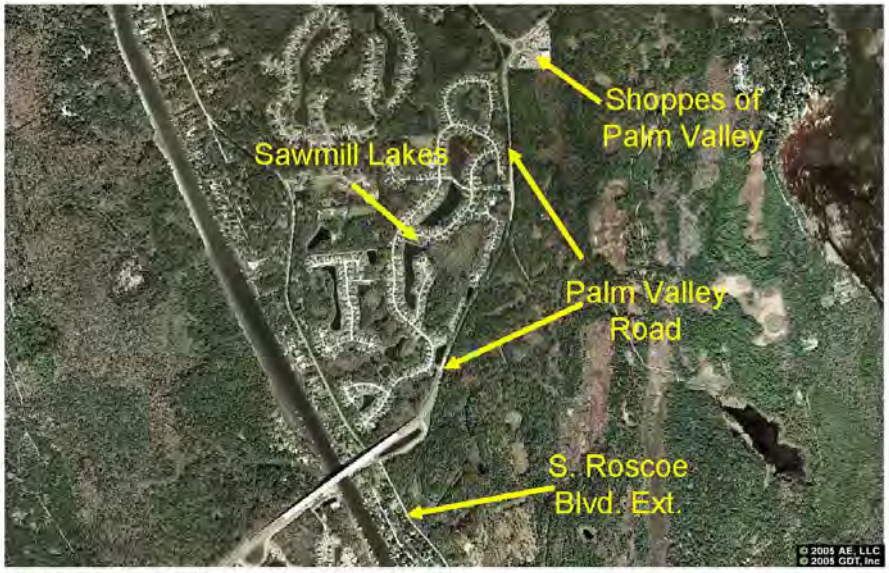

Figure 11. Development General Location Map

Sawmill Lakes

Sawmill Lakes is a single family dominated residential community located north of Palm Valley Road. The permit review for this subdivision found that the surface water management system developed for the home sites collected stormwater from the grounds and directed it to stormwater treatment systems. These treatment systems were generally detention system with a discharge to the north and west. Thus, according to the permit information reviewed as well as the

field assessment, all flow from the subdivision to the north of Palm Valley Road is directed away from the GRWMA.

Shoppes at Palm Valley

The Shoppes at Palm Valley are located to the north and east of the GRWMA area that is the focus of this evaluation effort. The stormwater management system collects water and treats it in a wet detention system. A portion of the drainage from the development goes to the north across the round-a-bout and is discharged away from the GRWMA. A small portion of the site is drained to a swale like treatment system along the southwestern boundary of the site and ultimately discharges into the GRWMA. The field visit was unable to access the discharge structure from the site but it is believed that the site ultimately discharges to an overland flow system through the GRWMA. Figure 12 depicts the portion of the drainage that impacts the GRWMA.

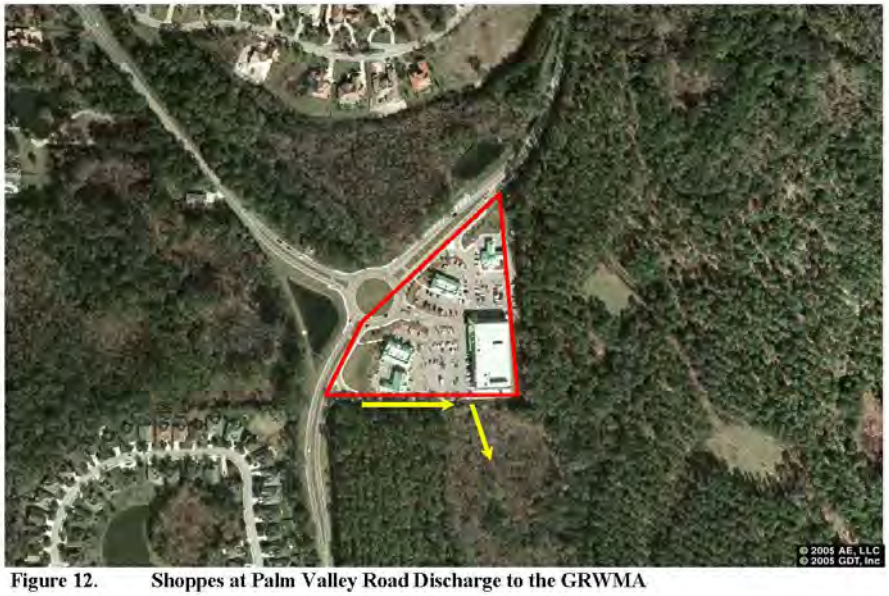

Figure 12. Shoppes at Palm Valley Road Discharge to the GRWMA

Palm Valley Road

The Palm Valley Road surface water management system generally consists of roadside swales and interconnecting culverts draining water from the roadway to a shallow treatment area near the intersection of the Palm Valley Road ramp with S. Roscoe Boulevard Ext. Flow from the north side of Palm Valley Road is conveyed to the south side of the road at the eastern edge of the ramp. The collected stormwater is allowed to drain into the GRWMA from the area of the ramp. Figure 13 generally depicts this drainage.

Figure 13. Generalized Palm Valley Road Drainage

GRWMA Internal Conveyance

The placement of the mosquito ditches within the GRWMA was discussed in the previous section. The mosquito ditches were found to provide a hydraulic connection between some of the wetland areas on the site. Two wetlands that are of interest to the study are identified as CWL 1-2 and CWL 1-4. These two wetlands are shown on Figure 14.

CWL 1-2

CWL 1-2 is a shallow prairie type wetland located as shown in Figure 4. This wetland, as identified previously is predominantly covered with marsh type grasses with some small oak trees near its center. During the field visit to the wetland water elevations within the wetland were relatively high. It was postulated that a mosquito ditch connected this wetland with other wetland areas to the south (CWL 1-1 and CWL 1-3). However, observations did not verify the location of this ditch. Instead, it was noted that very shallow floodplain like flow was occurring from the southern end of the wetland. This flow traveled south through the tree lined fringe to the wetland and eventually crossed the roadway from the Roscoe Entrance to the GRWMA.

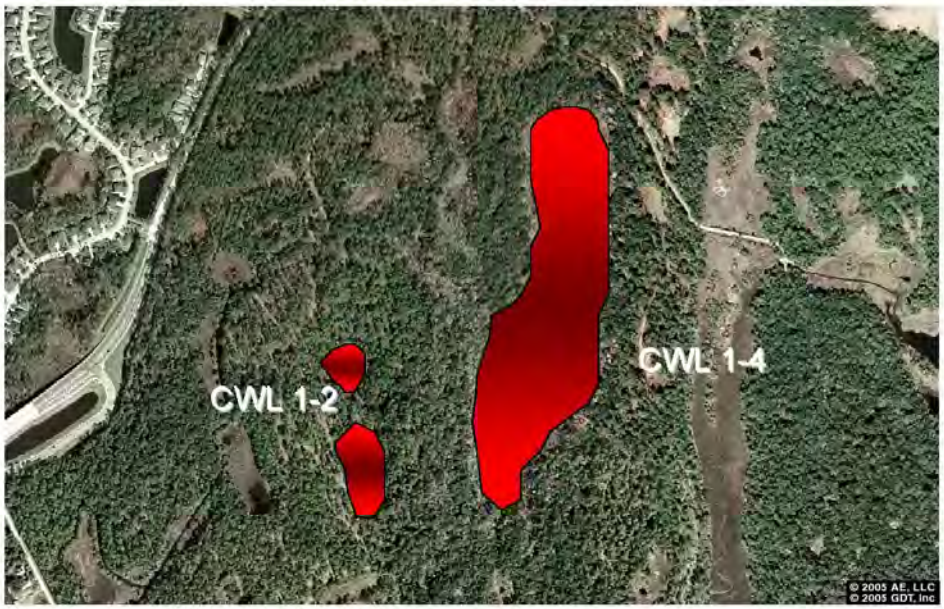

Figure 14. **GRWMA Internal Conveyance**

CWL 1-4

CWL 1-4 is a large shallow prairie type wetland located as shown in Figure 14. This wetland, is predominantly covered with marsh type grasses with large expanses of oak and pine trees within its boundaries. During the field visit to the wetland, water elevations within the area were relatively high. It was postulated that a mosquito ditch connected this wetland with other wetland areas to the south. However, observations did not verify the location of this ditch. Instead, it was noted that a very shallow floodplain-like flow was occurring from the southern end of the wetland.

An investigation of the area to the north and east of the wetland found a potential connection point for surface water flow. This connection point consists of a corrugated metal culvert (~24-inch) underneath the dirt road. No flow was visible at the time of the investigation; thus, the flow direction was not verified. A review of the LIDAR data for the area (Appendix B) shows that the outside fringe of the wetland is generally at elevations 4 ft and 5 ft. Elevations within the wetland generally fall from between 4 ft and 5 ft at the northern end to predominantly 3 ft near the southern boundary. As expected those areas that are identified a 4 ft and above generally are dominated by transitional species. Those at elevation 4 and below are consistent with the FNAI designation as a depressional marsh.

3.4 Conclusion

The assessment of the hydrology for the GRWMA has found that the mosquito ditches that have been constructed on the site have likely allowed for the postulated transition of many of the wetland systems within the GRWMA from fresh to saline systems over the past several decades. The historic surface water flow regimes that provided opportunities for "fresh" surface water runoff to enter the site along its northern border has been significantly altered by development including Palm Valley Road, Sawmill Lakes, and the Shoppes at Palm Valley. Each of these developed areas provides stormwater collection, treatment, and discharge in accordance with their permitted facilities. This has resulted in a reduction of freshwater flow to the GRWMA.

4.0 IMPACT ASSESSMENT

4.1 Impact Discussion

Sections 2 and 3 above evaluated the historic hydrology of the area, prior to the placement of many of the roadways and residential areas which exist adjacent to the GRWMA. These sections also assessed the primary flow paths through the wetland and marsh system to an eventual outfall into Jones Creek. The purpose of this section is to discuss the potential impact to the GRWMA and, if appropriate, discuss alternatives to restore the hydroperiod of these wetlands.

As noted in Section 2.0, the wetlands that are directly affected by mosquito ditching largely remain in good condition. The primary impacts appear to be displacement of wetland area by the ditches and spoil mounds. Even with these impacts, the vegetation in the unditched portions of these wetlands appears largely unaffected. It does not appear that drainage patterns, tidal circulation, and the configuration of marsh islands and salterns have been adversely impacted. Therefore it has been concluded that the mosquito ditching has had negligible impact on the wetlands aside from spatial reduction and salinity levels in three of the wetlands (Wetlands 1-3, 1-4, and 1-5). It also appears that the mosquito ditching may have had some beneficial effects by increasing access of estuarine fauna to the upper sections of the larger tidal marsh and enhancing wetland productivity.

It should be recognized that while the introduction of the mosquito ditching has not had a significant impact on the size and configuration of the wetlands, there is a likelihood that the composition of the wetlands has transitioned to more salt-tolerant species that may not have historically been present. This leads us to a discussion of whether the historic (pre-development) hydrology can be reestablished resulting in more freshwater dominant wetlands.

4.2 Alternative Assessment

A preliminary review of the hydrology within the GRWMA would lead to the postulation that if the mosquito ditches were filled or blocked, a more freshwater system would evolve. It is obvious that these ditches provide a hydraulic connection of these wetlands to tide and blocking these connections could reduce the tidal effects. The challenge for the transition of the wetlands from a saline to a freshwater system would be the availability of a fresh water source.

Historically, the area north of the GRWMA served as a freshwater storage area consisting of wetlands and uplands mirroring those within the GRWMA. The impacts of development have altered the land surface and changed the way rainfall and runoff are controlled. As noted in Section 3.0, developments such as Sawmill Lakes, the Shoppes at Palm Valley, and Palm Valley Road have changed surface water flow significantly. Rainfall induced runoff over the Sawmill Lakes area, which typically flowed both north

and south (though the GRWMA) is now captured in treatment systems and routed to the Intracoastal Waterway.

In a similar fashion, the placement and improvement of Palm Valley Road (C.R.210) has altered the drainage patters. Prior to the roadway, sheet flow of surface water was allowed to enter the GRWMA along its northern border. The roadway drainage now captures and collects drainage and routes it to the west towards S. Roscoe Boulevard. As noted previously, this drainage is stored in roadside swale areas with a final discharge to the GRWMA at a single location near the northwest corner of the GRWMA. Thus, freshwater flow from Palm Valley Road is directed to a single entrance point into the GRWMA. This water is directed by internal ditching to the outfall near the southern end of the S. Roscoe Boulevard Extension.

The Shoppes at Palm Valley are located to the north and east of the area within the GRWMA that is affected by mosquito ditching. However, a review of the hydrology indicates that this area once provided a source of surface water sheet flow to the GRWMA. With the development a stormwater management system was constructed. This system generally stores the low flow waters for treatment and then allows portions of the flow to drain as a point source.

The surface water flow regime within the area has been impacted by development. This has resulted in the diversion of surface water flow from their historic sheet flow patterns across the GRWMA either away from the site or to a localized point source. Thus, the volume of surface water flow that historically entered the GRWMA through sheet flow is no longer available. Filling or blocking the mosquito ditches in an effort to transition the currently salt water impacted wetland back to fresh water would likely result in the degradation of the wetlands. The severing of the connection with tidal fluctuation would results in an alteration of the hydroperiod and a reduction of flow into the wetland. In the current configuration (surface flow diverted from the site), there would not be a sufficient fresh water source to compensate for this loss.

An assessment of the potential to route additional flows into the GRWMA was performed. In general, to obtain significant surface water inflows to the site, a significant alteration of the existing drainage patterns would likely have to occur. Permitted facilities for the Palm Valley Road, Sawmill Lakes, and the Shoppes at Palm Valley would have to be modified to provide additional flows to the site. Modifications would require permission from the facility owner, the obtaining of easements to allow flow diversion, significant permit modifications, and associated engineering efforts required to redirect flow into the GRWMA site.

5.0 SUMMARY AND CONCLUSION

The assessment of ditched wetlands, including the evaluation of historical aerials of the site, as well as the field verification of the affected wetlands, has shown that the wetlands directly affected by mosquito ditching largely remain in good condition. It was found that localized drainage patterns, tidal circulation, and the configuration of marsh islands and salterns did not appear to have been adversely affected. Thus, it was tentatively concluded that the mosquito ditching has had no adverse impact on the wetlands aside from spatial reduction and perhaps an elevation of surface water salinity levels. It was also postulated that the mosquito ditching may have had some beneficial effects by increasing access of estuarine fauna to the upper sections of the larger tidal marsh and enhancing wetland productivity.

The assessment of the hydrology found that the surface water management systems that are located to the north and east of the GRWMA (associated with Palm Valley Road, Sawmill Lakes, and the Shoppes at Palm Valley) have likely altered the natural drainage patterns to the site. It was concluded that the surface water flow that historically entered the site has been rerouted or controlled into what now amounts to a greatly reduced point source inflow.

The assessment of alternatives finds that the filling or blocking of the mosquito ditches will reduce the tidal interactions with the wetlands. It also finds that with the reduced surface water flows from the north it is likely that the reduction in tidal flow will also cause a reduction in hydroperiod. Thus, based on the analysis contained herein, the mosquito ditches, while potentially increasing salinity levels in the wetlands, provide the much needed hydrology required to sustain the wetland hydroperiod. Thus, it is the recommendation of this report that the mosquito ditches be allowed to remain without alterations.

APPENDIX A

Representative Site Photographs

Wetland 1-1: Southeastern edge looking northwest

Wetland 1-1: Southwestern edge looking north

Wetland 1-2: Roscoe Blvd. South Extension east-side ditch at confluence of mosquito ditch

Wetland 1-2: Western edge looking northeast

Wetland 1-2: Spoil mound

Wetland 1-3: Eastern edge looking northwest

Wetland 1-3: Mosquito ditch along western edge

Wetland 1-4: Southeastern edge looking northwest

Wetland 1-5: Northeastern edge looking southwest

Wetland 1-5: Mosquito ditch along eastern edge

Wetland 1-5: interior portion toward open water zone

Wetland 2-1: Westernmost finger looking east

Wetland 2-1: Westernmost finger, mosquito ditch along eastern edge looking north

Wetland 2-1: Westernmost finger, mosquito ditch and spoil mound along eastern edge

Wetland 2-1: Westernmost finger, mosquito ditch along western edge looking north

Wetland 2-1: Westernmost finger, mosquito ditch along western edge looking south

APPENDIX B

Topographic Map of the Study Area (St. Johns County LIDAR Data)

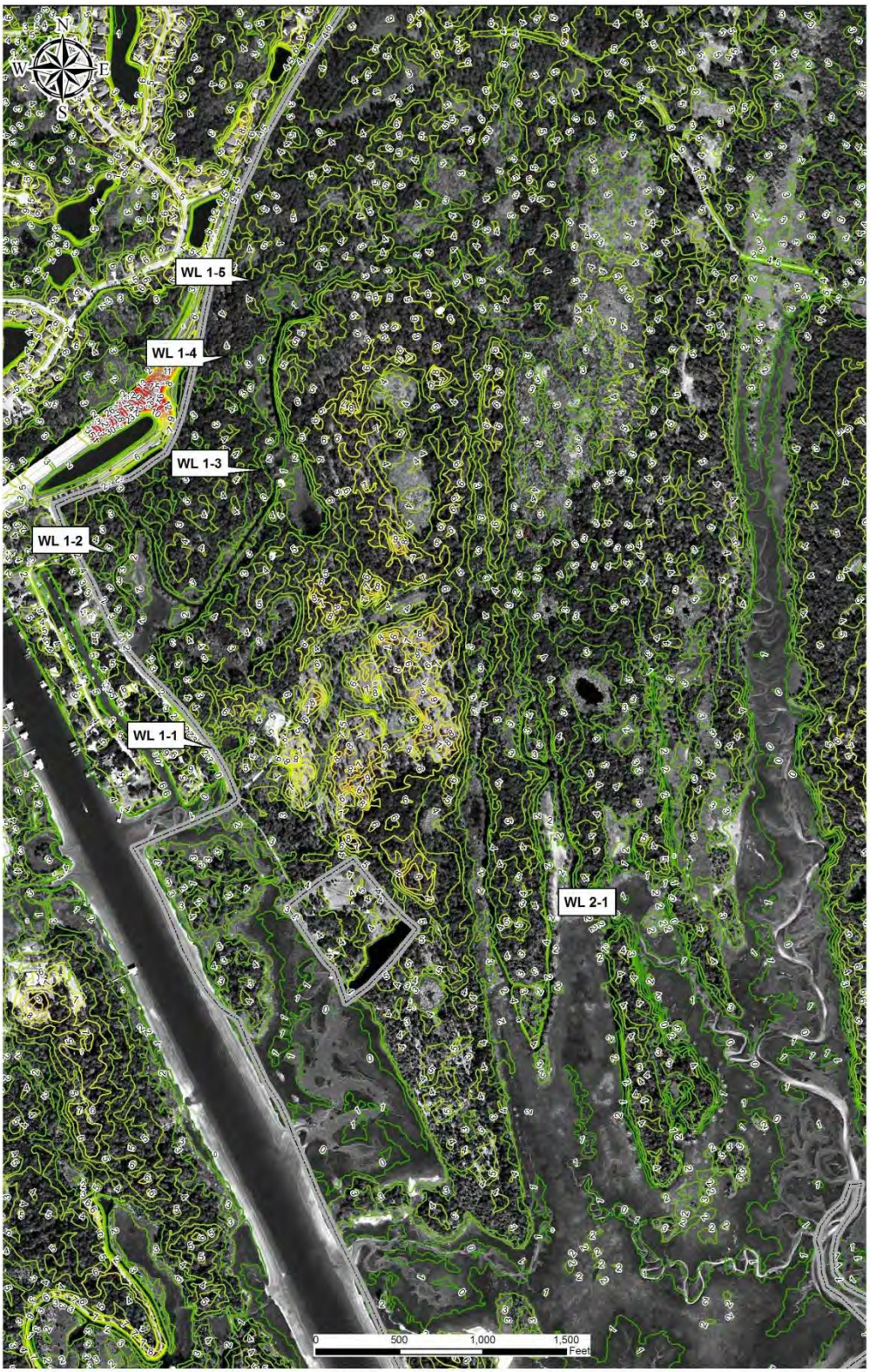

Figure B1. Topogaphic map of the GRWMA Study Area (data provided by St. Johns Co.)

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APPENDIX C

Aerial Photography of the Study Area Flown in 1952, 1960, 1984, and 1994

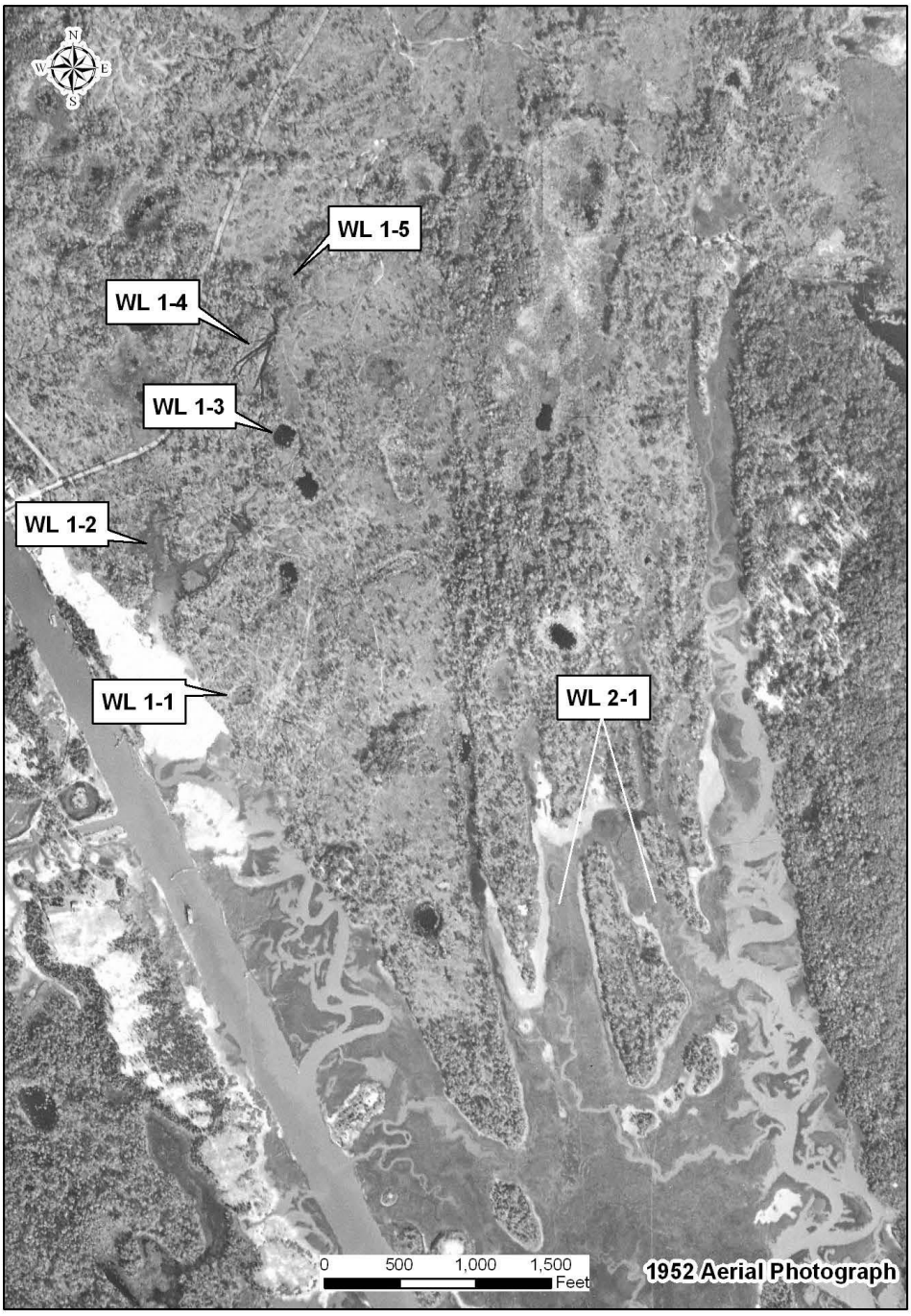

Figure C1. GRWMA Study Area on 1952 aerial photograph.

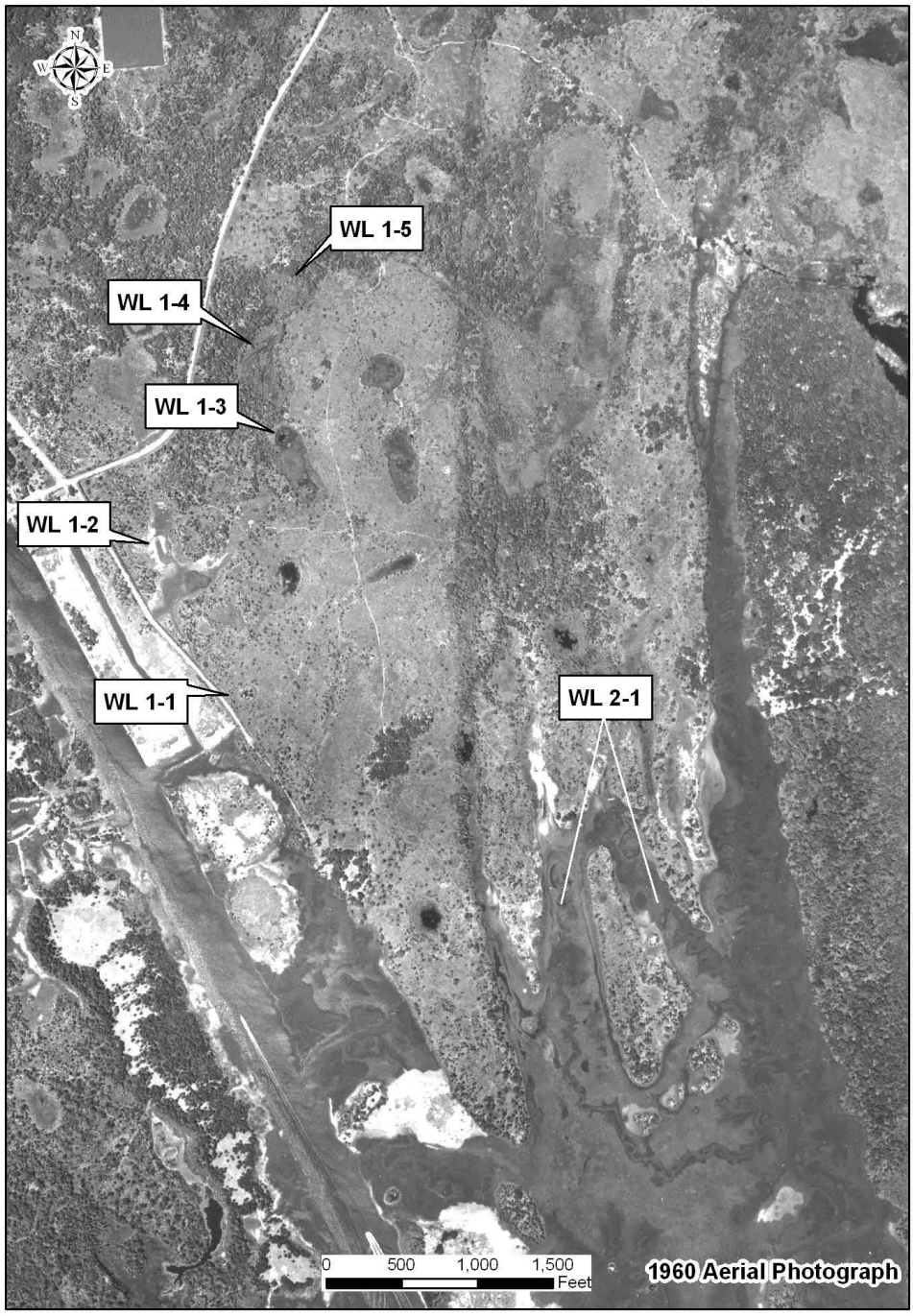

Figure C2. GRWMA Study Area on 1960 aerial photograph.

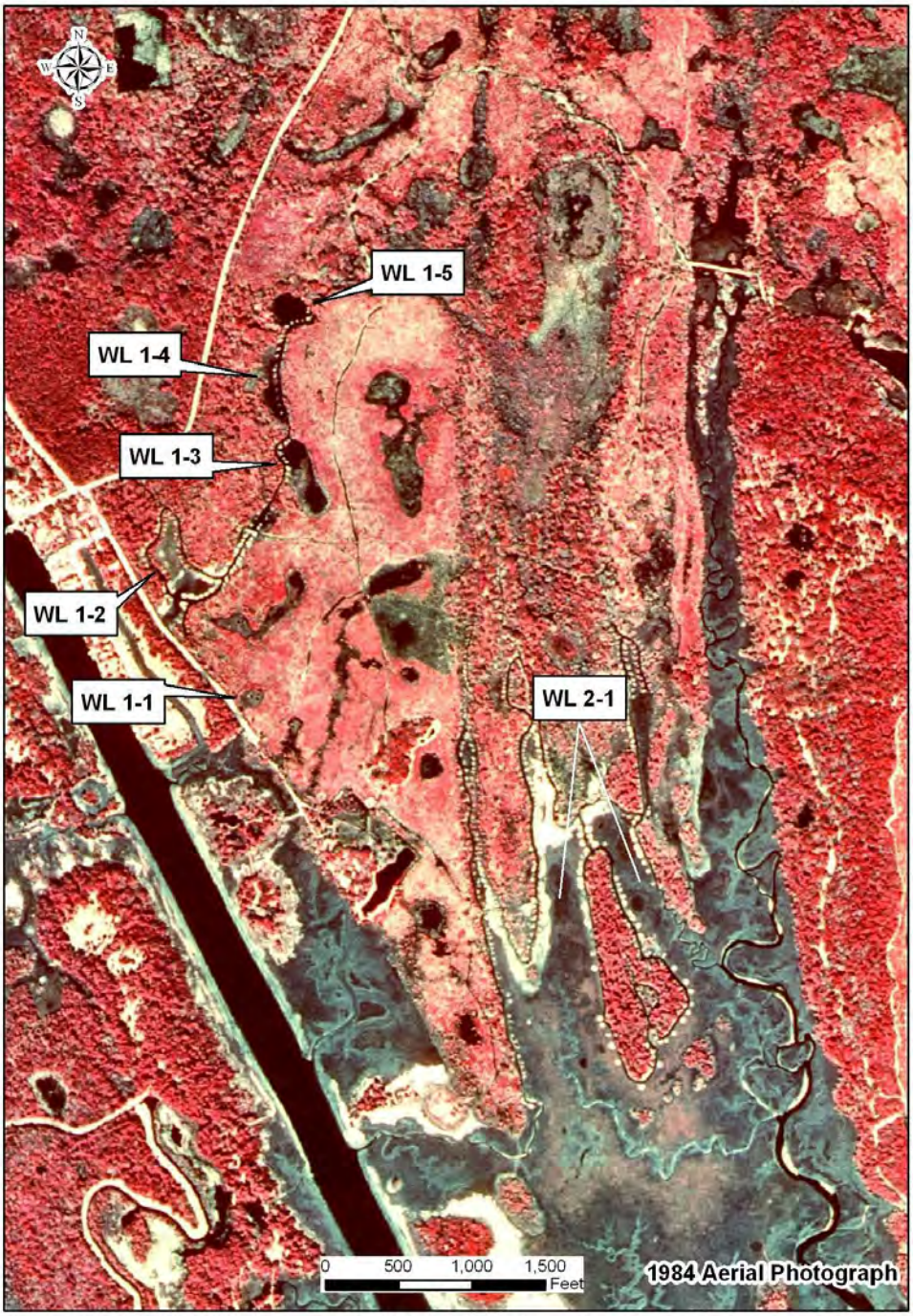

Figure C3. GRWMA Study Area on 1984 aerial photograph.

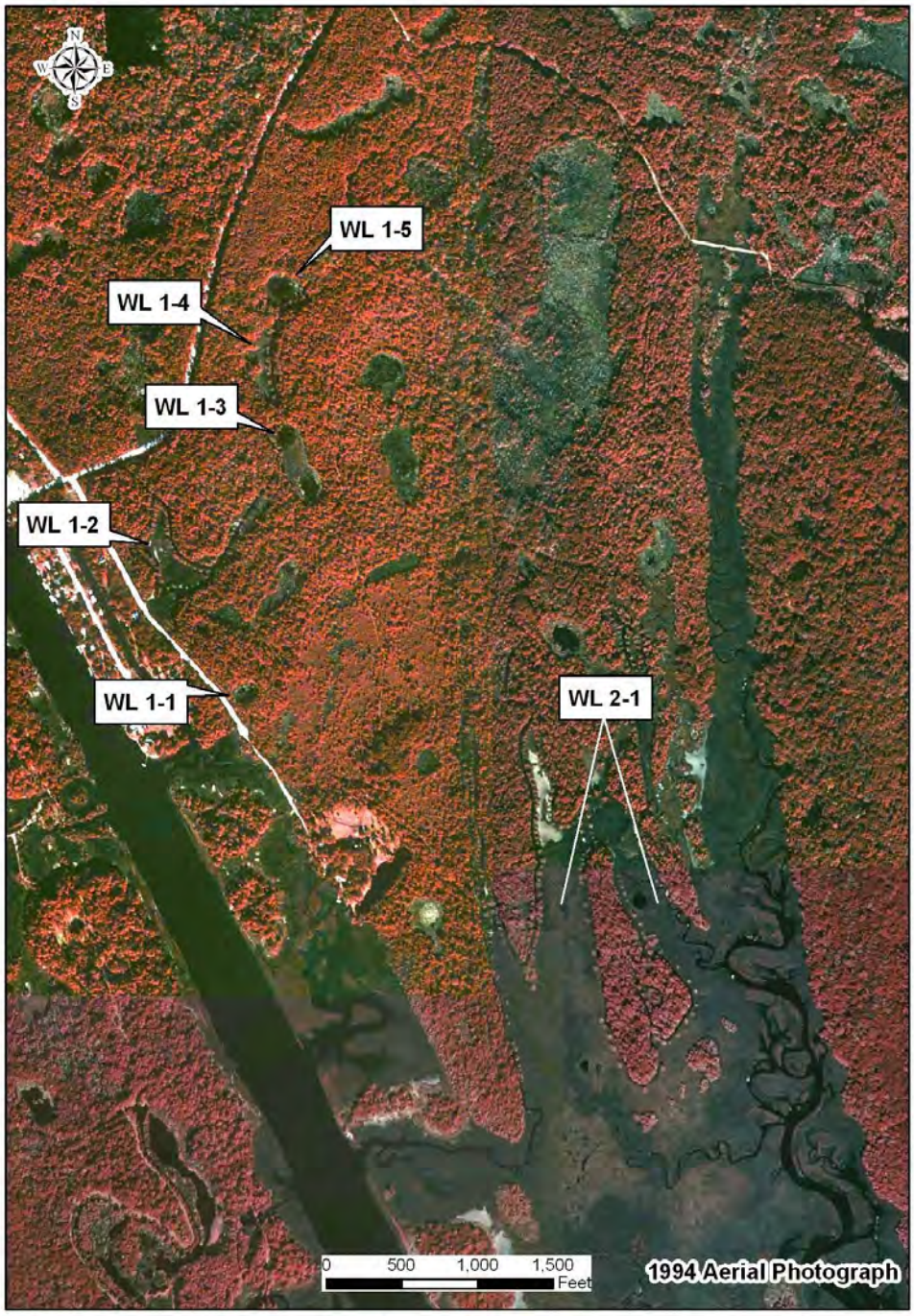

Figure C4. GRWMA Study Area on 1994 aerial photograph.

13.16 Land Management Uniform Accounting Council Categories – FWC Operation Plan Fiscal Year 2013 – 2014

Land Management Uniform Cost Accounting Council

Uniform Land Management Cost Categories and Subcategories

1. Resource Management

a. Exotic Species Control. -- Invasive exotic plant and animal removal activities and costs for inventorying, planning, preparing, executing, evaluating, monitoring and reporting. Also includes equipment, chemicals, protective clothing and supplies. Includes nuisance native feral animal and plant control.

b. Prescribed Burning. -- Prescribed burning activities and costs for assessing, planning, preparing, executing, evaluating and reporting. Also includes equipment, protective clothing and supplies.

c. Cultural Resource Management. -- Management activities and costs for assessing, planning, executing, evaluating and reporting, and for all maintenance, restoration or monitoring activities for prehistoric and historic sites, features and collection objects.

d. Timber Management. -- Activities and costs related to the establishment of a stand of potentially merchantable timber, harvest of merchantable timber, and cultural treatments intended primarily to improve the growth and overall health of a stand of merchantable timber. Also includes activities and costs related to the cutting of merchantable timber in natural community and habitat restoration projects.

e. Hydrological Management. -- Hydrological management and restoration activities and costs for assessing, monitoring, planning, preparing, executing, evaluating and reporting. Includes water level management, repair, removal or back-filling of ditches, canals, berms and dams. Also includes water quality and water quantity monitoring.

f. Other. -- All other resource management activities and costs not captured in other specific subcategories. Examples include natural community and habitat restoration through other techniques; plant, animal or biological community survey, monitoring and research; listed species management; technical assistance; and evaluating and commenting on resource impacts to parks.

2. Administration

a. Central Office/Headquarters. -- Headquarters units conducting general administration of land under management by the agency. Includes upper management direction, administration and fiscal, budget, personnel, purchasing and record keeping required for operations oversight and specific programs. Includes all duties unless they specifically relate to other categories or subcategories.

b. Districts/Regions. -- Sub-state administrative districts or regions conducting general administration of the properties under their management. Includes all duties, unless they specifically relate to other categories or subcategories. General operating costs of district or region administrative facilities are included.

c. Units/Projects. -- Conducting general administration duties at a specific management unit (state park, state forest, state wildlife management area, etc.). Includes supervisory duties, fiscal and record keeping duties, and any other duties that do not specifically relate to other categories or subcategories. General operating costs for the property, such as utilities, telephones and garbage collection, are included.

3. Support

a. Land Management Planning. -- Developing land management plans required by Sec. 253.034, F.S. Includes researching and compiling plan information, materials and maps, coordinating planning activities, conducting review activities (internal reviews, public meetings, advisory group meetings, ARC, etc.), and promulgating draft plans and final plans.

b. Land Management Reviews. -- Planning, organizing and conducting land management reviews by teams created under Sec. 259.036, F.S. Includes preparing and responding to land management review reports. Also includes similar work conducted as part of internal agency land management reviews.

c. Training/Staff Development. -- Staff training and development costs incurred in any facet of the agency's land management activities.

d. Vehicle Purchase. -- Acquisition of any vehicle purchased primarily for land management purposes or to support any category of land management activity by the agency.

e. Vehicle Operation and Maintenance. -- Costs of operating and upkeep of any vehicle used by the agency to support any category of land management activity.

f. Other. -- Any other support activity or cost not captured by other categories or subcategories.

4. Capital Improvements

a. New Facility Construction. -- Use of Fixed Capital Outlay (FCO) or other budget authority for all new facility design and construction activities. Includes new roads, parking and all other infrastructure.

b. Facility Maintenance. -- Use of Fixed Capital Outlay (FCO) or other budget authority for all repairs or renovations to existing facilities, roads or other infrastructure. Also includes ADA accessibility improvements and renovations.

5. Visitor Services/Recreation

a. Information/Education Programs. -- Interpretive, environmental education and marketing programs that explain or promote the agency's mission or instill in visitors an understanding and appreciation for Florida's natural and cultural resources and their proper use and care. Includes signs, brochures, maps and other public information materials that are produced or disseminated.

b. Operations. -- Includes the non-administrative and non-support costs involved in providing public access to lands. Includes all actions required to manage visitor activities in a way to ensure safe and enjoyable use by the public. Includes routine maintenance, cleaning and other work required to provide safe and efficient utilization of facilities and resources that support visitor use and recreation. Includes protection activities required by staff to safeguard natural and cultural resources, facilities, material, staff and visitors.

6. Law Enforcement

The provision of all activities for enforcing criminal, conservation and boating laws on land, freshwater and marine environments and all costs associated with these services. Includes the provision of uniform patrol. Includes overt and covert criminal investigations. Includes regulation of commercial wildlife trade. Also includes the direction and administration of all law enforcement programs and activities, and all associated costs.

Land Management Uniform Accounting Council and FWC Activity Code Groupings

Resource Management

Exotic Species Control

- 210 Exotic species control
- 211 Exotic plant control (mechanical)
- 212 Exotic plant control (chemical)

Prescribed Burning

- 205 Prescribed burning
- 206 Prescribed burning C growing season (April 1 to September 30)
- 207 Prescribed burning C dormant season (October 1 to March 31)
- 208 Firebreaks

Cultural Resource Management

- 201 Cultural resource management

Timber Management

- 202 Timber management

Hydrological Management

- 215 Hydrology management
- 216 Dams, dikes, levees
- 217 Canals
- 218 Water level management
- 194 Lake restoration

Other

- 185 GIS
- 186 Biometrics
- 200 RESOURCE MANAGEMENT
- 203 Tree and shrub planting
- 213 Wildlife management
- 214 Listed Species management
- 219 Upland restoration
- 282 Herbaceous seeding
- 283 Clearings
- 289 Native vegetation management (mechanical)
- 290 Native vegetation management (chemical)
- 221 Animal surveys
- 228 Inland aerial surveys
- 235 Vegetation and plant surveys
- 250 MONITORING AND ASSESSMENTS
- 252 Biomedical monitoring
- 253 Ecological monitoring
- 256 Habitat monitoring analysis
- 263 Nest box monitoring
- 264 Population demographics
- 295 Biological data collection, analysis, and reporting
- 275 Permits and authorizations

276 Commission rule development and review
277 Relocation
278 CITES tags
281 Other resource management
284 Feeding/watering
285 Nest structures
286 Population control
287 Stocking enhancements/population augmentation
288 Nuisance animal complaints
293 Mortality investigations
294 Program coordination and implementation C inter- and intra-agency coordination and program implementation at the section, bureau, or division level
296 Habitat protection technical assistance
750 URTD assessment
789 Site Preparation – GCR
790 Irrigation – GCR
791 Seed Collection – Hand
792 Seed Collection – Mechanical
793 Herbicide Maintenance Treatment

Administration

Central Office/Headquarters

100 ADMINISTRATION C administrative tasks, including preparation of forms, word processing, photocopying, filing, and other clerical/secretarial duties.
104 Budget/purchasing/accounting

Districts/Regions

See Location code

Units/Projects

See Location code

Support

Land Management Planning

103 Meetings C includes workshops, conferences, staff, and other meetings.
204 Resource planning

Land Management Reviews

209 Land Management Reviews
101 Project inspection C field inspections of projects.

Training/Staff Development

150 PERSONNEL MANAGEMENT C recruitment, hiring, training, counseling, and supervising.

Vehicle Purchase

128 New Vehicle and Equipment Purchase

Vehicle Operation and Maintenance

923 FEM C vehicles/equipment

Other

140 REPORT WRITING/EDITING/MANUSCRIPT PREPARATION
141 Grant applications
180 SYSTEMS ADMINISTRATION AND MANAGEMENT
182 Data management
184 Metadata development and management
187 IT
188 Web development
721 Geospatial analysis techniques
191 Stamp design coordination
226 Human dimensions surveys

Capitol Improvements

New Facility Construction

910 New facility construction C buildings/structures
912 New construction C roads/bridges
913 New construction C trails
914 New construction C fences

Facility Maintenance

920 Facility and equipment maintenance (FEM) C buildings/structures
921 FEM C utilities
922 FEM C custodial functions
925 FEM C boating access
926 FEM C roads/bridges
927 FEM C trails
928 FEM C fences

Visitor Services/Recreation

Information/Education Programs

145 Technical bulletin

Operations

311 Boundary signs
312 Informational signs
320 Outreach and education C attending or developing educational or informational materials or events for the public
327 Becoming an Outdoor Woman C enhancement
331 Wings Over Florida
339 Range safety operations
341 Public use administration (hunting)
342 Public use administration (non-hunting)
350 Customer service support C disseminating written or verbal information or assistance to the public
700 STUDIES
740 EVALUATIONS AND ASSESSMENTS

Law Enforcement

FWC Activity Code Numeric Listing

100 ADMINISTRATION C administrative tasks, including preparation of forms, word processing, photocopying, filing, and other clerical/secretarial duties.
101 Project inspection C field inspections of projects.
103 Meetings C includes workshops, conferences, staff, and other meetings.
104 Budget/purchasing/accounting
128 New Vehicle and Equipment Purchase
140 REPORT WRITING/EDITING/MANUSCRIPT PREPARATION
141 Grant applications
145 Technical bulletin
150 PERSONNEL MANAGEMENT C recruitment, hiring, training, counseling, and supervising.
180 SYSTEMS ADMINISTRATION AND MANAGEMENT
182 Data management
184 Metadata development and management
185 GIS
186 Biometrics
187 IT
188 Web development
191 Stamp design coordination
194 Lake restoration
200 RESOURCE MANAGEMENT
201 Cultural resource management
202 Timber management
203 Tree and shrub planting
204 Resource planning
205 Prescribed burning
206 Prescribed burning C growing season (April 1 to September 30)
207 Prescribed burning C dormant season (October 1 to March 31)
208 Firebreaks
209 Land Management Reviews
210 Exotic species control
211 Exotic plant control (mechanical)
212 Exotic plant control (chemical)
213 Wildlife management
214 Listed Species management
215 Hydrology management
216 Dams, dikes, levees
217 Canals
218 Water level management
219 Upland restoration
221 Animal surveys
226 Human dimensions surveys
228 Inland aerial surveys

235 Vegetation and plant surveys
250 MONITORING AND ASSESSMENTS
252 Biomedical monitoring
253 Ecological monitoring
256 Habitat monitoring analysis
263 Nest box monitoring
264 Population demographics
275 Permits and authorizations
276 Commission rule development and review
277 Relocation
278 CITES tags
281 Other resource management
282 Herbaceous seeding
283 Clearings
284 Feeding/watering
285 Nest structures
286 Population control
287 Stocking enhancements/population augmentation
288 Nuisance animal complaints
289 Native vegetation management (mechanical)
290 Native vegetation management (chemical)
293 Mortality investigations
294 Program coordination and implementation C inter- and intra-agency coordination and program implementation at the section, bureau, or division level
295 Biological data collection, analysis, and reporting
296 Habitat protection technical assistance
311 Boundary signs
312 Informational signs
320 Outreach and education C attending or developing educational or informational materials or events for the public
327 Becoming an Outdoor Woman C enhancement
331 Wings Over Florida
339 Range safety operations
341 Public use administration (hunting)
342 Public use administration (non-hunting)
350 Customer service support C disseminating written or verbal information or assistance to the public
700 STUDIES
721 Geospatial analysis techniques 740 EVALUATIONS AND ASSESSMENTS
750 URTD assessment
789 Site Preparation – GCR
790 Irrigation – GCR
791 Seed Collection – Hand
792 Seed Collection – Mechanical
793 Herbicide Maintenance Treatment

910 New facility construction C buildings/structures
912 New construction C roads/bridges
913 New construction C trails
914 New construction C fences
920 Facility and equipment maintenance (FEM) C buildings/structures
921 FEM C utilities
922 FEM C custodial functions
923 FEM C vehicles/equipment
925 FEM C boating access
926 FEM C roads/bridges
927 FEM C trails
928 FEM C fences

Guana River WMA Operational Plan Cost Estimate – Fiscal Year 2013-2014

Fiscal year 2014 Projects: 7326

Activity	Title	Staff Days	Salary	Fuel Cost	Other	Total	Units
101	Project inspection	10	$2,115.90	$182.50	$0.00	$2,298.40	0
103	Meetings	18	$3,808.62	$328.50	$1,000.00	$5,137.12	0
104	Budget/purchasing/accounting	10	$2,115.90	$182.50	$0.00	$2,298.40	0
128	New Vehicle and Equipment Purchases	0	$0.00	$0.00	$0.00	$0.00	0
140	Report writing/editing/manuscript preparation	5	$1,057.95	$91.25	$0.00	$1,149.20	0
150	Personnel management	5	$1,057.95	$91.25	$2,500.00	$3,649.20	0
194	Lake restoration	0	$0.00	$0.00	$0.00	$0.00	0
201	Cultural resource management	5	$1,057.95	$91.25	$500.00	$1,649.20	0
202	Timber management	10	$2,115.90	$182.50	$0.00	$2,298.40	0
204	Resource planning	30	$6,347.70	$547.50	$1,500.00	$8,395.20	0
206	Prescribed burning - growing season	20	$4,231.80	$365.00	$500.00	$5,096.80	500
207	Prescribed burning - dormant season	70	$14,811.30	$1,277.50	$2,000.00	$18,088.80	800
208	Firebreaks	5	$1,057.95	$91.25	$0.00	$1,149.20	20
211	Exotic plant control (mechanical)	2	$423.18	$36.50	$0.00	$459.68	0
212	Exotic plant control (chemical)	5	$1,057.95	$91.25	$5,000.00	$6,149.20	0
218	Water level management	30	$6,347.70	$547.50	$5,000.00	$11,895.20	8
221	Animal surveys	35	$7,405.65	$638.75	$3,000.00	$11,044.40	10
235	Vegetation and plant surveys	11	$2,327.49	$200.75	$24,000.00	$26,528.24	0
250	Monitoring and assessments	0	$0.00	$0.00	$0.00	$0.00	0
282	Herbaceous seeding	50	$10,579.50	$912.50	$8,000.00	$19,492.00	50
283	Clearings	0	$0.00	$0.00	$0.00	$0.00	0
285	Nest structures	5	$1,057.95	$91.25	$500.00	$1,649.20	85
289	Native vegetation management (mechanical)	90	$19,043.10	$1,642.50	$0.00	$20,685.60	450
290	Native vegetation management (chemical)	1	$211.59	$18.25	$1,000.00	$1,229.84	15
294	Program coordination and implementation	20	$4,231.80	$365.00	$0.00	$4,596.80	0
295	Biological data collection, analysis, and reporting	80	$16,927.20	$1,460.00	$6,000.00	$24,387.20	2
312	Informational signs	10	$2,115.90	$182.50	$1,000.00	$3,298.40	31

320	Outreach and education	5	$1,057.95	$91.25	$0.00	$1,149.20	0
341	Public use administration (hunting)	5	$1,057.95	$91.25	$4,000.00	$5,149.20	0
342	Public use administration (non-hunting)	5	$1,057.95	$91.25	$2,000.00	$3,149.20	4
350	Customer service support	3	$634.77	$54.75	$0.00	$689.52	0
740	Evaluations and assessments	0	$0.00	$0.00	$0.00	$0.00	0
920	FEM -- buildings/structures	10	$2,115.90	$182.50	$95,000.00	$97,298.40	11
922	FEM -- custodial functions	5	$1,057.95	$91.25	$500.00	$1,649.20	2
923	FEM -- vehicles/equipment	85	$17,985.15	$1,551.25	$30,000.00	$49,536.40	0
925	FEM -- boating access	5	$1,057.95	$91.25	$0.00	$1,149.20	2
926	FEM -- roads/bridges	80	$16,927.20	$1,460.00	$1,000.00	$19,387.20	15
928	FEM -- fences	5	$1,057.95	$91.25	$1,000.00	$2,149.20	10
All	totals	735	$155,518.65	$13,413.75	$195,000.00	$363,932.40	2015

13.17 Arthropod Control Plan

CHARLES H. BRONSON
COMMISSIONER

Florida Department of Agriculture and Consumer Services
Division of Agricultural Environmental Services

ARTHROPOD MANAGEMENT PLAN - PUBLIC LANDS

Section 388.4111, F.S.
Telephone: (850) 922-7011

For use in documenting an Arthropod control plan for lands designated by the State of Florida or any political subdivision thereof as being environmentally sensitive and biologically highly productive therein.

Name of Designated Land: Guana River Wildlife Management Area

Is Control Work Necessary: ☒ Yes ☐ No

Location: 440 Guana River Road, Ponte Vedra Beach Florida 32082

Land Management Agency: Florida Fish and Wildlife Conservation Commission (FWC)

Are Arthropod Surveillance Activities Necessary? ☒ Yes ☐ No
If "Yes", please explain:

According to the Florida Administration Code 5E-13 surveillance shall be conducted to determine the species and numbers of both pestiferous and disease bearing arthropods. Our surveillance program provides information as to sex, species and amounts of arthropods which may require a follow up of larviciding activity.

Which Surveillance Techniques Are Proposed?
Please Check All That Apply:

☒ Landing Rate Counts	☒ Light Traps	☐ Sentinel Chickens
☒ Citizen Complaints	☒ Larval Dips	☒ Other

If "Other", please explain:

Mosquito Magnets

DACS-13668 05/08

Arthropod Species for Which Control is Proposed: Salt Marsh mosquito Aedes taenorhynchus and Aedes sollicitans.

Secondary Targeted Arthropod Species: Freshwater Species: Culex restuans, Cx. erraticus, Cx. nigripalpus, Cx. quinquefasciatus, Coquillettidia perturbans. (WNV) (SLE) (EEE)

Proposed Larval Control:

Proposed larval monitoring procedure:

Are post treatment counts being obtained: ☒Yes ☐No

Biological Control of Larvae:

Might predacious fish be stocked: ☐Yes ☒No

Other biological controls that might be used:

Material to be Used for Larvaciding Applications:

(Please Check All That Apply:)

☒ Bti Aquabac Xt

☒ Bs

☒ Methoprene Altosid

☒ Non-Petroleum Surface Film Anquie

❑ Other, please specify:

Please specify the following for each larvacide: Treatment by Truck or Hand Aquabac xt, Bs, Methoprene Altosid,,Agnique
Treatment by Air Bti Aquabac xt, Methoprene Altsoid

Chemical or Common name: Please see attached label for each chemical that will be used

☒ Ground ☒ Aerial

Rate of application: We always follow all label requirements for applying pesticides

Method of application: Truck or Helicopter

Larvaciding of Lake Ponte Vedra (Guana Lake), Diego Pond, and the area north of Diego Road may be conducted whenever surveillance techniques approved in this plan indicate a need. Larvaciding any other areas of Guana River Wildlife Management Area will require prior written approval from FWC land manager or designee.

DACS-13668 05/08

Proposed Adult Mosquito Control:

Aerial adulticiding	☒Yes, Emergency only per Chapter 388	❑ No
Ground adulticiding	☒ Yes	❑ No

Please specify the following for each adulticide: Aqualuer 20-20

Chemical or common name: Permethrin

Rate of application: Depends on label rate, we always follow the label direction

Method of application: Ground ULV and Aerial

Aerial adulticiding would only be done in case of emergency, as declared by DOH per Chapter 388

Ground adulticiding will only be conducted whenever surveillance techniques approved in this plan indicate a need and after obtaining written approval from the FWC land manager or designee.

Proposed Modifications for Public Health Emergency Control: Arthropod control agency may request special exception to this plan during a threat to public or animal health declared by State Health Officer or Commissioner of Agriculture.

Proposed Notification Procedure for Control Activities: All adulticiding activities will be approved by the Land Manager or his designee

Records:

Are records being kept in accordance with Chapter 388, F.S.:

☒ Yes ❑No

Records Location: Base Station 500 Old Beach Road, St. Augustine Florida 32080

How long are records maintained: 5 yrs.

Vegetation Modification:

What trimming or altering of vegetation to conduct surveillance or treatment is proposed? No

Proposed Land Modifications:

Is any land modification, i.e., rotary ditching, proposed. No

Include proposed operational schedules for water fluctuations: Land manager will inform AMCD when water levels are raised.

List any periodic restrictions, as applicable, for example peak fish spawning times. No

Proposed Modification of Aquatic Vegetation: No

Land Manager Comments:

Ground adulticiding and Larvaciding outside of Lake Ponte Vedra, Diego Pond, and north of Diego Road may only be conducted after surveillance techniques approved in this plan indicate a need and after obtaining written approval from FWC land manager or designee.

Arthropod Control Agency Comments:

6/13/12
Signature of Lands Manager or Representative Date

7/31/12
Signature of Mosquito Control Director / Manager Date

13.18 St. Johns County Letter of Compliance with Local Government Comprehensive Plan

St. Johns County Board of County Commissioners

Growth Management | Environmental Division

March 31, 2015

Dylan Imlah
Florida Fish and Wildlife Conservation Commission
Division of Habitat and Species Conservation Land Conservation and Planning
620 S. Meridian Street
Tallahassee, Florida 32399

Re: Guana River Wildlife Management Area (GRWMA) Management Plan

Dear Ms. Imlah:

I have reviewed the Guana River Wildlife Management Area (GRWMA) Management Plan and find the proposed activities to be consistent with the policies of the St. Johns County Comprehensive Plan. The subject area is designated Parks/Recreation on the St. Johns County Future Land Use map and is zoned Open Rural.

The County is pleased that the Florida Fish and Wildlife Conservation Commission provides conservation, preservation and recreation opportunities in the GRWMA as that enhances the quality of life for citizens of the County and also the region.

If you have any questions or need additional information please feel free to contact me.

Sincerely,

Jan P. Brewer
Environmental Division Manager
St. Johns County Growth Management Department

Cc: Suzanne Konchan, Growth Management Director

4040 Lewis Speedway, St. Augustine, FL 32084 | P: 904.209.0655 | F: 904.209.0580 www.sjcfl.us