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MEMORANDUM NO. 19-035.01

PREPARED FOR:	Bob Davis Hilton Head Public Service District Hilton Head Island, South Carolina
PREPARED BY:	Alan Moore, PWS Project Scientist II Nutter & Associates Inc.
DATE:	June 26, 2019
SUBJECT:	Interim memorandum of biological monitoring results from the Hilton Head Plantation and Palmetto Hall recycled water projects, March 2019.

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1.0 INTRODUCTION

The following interim memorandum details the results of biological monitoring conducted in March 2019 at four recycled water discharge wetlands on Hilton Head Island, South Carolina. The Hilton Head Public Service District (PSD) discharges advanced treated dechlorinated recycled water to the wetlands as part of a sustainable water reuse program during low recycled water demand periods. The PSD water reuse program discharges to receiving wetlands under the National Pollution Discharge Elimination System (NPDES) permit Number SC0046191, administered by the S.C. Department of Health and Environmental Control (SCDHEC). The permit, as modified October 24, 2005, requires quantitative and qualitative biological monitoring of vegetation and benthic macroinvertebrates conducted annually with reports submitted to SCDHEC biennially or once every two years. The recycled water discharge wetlands include Whooping Crane Conservancy wetland and the Cypress Conservancy wetland in the Hilton Head Plantation neighborhood and the grassy wetland and wooded wetland within the Palmetto Hall Golf Course (Figure 1). However, the PSD has ceased discharging recycled water to the Palmetto Hall grassy wetland. Despite the cessation of discharge to the grassy wetland, vegetation was quantitatively documented in the grassy wetland area during the March 2019 site visit. The following details the methods and results of the March 2019 biological monitoring event.

2.0 METHODS

Field data collection consisted of quantitative assessments of hydrology, vegetation, and benthic macroinvertebrates at discrete stations established along transects within four monitoring wetlands in the Hilton Head Plantation and the Palmetto Hall Golf Course. Additional qualitative observations of birds and other wildlife, and any significant impacts such as tree mortality and blow downs were documented. Based upon previously identified monitoring schedules, spring biological monitoring was conducted during March of 2019 and monitoring will be conducted again in the summer of 2019. Tables 1 and 2 below detail the specific vegetation monitoring locations, effort, and monitoring elements conducted during the spring 2019 monitoring event. The locations and of each fixed monitoring station are provided in Figures 2 through 5.

Table. Recycled water discharge wetlands and associated monitoring effort conducted during the March 2019 biological monitoring event.

Recycled Water Project (RWP) Site / Wetland Areas	Monitoring Locations / Type
Palmetto Hall RWP	
Grassy Wetland	5 Transects / 3 stations per transect
Wooded Wetland	4 Transects / 3 stations per transect
Hilton Head Plantation RWP	
Cypress Conservancy	3 Transects / 3 stations per transect
Whooping Crane Conservancy	3 Transects / 3 stations per transect

Table 2. Biological monitoring sampling parameters and methods conducted for the Hilton Head PSD at four recycled water discharge wetlands.

Vegetation	
Canopy	One (1) 1/100-acre plot per station
Shrub and groundcover	1/1,000-acre plot per station
Nuisance species	Plot sampling and/or qualitative assessment
Benthic Macroinvertebrates	
Grab Samples	One composite sample per wetland*
Significant Impact	
Observations of disease, insects, hurricanes, tornados, etc.	Qualitative observations within each monitoring unit

* Benthic macroinvertebrates were not collected at the Palmetto Hall grassy wetlands due to a lack of water.

2.1 Vegetative Methods and Metrics

At each monitoring station, a 1/100-acre circular plot was established, and all canopy and sapling/shrub species were identified. Diameter at breast height (DBH) was measured for each canopy tree species equal to or greater than 3-inch DBH. Percent coverage estimates were conducted for canopy and shrub strata with each 1/100-acre plot. In the middle of the 1/100 plot, a 1/1,000-acre sub-plot was established to document herbaceous vegetation and cover. Because previous monitoring scientists relied upon local knowledge to locate poorly marked monitoring plots without the benefit of GPS waypoints, new monitoring plots were established in 2019. All monitoring plots were GPS located and the new plots will continue to be monitored annually to track changes in vegetative structure (Figures 2-5).

Tree density was calculated as the total number of an individual species per acre. Basal area (BA) was calculated as the sum of the cross-sectional area of each tree species, measured at breast height above ground. Importance values were calculated as the sum from (i) the relative frequency; (ii) the relative density; and (iii) the relative dominance. Importance values can range between 0 (absent) and 300 (highly frequent with high density).

For shrub and herbaceous ground cover plots, total coverage was calculated as the sum of coverage estimates from each station in a given wetland. Average coverage was calculated as the total coverage divided by the number of stations in each wetland. Relative dominance was calculated as the sum of total coverage of a given species dived by the overall shrub and herbaceous coverage and multiplied by 100 to calculate the percentage.

2.2 Benthic Macroinvertebrate Methods and Metrics

Where appropriate, macroinvertebrate sampling was adapted using protocols outlined in the SCDHEC Standard Operating and Quality Control Procedures for Macroinvertebrate Sampling (SCDHEC, 2012). However, the SCDHEC SOP was specifically written for stream sampling, so adaptations were made to accommodate wetland sampling. The grassy wetland at Palmetto Hall was not sampled in March 2019 for benthic macroinvertebrates due to a lack of water. At each monitoring transect, multiple habitats were targeted for sampling using D-frame dip net samplers. Targeted habitats included undercut banks and root wads, aquatic vegetation, and submerged logs. Submerged logs were rinsed within the D-frame dip net. All samples were composited for each wetland and stored in a 70% ethanol solution. Identification and enumeration of macroinvertebrates was performed by Wendell Pennington of Pennington and Associates, Inc., Cookeville, TN. Results were evaluated using the biotic index and commonly used diversity metrics including taxa richness.

3.0 CANOPY TREE MONITORING RESULTS

3.1 Basal Area of Trees

The Cypress Conservancy, Whooping Crane Conservancy, and the Palmetto Hall wooded wetlands were dominated by even-aged stands of large swamp tupelo (*Nyssa biflora*) (Tables 3-5). Within the Cypress Conservancy, several other sub-dominate species contributed to the total tree taxa richness including bald cypress (*Taxodium distichum*), loblolly pine (*Pinus taeda*), wax myrtle (*Morella cerifera*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and large gallberry (*Ilex coriacea*) (Table 3). However, sub-dominates contributed little to the total basal area of the Cypress Conservancy which was dominated by swamp tupelo. Total basal area in the Cypress Conservancy was 70 ft^2/acre. Sub-dominants occurring in the Whooping Crane Conservancy included loblolly pine, wax myrtle, Carolina willow (*Salix caroliniana*), and red maple (*Acer rubrum*) (Table 4). Total basal area in the Whooping Crane Conservancy was 75 ft^2/acre. Within the Palmetto Hall wooded wetlands, the only sub-dominant was wax myrtle (Table 5). Total basal area in the wooded wetlands was 14 ft^2/acre. The Palmetto Hall grassy wetlands contain few canopy species and was dominated by loblolly pine, with sub-dominants including swamp tupelo and Chinese tallow (*Triadica sebifera*) (Table 6). Total basal area in the grassy wetland was 2 ft^2/acre.

3.2 Density of Trees

As with basal area, the density of canopy trees in the Whooping Crane Conservancy, Cypress Conservancy, and the Palmetto Hall wooded wetlands was highest for swamp tupelo (Tables 3-5). The palmetto Hall grassy wetland had higher densities of loblolly pine. The highest density of trees occurs at the Whooping Crane Conservancy (227 trees per acre) with the next highest total density of canopy trees occurring at the Cypress Conservancy (166 trees per acre) (Table 3-4).

Tree density at the Palmetto Hall wooded wetlands is 101 trees per acre (Table 5). The grassy wetlands contained 50 trees per acre (Table 6).

3.3 Importance Value of Tree Species

Relative importance values were dominated by swamp tupelo at the Cypress Conservancy, Whooping Crane Conservancy, and the Palmetto Hall wooded wetlands, whereas loblolly pine was the most important species in the grassy wetland. Bald cypress occupied secondary importance only in the Cypress Conservancy.

Table 3. Quantitative analysis of tree cover at the Cypress Wetland as observed in March 2019.

Species Name	Common Name	Density (Trees per acre)	Basal Area (ft^2/ac)	Importance Values
Nyssa biflora	Swamp tupelo	124	56.9	213.3
Taxodium distichum	Bald cypress	23	3.5	39.5
Pinus taeda	Loblolly pine	2	0.1	11.3
Morella cerifera	Wax myrtle	1	0.0	5.6
Liquidambar styraciflua	Sweetgum	10	0.4	16.6
Salix caroliniana	Coastal plain willow	0	0.0	0.0
Triadica sebifera	Chinese tallow tree	0	0.0	0.0
Acer rubrum	Red maple	2	0.1	6.3
Ilex coriacea	Large gallberry	4	0.0	7.4
	Total	166	61	300

Table 4. Quantitative analysis of tree cover at the Whooping Crane Wetland in March 2019.

Species Name	Common Name	Density (Trees per acre)	Basal Area (ft^2/ac)	Importance Values
Nyssa biflora	Swamp tupelo	172	71.5	214.3
Taxodium distichum	Bald cypress	0	0.0	0.0
Pinus taeda	Loblolly pine	22	2.8	37.5
Morella cerifera	Wax myrtle	10	0.1	23.4
Liquidambar styraciflua	Sweetgum	0	0.0	0.0
Salix caroliniana	Coastal plain willow	22	0.3	19.6
Triadica sebifera	Chinese tallow tree	0	0.0	0.0
Acer rubrum	Red maple	1	0.0	5.2
Ilex coriacea	Large gallberry	0	0.0	0.0
	Total	227	75	300

Table 5. Quantitative analysis of tree cover at the Palmetto Hall wooded wetland in March 2019.

Species Name	Common Name	Density (Trees per acre)	Basal Area (ft^2/ac)	Importance Values
Nyssa biflora	Swamp tupelo	98	14.3	277.0
Taxodium distichum	Bald cypress	0	0.0	0.0
Pinus taeda	Loblolly pine	0	0.0	0.0
Morella cerifera	Wax myrtle	3	0.0	23.0
Liquidambar styraciflua	Sweetgum	0	0.0	0.0
Salix caroliniana	Coastal plain willow	0	0.0	0.0
Triadica sebifera	Chinese tallow tree	0	0.0	0.0
Acer rubrum	Red maple	0	0.0	0.0
Ilex coriacea	Large gallberry	0	0.0	0.0
	Total	101	14	300

Table 6. Quantitative analysis of tree cover at the Palmetto Hall grassy wetland in March 2019.

Species Name	Common Name	Density (Trees per acre)	Basal Area (ft^2/ac)	Importance Values
Nyssa biflora	Swamp tupelo	16	0.0	59.2
Taxodium distichum	Bald cypress	0	0.0	0.0
Pinus taeda	Loblolly pine	24	1.6	192.8
Morella cerifera	Wax myrtle	0	0.0	0.0
Liquidambar styraciflua	Sweetgum	0	0.0	0.0
Salix caroliniana	Coastal plain willow	0	0.0	0.0
Triadica sebifera	Chinese tallow tree	10	0.1	48.0
Acer rubrum	Red maple	0	0.0	0.0
Ilex coriacea	Large gallberry	0	0.0	0.0
	Total	50	2	300

4.0 SHRUB AND GROUNDCOVER RESULTS

Shrub and herbaceous diversity within the discharge wetlands is limited by several factors including shade from mature canopy trees that limits shrub and herbaceous growth. Additionally, the largest factor affecting shrub and herbaceous diversity in all wetlands except Palmetto Hall grassy wetland was the percent of stations with standing water and the average depth of water. Deeper waters preclude substantial herbaceous growth. It should be noted that diversity and abundance are also expected to increase during the summertime growing season monitoring event as water levels are expected to be lower.

The highest shrub and herbaceous diversity occurred at the Cypress Conservancy where only 55 percent of stations contained water (Table 7). The species composition in the Cypress Conservancy was dominated by lizard's tail (*Saururus cernuus*), with sub-dominates pennywort (*Hydrocotyle* sp.), swamp smartweed (*Polygonum hydropiperoides*), and maidencane (*Panicum hemitomon*) occupying a significant portion of the species composition (Table 7). Whooping Crane Conservancy had slightly less taxa richness with 88 percent of stations having observed standing water with slightly higher depths than Cypress Conservancy (Table 8). Species composition in Whooping Crane was dominated by pennywort, with sub-dominates savannah iris (*Iris tridenta*), Peruvian primrose (*Ludwigia peruvia*), primrose (*Ludwigia* sp.), Carolina willow (*Salix caroliniana*), cone-cup spikerush (*Eleocharis tuberculosa*) and buttonbush (*Cephalantha occidentalis*), occupying a significant portion of the species composition in the

Whooping Crane Conservancy. The Palmetto Hall wooded wetlands contained the least amount of shrub and herbaceous species, and all stations had water with average depths greater than all wetlands (Table 9). The species composition in the wooded wetlands is dominated by lizard's tail. There was no water discharged to the grassy wetland and the taxonomic profile of plant species was less hydrophytic than the other wetlands (Table 10). Species composition in the grassy wetland is dominated by knotweed (*Polygonum* sp.), with sub-dominants savannah iris, and chickweed (*Stelaria media*) occupying most of the rest of the species composition.

Table 7. Shrub and herbaceous coverage metrics and taxa richness recorded for the Cypress Conservancy, March 2019.

Species	Common Name	Total % coverage per m^2	Avg cover per wetland	Relative % dominance
Woodwardia virginiana	Virginia chainfern	10	1.1	2.7
Toxicodendron radicans	Poison ivy	2	0.2	0.5
Hydrocotyle sp.	Pennywort	66	7.3	18.0
Acer rubrum	Red maple	1	0.1	0.3
Liquidambar styraciflua	Sweetgum	3	0.3	0.8
Saururus cernuus	Lizard's tail	146	16.2	39.8
Polygonum hydropiperoides	Swamp smartweed	61.5	6.8	16.8
Nyssa biflora	Swamp tupelo	0.5	0.1	0.1
Iris tridentata	Savannah iris	22	2.4	6.0
Ludwigia repens	Creeping primrose	16	1.8	4.4
Panicum hemitonum	Maidencane	32	3.6	8.7
Scirpus cyperinus	Woolgrass	7	0.8	1.9
			Species Richness	12
			Percent of Station with Water	55
			Average Depth of Water in Inches	3.3

Table 8. Shrub and herbaceous coverage metrics and taxa richness recorded for the Whooping Crane Conservancy, March 2019.

Species	Common Name	Total % coverage per m^2	Avg cover per wetland	Relative % dominance
Hydrocotyle sp.	Pennywort	88	9.8	50.9
Saururus cernuus	Lizard's tail	1	0.1	0.6
Polygonum sp.	Knotweed	8	0.9	4.6
Nyssa biflora	Swamp tupelo	1	0.1	0.6
Iris tridentata	sSavannah iris	20	2.2	11.6
Ludwigia peruvia	Peruvian primrose	10	1.1	5.8
Ludwigia sp.	Primrose	10	1.1	5.8
Scirpus cyperinus	Woolgrass	3	0.3	1.7
Cephalanthus occidentalis	Buttonbush	7	0.8	4.0
Salix caroliniana	Carolina willow	10	1.1	5.8
Eleocharis tuberculosa	Cone-cup spikerush	15	1.7	8.7
			Species Richness	11
			Percent of Station with Water	88
			Average Depth of Water in Inches	4.9

Table 9. Shrub and herbaceous coverage metrics and taxa richness recorded for the Palmetto Hall wooded wetland, March 2019.

Species	Common Name	Total % coverage per m^2	Avg cover per wetland	Relative % dominance
Saururus cernuus	Lizard's tail	115	28.8	93.5
Polygonum sp.	Knotweed	2	0.5	1.6
Ludwigia repens	Creeping primrose	1	0.3	0.8
Triadica sebirifera	Chinese tallow	5	1.3	4.1
			Species Richness	4
			Percent of Station with Water	100
			Average Depth of Water in Inches	7.6

Table 10. Shrub and herbaceous coverage metrics and taxa richness recorded for the Palmetto Hall grassy wetland, March 2019.

Species	Common Name	Total % coverage per m^2	Avg cover per wetland	Relative % dominance
Woodwardia virginiana	Virginia chainfern	3	0.8	1.1
Polygonum sp.	Knotweed	175	43.8	63.6
Iris tridentata	Savannah iris	45	11.3	16.4
Scirpus cyperinus	Woolgrass	1	0.3	0.4
Setaria magna	Chickweed	36	9.0	13.1
Eupatorium sp.	Boneset	3	0.8	1.1
Erechites hieracifolia	Fireweed	4	1.0	1.5
Juncus effusus	Common rush	5	1.3	1.8
Toxicodendron radicans	Poison ivy	1	0.3	0.4
Pinus taeda	Loblolly pine	2	0.5	0.7
			Species Richness	10
			Percent of Station with Water	0
			Average Depth of Water in Inches	0

5.0 MACROINVERTEBRATE RESULTS.

The macroinvertebrate communities in the discharge wetlands are typical of many freshwater wetland systems in the coastal plain (Table 11). The soft sediments and naturally low dissolved oxygen concentrations in these wetlands are conducive for a community dominated by midge larvae in the family Chironimidae. Generally, wetlands will sustain a more tolerant suite of macroinvertebrate taxa than do freshwater streams. However, the receiving wetlands had several species with mid-tolerance values including, *Neoporus* sp., *Anax junius*, *Ferrissia fragilaris*, *Planorbella* sp., *Tanytarsus* sp., which would indicate that water quality conditions can support more sensitive species. Tolerance values were similar across all of the wetlands sampled. Taxa richness was lowest in the Whooping Crane Conservancy likely due to sampling inefficiencies related to abundant floating duckweed (*Lemna* sp.) which limits the ability to target habitats. Several long-lived species were collected, including species from the order Odonata, or dragonflies, and several beetle species from the order Coleoptera. The presence of long-lived species indicates a lack of chronic water quality stressors and the presence of long-term surface water hydrology. There is a good mix of functional feeding groups in these wetlands indicating good habitat conditions and presence of long-term surface water inundation.

Table 11. Macroinvertebrate assemblages collected from the Hilton Head Island PSD recycled water discharge wetlands, March 2019.

Species	Tolerance Values	Functional Feeding Groups	Whooping Crane Conservancy	Cypress Conservancy	Palmetto Hall Wooded Wetlands
MOLLUSCA					
Bivalvia					
Veneroida					
Sphaeriidae		FC			1
Musculium sp.	7.5	FC		2	
Gastropoda					
Basommatophora					
Ancylidae		SC			
Ferrissia fragilaris	6.55	SC	8	9	11
Lymnaeidae		SC			
Pseudosuccinea columella	7.7	CG		1	
Physidae					
Physella sp.	8.7	CG		17	54
Planorbidae		SC			
Menetus dilatatus	7.6	SC	7	1	55
Planorbella sp.	6.82		3		7
ANNELIDA					
Clitellata					
Oligochaeta		CG			
Tubificida					
Naididae		CG			
Naidinae		CG			52
Dero sp.	9.8	CG		2	3
Tubificinae w.h.c.	7.11	CG		1	
Pristininae					
Pristina sp.	7.7	CG			10
Lumbriculida					
Lumbriculidae	7.03	CG	52		
ARTHROPODA					
Arachnoidea					
Acariformes	5.53			1	
Crustacea					
Cladocera					
Daphnidae					
Ceriodaphnia sp.			1	3	20

Table 11. Continued, Macroinvertebrate assemblage from the Hilton Head Island PSD recycled water discharge wetlands, March 2019.

Species	Tolerance Values	Functional Feeding Groups	Whooping Crane Conservancy	Cypress Conservancy	Palmetto Hall Wooded Wetlands
Copepoda					
Cyclopoida					
Cyclopidae					
Acanthocyclops sp.			2	2	4
Macrocyclops albidus			6		
Ostracoda				6	27
Isopoda					
Asellidae		SH			
Caecidotea sp.	8.4	CG	9	53	56
Amphipoda		CG			
Hyalellidae					
Hyalella azteca	7.75	CG	57	4	2
Insecta					
Collembola					
Sminthuridae			2		1
Odonata					
Aeshnidae		P			
Anax junius		P			2
Nasiaeschna pentacantha	6.6			2	
Coenagrionidae		P			
Ischnura sp.	9.5				1
Libellulidae		P			
Pachydiplax longipennis	9.6			1	
Hemiptera					
Belostomatidae					
Belostoma sp.	9.5	P		1	
Corixidae	9	PI		1	
Naucoridae					
Pelocoris sp.	7.01		1		
Neuroptera					
Sisyridae		-			
Climacia sp.	8.4			1	
Coleoptera					
Curculionidae			10		
Dytiscidae		P			

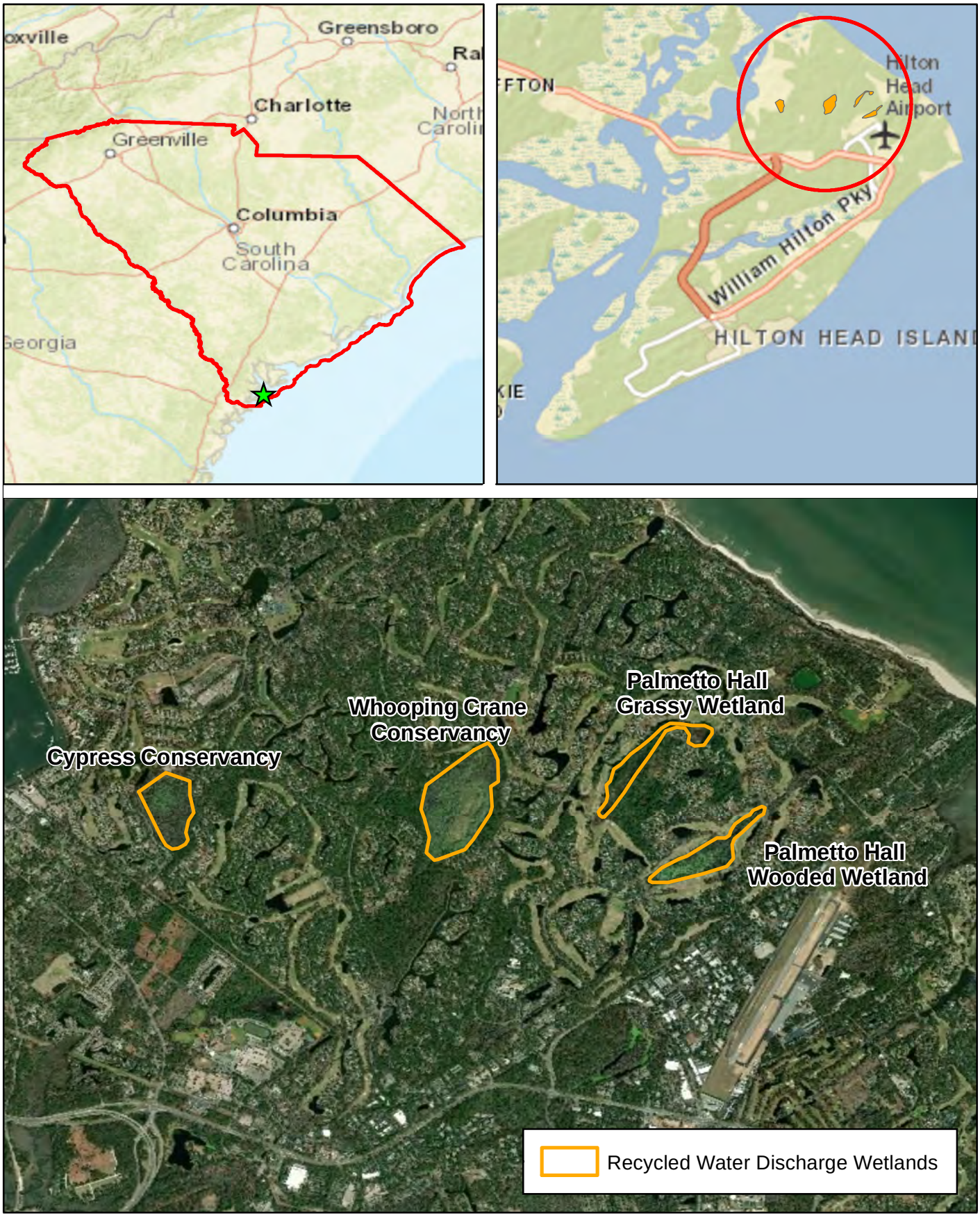
Table 11. Continued, Macroinvertebrate assemblage from the Hilton Head Island PSD recycled water discharge wetlands, March 2019.

Species	Tolerance Values	Functional Feeding Groups	Whooping Crane Conservancy	Cypress Conservancy	Palmetto Hall Wooded Wetlands
Neoporus sp.	5		4	2	5
Haliplidae					
Haliplus sp.	8.71	SH		2	3
Hydrophilidae		P			
Enochrus sp.	8.5	CG	3		
Tropisternus sp.	9.3	P		2	
Noteridae					
Suphisellus sp.			1		
Scirtidae		SC			
Scirtes sp.				1	
Diptera					
Ceratopogonidae		P		4	
Chironomidae					
Chironomus sp.	9.3	CG			2
Conchapelopia sp.	8.43	P		1	
Dicrotendipes neomodestus	7.9	CG		15	
Kiefferulus sp.				3	
Kiefferulus dux	8			72	
Limnophyes sp.	7.43	CG			2
Nanocladius crassicornus	7.4				1
Polypedilum illinoense gp.	8.7	SH		57	
Tanytarsus sp.	6.6	FC		1	1
Tanypus sp.	9.19	P		7	1
Simuliidae		FC			
Simulium sp.	4.9	FC	2		
Stratiomyidae		CG			
Myxosargus sp.			2		1
TOTAL NO. OF ORGANISMS			170	275	322
TOTAL NO. OF TAXA (Richness)			17	30	24
EPT INDEX			0	0	0
BIOTIC INDEX Assigned Values			7.21	8.18	7.79

6.0 CONCLUSIONS

The primary concern Ballentine Environmental Resources raised in their 2018 report were the substantial number of trees that had blown down along the edges of the wetlands and the required dry down periods in the Palmetto Hall wetlands. It is our understanding that discharge to the Palmetto Hall grassy wetlands has ceased due to concerns from local residents. The grassy wetlands are transitioning to a pine forest. Ballentine suggests that the rigid dry down periods make the trees more susceptible to blow down. However dry-down periods can be beneficial in the swamp tupelo swamps, including the Palmetto Hall wooded wetlands and the Hilton Head Plantation conservancies. Most of the swamp forest wetlands contained an even age of mature trees and very few younger swamp tupelos or bald and pond cypress. Carefully implemented dry downs can help with recruitment of younger tree species in these forests and increase overall plant diversity. The macroinvertebrate assemblage indicates long-term presence of hydrology, and good water quality conditions conducive for supporting a diverse assemblage of aquatic invertebrates. It is apparent that the receiving wetlands are benefiting from the PSD water reuse program.

The biennial reports for the Palmetto Hall wetlands and the Hilton Head Plantation conservancies are scheduled to be delivered to the PSD for delivery to SCDHEC in March of 2020. The biennial reports will be more comprehensive than this interim memorandum, containing a more robust description of wildlife species encountered and potential issues within the receiving wetland.



Data Source: ESRI GIS Data Server: February 19, 2017

Figure 1. Vicinity map for the Hilton Head Island PSD Recylcled Water Discharge Wetlands.

0 0.25 0.5 1 Mile

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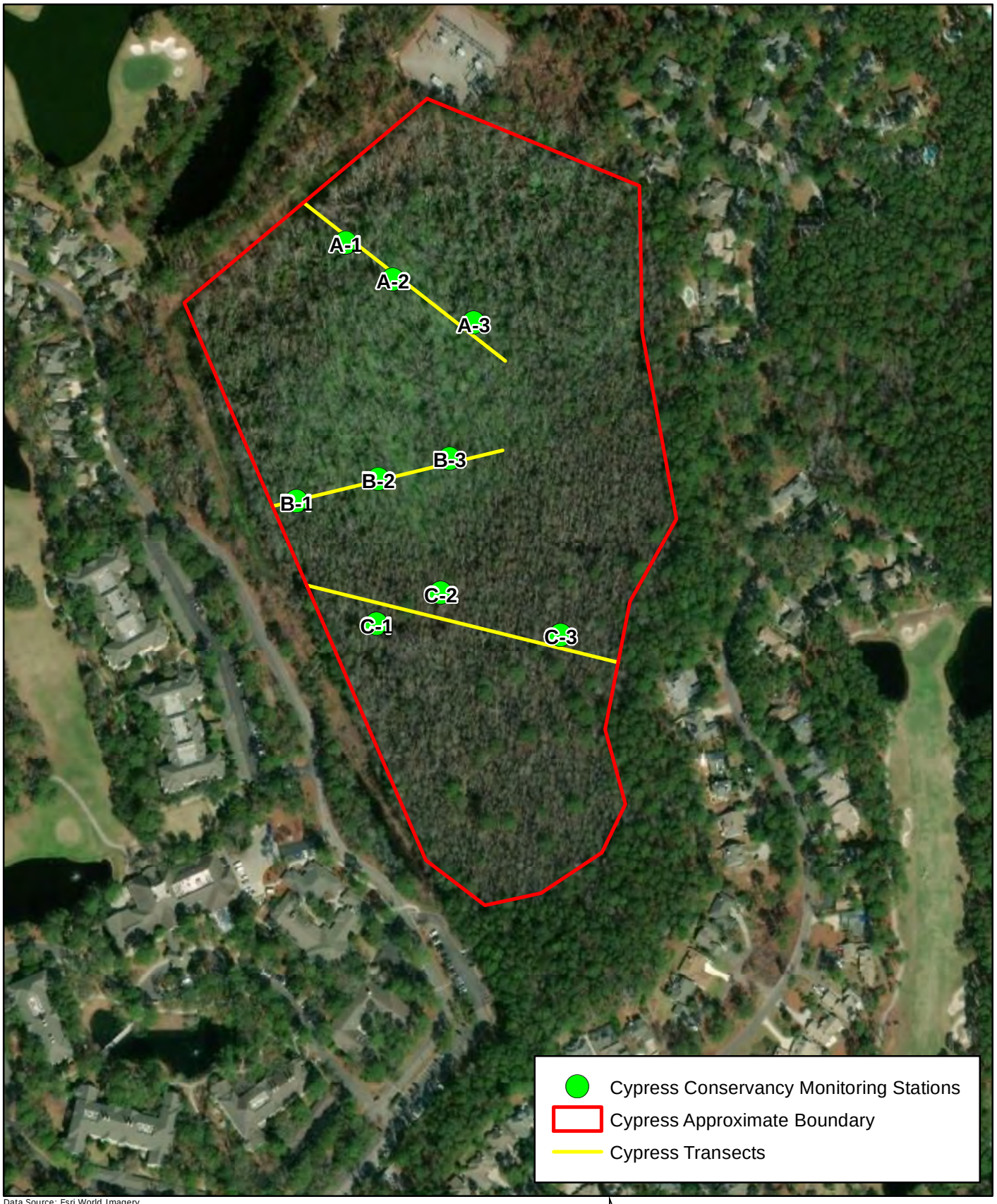

Figure 2. Cypress Conservancy Biological Monitoring Stations for the Hilton Head PSD Recycled water project.

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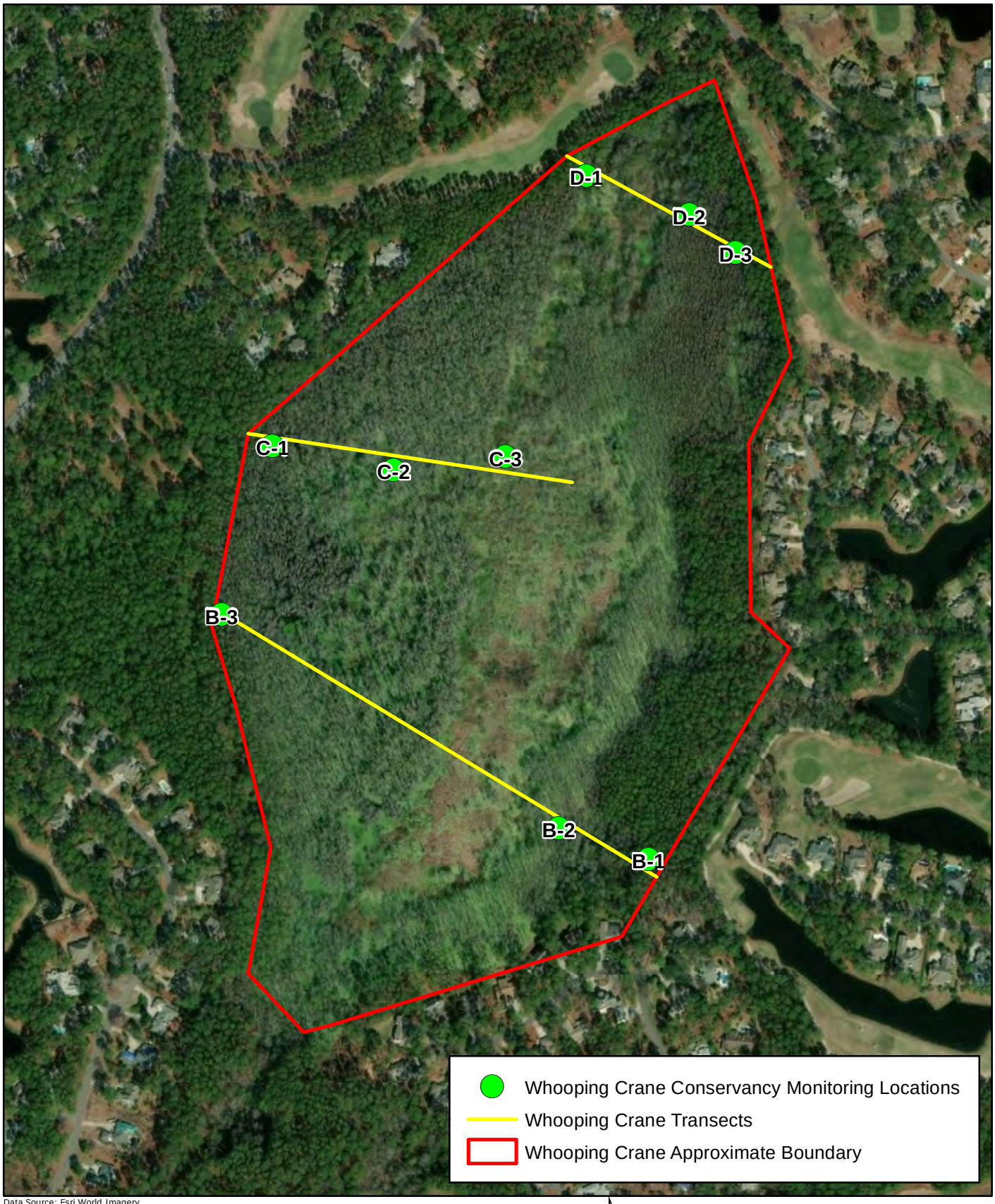

Figure 3. Whooping Crane Conservancy Biological Monitoring Stations for the Hilton Head PSD Recycled water project.

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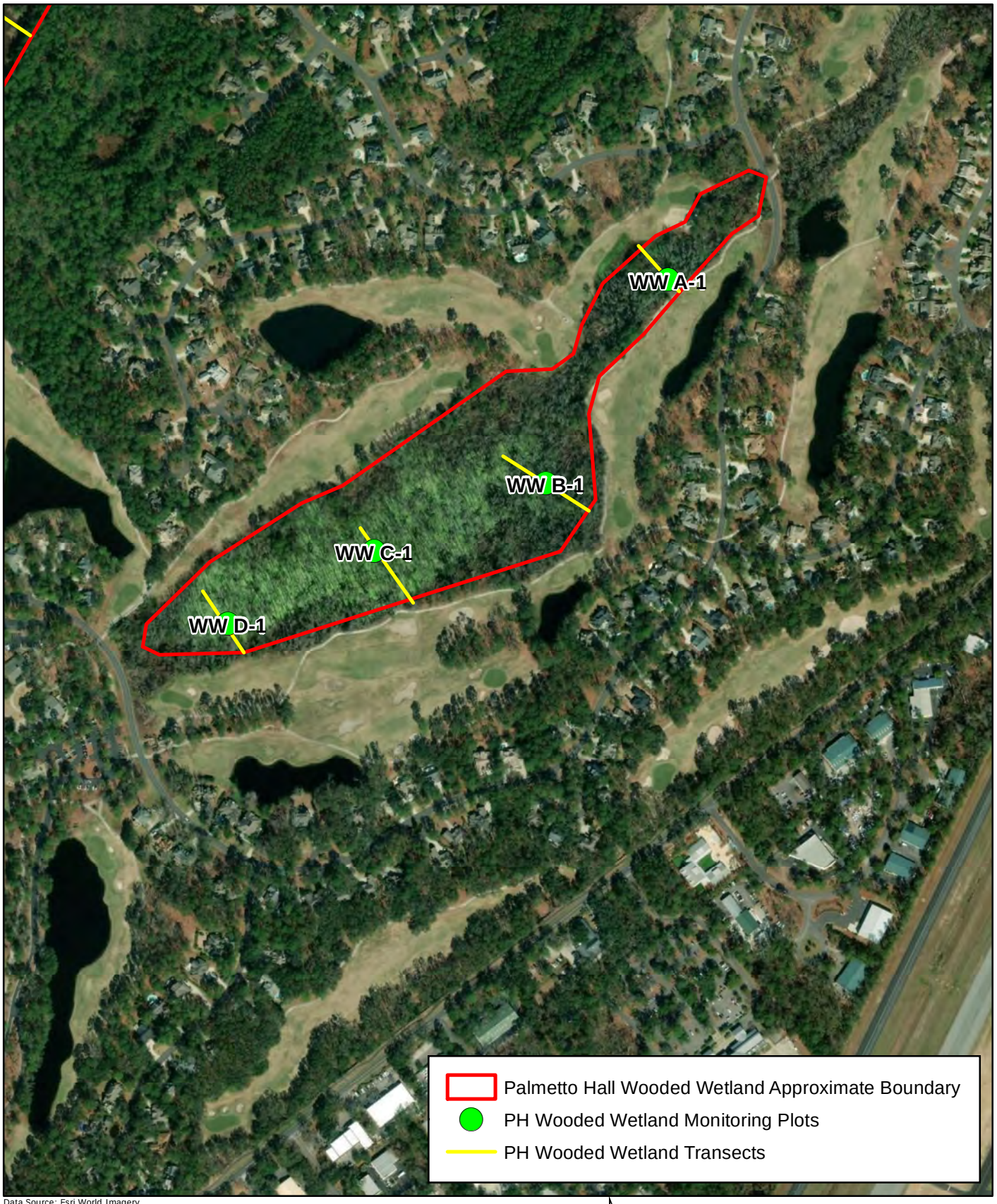

Figure 3. Palmetto Hall Wooded Wetland Biological Monitoring Stations for the Hilton Head PSD Recycled water project.

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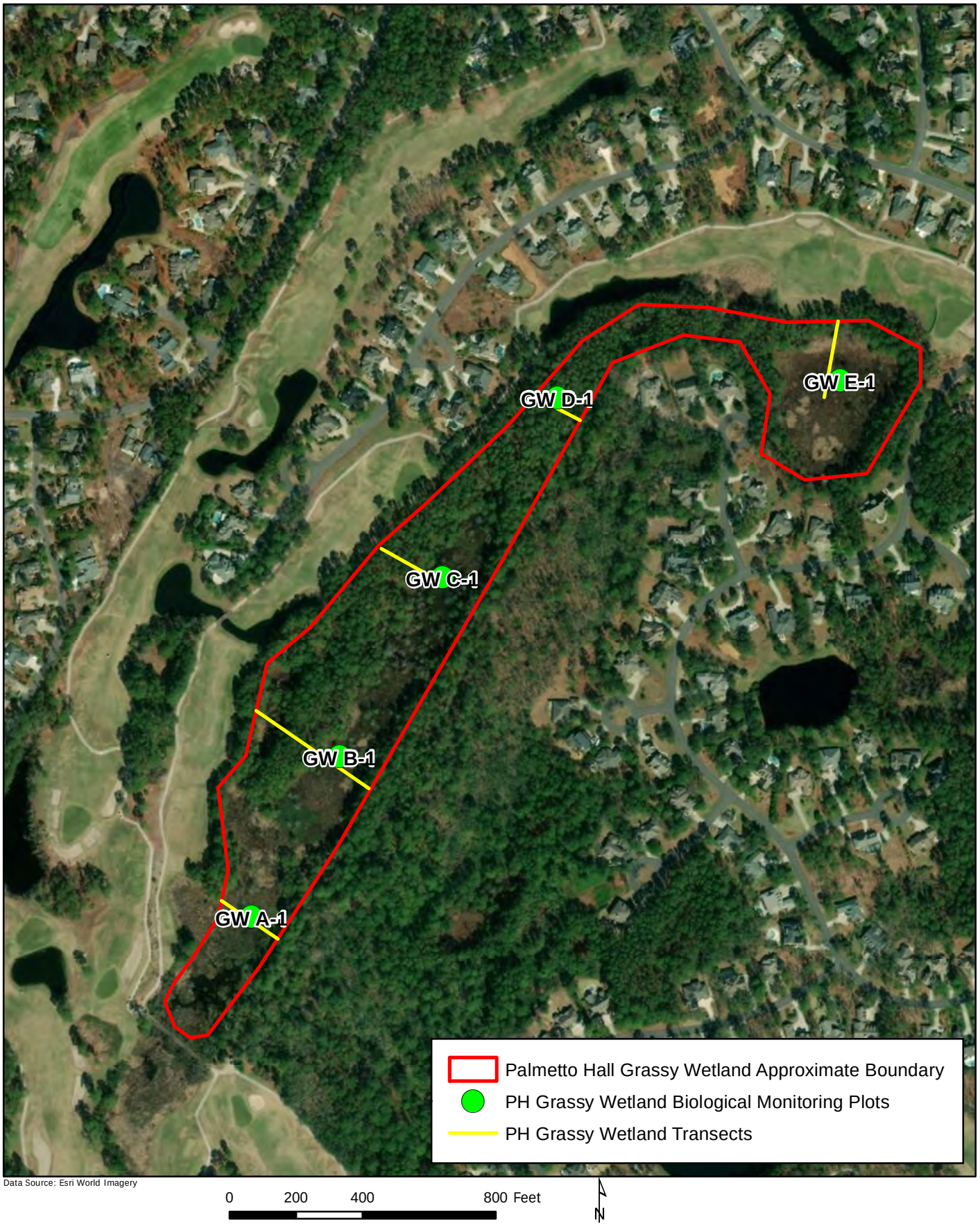

Figure 5. Palmetto Hall Grassy Wetland Biological Monitoring Stations for the Hilton Head PSD Recycled water project.

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APPENDIX

Example Photos

Photo 1. Cypress Conservancy at station C-1.

Photo 2. Cypress Conservancy at station B-1.

Photo 3. Cypress Conservancy at station A-2.

Photo 4. Whooping Crane Conservancy at station C-1.

Photo 5. Whooping Crane Conservancy at station B-2.

Photo 6. Whooping Crane Conservancy at station D-2.

Photo 7. Palmetto Hall Golf Course wooded wetland at station WW D-1.

Photo 8. Palmetto Hall Golf Course wooded wetland at station WW C-1.

Photo 9. Palmetto Hall Golf Course wooded wetland at station WW A-1.

Photo 10. Palmetto Hall Golf Course grassy wetland at station GW A-1.

Photo 11. Palmetto Hall Golf Course grassy wetland at station GW B-1.

Photo 12. Palmetto Hall Golf Course grassy wetland at station GW D-1.