



Vanasse Hangen Brustlin, Inc.

Hillsborough County, FL

Fifth Annual Archie Creek Relocation Mitigation Monitoring Report



October 2011



PREPARED FOR
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Background

In accordance with the Environmental Protection Commission of Hillsborough County Executive Director's Authorization for Wetland Impacts, October 2000; Florida Department of Environmental Protection Environmental Resource Permit No. 29-01583313-001 and U. S. Army Corps of Engineers Permit No. 199902004 IP-JB, the Archie Creek Relocation and Mitigation was authorized to offset wetland impacts associated with the Riverview Plant Phosphogypsum Stack Expansion for Mosaic Fertilizer, LLC.

Construction of the relocated Archie Creek system resulted in the creation of 20.9 acres of mixed wetland hardwoods, 2.0 acres of freshwater marsh, and 26.6 acres of creek/flow-way, for a total of 49.5 acres of created wetland habitat. Mitigation construction was completed in September 2006.

All areas were planted in accordance with applicable permit conditions, with Archie Creek plantings completed in June 2006. Both North and South mitigation areas were planted throughout July and August and into early September. All herbaceous species were two-inch pot or bare root material on three foot centers, with a few areas of higher planting densities. Shrub species were one-gallon pot material installed on five-foot centers, with occasional variations in spatial distribution to conform to localized field conditions. Tree species were planted as three-gallon pot material or equivalent root-ball averaging ten-foot centers. A planting completion report was submitted to all Restoration Reviewing Agency (RRA) members during the RRA meeting on October 12, 2006.

During the September 29, 2010 annual RRA meeting, it was acknowledged prolonged elevated water levels within the North Mitigation Area had resulted in mortality of a significant proportion of the tree species and this area was not meeting the above listed criteria. It was agreed Mosaic would investigate the mortality of the wetland trees in the North Mitigation Area and develop an alternative plan as part of the adaptive management approach to satisfy the intent of permit conditions. To this end, VHB developed an Alternative Mitigation Plan, (Plan) based on the adaptive management approach

implemented for this mitigation project. The Plan utilizes existing areas suitable for the successful establishment of wetland trees to expand the forested component of the mitigation area and incorporates the suggestions and recommendations provided by representatives of the RRA during a January 6, 2011 work session at the Hillsborough County Environmental Protection Commission. The Plan was reviewed and approved by the RRA members.

Installation of tree and herbaceous material was conducted between July 27, 2011 and August 12, 2011. All plants were installed according to the specifications provided in the Archie Creek Alternative Mitigation Plan and, prior to installation, all material was inspected for quality by a VHB biologist familiar with the site and the planting requirements. The following table provides the locations, species and numbers of all trees and herbaceous plants installed.

North Mitigation Area - Installed Tree and Herbaceous Species

Tree Species	Common Name	Number	Size	Spacing
<i>Acer rubrum</i>	Red maple	59	3 Gallon	9 ft. center
<i>Celtis laevigata</i>	Sugarberry	29	1 Gallon	9 ft. center
<i>Liquidambar styraciflua</i>	Sweetgum	29	1 Gallon	9 ft. center
<i>Magnolia virginiana</i>	Sweetbay	59	1 Gallon	9 ft. center
<i>Ulmus americana</i>	America elm	59	1 Gallon	9 ft. center
Total Trees		235		

Herbaceous Species	Common Name	Number	Size	Spacing
<i>Juncus effusus</i>	Softrush	400	Bare root	4 ft. center
<i>Nuphar advena</i>	Spadderdock	117	Bare root	6 ft. center
<i>Nymphaea elegans</i>	Blue waterlily	117	Bare root	6 ft. center
<i>Nymphaea odorata</i>	White waterlily	117	Bare root	6 ft. center
<i>Panicum hemitomon</i>	Maidencane	400	Bare root	4 ft. center
<i>Pontederia cordata</i>	Pickerelweed	400	Bare root	4 ft. center
<i>Sagittaria latifolia</i>	Duck potato	400	Bare root	4 ft. center
<i>Scirpus tabernaemontani</i>	Bulrush	150	Bare root	4 ft. center
<i>Thalia geniculata</i>	Alligator flag	150	Bare root	4 ft. center
Total Herbaceous		2,251		

Archie Creek Forested Wetland - Installed Tree Species

Tree Species	Common Name	Number	Size	Spacing
<i>Acer rubrum</i>	Red maple	526	3 Gallon	9 ft. center
<i>Celtis laevigata</i>	Sugarberry	263	1 Gallon	9 ft. center
<i>Fraxinus caroliniana</i>	Pop ash	1,117	3 Gallon	9 ft. center
<i>Liquidambar styraciflua</i>	Sweetgum	263	1 Gallon	9 ft. center
<i>Magnolia virginiana</i>	Sweetbay	526	1 Gallon	9 ft. center
<i>Taxodium distichum</i>	Bald cypress	1,117	1 Gallon	9 ft. center
<i>Ulmus americana</i>	America elm	526	1 Gallon	9 ft. center
Total Trees		4,338		

South Mitigation Area - Installed Tree and Herbaceous Species

Tree Species	Common Name	Number	Size	Spacing
<i>Acer rubrum</i>	Red maple	21	3 Gallon	9 ft. center
<i>Celtis laevigata</i>	Sugarberry	11	1 Gallon	9 ft. center
<i>Fraxinus caroliniana</i>	Pop ash	655	3 Gallon	9 ft. center
<i>Liquidambar styraciflua</i>	Sweetgum	11	1 Gallon	9 ft. center
<i>Magnolia virginiana</i>	Sweetbay	21	1 Gallon	9 ft. center
<i>Taxodium distichum</i>	Bald cypress	655	1 Gallon	9 ft. center
<i>Ulmus americana</i>	America elm	21	1 Gallon	9 ft. center
Total Trees		1,395		

Herbaceous Species	Common Name	Number	Size	Spacing
<i>Nuphar advena</i>	Spadderdock	883	Bare root	6 ft. center
<i>Nymphaea elegans</i>	Blue waterlily	883	Bare root	6 ft. center
<i>Nymphaea odorata</i>	White waterlily	883	Bare root	6 ft. center
Total Herbaceous		2,649		

Southwest Wedge Wetland - Installed Tree Species

Species	Common Name	Number	Size	Spacing
<i>Acer rubrum</i>	Red maple	94	3 Gallon	9 ft. center
<i>Celtis laevigata</i>	Sugarberry	47	1 Gallon	9 ft. center
<i>Fraxinus caroliniana</i>	Pop ash	128	3 Gallon	9 ft. center
<i>Liquidambar styraciflua</i>	Sweetgum	47	1 Gallon	9 ft. center
<i>Magnolia virginiana</i>	Sweetbay	94	1 Gallon	9 ft. center
<i>Taxodium distichum</i>	Bald cypress	128	1 Gallon	9 ft. center
<i>Ulmus americana</i>	America elm	94	1 Gallon	9 ft. center
Total		632		

A planting completion report was submitted to all RRA members on September 8, 2011. Comments on the planting completion report were provided by RRA members during the Annual RRA meeting of October 6, 2011 and a final revised report was submitted to all RRA members at the meeting.

The restored Archie Creek and associated mitigation areas will be considered successful when the following criteria are met:

- A. Upland and wetland areas are dominated by native, desirable species.
- B. Upland areas have developed a pyrogenic vegetative community that can be managed primarily by prescribed burning.
- C. An ecologically significant increase in utilization by wildlife is reflected through scheduled monitoring and other recorded observations.
- D. Exotic or nuisance species are present at sufficiently low levels as to not inhibit the growth and propagation of native species.

In assessing the achievement of these goals, quantifiable criteria that reflect the flexible nature of the project will be considered. These criteria shall include, but not be limited to, the following:

- A. Density of trees and total vegetative cover (canopy and groundcover) in forested wetland creation areas equivalent to that of similar natural systems (approximately 400 trees per acre and 70% total vegetative cover) and an indication of active growth of planted trees.
- B. Total vegetative cover (shrub and groundcover) in herbaceous wetland creation and restoration area equivalent to that of similar natural systems (approximately 85% vegetative cover).
- C. At a minimum, vegetative cover by exotic/nuisance vegetation shall be maintained at a level of less than 10%. Species targeted for control are generally those found on the current Florida Exotic Pest Plant Council list, with greater emphasis on species identified in Categories I and II of that listing. Control will be applied in a manner appropriate for meeting the long-term management goals
- D. The wetland creation areas have been inspected by a member of the appropriate regulatory staff and determined to be within the landward extent of waters of the State pursuant to Chapter 62-340, F.A.C.

Required monitoring for mitigation success began with a time-zero report in September 2006, followed by quarterly qualitative monitoring each quarter thereafter, annual quantitative monitoring, and comprehensive annual reporting. Following implementation of the Alternative Mitigation Plan, a second time zero report was submitted to address the supplemental planting event conducted in

July 2011. This document is the Fifth Annual Mitigation Monitoring Report and provides monitoring data for all areas included in the Alternative Mitigation Plan, as well as all areas originally included in previous monitoring reports.

Site & Methods

The Archie Creek Relocation and Mitigation site is located just upstream of tidally influenced Archie Creek adjacent to Mosaic's phosphogypsum Stack Buffer parcels in Riverview, Hillsborough County, Florida. The site illustrated in **Figure 1** includes a portion of Archie Creek between U.S. Route 41 and Old U.S. Route 41 extending upstream to the original Archie Creek channel. Two created wetland areas adjacent to the relocated channel designated North and South Mitigation Areas, are separated from the channel at low flows but are connected at higher flows through control structures.

Qualitative monitoring consists of quarterly visual inspection of all mitigation areas for installed and naturally recruited plant health, survival, approximate cover, and degree of exotic/nuisance invasion. Annual quantitative monitoring is a more comprehensive assessment as described below for each of the mitigation areas.

North Mitigation Area

The North Mitigation Area, (formerly referred to as *Mitigation Area 2* in permit documents), was originally designed as a 5.5 acre mixed wetland hardwood creation area. Although this area developed into a stabilized healthy deep marsh system, sustained water levels have been too high for the development of a forested wetland community. In response, the North Mitigation Area was redesignated as an herbaceous wetland with a forested fringe. Monitoring in this area occurs along a permanent transect (Transect A). Wetland habitats and monitoring station locations are graphically depicted in **Figure 2**. Herbaceous monitoring includes assessment of species cover by percent aerial contribution in one-square-meter quadrats along this fixed transect. Water levels are recorded at two-hour intervals within the site by a piezometer-datalogger unit located near the northwest corner of the wetland.



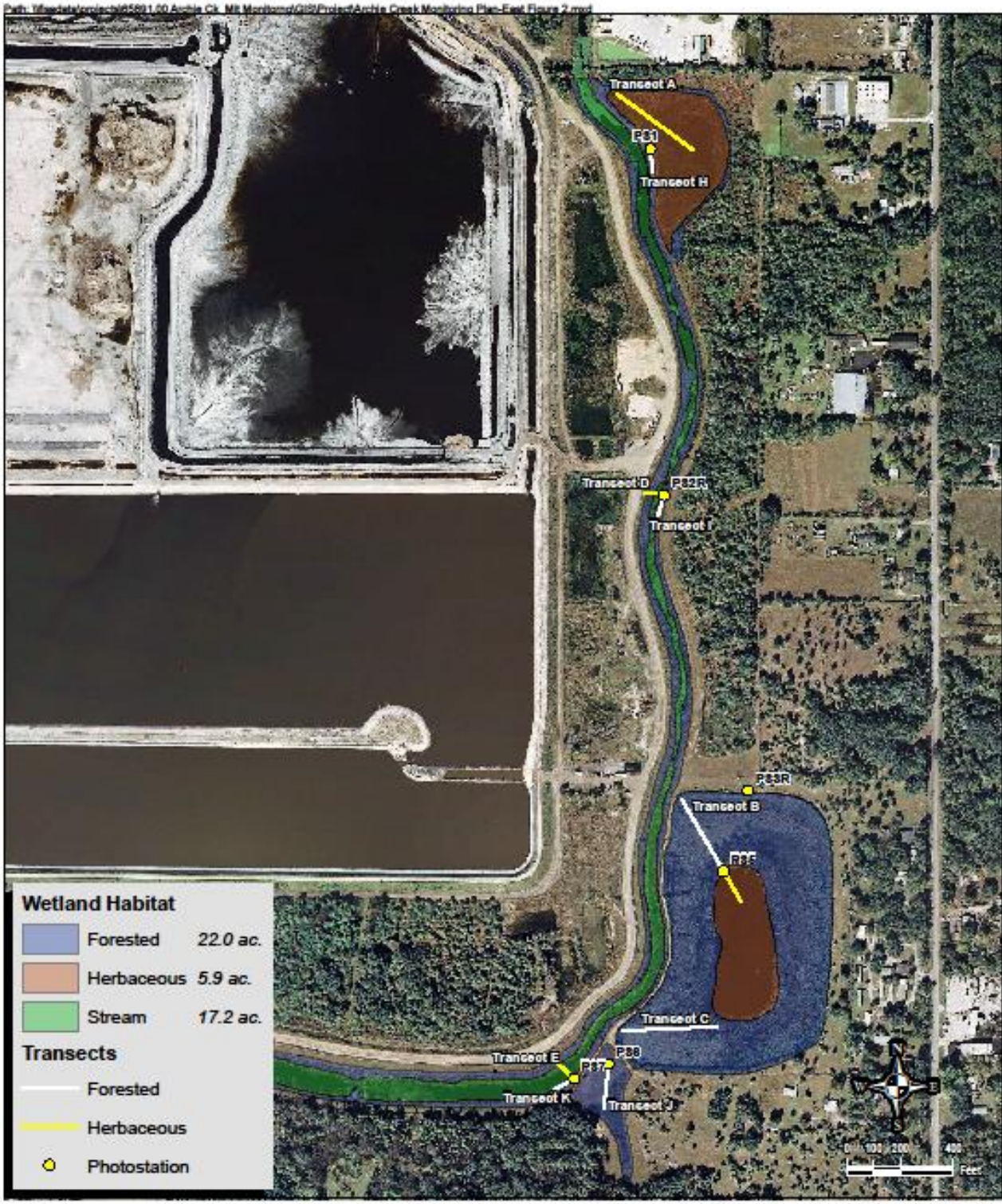


Figure 2
East Archie Creek
Transect and Photostation Locations

South Mitigation Area

The South Mitigation Area (formerly referred to as *Mitigation Area 5* in permit documents) includes 12.3 acres of created mixed forested wetland as well as a 2.7 acre freshwater marsh area within the center of the wetland designed for perennial flooding (**Figure 2**). Monitoring for this site utilizes two transects (Transects B and C) along which herbaceous cover, tree density and canopy cover are monitored. Water levels are recorded at 2-hour intervals within the site by a piezometer-datalogger unit located in the deepest zone of the wetland.

Southwest Wedge Wetland

The Southwest Wedge Wetland consists of 1.2 acres of created mixed forested wetland. It is located to the southwest of the South Mitigation Area and was previously not included in the monitoring (**Figure 2**). As part of the Alternative Mitigation Plan, this area was planted with wetland trees to provide forested wetland acreage towards the fulfillment of permit requirements. Monitoring for this site utilizes one transect (Transect J) along which herbaceous cover, tree density and canopy cover are monitored.

Relocated Archie Creek

The relocated Archie Creek includes 26.6 acres of constructed flow-way maintained as three stepped pools by a series of low weirs and a broad-bottomed box culvert under Old U.S. 41. Initially the creek was designed as an herbaceous system with a few areas in which trees were planted on the banks to maintain continuity with adjacent forested wetland restoration areas. As part of the Alternative Mitigation Plan, wetland trees were installed within approximately 8.1 acres along the banks of the creek including the berm which separates the North Mitigation Area from the relocated creek bed (**Figures 2 and 3**). Herbaceous portions of the creek have historically been monitored along four transects within the creek (Transects D, E, F and G). Forested portions of the creek are also monitored utilizing four transects (Transects H, I, K and L) along which herbaceous cover, tree density and canopy cover are monitored. Water levels are recorded at 2-hour intervals within the creek channel at the downstream end of the upper pool by a piezometer-datalogger unit located in the channel. Archie Creek monitoring locations are depicted in **Figures 2 and 3**.



Figure 3
South & West Archie Creek
Transect and Photostation Locations

Methods

A total of twelve transects were established within the restored wetlands of the Archie Creek Relocation and Mitigation Areas for the purpose of vegetation data collection. Transect locations are graphically depicted in **Figures 2 and 3**.

Transect details are as follows:

Wetland	Transect	Type	Length (m)	Width (m)
North Mitigation Area	A	Herbaceous	107	N/A
South Mitigation Area	B	Forested	97	10
	B	Herbaceous	39	N/A
	C	Forested	108	10
Southwest Wedge Wetland	J	Forested	50	10
Archie Creek	D	Herbaceous	25	N/A
	E	Herbaceous	25	N/A
	F	Herbaceous	40	N/A
	G	Herbaceous	20	N/A
	H	Forested	25	5
	I	Forested	25	5
	K	Forested	25	5
	L	Forested	25	5

Herbaceous monitoring transects were permanently marked in the field with PVC poles ten feet in length and anchored on rebar. Transect markers were placed at the beginning, at the end and at intermediate quadrat locations, as appropriate.

Forested wetland areas within the South Mitigation Area and the Southwest Wedge Wetland were monitored with belt transects ten meters (32.8 feet) in width. Forested areas along Archie Creek were monitored utilizing belt transects five meters (16.4 feet) in width. One side of the forested monitoring transects were permanently marked in the field with PVC poles ten feet in length and anchored on rebar. Transect markers were placed at the beginning, at the end and at intermediate locations, as appropriate.

Groundcover, defined as herbaceous and/or woody species less than eighteen inches in height, was monitored utilizing the square-meter sampling methodology (Bonham 1989). Square-meter quadrats were spaced at intervals along the length of each transect. Cover of each groundcover species rooted within each quadrat was recorded. Creeping and matting species were included if the shoots were rooted within the quadrat. Cover of open water and bare ground / dead vegetation in each quadrat was also recorded. Data for all quadrats in each wetland were combined to determine the dominant (most

abundant) species within each monitored area. Total and relative cover of groundcover species were calculated using the following formulas:

$$\text{Total Cover (\%)} = \frac{\text{Combined Cover of a Particular Species for the Wetland}}{\text{Total \# of Quadrats in Sample Area}}$$

$$\text{Relative Cover (\%)} = \frac{\text{Total Cover of a Particular Species}}{\text{Total Cover of All Vegetation}}$$

Trees located within the belt transects were identified by species and counted to calculate density (trees per acre). Tree density within the belt transects was determined using the following formula:

$$\text{Tree Density (tpa)} = \frac{\text{\# of Trees in Belt Transects}}{\text{Area of Belt Transects (ac.)}}$$

Height and canopy diameter were measured and recorded for each tree within the transect. Canopy cover for forested species was calculated using the following formulas:

$$\text{Canopy Area (m}^2\text{)} = \pi (D/2)^2$$

$$\text{Percent Canopy Cover} = \frac{\text{Total Canopy Area (m}^2\text{)}}{\text{Area of Belt Transect (m}^2\text{)}} \times 100$$

D = Diameter of Canopy (m)

Depth of water or soil moisture conditions at each quadrat location was also recorded. Additional vegetation species observed within each wetland area and not identified within the quadrats were noted. Photographs were taken from fixed photostations located throughout the project area. Photostation locations are depicted in **Figures 2 and 3**. All observed vertebrate wildlife species and aquatic invertebrate species were documented.

Taxonomy and nomenclature for all plant species identified during this survey follow Wunderlin and Hansen (2008).

Results

The results of monitoring events presented herein include quantitative vegetation data from the September 2011 monitoring event, hydrology data from September 2010 through September 2011 and relevant observations made during qualitative monitoring events in December 2010, March 2011, and June 2011. Photography from fixed photostations is provided in **Appendix A**.

Hydrology

Surface hydrology within the creek and mitigation wetlands was recorded on-site by three water level recorders as previously described. In response to a request during the 2010 RRA site meeting, the water level recorders were surveyed by professional surveyors to establish reference elevations for comparison of creek and mitigation area water levels. **Figure 4** summarizes the water levels relative to ground at piezometer location in inches for the period September 1, 2010 through September 1, 2011. Surface water level trends were similar throughout the mitigation areas with comparable drawdown and rain-event responses.

Calculated hydroperiods as percent of time inundated at each data logger location based on 2-hour intervals from September 2010 to September 2011 are as follows: North Mitigation Area - 100%, South Mitigation Area - 87.0%, Archie Creek - 97.4%. These hydroperiods fall within the range of hydroperiods for a variety of natural wetland systems within Hillsborough County. Although calculated hydroperiods at two data logger locations were less than 100%, lower areas within each wetland area remained inundated throughout the year.

These results indicate the Relocated Archie Creek and associated mitigation areas function hydrologically as wetlands.

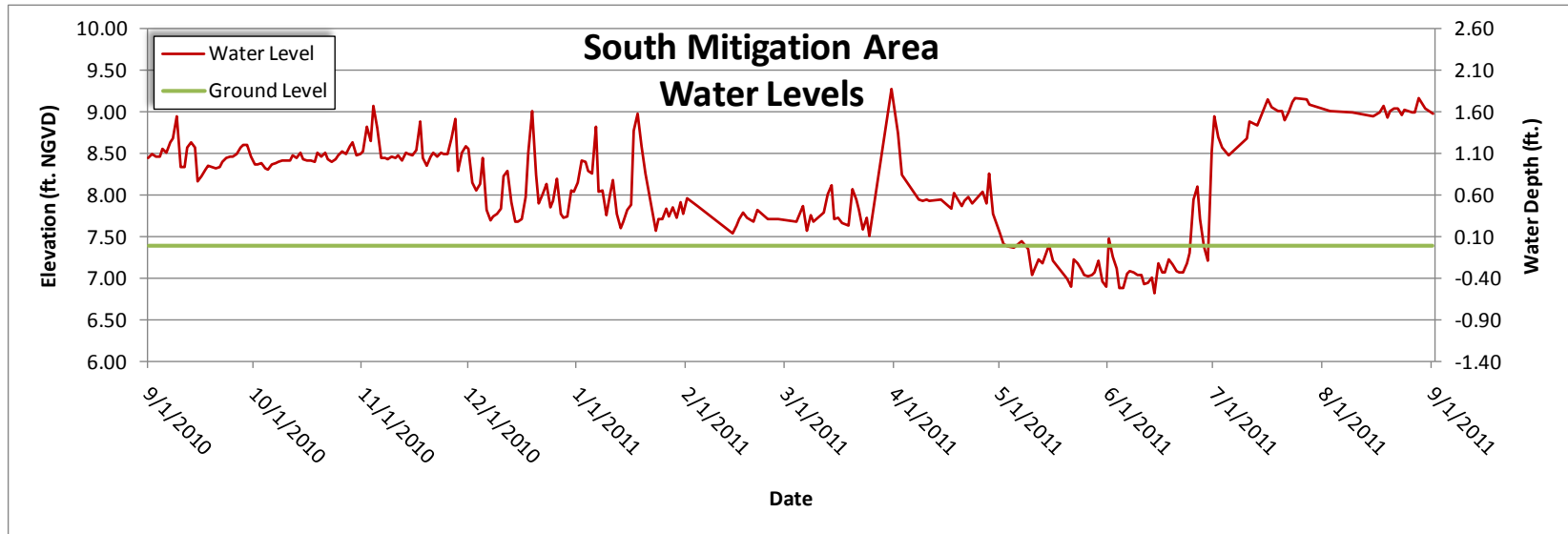
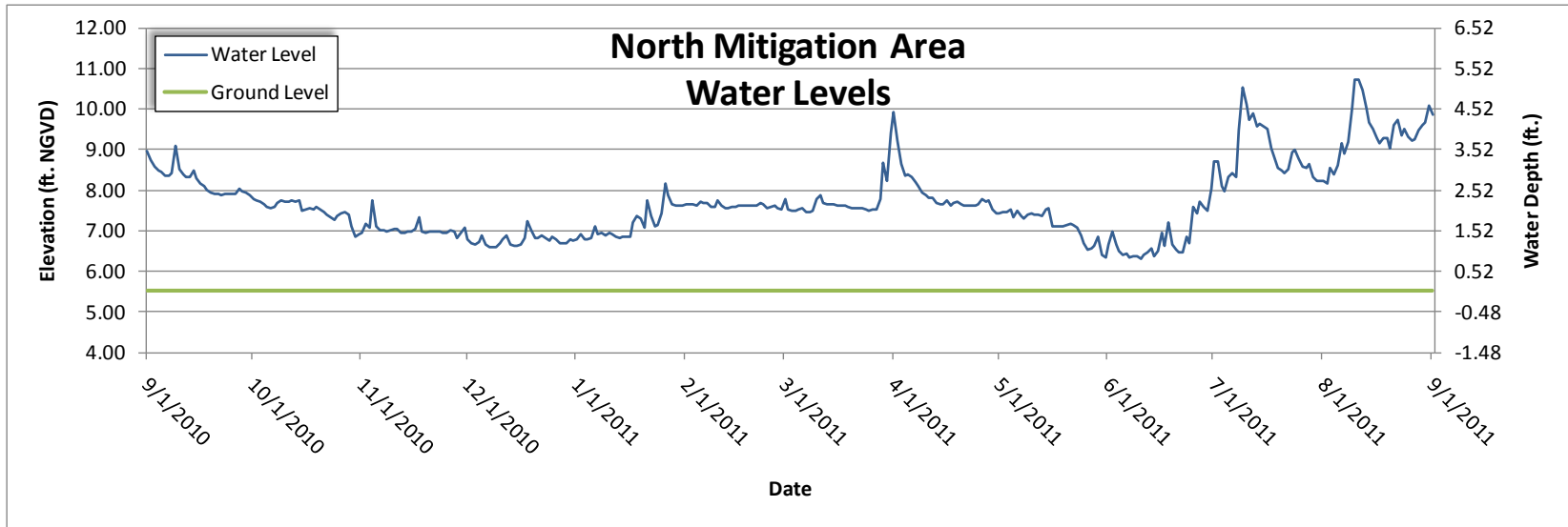


Figure 4. Archie Creek Relocation Mitigation Water Levels

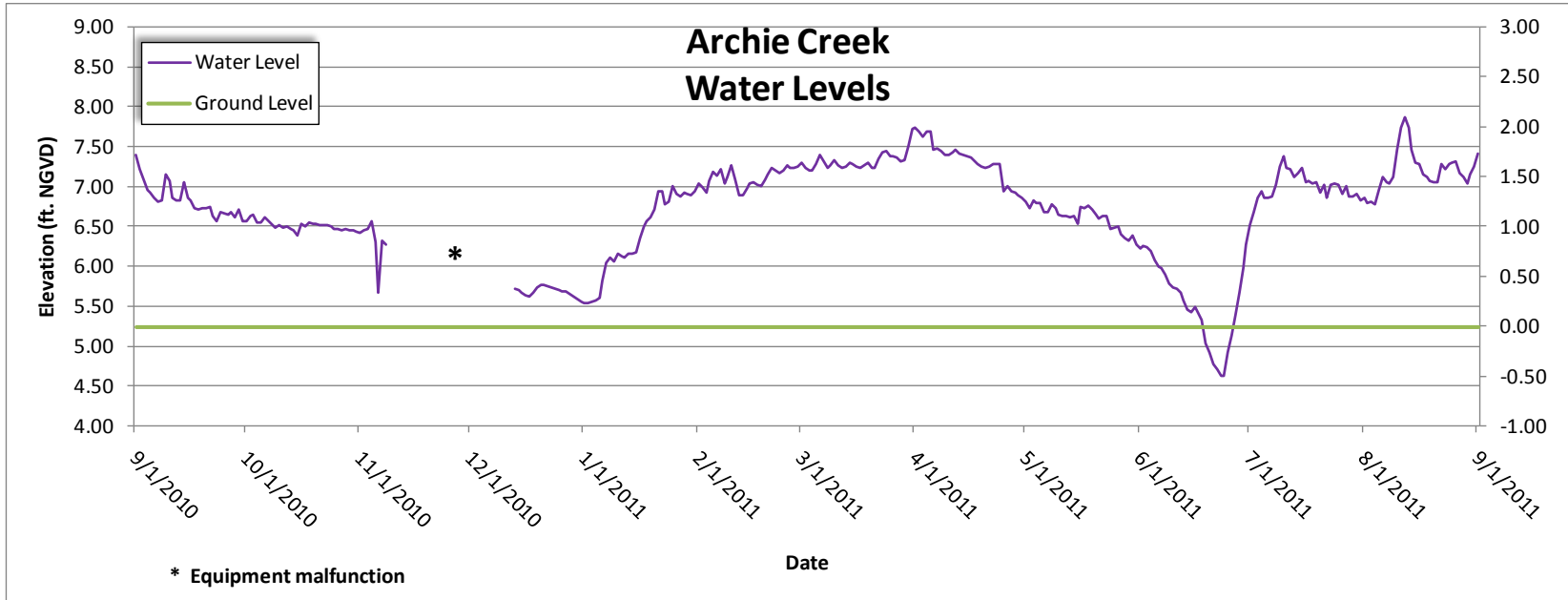


Figure 4. Archie Creek Relocation Mitigation Waters Levels (continued)

Vegetation Monitoring Results

Quantitative monitoring of the restored wetlands within the Archie Creek Relocation Mitigation was conducted on September 16th, 19th and 20th, 2011. Weather conditions at the time of monitoring consisted of temperatures in the low 90s with clear skies. A summary of the groundcover and water level data collected for all wetlands during this quantitative monitoring event is included as **Table 1**.

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 1
Summary of Herbaceous Vegetation Data
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species Classification</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
North Mitigation Area - Herbaceous		
Total Groundcover	93.5	100.0
Wetland Species (FAC or wetter)	93.5	100.0
Upland Species	0.0	0.0
Nuisance and Invasive Exotic Species	0.0	0.0
Open Water	8.2	N/A
Bare Ground / Dead Vegetation	0.0	N/A
Average Water Depth (Range) (cm)	51.3 (30 - 80)	
South Mitigation Area - Herbaceous		
Total Groundcover	0.0	0.0
Wetland Species (FAC or wetter)	0.0	0.0
Upland Species	0.0	0.0
Nuisance and Invasive Exotic Species	0.0	0.0
Open Water	100.0	N/A
Bare Ground / Dead Vegetation	0.0	N/A
Average Water Depth (Range) (cm)	76.7 (68 - 90)	
South Mitigation Area - Forested		
Total Groundcover	99.9	100.0
Wetland Species (FAC or wetter)	90.1	90.2
Upland Species	9.8	9.8
Nuisance and Invasive Exotic Species	22.5	22.5
Open Water	11.9	N/A
Bare Ground / Dead Vegetation	0.0	N/A
Average Water Depth (Range) (cm)	19.9 (2 - 45)	

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 1 (continued)

Summary of Herbaceous Vegetation Data

Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species Classification</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
Archie Creek - Herbaceous Stream		
Total Groundcover	93.3	100.0
Wetland Species (FAC or wetter)	93.3	100.0
Upland Species	0.0	0.0
Nuisance and Invasive Exotic Species	32.5	34.9
Open Water	10.7	N/A
Bare Ground / Dead Vegetation	1.7	N/A
Average Water Depth (Range) (cm)	33.1 (2 - 80)	
Archie Creek - Forested		
Total Groundcover	102.9	100.0
Wetland Species (FAC or wetter)	80.5	78.2
Upland Species	22.4	21.8
Nuisance and Invasive Exotic Species	0.9	0.9
Open Water	0.0	N/A
Bare Ground / Dead Vegetation	2.2	N/A
Average Water Depth (Range) (cm)	0.8 (0 - 10)	
Southwest Wedge - Forested		
Total Groundcover	97.6	100.0
Wetland Species (FAC or wetter)	74.6	76.4
Upland Species	23.0	23.6
Nuisance and Invasive Exotic Species	8.6	8.8
Open Water	1.2	N/A
Bare Ground / Dead Vegetation	2.4	N/A
Average Water Depth (Range) (cm)	4.6 (0 - 10)	

North Mitigation Area Vegetation

Herbaceous

The herbaceous plant community within the North Mitigation Area may be described as typical marsh vegetation with transitional zones dominated by wax myrtle (*Myrica cerifera*) and sand cordgrass (*Spartina bakeri*), grading into Carolina willow (*Salix caroliniana*) and smartweeds (*Polygonum* spp.) and progressing into deep marsh dominated by bulltongue arrowhead (*Sagittaria lancifolia*) and other emergent species. Visual estimates of overall herbaceous cover for the entire wetland have increased from approximately 70% following planting, to approximately 90% during September 2011.

Quantitative monitoring data collected within the North Mitigation Area in September 2011 is summarized in **Table 2**. Five vegetation species were identified within the sampling quadrats providing a total cover of 93.5%. The relative contribution by wetland species, National Wetland Inventory (NWI) status of facultative wetland (FAC) through obligate wetland (OBL) totaled 100%. No nuisance or invasive exotic species were sampled within the North Mitigation Area during this monitoring event.

This wetland has stabilized to a healthy deep marsh community dominated by bulltongue arrowhead, smartweed and Carolina willow with minimal cover provided by nuisance or invasive exotic species. Several stands of other species typical to deep marshes were observed within the wetland including sawgrass (*Cladium jamaicense*), alligatorflag (*Thalia geniculata*) and softstem bulrush (*Schoenoplectus tabernaemontani*). Recently planted spatterdock (*Nuphar advena*) and American white waterlily (*Nymphaea odorata*) appeared healthy and were observed in flower during this monitoring event. Additional community structure is provided by common buttonbush (*Cephalanthus occidentalis*), pop ash (*Fraxinus caroliniana*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*).

Nuisance or invasive exotic species observed on-site and scheduled for targeted removal included alligatorweed (*Alternanthera philoxeroides*), cattail (*Typha* sp.) and torpedograss (*Panicum repens*), all of which were present in trace amounts within the wetland. Potential nuisance species present within the wetland but not currently targeted for removal include Carolina willow. This species currently provides important structure and wildlife habitat functions within the mitigation area and will be targeted only if growth and aerial cover inhibit growth and spread of other desirable species.

Water levels recorded at quadrat locations within the North Mitigation Area ranged from thirty to eighty centimeters and averaged 51.3 centimeters in depth. At the time of this monitoring event, the entire wetland was inundated. The existing hydrology appeared to be sufficient to support a typical deep marsh system.

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 2
Herbaceous Vegetation Data By Species - North Mitigation Area - Herbaceous
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
<i>Cladium jamaicense</i>	Sawgrass	OBL	1.7	1.8
* <i>Polygonum hydropiperoides</i>	Mild waterpepper	OBL	11.0	11.8
* <i>Pontederia cordata</i>	Pickerelweed	OBL	6.7	7.1
* <i>Sagittaria lancifolia</i>	Bulltongue arrowhead	OBL	59.2	63.3
<i>Salix caroliniana</i>	Carolina willow	OBL	15.0	16.0
Total Ground Cover			93.5	100.0
Total Wetland Species			93.5	100.0
Total Upland Species			0.0	0.0
Total of Nuisance / Exotic Species			0.0	0.0
Open Water			8.2	N/A
Bare Ground / Dead Vegetation			0.0	N/A

*Species observed in fruit or flower: 3

South Mitigation Vegetation

Herbaceous

The herbaceous plant community within the South Mitigation Area may be described as typical wetland vegetation, with transitional zones dominated by sand cordgrass and other wetland grasses. Deeper zones grade into a well-developed interior dominated by bulltongue arrowhead, pickerelweed (*Pontederia cordata*) and knotted spikerush (*Eleocharis interstincta*). The central herbaceous area, once dominated by various species of waterlily, has transitioned to open water. As part of the planting event associated with the Alternative Mitigation Plan, 2,649 waterlilies were planted within this open water area. Planted species consisted of spadderdock, American white waterlily and tropical royalblue

waterlily (*Nymphaea elegans*). A visual estimate of herbaceous cover for the entire wetland was 80% at the time of this monitoring event.

Quantitative monitoring data collected within the forested portion of the South Mitigation Area in September 2011 is summarized in **Table 3**. Twenty-nine vegetation species were identified within the sampling quadrats providing a total cover of 99.9%. The relative contribution by wetland species, NWI status of FAC through OBL totaled 90.2%. Nuisance and invasive exotic species provided a total cover of 22.5% and consisted primarily of torpedograss.

The majority of desirable coverage within the forested portion of the South Mitigation Area was contributed by planted species but a contribution of cover from naturally recruited species was also noted, including species such as winged loosestrife (*Lythrum alatum* var. *lanceolatum*) and fall panicgrass (*Panicum dichotomiflorum*).

No plant species were sampled within the quadrats located in the herbaceous portion of the South Mitigation Area and observed herbaceous cover was approximately 10%. Dominant species included pickerelweed, knotted spikerush and American white waterlily. Planted waterlily species appeared healthy, and American white waterlily and spatterdock were observed in flower at the time of this monitoring event.

Invasive exotic species observed on-site and scheduled for targeted removal included torpedograss, alligatorweed and water-lettuce (*Pistia stratiotes*). Potential nuisance species not currently targeted for removal include climbing hempvine (*Mikania scandens*) and Carolina willow. These species currently provide important structure and wildlife habitat functions within the mitigation area and will be targeted only if cover becomes high enough to inhibit growth and spread of desirable species.

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 3
Herbaceous Vegetation Data By Species - South Mitigation Area - Forested
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
* <i>Aeschynomene indica</i>	Indian jointvetch	FACW+	0.2	0.2
* <i>Alternanthera philoxeroides</i>	Alligatorweed	OBL (2)	0.4	0.4
* <i>Ammannia coccinea</i>	Scarlet ammannia	FACW+	0.1	0.1
<i>Bidens laevis</i>	Burrmarigold	OBL	0.4	0.4
* <i>Cephalanthus occidentalis</i>	Common buttonbush	OBL	11.0	11.0
* <i>Cynodon dactylon</i>	Bermudagrass	FACU	9.8	9.8
* <i>Cyperus distinctus</i>	Swamp flatsedge	FACW	0.1	0.1
* <i>Cyperus lecontei</i>	Leconte's flatsedge	FACW	0.4	0.4
* <i>Echinochloa walteri</i>	Coast cockspur	OBL	0.5	0.5
<i>Eleocharis interstincta</i>	Knotted spikerush	OBL	0.1	0.1
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	OBL	0.4	0.4
<i>Lemna obscura</i>	Little duckweed	OBL	0.1	0.1
* <i>Ludwigia leptocarpa</i>	Anglestem primrosewillow	OBL	0.2	0.2
* <i>Ludwigia octovalvis</i>	Mexican primrosewillow	OBL	1.0	1.0
<i>Ludwigia repens</i>	Creeping primrosewillow	OBL	0.3	0.3
* <i>Lythrum alatum</i> var. <i>lanceolatum</i>	Winged loosestrife	FACW+	0.1	0.1
* <i>Mikania scandens</i>	Climbing hempvine	FACW+ (3)	0.1	0.1
* <i>Panicum dichotomiflorum</i>	Fall panicgrass	FACW	0.9	0.9
<i>Panicum hemitomom</i>	Maidencane	OBL	0.4	0.4
* <i>Panicum repens</i>	Torpedograss	FACW- (1)	20.1	20.1
* <i>Phyla nodiflora</i>	Turkey tangle fogfruit	FACW	0.1	0.1
<i>Pistia stratiotes</i>	Water-lettuce	OBL (1)	1.9	1.9
* <i>Pluchea odorata</i>	Sweetscent	FACW	0.2	0.2
* <i>Polygonum hydropiperoides</i>	Mild waterpepper	OBL	3.2	3.2
* <i>Pontederia cordata</i>	Pickerelweed	OBL	0.4	0.4
* <i>Sagittaria lancifolia</i>	Bulltongue arrowhead	OBL	33.4	33.5
* <i>Setaria parviflora</i>	Knotroot foxtail	FAC	0.1	0.1

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Table 3 (continued)

Herbaceous Vegetation Data By Species - South Mitigation Area - Forested
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
<i>Spartina bakeri</i>	Sand cordgrass	FACW+	12.9	12.9
* <i>Thalia geniculata</i>	Alligatorflag	OBL	1.4	1.4
Total Ground Cover			99.9	100.0
Total Wetland Species			90.1	90.2
Total Upland Species			9.8	9.8
Total of Nuisance / Exotic Species			22.5	22.5
Open Water			11.9	N/A
Bare Ground / Dead Vegetation			0.0	N/A

*Species observed in fruit or flower: 21

- (1) - FLEPCC Category I Invasive Exotic
- (2) - FLEPCC Category II Invasive Exotic
- (3) - Commonly Identified Nuisance Species

Water levels recorded at quadrat locations within the forested portion of the South Mitigation Area ranged from two to forty-five centimeters and averaged 19.9 centimeters in depth. At the time of this monitoring event, the entire wetland was inundated. The existing hydrology appeared to be appropriate to support a mixed wetland hardwood forest. Water levels recorded at quadrat locations within the herbaceous portion of the South Mitigation Area ranged from sixty-eight to ninety centimeters and averaged 76.7 centimeters in depth. The existing hydrology appeared to be sufficient to support an emergent deep marsh system.

Trees

Tree data collected within the South Mitigation Area during the current quantitative monitoring event is presented in **Table 4**. Four (4) wetland tree species were identified within the forested portion of the South Mitigation Area. A total of 147 wetland trees were counted providing a density of 291 trees per

acre. Average height of all trees was 2.7 meters (8.9 feet), and canopy cover was measured at 7.9%. Bald cypress (*Taxodium distichum*) was the dominant tree species providing a density of 166 trees per acre. All trees appeared healthy at the time of this monitoring event.

Archie Creek Herbaceous Stream Vegetation

The plant community within the Archie Creek Herbaceous Stream progresses from transitional wetland vegetation such as sand cordgrass and manyflower marshpennywort (*Hydrocotyle umbellata*) at the upper edges to species typical of a deep marsh such as pickerelweed and bulltongue arrowhead in the lower areas of the channel. The center of the channel is primarily open water with floating and submerged aquatic plant species providing some cover. Although many areas exhibit vegetation cover exceeding 90%, herbaceous cover of the entire creek area was estimated at 70%.

Quantitative monitoring data collected within the herbaceous portions of the relocated Archie Creek in September 2011 is summarized in **Table 5**. Twenty-nine vegetation species were identified within the sampling quadrats providing a total cover of 93.3%. The relative contribution by wetland species, NWI status of FAC through OBL was 100%. Nuisance and invasive exotic species provided a total cover of 32.5%, consisting primarily of hydrilla (*Hydrilla verticillata*).

The dominant non-nuisance species within the Archie Creek Herbaceous Stream were knotted spikerush, mild waterpepper (*Polygonum hydropiperoides*) and bulltongue arrowhead. Although not necessarily represented in the monitoring data, significant colonization by recruited coast cockspur (*Echinochloa walteri*), bearded sprangletop (*Leptochloa fusca* subsp. *fascicularis*) and denseflower knotweed (*Polygonum glabrum*) was observed throughout the stream system.

Exotic species present on-site and scheduled for targeted removal include torpedograss, alligatorweed and hydrilla. Potential nuisance species observed but not currently targeted for removal included climbing hempvine. These species will be targeted only if the aerial cover inhibits growth and spread of desirable species.

Water levels recorded at quadrat locations within the Archie Creek Herbaceous Stream ranged from two to eighty centimeters and averaged 33.1 centimeters in depth. At the time of this monitoring event, the entire stream channel was inundated. Although flow rates were very slow within the deep pools of the stream, water flow was observed throughout the entire system. The existing hydrology appeared to be appropriate to support an herbaceous stream system.

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Table 4
Tree Data By Species - South Mitigation Area - Forested
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Number</i>	<i>Density (Trees/Acre)</i>	<i>Average Height (m)</i>	<i>Total Canopy (m²)</i>	<i>Canopy Cover (%)</i>	<i>Percent Composition</i>
<i>Acer rubrum</i>	Red maple	OBL	13	26	1.9	13.8	0.7	8.8%
<i>Fraxinus caroliniana</i>	Pop ash	OBL	47	93	3.1	95.3	4.7	32.0%
<i>Taxodium distichum</i>	Bald-cypress	OBL	84	166	2.6	48.0	2.3	57.1%
<i>Ulmus americana</i>	American elm	FACW	3	6	2.7	5.6	0.3	2.0%
TOTALS			147	291	2.7	162.7	7.9	100.0%

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 5
Herbaceous Vegetation Data By Species - Archie Creek Herbaceous Stream
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>	
* <i>Alternanthera philoxeroides</i>	Alligatorweed	OBL (2)	5.4	5.8	
* <i>Ammannia coccinea</i>	Scarlet ammannia	FACW+	3.5	3.8	
	<i>Azolla filiculoides</i>	American waterfern	OBL	3.4	3.7
* <i>Cyperus distinctus</i>	Swamp flatsedge	FACW	0.3	0.4	
* <i>Cyperus surinamensis</i>	Tropical flatsedge	FACW	0.1	0.1	
* <i>Echinochloa walteri</i>	Coast cockspur	OBL	0.1	0.1	
* <i>Eclipta prostrata</i>	False daisy	FACW-	0.1	0.1	
	<i>Eleocharis interstincta</i>	Knotted spikerush	OBL	6.1	6.5
	<i>Hydrilla verticillata</i>	Hydrilla	OBL (1)	15.7	16.8
	<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	OBL	0.2	0.2
	<i>Lemna obscura</i>	Little duckweed	OBL	3.4	3.7
* <i>Ludwigia leptocarpa</i>	Anglestem primrosewillow	OBL	2.5	2.7	
* <i>Ludwigia octovalvis</i>	Mexican primrosewillow	OBL	0.3	0.3	
	<i>Ludwigia repens</i>	Creeping primrosewillow	OBL	6.3	6.7
* <i>Mikania scandens</i>	Climbing hempvine	FACW+ (3)	0.2	0.2	
	<i>Myriophyllum aquaticum</i>	Parrot feather watermilfoil	OBL	0.1	0.1
* <i>Panicum dichotomiflorum</i>	Fall panicgrass	FACW	0.8	0.9	
* <i>Panicum repens</i>	Torpedograss	FACW- (1)	9.6	10.3	
* <i>Paspalum acuminatum</i>	Brook crowngrass	OBL	0.1	0.1	
* <i>Pluchea odorata</i>	Sweetscent	FACW	0.2	0.2	
* <i>Polygonum glabrum</i>	Denseflower knotweed	OBL	5.8	6.3	
* <i>Polygonum hydropiperoides</i>	Mild waterpepper	OBL	13.3	14.3	
* <i>Pontederia cordata</i>	Pickerelweed	OBL	1.5	1.6	
* <i>Sagittaria lancifolia</i>	Bulltongue arrowhead	OBL	12.0	12.9	
	<i>Salvinia minima</i>	Water spangles	OBL (1)	0.8	0.9
* <i>Schoenoplectus tabernaemontani</i>	Softstem bulrush	OBL	0.3	0.3	

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Table 5 (continued)

Herbaceous Vegetation Data By Species - Archie Creek Herbaceous Stream
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
* <i>Symphytotrichum bahamense</i>	Bahaman aster	OBL	0.3	0.4
<i>Taxodium distichum</i>	Bald-cypress	OBL	0.2	0.2
* <i>Typha</i> sp.	Cattail	OBL (3)	0.8	0.9
Total Ground Cover			93.3	100.0
Total Wetland Species			93.3	100.0
Total Upland Species			0.0	0.0
Total of Nuisance / Exotic Species			32.5	34.9
Open Water			10.7	N/A
Bare Ground / Dead Vegetation			1.7	N/A

*Species observed in fruit or flower: 20

- (1) - FLEPCC Category I Invasive Exotic
- (2) - FLEPCC Category II Invasive Exotic
- (3) - Commonly Identified Nuisance Species

Archie Creek Forested Wetland

Herbaceous

The herbaceous plant community within the Archie Creek Forested Wetland may be described as transitional wetland vegetation dominated by sand cordgrass and bushy bluestem (*Andropogon glomeratus*). Some of the lower portions progress to deeper wetland species such as soft rush (*Juncus effusus* subsp. *solutus*) and American cupscale (*Sacciolepis striata*). Due to this area exhibiting hydrology sufficient to support wetland trees, it was planted as part of the Alternative Mitigation Plan to partially satisfy the permit requirements for forested wetland acreage. A visual estimate of herbaceous cover for the entire wetland was 100% at the time of this monitoring event.

Quantitative monitoring data collected within the Archie Creek Forested Wetland in September 2011 is summarized in **Table 6**. Fifty-five vegetation

species were identified within the sampling quadrats providing a total cover of 102.9%. Herbaceous cover is greater than 100% due to the overlap of multiple vegetation strata. The relative contribution by wetland species, NWI status of FAC through OBL, totaled 78.2%. Nuisance and invasive exotic species provided a total cover of 0.9%, consisting primarily of climbing hempvine.

Sand cordgrass was the dominant species within the Archie Creek Forested Wetland. However, the majority of desirable cover was provided by naturally recruited species, including bushy bluestem, forked rush (*Juncus dichotomus*) and turkey tangle fogfruit (*Phyla nodiflora*). Nuisance and invasive exotic species observed on-site and scheduled for targeted removal included torpedograss and climbing hempvine.

Water levels recorded at quadrat locations within the Archie Creek Forested Wetland ranged from zero to ten centimeters and averaged 0.8 centimeters in depth. Soils at the wetland/upland interface were moist to saturated. Observed soil and hydrology conditions indicated seepage flow from the adjacent uplands into the creek. This seepage is sufficient to support the wetland trees species recently installed within this area.

Trees

Tree data collected within the Archie Creek Forested Wetland during the current quantitative monitoring event is presented in **Table 7**. Eight wetland tree species were identified within the forested portion of the relocated Archie Creek. A total of 128 wetland trees were counted providing a density of 1,035 trees per acre. Average height of all trees was 1.0 meters (3.3 feet), and canopy cover was measured at 2.9%. Pop ash (*Fraxinus caroliniana*) was the dominant tree species providing a density of 405 trees per acre. All trees appeared healthy at the time of this monitoring event. In addition, numerous cabbage palm recruits, which were not counted due to small size, were observed within the transects.

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 6
Herbaceous Vegetation Data By Species - Archie Creek Forested
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
* <i>Acalypha gracilens</i>	Slender threeseed mercury	UPL	1.0	1.0
* <i>Alternanthera philoxeroides</i>	Alligatorweed	OBL (2)	0.3	0.3
* <i>Ammannia coccinea</i>	Scarlet ammannia	FACW+	0.3	0.2
* <i>Andropogon glomeratus</i>	Bushy bluestem	FACW+	9.2	8.9
* <i>Andropogon virginicus</i>	Broomsedge bluestem	FAC-	4.2	4.0
* <i>Axonopus compressus</i>	Tropical carpetgrass	FACW-	0.4	0.4
	<i>Baccharis halimifolia</i>	FAC	0.1	0.1
* <i>Bacopa monnieri</i>	Herb-of-grace	OBL	3.0	2.9
* <i>Bidens alba</i>	Beggarticks	FACW-	0.1	0.1
* <i>Chamaecrista nictitans</i>	Sensitive pea	FACU	0.1	0.1
* <i>Conyza canadensis</i>	Canadian horseweed	FACU	0.5	0.5
* <i>Coreopsis leavenworthii</i>	Leavenworth's tickseed	FACW	0.4	0.4
* <i>Crotalaria rotundifolia</i>	Rabbitbells	FACU	0.2	0.2
* <i>Cynodon dactylon</i>	Bermudagrass	FACU	12.1	11.7
* <i>Cyperus croceus</i>	Baldwin's flatsedge	FAC	0.3	0.2
* <i>Cyperus distinctus</i>	Swamp flatsedge	FACW	0.2	0.2
* <i>Cyperus ovatus</i>	Pinebarren flatsedge	FACU+	0.8	0.7
* <i>Cyperus polystachyos</i>	Manyspike flatsedge	FACW	5.9	5.7
* <i>Cyperus surinamensis</i>	Tropical flatsedge	FACW	0.7	0.6
* <i>Digitaria serotina</i>	Dwarf crabgrass	FAC	1.3	1.2
* <i>Eustachys petraea</i>	Pinewoods fingergrass	FACU-	1.8	1.8
* <i>Fimbristylis autumnalis</i>	Slender fimbry	OBL	0.4	0.4
* <i>Fuirena pumila</i>	Dwarf umbrellasedge	OBL	1.7	1.6
* <i>Heterotheca subaxillaris</i>	Camphorweed	FACU-	0.1	0.1
	<i>Hydrocotyle bonariensis</i>	FACW	0.3	0.2
	<i>Hydrocotyle umbellata</i>	OBL	5.6	5.4
* <i>Juncus dichotomus</i>	Forked rush	FACW	7.5	7.3
* <i>Juncus marginatus</i>	Grassleaf rush	FACW	0.4	0.4
* <i>Juncus scirpoides</i>	Needlepod rush	FACW+	0.2	0.2
* <i>Kyllinga pumila</i>	Low spikesedge	FACW	0.1	0.1
* <i>Ludwigia decurrens</i>	Wingleaf primrosewillow	OBL	0.3	0.2
* <i>Ludwigia maritima</i>	Seaside primrosewillow	FACW	1.0	1.0

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 6 (continued)

**Herbaceous Vegetation Data By Species - Archie Creek Forested
Fifth Annual Quantitative Monitoring Event, September 2011**

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
* <i>Ludwigia octovalvis</i>	Mexican primrosewillow	OBL	0.5	0.5
* <i>Ludwigia repens</i>	Creeping primrosewillow	OBL	0.4	0.4
* <i>Lythrum alatum</i> var. <i>lanceolatum</i>	Winged loosestrife	FACW+	0.3	0.2
* <i>Mikania scandens</i>	Climbing hempvine	FACW+ (3)	0.5	0.5
<i>Myrica cerifera</i>	Wax myrtle	FAC+	0.1	0.1
* <i>Oldenlandia uniflora</i>	Clustered mille grains	FACW-	3.1	3.0
* <i>Panicum dichotomiflorum</i>	Fall panicgrass	FACW	0.5	0.5
* <i>Phyla nodiflora</i>	Turkey tangle fogfruit	FACW	8.0	7.8
* <i>Pluchea odorata</i>	Sweetscent	FACW	0.3	0.3
* <i>Polygonum hydropiperoides</i>	Mild waterpepper	OBL	0.3	0.2
<i>Rubus pensilvanicus</i>	Sawtooth blackberry	FACU+	1.7	1.6
<i>Sabal palmetto</i>	Cabbage palm	FAC	0.9	0.9
* <i>Sacciolepis striata</i>	American cupscale	OBL	0.5	0.5
<i>Salix caroliniana</i>	Carolina willow	OBL	0.1	0.1
<i>Salvinia minima</i>	Water spangles	OBL (1)	0.1	0.1
* <i>Scleria ciliata</i>	Fringed nutrush	FAC	0.4	0.4
* <i>Scoparia dulcis</i>	Licoriceweed	FAC	0.4	0.4
* <i>Setaria parviflora</i>	Knotroot foxtail	FAC	2.3	2.2
<i>Solidago sempervirens</i>	Seaside goldenrod	FACW	0.8	0.7
<i>Spartina bakeri</i>	Sand cordgrass	FACW+	20.0	19.4
* <i>Sporobolus indicus</i>	Smutgrass	FACU+	0.1	0.1
* <i>Symphotrichum bahamense</i>	Bahaman aster	OBL	1.0	1.0
* <i>Vigna luteola</i>	Hairy pod cowpea	FACW	0.8	0.8
Total Ground Cover			102.9	100.0
Total Wetland Species			80.5	78.2
Total Upland Species			22.4	21.8
Total of Nuisance / Exotic Species			0.9	0.9
Open Water			0.0	N/A
Bare Ground / Dead Vegetation			2.2	N/A

* **Species observed in fruit or flower: 45**

(1) - FLEPCC Category I Invasive Exotic

(2) - FLEPCC Category II Invasive Exotic

(3) - Commonly Identified Nuisance Species

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 7
Tree Data By Species - Archie Creek - Forested
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Number</i>	<i>Density (Trees/Acre)</i>	<i>Average Height (m)</i>	<i>Total Canopy (m²)</i>	<i>Canopy Cover (%)</i>	<i>Percent Composition</i>
<i>Acer rubrum</i>	Red maple	OBL	25	202	1.2	3.3	0.7	19.5%
<i>Celtis laevigata</i>	Sugarberry	FACW	12	97	0.6	0.4	0.1	9.4%
<i>Diospyros virginiana</i>	Common persimmon	FAC	3	24	0.6	0.4	0.1	2.3%
<i>Fraxinus caroliniana</i>	Pop ash	OBL	50	405	1.3	8.5	1.7	39.1%
<i>Liquidambar styraciflua</i>	Sweetgum	FAC+	16	129	0.7	0.3	0.1	12.5%
<i>Magnolia virginiana</i>	Sweetbay	FACW+	10	81	0.7	0.8	0.2	7.8%
<i>Taxodium distichum</i>	Bald-cypress	OBL	8	65	0.9	0.6	0.1	6.3%
<i>Ulmus americana</i>	American elm	FACW	4	32	1.0	0.5	0.1	3.1%
TOTALS			128	1035	1.0	14.6	2.9	100.0%

Southwest Wedge Wetland

Herbaceous

The herbaceous plant community within the Southwest Wedge Wetland may be described as wet prairie vegetation dominated by bluestems (*Andropogon* spp.) and nutrushes (*Scleria* spp.), which progressively transitions to deeper wetland species such as American cupscale and marshpennyworts (*Hydrocotyle* spp.). Due to this area exhibiting hydrology sufficient to support wetland tree species, it was planted as part of the Alternative Mitigation Plan to partially satisfy the permit requirements for forested wetland acreage. A visual estimate of herbaceous cover for the entire wetland was 100% at the time of this monitoring event.

Quantitative monitoring data collected within the Southwest Wedge Wetland in September 2011 is summarized in **Table 8**. Forty vegetation species were identified within the sampling quadrats providing a total cover of 97.6%. The relative contribution by wetland species, NWI status of FAC through OBL, totaled 76.4%. Nuisance and invasive exotic species provided a total cover of 8.6%, consisting primarily of torpedograss.

American cupscale and broomsedge bluestem (*Andropogon virginicus*) were the dominant species within the Southwest Wedge Wetland. Much of the desirable cover was provided by naturally recruited species, including manyflower marshpennywort (*Hydrocotyle umbellata*), shade mudflower (*Micranthemum umbrosum*), netted nutrush (*Scleria reticularis*) and turkey tangle fogfruit. Nuisance and invasive exotic species observed on-site and scheduled for targeted removal included cattail, torpedograss and alligatorweed.

Water levels recorded at quadrat locations within the Southwest Wedge Wetland ranged from zero to ten centimeters and averaged 4.6 centimeters in depth. Soils at the wetland/upland interface were moist to saturated. Observed soil and hydrology conditions indicated seepage flow from the adjacent uplands into the creek. This seepage is sufficient to support the wetland trees species recently installed within this area.

Trees

Tree data collected within the Southwest Wedge Wetland during the current quantitative monitoring event is presented in **Table 9**. Seven wetland tree species were identified within the transect. A total of 92 wetland trees were counted providing a density of 745 trees per acre. Average height of all trees was 1.1 meters (3.6 feet), and canopy cover was measured at 3.1%. Pop ash was the dominant tree species providing a density of 267 trees per acre. All trees appeared healthy at the time of this monitoring

event. Numerous cabbage palm recruits, which were not counted due to small size, were observed within the wetland.

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 8
Herbaceous Vegetation Data By Species - Southwest Wedge - Forested
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
* <i>Acalypha gracilens</i>	Slender threeseed mercury	UPL	0.4	0.4
* <i>Aeschynomene indica</i>	Indian jointvetch	FACW+	0.2	0.2
* <i>Alternanthera philoxeroides</i>	Alligatorweed	OBL (2)	0.2	0.2
* <i>Andropogon glomeratus</i>	Bushy bluestem	FACW+	2.0	2.0
* <i>Andropogon virginicus</i>	Broomsedge bluestem	FAC-	20.4	20.9
* <i>Axonopus compressus</i>	Tropical carpetgrass	FACW-	0.6	0.6
* <i>Carex longii</i>	Long's sedge	OBL	0.2	0.2
<i>Centrosema virginianum</i>	Spurred butterfly pea	UPL	0.2	0.2
* <i>Chamaecrista nictitans</i>	Sensitive pea	FACU	0.6	0.6
* <i>Coreopsis leavenworthii</i>	Leavenworth's tickseed	FACW	0.6	0.6
* <i>Cyperus croceus</i>	Baldwin's flatsedge	FAC	0.4	0.4
* <i>Cyperus ovatus</i>	Pinebarren flatsedge	FACU+	1.0	1.0
* <i>Cyperus polystachyos</i>	Manyspike flatsedge	FACW	4.4	4.5
* <i>Diodia virginiana</i>	Virginia buttonweed	FACW	0.2	0.2
<i>Eupatorium capillifolium</i>	Dogfennel	FACU	0.4	0.4
* <i>Fimbristylis autumnalis</i>	Slender fimbry	OBL	0.2	0.2
<i>Hydrocotyle umbellata</i>	Manyflower marshpennywort	OBL	4.8	4.9
* <i>Juncus dichotomus</i>	Forked rush	FACW	1.0	1.0
* <i>Juncus megacephalus</i>	Bighead rush	OBL	0.2	0.2
* <i>Ludwigia microcarpa</i>	Smallfruit primrosewillow	OBL	0.6	0.6
* <i>Ludwigia octovalvis</i>	Mexican primrosewillow	OBL	1.0	1.0
<i>Ludwigia repens</i>	Creeping primrosewillow	OBL	0.8	0.8
* <i>Ludwigia suffruticosa</i>	Shrubby primrosewillow	OBL	0.2	0.2
* <i>Lythrum alatum</i> var. <i>lanceolatum</i>	Winged loosestrife	FACW+	1.2	1.2
<i>Micranthemum umbrosum</i>	Shade mudflower	OBL	7.6	7.8
* <i>Myrica cerifera</i>	Wax myrtle	FAC+	0.2	0.2
* <i>Oldenlandia uniflora</i>	Clustered mille graines	FACW-	0.4	0.4
* <i>Panicum dichotomiflorum</i>	Fall panicgrass	FACW	0.2	0.2
* <i>Panicum hemitomon</i>	Maidencane	OBL	2.0	2.0
* <i>Panicum repens</i>	Torpedograss	FACW- (1)	8.4	8.6

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 8 (continued)

Herbaceous Vegetation Data By Species - Southwest Wedge - Forested
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Cover (%)</i>	<i>Relative Cover (%)</i>
* <i>Paspalum laeve</i>	Field paspalum	FACW-	2.0	2.0
* <i>Phyla nodiflora</i>	Turkey tangle fogfruit	FACW	4.4	4.5
* <i>Pluchea odorata</i>	Sweetscent	FACW	0.6	0.6
* <i>Polygonum hydropiperoides</i>	Mild waterpepper	OBL	0.2	0.2
* <i>Pontederia cordata</i>	Pickerelweed	OBL	1.0	1.0
* <i>Sacciolepis striata</i>	American cupscale	OBL	23.0	23.6
* <i>Sagittaria lancifolia</i>	Bulltongue arrowhead	OBL	1.0	1.0
* <i>Scleria reticularis</i>	Netted nutrush	OBL	4.0	4.1
* <i>Setaria parviflora</i>	Knotroot foxtail	FAC	0.2	0.2
* <i>Symphotrichum bahamense</i>	Bahaman aster	OBL	0.6	0.6
Total Ground Cover			97.6	100.0
Total Wetland Species			74.6	76.4
Total Upland Species			23.0	23.6
Total of Nuisance / Exotic Species			8.6	8.8
Open Water			1.2	N/A
Bare Ground / Dead Vegetation			2.4	N/A

* Species observed in fruit or flower: 35

(1) - FLEPCC Category I Invasive Exotic

(2) - FLEPCC Category II Invasive Exotic

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 9

Tree Data By Species - Southwest Wedge

Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>	<i>Total Number</i>	<i>Density (Trees/Acre)</i>	<i>Average Height (m)</i>	<i>Total Canopy (m²)</i>	<i>Canopy Cover (%)</i>	<i>Percent Composition</i>
<i>Acer rubrum</i>	Red maple	OBL	18	146	1.1	2.5	0.5	19.6%
<i>Celtis laevigata</i>	Sugarberry	FACW	3	24	0.8	0.0	0.0	3.3%
<i>Fraxinus caroliniana</i>	Pop ash	OBL	33	267	1.5	7.8	1.6	35.9%
<i>Liquidambar styraciflua</i>	Sweetgum	FAC+	4	32	0.6	0.0	0.0	4.3%
<i>Magnolia virginiana</i>	Sweetbay	FACW+	8	65	0.6	0.3	0.1	8.7%
<i>Taxodium distichum</i>	Bald-cypress	OBL	17	138	0.9	1.9	0.4	18.5%
<i>Ulmus americana</i>	American elm	FACW	9	73	1.2	2.9	0.6	9.8%
TOTALS			92	745	1.1	15.4	3.1	100.0%

Table 10 provides a list of additional vegetation species observed within each wetland but not identified within the quadrats.

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 10
Additional Vegetation Species Observed
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>
Archie Creek - Forested		
* <i>Aeschynomene americana</i>	Shyleaf	FAC
* <i>Aeschynomene indica</i>	Indian jointvetch	FACW+
* <i>Boehmeria cylindrica</i>	False nettle	FACW+
<i>Centrosema virginianum</i>	Spurred butterfly pea	UPL
* <i>Chamaesyce hyssopifolia</i>	Hyssopleaf sandmat	FAC
* <i>Cyperus odoratus</i>	Fragrant flatsedge	FACW
* <i>Eclipta prostrata</i>	False daisy	FACW-
<i>Eleocharis vivipara</i>	Viviparous spikerush	OBL
<i>Eupatorium capillifolium</i>	Dogfennel	FACU
* <i>Gaura angustifolia</i>	Southern beeblossum	UPL
<i>Indigofera hirsuta</i>	Hairy indigo	UPL
* <i>Juncus megacephalus</i>	Bighead rush	OBL
* <i>Leptochloa fusca</i> subsp. <i>fascicularis</i>	Bearded sprangletop	FACW+
* <i>Ludwigia suffruticosa</i>	Shrubby primrosewillow	OBL
* <i>Panicum hemitomon</i>	Maidencane	OBL
* <i>Panicum repens</i>	Torpedograss	FACW- (1)
* <i>Paspalum notatum</i>	Bahiagrass	FACU+
* <i>Pluchea baccharis</i>	Rosy camphorweed	FACW
Archie Creek - Herbaceous Stream		
* <i>Aeschynomene indica</i>	Indian jointvetch	FACW+
* <i>Bacopa monnieri</i>	Herb-of-grace	OBL
* <i>Boehmeria cylindrica</i>	False nettle	FACW+
* <i>Cyperus odoratus</i>	Fragrant flatsedge	FACW
<i>Eleocharis vivipara</i>	Viviparous spikerush	OBL
<i>Eupatorium leptophyllum</i>	Falsefennel	FAC+
<i>Hydrocotyle ranunculoides</i>	Floating marshpennywort	OBL
* <i>Juncus effusus</i> subsp. <i>solutus</i>	Soft rush	FACW+
* <i>Juncus megacephalus</i>	Bighead rush	OBL
* <i>Leptochloa fusca</i> subsp. <i>fascicularis</i>	Bearded sprangletop	FACW+
* <i>Ludwigia decurrens</i>	Wingleaf primrosewillow	OBL
* <i>Ludwigia erecta</i>	Yerba de jicotea	OBL
* <i>Ludwigia peruviana</i>	Peruvian primrosewillow	OBL (1)
* <i>Panicum hemitomon</i>	Maidencane	OBL
<i>Salix caroliniana</i>	Carolina willow	OBL
* <i>Thalia geniculata</i>	Alligatorflag	OBL

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 10 (continued)

Additional Vegetation Species Observed

Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>
North Mitigation Area - Herbaceous		
<i>Acer rubrum</i>	Red maple	OBL
* <i>Alternanthera philoxeroides</i>	Alligatorweed	OBL (2)
* <i>Ammannia coccinea</i>	Scarlet ammannia	FACW+
* <i>Bacopa monnieri</i>	Herb-of-grace	OBL
<i>Bidens laevis</i>	Burrmarigold	OBL
* <i>Cephalanthus occidentalis</i>	Common buttonbush	OBL
* <i>Coreopsis leavenworthii</i>	Leavenworth's tickseed	FACW
* <i>Diodia virginiana</i>	Virginia buttonweed	FACW
* <i>Echinochloa walteri</i>	Coast cockspur	OBL
<i>Eleocharis vivipara</i>	Viviparous spikerush	OBL
<i>Fraxinus caroliniana</i>	Pop ash	OBL
* <i>Juncus effusus</i> subsp. <i>solutus</i>	Soft rush	FACW+
* <i>Leptochloa fusca</i> subsp. <i>fascicularis</i>	Bearded sprangletop	FACW+
* <i>Myrica cerifera</i>	Wax myrtle	FAC+
<i>Nuphar advena</i>	Spadderdock	OBL
* <i>Nymphaea odorata</i>	American white waterlily	OBL
<i>Nyssa sylvatica</i> var. <i>biflora</i>	Swamp tupelo	OBL
* <i>Panicum dichotomiflorum</i>	Fall panicgrass	FACW
<i>Panicum hemitomon</i>	Maidencane	OBL
* <i>Panicum repens</i>	Torpedograss	FACW- (1)
* <i>Pluchea odorata</i>	Sweetscent	FACW
* <i>Sacciolepis striata</i>	American cupscale	OBL
* <i>Schoenoplectus tabernaemontani</i>	Softstem bulrush	OBL
<i>Spartina bakeri</i>	Sand cordgrass	FACW+
* <i>Thalia geniculata</i>	Alligatorflag	OBL
* <i>Typha</i> sp.	Cattail	OBL (3)
<i>Ulmus americana</i>	American elm	FACW

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 10 (continued)

Additional Vegetation Species Observed

Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>
South Mitigation Area - Forested		
* <i>Amaranthus australis</i>	Southern amaranth	OBL
* <i>Cyperus odoratus</i>	Fragrant flatsedge	FACW
* <i>Cyperus surinamensis</i>	Tropical flatsedge	FACW
* <i>Diodia virginiana</i>	Virginia buttonweed	FACW
<i>Eleocharis vivipara</i>	Viviparous spikerush	OBL
* <i>Juncus megacephalus</i>	Bighead rush	OBL
* <i>Leptochloa fusca</i> subsp. <i>fascicularis</i>	Bearded sprangletop	FACW+
* <i>Ludwigia decurrens</i>	Wingleaf primrosewillow	OBL
* <i>Ludwigia peruviana</i>	Peruvian primrosewillow	OBL (1)
* <i>Myrica cerifera</i>	Wax myrtle	FAC+
* <i>Polygonum glabrum</i>	Denseflower knotweed	OBL
<i>Salix caroliniana</i>	Carolina willow	OBL
* <i>Sesbania herbacea</i>	Danglepod	FACW-
* <i>Sesbania vesicaria</i>	Bladderpod	FAC+
* <i>Symphytotrichum bahamense</i>	Bahaman aster	OBL
* <i>Typha</i> sp.	Cattail	OBL (3)
* <i>Vigna luteola</i>	Hairy pod cowpea	FACW
South Mitigation Area - Herbaceous		
<i>Eleocharis interstincta</i>	Knotted spikerush	OBL
<i>Nuphar advena</i>	Spadderdock	OBL
<i>Nymphaea elegans</i>	Tropical royalblue waterlily	OBL
* <i>Nymphaea odorata</i>	American white waterlily	OBL
<i>Panicum hemitomon</i>	Maidencane	OBL
<i>Pistia stratiotes</i>	Water-lettuce	OBL (1)
* <i>Pontederia cordata</i>	Pickerelweed	OBL
* <i>Sagittaria lancifolia</i>	Bulltongue arrowhead	OBL
* <i>Schoenoplectus tabernaemontani</i>	Softstem bulrush	OBL
* <i>Thalia geniculata</i>	Alligatorflag	OBL

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 10 (continued)

Additional Vegetation Species Observed

Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>ACOE Status</i>
Southwest Wedge - Forested		
* <i>Cynodon dactylon</i>	Bermudagrass	FACU
* <i>Cyperus surinamensis</i>	Tropical flatsedge	FACW
<i>Eleocharis interstincta</i>	Knotted spikerush	OBL
<i>Eleocharis vivipara</i>	Viviparous spikerush	OBL
* <i>Eustachys petraea</i>	Pinewoods fingergrass	FACU-
* <i>Gaura angustifolia</i>	Southern beeblossum	UPL
* <i>Juncus marginatus</i>	Grassleaf rush	FACW
* <i>Paspalum notatum</i>	Bahiagrass	FACU+
* <i>Sacciolepis indica</i>	Indian cupscale	FAC
* <i>Scleria ciliata</i>	Fringed nutrush	FAC
<i>Spartina bakeri</i>	Sand cordgrass	FACW+
* <i>Sporobolus indicus</i>	Smutgrass	FACU+

* **Species observed in fruit or flower**

- (1) - FLEPCC Category I Invasive Exotic
- (2) - FLEPCC Category II Invasive Exotic
- (3) - Commonly Identified Nuisance Species

Wildlife

As outlined by **Table 11** an abundance of wildlife has been regularly observed within and around the Archie Creek Relocation Mitigation area since monitoring began in 2006.

Wading birds were regularly observed foraging within the relocated creek and mitigation areas, often concentrated near the spreader weirs and control structures. Channeled apple snail (*Pomacea canaliculata*) has colonized the entire site, but predation by wading birds controls the snail population. Limpkins (*Aramus guarauna*) and wood storks (*Mycteria americana*) were directly observed consuming snails, and numerous empty shells were obvious along the shallow edges of all wetlands.

Many of the wading bird species present are provided some degree of protection by the Florida Fish and Wildlife Conservation Commission (FFWCC) as species of special concern, while the wood stork is listed as endangered by both the FFWCC and the United States Fish and Wildlife Service (USFWS). Additional protected species observed on site included American alligator (*Alligator mississippiensis*), listed as species of special concern by the FFWCC and threatened due to similarity of appearance by the USFWS; eastern indigo snake (*Drymarchon corais couperi*), listed as threatened by both the FFWCC and USFWS; and sandhill crane (*Grus canadensis pratensis*), listed as threatened by the FFWCC.

Extensive utilization of the relocated creek and mitigation areas by wading and shore birds, numerous frog species and turtles should be considered ecologically significant for this coastal freshwater system. Wildlife utilization is expected to continue to increase as on-site vegetation matures.

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 11
Wildlife Observations
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>State Status</i>	<i>Federal Status</i>
Avian Species			
* <i>Botaurus lentiginosus</i>	American bittern		
* <i>Anas rubripes</i>	American black duck		
* <i>Anhinga anhinga</i>	Anhinga		
<i>Haliaeetus leucocephalus</i>	Bald eagle		
<i>Strix varia</i>	Barred owl		
* <i>Ceryle alcyon</i>	Belted kingfisher		
* <i>Nycticorax nycticorax</i>	Black-crowned night-heron		
<i>Rhynchops niger</i>	Black Skimmer	SSC	
<i>Cyanocitta cristata</i>	Blue jay		
* <i>Quiscalus major</i>	Boat-tailed grackle		
<i>Bubulcus ibis</i>	Cattle egret		
* <i>Columbina passerina</i>	Common ground-dove		
* <i>Gallinula chloropus</i>	Common moorhen		
* <i>Phalacrocorax auritus</i>	Double-crested cormorant		
<i>Dendrocygna bicolor</i>	Fulvous whistling duck		
* <i>Plegadis falcinellus</i>	Glossy ibis		
* <i>Ardea herodias</i>	Great blue heron		
* <i>Casmerodias albus</i>	Great egret		
* <i>Butorides striatus</i>	Green heron		
<i>Lophodytes cucullatus</i>	Hooded merganser		
<i>Aramus guarauna</i>	Limpkin	SSC	
* <i>Egretta caerulea</i>	Little blue heron	SSC	
<i>Anas fulvigula</i>	Mottled duck		
* <i>Zenaida macroura</i>	Mourning dove		
<i>Circus cyaneus</i>	Northern harrier		
* <i>Pandion haliaetus</i>	Osprey		
* <i>Buteo lineatus</i>	Red shouldered hawk		
<i>Egretta rufescens</i>	Reddish egret	SSC	
* <i>Agelaius phoeniceus</i>	Red-winged blackbird		
<i>Platalea ajaja</i>	Roseate spoonbill	SSC	
<i>Grus canadensis pratensis</i>	Sandhill crane	T	

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 11 (continued)
Wildlife Observations
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>State Status</i>	<i>Federal Status</i>
Avian Species (cont.)			
* <i>Egretta thula</i>	Snowy egret	SSC	
* <i>Tachycineta bicolor</i>	Tree swallow		
	<i>Cathartes aura</i>		
* <i>Eudocimus albus</i>	White ibis	SSC	
* <i>Mycteria americana</i>	Wood stork	E	E
Amphibian Species			
* <i>Rana catesbeiana</i>	Bullfrog		
	<i>Osteopilus septentrionalis</i>		
* <i>Pseudacris nigrita verrucosa</i>	Florida chorus frog		
* <i>Hyla cinerea</i>	Green tree frog		
	<i>Eleutherodactylus planirostris</i>		
* <i>Bufo quercicus</i>	Oak toad		
* <i>Rana grylio</i>	Pig frog		
* <i>Rana sphenacephala</i>	Southern leopard frog		
Fish Species			
* <i>Tilapia aurea</i>	Blue tilapia		
* <i>Gambusia holbrooki</i>	Mosquito fish		
Mammalian Species			
	<i>Sylvilagus floridanus</i>		
* <i>Dasypus novemcinctus</i>	Nine-banded armadillo		
	<i>Procyon lotor</i>		
	<i>Odocoileus virginianus</i>		
* <i>Sus scrofa</i>	Wild pig		

Mosaic Fertilizer, LLC - Archie Creek Relocation Mitigation

Table 11 (continued)
Wildlife Observations
Fifth Annual Quantitative Monitoring Event, September 2011

<i>Species</i>	<i>Common Name</i>	<i>State Status</i>	<i>Federal Status</i>
Reptilian Species			
<i>Alligator mississippiensis</i>	American alligator	SSC	T (S/A)*
<i>Drymarchon corais couperi</i>	Eastern indigo snake	T	T
<i>Nerodia fasciata pictiventris</i>	Florida banded water snake		
<i>Chelydra serpentina osceola</i>	Florida snapping turtle		
<i>Apalone ferox</i>	Florida softshell turtle		
* <i>Anolis carolinensis</i>	Green anole		
<i>Coluber constrictor priapus</i>	Southern black racer		
<i>Agkistrodon piscivorus conanti</i>	Water moccasin		
Aquatic Invertebrate Species			
* <i>Pomacea canaliculata</i>	Channeled apple snail		
* Order Decapoda	Crayfish		
* Total species observed during current monitoring event:		35	

4

Summary

Pursuant to Specific Condition 22 of the Environmental Protection Commission of Hillsborough County Executive Director's Authorization for Wetland Impacts, October 2000; Specific Condition 23 of the Florida Department of Environmental Protection, Environmental Resource Permit No. 29-015833133-001; and Special Condition 4 of the U.S. Army Corps of Engineers Permit No. 199902004 (IP-JB), the criteria considered to determine the achievement of the restoration goals shall include, but not be limited to, the following:

Success Criteria	Current Status of Mitigation Site	Success Criteria Demonstrated
A. Density of trees and total vegetative cover (canopy and groundcover) in forested wetland creation areas equivalent to that of similar natural systems (approximately 400 trees per acre and 70% total vegetative cover) and an indication of active growth of planted trees.	<u>Tree Density (tpa) / Vegetation Cover</u>	
	Archie Creek Forested: 1035 / 102.9%	Yes / Yes
	South Mitigation Area: 291 / 99.9%	No / Yes
	Southwest Wedge: 745 / 97.6%	Yes / Yes
B. Total vegetative cover (shrub and groundcover) in herbaceous wetland creation and restoration area equivalent to that of similar natural systems (approximately 85% vegetative cover).	<u>Vegetation Cover</u>	
	Archie Creek Herbaceous: 93.3%	Yes
	North Mitigation Area: 93.5%	Yes
	South Mitigation Area (Herbaceous): 0.0%	No
C. At a minimum, vegetative cover by exotic/nuisance vegetation shall be maintained at a level of less than 10%. Species targeted for control are generally those found on the current Florida Exotic Pest Plant Council list, with greater emphasis on species identified in Categories I and II of that listing. Control will be applied in a manner appropriate for meeting the long-term management goals.	<u>Nuisance / Exotic Species Total Cover</u>	
	Archie Creek Forested: 0.9%	Yes
	Archie Creek Herbaceous: 32.5%	No
	North Mitigation Area: 0.0%	Yes
	South Mitigation Area (Forested): 22.5%	No
	South Mitigation Area (Herbaceous): 0.0%	Yes
D. The wetland creation areas have been inspected by a member of the appropriate regulatory staff and determined to be within the landward extent of waters of the State pursuant to Chapter 62-340, F.A.C.	All restoration and mitigation areas were inspected and approved by RRA members during the Annual RRA Meeting held on October 6, 2011	Yes

All sites, which lie within the Relocated Archie Creek Mitigation area, exhibit wetland hydrology consistent with that of natural wetlands within Hillsborough County, and are driven by both surface water inputs and groundwater seepage.

While plant species composition may change due to future precipitation trends, cover density and relative contribution by desirable wetland species has remained stable through several years and is expected to remain consistent during future monitoring events. Undesirable species have persisted in some areas regardless of regular maintenance events. The contribution of undesirable species is not uniform across transects or wetlands, and this condition is expected to improve with continued maintenance and natural recruitment of native wetland vegetation species as the herbaceous community matures.

Continued maintenance consisting of nuisance and exotic species control via targeted manual removal and/or herbicide treatment has been successful in reducing overall exotic species cover, maintaining a level below those listed in the applicable permits, except in a few areas within the South Mitigation Area and some sections within Archie Creek. Archie Creek itself poses particular maintenance challenges which are not often experienced on other mitigation and restoration sites as the seed source for many of the exotic species observed within the creek is upstream on properties not maintained by Mosaic. This is particularly evident with the infestation of hydrilla.

Tree species in the South Mitigation area exhibited greater than 90% survival within tagged subsamples, corresponding closely to visual estimates of overall survival, and have exhibited notable positive growth. Trees planted as part of the Alternative Mitigation Plan all appeared healthy at the time of this monitoring event. Many trees experienced some amount of planting stress, but all appear to have recovered. It is anticipated high survival rates will be observed during the next quantitative monitoring event.

In summary, all components of the Archie Creek Relocation and Mitigation sites are trending towards mitigation site success based on the fifth year of monitoring. Evaluations are underway to identify those areas potentially meeting the success criteria of the applicable permits. In the event that selected areas satisfy the success specifications, Mosaic will seek the appropriate agency confirmation.

Appendix A – Photostation Photographs

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 1 facing North



Photostation 1 facing East

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 1 facing South



Photostation 1 facing West

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 2R facing North



Photostation 2R facing South

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 4 facing East



Photostation 4 facing West

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 5 facing North



Photostation 5 facing East

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 5 facing South



Photostation 5 facing West

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 6 facing North



Photostation 6 facing East

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 6 facing South



Photostation 6 facing West

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
Fifth Annual Quantitative Monitoring Report
September 2011**



Photostation 7 facing North



Photostation 7 facing West

**Mosaic Fertilizer, LLC
Archie Creek Relocation Mitigation
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Photostation 8 facing North



Photostation 8 facing South

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