NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION PLAN/ ENVIRONMENTAL ASSESSMENT (DARP/EA) FOR THE RIVERVIEW, FLORIDA PHOSPHOGYPSUM STACK DISCHARGE, SEPTEMBER 5 – 6, 2004

Prepared by

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1. Introduction

This Final Damage Assessment and Restoration Plan/Environmental Assessment (Draft DARP/EA) was prepared by the natural resource trustees responsible for restoring natural resources and services impacted by the September 5 – 6, 2004, process water discharge (the "Discharge") from a phosphogypsum stack owned and operated by Mosaic Fertilizer, LLC (formerly Cargill Crop Nutrition) in Riverview, Hillsborough County, Florida. Mosaic Fertilizer, LLC ("Mosaic") is taking responsibility for the costs of conducting a natural resource damage assessment, as well as the costs of implementing restoration to nearby wetlands and surface waters. This Draft DARP/EA describes how the trustees and Mosaic documented and quantified injuries resulting from the Discharge and describes several restoration projects that the trustees identified as compensation for injuries to natural resources resulting from the Discharge.

The purpose of restoration, as outlined in this Draft DARP/EA, is to make the environment and the public whole for damages resulting from the Discharge by implementing restoration actions that return impacted natural resources and services to baseline conditions, and compensate for interim losses.

The natural resource trustees for this incident include two federal and one state agency: the U.S. Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); the U.S. Department of the Interior (USDOI), represented by the U.S. Fish and Wildlife Service (USFWS); and the Florida Department of Environmental Protection (FDEP), (collectively, the "Trustees"). These agencies share Trusteeship and responsibilities for natural resources and services and their supporting ecosystems belonging to, managed by, controlled by, or appertaining to the United States of America and the State of Florida that have been injured by the discharge of hazardous substances as defined by applicable federal statutes (described in more detail in Section 1.1 below).

The Trustees have prepared this DARP/EA to inform the public about injury assessment and restoration planning efforts related to the Discharge and to solicit comments on the preferred restoration alternatives presented. Members of the public had 30 days from the release of this Draft DARP/EA on January 29th, 2012 to provide comments to the Trustees regarding the Natural Resource Damage Assessment ("NRDA") and preferred restoration projects. No comments were received.

1.1 Statutory Authorities

NOAA, USFWS, and FDEP are acting under their authority as natural resource trustees under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. § 9601 et seq., the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq. (also known as the Clean Water Act or CWA), and other federal statutes and regulations, including the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Subpart G, 40 C.F.R. Sections 300.600 - 300.615 and 43 C.F.R. Part 11, which are applicable to natural resource damage assessments under CERCLA. In addition, FDEP is acting under Chapters 376 and 403,

Florida Statutes, and the rules promulgated thereunder. Each of the Trustees is authorized under applicable law to assess and recover natural resource damages arising from the Discharge and to base that assessment on the costs to restore, replace, or acquire the equivalent of the injured resources, and lost resource services.

1.2 Coordination with Responsible Party

The trustees coordinated with Mosaic and its representatives (collectively, "Mosaic" or "RP" for responsible party) throughout the NRDA process to collect and analyze data that would ultimately be used for injury assessment and restoration planning. Beginning with the initial phases of the pre-assessment, a cooperative working group was established that included representatives from NOAA, USFWS, FDEP, and Mosaic ("Working Group"). Technical support was also provided to the Working Group by the Florida Fish and Wildlife Conservation Commission (FWC) and the Environmental Protection Commission of Hillsborough County (EPCHC).

In May of 2005, the Trustees held a public meeting in conjunction with the Tampa Bay Regional Planning Council's Agency on Bay Management. During this first public meeting, the Trustees explained the NRDA process and presented preliminary findings of the injury assessment and case updates. The public was provided the opportunity to ask questions about the injury assessment and restoration selection process.

The Trustees published a "Notice of Intent to Conduct Restoration Planning" (NOI) on February 10, 2006. In order to get the broadest distribution, the NOI was published simultaneously in two local newspapers with wide distribution and readership in the Tampa Bay area: the *St. Petersburg Times* and the *Tampa Tribune*. The NOI was intended to inform the public about the status of the case, communicate the Trustees' authority to pursue a claim for natural resource injuries, solicit feedback on the injury assessment, and solicit restoration projects that might be implemented to offset natural resource losses that resulted from the Discharge. The NOI also made the "Preassessment Data Report" (PADR) available to the public and announced that a public meeting would be held to discuss the PADR and restoration planning.

A second public meeting, also held in conjunction with the Tampa Bay Regional Planning Council's Agency on Bay Management, was held in March of 2006, The Trustees presented an overview of the PADR and answered questions related to the injury assessment, restoration planning and other topics. The Trustees announced that they were soliciting restoration projects that would help compensate for injuries sustained from the Discharge.

On January 29th, 2012, the Trustees published a Public Notice in the Tampa Bay Times announcing the Draft DARP/EA and to invite the public the opportunity to comment with an open 30 day public comment period. No comments were received.

A third public meeting, also held in conjunction with the Tampa Bay Regional Planning Council's Agency on Bay Management, was held in September 6th, 2012. The Trustees and Responsible party presented an overview of the Draft DARP /EA with its proposed restoration projects and answered questions related to the injury assessment, restoration planning and other topics. The Trustees announced that they were moving forward with implementing the selected restoration alternatives that would help compensate for injuries sustained from the Discharge.

Final projects have been selected and the federal trustees have completed the Damage Assessment Restoration Plan/ Environmental Assessment (DARP/EA) in conformance with National Environmental Policy Act (NEPA).

1.3 Administrative Record

An administrative record was created which contains the major documents that will be used to make determinations of injury and select restoration alternatives. The Administrative Record is maintained and updated by NOAA and can be accessed by requesting access to the Administrative Record (AR) by contacting Sheila O'Brien, NOAA Office of the General Counsel SE; 253 13th Ave. S Suite 177; St. Petersburg, FL 33701; telephone: (727) 824-5382.

2. **Overview of Incident**

2.1 Description of the Discharge

Early in the morning on September 5, 2004, during Hurricane Frances[1] high winds and rainfall eroded a berm at the top of a phosphogypsum stack at the Mosaic phosphoric acid/fertilizer production facility in Riverview, Florida (Figure 1). As a result, until the breach was closed on September 6, 2004, approximately 65 million gallons of acidic process water were discharged from the stack and traveled through several swales on Mosaic's property until it reached South Archie Creek Canal and eventually Hillsborough Bay. The acidic water, with a pH approaching 2 standard units*, killed and injured vegetation and aquatic organisms in open waters and adjacent marshes and mangroves. Once it reached the bay, currents spread most of the acidity northward

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[1] There is some question about whether hurricane force winds were present during the breach of the berm on the phosphogypsum stack. By the time Hurricane Frances reached Tampa Bay, it had been downgraded to a tropical storm. The nearest NOAA wind gauges registered wind speeds of 47 knots max, although the wind speed on top of the stack is unknown. Regardless whether the storm met the technical definition of a hurricane, it will be referred to in this document interchangeably as Hurricane Frances, the hurricane, or the storm. The official storm report has the following data measurements for the storm – Location -Tampa (KTPA), Date and Time (UTC) - 05/2225, Pressure (mb) 980.0, Date and Time (UTC) 05/1905 Sustained Winds (knots) 39, Peak Gust (knots) - 47 Rainfall Storm total (inches) - 5.74 – Source – "Tropical Cyclone Report Hurricane Frances 25 August - 8 September 2004 John L. Beven II National Hurricane Center 17 December 2004

[*] For actual measurements and data please refer to the Pre-Assessment Damage Report

along the shore, where high water levels and winds associated with the storm carried the acidic water into the adjacent marshes. The open waters of the bay were also acidified, and lower than normal pH values were recorded up to 0.75 miles offshore on September 6. The open waters of the bay tended to neutralize the acidity, and pH levels throughout the affected waters were near normal by September 15. Circulation modeling following the hurricane event shows a 42% change in flux in Tampa Bay within 48 hours of the storm. The additional input of floodwater and wind driven positive volume increases did not drain until 50 hours after the event. (Wilson M. et. al. 2006).

During the Discharge, Mosaic worked closely with the several federal, state, and local agencies to stop the discharge and mitigate the damage, but these could not prevent natural resource injuries and losses from occurring. Since acidity was a major concern, Mosaic attempted to neutralize the process water at the point of discharge and in South Archie Creek Canal from September 5-7, 2004, but the attempt was not successful.

The process water which was discharged is typically used and re-circulated throughout the phosphate processing systems at the Mosaic facility as a scrubbing medium for production equipment air pollution control devices, a heat-exchange medium, for phosphate recovery, and as a transport medium. Process water contains approximately 2% phosphoric acid and other compounds including nutrients (nitrogen and phosphorous), fluoride and heavy metals. A complete description of the chemical constituents in the process water is in Table 1a of the Pre-Assessment Data Report, which is in the administrative record of this case and available from NOAA.

During and after the Discharge, federal, state, and local agencies and Mosaic started collecting data in a joint effort to gather and preserve information concerning the size and effects of the Discharge on potentially affected natural resources. Detailed descriptions of these activities are included in the Pre-Assessment Data Report and are summarized in this DARP/EA.

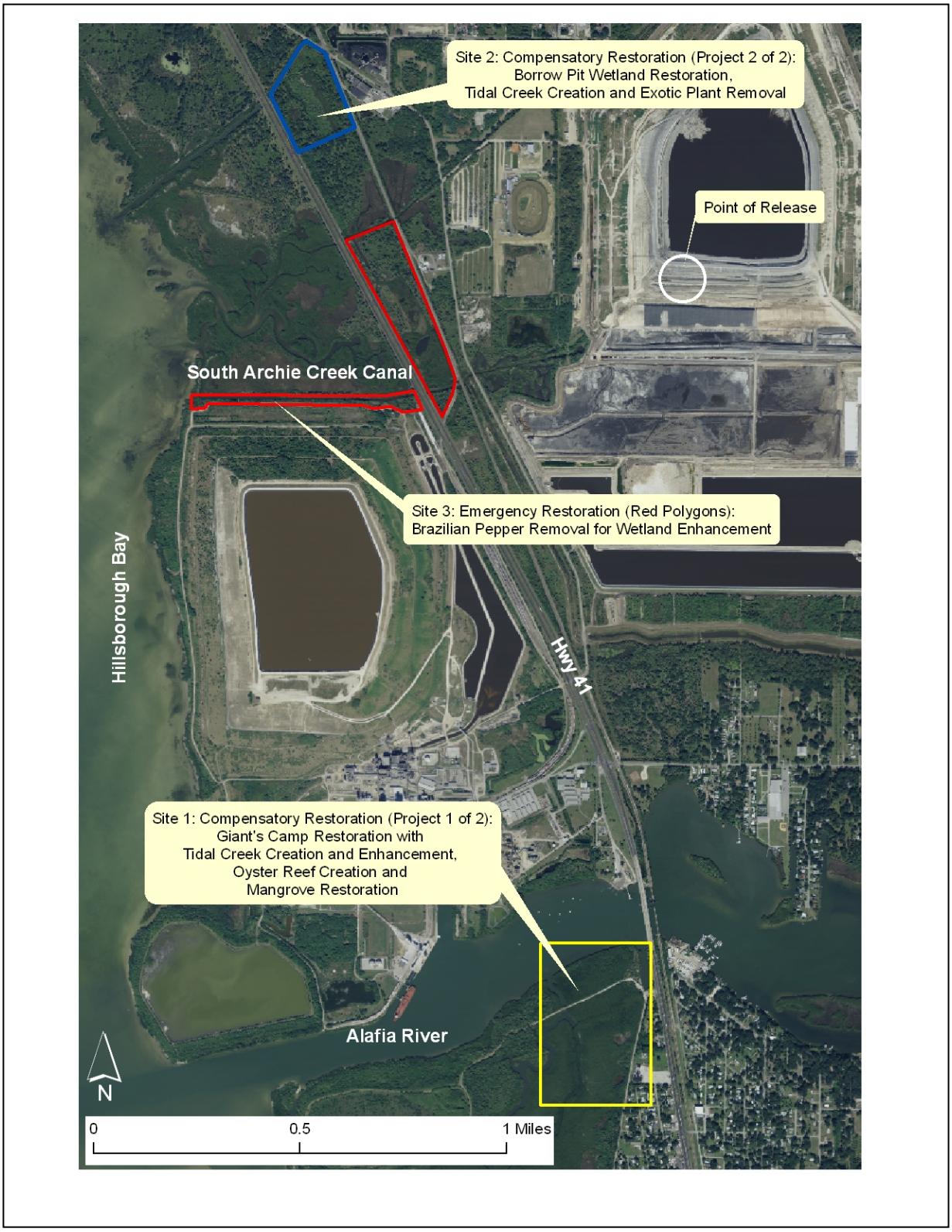


Figure 1. Incident Location.

2.2 Affected Environment

Consistent with NEPA, this section briefly describes the physical and biological environments that were affected or potentially affected by the Discharge and that may be affected by the restoration actions. The physical environment includes the surface waters of Archie Creek and Hillsborough Bay, associated freshwater wetlands and estuarine habitats, surface waters and habitats near the mouth of the Alafia River, and the locations of the restoration projects. The biological environment includes a wide variety of fish, crustaceans, shellfish, wetland vegetation, submerged aquatic vegetation, birds, and other organisms.

2.2.1 Physical

Tampa Bay, located on the west central coast of peninsular Florida, is the State's largest open water estuary. This roughly Y-shaped estuary covers almost 400 square miles and is typically subdivided into five main segments (Hillsborough Bay, Old Tampa Bay, Middle Tampa Bay, Lower Bay, and Terra Ceia Bay). The Tampa Bay watershed spans 2,300 square miles in six counties. Due to the influence of rivers and tributaries that drain into Tampa Bay, activities in its watershed directly affect the health of the Bay. Hillsborough Bay and associated emergent wetlands are approximately $1/10^{th}$ the size of the entire estuary. The Alafia River discharges into Hillsborough Bay, along with the Hillsborough River and Palm River. Hillsborough Bay is bordered by the City of Tampa and has a major port located in its northern reach. South Archie Creek and North Archie Creek are small tributaries that also drain into Hillsborough Bay near the Discharge site.

2.2.2 Biological

Biological resources exposed to the acidic water included tidal marsh (primarily smooth cordgrass, *Spartina alterniflora* and needlerush, *Juncus roemerianus*), mangrove forests (red mangrove *Rhizophora mangle,* black mangrove *Avicennia germinans,* and white mangrove, *Laguncularia racemosa*), high marsh and transitional vegetation consisting mostly of salt grass (*Distichlis spicata),* and exotic plant species primarily Brazilian pepper (*Schinus terebinthifolius*); invertebrates,(blue crab (*Callinectes sapidus*), fiddler crabs (*Uca spp.*) and various shrimp species), water column organisms, seagrasses and marine algae; fish species included small forage fish species (*Gambusia holbrooki*, *Lucania parva, Poeicilia latipinna, Cyprinodon variegatus, Fundulus spp., Adinia xenica*), marsh resident and transient species such as sand seatrout (*Cynoscion arenarius*), striped mullet (*Mugil cephalus),* spadefish (*Chaetodipterus faber),* scaled sardine (*Harengula jaguana),* mojarra (*Eucinostomus* spp.), stingray (Dasyatidae), croaker (*Micropogonias spp.*), menhaden (*Brevoortia tyrannus*), sea robin (*Prinotus spp.*), hog choaker (*Trinectes maculatus*), white grunt (*Haemulon plumieri),* spotted seatrout (*Cynoscion nebulosus),* red drum (*Sciaenops ocellatus),* and common snook (*Centropomus undecimalis).* Though a number of species occur within Hillsborough County that are designated by either state or federal laws as threatened, endangered**,** or species of special concern, the Trustees did not document injury to any such species.

The open waters of Hillsborough Bay provide important habitat for the estuarine dependant fish species, such as those mentioned above, as well as marine fish species, marine mammals (*e.g.*, bottlenose dolphin, *Tursiops truncatus*, and the West Indian Manatee, *Trichechus manatus*) and seabirds. Other important habitats within Tampa and Hillsborough Bays are seagrass meadows, tidal marshes, salt barrens, oyster reefs, and mangrove forests. Among the more commonly identified functions of the affected wetlands are food web support, water quality maintenance, and wildlife habitat. Detritus produced by wetland vegetation provides food resources to microbial and protozoan communities that act as food for invertebrates, which in turn act as food for fish. Wetland vegetation enhances water quality through the removal and uptake of nitrogen and phosphorus. Wetland vegetation, whether herbaceous, shrub or canopy species, provides cover for fish and wildlife which is an important habitat characteristic

2.2.3 Cultural and Human Use

Water-related recreational activities common in Tampa Bay include recreational fishing, swimming, canoeing, and other boating activities. These activities are important to tourists and residents. Currently, there are more than 46,000 registered boats in Hillsborough County (2009 Alphabetical Vessel Statistics by County [FLHMSV]) and over 200 public and private marinas. This does not include vessels brought into the area by visitors. The Alafia River boat ramp is the closest recreational access to the Discharge site. Recreational activities on Hillsborough Bay also support businesses, such as bait shops and boat rental facilities, some of which are located along the Alafia River.

Agriculture, boat building, and port activities are some of the historic and current industries in the Tampa Bay region. Due in large part to the Port of Tampa and the dredging of more than eighty miles of deep-water shipping channels, seaborne commerce has historically been a large part of the Tampa Bay area's economy. The Port of Tampa is the largest port in Florida and the tenth largest in the nation. The port accommodates 50% of Florida's cargo in the form of bulk, break bulk, roll-on/roll-off, refrigerated and container cargo. The port also has a large ship repair and building industry, and recently expanded cruise ship facilities. It supports important industries, such as phosphate mining, by providing affordable bulk transportation. Tampa is one of the world's leading exporters of phosphate. Tampa Bay is also a major commercial fishing port, with fish and shellfish landings at 1,946,103 pounds during 2007 (Florida Fish and Wildlife Conservation Commission, 2008), the majority of which was shrimp caught in the Gulf of Mexico.

2.3 Summary of Pre-Assessment Activities

Following the Discharge, the Responsible Party and the Trustees acted quickly to identify and, to the extent practicable, coordinate activities to collect data and other information needed to document the Discharge and assess its potential to adversely affect natural resources. These efforts took into account investigations undertaken as part of the Discharge response, natural resources at risk, preexisting monitoring programs for resources of concern, and the different capabilities, human resources and expertise of the

agencies investigating the resource injuries. Relevant activities are described in the PADR and included the following:

(1) Documentation of the Discharge and its movement through South Archie Creek Canal and Hillsborough Bay;

(2) Tributary and open bay water column sampling to assess potential injuries and to document pathways of potential resource exposure;

(3) Visual surveys to identify and assess resource impacts;

(4) Benthic sampling to evaluate potential effects on benthic communities;

(5) Ground reconnaissance, systematic field sampling and aerial photographic surveys to assess potential impacts to shoreline, wetland, and upland vegetation; and

(6) Fish sampling activities.

2.4 Natural Resources and Resource Services with Documented Injuries

As described in the PADR, the Working Group identified four types of natural resource injuries warranting further assessment in developing this DARP/EA:

2.4.1 Estuarine Wetland

Approximately 78.4 acres of mangroves and 57.3 acres of tidal marsh situated along South Archie Creek Canal and the eastern edge of Hillsborough Bay experienced some degree of die-off as a result of contact with the acidic process water. The die-off of vegetation represents a loss of associated ecological services until such time as the areas recover to pre-Discharge conditions.

2.4.2 Seagrass

Post-Discharge monitoring indicated approximately 21.57 acres of seagrass meadow showed some level of stress from the Discharge. In addition, an estimated 2.87 acres of seagrass meadows were presumed to exist at some point before the Discharge from historic survey data, but evidence of these meadows (*i.e.*, leaves or rhizomes) could not be identified during post-Discharge surveys. Data suggests that 24.44 acres of seagrass meadow likely existed along the shoreline before the Discharge.

2.4.3 Surface Water

The Discharge injured the physical and chemical quality of the surface waters of South Archie Creek Canal and Hillsborough Bay for several days. It reduced pH in South Archie Creek Canal and nearshore Hillsborough Bay to levels below water quality criteria established under both state and federal law. The Discharge also added

nutrients, such as phosphorus and nitrogen, to South Archie Creek Canal and Hillsborough Bay.[2]

2.4.4 Marine Organisms

Fish, crabs and shrimp were killed in South Archie Creek Canal, Hillsborough Bay, and their attendant marshes. The loss of these individuals also created the potential for a corresponding loss of future production of these species and the services they provide.

2.5 Natural Resources and Resource Services with Undocumented, but Likely, Injuries

The Trustees also identified the potential injury of the following natural resources or resource services due to the spill:

2.5.1 Birds and terrestrial vertebrates

Although no bird or other terrestrial animal injuries were observed, losses of fish and crustaceans, the food base for some birds, were observed and documented. This loss of prey provides a basis for concern that the Discharge may have indirectly affected birds, in particular, by temporarily reducing available prey.

2.5.2 Lost Use of Fish for Recreation

The fish loss caused by the Discharge could have impacted recreational fishing by decreasing the availability and abundance of fish stocks. Recreational fishing activity might have declined or the quality of the recreational fishing experience might have decreased as a result.

2.5.3 Estuarine Benthic Invertebrates

The Trustees compared pre- and post-Discharge sampling data bearing on the abundance and diversity of benthic communities in estuarine portions of the Alafia River. The results were inconclusive as differences in pre- and post-Discharge data were generally consistent with “normal” seasonal variability or salinity changes following significant rainfall. Nevertheless, these resources could have been injured by the Discharge. However, the Trustees concluded further study of potential injuries to estuarine benthos was not justified, because ecological benefits to estuarine benthos would accrue from the types of restoration actions that would be considered to compensate for other injuries, such as for the fish losses.

[2]The Trustees agreed to address the damages caused by the discharge of approximately 100 tons of nutrients through a consent order between Mosaic, FDEP and EPCHC. Consent Order No. 04-1548 is available by contacting either FDEP or EPCHC.

For each of the potential injuries identified in sections 2.5.1 through 2.5.3, additional investigations or studies would have been necessary to assess and quantify the losses. The Trustees elected not to proceed with additional investigations or studies for these potential injuries for several reasons. Primarily, due to data gaps, it was difficult to establish with the necessary degree of certainty that fish losses were significant on a local population level. As an alternative, the Agency/RP Working Group sought to develop a restoration plan that would compensate for the documented natural resource injuries while also maximizing benefits to birds and fish. This strategy recognized that restoration actions available to compensate for documented injuries are likely to also effectively compensate for any recreational fishing impacts or indirect injuries to birds that may have occurred, based on the circumstances of the event and the period for exposure or effects. Accordingly, these potential injuries were considered in developing this DARP/EA.

2.6 Resource Services with no Documented Injury

Lost Use of Surface Waters for Recreational Boating – Given the inclement weather associated with Hurricane Frances and the timing of the incident, the Trustees concluded that recreational boating losses that could be attributable to the Discharge were unlikely to have occurred. The severe weather conditions were sufficient to have eliminated boating activity during the Discharge period. The Trustees determined that further action or cost to assess such potential for loss was not warranted.

3. **Assessment of Injury Categories**

3.1 Estuarine Wetland

3.1.1 Mangrove Forest

(1) Overview of Assessment Activities and Findings

Methods described in the 'Proposed Ephemeral Data Collection Protocols for Documenting and Monitoring Vegetation Impacts', NRDA Working Group, Version 2, September 20, 2004, were used to assess injury to wetland vegetation. Methods included using low altitude high-resolution true color and color infrared photographs of the assessment area and using both quadrat and transect monitoring. Aerial photography was taken on numerous dates to document initial mangrove injury and potential delayed effects. Permanent vegetation sampling locations, including quadrats and transects, were established to monitor mangrove impact and recovery.

Nine one-meter square quadrats were established in impact and reference locations; data were collected from September, 2004 through April, 2007. Each corner of the quadrat was marked with permanent PVC pipe and the quadrat was photographed. Vegetation parameters recorded within each quadrat included the following: (1) plant species by ground cover, shrub layer and canopy strata; (2) plant communities; (3) percent cover estimated visually; (4) the estimated percent of live and dead stems by species; and (5) a characterization of any stress symptoms and type of stressor visible (*i.e.*, chlorotic leaves, leaf deformities, wilting, insect damage, etc.). For mangrove trees

where only lower portions of the tree showed leaf stress and loss, percent leaf mortality was recorded. At ten points within the quadrat, the maximum height of vegetation was recorded by species.

Vegetation transects were established in visibly stressed and un-stressed plant communities based on data from the first two overflights. Transects were oriented across tidal streams or at right angles to shorelines if established at shoreline locations. In tidal stream locations, the transects were established to traverse the sampled vegetation from a "top of bank" position in the vegetation on one side of a tidal stream, across the tidal stream, and extending into the vegetation on the other side of the tidal stream. At each site, a tape measure was stretched the length of the transect and uniquely numbered stakes were installed on the centerline at approximately ten meter intervals, depending on the vegetation community. A profile of the vegetation touched by the transect line and lying 1 meter on each side was recorded in the field.

(2) Injury Determination

Injuries to mangrove habitat from the Discharge were categorized in terms of projected recovery. Mangroves occur at various life stages and recovery is affected by both the magnitude of impact and life stage. For species that were dead, recovery was assumed based on the time for the species to grow to pre-spill dimensions from natural volunteer propagules. For plants with partial impact, recovery was assumed based on results of monitoring re-growth in subsequent years. Of the estimated impact to 78.4 acres of mangrove communities, approximately 53.59 acres of young mangroves were expected to recover in less than two years, 10.09 acres were expected to recover in two to four years, 13.70 acres were expected to recover in four to ten years, and approximately 1.02 acre of mature mangroves were anticipated to require over ten years to recover (Figure 2, Table 1).

Data collected in April, 2007, and reported in the Technical Data Report Supplement Number Two, August, 2007, show that most of the impacted mangrove areas recovered or were at a minimum of 50% recovery. Follow up investigations and photographic documentation in fall 2009 confirmed that the natural recovery of the affected mangroves did recover as expected. This included the ongoing recovery of a small island area of old black mangroves (25-30' tall) that was determined to take ten or more years to fully return to baseline condition (Table 1). During January, 2010, a freezing weather condition which persisted for several days resulted in plant stress within the impact area and throughout the region.

3.1.2 Tidal Marsh

1) Overview of Assessment Activities and Findings

The same aerial photography and methods used for mangrove assessments were also used to determine tidal marsh injury. Data for injury and recovery of tidal marshes was

collected at the same time as mangrove data collections. Injuries to tidal marshes and recovery times were evaluated and projected.

(2) Injury Determination

A total of 57.36 acres of tidal marsh situated along South Archie Creek Canal and the eastern edge of Hillsborough Bay experienced some injury as a result of the Discharge. Injuries from the Discharge were categorized for each habitat in terms of projected recovery. For species that were dead, recovery was assumed based on the time for the species to grow to pre-spill dimensions. For plants with partial impact, recovery is assumed based on results of monitoring re-growth in subsequent years. Recovery for 57.36 acres of tidal marsh was projected to occur between one and four years. (Figure 2, Table 1).

Data collected in April, 2007 and reported in the Technical Data Report Supplement Number Two, August, 2007, show that most of the impacted tidal marsh areas recovered or were at a minimum of 50% recovery. Follow up investigations and photographic documentation in fall 2009 confirmed that the natural recovery of the affected marsh did proceed as expected and in some cases even showed the progress of natural succession from cordgrass marsh to mangroves (Figures 3 and 4).

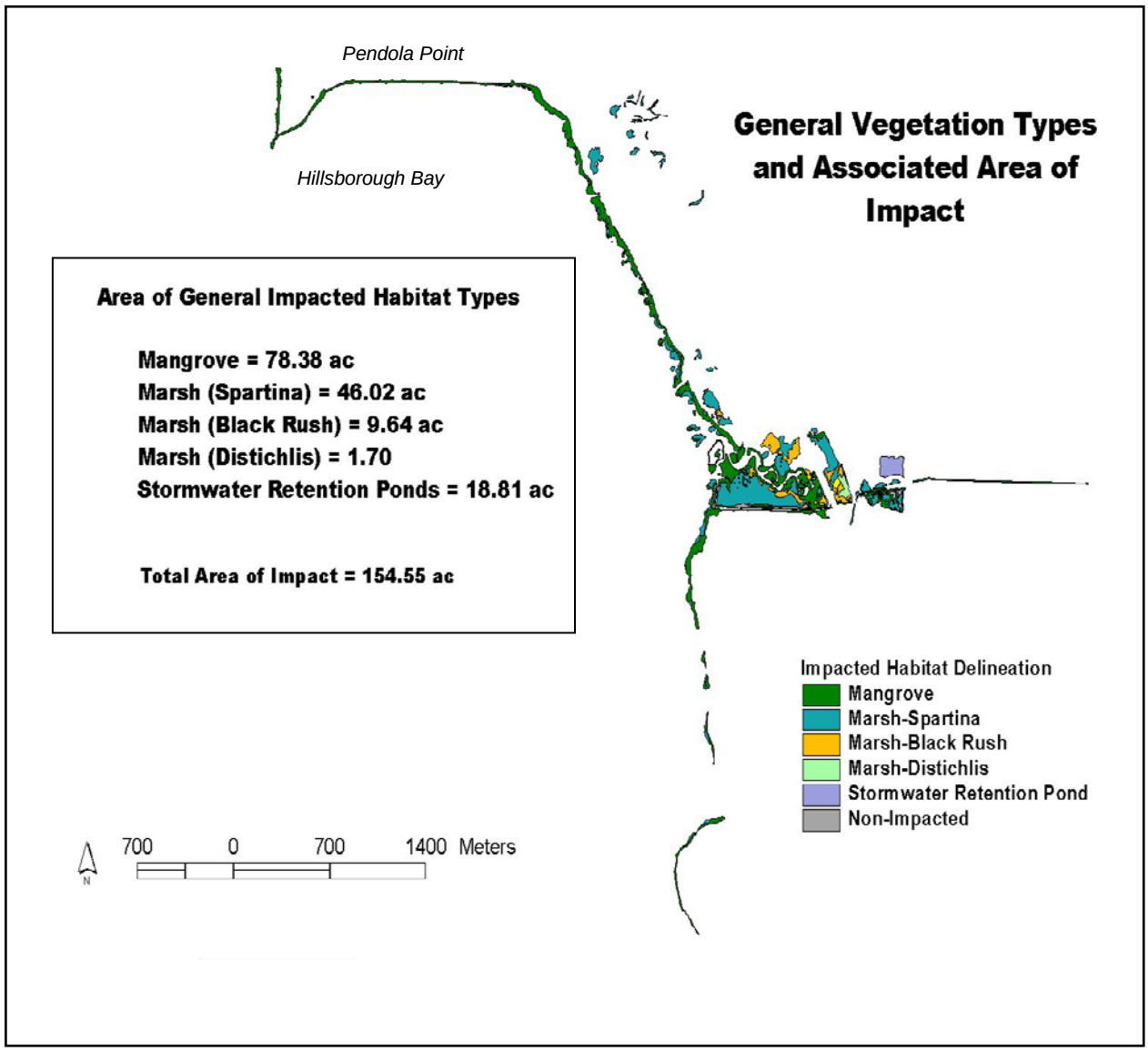


Figure 2. Impacted Vegetative Habitat Types and Distribution.

Table 1. Projected Recovery Time (years) for the 154.57 Acres of Varied Degree of Impacted Vegetative Habitats. (Data from PADR,2005)

Habitat Type	Projected Recovery Time	Affected Acres
Mangrove	<2 years	53.59
Mangrove	2-4 years	10.09
Mangrove	4-10 years	13.70
Mangrove	> 10 years	1.02
Total Mangrove		**78.40**
Spartina Marsh	<2 years	9.11
Spartina Marsh	2-3 years	33.18
Spartina Marsh	3-4 years	3.73
Total Spartina Marsh		46.02
Black Rush Marsh	<2 years	6.88
Black Rush Marsh	2-4 years	2.76
Black Rush Marsh Sum		9.64
Distichlis Marsh	2-3 years	1.7
Total Marsh		**57.36**

Total mangrove and marsh impacts equal 135.76 acres with an additional 18.81 acres of stormwater retention pond (total impacts 154.57 acres).

Figure 3. Damaged mangrove and tidal marsh south side of South Archie Creek Canal and east of Old Hwy 41 in "Severe Impact Area". Photo taken September 13, 2004.

Figure 4. Damaged mangrove and tidal marsh north side of South Archie Creek Canal and east of US 41 in "Severe Impact Area". Photo taken April 19, 2007.

3.1.3 Seagrass meadows

(1) Overview of Assessment Activities and Findings

Two species of seagrass are known to be present in Hillsborough Bay, shoal grass (*Halodule wrightii*), and widgeongrass (*Ruppia maritima*). Assessing the seagrass injury resulting from the Discharge required an estimate of the acreage and condition of seagrass before and after the Discharge. While local Tampa Bay groups, such as the City of Tampa Bay Studies Group (COTBSG) and Tampa Bay Interagency Seagrass Monitoring Program (TBISP), have done significant work to monitor and evaluate seagrass health and distribution, the monitoring has not been carried out with the intent of quantifying the exact acreage and density of every seagrass bed in Hillsborough Bay. Given the specific challenges of monitoring seagrass beds and their likely rapid response to low pH from the discharge, it is impossible to know precisely the pre-Discharge extent of the seagrass meadows. For this reason, the Working Group used a combination of photo-interpretation and field evaluation to estimate pre-Discharge seagrass bed extent and density.

True color and color infra-red aerial photographs were taken of South Canal and the impacted areas in Hillsborough Bay periodically from September 8, 2004 until November 11, 2004. Initial photographs were used to assist with estimates of pre-Discharge extent of seagrass meadows and as an aid in selecting appropriate sites for on-the-ground data collection (such as transects, quadrats and seagrass bed circumference measurements). Subsequent photographs were used to assess the extent and degree of seagrass meadow coverage.

Field surveys of the coastline were undertaken at low tide to identify the circumference of seagrass meadows. DGPS (Garmin GPS Map 76) was used to record points with obvious seagrass vegetation. In addition, hand trowels were used to spot-check other areas for the existence of rhizomes. If rhizomes were found without above-ground leaves the location was recorded on the DGPS and designated as part of the pre-Discharge extent of seagrass meadows. The points were overlain on Southwest Florida Water Management District 2004 rectified photography. The circumference and area of seagrass meadows were estimated by constructing polygons around individual seagrass meadows based on DGPS points, field observations and professional judgment.

The pre-Discharge density of individual seagrass meadows were also characterized in terms of “continuous and sparse” using Florida FLUCCS code definitions (Florida Department of Transportation 1999). Continuous meadows are defined as evenly distributed vegetation or rhizomes within a given area or greater than 25% cover. Sparse meadows are defined as areas with less evenly distributed vegetation or rhizomes with large patches of bare sand bottom or less than 25% cover. Thirty quadrat samples were used to assess the seagrass cover.

To evaluate post-Discharge conditions, two methods of field inspections (transect monitoring and haphazard quadrat sampling) were used to estimate the acreage and percent cover of meadows through time. The transect procedure involved setting a linear transect starting at the shoreline and extending out perpendicularly from the shore across existing seagrass meadows. A one square meter quadrat was used at either 25 m or 10 m intervals along each transect, and seagrass abundance was estimated using the Braun-Blanquet methodology. General observations were recorded, including water depth and short shoot density (short shoots per 100 cm^2), and the condition of the meadow. These data were used to assist in the estimate of seagrass stress or mortality. A separate quadrat sampling protocol was used to determine the extent and degree of injured seagrass, as well as potential recovery through time. Density of above-ground seagrass was recorded from ten haphazardly placed quadrats at each sampling site. Sites were sampled through April, 2005 to provide a comparison through time.

(2) Injury Determination

Post-Discharge monitoring and general field observations indicate that 24.44 acres of seagrass meadow likely existed along the shoreline before the Discharge. Of those, 21.57 acres were located and showed signs of stress and 2.87 acres were not visible (*i.e.*, leaves or rhizomes could not be identified during post-Discharge surveys). The results of these surveys are further documented in LES Tech report Supplement Number 1, March 2006.

3.1.4 Fishery Resources (Fish and Crustaceans)

(1) Overview of Assessment Activities and Findings

Shoreline surveys were performed to provide an estimate of the number of dead organisms in the affected area. Survey sampling locations were 100 yards long and ten feet from the shoreline and followed the American Fisheries Society Sourcebook for Investigation and Valuation of Fish Kills (AFS 1993). In addition to counts of organisms along transects, dead organisms found on the beach and in the marsh perpendicular to the transect locations were also quantified by direct counts. Fish counts by species and size class were recorded for both transect and direct counts. Surveys were conducted from Pendola Point to Archie Creek on September 8, 2004 and from Archie Creek to south of the Alafia River on September 9, 2004.

Fish and macroinvertebrate sampling was performed by Mote Marine Laboratory on September 8 and 9, 2004 by using a standard 20 foot otter trawl with a 3.8 centimeter (1.5 inch) mesh net. The trawl mouth was approximately 12.5 feet across the bottom, 9.5 feet across the top and 18 inches high, resulting in a net opening area of five square meters. Trawl sites were randomly selected in areas of known exposure, areas with no known exposure, and potentially exposed areas based on preliminary data and observations regarding the extent of injury. Mote Marine Laboratory performed 20 ten-minute trawls north and south of the Alafia River. Five trawls were conducted in shallow water and five trawls in deep water both north and south of the Alafia River.

Nineteen five-minute trawls were performed north of the Alafia River and South of Pendola Point by Florida Fish and Wildlife Commission (FWC) using a standard 20 foot otter trawl. Each trawl sample consisted of the biomass collected during five minutes at 1.2 knots (0.1 nautical miles). All species of fish and select macroinvertebrates were identified for each sample. Each specimen was identified to the species or species-complex level, measured, and counted.

Surveys of actively fishing crab traps surveys near the Discharge site were conducted on September 7, 8 and 9, 2004. The trap identifier information was recorded and traps were inspected for live and dead organisms by species to provide evidence regarding the extent of acute toxicity to organisms in the traps at the time of the survey. GPS positions of over 110 crab traps in Hillsborough Bay were recorded. The precise date and time of the placement individual crab traps, relative to the Discharge, was not determined.

(2) Injury Determination

All species captured by trawl were identified. Fish and elasmobranchs commonly captured included silverside (*Menidia menidia*), sand trout (*Cynoscion arenarius*), spadefish (*Chaetodipterus faber)*, blue gill (*Lipomus spp.*), scaled sardine (*Harengula jaguana),* mojarra (*Eucinostomus spp.*), stingray (Dasyatidae), croaker (*Micropogonias spp.*), menhaden (*Brevoortia tyrannus*), sea robin (*Prinotus spp.*), hog choaker (*Trinectes maculatus*), and white grunt (*Haemulon plumieri)*. Crustaceans and other invertebrates captured include brown shrimp (*Farfantepenaeus aztecus),* pinkspotted shrimp *(Farfantepenaeus braziliensis)*, pink shrimp *(Farfantepenaeus duorarum),* white shrimp *(Litopenaeus setiferus),* roughneck shrimp *(Rimapenaeus constrictus),* blue crab (*Callinectes sapidus),* lesser blue crab *(Callinectes similes),* stone crab *(Menippe spp.),* horseshoe crab (*Limulus polyphemus),* and the cannonball jelly *(Stomolophus meleagris)*.

The total species, organisms, and biomass for each trawl performed by Mote Marine Laboratory were normalized to the length of the trawl (*i.e.*, species per kilometer, *etc*.). No significant differences were found between assumed impact and non-impact (reference) areas or between impact areas and historical data. (Please refer to the PADR for actual data.)

Shoreline survey data from sampled transects were extrapolated to overall estimates of dead marine organisms using American Fisheries Guidelines (American Fisheries Society 1993). The estimated numbers of dead fish along the shoreline was 7,387 and represent a portion of the total kill. Crab trap data collected by NOAA September 7-9, 2004, found 523 blue crabs in 117 traps examined in the vicinity of the discharge. Of these, 367 (70.2%) were dead, and 156 (29.8%) were live. Seven of the traps examined were empty, ten had a mixture of live and dead crabs, 31 had only live crabs and 69 had only dead crabs. Additionally, 4 dead stone crabs, ten dead horseshoe crabs, twenty-five dead snails, and 20 additional fish were found dead in the traps.

Estimates of total biomass loss and fish and invertebrate injuries are difficult to determine for a number of reasons, including: 1) The severe weather associated with the

Discharge did not allow sampling to occur until three days following the incident. Small fish and invertebrates can rapidly decay and/or be scavenged during that time; 2) The tropical weather event resulted in a surge of tidal waters into the mangroves and marshes. Tidal flooding carried the low pH water from the Discharge into the marshes and likely resulted in the broad distribution of dead organisms throughout the marsh system, rather than accumulation along the shoreline, and therefore those animals would be largely unaccounted for with the given sampling methods; and 3) It is possible that changes in barometric pressure and a decrease in salinities associated with Hurricane Frances could trigger some fish species to seek deeper water for shelter, thereby altering the typical fish assemblages (Greenwood *et al*. 2006).

3.1.5 Surface Water

(1) Overview of Assessment Activities and Findings

Water column pH and salinity were measured at ten sites near the Discharge site from September 6 to September 27, 2004. Water column pH was measured by State agencies throughout Hillsborough Bay from September 6 to September 29, 2004. Mosaic also maintains stream flow monitoring stations, on Archie Creek North and on Archie Creek South, each near Highway 41. Each station records pH continuously. The stream flow gauge failed in South Archie Creek Canal on September 9, 2004.

(2) Injury Determination

Water quality was affected by acidity and other components of the Discharge. Surface water pH data from Hillsborough Bay on September 6, 2005 were interpolated to isobars of reduced pH in the Bay (Figure 5). Hillsborough Bay pH levels in the vicinity of the mouth of South Archie Creek Canal remained low for several days. FDEP observed pH values below State Water Quality Standards in South Archie Creek Canal through September 10, 2004.

Low pH in surface waters resulted in lethal and sub-lethal effects on biota. Injuries to mangroves, marshes, seagrasses, fish and macroinvertebrates were assessed. Low pH also likely resulted in a range of other water quality injuries including loss of phytoplankton and zooplankton, macro and micro algae and disruption of chemical processes. While not quantified, the Trustees considered these likely water quality injuries during restoration planning and expect that the restoration options will also address these injuries.

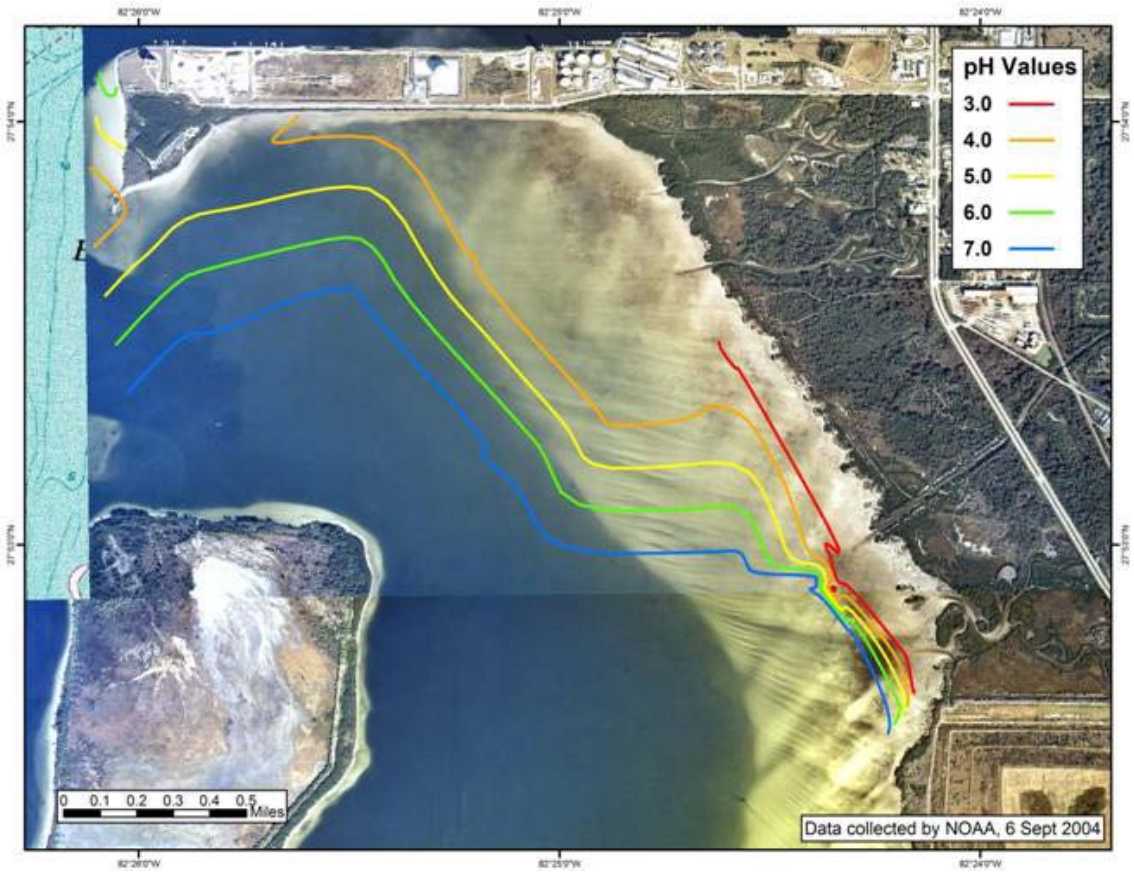


Figure 5. pH value interpretation presented as gradient contours.

4. Types of Restoration and Restoration Plan Alternatives

4.1 Types of Restoration

Federal liability frameworks for natural resource damages share a common objective – to provide for expeditious restoration, replacement, or acquisition of equivalent resources to compensate the public when injuries to natural resources result

from unlawful discharges of hazardous substances, pollutants or contaminants. Under these laws, the Trustees are responsible for determining the actions needed to meet this objective. The four alternative actions considered for the Discharge include the broad categories of *primary restoration*, *emergency restoration*, *compensatory restoration* and *no action*.

Primary Restoration includes those actions taken to return natural resources and services directly injured by the Discharge to the condition they would have been in if the Discharge had not occurred (sometimes referred to as the baseline conditions). Primary restoration may include natural recovery of injured resources.

Emergency Restoration is action considered necessary to reduce continuing natural resource injuries and to keep the injured area from further degradation. Emergency restoration is implemented as soon as possible after an injury event.

Compensatory restoration is action taken to compensate for the interim losses of natural resources and/or services before they recover to baseline conditions. Compensatory restoration can include restoration, rehabilitation, replacement, or acquisition of equivalent natural resources and/or services. The Trustees used a number of criteria to evaluate potential compensatory restoration projects including the following:

1. Relationship of the Restoration Action to the Type and Quality of Resources and/or Services Injured – This criterion considers the nature and extent to which a restoration action would address the natural resource injuries that occurred as a result of the event. It includes the extent to which the benefits of the action would be on-site, in-kind, or would be otherwise comparable in nature, scope, and location to injuries that occurred. Evaluation of each restoration action also considered the full range of potentially affected resource categories, even if no injury assessment was completed for that category. Specifically, projects that meet this criterion augment or create fish nursery habitat, create or enhance conditions for invertebrate growth and their availability as forage for fish and other animals, increase foraging opportunities for birds, and/or enhance water quality in the area.

2. Consistency with Community Objectives – This criterion considers the degree to which a given restoration action is consistent with current or future community objectives. Community objectives are discerned from larger ecosystem restoration plans and discussions with local resource managers. For example, the regional effort to remove exotic species is a current and future community objective.

3. Multiple Benefits – This criterion considers the extent to which a restoration action will address more than one natural resource injury or benefit other resources.

4. Technical Feasibility – This criterion considers both the likelihood that a given restoration action will succeed in a reasonable period of time and the availability of technical expertise, programs and contractors to implement the action. This criterion includes, but is not limited to, consideration of prior experience with methods or techniques proposed for use, availability of equipment and materials, site availability, and logistical difficulty.

5. Restoration Site Requirements - This criterion considers the extent to which the scientific, engineering or legal requirements of the restoration can be met by available sites.

6. Potential for Additional Natural Resource Injury – This criterion considers the risk that a action may aggravate or cause additional natural resource injuries.

7. Restoration is Self-sustaining – This criterion considers the degree to which a restoration will achieve and maintain success without human intervention.

8. Consistency with Applicable Laws and Policies – This criterion considers the extent to which a restoration is consistent with relevant State, Federal and County policies and would be implemented in accordance with State, Federal and County laws.

9. Potential Effects on Human Health and Safety – This criterion considers the potential adverse impacts a restoration may have to human health and safety.

10. Cost Effective – This criterion considers the costs of a restoration alternative to the benefits of that. Other factors being substantially equal, a less costly restoration approach is preferred.

No Action includes no direct restoration activities undertaken by the Trustees to restore injured resources or to compensate for lost resource services pending their ecological recovery. Only natural recovery occurs under this option. Interim losses are not compensated.

This DARP/EA identifies the restoration alternatives that address injuries to natural resources and their services as a result of the Discharge. In addition to natural recovery of the directly injured resources, three projects are proposed and/or completed to address the injuries identified above. The projects include one emergency restoration (project completed) and two compensatory restoration projects. All three projects include restoration and protection of mangrove forest, marsh enhancement and wetland creation and one of the projects incorporates oyster reef creation. In addition, conservation easements over 103.76 acres will be established for the future protection of two of the project sites

4.2 Restoration Plan Alternatives

4.2.1 Primary Restoration Alternative - Natural Recovery

The Trustees have determined that natural recovery is the most appropriate action to restore those resources and services that were directly injured by the Discharge. The Trustees did not identify any other primary restoration actions that would restore the natural resources and services in a more expeditious and robust manner than natural recovery, because the injured areas were surrounded by adequate seed sources and the Discharge did not change the elevations or substrate in ways that would prevent the injured areas from recovering naturally.

(1) Evaluation of Alternative

Injuries to the mangrove and marsh habitat were caused by exposure to the Discharge. The Trustees consider the mangroves and marsh vegetation recovered when they meet baseline conditions. While vegetation planting could be considered, natural recruitment was expected to re-vegetate the area, and recovery to baseline was expected to occur in 4 years or less for 121.02 acres of the 135.74 acres of injured saltwater habitat (89%). Monitoring of the habitat over the past 6 years has supported that assumption as marsh and mangrove habitat has actively recruited. The 14.72 acres of mangrove and marsh habitat with longer time periods to recovery have also recruited vegetation and will return to full function when the vegetation reaches baseline levels.

The seagrass meadow injuries were also caused by exposure to the Discharge. The Trustees consider the re-growth of seagrass meadow back to baseline levels an appropriate measure of recovery. However, establishment of a baseline for seagrass habitat is difficult given their natural temporal and spatial variability. Given the fact that 21.57 acres of the 24.44 acres (88%) injured showed signs of stress but still had intact rhizomes, the Trustees expected that natural recovery would occur for some portion of this habitat during the next growing season. For the 2.87 acres of seagrass habitat that was lost and the seagrass habitat that was stressed, the Trustees expect natural recovery to take place over several years. In this particular instance, natural recovery is preferred as a better alternative than active restoration since replanting entire seagrass meadows is inherently difficult and the restoration alternatives will account for the lost services from this impacted area.

The Trustees also propose that natural recovery is the best primary restoration alternative for fish and invertebrate injuries. Although the Discharge killed fish and invertebrates, it was difficult to establish with the necessary degree of certainty based on the numbers of fish and invertebrates collected from the impact and non impact areas or between the impact areas and historic survey data that the difference was significant. This data suggests that the fish and invertebrate populations in unimpacted waters surrounding the site of the Discharge were able to recolonize the area of the acute injury within a short time period. The Trustees were not able to establish a statistically significant difference in the composition of the fish and invertebrate communities, and no active primary restoration is warranted for this injury.

The injuries to phytoplankton, zooplankton, and micro- and macroalgae caused by low pH and compromised water quality appeared to be short-lived. The pH returned to baseline condition within several days and the affected natural resources and services likely returned to something similar to baseline with respect to pH shortly thereafter. No active primary restoration action is warranted for this injury.

4.2.2 Emergency Restoration Alternative - Wetland Enhancement through Removal of Exotic Invasive Vegetation

The Trustees authorized Mosaic to implement one emergency restoration project, which was considered necessary to reduce continuing natural resource injuries and to keep the injured area from further degradation due to invasive species colonization.

Trustees approved "Draft 5 Proposed Protocol for Exotic Plant Species Control, Monitoring and Reporting at the Cargill Site, Riverview, Florida" [December 13, 2004], which set forth a plan to remove exotic plants from 26.46 acres of land comprised of wetlands injured by the Discharge and adjacent uplands. These areas include North Parcel East B-2, 16.50 acres; North Parcel East B-3, 1.61 acres; and North Parcel West-C, 8.35 acres (Figure 6, Site 3 and Figure 10).

(2) Evaluation of Alternative

Within 30 days of the Discharge, Mosaic presented an emergency restoration plan to the Trustees to promptly prevent additional degradation of wetlands from invasive exotic species colonization. This plan identified 26.46 acres of mangrove and tidal marsh vegetation that had been killed by the Discharge and was surrounded by invasive and exotic species. The exotic plant community was primarily composed of Brazilian pepper, but included other species such as chinaberry (*Melia azedarach*), lead tree (*Leucaena leucocephala*), and air potato (*Dioscorea bulbifera*). Due to their tolerance of freezing events, rapid re-growth following injury, and lack of native insect predators, these species are aggressive invaders of disturbed habitats and have a competitive advantage over many native tidal marsh, mangrove forest, and transitional zone plants. The Trustees determined that invasion by the exotic vegetation into the wetland was likely to occur without emergency action. Such an invasion would result in an extended period of recovery for the wetland and could lead to the complete loss of the wetland habitat and resource services.

Removal of exotic vegetation began January 31, 2005 and was completed February 22, 2005. Regular maintenance of the area has prevented exotic plant invasion in the injured wetland and allowed for natural recolonization by native wetland species. The final monitoring report shows at 5.98 acres of restored wetland habitat through the Time Zero Plus 69 Months Monitoring Report, December 13, 2010.

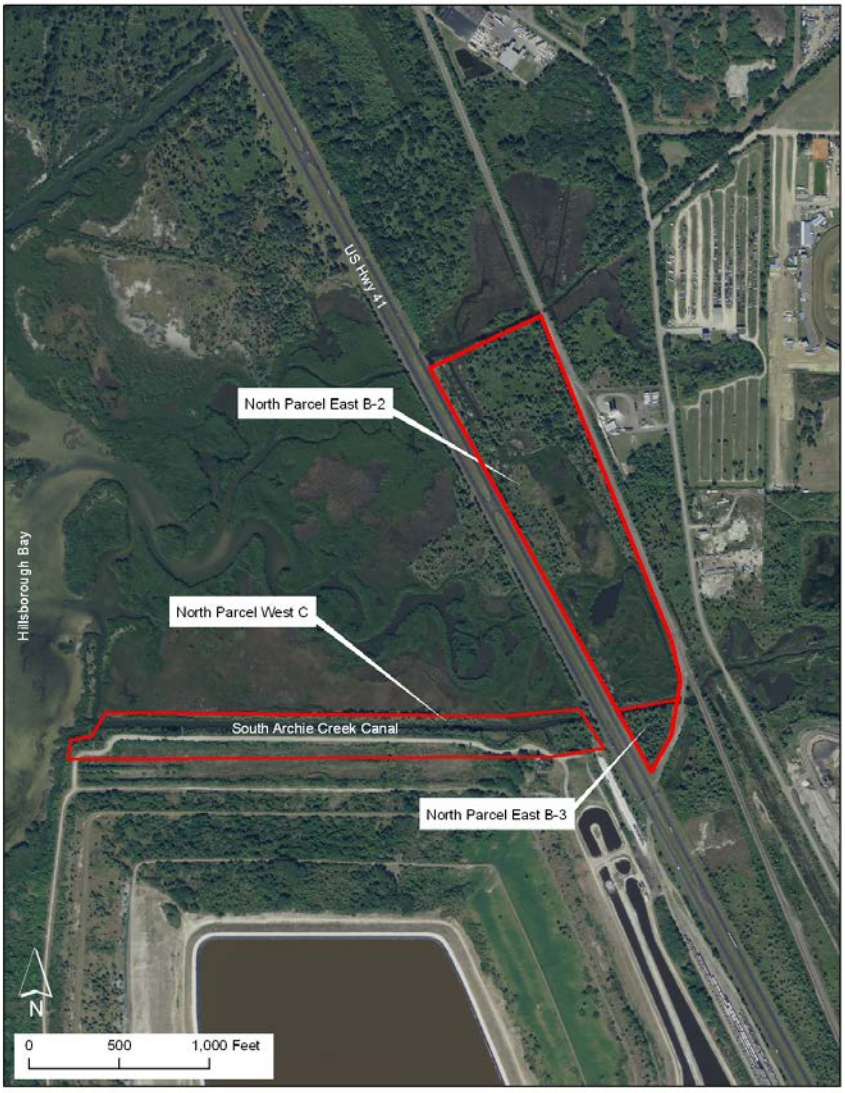


Figure 6. Location of Parcels included in the Emergency Primary Restoration.

(2) Relationship to Injury

The emergency restoration likely prevented further degradation of the affected mangrove and tidal marsh and alleviated the potential for complete loss of the resource had exotic species invaded and displaced the natural vegetation. The emergency restoration likely allowed for a more rapid return to baseline for the injured wetlands.

(3) Environmental and Socio-Economic Impact

Removing exotic vegetation and preventing their spread has environmental and socio-economic impacts. Brazilian pepper is a long-term invasive exotic species that

grows in areas between uplands and wetlands. The species spreads rapidly through dispersal of seeds by wind and fauna. Dense forests of Brazilian pepper will inhibit the growth of native plants and few native animals rely significantly on the plant for food, shelter, or nesting. Removal of Brazilian Pepper benefits the environment by allowing the re-colonization of native plant species. (Cuda, et al 2006.) Ultimately, re-establishing native habitat will support native fauna by providing shelter, nesting, and foraging habitat to which they are adapted.

Large-scale efforts are underway throughout the Tampa Bay area to control and remove many invasive plants. These activities are often undertaken with public funding in an effort to maintain public lands. Private industry also carries out exotic plant control and maintenance activities. Removal and maintenance of exotic plants is often a chronic task that requires expensive vigilance and man-power. The emergency removal not only eliminates the invasive plants but also eliminates an additional 26.46 acres of a potential seed source and lowers the amount of money needed to address the perennial problem.

4.2.2 Compensatory Restoration Alternative (Project 1 of 2) – Giants Camp Hydrologic Restoration with Mangrove Tidal Creek Creation/Enhancement and Oyster Habitat Creation (Site 1).

While natural recovery is the preferred alternative to restore those resources that were directly injured as a result of the Discharge, the Trustees have considered several alternative projects to compensate for the loss of resources and associated resource services until full recovery has occurred. The objective of these compensatory restoration projects is to compensate for injuries to mangrove tidal marshes, seagrass, fish, macroinvertebrates, and surface waters.

Location

Two projects are the Compensatory Restoration Alternative projects. The first project (Site 1) is the Giant's Camp Hydrologic Restoration with Tidal Creek Creation/Enhancement and Oyster Reef Creation Project. The second restoration project is the Borrow Pit Wetland Creation and Enhancement (Site 2). The location of Site 1 is southwest of the Highway 41 Bridge adjacent to the Alafia River. The Borrow Pit Wetland Creation and Enhancement project (Site 2) is located east of Highway 41 North just north of the Riverview facility (Figure 7).

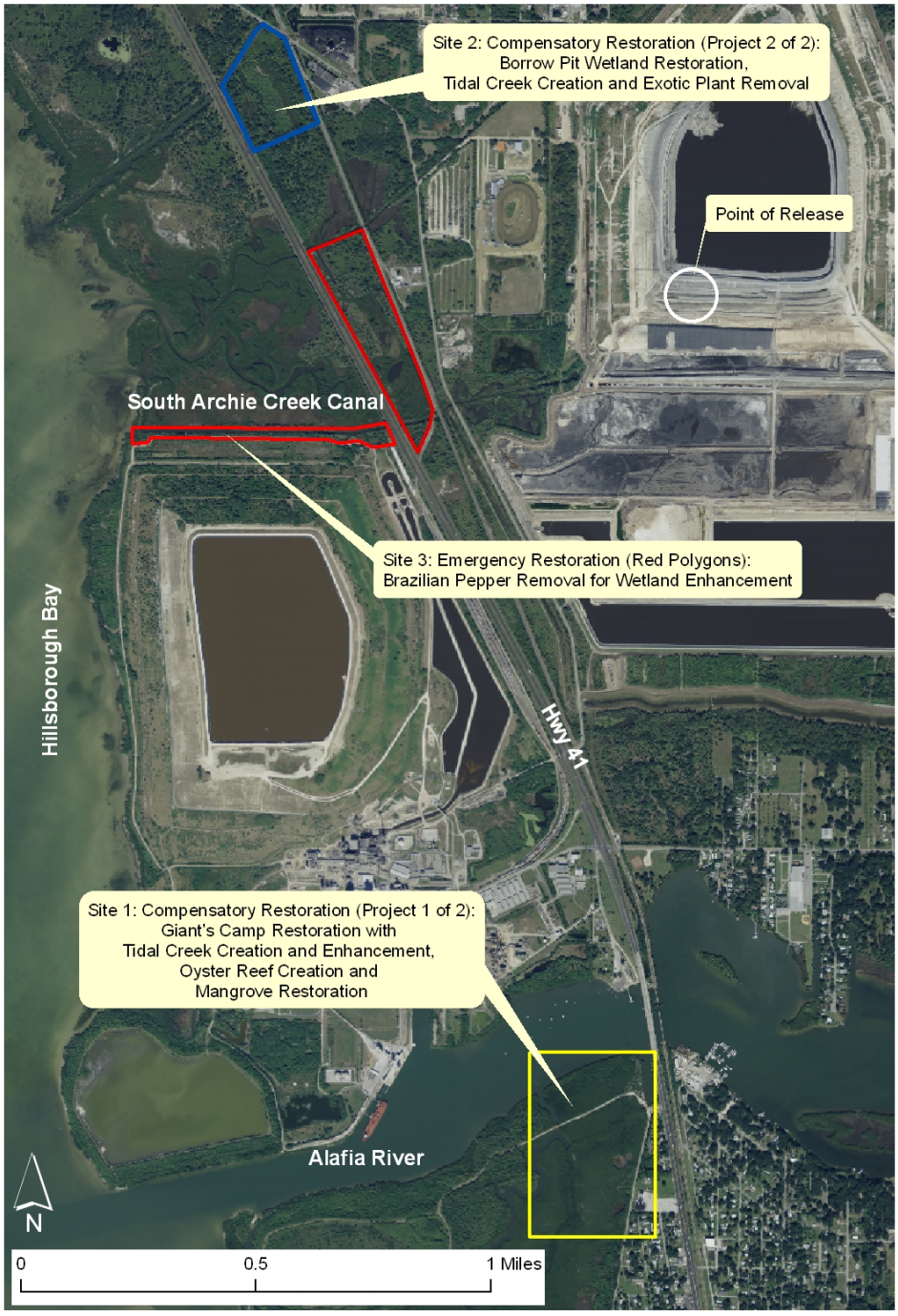


Figure 7. Locations of the Two Chosen Restoration Sites - Giant's Camp Hydrologic Restoration with Mangrove Tidal Creek Creation/Enhancement and Oyster Habitat Creation, and Borrow Pit Wetland Creation and Enhancement.

A. **The Giant's Camp Hydrologic Restoration with Tidal Creek Creation/Enhancement and Oyster Reef Creation Project** (Site 1).

The goal of this project is to restore and enhance mangrove habitat and associated natural resource services by improving hydrology. Pockets of the mangrove forest show signs of both stress and die-off, possibly due to a reduced tidal prism. Gradual closure of the tidal creeks can cause impounded conditions affecting mangroves. Analysis of historical photography shows that the areas of die-off have only developed since the early 1990's.

Restoration of the site will improve the hydrological regime that provides adequate tidal prism in an attempt to stop the decline of the mangrove forest and to provide additional nursery and forage habitat for local fish species. Hydrodynamic modeling indicates that creating a tidal channel between the marina basin and the mangrove forest and re-establishing the historic channels will result in an increase in flow through the system. Routine flooding of the mangrove forest should provide forage fish species greater access to habitat and ultimately should increase fish production in the area. The pond located near the eastern edge of the mangrove forest will be connected to the created/restored tidal creeks to provide habitat for both resident and transient fish species, and to provide additional nursery habitat for fish and invertebrate species of importance to local fishing interests (*e.g,*. common snook, red drum, spotted seatrout, striped mullet, blue crab, and pink shrimp).

The project includes the following actions:

1. Connecting the Giant's Camp marina basin to the tidal creek labeled as Flow Way #5 (Figure 8). This construction will span approximately 1,020 linear feet, and construction is divided into two parts as follows:

    a. First, a portion of seawall at the southwest corner of the marina will be removed and 270' of new tidal creek will be created. The new tidal creek will extend to an existing remnant tidal creek as described in part b (below). A small bridge or large culvert will be placed over the breach in the seawall to maintain road access to the education facility located on site.

    b. Second, 750 linear feet of existing remnant tidal creek will be widened and deepened to allow for hydrologic flow from the 270' marina tidal creek into existing Flow Way #5. The cross section of the remnant tidal creek will be modified to match the width and depth of the new 270' marina tidal creek. (Figure 8).

2. Reopening approximately 1,517 linear feet of additional remnant tidal creeks through mangrove habitat which is largely closed to tidal flows.

3. Widening and removing 1,900 cubic yards of spoil to eliminate blockages to sheet flow. The spoil removal spans 234 linear feet adjacent to tidal creeks in the mangroves (Figure 8).

4. Improving the hydroperiod in an impounded 0.56 acre tidal pond by enhancing tidal creek connection. (Figure 8).

5. Enhancing oyster habitat through the placement of rip rap along a portion of the existing boat basin seawall. Placement of rip rap will provide approximately 3,652 square feet of surface area along the shoreline of the marina basin and will be available for oyster recruitment.

6. Removal and relocation of live oyster clusters from the footprint of the rip rap placement described above in Action 5. to a 2000 square foot created oyster habitat alongside the Channel B area.

7. Cleaning approximately 500 linear feet of an existing tidal creek to remove debris and vegetation.

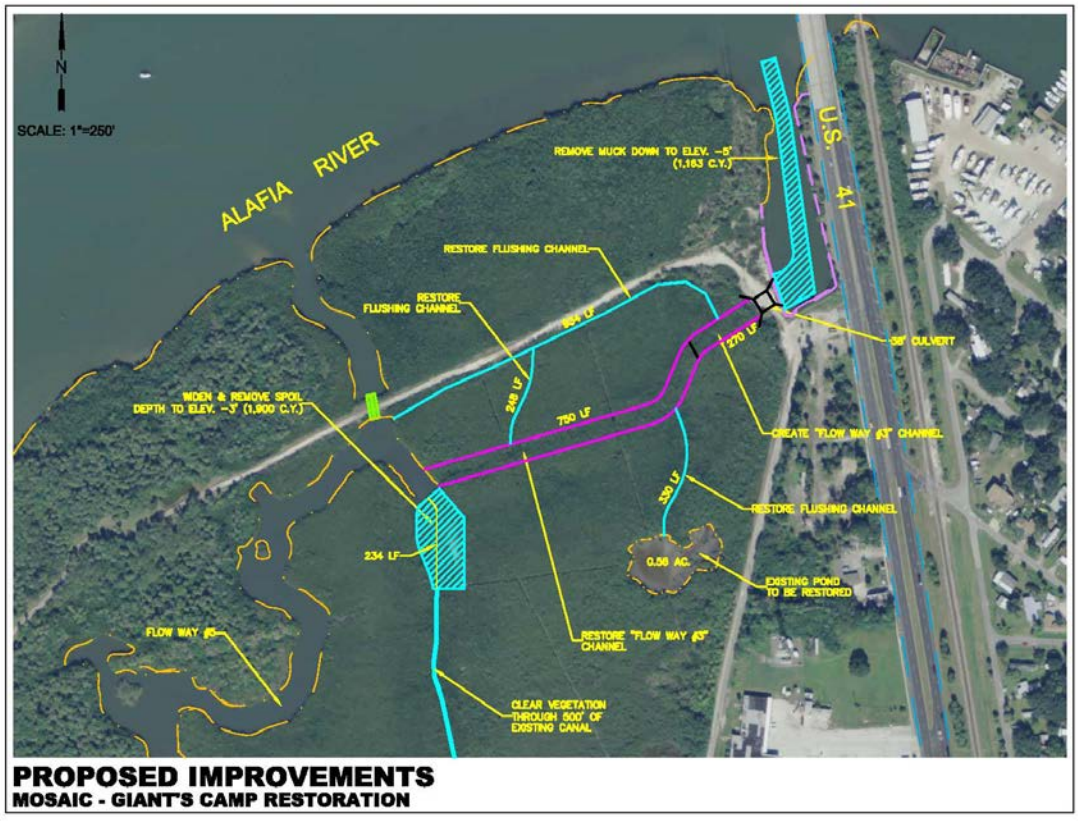


Figure 8. The Giant's Camp Hydrologic Restoration with Tidal Creek Creation/Enhancement and Oyster Reef Creation Project Restoration Plan.

(1) Evaluation of Alternative

Improved hydrology will likely benefit the mangrove and tidal marsh habitat by relieving impounded conditions and allowing for more frequent and extensive flooding throughout the system. Prior to its realignment, the mouth of the Alafia River took a southern turn through this mangrove system. Currently, flow from the Alafia is restricted to the western portion of the area. Breaching the seawall in the marina will allow for river water from the northeast to continually flow through a larger portion of the mangrove habitat. In addition, the widening and deepening of tidal creeks is expected to allow for tidal waters from the southwest to flow more freely into the system. The improved hydrology should be adequate to maintain the tidal channels, allow for improved hydroperiod, and enhance mangrove and tidal marsh productivity.

Fish and macroinvertebrates will use the area more often due to the increased frequency and extent of flooding. Resident species may reproduce and feed year-round in sub-tropical mangrove ecosystems, but vary significantly in their utilization of mangrove forest microhabitats based on seasonal and daily changes in forest inundation. For example, the common mangrove and saltern species, the sheepshead minnow (*Cyprinodon variegatus*), breeds in open areas within the basin mangrove forest, feeds on cyanobacterial mats during seasonal high water periods, and retreats to mangrove fringed tidal creeks and adjacent seagrass meadows during low water periods. Transient fish species move between the Alafia River and Tampa Bay and the adjacent wetlands (Whitman and Gilmore. 1991).

Improvements to water quality are also likely to result from implementation of this project. A portion of Alafia River water will flow through the wetland system prior to entering Hillsborough and Tampa Bay. The river water will be exposed to wetland processes which can include the removal of nutrients and the settling of suspended sediments. Similar improvements to water quality are also likely to result from improvements to sheet flow as a result of spoil bank removal.

While not directly beneficial to seagrass habitat, improvements to water quality are known to have indirect benefits on seagrass. Removal of excess nutrients benefits seagrass by decreasing the proliferation of epiphytes, phytoplankton and algae that can smother seagrass habitat and block light penetration. Similarly, decreased turbidity benefits seagrass by improving light penetration which is critical to photosynthesis.

Hydrologic restoration projects are common in the Tampa Bay watershed and have been largely supported by resource managers and restoration practitioners. A similar project, which also involved deepening and widening tidal channels, was completed about 20 years ago on the same property. The enhanced tidal channels allow for tidal waters to flow through the system on a strong high tide and for river water to flow through following high rainfall in the watershed. Based upon the completion and success of the previous project, the Trustees have confidence in the technical feasibility

of the project and in the potential for the project site to become self-sustaining following implementation.

Feasibility of project implementation is also ensured since Mosaic is the sole owner of the property above mean sea-level. Property ownership reduces the need to identify and acquire a parcel of land for restoration project implementation. Given the fact that large portions of the Tampa Bay coastline are developed with low likelihood for restoration, privately owned with high purchase prices, or publicly owned with restoration already underway, identification of alternative sites for project implementation was challenging.

Oyster reef creation is an integral component of ongoing restoration efforts in Tampa Bay, providing habitat for aquatic fauna, improving water quality and enhancing recreational opportunities. Oyster reefs provide three-dimensional habitat for both shelter and foraging for crabs, shrimp and fish. Ultimately, the introduction of additional habitat will likely enhance overall fisheries production in the area.

Current conditions at Giant's Camp support only minimal oyster colonization, primarily attached to vertical concrete seawalls. This is likely due to accumulation of soft sediments and the lack of appropriate substrate for colonization in the open waters of the abandoned boat basin. The removal of accumulated sediment and creation of flow to the adjacent mangrove forest, though the hydrologic restoration, will result in improved conditions for oysters by improving water quality and the flow of food through the boat basin

The Giant's Fish Camp Oyster Reef Creation portion of the project entails placing substrate suitable for oyster larvae settlement (cultch) along the seawalls of the marina boat basin. Live oyster clusters currently within the footprint of the creation portion of the project will be removed and transplanted within a 2000 square foot oyster reef habitat within Channel B. This area is referred to as "Structure C' in the restoration plan. This oyster platform with serve as an additional oyster creation restoration area to prevent the destruction of live oyster within the rip rap site and to allow for no net loss of oyster from construction activities.

For the portion of oyster reef creation within the Giants Camp Basin (Structures "A" and "B"), in areas where the seawall can be removed, oyster reef may be placed along the sloping shoreline. Placement of artificial oyster reef base materials, whether limestone, mined or recycled fossil shell, in appropriate locations will facilitate the colonization of sessile organisms such as American oysters (*Crassostrea virginica)* and barnacles and result in the creation of oyster reef habitat. The placement of cultch material will "soften" the vertical seawall and create a greater surface area for attachment of sessile invertebrates. The cracks and crevices created by the natural hardening on the created oyster reef attract and promote production of invertebrates such as crabs and shrimp. Placement of limestone or concrete rip rap extending 5.5 to 6 m out from the seawall, will provide approximately 3,652 square feet of surface area for oyster colonization. Sources of larvae include natural sources at Showman's Island upstream on the Alafia River, and at the Williams Park Marina, directly across the river from the

Giant's Camp boat basin. Fish species including red drum, common snook, mullet, and sheepshead will utilize the reefs for shelter during juvenile stages and return in adulthood to search for prey. Eventually some of the high edges of these reefs, at or just above the hide tide mark, are expected to be naturally colonized by mangroves (Figure 9). As part this portion of the restoration, accumulated sediments in the marina will be removed providing a more stable substrate for cultch placement.

Figure 9. Oyster Reef Creation at Giants Camp.

(2) Relationship to Injury

The Giant's Camp Hydrologic Restoration with Tidal Creek Creation/Enhancement and Oyster Reef Creation Project will compensate for several of the injuries caused by the Discharge including injuries to the mangrove and marsh habitat, fish and invertebrates, and water quality. Seagrass habitat benefits indirectly from improved water quality. Avifauna should benefit from increased numbers of fish and macroinvertebrates.

Oyster reef creation will provide new habitat that supports the invertebrate and fish species impacted by the Discharge. The location of the oyster reef will be within the shallow estuarine environment and will provide additional habitat and diversity to the ecosystem. Species expected to use the reefs include oysters, barnacles, pink shrimp, white shrimp, blue crab, lesser blue crab, stone crab, and fish species, such as sheepshead, common snook, and juvenile goliath grouper.

The filtering capacity of oysters also provides benefits to water quality. Given the small size of these reefs, this effect is expected to be minimal; however, it should contribute to improved water quality within the boundaries of the marina basin.

Creation of oyster reef habitat is also expected to benefit avifaunal species that may have been impacted by the reduced food availability in surrounding waters as a result of the Discharge. Some shorebirds rely on oyster habitat for foraging.

(3) Environmental and Socio-Economic Impact

Prior to removing a portion of the marina seawall to allow for river water to flow through the marina into the wetland system, accumulated sediments within the marina will likely require removal. The sediments will be analyzed to determine if contamination is present and to determine the appropriate methods for handling and disposal. Contaminated sediments will be properly removed and disposed of to ensure that no contaminated sediments are washed into the surrounding estuarine marshes once the marina is reconnected to the mangrove system.

The majority of the restoration site is dominated by wetland vegetation, including mangrove forests, needlerush and salt flats (which include cyanobacterial mats). The restoration work is expected to enhance fish use of higher elevation ephemeral ponds and salt flats, as well as to increase fish migration through tertiary and secondary channels and tributaries. However, in order to create and restore the tidal creeks necessary to allow fish access and improve impounded wetland conditions, approximately 1.94 acres of mangroves will be removed (Figure 9). The removal of these mangroves is necessary to establish adequate tidal creek widths that will remain open over a long period of time. Restoration of the smaller adjacent tidal creeks will result in approximately 0.11 acres of mangrove removal. Removal of spoil and widening the southern connection will result in approximately 0.50 acres of mangrove removal (Figure 9). The hydrologic restoration will create some negative environmental impacts when the mangroves are removed. These negative impacts will be offset by the improvements in flow that will improve the

health of the remaining mangroves and enhance the entire area and the compensatory project described herein.

The projected environmental benefits to creating and restoring the tidal creek connections include an increase of fish habitat, increase of resident fish production, and an increase of wetland biological productivity transfer to the adjacent riverine and estuarine ecosystems through flows, fish migration, and food webs. An increase in fish production may benefit local fishermen. Additional benefits include the provision of long term shoreline protection from storm events and sea level rise due to the enhanced health of the mangrove ecosystem and improvements to water quality through enhanced treatment of riverine waters as they flow through the wetland.

The mangrove restoration project and it subsequent monitoring data also provides socio-economic benefits, as well as educational opportunities for local students. The Fiddler's Cove Education Center, located on the property just west of the project site, helps to educate local elementary school students about the importance of coastal habitats. Classes are held each spring and fall at the Center. Options for integrating additional educational aspects to the program include expanding the students' knowledge of the importance of seagrass, mangrove, and tidal creek habitats, and the Tampa Bay ecosystem as a whole. This can be achieved through on-site visits and catching and tracking fish tagged in the study as well utilizing the mangrove and oyster restorations as study tools to engage students in the value and importance of coastal marine habitats. The specific curriculum will be determined by coordination between Mosaic's educational department and local schools.

Creation of oyster reef habitat adjacent to tidal wetlands provides an important alternative nursery and foraging area for estuarine fishes. Provision of habitat has direct socio-economic benefits as it enhances fishery populations with resultant impacts on commercial and recreational fishing. Given the small size of the reefs, this effect is expected to be minimal; however, the surrounding area is heavily frequented by recreational fishermen who may realize the benefit of increased fishery habitat. Over time, colonization of bivalve species will aid in filtering water, contributing to the overall improvement to water quality.

Another important outcome of this project will be the improved habitat functionality within the Giant's Fish Camp Marina. Currently, this area does not provide habitat value nor is it aesthetically pleasing, given the sedimentation in the marina and the failing seawalls. Removal of the accumulated sediment, introduction of limestone rip rap and creation of fishery habitat will improve the habitat functionality and aesthetic qualities of this publically visible project site.

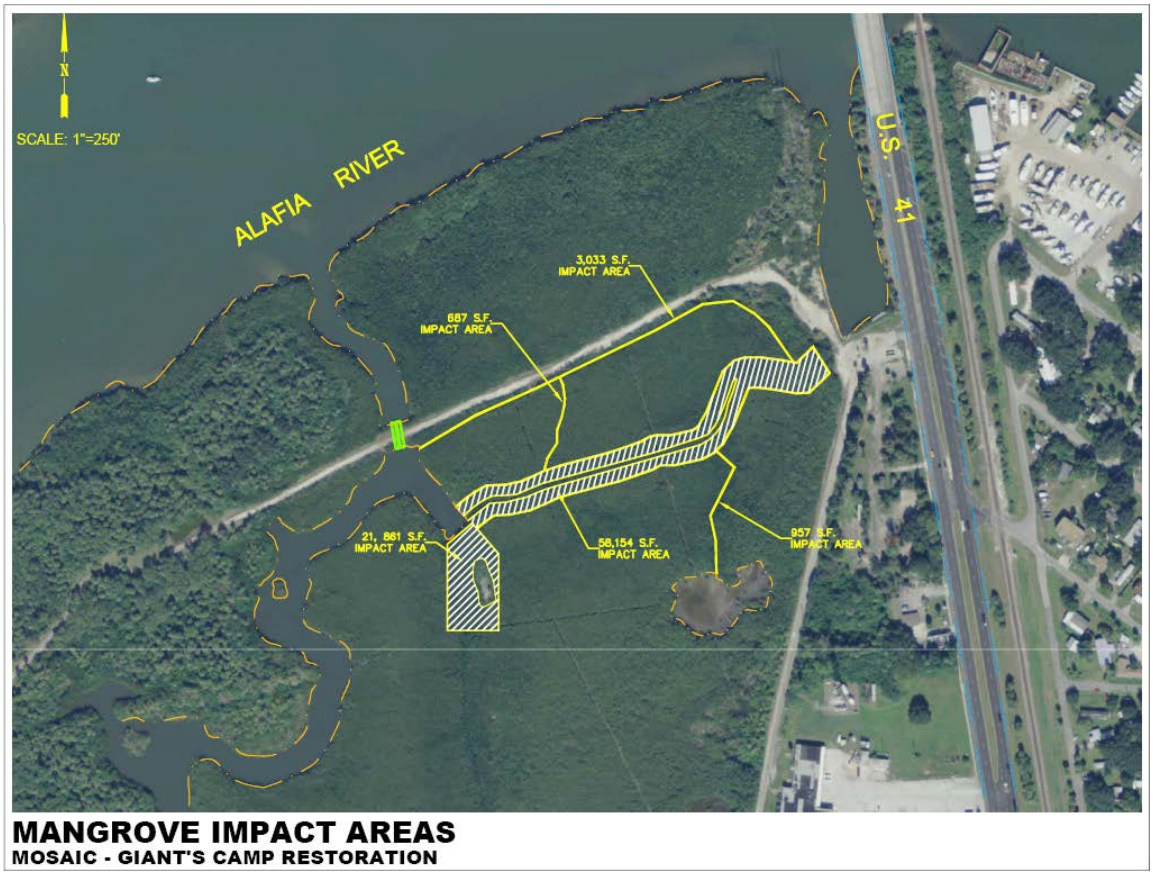


Figure 10. Areas of Mangrove Removal Necessary to Create and Restore the Tidal Creek System.

B. Compensatory Restoration Alternative (Project 2 of 2) - Borrow Pit Wetland Creation and Enhancement Project (Site 2)

The Borrow Pit Hydrological Restoration and Wetland Enhancement Project (Borrow Pit Project) is located between Old Highway 41 and Highway 41 North within a Mosaic-owned parcel (Figure 8, Site 2). Historically, a portion of the parcel was used as a source of fill material for construction of the highway and railroad. This alteration of the land resulted in a "borrow pit" feature which subsequently developed into a combination of mangrove and saltern habitats. The remaining portion of the parcel has been periodically altered by ditching, excavation, or filling, and is presently comprised of uplands and wetlands dominated by Brazilian pepper. A narrow ditch on the north end of the parcel connects the site to the Delaney Creek Pop-Off Canal which runs directly into Hillsborough Bay, over a distance of approximately 0.5 miles.

The objective of this project is to improve habitat functionality through creation of a tidal creek (approximately 900 feet) and pond (approximately one acre) that will be connected to Delaney Creek Pop-Off Canal. The mouth of the ditch that currently connects the site to Delaney Creek Pop-Off Canal will be widened and extended into a newly created tidal creek. The creek will flow into a tidal pond that will remain partially

wet during all but the lowest tides of the year (Figure 11). Removal of invasive vegetation will allow for colonization by native wetland vegetation at low and high marsh elevations. A saltern will also be created adjacent to the wetland to provide additional habitat diversity; wetland enhancement will comprise 4 acres.

(1) Evaluation of Alternatives

Given the restricted tidal flow, the existing condition of the site provides limited habitat value to fish and macroinvertebrate species. The exotic species present throughout the transitional wetland also provide limited habitat functionality.

Currently, the opening between the ditch and Delaney Creek Pop-Off Canal is too narrow to sustain a long term tidal connection to the site. Mangroves have grown across the opening and will likely cause a blockage in the connection over time. Widening the opening and constructing a tidal creek connecting to the wetland pond will create a sustainable tidal prism to keep the connection open. The pond is expected to provide habitat for fish and macroinvertebrates and serve as a refuge for small forage fish during low tide. Removal and control of exotic species within the wetland boundary will allow for native wetland plant colonization and provide additional foraging habitat for local wildlife. Creation of the saltern will provide additional habitat complexity. Several restoration projects of similar design have been successfully implemented in the Tampa Bay watershed.

Removal and control of invasive exotic vegetation is a priority for resource managers in the Tampa Bay area. Exotic removal will follow the procedures used for the emergency restoration. Brazilian pepper will be mechanically removed and stumps sprayed with an EPA approved wetland herbicide (Garlon 4) to terminate re-growth. Subsequent herbicide treatments and hand pulling of seedlings over time will prevent re-colonization of exotic species and will allow the natural colonization of native species to dominate (Figure 6). Exotic vegetation maintenance will be required until such time as native vegetation have completely re-colonized the site. Based upon past experience, exotic vegetation control will likely be required for five years. At that point, the site is expected to be self-sustaining.

The location of the project site on Mosaic-owned property increases the cost effectiveness and likelihood of success of project implementation. As previously described, land available for restoration in Tampa Bay is limited and when available, is typically expensive to acquire.

(2) Relationship to Injury

The Borrow Pit Project serves as compensatory restoration for injuries to fish. macroinvertebrates, mangroves, and tidal marsh. The improved connectivity of the wetland to the Canal will allow for improved fish access to the wetland. Creation of the tidal creek and pond will provide a refuge for fish and macroinvertebrates during low tide. Exotic vegetation removal and control will enhance the wetland area by allowing re-colonization of native wetland species such as those injured in the Discharge. The

new wetland and saltern area will also provide foraging area for avifauna species that may have experienced decreased prey availability as a result of the Discharge.

(3) Environmental and Socio-Economic Impact

The Borrow Pit project will have positive socio-economic benefits related to the creation of estuarine wetland habitat and removal of invasive exotic vegetation. Enhancement of marsh habitat and creation of additional fisheries habitat will facilitate overall fish production for Tampa Bay. Tidal creek habitats, like those created by this project, often specifically benefit popular sport fish species such as redfish and snook, which may benefit recreational fishing activities.

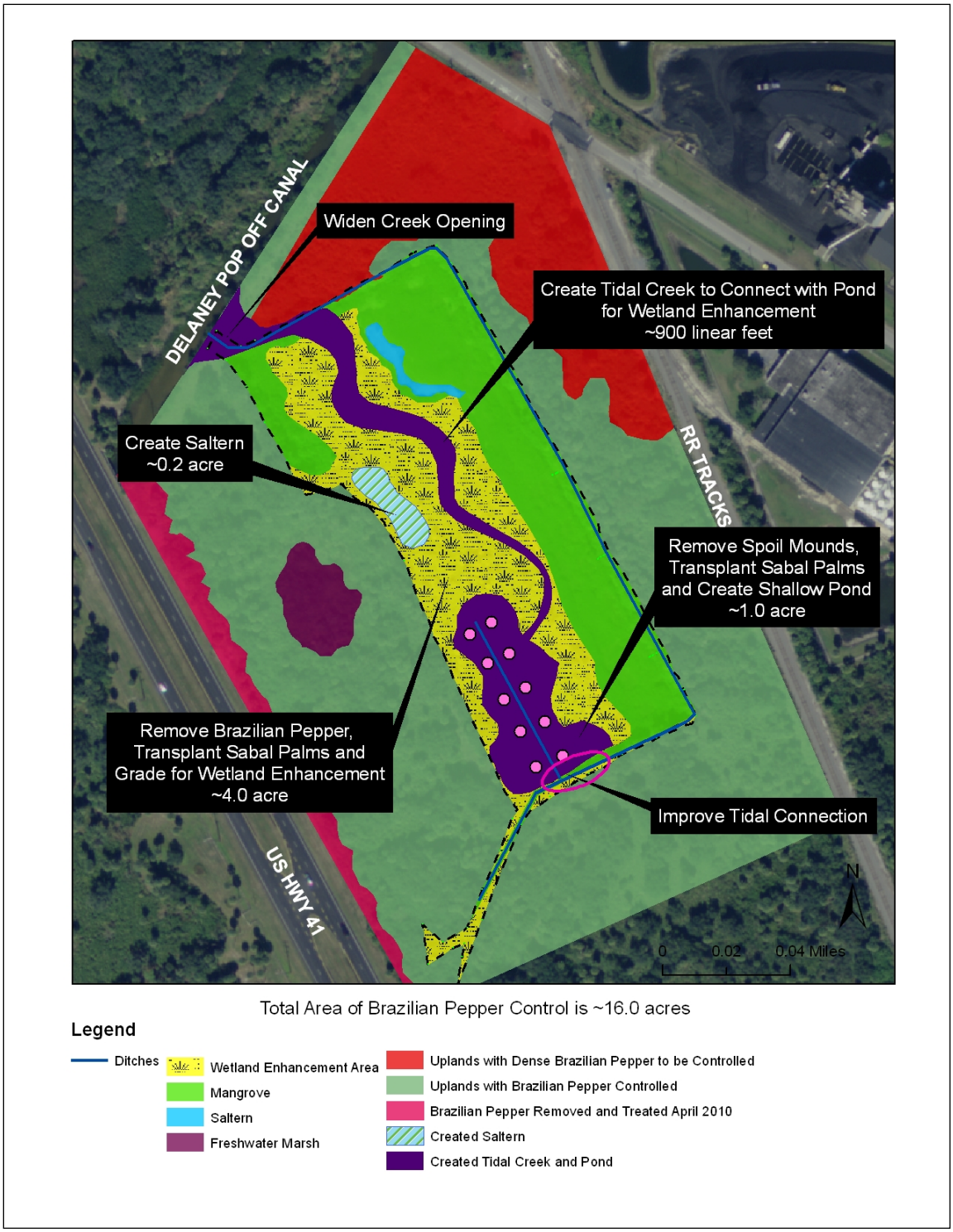


Figure 11. Borrow Pit Restoration Plan.

4.2.3 Conservation Easements at Giant's Camp and Borrow Pit – Alternative

(1) Evaluation of Alternative

Conservation easements will be secured at both of the project sites (Figure 6, Sites 1 and 2) to ensure the future protection of the restored and newly created wetlands. The Giant's Camp Conservation Easement will encompass 82.48 acres of mangrove forest with restored and newly created tidal creeks. The Borrow Pit Conservation Easement will encompass 21.28 acres of wetland restoration and creation with a newly created tidal creek, pond and saltern. Together, 103.76 acres of wetland habitat will be protected by conservation easements provided by Mosaic.

(2) Relationship to Injury

Conservation easements at these two restoration project sites will permanently ensure the future preservation of the ecological and socio-economic benefits of these projects. Both projects will result in benefits to fish, invertebrates and mangrove and marsh vegetation of the types that were injured by the Discharge. Protection of the project sites into the future will ensure that these benefits are maintained.

(3) Environmental and Socio-Economic Impact

While wetlands in the Tampa Bay area enjoy a strong degree of regulatory protection, there is no guarantee that current protection will remain unchanged. Historic development has impacted a large percentage of estuarine wetlands in the Tampa Bay watershed. Ongoing development pressures continue to pose a threat. Permanent protection of the restored wetlands through conservation easement ensures the resources and services provided will not be directly impacted by development activities. Oversight by the EPC and the Trustees will further ensure that the project locations are managed as described in the conservation easement.

4.3 Non-preferred Alternative Projects

In addition to the projects identified as preferred alternatives for compensatory restoration, the Trustees also considered several other projects. The Trustees evaluation of each of these non-preferred alternatives is described below.

Mangrove Forest

Alternatives for mangrove restoration included a general analysis of potential areas within Hillsborough Bay. Much of the western shoreline of Hillsborough Bay has been developed, leaving only the eastern side for potential projects. Mangroves along the shoreline of Delaney Pop-Off Canal, Archie Creek North, Archie Creek, and the South Archie Creek Canal were either not in need of active restoration or were not affected by the Discharge and were monitored for natural re-establishment of vegetation. Mangroves in need of restoration near the Discharge site but not affected by the Discharge were limited to an area south of the Alafia River. This area, commonly known as the "South Parcel" is owned by Mosaic and includes the Site 1 alternative. The South Parcel was the

historic Alafia River channel before the river's mouth was straightened, deepened and widened to allow for large vessel access to the phosphate plant. Dredge material from this excavation was placed on the South Parcel with a water flow connection just west of the Highway 41 Bridge. Later, the construction of the Giant's Fish Camp Boat Basin on the southwest corner of the Highway 41 Bridge cut off direct flow from the river into the mangrove system. Over time, mangrove tidal creeks have closed, choking the system and stressing the mangroves.

In addition to the design described for the Site 1 alternative, a number of other designs were considered. The first conceptual design for the Giant's Camp project, as described in the Alafia River/Mulberry Phosphates Spill (a separate incident) Estuarine Restoration Implementation Plan, included creating wetlands in the remnant boat basin and placing a relatively small culvert through the marina seawall to connect the boat basin to the adjacent mangrove forest. During the early conceptual design phase, it was determined that this design would not provide sufficient flow of water in the system to sustain open tidal channels and restore mangroves. Therefore, the original project plan design was rejected and modified to include excavation of the marina sediments coupled with a larger culvert to provide adequate flow.

The second conceptual design for the Giant's Camp project included only minor excavation of existing tidal channels, proposed to be accomplished by hand-digging to minimize impacts to existing mangroves surrounding the tidal channels. A modeling exercise indicated that more extensive excavation would be needed to allow for the water flow needed to maintain open tidal creeks through time. The minimal excavation originally proposed would not increase water flow through the mangrove forest and the benefits of the project would be minimized and short-lived.

Tidal Marsh

Alternative tidal marsh restoration projects included reviewing areas that were affected by the Discharge, other potential restoration areas on Mosaic property, and consideration of wetland restoration at William's Park.

Initial considerations included re-planting salt marsh areas that were affected by the Discharge. However, due to monitoring and relatively quick re-growth of vegetation this alternative did not meet the criteria of restoration. Other salt marsh areas on Mosaic property are a part of Net Environmental Benefits (NEBs) agreed to as part of the permitting of gypsum stack expansion, and are already required to be maintained and monitored regularly.

The "Cargill Stormwater Ponds at William's Park", originally considered and described in the Alafia River/Mulberry Spill Estuarine Restoration Implementation Plan, was also considered as a site for potential wetland creation to compensate from injuries resulting from this Discharge. However, during the initial conceptual design phase it was determined that the area is a potential site of historical significance. In order to not disturb the site, the project was abandoned and replaced by tidal marsh restoration at the Borrow Pit (Site 2).

Conservation Easements

Several options for conservation easements at Giant's Camp were considered. These included areas north of the access road to the Fiddler's Cove Educational Center and various combinations of parcels within the Giant's Camp property to create a contiguous area of protection. Due to potential maintenance needs of the Mosaic Berth, property along the Alafia Bank north of the access road was not included in the easement. Ultimately, the preferred option was to create conservation easements that would adjoin existing conservation easements to create and enhance a large contiguous area of mangrove forest protection.

No Action Alternative

A No Action alternative would not entail direct restoration activities undertaken by the Trustees to restore injured resources nor to compensate for lost resource services pending their ecological recovery. Only natural recovery occurs under this option. Interim losses are not compensated.

As a result of the Discharge, a total of 154.55 acres of wetland and upland habitat incurred varied levels of impact. The wetland habitats affected by the Discharge are mangrove, native tidal marsh, high marsh and transitional vegetation consisting mostly of salt grass and exotic species (*e.g.*, Brazilian pepper).

The habitat vegetation types were identified from aerial photographs and verified by vegetation transect and quadrat data during the damage assessment. Degrees of effect from the Discharge were categorized for each habitat in terms of projected recovery. For species that were dead, recovery is assumed based on the time for the species to grow to pre-Discharge dimensions. For other species with partial impact, recovery is assumed based on results of monitoring re-growth (measured in years) and professional judgment. After five years of post-Discharge monitoring, almost all of the vegetation has visually recovered to conditions similar to those that existed pre-Discharge. This recovery has occurred naturally without additional planting (see examples in Figures 3&4). However, functional loss of these habitats from the Discharge and subsequent recovery cannot be accounted for by the No Action Alternative.

5. NEPA Compliance

5.1.1 The Trustees performed their assessment and restoration planning in accordance with the National Environmental Policy Act (NEPA), 42 USC 4321, *et seq.*, and 40 CFR Parts 1500- 1508. In considering and identifying the restoration actions described herein, the DARP/EA for Mosaic Florida Phosphogypsum acid water discharge integrates the elements of an Environmental Assessment (EA) into this document, in accordance with NEPA. The DARP/EA, identifies the restoration actions which the Agencies believe are appropriate to

return the impacted areas of the Alafia River and Archie Creek to baseline conditions and compensate the public for interim natural resource losses.

5.1.2 Finding of No Significant Impact (if applicable)

In accordance with NEPA, the Federal Trustees are pursuing Findings of No Significant Impact(FONSI) in relation to these restoration implementation activities.

6. References

American Fisheries Society. 1993. Sourcebook for Investigation and Valuation of Fish Kills Southwick Associates, 151 pages.

Cuda, J, P. Ferriter, V. Manrique & J. Medal. 2006. Interagency Peppertree (*Schinus terebinthifolius*) Management Plan for Florida. Recommendations from the Brazilian Peppertree Task Force, Florida Exotic Pest Plant Council.

Greenwood M., P. Stevens & R. Matheson. 2006. Effects of the 2004 hurricanes on the fish assemblages in two proximate southwest Florida estuaries: Change in the context of interannual variability. *Estuaries and Coasts* 29:985-996.

Florida Department of Transportation. 1999. Florida Land Use, Cover and Forms Classification System (FLUCCS), third edition.

Florida Department of Highway Safety and Motor Vehicles. 2009. Alphabetical Vessel Statistics by County. http://www.flhsmv.gov/dmv/TaxCollDocs/vesselstats2009.pdf.

Florida Fish and Wildlife Conservation Commission. 2008. Marine Fisheries Information System, 2007 Annual Landings Summary.

Lewis Environmental Services, Inc. 2004. Proposed Ephemeral Data Collection Protocols for Documenting and Monitoring Vegetation Impacts, Version 2, September 20.

Lewis Environmental Services, Inc. 2004. Draft 5 Proposal Protocol for Exotic Plant Species Control, Monitoring and Reporting at the Cargill Site, Riverview, Florida.

Lewis Environmental Services, Inc. 2005. Technical Data Report: Supplemental Report #1. Prepared for Mosaic Fertilizer, LLC, Riverview, FL. 31 pages.

Lewis Environmental Services, Inc. 2007. Technical Data Report Supplemental Report #2. Prepared for Mosaic Fertilizer, LLC. Riverview, FL. 35 pages.

Lewis Environmental Services, Inc. 2010. Time Zero Plus Sixty-nine Exotic Plant Species Control Summary of Data (Emergency Primary Restoration) at Mosaic Fertilizer, LLC, Riverview, FL. 32 pages.

U.S. Department of Commerce, NOAA, *et al*. 2005. Preassessment Data Report *Mosaic* Acidic Process Water Release Riverview, Florida. 120 pages.

Whitman, R.L., Jr. and R.G. Gilmore, Jr. 1991. Comparative evaluation of fisheries community structure and habitat relationships in natural and created saltmarsh ecosystems. Proctor and Redfern Inc. Final Rpt. to Southwest Florida Water Management District, Brooksville, Florida, USA.

Wilson, M., S. Meyers & M. Luther. 2006. Changes in the circulation of Tampa Bay due to Hurricane Frances as recorded by ADCP measurements and reproduced with a numerical ocean model. *Estuaries and Coasts* 29(6A):914-918

7. **List of Preparers –**

The State of Florida's Department of Environmental Protection -
Charles Kovach, David Thulman and Lauren Greenfield

The United States Department of Interior's United States Fish and Wildlife Service – Patricia Hurst (ENRD)

The Hillsborough County Environmental Protection Commission – Richard Boler and Tom Ash

The United States Department of Commerce's National Oceanic and Atmospheric Administration – Daniel Hahn, Leslie Craig, Sheila O'Brien and Sean Meehan

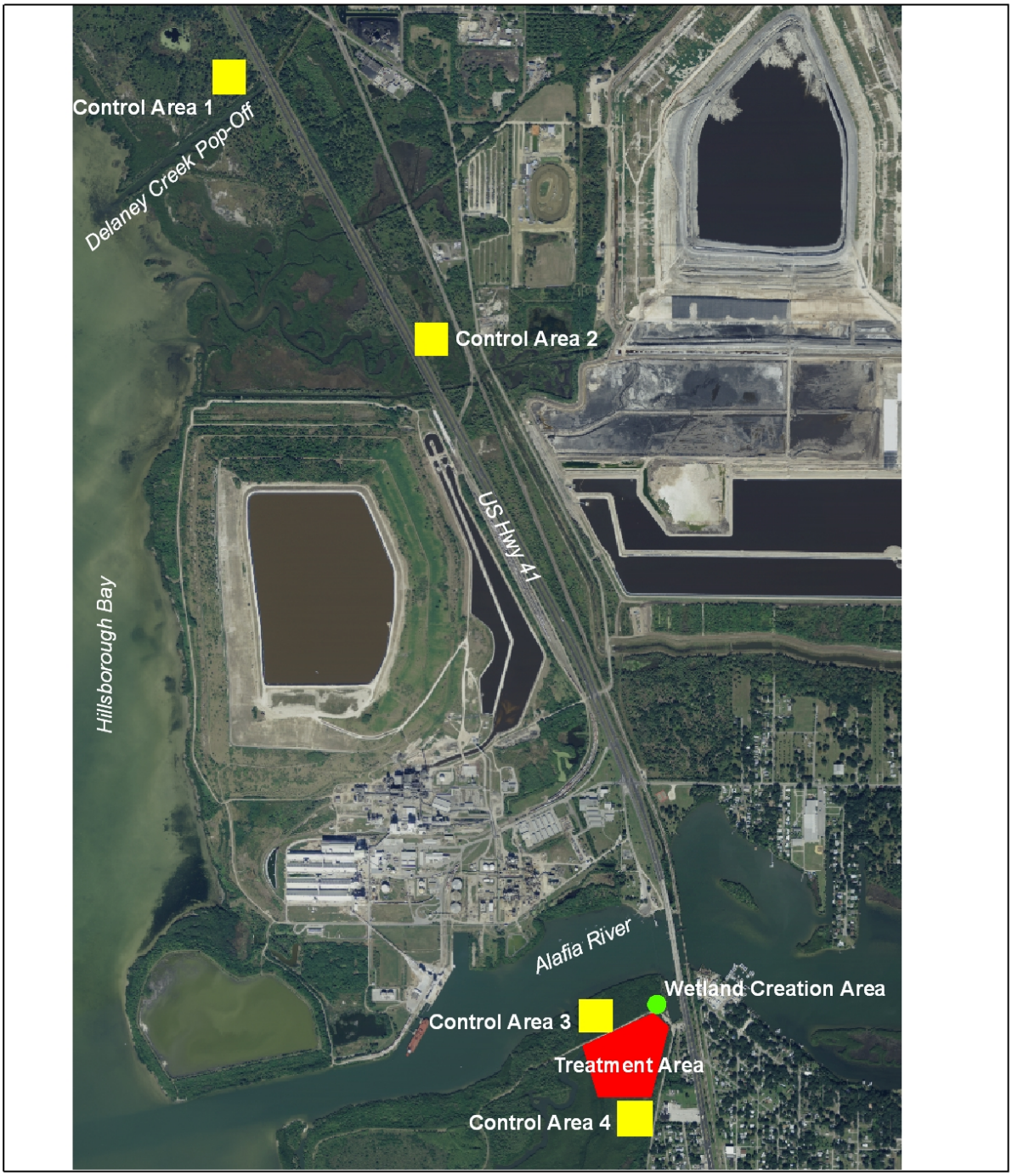
MOSAIC DARP/EA Amendment summaries

12/14/2012

1) **Change in location and impacts from construction of opening of tidal creek into Giant's Fish Camp Basin**
   The change and language below was provided by Lewis Environmental Services, contractor for MOSAIC.

"Based on our analysis of the TECO power pole located just north of the culvert location and our discussions with TECO representatives, we have determined that it is necessary to move the culvert location 26 feet to the south. After examination, the power pole guy wire would be in the way of the original proposed culvert location. In addition, it would have been difficult to stage the crane needed for dredge placement just west of the proposed culverts without violating OSHA standards for distance from power lines. The culvert movement will not change the overall function of the proposed restoration and we expect the flow rates to remain the same. This adjustment will not change the area of oyster habitat enhancement. However, the change will result in additional permanent and temporary wetland impacts. Additional permanent wetland impacts of 1,796 sq ft are necessary to make this adjustment because a portion of the original culvert location was in uplands and with this adjustment is now within wetlands. This change of location also required a design change to the grading area resulting in additional impacts. Details are summarized below and shown on the "Proposed Wetland Impacts" attachment.
Total permanent wetland impacts
Previous: 83,187 sf, Current: 84,085 sf (increase of 898 sf)
Permanent impacts that are converted to surface water
Previous: 79,600 sf, Current: 79,819 sf (increase of 219 sf)
Permanent impacts that are permanently filled
Previous: 3,587 sf, Current: 4,266 sf (increase of 679 sf)

The increased permanent impacts to wetlands of 679 sf (square feet) for a total of 4,266 sf will be compensated by a 0.25 acre sediment drag down and exotic plant removal near the culvert mouth location. This project has been approved by both parties. Its location is marked in Figure 4 as Wetland Creation Area and is designated by the green circle. The spoil mound removal to wetland elevation will be monitored for natural colonization of native wetland plant species and must reach 50% mean cover within 3 years and 80% mean cover by the end of five years with no more than 10% exotic plant cover at any time.



This activity and resulting change in construction is accurately reflected in the Statement of Work for the Giants Camp Restoration projects, dated Dec 13th, 2012.

2) Change in location for the reference sites for monitoring oyster restoration within the Giants Fish Camp Restoration Project.

William's Park on the Alafia River was the original site selected to conduct reference monitoring for oyster growth and survival in the Alafia River and the Restoration Areas. However, observations on several occasions of people harvesting large oysters at Williams Park and associated biota to use as fishing bait has made this site not acceptable. LES located acceptable oyster reefs at the opening of Giants Fish Camp Basin to the Alafia River and at Showman's reef, a created oyster reef just up river from the Giant's Fish Camp location. Both of these sites are acceptable to the Trustees as reference sites and permanent transects, as per the DARP/EA and SOW methodologies have been established. Nothing more has changed from the original monitoring methodologies other than the reference site locations. Please refer to the updated graphic below for the site locations. This figure should replace Figure 9 in the Final DARP/EA. The SOW has the updated language and graphic.