Appendix 4.3.5-**A**

Essential Fish Habitat Assessment Report

Essential Fish Habitat Assessment Report for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida

Prepared for: United States Army Corp of Engineers

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List of Acronyms and Abbreviations

AAF	All Aboard Florida – Operations LLC
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
BMP	best management practice
dB	decibels
DLE	Department of Law Enforcement
	Division of Emergency Management
FA	Environmental Assessment and Section 4(f) Statement (EA) for the AAE
	Proposed Bail Project between West Palm Beach and Miami and adjacent
	areas within which the system stations and vehicle maintenance facility
	(VME) released for public circulation and comment from October 31, 2012
	through December 3, 2012 ¹
EEU	Eccential Fich Habitat
East West Corridor	Approximate 40 mile extension of the Project proposed from Cocce to
East-west Comuon	Orlando. Florida
EIS	Environmental Impact Statement
EWRAP	Estuarine Wetland Rapid Assessment Method
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEC Corridor	Florida's East Coast
FECI	Florida East Coast Industries. Inc.
FPL	Florida Power and Light
FONSI	Finding of No Significant Impact issued by FRA on January 30, 2013, based
	on the information in the EA. ²
FRA	Federal Railroad Administration
FWC	Florida Fish and Wildlife Conservation Commission
HAPC	Habitat Areas of Particular Concern
HAPC	Habitat Areas of Particular Concern
I-95	Interstate 95
IUCN	International Union for Conservation of Nature
MCO	Orlando International Airport
MP	Mile Post
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
No.	Number
NOAA	National Oceanic and Atmospheric Administration
North-South Corridor	North-South 128.5-mile extension from West Palm Beach to Cocoa
Proiect	AAF plans to connect Southeast and Central Florida with a privately owned
-]	and operated intercity passenger rail system with stations located in Orlando.
	West Palm Beach. Fort Lauderdale and Miami
ROW	right-of-way
RRIF	Railroad Rehabilitation and Improvement Financing
SAFMC	South Atlantic Fishery Management Council

¹All Aboard Florida – Operations LLC (AAF). 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. Available at: http://www.fra.dot.gov/eLib/details/L04278. ² United States Department of Transportation (USDOT), Federal Railroad Administration (FRA). 2013. Finding of No Significant

² United States Department of Transportation (USDOT), Federal Railroad Administration (FRA). 2013. Finding of No Significant Impact for the All Aboard Passenger Rail Project West Palm Beach to Miami, Florida. Available at: http://www.fra.dot.gov/Elib/Details/L04277.

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List of Acronyms and Abbreviations (continued)

SAV	Submerged Aquatic Vegetation
UMAM	Uniform Mitigation Assessment Method
USC	United States Code
USACE	US Army Corp of Engineers
USDOT	United States Department of Transportation
WRAP	Wetland Rapid Assessment Method
VMF	Vehicle Maintenance Facility

1.0 Executive Summary

1.1 Background, Project Location and Proposed Action

All Aboard Florida – Operations LLC (AAF) is currently developing a 235-mile intercity passenger railroad system that will connect Orlando, Florida and Miami, Florida, with intermediate stops in Fort Lauderdale and West Palm Beach, Florida (Project or Proposed Action). The proposed Project will fulfill several public policy objectives, by, among other things, reducing our state's dependence on fossil fuels, relieving transportation congestion in the region and improving air quality as a result. Furthermore, the Project will serve as a means to enhance job creation and economic development within South-Central Florida.

Pursuant to the National Environmental Policy Act (NEPA) of 1969 [42 United States Code (USC) 4321 et seq], and Council on Environmental Quality (CEQ) NEPA regulations [40 Code of Federal Regulation (CFR) 1500-1508], the Federal Railroad Administration (FRA) has initiated an evaluation of the potential environmental and related impacts of constructing and operating an intercity passenger rail service as proposed by AAF. As AAF intends to apply for a loan under FRA's Railroad Rehabilitation and Improvement Financing (RRIF) Program pursuant to 49 CFR Part 260, FRA must consider the potential environmental impacts resulting from the Project pursuant to NEPA. As described in more detail in the notice of intent to prepare an environmental impact statement (EIS) for the Project that was published by FRA in the Federal Register on April 15, 2013, FRA shall act as the lead Federal agency in conducting the environmental review and preparing, reviewing, revising and completing the environmental documentation related to the Proposed Action. The EIS shall be prepared to satisfy the requirements of NEPA.

AAF previously completed an Environmental Assessment and Section 4(f) Evaluation (AAF EA)³ for intercity passenger rail service between Miami and West Palm Beach, Florida. FRA issued a Finding of No Significant Impact (AAF FONSI)⁴ for the AAF EA in January 2013. To the extent that actions have not changed since the AAF EA, these would not be evaluated by FRA as part of the EIS.

1.2 Purpose

This Essential Fish Habitat (EFH) Assessment focuses on bridge locations where construction of the Project is proposed between Miami and Cocoa, Florida (Project Area), as there are no tidally influenced waters along the East-West Corridor. This EFH Assessment was prepared to evaluate potential impacts to EFH as a result of Project construction. The literature review identified four EFH types (estuarine planktonic, mangrove, sand/shell bottom and mud/sand bottom) in the vicinity of the proposed Project Areas. The literature review and personal communication with Brandon Howard of National Oceanic and Atmospheric Administration (NOAA) Fisheries⁵ identified several species within the Snapper Grouper Complex in addition to white shrimp (*Litopenaeus setiferus*), pink shrimp (*Farfantepenaeus duorarum*) and brown shrimp (*F. aztecus*) and spiny lobster (*Panulirus argus*) that may utilize the habitats available in the proposed Project Area. The managed species identified during the literature review and through personal communication with NOAA Fisheries staff are listed in the Table ES-1, along with the managing agency and fisheries management plan for each species.

³ All Aboard Florida – Operations LLC (AAF). 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. Available at: http://www.fra.dot.gov/eLib/details/L04278.

⁴ United States Department of Transportation (USDOT), Federal Railroad Administration (FRA). 2013. Finding of No Significant Impact for the All Aboard Passenger Rail Project West Palm Beach to Miami, Florida. Available at: http://www.fra.dot.gov/Elib/Details/L04277.

⁵ Howard, Brandon. 2012/2013. NOAA Fisheries. Personal Communication September 2012 – May 2013.

Species Name	Managing Agency	Fisheries Management Plan
Goliath grouper (Epinephelus itajara)	SAFMC	Snapper Grouper Complex
Grey snapper (Lutjanus griseus)	SAFMC	Snapper Grouper Complex
Mutton snapper (Lutjanus analis)	SAFMC	Snapper Grouper Complex
Spiny lobster (Panulirus argus)	SAFMC	Spiny Lobster
Pink shrimp (Farfantepenaeus duorarum)	SAFMC	Penaeid Shrimp
White shrimp (Litopenaeus setiferus)	SAFMC	Penaeid Shrimp
Brown shrimp (Farfantepenaeus aztecus)	SAFMC	Penaeid Shrimp

Table ES-1. Managed Species with EFH in the Project Vicinity

Notes: SAFMC = South Atlantic Fisheries Management Council

The proposed bridge construction may have direct short-term adverse effects on the water quality in the vicinity of the Project. During construction, sediment control best management practices (BMPs) including installation of turbidity curtains and silt fencing would be utilized to protect surface waters; therefore, long-term impacts to the managed species in the vicinity of the Project would be minimized.

Fifteen bridge projects over water bodies that contain EFH are proposed as part of the Project from Miami to Cocoa. The impacts to EFH, associated with the proposed Project, vary by Project Area. Overall direct permanent impacts to wetlands and surface waters associated with these bridge projects, including shading, is approximately 0.88 acres. Secondary impacts including noise and vibration during construction are anticipated to be minimal and temporary in nature. Based on the limited impacts, the potential impacts as a result of project construction on the managed species, affected life stages, and EFH are also expected to be minimal.





2.0 Introduction

Essential Fish Habitat (EFH) is defined as those waters and substrates necessary to support fish for spawning, breeding, feeding, or growth to maturity. The concept of EFH was established in 1996 with the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act, which requires the cooperation of National Oceanic and Atmospheric Administration (NOAA) Fisheries [formerly known as the National Marine Fisheries Service (NMFS)], eight Regional Fishery Management Councils, Federal and State agencies, resource users, and others to protect, conserve, and enhance EFH. The South Atlantic Fishery Management Council (SAFMC) is responsible for the conservation and management of fish stocks within the federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia and eastern Florida to Key West. SAFMC is responsible for the development of fishery management plans and amendments to ensure sustainable fisheries. Implementation of the regulations, including federal requirements for permits for some fisheries, is the responsibility of NOAA Fisheries. SAFMC also identifies Habitat Areas of Particular Concern (HAPC). These are areas within EFH that are ecologically important, sensitive to disturbance, or rare.

An EFH Assessment is a review of a proposed project and the project's potential impacts to EFH⁶ and is required for this Project due to the presence of designated EFH within the proposed Project corridor. As set forth in NOAA Fisheries' rules, EFH Assessments must include: (1) a description of the Proposed Action; (2) an analysis of the effects, including cumulative effects, of the action on EFH, the managed species, and associated species by life history stage; (3) the Federal agencies' views regarding the effects of the action on EFH; and (4) proposed mitigation, if applicable.⁶ If appropriate, the EFH Assessment should also include the results of an on-site inspection, the views of recognized experts on the habitat or species affected, a literature review, an analysis of alternatives to the Proposed Action, and any other relevant information.⁶ This section describes the Proposed Action and presents the results of the on-site inspections. Subsequent sections of this document present the managed species potentially affected by the Proposed Action; the Federal agencies' views regarding the effects of the action on EFH; and mitigation.

2.1 Description of the Proposed Action

The proposed Project is composed of two corridors: (1) a north-south corridor of approximately 195 miles from Cocoa Beach, Florida to Miami, Florida (North-South Corridor), within the existing rail right-of-way (ROW) along the east coast of Florida (FEC Corridor) and (2) an east-west corridor of approximately 40 miles from Cocoa Beach, Florida, to the Orlando International Airport (MCO) where the terminal station will be located (East-West Corridor). The North-South Corridor will connect downtown West Palm Beach to downtown Miami with one stop in downtown Fort Lauderdale. The North-South Corridor improvements for the Project will take place entirely within the FEC Corridor. That existing rail ROW within the North-South Corridor is approximately 100 feet wide and has supported freight and/or passenger service on a continuous basis for more than 100 years. The FEC Corridor was originally built as a double-track railroad, but today it is mostly single track with several sidings. The roadbed for the second track in the corridor still exists today and would be used for the additional track improvements. Figure 1 provides a site location map of the FEC Corridor in which the majority of the Project is proposed.

Project improvements along the North-South Corridor include:

• Returning the existing railroad corridor to a dual-track system to allow for the addition of fast, dependable and efficient passenger service; and

⁶ National Marine Fisheries Service (NMFS). 2008. National Marine Fisheries Service Habitat Conservation District Southeast Regional Office. 2008. Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies. Available: http://sero.nmfs.noaa.gov/hcd/pdfs/efhdocs/sa_guide _2008. pdf. Accessed October 2012.

• Enhancement or replacement of aging timber constructed railroad bridges.

This EFH Assessment is evaluating the impacts to EFH associated with railroad bridge enhancement/replacement projects between Miami and Cocoa within the FEC Corridor (Figure 1). AAF is proposing enhancement/replacement to 34 bridges between Miami and Cocoa; however, only 19 of these bridges will require in-water work or a change in the footprint of the bridges. Four of the 19 bridges were determined to be upstream of salinity barriers. Bridges over water bodies with salinity barriers downstream are not included in this assessment, as the Project Areas are not accessible to marine species and do not include EFH. There are no proposed bridge structures over tidally influenced waters along the East-West Corridor; therefore, the remainder of this EFH will only focus on the 15 bridges along the North-South Corridor depicted in Figure 2 (Bridge Project Areas). Each Bridge Project Area is defined as the footprint of that bridge, as well as the area upstream and downstream within the limits of construction.

2.2 Method/Results of On-site Inspections

The proposed alignment for the Project from Miami to Cocoa will require in-water work for enhancement or replacement of 15 timber railroad bridges over water bodies containing EFH (Figure 2). Wetland delineations and snorkeling surveys were conducted at each of the 15 Bridge Project Areas to evaluate the type and quality of aquatic habitats and associated substrates [i.e., submerged aquatic vegetation (SAV) and oyster beds/shell bottom] for EFH determinations and to evaluate potential impacts to wetlands and other sensitive habitats. The results of these inspections were used to evaluate potential impacts to EFH and the managed species as a result of Project construction.

Figure 2. Bridge Project Areas with EFH



2.2.1 Wetland Delineation Methods

Potential wetlands in the Bridge Project Areas were identified and delineated in accordance with Florida Administrative Code (FAC), Chapter 62-340, the US Army Corp of Engineers (USACE) 1987 Wetland Delineation Manual⁷ and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plains Region (version 2.0).⁸ Field resources included the FDEP manual on wetland delineation.⁹ The FDEP's method for determining a wetland boundary is as follows:

"The landward extent of wetlands shall be determined by the dominance of plant species, soils and other hydrologic evidence indicative of regular and periodic inundation or saturation. In all cases, attempts shall be made to locate the landward extent of wetlands visually by on-site inspection, or aerial photo interpretation in combination with ground truthing, without quantitative sampling."

The above-referenced FDEP methodology utilized to identify and delineate wetlands includes all jurisdictional wetlands otherwise identified and described by the USACE 1987 Wetlands Delineation Manual and the regional supplement.⁸

2.2.2 Benthic Assessment Methods

Estuarine natural communities of Florida may be separated into mineral-based, faunal-based, and floral-based communities. Mineral-based communities, faunal-based communities (e.g. octocoral bed, sponge bed, coral reef, mollusk reef, and worm reef communities), floral-based communities (e.g. algal beds, seagrass beds, tidal marsh, and tidal swamp), and composite substrate communities all occur in sub-tidal, intertidal, and supra-tidal zones¹⁰.

The purpose of the benthic survey was to characterize the bottom composition as well as evaluate the presence of rooted seagrass beds, oyster beds (live or dead), sponges, and other benthic colonizing organisms. AMEC performed visual in-water reconnaissance of the Bridge Project Areas. Benthic surveys were performed in accordance with the NOAA NMFS guidance for assessing small project sites less than or equal to 1 hectare.¹¹ Based on proposed Project size and location, AMEC field personnel performed a bottom survey that included a center line transect beneath the existing bridge structure as well as transects on both the east and west sides of the existing bridge structures. As part of the in-water seagrass survey protocol, if seagrasses were determined to be rooted within the Bridge Project Area, field personnel would delineate and quantify patch distribution.12

2.2.3 Results of Field Investigation

Table 1-1 summarizes the Proposed Action and the results of the field assessment at each of the 15 Bridge Project Areas over water bodies containing EFH.

⁷ United States Army Corps of Engineers (USACE). 1987. Wetland Delineation Manual (FAC, Chapter 62-340).

⁸ United States Army Corps of Engineers (USACE). 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)

⁹ Florida Department of Environmental Protection (FDEP). 2008. Delineation of the Landward Extent of Wetlands and Surface Waters (FDEP, Chapter 62.340, F.A.C)

¹⁰ Florida Natural Areas Index (FNAI). 2010. Guide to the Natural Communities of Florida. Florida State University.

¹¹ National Oceanic and Atmospheric Administration (NOAA) Fisheries. 2012. Recommendations for Sampling Halophila johnsonii at a Project Site. Website: http://sero.nmfs.noaa.gov/pr/docs/JSG%20Survey%20Guidelines.pdf. Accessed August 2012. ¹² Florida Fish and Wildlife Conservation Commission (FWC) 2011. Recommended Survey Protocols for Estuarine and Marine

Submerged Aquatic Vegetation (SAV) related to Permitting Applications (Draft).

Bridge Project Proposed Action		Field Investigation Results	
Horse Creek (MP 187.37)	Installation of single-track railroad bridge on the west side of existing bridge	Freshwater creek with sand/shell bottom	
Goat Creek (MP 202.59)		Freshwater creek (during site visit) with a mud/sand bottom overlain by ballast. White mangrove observed in Project Area and red mangroves observed downstream of Project Area.	
North Canal (MP 223.70)	Installation of single-track railroad bridge on the west side of existing bridge	Freshwater canal (during site visit), with a soft sand bottom	
South Canal (MP 230.03)	Installation of single-track railroad bridge on the east side of existing bridge	Freshwater canal (during site visit) with mud/sand bottom	
Moores Creek (MP 241.27)	Installation of single-track railroad bridge on the west side of existing bridge	Brackish creek with a mud/sand bottom. Red mangrove observed within Project Area and black mangrove observed downstream of project site	
Unnamed Creek (MP 259.95)	Removal of existing railroad bridge and installation of double-track railroad bridge	Brackish creek with sand/shell bottom. Red mangrove observed along shoreline	
Unnamed Tributary 2 (MP 266.58)	Installation of single-track railroad bridge on the west side of existing bridge	Brackish/Tidal creek with soft sand bottom. Red mangroves were observed along shoreline	
Unnamed Tributary 1 (MP 266.86)	Removal of existing railroad bridge and installation of double-track railroad bridge	Brackish/Tidal creek with mud/sand bottom. Red, black, and white mangrove were observed along the shoreline	
Tributary to Manatee Creek 2 (MP 267.34)	Removal of existing railroad bridge and installation of double-track railroad bridge	Freshwater creek (during site visit) with a sand bottom	
Tributary to Manatee Creek 1 (MP 267.70)	Removal of existing railroad bridge and installation of double-track railroad bridge	Freshwater (during site visit) with a soft sand bottom. Eelgrass was observed rooted within the creek.	
Hillsboro River (MP 326.58)	Installation of single-track railroad bridge on the west side of existing bridge	Brackish creek with sand/shell bottom covered with non-commercial oysters. White mangroves observed along shoreline	
North Fork of the Middle River (MP 337.91)	Removal of existing railroad bridge and installation of double-track railroad bridge	Brackish creek with sand/shell bottom covered with non-commercial oysters. Red and white mangroves observed along shoreline	
South Fork of the Middle River (MP 338.52)	Removal of existing railroad bridge and installation of double-track railroad bridge	Brackish creek with sand/shell bottom covered with non-commercial oysters. Red and white mangroves observed along shoreline	
Oleta River (MP 353.74)	Removal of existing railroad bridge and installation of double-track railroad bridge	Brackish/Tidal creek with sand/shell bottom covered with non-commercial oysters. Red, black, and white mangroves were observed along the shoreline	
Arch Creek (MP 356.53)	Installation of single-track railroad bridge span on the west side of existing bridge	Brackish/Tidal creek with mud/sand bottom. Red and white mangrove were observed along the shoreline	

 Table 1-1.
 Proposed Action and Results of Field Investigation

Source: AMEC, 2013

Based on the field investigation the following habitats were identified: mangrove, estuarine planktonic, sand/shell bottom and mud/sand bottom. No seagrasses were identified within the Bridge Project Areas. Photographs of each Bridge Project Area are located in Appendix A and aerial photographs of each Bridge Project Area are located in Appendix B. Based on literature review and personal communication with NOAA Fisheries,¹³ EFH for species within the Snapper-Grouper complex; spiny lobster, pink shrimp, white shrimp, and brown shrimp; were identified within the 15 Bridge Project Areas. The mangrove habitat identified at several of the Bridge Project Areas is classified as HAPC for species within the Snapper-Grouper complex.

¹³ Howard, Brandon. 2012/2013. NOAA Fisheries. Personal Communication September 2012 – May 2013.

3.0 EFH and Managed Species

The proposed alignment for the Project from Miami to Cocoa will require in-water work for the enhancement or replacement of 15 railroad bridges over water bodies containing EFH, including 10 sites containing HAPC for Snapper-Grouper complex. A literature review was conducted and regulatory agency personnel were contacted to evaluate the EFH and managed species known to occur in the vicinity of the proposed crossing locations. The results of the literature review and an analysis of the effects, including cumulative effects, of the proposed Project on EFH, the managed species, and associated species by life history stage are presented in this section.

Essential Fish Habitat within the Project Area 3.1

The habitats identified in the Bridge Project Areas include: estuarine planktonic, mangrove, sand/shell bottom, and mud/sand bottom. These habitats fit into the following EFH types: mangroves fit into the estuarine scrub/shrub EFH; estuarine planktonic fit into the estuarine subtidal open water/water column EFH; and sand/shell and mud/sand bottoms fit into tidal creek EFH. Below is a brief description of each of these EFH types and their utilization by fish managed under SAFMC.

3.1.1 Estuarine Scrub/Shrub (Mangroves)

Estuarine Scrub/Shrub (Mangroves) wetlands are characterized by salt-tolerant woody vegetation less than 20 feet in height.¹⁴ There are four species which comprise the "mangrove" forest ecosystem: red mangrove (Rhizophora mangle), black mangrove (Avicennia germinans), white mangrove (Languncularia racemosa), and buttonwood mangrove (Conocarpus erectus). Mangrove wetlands provide a variety of beneficial biological and physical functions including habitat for nursery, feeding, and refuge for both recreationally and commercially important fisheries and their prey resources.¹⁵ Based upon the classification scheme proposed by Gilmore and Snedaker,¹⁶ the mangrove forests present within the Bridge Project Areas are riverine mangrove forests. Riverine mangrove forests occur in riverine areas that are tidally influenced. Riverine mangrove forests are considered the most productive mangrove forests. High primary productivity is attributed to lower salinities and nutrient loading from freshwater runoff. Goat Creek, Moores Creek, Unnamed Creek, Unnamed Tributary 2, Unnamed Tributary 1, Hillsboro River, North Fork of the Middle River, South Fork of the Middle River, Oleta River, and Arch Creek Bridge Project Areas include riverine mangrove forests.

Estuarine Subtidal Open Water/Water Column (Estuarine Planktonic) 3.1.2

Water column habitats are constantly changing in time and space; therefore, there are numerous potential distinct water column habitats for a broad array of species and life-stages.¹⁵ Physical parameters such as temperature, salinity, density, nutrients, light, etc. often define the specific habitats in the water column.¹⁵ All of the Bridge Project Areas: Horse Creek, Goat Creek, North Canal, South Canal, Moores Creek, Unnamed Creek, Unnamed Tributaries 1 and 2, Tributaries to Manatee Creek 1 and 2, Hillsboro River, North Fork of the Middle River, South Fork of the Middle River, Oleta River, and Arch Creek include estuarine subtidal open water EFH.

¹⁴ Tiner, R. W. 1993. A Field Guide to Coastal Wetland Plants of the Southeastern United States. Amherst, Massachusetts: University of Massachusetts Press.

¹⁵ South Atlantic Fisheries Management Council (SAFMC). 1998. Habitat Plan for the South Atlantic Region: Essential Fish Habitat Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council. Available:

http://www.safmc.net/ecosystem/EcosystemManagement/HabitatProtection/SAFMCHabitatPlan/ tabid/80/Default.aspx#EFHAm. Accessed October 2012. ¹⁶ Gilmore, R.G. and S.C. Snedaker. 1993. Chapter 5: Mangrove forests in W.H. Martin, S.G. Boyce, and A.C. Echternacht, eds.

Biodiversity of the southeastern United States: lowland terrestrial communities. John Wiley & Sons, Inc., Publishers, New York.

3.1.3 Tidal Creeks (Mud/Sand and Sand/Shell Bottom)

Unconsolidated bottom substrate of tidal creeks may be made up of mud, sand, or shell or any combination of the three. Different commercially, recreationally, or ecologically significant species may utilize the bottom substrate of tidal creek during their life cycle. Penaeid shrimp are known to utilize inshore estuarine areas including tidal creeks for nursery areas.¹⁷ White shrimp and brown shrimp tend to prefer mud/sand bottom habitat when in inshore waters; while pink shrimp tend to prefer sand/shell bottom habitat.¹⁵ All of the Bridge Project Areas: Horse Creek, Goat Creek, North Canal, South Canal, Moores Creek, Unnamed Creek, Unnamed Tributaries 1 and 2, Tributaries to Manatee Creek 1 and 2, Hillsboro River, North Fork of the Middle River, South Fork of the Middle River, Oleta River, and Arch Creek include tidal creek EFH.

3.2 EFH Managed Species that May Occur in the Project Area

The NOAA EFH Mapper¹⁸ was also used to generate a list of species with designated EFH within the vicinity of the proposed Project. The NOAA EFH mapper indicated that EFH for the snapper/grouper complex, spiny lobster, and shrimp is present at one or more of the bridge locations. Habitat was evaluated during the September 2012 site assessment. AMEC scientists used Appendix 6: Summary of EFH Requirements for Species Managed by the SAFMC in the NMFS document *Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies- South Atlantic Region*¹⁹ to identify the species that may utilize habitat within the Bridge Project Areas. The list of the managed species in the snapper-grouper complex may also utilize habitat in the Bridge Project Areas.

¹⁷ South Atlantic Fisheries Management Council (SAFMC). 2011. Users Guide to Essential Fish Habitat Designation. Available: http://www.safmc.net/LinkClick. aspx? fileticket= S5hRz7dAT w0 %3D&tabid=710. Accessed March 2013.

 ¹⁸ NOAA. 2013. EFH Mapper. Website: http://www.habitat.noaa.gov/protection/efh/habitatmapper.html. Accessed March 7, 2013.
 ¹⁹ National Marine Fisheries Service (NMFS). 2008. National Marine Fisheries Service Habitat Conservation District Southeast Regional Office. 2008. Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies. Available: http://sero.nmfs.noaa.gov/hcd/pdfs/efhdocs/sa_guide _2008. pdf. Accessed October 2012.

Table 2-1.	Species with EFH in the Project Vicinity (page 1 of 3)
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Bridge Project Area	Habitat	Fish Species	Life Stages
Horso Crook	Sand/Shell Bottom; Planktonic	spiny lobster	larvae (planktonic)
(MP 187.37)		pink shrimp	postlarvae/juvenile, subadults (sand/shell bottom)
		goliath grouper	juvenile (mangrove)
		grey snapper	postlarvae/juvenile (mangrove; mud bottom); adult (mangrove)
Coot Oreals	Mangrove;	mutton snapper	juvenile (mangrove; mud/sand bottom)
Goat Creek	Mud/Sand Bottom;	spiny lobster	larvae (planktonic)
(111 202.33)	Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		mutton snapper	juvenile (mud/sand bottom)
		spiny lobster	larvae (planktonic)
North Canal (MP 223.70)	Sand Bottom; Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		grey snapper	postlarvae/juvenile (mud bottom)
		mutton snapper	juvenile (mud/sand bottom)
South Canal	Mud/Sand Bottom:	spiny lobster	larvae (planktonic)
(MP 230.03)	Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		goliath grouper	juvenile (mangrove)
		grey snapper	postlarvae/juvenile (mangrove; mud bottom); adult (mangrove)
Moores Creek	Mangrove;	mutton snapper	juvenile (mangrove; mud/sand bottom)
(MP 241 27)	Mud/Sand Bottom;	spiny lobster	larvae (planktonic)
(,	Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		goliath grouper	juvenile (mangrove)
	Manarove:	grey snapper	postlarvae/juvenile, adult (mangrove)
Unnamed Creek	Sand/Shell bottom:	mutton snapper	juvenile (mangrove)
(MP 259.95)	Planktonic	spiny lobster	larvae (planktonic)
		pink shrimp	post larval/juvenile, subadults (sand/shell bottom)
		goliath grouper	juvenile (mangrove)
		grey snapper	postlarvae/juvenile, adult (mangrove)
		mutton snapper	juvenile (mangrove; mud/sand bottom)
Unnamed Tributary 2	Mangrove; Sand	spiny lobster	larvae (planktonic)
(WP 200.58)	Bottom; Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)

Table 2-1.	Species with EFH in the Project Vicinity (page 2 of 3)
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Bridge Project Area	Habitat	Fish Species	Life Stages
		goliath grouper	juvenile (mangrove)
		grey snapper	postlarvae/juvenile (mangrove; mud bottom); adult (mangrove)
IInnamed Tributary 1	Mangrove;	mutton snapper	juvenile (mangrove; mud/sand bottom)
(MP 266.86)	Mud/Sand Bottom;	spiny lobster	larvae (planktonic)
(,	Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		mutton snapper	juvenile (mud/sand bottom)
Tributary to Manatee		spiny lobster	larvae (planktonic)
Creek 2 (MP 267 34)	Sand Bottom; Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
(101 207.34)		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		mutton snapper	juvenile (mud/sand bottom)
Tributary to Manatee		spiny lobster	larvae (planktonic)
Creek 1 (MP 267 70)	Sand Bottom; Planktonic	brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
(111 201110)		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
	Manarova	goliath grouper	juvenile (mangrove)
		grey snapper	postlarvae/juvenile, adult (mangrove)
Hillsboro River	Sand/Shell bottom:	mutton snapper	juvenile (mangrove)
(MP 326.58)	Planktonic	spiny lobster	larvae (planktonic)
		pink shrimp	post larval/juvenile, subadults (sand/shell bottom)
		goliath grouper	juvenile (mangrove)
North Fork of the	Manarove	grey snapper	postlarvae/juvenile, adult (mangrove)
Middle River	Sand/Shell bottom:	mutton snapper	juvenile (mangrove)
(MP 337.91)	Planktonic	spiny lobster	larvae (planktonic)
· · · ·		pink shrimp	post larval/juvenile, subadults (sand/shell bottom)
		goliath grouper	juvenile (mangrove)
South Fork of the	Manarove:	grey snapper	postlarvae/juvenile, adult (mangrove)
Middle River	Sand/Shell bottom:	mutton snapper	juvenile (mangrove)
(MP 338.52)	Planktonic	spiny lobster	larvae (planktonic)
, , 		pink shrimp	post larval/juvenile, subadults (sand/shell bottom)
		goliath grouper	juvenile (mangrove)
	Manorove:	grey snapper	postlarvae/juvenile, adult (mangrove)
Oleta River	Sand/Shell bottom; Planktonic	mutton snapper	juvenile (mangrove)
(MP 353.74)		spiny lobster	larvae (planktonic)
		pink shrimp	post larval/juvenile, subadults (sand/shell bottom)

Bridge Project Area	Habitat	Fish Species	Life Stages
		goliath grouper	juvenile (mangrove)
		grey snapper	postlarvae/juvenile (mangrove; mud bottom); adult (mangrove)
Arah Crook	Mangrove; Mud/Sand Bottom; Planktonic	mutton snapper	juvenile (mangrove; mud/sand bottom)
(MP 356.53)		spiny lobster	larvae (planktonic)
		brown shrimp	postlarvae/juvenile; subadults (mud/sand bottom)
		white shrimp	postlarvae/juvenile; subadults (mud/sand bottom)

Table 2-1. Species with EFH in the Project Vicinity (page 3 of 3)

Sources: AMEC, 2013; NOAA, 2008¹⁹; Personal Communication Brandon Howard, 2012-2013¹³

Note: Red drum, a species formerly managed by SAFMC, is also likely to occur in the vicinity of the proposed Project. According to NOAA Fisheries, EFH for red drum is no longer recognized by SAFMC (Howard, 2012-2013 personal communication¹³).

3.2.1 Grouper Snapper Complex

The snapper grouper complex includes sea basses and groupers (Serranidae), wreckfish (Polyprionidae), snappers (Lutianidae), porgies (Sparidae), grunts (Haemulidae), jacks (Carangidae), tilefishes (Malacanthidae), triggerfishes (Balistidae), wrasses (Labridae), and spadefishes (Eppiphidae). The species in the snapper grouper complex utilize both pelagic and benthic habitats during their life cycle. Estuarine dependant species in the snapper grouper complex include gag grouper, lane snapper, and gray snapper. Juveniles of some species, such as mutton snapper (Lutianus analis), grav snapper, dog snapper (L. iocu), lane snapper, vellowtail snapper (Ocyurus chrysurus), goliath grouper (Epinephelus itajara), red grouper (E. morio), gag, yellowfin grouper (Mycteroperca venenosa), Atlantic spadefish (Chaetodipterus faber), and hogfish (Lachnolaimus maximus) may occur in inshore seagrass beds, mangrove estuaries, lagoons, and bay systems.20

EFH for snapper grouper complex species includes coral reefs, live/hard bottom, SAV, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet.²¹ EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including Sargassum, required for larval survival and growth. In addition, the Gulf Stream is an EFH because it provides a mechanism to disperse larvae of the snapper grouper complex species.²¹

EFH for specific life stages of estuarine dependent and nearshore snapper grouper complex species includes habitats such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (salt marshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); ovster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom inshore of the 100-foot contour.²¹

Estuarine mangrove wetlands, sand/shell bottom, and sand/mud bottom are present at one or more of the Project Areas. Estuarine mangrove wetlands are HAPC for the Snapper-Grouper complex. Several species within the snapper-grouper complex have the potential to occur in the vicinity of the proposed Project; however, based on guidance from NOAA Fisheries,¹³ this EFH assessment will focus on the following species: gray snapper, mutton snapper, and goliath grouper.

²⁰ South Atlantic Fisheries Management Council (SAFMC). 1998. Habitat Plan for the South Atlantic Region: Essential Fish Habitat Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council.

Available:http://www.safmc.net/ecosystem/EcosystemManagement/HabitatProtection/

SAFMCHabitatPlan/tabid/80/Default.aspx#EFHAm. Accessed October 2012. ²¹ South Atlantic Fisheries Management Council (SAFMC). 1998. Final Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region. Available: http://www.safmc.net/

ecosystem/EcosystemManagement/ Habitat Protection/SAFMCHabitatPlan/tabid/80/Default.aspx#EFHAm. Accessed October 2012.

3.2.1.1 Grav Snapper

Population Abundance and Distribution: Gray snappers are widely distributed in the western Atlantic from Florida through Brazil, including Bermuda, the Caribbean, and the northern Gulf of Mexico. Juveniles have been reported from as far north as Massachusetts.²² Most are caught in US waters off Florida.²³ The abundance of gray snapper on the Atlantic and Gulf coasts of Florida is unknown. but appears to have remained mostly stable over the last few decades.²³ In US waters, three distinct populations have been found: the northwestern Gulf of Mexico, the north central/eastern Gulf of Mexico, and the east coast of Florida.23

Habitat Requirements: Gray snapper occupy a variety of habitats during their life cycle.²² Adults are found near irregular, complex habitats, such as coral reefs, shipwrecks, rocky outcroppings and ledges, and other natural live bottom areas.²² Spawning occurs offshore, and eggs and larvae are transported into estuarine, shallow seagrass and mangrove nursery areas by favorable currents. Larvae, juveniles, and smaller adults are found inshore in seagrass beds and around mangrove thickets, pilings, seawalls, and jetties.²²

Life History: Spawning occurs from April to November with a peak during the summer months, and is influenced by the lunar cycle. Gray snapper spawn in aggregations during the times surrounding the full moon. Individual snappers may spawn multiple times during the course of the reproductive season. The species is a broadcast spawner of demersal eggs from which hatch sparsely pigmented larvae approximately 20 hours post-fertilization. The yolk sac is absorbed within the first 45 hours, after which the larvae must actively feed amongst the plankton. The post-larval gray snapper typically settle into suitable estuarine habitats. The pre-juvenile and juvenile snapper feed by day until they achieve a size of approximately 80 millimeters (total length) around which time they move into shallow rocky areas and the coastal reefs where they are commonly found as adults.²⁴

Population Dynamics: The bulk of gray snapper landings in the US south Atlantic (North Carolina to the Florida Keys) occur in Florida. Combined landings of gray snapper from head boats (private recreational and charter boats) and the commercial fisheries of Florida's east coast averaged 493,895 kilograms annually between 1986 and 1997. Average annual landings from the south Florida area (Ft. Pierce through the Dry Tortugas = 412,279 kilograms) were five times greater than those from north Florida (Fernandina Beach through Sebastian = 81.616 kilograms). Grav snapper are highly valued by anglers for their fighting ability at all sizes. Recreational landings averaged 60,685 kilograms for north Florida compared with 290,266 kilograms for south Florida annually between 1986 and 1997. Commercial landings averaged 20,931 kilograms for north Florida and 122,013 kilograms for south Florida for the years 1986 through 1997.²²

3.2.1.2 Mutton Snapper

Population Abundance and Distribution: Mutton snappers are found in the Gulf of Mexico and the western Atlantic from Massachusetts to Brazil; but are most common in the tropical waters of Florida, the Bahamas, and the Caribbean Sea.²⁵ Juveniles and small adults are found in shallow coastal waters over coral reefs, in protected bays with grass beds or mud bottoms, in tidal creeks surrounded by mangrove, and in canals. Larger adults are found in deeper waters on the continental shelf out to 91 foot (28 meter) depths.²⁶

²² Burton, M.L. 2001. Age, growth, and mortality of gray snapper, *Lutjanus griseus*, from the east coast of Florida. Fish. Bull.99:254-265.

Blue Ocean Institute (BOI). 2012. Mangrove Snapper Full Species Report. Available at: http://

[/]blueocean.org/documents/2012/06/snapper-mangrove-full-species-report.pdf. Accessed October 2012. ²⁴ Florida Museum of Natural History (FLMNH). 2009. Florida Museum of Natural History Ichthyology Department: Gray Snapper. Available: http://www.flmnh.ufl.edu/fish_/gallery/Descript/ GraySnapper/Graysnapper.html. Accessed October 2012. ²⁵ Florida Museum of Natural History (FLMNH). 2012. Mutton Snapper Biological Profile. Available at:

http://www.flmnh.ufl.edu/fish/gallery/descript/muttonsnapper/muttonsnapper.html. Accessed October 2012.

Watanabe, W.O. 2001. Species Profile: Mutton Snapper. Southern Region Aquaculture Center Publication No. 725.

Habitat Requirements: Mutton snapper are found in various habitats. The juveniles are abundant in shallow waters such as tidal mangrove creeks, canals, and shallow protected bays, utilizing turtle grass as bottom cover. Solitary adults can be found among rocks and reefs, while juveniles occur over sandy or seagrass bottoms. Once an adult, mutton snapper becomes established in an area, they tend to remain there; small aggregations of mutton snapper may form during the day. disbanding at night.25

Life History: This snapper spawns throughout its range, though primarily in the northeastern Caribbean. Spawning occurs during the month of February in the Caribbean region while in other areas spawning occurs during summer.²⁵ Large spawning aggregations of mutton snapper occur seasonally off the coasts of Cuba, the Turks and Caicos, and the US Virgin Islands.²⁶ In the continental US, the last known spawning aggregation of mutton snapper is located in the Riley's Hump near the Dry Tortugas area off Key West, Florida. May and June are the principal spawning months for mutton snapper populations in this aggregation, which is heavily fished by commercial and recreational anglers.²⁶ Mutton snapper exhibit high site-fidelity, spawning at the same site and the same lunar calendar days, year after year.²⁵ Little is known about the life history of mutton snapper from juvenile to adult stages, including patterns of movement and migration.²⁶ All snappers are oviparous; they release pelagic eggs that move freely with the water currents. The number of eggs is dependent upon the size of the female, and after spawning, the adult fish move offshore to deeper waters. At lengths of less than 10 millimeters, the larvae tend to be planktonic. There is little known about the development of the larvae. They eventually settle on suitable habitat that offers some protection from predators.²⁵ Natural distributions of juveniles and adults suggest that the young recruit into shallow inshore waters, gradually moving into deeper offshore areas with maturity. Recruitment of juveniles (less than 7 centimeters fork length) to seagrass beds in Florida and Cuba has been reported to peak during August and September.²⁶

Population Dynamics: Combined annual head boat landings of Mutton Snapper in the southeastern US averaged 45,980 kilograms annually between 1982 and 1996. Combined annual commercial landings of Mutton Snapper in the southeastern US averaged 133,974 kilograms annually between 1982 and 1996.22

3.2.1.3 Goliath Grouper

Population Abundance and Distribution: The goliath grouper occurs in the western Atlantic Ocean from Florida south to Brazil, including the Gulf of Mexico and the Caribbean Sea. It is also found in the eastern Atlantic Ocean, from Senegal to Congo although rare in the Canary Islands. The species is also present in the eastern Pacific Ocean from the Gulf of California to Peru.²⁷

Habitat Requirements: Occurring in shallow, inshore waters to depths of 150 feet (46 meters), the goliath grouper prefers areas of rock, coral, and mud bottoms. Juveniles inhabit mangroves and brackish estuaries, especially near oyster bars.²⁷ They settle in shallow mangrove habitat, first in mangrove leaf litter, and then along mangrove shorelines. The juvenile stage lasts 5 or 6 years in this mangrove habitat, after which fish egress to shallow reefs, eventually joining adult populations offshore. Their distribution in mangroves depends on local water quality, particularly dissolved oxygen content (greater than 4 parts per million) and mid-range salinities (greater than 10 parts per thousand).²⁸ The goliath grouper is notable as one of the few groupers found in brackish waters. This fish is solitary by nature, with the adults occupying limited home ranges. It is territorial near areas of refuge such as caves, wrecks, and ledges, displaying an open mouth and quivering body to intruders.27

²⁷ Florida Museum of Natural History (FLMNH). 2012. Goliath Grouper Biological Profile. Available at:

http://www.flmnh.ufl.edu/fish/Gallery/Descript/GoliathGrouper/GoliathGrouper.html. Accessed October 2012. ²⁸ Florida State University (FSU). 2012. Coleman and Koenig Research Laboratory. Available at: http://www.bio.fsu.edu /coleman_lab/goliath_grouper.php. Accessed October 8, 2012.

<u>Life History</u>: Many groupers are protogynous hermaphrodites, a condition in which individuals first mature as females only later to become males. Spawning occurs during the summer months of August and September throughout the goliath grouper's range and is strongly influenced by the lunar cycle. Spawning goliath grouper form impressive offshore aggregations of up to 100 or more individuals. Ship wrecks, rock ledges, and isolated patch reefs are preferred spawning habitat. In the 1980s these aggregations reached a low of less than 10 individuals per site as fishing pressure greatly impacted this species. Since receiving legislative protection, the spawning aggregations of goliath grouper have risen to 20 to 40 individuals per location. The females release eggs while the males release sperm into the open offshore waters. After fertilization, the eggs are pelagic, dispersed by the water currents. Upon hatching, the larvae are kite-shaped, with the second dorsal fin spine and pelvic fin spines greatly elongated. These pelagic larvae transform into benthic juveniles at lengths of one inch (2.5 centimeters), around 25 or 26 days after hatching.²⁷

<u>Population Dynamics</u>: The large size, slow growth, low reproductive rate, and spawning behavior have made the goliath grouper especially susceptible to overfishing. The goliath grouper is totally protected from harvest and is recognized as a "Critically Endangered" species by the International Union for Conservation of Nature (IUCN). Furthermore, the IUCN concludes that the species has been "observed, estimated, inferred or suspected" of a reduction of at least 80% over the last 10 years or three generations. In US waters, take of this species has been prohibited since 1990, and the species has been protected in the Caribbean since 1993. Historical exploitation of goliath grouper annual spawning aggregation sites greatly reduced the number of reproductive adults. As goliath grouper are slow growing and require several years to reach sexual maturity, recovery for this species is expected to be slow.²⁷

3.2.2 Spiny Lobster

Spiny lobster EFH includes nearshore shelf/oceanic waters; shallow subtidal bottom; seagrass habitat; unconsolidated bottom (soft sediments); coral and live/hard bottom habitat; sponges; algal communities; and mangrove habitat (prop roots). EFH for spiny lobster applies to coastal waters to the landward most influence of the tide from the Virginia/North Carolina border to the Dry Tortugas in the Florida Keys.²⁹

Estuarine planktonic habitat was identified as one of the EFH requirements for larval Spiny Lobster.³⁰ Estuarine planktonic habitat is present within all of the Project Areas.

<u>Population Abundance and Distribution</u>: The spiny lobster inhabits the coastal waters and shallow Continental Shelf waters from North Carolina south to Brazil, including Bermuda and the Gulf of Mexico. A few specimens have been collected in the Gulf of Guinea, West Africa.³¹ They live just below the water surface to depths of 1,650 feet.³²

<u>Habitat Requirements</u>: A broad range of marine habitats are used during their life cycle.³¹ Larval spiny lobsters float in the water column.³² As they grow, they swim to nearshore habitats and settle in dense vegetation, especially among macroalgae.³² Early benthic larvae and juveniles apparently

 ²⁹ South Atlantic Fisheries Management Council (SAFMC). 2011. Users Guide to Essential Fish Habitat Designation. Available: http://www.safmc.net/LinkClick. aspx? fileticket= S5hRz7dAT w0 %3D&tabid=710. Accessed March 2013.
 ³⁰ National Marine Fisheries Service (NMFS). 2008. National Marine Fisheries Service Habitat Conservation District Southeast

 ³⁰ National Marine Fisheries Service (NMFS). 2008. National Marine Fisheries Service Habitat Conservation District Southeast Regional Office. 2008. Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies. Available: http://sero.nmfs.noaa.gov/hcd/pdfs/efhdocs/sa_guide _2008. pdf. Accessed October 2012.
 ³¹ Marx, J.M., and W.F. Herrnkind. 1986. Species profiles: life histories and environmental requirements of coastal fishes and

³¹ Marx, J.M., and W.F. Herrnkind. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Florida)--spiny lobster. US Fish Wildl. Serv. Biol. Rep. 82(11.61). US Army Corps of Engineers, TR EL-82-4. 21 pp.

pp. ³² National Oceanic and Atmospheric Administration (NOAA) Fisheries. 2012. Fish Watch: Caribbean Spiny Lobster. Available at: http://www.fishwatch.gov/seafood_profiles/species/lobster/ species_pages/caribbean_spiny_lobster.htm. Accessed October 11, 2012.

concentrate in macroalgae beds along rocky shorelines and may be interspersed among large expanses of seagrass that typify known nursery areas like Florida Bay.³¹ They live here until they reach about 0.6 to 0.8 inches, then find shelter in crevices provided by large sponges, octocorals (soft corals), and solution holes until they are about 1 1/2 inches long. When they reach 2 to 3.15 inches, Caribbean spiny lobsters begin to travel from their nearshore nursery habitat to coral reefs and other offshore habitats. Adult spiny lobsters move along shore and offshore seasonally, migrating in single-file lines to deeper water to escape cold and turbid waters.³² Shelters for adults include large sponges, coral heads, mangrove roots, grass-bed undercuts, solution holes, rocky outcroppings or ledges, and even clumps of sea urchins. Although adult males and females sometimes inhabit bays, lagoons, estuaries, and shallow banks, none are known to spawn there. Requirements of offshore spawning are high shelter quality, suitable water conditions (stable temperature and salinity, low surge and turbidity), and adequate larval transport by oceanic currents.³¹

Life History: Most spiny lobster in Florida waters reproduce during late spring and early summer. Yearly variations in peak spawning time depend largely on water temperature. In Florida, there is no direct evidence that lobsters spawn more than once a year, but repeat spawning by some individuals is suspected in Bermuda waters. The life history of the spiny lobster consists of five major phases, having the following distinctive behaviors and habitat use: (1) oceanic planktonic phyllosome larvae, (2) swimming postlarvae pueruli (singular = puerulus), (3) early benthic "banded" juveniles, (4) later juveniles (20 to 65 millimeters carapace length), and (5) adults. Distribution of larvae is otherwise regulated by ocean currents and other factors that influence water circulation patterns. The spiny lobster larva metamorphoses into a puerulus, a brief (several weeks), nonfeeding, oceanic phase. Large numbers of pueruli arrive along the southeast Florida coast and southern shores of the Florida Keys throughout the year, principally during the new and first - quarter lunar phases. Pueruli settle rapidly when they encounter suitable inshore substrate.³¹

<u>Population Dynamics</u>: In Florida, the amount of spiny lobster capable of reproducing (spawning biomass) has increased over time, especially from 2002 to 2005. Lobsters spend a long time in the larval stage traveling with the currents. This leads scientists to suspect that young lobsters that survive to adulthood (recruits) in the US come from many other areas. Recent genetic studies have shown almost all recruits in US waters are from the Caribbean. Therefore, the spawning biomass in the greater Caribbean area is more relevant to the population status than the spawning biomass in Florida. Scientists were not able to determine the current status for the spiny lobster stock in the Caribbean because the data from the latest assessment was uncertain.³²

3.2.3 Penaeid Shrimp

The three species of penaeid shrimp under SAFMC management are white shrimp, pink shrimp and brown shrimp. EFH for penaeid shrimp includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine SAV (e.g., seagrass); and subtidal and intertidal non-vegetated flats. The EFH is designated from North Carolina through the Florida Keys.³³

Estuarine mangrove wetlands, sand/shell bottom, and sand/mud bottom are present in one or more of the Project Areas. Therefore, estuarine EFH for brown shrimp, white shrimp and pink shrimp associated with their postlarvae/juvenile and subadult life stages is present in one or more of the

³³ South Atlantic Fisheries Management Council (SAFMC). 1998. Final Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region. Available:

http://www.safmc.net/ecosystem/EcosystemManagement/ Habitat Protection/SAFMCHabitatPlan/tabid/80/Default.aspx#EFHAm. Accessed October 2012.

Project Areas.³⁴ Table 2-2 describes the estuarine EFH of these species. Species not included in Table 2-2 do not have lifestages that occur within the Project Area of effect.

Species	Life Stage	Ecosystem	EFH
Brown Shrimp	Postlarvae/juvenile/subadult	estuarine	Sand/mud bottom
White shrimp	Postlarvae/juvenile/subadult	estuarine	Sand/mud bottom
Pink shrimp	Postlarvae/juvenile/subadult	estuarine	Sand/shell substrate

Table 2-2. Estuarine EFH of Penaeid Shrimp

Source: NMFS, 2008³⁴

Population Abundance and Distribution: White shrimp range from Fire Island, New York to St. Lucie Inlet on the Atlantic Coast of Florida. On the Atlantic Coast, brown shrimp occur from Martha's Vineyard, Massachusetts to the Florida Keys. Pink shrimp occur from southern Chesapeake Bay to the Florida Keys and around the coast of the Gulf of Mexico to Yucatan south of Cabo Catoche.³⁵

Habitat Requirements: White shrimp appear to prefer muddy or peaty bottoms rich in organic matter and decaying vegetation when in inshore waters. Offshore, white shrimp are most abundant on soft muddy bottoms. Brown shrimp appear to prefer a similar bottom type, and as adults, may also be found in areas where the bottom consists of mud, sand, and shell. Pink shrimp are most often found on hard sand and calcareous shell bottom.35

Penaeid shrimp have a life cycle which requires a variety of habitats. The high salinity, oceanic waters serve as habitat for large mature shrimp, which will spawn offshore. Brown and pink shrimp move to relatively deep continental shelf water, and white shrimp tend to remain nearshore in shallower water. Offshore water also serves as habitat for larval and postlarval shrimp. These shrimp are planktonic and feed on zooplankton in the water column. There is some evidence that postlarval brown shrimp may overwinter in nearshore bottom sediments.³⁶ Postlarval shrimp move inshore to nursery areas in estuaries beginning in April and early May. In the South Atlantic, these areas are generally dominated by the marsh grass Spartina alterniflora. Smaller pink shrimp remain in the estuary during winter. They bury themselves deeply in the substrate when cold weather comes and are somewhat protected from winter mortalities. Shrimp that survive the winter grow rapidly in late winter and early spring before migrating to the ocean.³⁷

Spawning is correlated with bottom water temperatures and has been reported to occur at bottom temperatures of between 17 degrees Celsius and 29 degrees Celsius. Brown shrimp spawn in relatively deep water. Pink shrimp spawn at depths between 3.7 and 15.8 meters.³⁵

Life History: White shrimp begin spawning in April in Florida and Georgia and late April or May in South Carolina. Spawning may continue into September or October. In North Carolina, roe-bearing pink shrimp females are found as early as May, and by June, most pink shrimp are ripe.³⁵

All three species have eleven larval stages (5 nauplier, 3 protozoan and 3 mysid) before developing into postlarvae. Duration of the larval period is dependent on temperature, food, and habitat.

³⁴ National Marine Fisheries Service (NMFS). 2008. National Marine Fisheries Service Habitat Conservation District Southeast Regional Office. 2008. Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies. Available: http://sero.nmfs.noaa.gov/hcd/pdfs/efhdocs/sa_guide _2008. pdf. Accessed October 2012. ³⁵ South Atlantic Fisheries Management Council (SAFMC). 1998. Habitat Plan for the South Atlantic Region: Essential Fish Habitat

Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council. Available:

http://www.safmc.net/ecosystem/ EcosystemManagement/HabitatProtection/SAFMCHabitatPlan/tabid/80/Default.aspx#EFHAm. Accessed October 2012. ³⁶ National Oceanic and Atmospheric Administration (NOAA) Fisheries. 2012. National Marine Fisheries Service. Penaeid Shrimp

EFH and Habitat Requirements. Available: http://www.nmfs.noaa.gov/habitat/habitatprotection/ profile/

southatlantic/penaidshrimp_efhenvreq.htm. Accessed October 2012. ³⁷ National Oceanic and Atmospheric Administration (NOAA) Fisheries. 2012. National Marine Fisheries Service. Fishwatch – Pink shrimp. Available: http://www.nmfs.noaa.gov/ fishwatch/species/pink_shrimp.htm. Accessed October 2012

Records suggest larval periods of 10 to 12 days for white shrimp, 11 to 17 days for brown shrimp, and 15 to 25 days for pink shrimp. Postlarval shrimp sizes range from approximately 2.9 to 12 millimeters total length, with pink and white shrimp sizes overlapping and brown shrimp usually being larger.³⁵

The mechanism by which postlarvae are carried from distant spawning areas to estuaries is not well known. White and pink shrimp enter the estuaries at about the same time, usually beginning in April and early May in the southern part of their range and in June and August in North Carolina sounds, where white shrimp are uncommon. Large white shrimp begin emigrating out of the estuary to the commercial fishing areas in August and continue through December. Pink and white shrimp that survive the winter grow rapidly in late winter and early spring before migrating to the ocean.³⁵

<u>Population Dynamics</u>: The pink shrimp population of the South Atlantic is low (but likely due to environmental factors rather than fishing pressure). Overall annual harvest in the South Atlantic is dominated by white and brown shrimp species. Annual landings of the three penaeid species vary considerably from year to year. These fluctuations have been attributed to environmental influences.³⁷

4.0 Impacts to EFH

Habitats within the Bridge Project Areas have been identified as EFH and HAPC. The Bridge Project Areas provide EFH, during some portion of their life cycle, for at least seven fishery species managed by the SAFMC: goliath grouper, gray snapper, mutton snapper, spiny lobster, pink shrimp, white shrimp and brown shrimp. Table 3-1 presents the potentially affected lifestages for each of the managed species known to occur in the Project vicinity based on the results of the literature review for each species.

 Table 3-1.
 Managed Species and Affected Lifestages

Species Name	Potentially Affected Lifestages	
Goliath grouper (Epinephelus itajara)	juvenile	
Grey snapper (Lutjanus griseus)	postlarvae/juvenile, adult	
Mutton snapper (Lutjanus analis)	Juvenile	
Spiny lobster (Panulirus argus)	larvae	
Pink shrimp (Farfantepenaeus duorarum)	postlarvae/juvenile, subadult	
Brown shrimp (Farfantepenaeus aztecus)	postlarvae/juvenile, subadult	
White shrimp (Litopenaeus setiferus)	postlarvae/juvenile, subadult	

Source: NOAA, 2008³⁴

This section discusses the direct, indirect, temporary, and cumulative impacts to EFH and HAPC associated with the fifteen Bridge Project Areas and potential implications to their associated fisheries communities. Direct, indirect, and temporary impacts are expected to be generally similar for all fisheries; therefore, the presentation of impacts is for all species.

4.1 Construction Methods

At each Bridge Project Area (with the exception of Arch Creek), piles will be driven to load bearing capacity for E80 live loads plus the dead load. Piles will be driven with a steel pile driving template placed to prevent movement of the pile group. Multiple piles are connected by a cast in place pile bent cap or end bent at the abutments. The piling driver equipment will be placed on the abutment or on a barge in larger systems (Hillsboro River, North Fork of the Middle River, and South Fork of the Middle River).

The superstructure will consist of Standard Precast Prestressed Concrete Bridge Slabs. The bridge slabs will sit atop the bent cap. A crane will place the bridge slabs on the abutment. To form the end bents and backwall, a small area upslope will be excavated to install the forms. After installation is complete, the area will be backfilled and compacted. Rip–rap will be placed around the abutment for slope protection.

The deck slab with curbs, constructed of reinforced concrete, will be placed onto the superstructure. A ballast deck with concrete ties for the track will be installed on the deck.

Materials for the bridge upgrades will be brought onsite via existing roads or rail. The bridge construction will require access for a crane at a location on top of the abutment. Plans indicate a proposed construction zone for access purposes around the bridge. Cranes will not access the construction area from the existing active track.

Silt fence and floating turbidity barriers will be installed and maintained during construction in accordance with performance standards for erosion and sediment control and stormwater treatment set forth in section 62-40.432, FAC. Construction drawings for each site are located in Appendix C.

4.2 Direct Impacts

Essential fish habitats and HAPCs that potentially could be affected by the proposed Project are Estuarine Intertidal Scrub-shrub (Mangroves), Estuarine Subtidal Open Water/Water Column (Estuarine Planktonic) and Tidal Creeks (Mud/sand and Sand/Shell Bottom). Within each of the Bridge Project Areas, EFH is equivalent to wetland and/or surface water habitats. The wetlands and/or surface waters within the Bridge Project Areas were identified as jurisdictional wetlands and/or waters. Boundaries were field verified by the USACE. Brandon Howard from NOAA Fisheries accompanied USACE during the site visit to verify the wetland boundaries and EFH habitats.

Construction of the proposed Project could involve unavoidable impacts to EFH and HAPC. Direct impacts associated with the proposed Project would include placement of rip-rap/fill for the bridge approaches, placement of structures at the locations of bridge pilings, and excavation at locations of existing timber pilings to be replaced. The impact of piling placement will be limited to the total footprint of pilings placed in EFH, totaling approximately 760 square feet (0.02 acre), across the 15 bridge locations. The impacts of the rip-rap/fill at the location of the abutments has been calculated as the total area of rip-rap/fill placed in surface waters and totals approximately 5,000 square feet (0.11 acre). The placement of pilings would have a variable effect on the managed species. Pilings could ultimately result in a beneficial effect to species/life stages that prefer such structures as habitat, such as adult goliath grouper, gray snapper, and mutton snapper. However, permanent impact of the removal of mangrove wetlands could adversely affect species/life stages that prefer stages that prefer mangrove habitat, such as juvenile goliath grouper, post larval/juvenile grey snapper, and juvenile mutton snapper.

Impacts to wetlands (mangroves) were calculated as the aerial extent of mangroves to be permanently removed by the proposed Project. Proposed avoidance, minimization, and mitigation measures are discussed in Section 4.0

4.3 Indirect Impacts

Because an active railroad bridge is currently located at all of the Bridge Project Areas, it was determined that indirect impacts would be minimal. Best management practices (BMPs) including silt fencing and turbidity curtains will be utilized during construction to avoid indirect impacts to water quality as well as shoreline erosion. During continued operation and maintenance of the bridge and associated railroad, BMPs in accordance with those outlined by standards for erosion and sediment control and stormwater treatment set forth in section 62-40.432, FAC will be implemented.

4.4 Temporary Impacts

Temporary construction-related impacts are anticipated to be limited to the area immediately adjacent to and under each of the proposed Bridge Project Areas. Temporary impacts resulting from construction activities would potentially occur from temporary disturbance, increased sediment loads, and increased turbidity in the water column. These impacts will be minimized by implementation of BMPs including installation of silt fencing and turbidity curtains during construction. Additional temporary impact would potentially occur through the disruption/burial of aquatic habitats at the location of the bridge abutments and piles. Most of the species of concern are mobile and can actively avoid construction activities, although some benthic fauna could potentially be impacted at the site of the piles. Due to the small footprint of in-water work at each bridge, mortality levels are anticipated to be negligible. Temporary impacts were quantified by estimating the area of proposed excavation for timber piling removal.

Pile driving (percussive or vibratory) has the potential to have temporary impacts on fish and other aquatic organisms during construction of a bridge.³⁸ Potential impacts to eggs, larvae, and adults of invertebrates and fishes associated with pile driving are noise vibration, sediment deposition, and crushing. Factors that affect the physical interaction of sound with fish include the size of the fish relative to the wavelength of sound, the mass of the fish, its anatomical variation, and the location of the fish in the water column relative to the sound source.³⁹ Fish have been divided into two broad groups based on hearing sensitivity, 'hearing specialists' and 'hearing generalists'. 'Hearing specialists' show high sensitivity to sound with levels as low as 60 decibels (dB) re 1 microPascal at 1 meter across a broad frequency range. The hearing sensitivity of 'hearing generalists' is lower than that of 'hearing specialists'. 'Hearing generalists' rely on the detection of particle displacement for sensing sound. The highly variable auditory sensitivity of fish means that it is impossible to generalize on the impact of impulse signals from one species to another.³⁹

Invertebrates also vary in their sensitivity to sound. Sand shrimp exhibited a significant reduction in growth and reproduction rates, and an increase in aggression and mortality when exposed to noise levels of 30 dB in the 25 to 400 hertz bandwidth in aguaria.³⁹

Noise from pile driving during construction could potentially affect federally managed species; however, the use of bubble curtains during pile driving will help to dampen noise by about 5 to 22 dB depending on the pile type and other conditions (Personal Communication NOAA Fisheries⁴⁰). NOAA Fisheries has recommended that bubble curtains be used when impacts could occur. It is anticipated that the air bubble curtains will be used during pile driving to minimize the potential effects on federally managed species.

4.5 **Cumulative Impacts**

Cumulative impacts result from the total effect of the proposed Project when added to other past, present, and reasonably foreseeable future projects or actions (40 CFR 1508.7 and 50 CFR 402.02). For purposes of this analysis, the cumulative impact study area is defined as the Bridge Project Areas. The proposed Project is being considered within the context of other development projects within the watersheds of the proposed Bridge Project Areas. An active rail bridge currently exists at each Bridge Project Area. As discussed in Section 1.0 (Introduction), the purpose and need for these bridges is to support the Project from Miami to Orlando. The objective of the proposed Project is in response to the societal desire to expand passenger rail service in Florida as well as, the regulatory requirements to establish and maintain a safe railway. Past actions have resulted in a landscape that is residential and commercial land uses surrounding the Bridge Project Areas. In addition, past growth in the vicinity of the Project Areas has resulted in additional stormwater discharge which has contributed to a degradation of water quality within these systems.

The proposed Bridge Project Areas will not have stations associated with them: therefore, it is anticipated that the proposed Project would not increase the potential for any long term growth-induced development at the proposed Bridge Project Areas.

Any other development projects that would affect jurisdictional wetlands or water quality would be subject to the same permitting and mitigation requirements as the proposed Project. The level of cumulative impacts for EFH within the Bridge Project Areas is expected to be very low. The total permanent impacts to wetlands and surface waters at the 15 Bridge Project Areas is approximately

³⁸ Popper, A.N. 2005. What do we know about pile driving and fish? In: Irwin, C.L., Garrett, P. and McDermott, K.P. (eds.). Proceedings of the 2005 International Conference on Ecology and Transportation, Center for Transportation and the Environment, North Carolina State University, Raleigh, North Carolina.

³⁹ Kent, C.S. and R. McCauley. 2006. Review of "Environmental Assessment of the Batholiths Marine Seismic Survey, Inland Waterways and Near-Offshore, Central Coast of British Columbia". Center for Marine Science and Technology. Curtin University. October 2006.

⁹ Howard, Brandon. 2012/2013. NOAA Fisheries. Personal Communication September 2012 – May 2013.

0.88 acres. It is not anticipated that the Proposed Action would cumulatively influence or impact any managed fish species or EFH evaluated in this report.

5.0 Avoidance, Minimization and Proposed Mitigation

The three EFH types in the vicinity of the Bridge Project Areas are Estuarine Intertidal Scrub-shrub (Mangroves), Estuarine Subtidal Open Water/Water Column (Estuarine Planktonic) and Tidal Creeks (Mud/sand and Sand/Shell Bottom). The effects to these EFH types would be the placement of pilings, placement of rip-rap/fill at the location of abutments, removal of existing timber pilings, and shading resulting from bridge construction. The adverse impact of piling placement will be limited to the total footprint of pilings placed in EFH, totaling approximately 760 square feet (0.02 acre), across the 15 bridge locations. The adverse impacts of the rip-rap/fill at the location of the abutments have been calculated as the total area of rip-rap/fill to be placed in surface waters and totals approximately 5,000 square feet (0.11 acre). Approximately 0.73 acre of the substrate will be shaded. Shading impacts were calculated as the footprint of the new bridges at each Bridge Project Area. It should be noted, though, that no seagrasses were observed within the Bridge Project Areas. Therefore, shading impacts will not impact seagrasses. Approximately 940 square feet (0.02 acre) of wetland (primarily mangroves) will be permanently removed, and approximately 4,000 square feet (0.09 acre) of mangroves will be trimmed according to FDEP Mangrove Trimming Guidelines, which are designed to avoid defoliation, removal, or destruction of the mangrove tree itself. The details of these impacts at each Bridge Project Area are summarized in Table 4-1. It is expected that the pilings might actually serve as an attractant to some fish species in the area and may enhance the habitat in several of these systems.

To mitigate for these impacts, work required for construction of the bridges would be conducted in a manner to reduce erosion and sedimentation through implementation of BMPs (such as the use of silt fences and turbidity curtains) in accordance with an approved Erosion and Sedimentation Control Plan to prevent further impacts to EFH. The placement of fill and rip-rap in wetlands resulting from bridge construction are considered permanent impacts to jurisdictional wetlands. As a result, an appropriate Clean Water Act Section 404 permit would be obtained from the USACE prior to construction, and mitigation would be implemented as required by wetland permit conditions.

Wetlands (mangroves) were evaluated through the Uniform Mitigation Assessment Method (UMAM) (Chapter 62-345, FAC), Wetland Rapid Assessment Method (WRAP)/Estuarine Wetland Rapid Assessment Method (EWRAP), or WATER depending on the method used at each of the mitigation banks. These assessment methods serve as standardized method to assess wetland structure, function, and health. UMAM, WRAP/EWRAP, or WATER calculations have been prepared for sites where mitigation credits will be purchased from banks. Details of the wetland evaluation for Bridge Project Areas including wetlands (mangroves) are contained in Appendix D. The anticipated functional losses and proposed mitigation for each bridge are summarized in Table 4-1.

Mitigation credits will be purchased at the following mitigation banks:

- Lake X Ranch Mitigation Bank (for impacts at Goat Creek)
- Bluefield Ranch Mitigation Bank (for impacts at Unnamed Creek)
- Bear Point Mitigation Bank (for impacts at Unnamed Tributary 1 and 2 and Tributary to Manatee Creek 1)
- Florida Power and Light (FPL) Everglades Mitigation Bank (for impacts at North Fork of the Middle River, South Fork of the Middle River and Oleta River).

	Surface Water Impact		Surface Water Impacts		Surface Water Impact		Temporary Surface Water		Wetland Impact		Mangrove					
	(pilings)		(rip-rap/fill)		(shading)		Impact (timber piling removal)		(mangrove removal)		Trimming		Functional Loss			Mitigation
0.1		Square	•	·				· · ·	•	·		Square		WRAP/		Credits to be
Site	Acres	Feet	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres	Feet	UMAM	EWRAP	WAIER	Purchased
Horse Creek (MP 187.37)	0.0004	18.84	0.00005	2.00	0.0174	756.82	-	-	-	-	-	-	-	-	-	-
Goat Creek																
(MP 202.59)	0.0015	66.66	0.0149	649.65	0.0640	2788.02	0.0017	75.20	0.0008	34.91	-	-	0.5	-	-	0.0005
North Canal																
(MP 223.7)	0.0008	33.33	0.0003	11.27	0.0260	1132.84	-	-	-	-	-	-	-	-	-	-
South Canal																
(MP 230.03)	0.0010	44.44	0.0076	332.43	0.0434	1890.48	-	-	-	-	-	-	-	-	-	-
Moores Creek		10.01				0.40 50					0.00/0					
(MP 241.27)	0.0004	18.84	0.0020	87.35	0.0218	948.50	-	-	-	-	0.0016	68.11	-	-	-	-
Unnamed Creek			a a a 4 -	==						70.00						
(MP 259.95)	0.0015	66.66	0.0017	/5.32	0.0536	2335.35	0.0013	55.02	0.0018	79.30	0.0151	657.74	0.43	-	-	0.0009
Unnamed Tributary 1	0.0045			400.00				07.54	0.0050*		0.0044			0.57		0.0000
(MP 266.86)	0.0015	66.66	0.0099	429.39	0.0663	2886.93	0.0006	27.51	0.0052^	226.81^	0.0214	933.02	-	0.57	-	0.0029
Unnamed Tributary 2		0.40		000 57	0.0101	500.04				00.01	0 0005					0.0005
(MP 266.58)	0.0002	9.42	0.0088	382.57	0.0124	539.64	-	-	0.0008	36.61	0.0065	282.63	-	0.5	-	0.0005
I ributary to Manatee			0.0007	1007.00	0.0010	054.00	0.0000	7.04	0 0051*	000.00*				0.50		0.0007
Creek 1 (MP 267.70)	-	-	0.0307	1337.88	0.0219	954.99	0.0002	7.84	0.0051*	220.33*	-	-		0.53	-	0.0027
I ributary to Manatee			0.0004	400.07	0.0100	707.00	0.0000	7.00								
Creek 2 (MP 267.34)	-	-	0.0094	409.97	0.0162	707.66	0.0002	/ .80	-	-	-	-	-	-	-	-
HIIISDORO RIVER	0.0010		0.0010	<u> </u>	0.0000	0005.01					0.0015	<u></u>				
(MP 326.58)	0.0018	//.//	0.0016	68.90	0.0688	2995.81	-	-	-	-	0.0015	66.29	-	-	-	-
North Fork of the																
	0.0000	155 44	0 0000	10.00	0 1 0 0 0	5050 70	0.0005	110.04	0.0050	010 50					0.57	0.0000
(MP 337.91)	0.0036	155.44	0.0003	13.36	0.1230	5358.72	0.0025	110.04	0.0050	218.53	-	-	-	-	0.57	0.0029
South Fork of the																
	0.0000	155 44	0.0151	050.00	0 10 40	5047.01	0.0000	105.70	0 0011	40.04	0.0040	100.00			0.57	0.0000
(IVIF 338.52)	0.0036	155.44	0.0151	058.36	0.1342	JØ47.81	0.0029	125.76	0.0011	48.34	0.0046	199.99	-	-	0.57	0.0006
(MD 252 74)	0.0010	44.44	0.0047	005.00	0.0500	0000 50	0.0005	00.50	0.0017	75.07	0 0000	1075.07			0.57	0.0011
(IVIP 353.74)	0.0010	44.44	0.0047	205.92	0.0529	2302.50	0.0005	23.52	0.0017	/5.3/	0.0293	12/5.6/	-	-	0.57	0.0011
Arch Creek					0.0114	405.00					0.01.40	040.00				
(MP 356.53)	-	-	-	-	0.0114	495.02	-	-	-	-	0.0148	642.86	-	-	-	-
Total	0.0174	757.94	0.1071	4664.37	0.7333	31941.09	0.0099	432.75	0.0216	940.20	0.0947	4126.51	0.93	1.60	1.71	0.0121

Table /1-1	Anticipated Impacts	Watland Assessment and Proposed Mitigation for each Bridge Project	ot Aroa
	Anticipated impacts,	, Welland Assessment and Froposed Millyallon for each Dhuge Froje	JIAIEd

Source: AMEC, 2013

Notes: *= non-mangrove wetland impacts

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Appendix A Photograph Log
Horse Creek



Photograph 1. Existing rail bridge over Horse Creek (Brevard County), with concrete pedestrian access; view to south.



Photograph 2. Horse Creek rail bridge and west side right-of-way; view to north.



Photograph 3. Residential land use; view to northeast from rail bridge.



Photograph 4. Representative view of undeveloped land in vicinity of rail bridge; view to southeast.



Photograph 5. Dock observed in Horse Creek near residence; view to east from rail bridge.



Goat Creek

Photograph 1. View from south bank looking north along east side of the bridge.



Photograph 2. View showing proximity of white mangrove in project area.

North Canal



Photograph 1. Typical view of North Canal Bridge facing south.



Photograph 2. Typical view of North Canal Bridge.



Photograph 3. Typical view of North Canal, view to east.

South Canal



Photograph 1. Gravel and grass right-of-way to north of the South Canal railroad bridge and pedestrian bridge, view to north.



Photograph 2.

Sedimentation beneath the South Canal Bridge, with Elephant grass and Brazilian pepper dominant vegetation; view to north.



Photograph 3. Vegetation observed at base of bridge, including Brazilian pepper.

Moore's Creek



Photograph 1. View from north bank looking south along west side of the bridge.



Photograph 2. View showing red s in the assessment area, approximately 18 feet west of the existing rail bridge.

Unnamed Creek



Photograph 1. Seven rows of multiple wood pilings in the water to help support the bridge.



Photograph 2. Red mangrove propagules were observed growing under existing bridge during the site visit.



Unnamed Tributary 1 (MP 266.86)

Photograph 1. The bridge at MP 266.86 crosses a creek about 20 feet wide surrounded by red mangrove wetlands.



Photograph 2. Representative photograph of the coastal marsh in the footprint of the proposed new bridge.



Unnamed Tributary 2 (MP 266.58)

Photograph 1. The railroad bridge at MP 266.58 has a row of 3 pilings in the water and ballast on the shoreline.



Photograph 2. Manatee Plaza Marina is located just north of the Project Area at MP 266.58.



Tributary to Manatee Creek 1 (MP 267.70)

Photograph 1. The bridge has two rows of five pilings in the water and ballast on the shoreline.



Photograph 2. Eel grass observed in stream.

Tributary to Manatee Creek 2 (MP 267.34)



Photograph 1. The bridge crosses the Tributary to Manatee Creek 2 with two sets of four pilings. The shore is covered with ballast and riprap.



Photograph 2. Assessment Area beneath existing bridge structure.

Hillsboro River



Photograph 1. Facing south from the north bank.



Photograph 2. Rip-rap beneath newly constructed automobile bridge.



Photograph 3. Oyster shell covered bottom within assessment area.



Photograph 4. *Hygrophila* sp. observed within the assessment area.

North Fork of the Middle River



Photograph 1. Facing south at mangroves growing into the former west bridge.



Photograph 2. Oyster shell covered bottom within assessment area.



Photograph 3. Algae covered Eel Grass (Vallisneria americana) within assessment area.



Photograph 4. *Hygrophila* sp. bed within the assessment area

South Fork of the Middle River



Photograph 1. Facing north from the southern end of the former bridge.



Photograph 2. Facing northeast from the existing in-service bridge.



Photograph 3. Facing north through the center of the existing bridge structures.



Photograph 4. Small oyster beds within the assessment area.

Oleta River



 Photograph 1.
 Facing north illustrating existing timber constructed railroad bridge.



Photograph 2. Red mangroves growing within the assessment area.



Photograph 3. Red mangroves growing beneath existing railroad bridge.

Arch Creek



Photograph 1. Facing north illustrating existing railroad bridge.



Photograph 2.

View from above illustrating footprint of former railroad bridge.



Photograph 3. Red mangroves growing within the assessment area



Photograph 4. Red mangrove propagules growing beneath the existing bridge structure.

Appendix B Aerial Photographs





Project Area (0.28 ac.)

Horse Creek Site Map

Bridge Over Horse Creek at Milepost 187.37 Along AAF Rail Corridor

100

amec



Date

1 # 6063-12-021

Figure



Drawn

NMG

Checked

ARB

Date

11/26/20

Date

11/26/201

Explanation of Features



Project Area (0.51 ac.)

Goat Creek Site Map

Bridge Over Goat Creek at Milepost 202.59 Along AAF Rail Corridor



Figure





Project Area (0.71 ac.)

North Canal Site Map

Bridge Over North Canal at Milepost 223.70 Along AAF Rail Corridor





Date

Explanation of Features



Project Area (0.69 ac.)

South Canal Site Map

amec

Bridge Over South Canal at Milepost 230.03 Along AAF Rail Corridor

100 1ft



Figure





Project Area (0.48 ac.)

Moores Creek Site Map

Bridge Over Moores Creek at Milepost 241.27 Along AAF Rail Corridor



Figure





Project Area (0.68 ac.)

Tributary to Unnamed Creek Site Map

Figure

ct # 6063-12-021

1

Bridge Over Unnamed Creek at Milepost 259.95 Along AAF Rail Corridor







Project Area (0.74 ac.)

Unn**a**m**ed** T**ri**bu**tar**y 2 Si**te Map**

Bridge Over Unnamed Tributary at Milepost 266.58 Along AAF Rail Corridor



ct # 6063-12-0212





Project Area (0.68 ac.)

Unnamed Tributary 1 Site Map

Bridge Over Unnamed Tributary at Milepost 266.86 Along AAF Rail Corridor







Project Area (0.53 ac.)

Tributary to Manatee Creek 2 Site Map

Bridge Over Tributary to Manatee Creek at Milepost 267.34 Along AAF Rail Corridor







Project Area (.0.56 ac.)

Tributary to Manatee Creek 1 Site Map

Bridge Over Tributary to Manatee Creek at Milepost 267.70 Along AAF Rail Corridor





Explanation of Features Project Area (.93 ac.)

Hillsboro Canal Aerial Map

Bridge Over Hillsboro Canal at Milepost 326.58 Along AAF Rail Corridor






Project Area (.90 ac.)

North Fork of Middle River Bridge Site Map

Bridge Over North Fork of Middle River at Milepost 337.91 Along AAF Rail Corridor







Project Area (.86 ac.)

South Fork of Middle River Bridge Site Map

Bridge Over South Fork of Middle River at Milepost 338.52 Along AAF Rail Corridor







Project Area (.64 ac.)

Oleta River Bridge Site Map

Bridge Over Oleta River at Milepost 353.74 Along AAF Rail Corridor







Arch Creek Bridge Site Map

Bridge Over Arch Creek at Milepost 356.53 Along AAF Rail Corridor



Figure

Appendix C Construction Drawings


















































































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Appendix D Wetland Assessment Forms

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name Application Number			er Assessment Area Name or Number				
Goat Creek at Mile Po	ost 202.59				Goat Creek Project Site		
FLUCCs code	Further classifica	tion (optional)		Impac	t or Mitigation Site?	Assessment Area Size	
812 (Transportation)	612 (Mang	proves); 642 (Coa	stal Marsh)		Impact	0.001	
Basin/Watershed Name/Number	Affected Waterbody (Clas	ss)	Special Classificati	on (i.e.C	DFW, AP, other local/state/federal	designation of importance)	
Northern Indian River Lagoon/21	Class I	II			None		
Geographic relationship to and hyd	rologic connection with	wetlands, other s	urface water, upla	nds			
The assessment area includes Goat Creek, located in Malabar, FL. Goat Creek drains intoIndian River Lagoon. Goat Creek is connected to the surrounding landscape primarily through the surface water. Areas of mangrove wetlands still exist in the assessment area.							
Assessment area description							
The assessment area is classified time of inspection the water in the bridge and th	as "Other surface wate creek was fresh. One ree red mangroves are	r". The creek bot mature white ma present approxim	tom substrate was ngrove is located o nately 50-75 meter	gener on the s dow	rally muddy sand overla southwest shore immed nstream from the bridge	in by rail ballast. At the diately adjacent to the e.	
Significant nearby features Indian River Lagoon			Uniqueness (considering the relative rarity in relation to the regional landscape.) Many of the tidally influence tribuatry within Brevard county are surrounded by residential development and have been channelized. Goat Creek is not surrounded by residential land us and is fairly sinuos.				
Functions			Mitigation for pre	vious p	permit/other historic use)	
The assessment area functions as habitat for marine and avian fauna and marine and terrestrial flora. The mangroves may serve as a buffer against tidal erosion.			Not present				
Anticipated Wildlife Utilization Base that are representative of the asses be found)	d on Literature Review sment area and reason	(List of species hably expected to	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)				
Various wading birds (such as e american alligator, mud turtle, d mangrove water snake, sheepshe and va	egrets, herons, rails, and iamondaback terrapin, r ad, mosquito fish, snool arious crabs	d sandpipers), marine turtles, k, marsh killifish,	Manatee (federally E; resting, foraging; no manatees observed; habitat appeared marginal for the manatee) and sea turtle species (federally E and T (Loggerhead); foraging; no Sea turtles observed; habitat appeared marginal for sea turtles)				
Observed Evidence of Wildlife Utiliz	zation (List species dire	ctly observed, or	other signs such a	is tracl	ks, droppings, casings,	nests, etc.):	
Wildlife observed during the September site visit included: small crabs and mullet.							
Additional relevant factors:							
Assessment conducted by:			Assessment date	e(s):			
Kevin Shelton/Joy Ryan/Shannon N	IcMorrow		9/18/2012 & 9/20	/2012			

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)

Site/Project	te/Project Name Application Number				Assessment Area Name or Number			
	AAF Go	at Creek a	at MP 202.59			Goat Creek at MP202.59		
Impact or I	Impact or Mitigation			Assessment conducted by:	Assessment date:			
	0	Impac	t	Kevin Shelton/Joy Ryan/S	Shannon	9/18/2012 & 9/20/2012		
				McMorrow				
Scorin	g Guidance	٦	Optimal (10)	Moderate(7)	Mi	nimal (4)	Not Present	t (0)
The sco	oring of each		· · · · /	Condition is less than				. ,
indicator is	s based on wh	at	Condition is optimal and fully	optimal, but sufficient to	Minimal le	evel of support of	Condition is insu	fficient to
type of we	suitable for the	e xe	supports wetland/surface water functions	wetland/surface	welland	inctions	water functi	ons
water	r assessed		Mator fanotionio	waterfunctions			hator landt	0110
.500(Lar w/o pres or current	CURRENT: The area is currently being impacted by the existing railroad bridge and associated structure support for wildlife from habitats outside the assessment area; there is forest surrounding the assessment minimal residential and transportation landuse. Upstream of the assessment area, the mangrove forest is This land use allows terrestrial wildlife access to and from the assessment area. Wading birds could a assessment area by flight. Wildlife could potentially access the assessment area from the tributary itself and downstream). Goat Creek has the potential to be utilized by the manatee to access upstream habita the creek's size begins to decrease and would likely prevent migration of animals as large as manatee Goat Creek passes beneath US Highway 1 just east (approximately 375 feet) of the assessment area. Or hydrologically connected to Indian River Lagoon (~1000 feet NE of assessment area). The assessment provides moderate benefits to downstream fish and wildlife, habitats, and other hydrologically connected to Indian River Lagoon (~1000 feet NE of assessment area. The assessment of ish and wildlife. Noise, people, domesticated animals, boats, automobiles and other vehicles, and pollutants reduce the quality of the habitat within the assessment area. WITH IMPACT: The proposed action will include removal and replacment of the existing railroad bridge, will increadiditional traffic, potentially reducing support to wildlife and wildlife access to and from the assessment result of the avoidance and minimization practices implemented during the design of the proposed devel permanently impacted Landscape and Location Support resources within the assessment area will manate to access to and from the assessment area will manate and the advected and use out of the avoidance and minimization practices implemented during the design of the proposed devel permanently impacted Landscape and Location Support resources within the assessment area.							Regarding area with ms intact. sss the pstream however, stream. tt Creek is area areas. hent area hoff of e, with a e with the ea. As a ment, non- ain their
6		0						
 .500(6)(b)Water Environment (n/a for uplands) w/o pres or current with Current with CURRENT: Standing (flowing) freshwater was observed in the assessment area during the site visit. Goal the assessment area, has generally consistent water levels & flows, depth, and currents for a tidally influent the assessment area is moderate. The steep banks of the the prevents the natural movement of water into the mangrove ecosystem. WITH IMPACTS: The proposed bridge construction phase, the implementation of Best Management Practice or eliminate the transport of sediment and debris outside the project area. (As a result of the avoidar minimization practices implemented during the design of the proposed development, the non permanently wetland resources within the assessment area will maintain their current ecological function and value as to to the water environment)						the site visit. Goat or a tidally influence idential landuse up ep banks of the trik stem. water quality within hagement Practice ult of the avoidanc non permanently i on and value as the	Creek, in sed creek. Istream of putary In the Is will limit I and impacted I and impacted I and	
.500(6)(d 1. \ 2. Be w/o pres or current 4	1. Vegetation and/or 2. Benthic Community as or ent 0 0					ure (vegetation pri ies. Other wetland hore, adjacent to the ther bank and the exi- ie woody debris, sr d rail ROW) are add ged aquatic vegeta ged aquatic vegeta the new bridge winoved.	marily in species ne bridge. sting nag, den versely ation was WITH Il result in	
ι <u> </u> Ι								
		10.5 11-	Managan di su	ations.		Facility of t		l I
Score = su	im ot above sco ands, divide bv	res/30 (if 20)	If preservation as mitiga	ation,		⊢or impact assess	sment areas	
current		-,	Preservation adjustmer	nt factor =				
or w/o pres	_	with	Adjusted mitigation delt	a =	FL =	delta x acres = 0.0	0005	
0.5		0	najusiou miligalion dell	~ -				l
<u> </u>			1					
			If mitigation		F	or mitigation asse	ssment areas	
Delt	ta = [with-curre	ent]	Time lag (t-factor) =					
 	0.5		Dials fa at - "		RFG	= delta/(t-factor x i	risk) =	
	-0.5		RISK factor =			- (//	,	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name		Application Numbe	Number Assessment Area Name or Number			or Number	
Unnamed Creek at Mile	Post 259.95		Unnamed Creek Project S			ek Project Site	
FLUCCs code	Further classifica	tion (optional)		Impac	t or Mitigation Site?	Assessment Area Size	
812 (Transportation)		612 (Mangroves)			Impact	0.002	
Basin/Watershed Name/Number	Affected Waterbody (Clas	ss)	Special Classificati	on (i.e.C	FW, AP, other local/state/federa	designation of importance)	
North St. Lucie/ 43	Class	111			None		
Geographic relationship to and hyd	rologic connection with	wetlands, other si	urface water, upla	nds			
The assessment area includes unnamed creek is connected to	an unnamed creek, lo the surrounding landsc assessment area. Th	cated in Jensen B ape primarily thro e St. Lucie River f	each, Martin Cour ugh the surface wa flows into the India	nty, FL ater. <i>A</i> an Rive	., that drains into the S Areas of mangrove wetl er Lagoon.	t. Lucie River. The ands still exist in the	
Assessment area description							
The assessment area is classified as a tidally influenced riparian zone colonized by red mangroves. Small red mangroves were observed growing beneath the existing rail bridge. The observed water depth within the unnamed creek was approximately 1 to 2 ft deep. Based on the results of the benthic survey, the substrate within the assessment area is comprised of a mixture of sand, muck, and shells.							
Significant nearby features			Uniqueness (co landscape.)	nsider	ing the relative rarity in	relation to the regional	
Rio Nature Park (a small Martin County park) is just south of the assessment area, on the east side of the unnamed creek.			Many of the tidally influence tribuatries within Martin county are surrounded by residential development, as is the unnamed tributary at MP 259.95.				
Functions			Mitigation for pre-	vious p	permit/other historic use	9	
The assessment area functions as habitat for marine and avian fauna and marine and terrestrial flora. The mangroves may serve as a buffer against tidal erosion.			Not present				
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)			Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)				
Various wading birds (such as egrets, herons, rails, and sandpipers), american alligator, mud turtle, diamondback terrapin, marine turtles, mangrove water snake, sheepshead, mosquito fish, snook, marsh killifish, and various crabs			Florida Wood Stork (federally E; foraging; no wood storks observed) Manatee (federally E; resting, foraging; no manatees observed; habitat appeared marginal for the manatee); the waterway is located within the federally-protected Essential Fish Habitat (EFH) for a variety of species, including the smalltooth sawfish			wood storks observed); manatees observed; he waterway is located n Habitat (EFH) for a lltooth sawfish	
Observed Evidence of Wildlife Utiliz	zation (List species dire	ectly observed, or	other signs such a	s track	ks, droppings, casings,	nests, etc.):	
Field personnel observed fiddler crabs, hermit crabs, clams, and oysters.							
Additional relevant factors:							
Assessment conducted by:			Assessment date	e(s):			
Jeremy Paris/ Shannon McMorrow			9/11/2012				

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name			Application Number		Assessment Area Name or Number			
Unnamed Creek at Mile Post 259.95					Unnamed Creek Project Site			
Impact or Mitigation			Assessment conducted by	:	Assessment dat	Assessment date:		
	Impad	ct	Jeremy Paris/ Shannon M	cMorrow	orrow 9/11/2012			
L	•				I			
Scoring Guidance		Optimal (10)	Moderate(7)	Mi	nimal (4)	Not Present (0)		
The scoring of each			Condition is less than					
indicator is based on wh	nat	Condition is optimal and fully	optimal, but sufficient to	Minimal le	evel of support of	Condition is insufficient to		
type of wetland or surface	ce	water functions	wetland/surface water	fi	unctions	functions		
water assessed			functions					
.500(6)(a) Location Landscape Supp w/o pres or current 4	n and bort with 0	CURRENT: The area is cul assessment area is located located south of the assess into the St. Lucie River). R- minimal as the assessment all sides. Terrestrial wildlife Highway); to the S is a par- is located to the NE of the business. Wading birds col assessment area from the within the bound triangle of necessary habitat for seven pine were observed in the fish and wildlife. Noise, peo- pollutants reduce the qualit WITH IMPACT: The propo- impacts associated with the support to wildlife and wildli minimization practices impl Landscape and Location S function and value.	rrently being impacted by the d ~100 ft NW of Rio Nature I egarding support to the asset t area is located within a sm access to and from the site ved secondary road (NW Ali assessment area, but it is al uld access the assessment a creek itself (upstream and d i land. Red mangrove prop r ral juvenile fish species. The vicinity of the assessment an ople, domesticated animals, y of the habitat within the as sed action will occur on the u e existing railroad bridge, wi life access to and from the a lemented during the design upport resources within the	e existing r Park, and ~ redged ope essment ar- all triangle is very lim ce St.). A so bound b area by flig ownstream invasive, o rea. Impac boats, auto sessment west side o Il increase of the prop assessment	ailroad bridge an 600 ft N of the S ening of the unna ea for wildlife by o of undeveloped, ited: to the N is a small (10-15 acre by paved roadway ht. Wildlife could and the creek i ved in the assess exotic species Br exotic spec	d associated structures. The t. Lucie River (the marina med creek that feeds directly butside habitats; this is wooded land with barriers on major highway (NW Dixie t) undeveloped, wooded area, vs and commercial/industrial potentially access the s a source of water for wildlife iment area typically provide azilian pepper & Australian tside the assessment area to er vehicles, and runoff of dge. The noise and vibration al traffic, potentially reducing t of the avoidance and t, non-permanently impacted tin their current ecological		
 Sou(6)(b)Water Environment (n/a for uplands) wo pres or current with 5 0 					nent area. The ci for a tidally influe va is a disturbed s The steep banks eek that passes the ermanently alter v ementation of Be project area. (/ proposed develop tain their current	reek in the assessment area anced creek. Higher water site; community zonation of s of the tributary prevents the arough the assessment area water quality within the st Management Practices will As a result of the avoidance oment, the non permanently ecological function and value		
.500(6)(c)Community structure CURRENT: Plant cover and species in assessment area was limited so far as structure (vegetation prishrub layer); species diversity was poor (primarily red mangroves, a desirable plant species and Brazi pepper, an undesirable species). Plant condition was generally moderate, due to the presence of balla the river bank and the existing structures, the current substrate is consolidated and light is poor, result stunted growth of some mangroves. Other plant species observed included black mangrove, maidence oak, and Australian pine. Brazilian pepper and Australian pine are classified as a FLEPPC invasive et al. No evidence of coarse woody debris, snag, den and cavity habitat were observed. The land mgmt practimating rail bridge and rail ROW) are adversely affecting vegetation in the assessment area (prestabalist, steep slopes). Submerged aquatic vegetation was not observed. WITH IMPACT: Permanent associated with installation of the new bridge will result in the removal of 1 medium size (<4 inch DBH) mangrove and associated propagules. Additional red mangroves may be trimmed in accordance with guidance.					cture (vegetation primarily in t species and Brazilian le presence of ballast along d light is poor, resulting in nangrove, maidencane, live FLEPPC invasive exotic plant. The land mgmt practices sessment area (presence of PACT : Permanent impacts size (<4 inch DBH) red l in accordance with FDEP			
		. <u> </u>						
Score = sum of above s	scores/30	If preservation as mitig	ation, Not Applicable		For impact ass	essment areas		
(if uplands, divide b	oy 20)	Proconvotion adjustme	nt factor -					
current		Freservation aujustme	11. 140101 =	FL =	delta x acres = 0.0	0009		
pr w/o pres	with	Adjusted mitigation del	ta =		-			
0.43333	0			L				

Delta = [with-current] -0.43 It mitigation Time lag (t-factor) = Risk factor =

For mitigation assessment areas

RFG = delta/(t-factor x risk) =

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

US Army Corp. of Engineers We	etland Rapid A	ssessme	ent Procedure (WRAP)
	Score Sheet		
Category	Possible Score	Score	Notes
Wildlife Utilization Matrix			
Existing Wetland Exhibits No Evidence of Wildlife	0		The wetland area is impacted by the existing railroad. The
Existing Wetland Exhibits Minimal Evidence of Wildlife Utilization	1	1.5	railroadacts as a barrier to wildlife movement and the noise
Existing Wetland Exhibits Moderate Evidence of Wildlife Utilization	2		acts as a disturbance to wildlife. There was limited wildlife — utilization observed during the site visit. The Creek itself acts
Existing Wetland Exhibits Strong Evidence of Wildlife Utilization	3		as a corridor for aquatic fauna.
Wetland overstory/shrub canopy of Desirable Species Matrix			
No Desirable Wetland Overstory/Shrub Canopy Trees Present	0		The dominant canopy/shrub species were red and black
Minimal Desirable Wetland Overstory/Shrub Canopy Trees Present	1		mangroves and were healthy and there was recruitment of
Moderate Desirable Wetland Overstory/Shrub Canopy Trees Present	2	1.5	young mangrove propagules. The invasive exotic species
Abundant Desirable Wetland Overstory/Shrub Canopy Trees Present	3		Brazilian Pepper was also common.
Wetland Vegetative Ground Cover of Desirable Species			
No Desirable Vegetative Ground Cover Is Present	0		The rail ROW is mowed and herbicided to maintain visibilty
Minimal Desirable Vegetative Ground Cover Is Present	1	1	within the rail corridor, thus reducing plant diversity, thus
Moderate Amount of Desirable Vegetative Ground Cover is Present	2		ground cover was minimal. In addition, the invasive exotic
Moderate Amount of Desirable Vegetative Ground Cover is Present	3		species torpedograss was common.
A dia sout the loss of (Matching of De office Matching			
Adjacent Upland/Wetland Buffer	0		The habitat /land use to the west of the project area is primarily
Adjacent Upland (Wetland Buffer Average 20 (ft) or loss containing	0		
Adjacent Upland/ Wetland Buffer Averages 30 (ft) or less, containing			there is a greater than 30 foot less than 300 foot vegetated
desirable plant species	1		buffer between these land uses and the wetland: however.
than 200 (ft), containing prodominately desirable plant energies	2	1	there is a pedestrian walkway within 50 feet of the assessment
	۷	T	area. To the east of the wetland area, the land use is the
Adjacent Upland/Wetland Buffer Averages greater than than 300 (ft)			railroad with no vegetated buffer.
containing predominately desirable plant species	3		

US Army Corp. of Engineers W Score	etland Rapid e Sheet (cont	Assessme inue)	ent Procedure (WRA	AP)		
Field Indicators of Wetland Hydrology Matrix						
Hydrologic Regime has Become Severely altered with Strong Evidence of Succession to Transitional/Uplant or Open Water Plant Community	0		Standing (flowing) water was observed in the assessment are during the site visit; the depth of the tributary was estimated as 4 feet during mid-tide. The tributary in the assessment are			
Hydrologic Regime Inadequate to Maintain a Viable Wetland System	1	2	 indigenerating consistent watch revels a nows, depth, and currents for a tidally influenced creek. Higher water level indicators were noted by water staining of the ballast. The hydrologic regime is adequate to maintain a viable wetland system; however, is affected by external features primarily the existing railroad. 			
Hydrologic Regime Adequate to Maintain a Viable Wetland System External Features May Affect Wtland Hydrology	2					
Hydrologic Regime Adequate to Maintain a viable Wetland System	3					
Water Quality Input and Treatment Matrix						
Land Use Category						
LU1 Railroad (15%) score 1.5			LU 1	0.225		
LU2 Single Family Residential (70%) score 1.5			LU 2	1.05		
LU3 Commercial Low (5%) score 2			LU3	0.1		
LU4 Natural Undeveloped (10%) score 3			LU4	0.3		
			LU Total	1.675		
Pre-treatment Category						
LU1 Railroad (15%) - grass swales only (1)			LU 1	0.15		
LU2 Single Family Residential (70%)- wet/dry detention (2.5)			LU 2	1.75		
LU3 Commercial Low (5%) - grass swales only (1)			LU 3	0.05		
LU4 Natural Undeveloped (10%) - natural land (3)			LU4	0.3		
			LU Total	2.25		
			WQIT	1.9625		
Water Quality Input and Treatment Total	3	1.9625				
	T + 10					
	Total Possible	l'otal				
	18	8.9625				
Wrap Score	0.50					

US Army Corp. of Engineers We	etland Rapid A	ssessme	ent Procedure (WRAP)
	Score Sheet		
Category	Possible Score	Score	Notes
Wildlife Utilization Matrix			
Existing Wetland Exhibits No Evidence of Wildlife	0		The wetland area is impacted by the existing railroad. The
Existing Wetland Exhibits Minimal Evidence of Wildlife Utilization	1	1.5	railroadacts as a barrier to wildlife movement and the noise
Existing Wetland Exhibits Moderate Evidence of Wildlife Utilization	2		acts as a disturbance to wildlife. There was limited wildlife —utilization observed during the site visit. The Creek itself acts
Existing Wetland Exhibits Strong Evidence of Wildlife Utilization	3		as a corridor for aquatic fauna.
Wetland overstory/shrub canopy of Desirable Species Matrix			
No Desirable Wetland Overstory/Shrub Canopy Trees Present	0		The dominant sub canopy species were red, black and white
Minimal Desirable Wetland Overstory/Shrub Canopy Trees Present	1		mangroves, which were healthy and recruitment of young
Moderate Desirable Wetland Overstory/Shrub Canopy Trees Present	2	1.5	mangrove propagules was observed. The invasive exotic
Abundant Desirable Wetland Overstory/Shrub Canopy Trees Present	3		species Brazilian Pepper was also common.
Wetland Vegetative Ground Cover of Desirable Species			
No Desirable Vegetative Ground Cover Is Present	0		The rail ROW is mowed and herbicided to maintain visibilty
Minimal Desirable Vegetative Ground Cover Is Present	1	2	within the rail corridor, thus reducing plant diversity, thus
Moderate Amount of Desirable Vegetative Ground Cover is Present	2		ground cover was minimal. In addition, the rail ballast along
Moderate Amount of Desirable Vegetative Ground Cover is Present	3		the creek limited groundcover vegetation. However, swamp lily was common within the wetland assessment area.
Adjacent Unland/Wetland Buffer Matrix			
No Adjacent Upland/Wetland Buffer	0		The habitat/land use to the west of the project area is primarily
Adjacent Upland/Wetland Buffer Averages 30 (ft) or less, containing	-		single family residential and undeveloped land use; and, to the
desirable plant species	1		east of the wetland area, the land use is the railroad. Despite
Adjacent Upland/Wetland Buffer Averages greater than 30 (ft) but less			the residential and railroad land uses there is a vegetated
than 300 (ft), containing predominately desirable plant species	2	1.5	buffer (approximately 30 feet in width) surrounding the
Adjacent Upland/Wetland Buffer Averages greater than than 300 (ft)			
containing predominately desirable plant species	3		

US Army Corp. of Engineers W Score	etland Rapid e Sheet (cont	Assessme inue)	ent Procedure (WR	AP)		
Field Indicators of Wetland Hydrology Matrix						
Hydrologic Regime has Become Severely altered with Strong Evidence of Succession to Transitional/Uplant or Open Water Plant Community	0		Standing (flowing) water was observed in the assessment are during the site visit; the depth of the tributary was estimated as 1 foot during mid-tide. The tributary in the assessment are			
Hydrologic Regime Inadequate to Maintain a Viable Wetland System	1	2	currents for a tidally infl - indicators were noted by	uenced creek. Higher water level		
Hydrologic Regime Adequate to Maintain a Viable Wetland System External Features May Affect Wtland Hydrology	2		hydrologic regime is adequate to maintain a viable wetland system; however, is affected by external features primarily th existing railroad.			
Hydrologic Regime Adequate to Maintain a viable Wetland System	3					
Water Quality Input and Treatment Matrix						
Land Use Category						
LU1 Railroad/Transportation (40%) score 1.5			LU 1	0.6		
LU2 Single Family Residential (30%) score 1.5			LU 2	0.45		
LU4 Natural Undeveloped (30%) score 3			LU 3	0.9		
			LU Total	1.95		
Pre-treatment Category						
LU1 Railroad (40%) - grass swales only (1)			LU 1	0.4		
LU2 Single Family Residential (30%)- grass swales only (1)			LU 2	0.3		
LU4 Natural Undeveloped (30%) - natural land (3)			LU 3	0.9		
			LU Total	1.6		
			WQIT	1.775		
Water Quality Input and Treatment Total	3	1.775				
	Total Possible	Total				
	18	10.275				
Wrap Score	0.57					

US Army Corp. of Engineers We	etland Rapid A	ssessme	ent Procedure (WRAP)
	Score Sheet		
Category	Possible Score	Score	Notes
Wildlife Utilization Matrix			
Existing Wetland Exhibits No Evidence of Wildlife	0		The wetland area is impacted by the existing railroad. The
Existing Wetland Exhibits Minimal Evidence of Wildlife Utilization	1	1.5	railroadacts as a barrier to wildlife movement and the noise
Existing Wetland Exhibits Moderate Evidence of Wildlife Utilization	2		acts as a disturbance to wildlife. There was limited wildlife – utilization observed during the site visit. The Creek itself acts
Existing Wetland Exhibits Strong Evidence of Wildlife Utilization	3		as a corridor for aquatic fauna.
Watland overstory/shrub canony of Desirable Species Matrix			
No Desirable Wetland Overstory/Shrub Canopy Trees Present	0		The dominant subcanony species was the invasive exotic
Minimal Desirable Wetland Overstory/Shrub Canopy Trees Present	0		Brazilian Pepper followed by the invasive exotic primrose
Moderate Desirable Wetland Overstory/Shrub Canopy Trees Present	2	0.5	willow. The ROW is maintained to accomodate visibility along
Abundant Desirable Wetland Overstory/Shrub Canopy Trees Present	3	0.5	the rail corridor, thus reducing plant diversity.
Wetland Vegetative Ground Cover of Desirable Species			
No Desirable Vegetative Ground Cover Is Present	0		Ground cover within the wetland is fair, including bushy
Minimal Desirable Vegetative Ground Cover Is Present	1	2	bluestem, torpedograss, and duck potato. Torpedograss is an
Moderate Amount of Desirable Vegetative Ground Cover is Present	2		-to maintain visibility within the rail corridor, thus reducing plant
Moderate Amount of Desirable Vegetative Ground Cover is Present	3		diversity.
Adiacent Upland/Wetland Buffer Matrix			
No Adjacent Upland/Wetland Buffer	0		The habitat/land use to the west of the wetland area is single
Adjacent Upland/Wetland Buffer Averages 30 (ft) or less, containing			family residential and undeveloped; and, to the east is the
desirable plant species	1		railroad. There is little to no vegetated buffer between the
Adjacent Upland/Wetland Buffer Averages greater than 30 (ft) but less			railroad and residential land uses and the wetland; however,
than 300 (ft), containing predominately desirable plant species	2	1.5	the undeveloped natural area to the southwest provides a
Adjacent Upland/Wetland Buffer Averages greater than than 300 (ft) containing predominately desirable plant species	3		Brazilian Pepper (an undesireable species) .

US Army Corp. of Engineers W Scor	etland Rapid / Sheet (conti	Assessme nue)	ent Procedure (WR	Α Ρ)		
Field Indicators of Wetland Hydrology Matrix						
Hydrologic Regime has Become Severely altered with Strong Evidence of Succession to Transitional/Uplant or Open Water Plant Community 0			Standing water and hydrologic indicators including high water marks on the trees were observed in the assessment area. Soil at the edge of the wetland was muck. The assessment area is			
Hydrologic Regime Inadequate to Maintain a Viable Wetland System	1	2	nydrologically connected to the Tributary to Manatee Creek. The hydrologic regime is adequate to maintain a viable wetland system: however, is affected by external features			
Hydrologic Regime Adequate to Maintain a Viable Wetland System External Features May Affect Wtland Hydrology	2		primarily the existing railroad.			
Hydrologic Regime Adequate to Maintain a viable Wetland System	3					
Water Quality Input and Treatment Matrix						
Land Use Category						
LU1 Railroad (15%) score 1.5			LU 1	0.225		
LU2 Single Family Residential (70%) score 1.5			LU 2	1.05		
LU3 Natural Undeveloped (15%) score 3			LU3	0.45		
			LU Total	1.725		
Pre-treatment Category						
LU1 Railroad (15%) - wetland system is part of treatment (1.5)			LU 1	0.225		
LU2 Single Family Residential (70%)- wet detention/dry detention (2.5)		LU 2	1.75		
LU3 Natural Undeveloped (15%) - natural land (3)			LU3	0.45		
			LU Total	2.425		
			WQIT	2.075		
Water Quality Input and Treatment Total	3	2.075				
	Total Possible	Total				
	18	9.575				
Wrap Score	0.53					

FPL Everglades Mitigation Bank- North Fork of the Middle River Mitigation Bank Site Suitability Evaluation (MBSE) Matrix

Page 1 of 1

Parameters			
Parameter	Scoring Criteria	Ratings	Score
1. Adjacent to lands or waters of regional Importance and results in identifiable	State Park, OFW, AP, and including but not limited to Special Waters on at least 1 boundary	1	
ecological benefits to adjacent lands or waters.	Adjacent lands contain no special designation or undesignated special value	0	1
2. Property is within boundary of an acknowledged state, local or regional acquisition program	Property is within boundary of an acquisition program	1	
	Property is not within boundary of an acquisition program	0	0
3. Property contains ecological or geological features consistently considered by regional	Property qualifies	1	
Scientist, or federal and state agencies to be unusual, unique or rare in the region and is of sufficient size	Property does not qualify	0	0
4. Property designated as being of critical state or federal concern and/or contains special designations,	Property contains at least 1 special designation.	1	
	Property contains no special designations.	0	
5. Property important to acknowledged restoration efforts	Property is important.	1	0
	Property is not important.	0	0
6. Ownership and control of the property.	Property is privately owned.	1	
	Property is publicly owned.	0	1
7. Threatened , Endangered & Species of Special Concern	Documented Presence of Species on site	1	
Presence of animal species (faunal) found on site	No documented Presence of species on site.	0	1
8. Threatened , Endangered & Listed Species	Documented Presence of Species on site	1	
Presence of plant species (floral) found on site	No documented Presence of species on site.	0	0
9. Threat of loss or destruction from development activities. (Development Pressure)	High probability of development.	1	
	Low probability of development.	0	0
10. Extent to which lands are subject to Local, State, and Federal dredge and fill/ ERP Regulations	Property is not regulated.	1	
	Property is regulated.	0	0
	Value Cumulative Score (CS)		4

The Mitigation Bank Site Suitability Evaluation Matrix is designed to provide a quantifiable means of determining the number of mitigation credits that should be assigned to a bank for "value" related parameters. Value related parameters are human values determined to be important to society; and therefore are not measurable in a purely functional analysis. Functional analysis will only measure the degree of functional ecological improvement (degree of ecological improvement) resulting from mitigation activities. The SS Evaluation measures and provides credit for societal values that separate one mitigation bank from another as required by Ch. 62-342.470 (a) (b) (e) (f) (g) (h) (i) F.A.C.. The SS evaluation is not to be utilized in conjunction with a functional analysis.



Site Suitability Matrix					
Maximum Possible Score (MPS)		10			
Cumulative Score (CS)		4			
Site Suitability		0.4			

EPA, USACOE, USF & W, FDEP, NMFS, SFWMD, Dade DERM, FPL, CH

3-Apr-96

After Calculating the Site Suitability Score determine the Site Suitability Multiplier by utilizing the Evaluation Scale to the left. The Site Suitability Multiplier is to be multiplied times the number of the Functional Mitigation Credits, resulting from the (W.A.T.E.R.) Functional Assessment of the Mitigation Bank, to determine the number of Site Suitability Credits to be assigned to the Mitigation Bank.

Mitigation Bank Wetland Function Evaluation Matrix				North Fork	
W.A.T.E.R Wetland Assessment Technique for Environmental Reviews Based on WBI, WQI, WRAP, HGM and 4th Priority Project List (PPL) with technical advise from EPA EDEP ACOE NMES LISE & W. SEVMD & Dade County				J. Baker 2/11/2013	
,,,,,,,			Polygon	Polygon	
Parameter/ Function	Scoring Criteria	Ratings			
1. Fish & Wildlife Functions Apply to freshwater, sa	Itwater, brackish and mitigation systems			•	
	7 or more species commonly observed	3			
a. Waterfowl, wading birds, wetland dependent, or aquatic	3-6 species commonly observed	2			
birds of prey.	1-2 species commonly observed	1			
(Mit. Bank - High specie count w/ low pop. #'s score 1	0 species commonly observed	0			
	7 or more species commonly observed	3			
b. Fish	3-6 species commonly observed	2	3 (based on		
(Mit. Bank - High specie count w/ low pop. #'s score 1	1-2 species commonly observed	1	count)		
Restoration that causes 12% pop. Increases-higher score)	0 species commonly observed	0			
	Top predator (carnivore) &/or large mammals	3			
c. Mammals	Medium sized mammals , (adult weight > 6 ibs.)	2	3 (based on		
(Mit. Bank - High specie count w/ low pop. #'s score 1	Small animals (rodents, etc.), (adult weight < 6 lbs.)	1	manatee zone)		
Restoration that causes 12% pop. Increases-higher score)	0 species present	0	-		
	7 or more species commonly observed	3	-		
d. Aquatic macroinvertebrates, amphibians	3-6 species commonly observed	2	2		
(Mit. Bank - High specie count w/ low pop. #'s score 1	1-2 species commonly observed	1	-		
Restoration that causes 12% pop. Increases-higher score)	0 species commonly observed	0			
	Large species observed	3	-		
e. Aquatic reptiles	Aquatic turtles	2	- 1		
(Mit. Bank - High specie count w/ low pop. #'s score 1	Snakes & lizards	1	-		
Restoration that causes 12% pop. Increases-higher score)	No evidence of species present	0	ļ		
2. Vegetative Functions Apply to freshwater, saltwa	ter, brackish and mitigation systems				
	Desirable trees/shrub healthy & providing appropriate habitat (seedlings present) & no inappropriate species	3	-		
a. Overstory/shrub canopy	inappropriate species present	2	2		
	Inappropriate trees/shrubs shading or overcoming desirable	1	_		
	Very little or no desirable tree/shrubs present (evidence suggests there should be)	0	_		
	Assessment area exhibits <2% inappropriate herbaceous ground	3			
	Assessment area contains >2% but <30% inappropriate herbaceous	2	2 (exotic species		
b. Vegetative ground cover	groundcover, or lack of groundcover >2% but < 30% Assessment area contains >30% to <70% inappropriate herbaceous	- 1	and rip rap		
	groundcover, or lack of ground cover >30% to <70% Assessment area >70% inappropriate herbaceous groundcover or	-	present)		
	lack of groundcover >70%	0			
	Periphyton (Blue-green algae) present with average mat thickness >1 1/4 in. (measure active & dead layer)	3	_		
c. Periphyton mat coverage	Periphyton (Blue-green algae) present with average mat thickness between 3/4 in. to 1 1/4 in. (active & dead layer)	2	0		
	Periphyton (Blue-green algae) present with average mat thickness	1	0		
	Periphyton (Blue-green algae) not present or if pressent with average	1			
	thickness of 0.0 to 1/4 in. (active & dead layer)	0			
	< (or = to) 1 % exotic plant cover	3			
d. Category 1 and Category 2 exotic plants or (non-native)	>1 % to 10 % exotic plant cover	2	2		
species	>10 % to 65 % exotic plant cover	1	-		
	> 65 % exotic plant cover	0			
	>3 native species communities on site within assesssment area	3	-		
e. Habitat diversity (vegetative)	2 or 3 native specie communities on site within assessment area	2			
(within assessment area)	assessment area	1	I		
	1 native species community has > 90 % coverage	0			
	שינויויו מספראווידיון מודמ				
f Distantial discontraction (his open for the	> 3 alternative habitats available (including upland)	3	-		
control diversity within 3000 feet	2 to 3 alternative habitat	2	3		
approximately 1/2 mile noni euge of assessment area)	Same habitat type, or inappropriate / impacted	0	1		

North Fork of the Middle River

3. Hydrologic Functions				
	Major connection (Flowing water/ river or floodplain/ uniform flow through natural systems)	3		
a Surface water hydrology / sheet flow	Moderate connection (Natural restriction of flow or Flowing water due to hydrologic angineering)	2	3 (Serves as major	
Apply to freshwater, saltwater, brackish and mitigation systems	Minor connection (Runoff collection point, or uneven flow due to berms,	1	tidal connection)	
	Hydrologically isolated, no net lateral movement	0	-	
	> 8 months inundated with no reversals & every year drydown	3		
h Hydroperiod (pormal year) fresh systems	>5 months < 8 months or >5 years continuous inundation (look for	2		
	 I month <5 months, with possible reversals (look for soft or less dicting trades statics on parsistant vagetation) 	1		
	4 weeks cumulative annual inundation or < 2 weeks continuous inundation	0		
		-		
	>10 weeks of continuous inundation including soil saturation > 6 weeks but <10 weeks of continuous inundation including soil	3	-	
b-1 Alternate to b. for	saturation	2	-	
Short Hydroperiod (normal year) fresh systems:	>2 weeks but <6 weeks of inudation, including soil saturation	1		
	<2 weeks of continuos inundation	0		
	Inundated by >90% high tides			
b-2 Alternate to b. for	Inundated by "spring" high tides (bi-monthly)	2		
Saltwater, brackish (tidal) systems	Inundated by "extreme high" tides only (biannually)	1		
	Inundated by storm surges only	0		
	Inundated by high "spring" tides (monthly) and flushed by fresh water sheetflow every 10 days average	3		
b-3 Alternate to b. for	Inundated by high "spring" tides (monthly) and flushed by fresh water sheetflow every 30 days on the average	2		
High Marsh (Juncus-Distichlis)	Inundated by high "spring" tides (monthly) and exposed to rain only	1		
	Inundated by >50% high tides and exposed to rain only	0		
	Inundated by high tides (daily) and/or recieves and maintains fresh	3		
	water at least into first half of dry season Inundated by high tides (daily) and/or recieves and maintains fresh		-	
b-4 Alternate to b. for	water during rainy season only	2	1	
Riverine systems	Inundated by high tides (daily) and/or recieves fresh water but does not maintain (reversal) during rainy season	1		
	Inundated by spring tides (bi-monthly) and/or experiences frequent reversals of fresh water (flashy)	0		
3. Hydrologic Functions continued				
	>1 ft. water depth for at least 2.5 months and <6 in. for >1 month (measure water mark/ lichen line), or water depth ideal for specific wetland system.	3		
	>6 in to 1 ft. for at least 2.5 months (measure water mark/ lichen line)	2		
c. Hydropattern (iresh system)	or water depth bordenine over or under for specific wetland system <6 in. for at least 2.5 months (measure water mark/ lichen line) or		-	
	water depth incorrect for specific wetland system	I	-	
	<6 in. in association with either canals, ditches, swales, culverts, pumps, and/or wellfields, or these factors cause water depth to be too deep for specific system.	0		
	>1 ft. water depth <2 ft. on 90% high tides	3		
c-1 Alternate to c. for	> 6 in. water depth <1 ft. on >50% high tides	2		
Saltwater, brackish (tidal) systems	< 6 in. water depth , but > than saturated	1		
	Saturated by saline water table only	0		
	>10 in. water depth <2 ft. on regular basis during growing season	3		
c-2 Alternate to c. for	>5 in. to 10in. water depth on regular basis during growing season	2		
High Marsh (Juncus-Distichlis)	>1 in. to 5 in. water depth on regular basis during growing season	1		
	>0.0 in. to 1 in. water depth sporadically during growing season	0		
	>2 ft water depth (main channel) <6 ft for 8 months	3		
c-3 Alternate to c. for	>2 ft. water depth (main channel) <4 ft. for 6 months	2	1	
Riverine systems	>1 ft. water depth (main channel) <2.5 ft. for 4 months	1	3	
	<1 ft. water depth, but dry for >4 weeks (dry season)	0		

North Fork of the Middle River

e.

3. Hydrologic Functions continued				
	No indication of poor water quality (lab testing required, all values within acceptable range)	3		
d Water Quality	No visual indicators of poor water quality observed (1 value just over	2		
a. water Quanty	Visual indicators of poor water quality questionable (2 values over or	1	2 (based on visual observation)	
	under acceptable range) Visual indicators of poor water quality observed or lab verified (values		-	
	are out of acceptable range)	0		
	Unaltered	3		
e. Intactness of historic topography (soil disturbance)	Slightly altered soil disturbance, < 10% of assessment area	2		
	Moderately altered soil disturbance, < 25% of assessment area	1		
	Extremely altered soil disturbance, may exceed 50% of assessment area	0	0	
	Organic soil classified hydric soil >12 in. or any thickness over bedrock/caprock with perched water table and either condition covering >90% of surface area	3		
f. Soils, organic (fresh systems)	Organic soil classified hydric soil >6 in. but <12 in. and covering >90% of surface area	2		
	Organic soil classified hydric soil >1 in. but <6 in. and covering >50% but <90% of surface area	1		
	Organic soil classified non-hydric soil <1 in. for >50% of surface area	0		
	Sandy soil classified hydric soil with distinct mottling and concretions present in greater than 40% of horizon.	3		
f-1 Alternate to f. for	Sandy soil classified hydric soil with mottling and concretions present in > 20% but < 40% of horizon.	2		
Freshwater, saltwater systems	Sandy soil classified hydric soil with light or sparse mottling and concretions < 2 mm diameter or $< 20\%$ of horizon	1		
	Sandy soil exhibits strong evidence of disturbance or mechanical manipulations or is fill material.	0		
	Calcareous loam >12 in. and >90 % of surface area	3		
f-2 Alternate to f. for	Calcareous loam >6 in. to <12 in. and >90% of surface area	2		
Freshwater, saltwater, brackish (tidal) systems	Calcareous loam >1 in. to <6 in. and covering >50% but <90% of surface area	1		
	Calcareous loam <1 in. for >50% of surface area	0	0	
4. Salinity Parameters Apply to freshwater, saltwater, b	rackish, hypersaline and mitigation systems - Choose 1			
	<2 parts per thousand (ppt)	3		
a. Optimum salinity for fresh systems during growing	2 to 3 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	4 to 5 parts per thousand (ppt)	1		
Apply to freshwater systems within 5 miles of the coast	>5 parts per thousand (ppt)	0		
a-1. Alternate to a.	6 to 8 parts per thousand (ppt)	3		
Optimum salinity for brackish systems during growing	9 to 13 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	14 to 16 parts per thousand (ppt)	1	-	
Apply to brackish (ildai) systems only	>16 parts per thousand (ppt)	0		
a-2. Alternate to a.	17 to 19 parts per thousand (ppt)	3		
Optimum salinity for saline systems during growing	20 to 22 parts per thousand (ppt)	2	-	
season based on mean high salinity for a normal year.	23 to 25 parts per thousand (ppt)	1		
	>25 parts per thousand (ppt)	0		
a-3. Alternate to a.	26 to 41 parts per thousand (ppt)	3	-	
Optimum salinity for hypersaline systems during growing	42 to 46 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	47 to 51 parts per thousand (ppt)	1	-	
		0		
a-4 Alternate to a.	bottom (lower) third between 12 to 25 ppt	3		
growing season based on mean high slainity for a normal	unner (top) third between 0 to 4 ppt			
vear	bottom (lower) third between 25 to 32 ppt	2		
Apply to riverine systems only	middle third between 6 to 24 ppt.	-		
	upper (top) third betweem 0 to 5 ppt.			
	bottom (lower) third between 30 to 40 ppt	1	2 (estimated)	
	middle third between 8 to 29 ppt.			
	upper (top) third betweem 0 to 7 ppt.			
	bottom (lower) third between 35 to 50 ppt	0	1	
	middle third between 10 to 34 ppt.			
	upper (top) third betweem 0 to 9 ppt.			
Cotleur Hearing, Inc.	Cumulative	Score (SC)	31.00	
W.A.T.E.R. created by: Bill L. Maus	Maximum Possible S	score (MPS)	54.00	

11/1/1998

North Fork of the Middle River

		FUNCTIONAL MITIGATION	SITE SUITABILITY	Sľ	TE SUITABILITY
W.A.T.E.R SCORE	MITIGATION ACREAGE	CREDITS	MULTIPLIER		CREDITS
0.57	0.005	0.00285		1	0.0029
	vegetation removal, pile insta	llation, shading, and placement	of rip rap		

FPL Everglades Mitigation Bank - South Fork of the Middle River Mitigation Bank Site Suitability Evaluation (MBSE) Matrix

Page 1 of 1

Parameters			
Parameter	Scoring Criteria	Ratings	Score
1. Adjacent to lands or waters of regional Importance and results in identifiable	State Park, OFW, AP, and including but not limited to Special Waters on at least 1 boundary	1	
ecological benefits to adjacent lands or waters.	Adjacent lands contain no special designation or undesignated special value	0	1
2. Property is within boundary of an acknowledged state, local or regional acquisition program	Property is within boundary of an acquisition program	1	
	Property is not within boundary of an acquisition program	0	0
 Property contains ecological or geological features consistently considered by regional Scientist, or federal and state agencies to be unusual, unique or rare in the region and is of sufficient size 	Property qualifies Property does not qualify	1 0	0
4. Property designated as being of critical state or federal concern and/or contains special designations,	Property contains at least 1 special designation. Property contains no special designations.	1 0	1
5. Property important to acknowledged restoration efforts	Property is important. Property is not important.	1 0	0
6. Ownership and control of the property.	Property is privately owned. Property is publicly owned.	1 0	1
7. Threatened , Endangered & Species of Special Concern	Documented Presence of Species on site	1	
Presence of animal species (faunal) found on site	No documented Presence of species on site.	0	1
8. Threatened , Endangered & Listed Species	Documented Presence of Species on site	1	
Presence of plant species (floral) found on site	No documented Presence of species on site.	0	0
9. Threat of loss or destruction from development activities. (Development Pressure)	High probability of development.	1]
	Low probability of development.	0	0
10. Extent to which lands are subject to Local, State, and Federal dredge and fill/ ERP Regulations	Property is not regulated.	1	
	Property is regulated.	0	0
	Value Cumulative Score (CS)		4

The Mitigation Bank Site Suitability Evaluation Matrix is designed to provide a quantifiable means of determining the number of mitigation credits that should be assigned to a bank for "value" related parameters. Value related parameters are human values determined to be important to society; and therefore are not measurable in a purely functional analysis. Functional analysis will only measure the degree of functional ecological improvement (degree of ecological improvement) resulting from mitigation activities. The SS Evaluation measures and provides credit for societal values that separate one mitigation bank from another as required by Ch. 62-342.470 (a) (b) (e) (f) (g) (h) (i) F.A.C.. The SS evaluation is not to be utilized in conjunction with a functional analysis.



Site Suitability Matrix				
Maximum Possible Score (MPS)		10		
Cumulative Score (CS)		4		
Site Suitability		0.4		

EPA, USACOE, USF & W, FDEP, NMFS, SFWMD, Dade DERM, FPL, CH

3-Apr-96

After Calculating the Site Suitability Score determine the Site Suitability Multiplier by utilizing the Evaluation Scale to the left. The Site Suitability Multiplier is to be multiplied times the number of the Functional Mitigation Credits, resulting from the (W.A.T.E.R.) Functional Assessment of the Mitigation Bank, to determine the number of Site Suitability Credits to be assigned to the Mitigation Bank.

Mitigation Bank Wetland Function Evaluation Matrix				South Fork	
W.A.T.E.R Wetland Assessment Techn Based on WBI, WQI, WRAP, HGM and 4th Priorit EPA EDEP, ACOE, NMES, LISE & W. SEWMD & Date Gr	Reviewer: Date:	J. Baker 2/11/2013			
ETA, TEET, ACCE, NWI C, COT & W, CTWIND & Dade OC			Polygon	Polygon	
Parameter/ Function	Scoring Criteria	Ratings			
1. Fish & Wildlife Functions Apply to freshwater, sa	Itwater, brackish and mitigation systems				
· · · · · · · · · · · · · · · · · · ·	7 or more species commonly observed	3			
a. Waterfowl, wading birds, wetland dependent, or aquatic	3-6 species commonly observed	2			
birds of prey.	1-2 species commonly observed	1			
(Mit. Bank - High specie count w/ low pop. #'s score 1	0 species commonly observed	0			
	7 or more species commonly observed	3			
b. Fish	3-6 species commonly observed	2	3 (based on		
(Mit. Bank - High specie count w/ low pop. #'s score 1	1-2 species commonly observed	1	count)		
Restoration that causes 12% pop. Increases-higher score)	0 species commonly observed	0			
	Top predator (carnivore) &/or large mammals	3			
c. Mammals	Medium sized mammals , (adult weight > 6 ibs.)	2	3 (based on		
(Mit. Bank - High specie count w/ low pop. #'s score 1	Small animals (rodents, etc.), (adult weight < 6 lbs.)	1	manatee zone)		
Restoration that causes 12% pop. Increases-higher score)	0 species present	0			
	7 or more species commonly observed	3	_		
d. Aquatic macroinvertebrates, amphibians	3-6 species commonly observed	2	2		
(Mit. Bank - High specie count w/ low pop. #'s score 1	1-2 species commonly observed	1	_		
Restoration that causes 12% pop. Increases-higher score)	0 species commonly observed	0			
	Large species observed	3	_		
e. Aquatic reptiles	Aquatic turtles	2	- 1		
(Mit. Bank - High specie count w/ low pop. #'s score 1	Snakes & lizards	1	_		
Restoration that causes 12% pop. Increases-higher score)	No evidence of species present	0	<u> </u>	ļ	
2. Vegetative Functions Apply to freshwater, saltwa	ter, brackish and mitigation systems			-	
	Desirable trees/shrub healthy & providing appropriate habitat (seedlings present) & no inappropriate species	3			
a. Overstory/shrub canopy	Inappropriate rees/structure exhibit signs of stress (no seedlings) rew	2	2		
	tree/shrubs	1			
	Very little or no desirable tree/shrubs present (evidence suggests there should be)	0			
	Assessment area exhibits <2% inappropriate herbaceous ground cover for specific wetland systems and groundcover is present	3			
b. Vegetative ground cover	Assessment area contains >2% but <30% inappropriate herbaceous groundcover, or lack of groundcover >2% but < 30%	2	2 (exotic species		
	Assessment area contains >30% to <70% inappropriate herbaceous groundcover, or lack of ground cover >30% to <70%	1	present)		
	Assessment area >70% inappropriate herbaceous groundcover or lack of groundcover >70%	0			
	Periphyton (Blue-green algae) present with average mat thickness >1 1/4 in. (measure active & dead layer)	3			
c. Periphyton mat coverage	Periphyton (Blue-green algae) present with average mat thickness between 3/4 in, to 1 1/4 in (active & dead laver)	2	0		
	Periphyton (Blue-green algae) present with average mat thickness between 1/4 in. to 3/4 in. (active & dead laver)	1	0		
	Periphyton (Blue-green algae) not present or if pressent with average thickness of 0.0 to 1/4 in. (active & dead laver)	0			
	< (or - to) 1% evotic plant cover	3			
d. Category 1 and Category 2 exotic plants or (non-pative)	>1 % to 10 % exotic plant cover	2	1		
species	>10 % to 65 % exotic plant cover	1	2		
	> 65 % exotic plant cover	0			
	>3 native species communities on site within assesssment area	3			
e. Habitat diversity (vegetative)	2 or 3 native specie communities on site within assessment area	2			
(within assessment area)	1 native species community with 75 % to 90 % coverage within assessment area	1	1		
	1 native species community has > 90 % coverage within assessment area	0			
	> 3 alternative habitats available (including upland)	3			
f. Biological diversity within 3000 feet	2 to 3 alternative habitats	2	1		
(approximately 1/2 mile from edge of assessment area)	1 alternative habitat	1	3		
	Same habitat type, or inappropriate / impacted	0			

South Fork of the Middle River

3. Hydrologic Functions				
	Major connection (Flowing water/ river or floodplain/ uniform flow through natural systems)	3		
	Moderate connection (Natural restriction of flow or Flowing water due to	2		
a. Surface water hydrology / sheet flow Apply to freshwater, saltwater, brackish and mitigation systems	hydrologic engineering) Minor connection (Runoff collection point, or uneven flow due to berms, ditches, roadways etc.)	1	tidal connection)	
	Hydrologically isolated, no net lateral movement	0		
		3		
b. Hydroperiod (normal year) fresh systems	> 8 months inundated with no reversals & every year drydown >5 months < 8 months or >5 years continuous inundation (look for strong water stains on persistent vegetation)	2		
	 >1 month < 5 months, with possible reversals (look for soft or less distinct water stains on persistent vegetation) 	1		
	< 4 weeks cumulative annual inundation or < 2 weeks continuous inundation	0		
	<10 weeks of continuous inundation including soil saturation	3		
b-1 Alternate to b. for	 > 6 weeks bit <10 weeks of continuous inundation including soil saturation > 6 weeks but <10 weeks of continuous inundation including soil saturation 	2		
Short Hydroperiod (normal year) fresh systems:	>2 weeks but <6 weeks of inudation, including soil saturation	1		
	<2 weeks of continuos inundation	0		
	Inundated by >90% high tides			
b-2 Alternate to b. for	Inundated by "spring" high tides (bi-monthly)	2		
Saltwater, brackish (tidal) systems	Inundated by "extreme high" tides only (biannually)	1		
	Inundated by storm surges only	0		
	Inundated by high "spring" tides (monthly) and flushed by fresh water sheetflow every 10 days average	3		
b-3 Alternate to b. for	Inundated by high "spring" tides (monthly) and flushed by fresh water sheetflow every 30 days on the average	2		
High Marsh (Juncus-Distichlis)	Inundated by high "spring" tides (monthly) and exposed to rain only	1		
•	Inundated by >50% high tides and exposed to rain only	0		
	Inundated by high tides (daily) and/or recieves and maintains fresh water at least into first half of dry season	3		
b-4 Alternate to b. for	Inundated by high tides (daily) and/or recieves and maintains fresh water during rainy season only	2	-	
Riverine systems	Inundated by high tides (daily) and/or recieves fresh water but does not maintain (reversal) during rainy season	1		
	reversals of fresh water (flashy)	0		
3. Hydrologic Functions continued				
	>1 ft. water depth for at least 2.5 months and <6 in. for >1 month (measure water mark/ lichen line), or water depth ideal for specific wetland system.	3		
c. Hydropattern (fresh system)	>6 in to 1 ft. for at least 2.5 months (measure water mark/ lichen line) or water depth borderline over or under for specific wetland system	2		
	<6 in. for at least 2.5 months (measure water mark/ lichen line) or water depth incorrect for specific wetland system	1		
	<6 in. in association with either canals, ditches, swales, culverts, pumps, and/or wellfields, or these factors cause water depth to be too deep for specific system.	0		
	>1 ft. water depth <2 ft. on 90% high tides	3		
c-1 Alternate to c. for	> 6 in. water depth <1 ft. on >50% high tides	2		
Saltwater, brackish (tidal) systems	< 6 in. water depth , but > than saturated	1		
	Saturated by saline water table only	0		
	>10 in. water depth <2 ft. on regular basis during growing season	3		
c-2 Alternate to c. for	>5 in. to 10in. water depth on regular basis during growing season	2		
High Marsh (Juncus-Distichlis)	>1 in. to 5 in. water depth on regular basis during growing season	1		
	>0.0 in. to 1 in. water depth sporadically during growing season	0		
	>2 ft. water depth (main channel) <6 ft. for 8 months	3		
<i>c-3 Alternate to c. for</i> Riverine systems	>2 ft. water depth (main channel) <4 ft. for 6 months	2	3	
	>1 tt. water depth (main channel) <2.5 ft. for 4 months	0	1	
	I II. water depth, but dry for >4 weeks (dry season)	5		

South Fork of the Middle River

3. Hydrologic Functions continued				
	No indication of poor water quality (lab testing required, all values within acceptable range)	3		
	No visual indicators of poor water quality observed (1 value just over	2		
d. Water Quality	or under acceptable range) Visual indicators of poor water quality questionable (2 values over or under acceptable range)	- 1	2 (based on visual observation)	
	Visual indicators of poor water quality observed or lab verified (values are out of acceptable range)	0		
		3		
e Intactness of historic tonography (soil disturbance)	Slightly altered soil disturbance < 10% of assessment area	2		
	Moderately altered soil disturbance, $< 25\%$ of assessment area	1		
	Extremely altered soil disturbance, may exceed 50% of assessment			
	area	0	0	
	Organic soil classified hydric soil >12 in. or any thickness over bedrock/caprock with perched water table and either condition covering >90% of surface area	3		
f Soils organic (freeh systems)	Organic soil classified hydric soil >6 in. but <12 in. and covering >90% of surface area	2		
	Organic soil classified hydric soil >1 in. but <6 in. and covering >50% but <90% of surface area	1		
	Organic soil classified non-hydric soil <1 in. for >50% of surface area	0		
	Sandy soil classified hydric soil with distinct mottling and concretions present in greater than 40% of horizon.	3		
	Sandy soil classified hydric soil with mottling and concretions present	2		
f-1 Alternate to f. for Freshwater, saltwater systems	in > 20% but < 40% of horizon. Sandy soil classified hydric soil with light or sparse mottling and	-		
··· ··· · · · · · · · · · · · · · · ·	concretions < 2 mm diameter or < 20% of horizon.	1		
	Sandy soil exhibits strong evidence of disturbance or mechanical manipulations or is fill material.	0		
	Calcareous loam >12 in. and >90 % of surface area	3		
f-2 Alternate to f. for	Calcareous loam >6 in. to <12 in. and >90% of surface area	2		
Freshwater, saltwater, brackish (tidal) systems	Calcareous loam >1 in. to <6 in. and covering >50% but <90% of	1		
	surface area Calcareous loam <1 in. for >50% of surface area	0	0	
4. Salinity Parameters Apply to freshwater, saltwater, b	rackish, hypersaline and mitigation systems - Choose 1	Ŭ	0	
	<2 parts per thousand (ppt)	3		
a. Optimum salinity for fresh systems during growing	2 to 3 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	4 to 5 parts per thousand (ppt)	1		
Apply to freshwater systems within 5 miles of the coast	>5 parts per thousand (ppt)	0		
a-1. Alternate to a.	6 to 8 parts per thousand (ppt)	3		
Optimum salinity for brackish systems during growing	9 to 13 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	14 to 16 parts per thousand (ppt)	1		
Apply to brackish (tidal) systems only	>16 parts per thousand (ppt)	0		
a-2. Alternate to a.	17 to 19 parts per thousand (ppt)	3		
Optimum salinity for saline systems during growing	20 to 22 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	23 to 25 parts per thousand (ppt)	1		
Apply to saline marsh (tidal) systems only	>25 parts per thousand (ppt)	0		
a-3. Alternate to a.	26 to 41 parts per thousand (ppt)	3		
Optimum salinity for hypersaline systems during growing	42 to 46 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	47 to 51 parts per thousand (ppt)	1		
Apply to hypersaline (tidal) systems only	>51 parts per thousand (ppt)	0		
a-4 Alternate to a.	bottom (lower) third between 12 to 25 ppt	3		
Optimum salinity for riverine/tidal creek system during	middle third between 5 to 11 ppt.			
growing season based on mean high slainity for a normal	upper (top) third betweem 0 to 4 ppt.	-		
year.	bottom (lower) third between 25 to 32 ppt	2		
Apply to riverine systems only	middle third between 6 to 24 ppt.			
	upper (top) third between 0 to 5 ppt.	4	2 (estimated)	
	middle third between 8 to 29 ppt	1		
	upper (top) third between 0 to 7 ppt			
	bottom (lower) third between 35 to 50 ppt	0		
	middle third between 10 to 34 ppt.	Ŭ		
	upper (top) third betweem 0 to 9 ppt.			
Cotleur Hearing, Inc.	Cumulative	e Score (SC)	31.00	
W.A.T.E.R. created by: Bill L. Maus	Maximum Possible	Score (MPS)	54.00	
11/1/1998	W.A.T.E.R. = Cumulative Score/Maximum Po	ssible Score	0.57	

South Fork of the Middle River

		FUNCTIONAL MITIGATION	SITE SUITABILITY	SI	TE SUITABILITY
W.A.T.E.R SCORE	MITIGATION ACREAGE	CREDITS	MULTIPLIER		CREDITS
0.57	0.001	0.00057		1	0.0006
vegetation removal, pile installation, shading, and placement of rip rap					

FPL Everglades Mitigation Bank - Oleta River Mitigation Bank Site Suitability Evaluation (MBSE) Matrix

Page 1 of 1

Parameters			
Parameter	Scoring Criteria	Ratings	Score
1. Adjacent to lands or waters of regional Importance and results in identifiable	State Park, OFW, AP, and including but not limited to Special Waters on at least 1 boundary	1	
ecological benefits to adjacent lands or waters.	Adjacent lands contain no special designation or undesignated special value	0	1
2. Property is within boundary of an acknowledged state, local or regional acquisition program	Property is within boundary of an acquisition program	1	
	Property is not within boundary of an acquisition program	0	0
 Property contains ecological or geological features consistently considered by regional Scientist, or federal and state agencies to be unusual, unique or rare in the region and is of sufficient size 	Property qualifies Property does not qualify	1 0	0
4. Property designated as being of critical state or federal concern and/or contains special designations,	Property contains at least 1 special designation. Property contains no special designations.	1 0	1
5. Property important to acknowledged restoration efforts	Property is important. Property is not important.	1 0	0
6. Ownership and control of the property.	Property is privately owned. Property is publicly owned.	1 0	1
7. Threatened , Endangered & Species of Special Concern	Documented Presence of Species on site	1	
Presence of animal species (faunal) found on site	No documented Presence of species on site.	0	1
8. Threatened , Endangered & Listed Species	Documented Presence of Species on site	1	
Presence of plant species (floral) found on site	No documented Presence of species on site.	0	0
9. Threat of loss or destruction from development activities. (Development Pressure)	High probability of development.	1]
	Low probability of development.	0	0
10. Extent to which lands are subject to Local, State, and Federal dredge and fill/ ERP Regulations	Property is not regulated.	1	
	Property is regulated.	0	0
	Value Cumulative Score (CS)		4

The Mitigation Bank Site Suitability Evaluation Matrix is designed to provide a quantifiable means of determining the number of mitigation credits that should be assigned to a bank for "value" related parameters. Value related parameters are human values determined to be important to society; and therefore are not measurable in a purely functional analysis. Functional analysis will only measure the degree of functional ecological improvement (degree of ecological improvement) resulting from mitigation activities. The SS Evaluation measures and provides credit for societal values that separate one mitigation bank from another as required by Ch. 62-342.470 (a) (b) (e) (f) (g) (h) (i) F.A.C.. The SS evaluation is not to be utilized in conjunction with a functional analysis.



Cita Cuitability Matrix				
Sile Suitability Matrix				
Maximum Possible Score (MPS)		10		
Cumulative Score (CS)		4		
Site Suitability		0.4		

EPA, USACOE, USF & W, FDEP, NMFS, SFWMD, Dade DERM, FPL, CH

3-Apr-96

After Calculating the Site Suitability Score determine the Site Suitability Multiplier by utilizing the Evaluation Scale to the left. The Site Suitability Multiplier is to be multiplied times the number of the Functional Mitigation Credits, resulting from the (W.A.T.E.R.) Functional Assessment of the Mitigation Bank, to determine the number of Site Suitability Credits to be assigned to the Mitigation Bank.
Mitigation Bank Wetland Function Evaluation Matrix				Oleta River	
W.A.T.E.R Wetland Assessment Technique for Environmental Reviews Based on WBI, WQI, WRAP, HGM and 4th Priority Project List (PPL) with technical advise from EPA. FDEP, ACOE, NMFS, USF & W, SFWMD & Dade County			Reviewer: Date:	Jay Baker 2/11/2013	
			Polygon	Polygon	
Parameter/ Function	Scoring Criteria	Ratings			
1. Fish & Wildlife Functions Apply to freshwater, salt	water, brackish and mitigation systems				
	7 or more species commonly observed	3			
a. Waterfowl, wading birds, wetland dependent, or aquatic	3-6 species commonly observed	2	1		
birds of prey.	1-2 species commonly observed	1	-		
(Mit. Bank - High specie count w/ low pop. #'s score 1	0 species commonly observed	0			
	7 or more species commonly observed	3	2 (based on		
b. Fish	3-6 species commonly observed	2	observed species		
(Mit. Bank - High specie count w/ low pop. #'s score 1	1-2 species commonly observed	1	count)		
Restoration that causes 12% pop. Increases-higher score)	0 species commonly observed	0			
	Top predator (carnivore) &/or large mammals	3			
c. Mammals	Medium sized mammals , (adult weight > 6 ibs.)	2	3 (based on manatee zone)		
(Mit. Bank - High specie count w/ low pop. #'s score 1	Small animals (rodents, etc.), (adult weight < 6 lbs.)	1	(11a11a188 20118)		
Restoration that causes 12% pop. Increases-higher score)	0 species present	0			
	7 or more species commonly observed	3	4		
d. Aquatic macroinvertebrates, amphibians	3-6 species commonly observed	2	2		
(Mit. Bank - High specie count w/ low pop. #'s score 1	1-2 species commonly observed	1			
nestoration that causes 12 % pop. Increases-nigher score)		0			
	Large species observed	3	-		
e. Aquatic reptiles	Aquatic turtles	2	1		
(Mit. Bank - High specie count w/ low pop. # s score 1 Restoration that causes 12% pop. Increases bigher score)	Shakes & lizards	0			
		0		1	
2. Vegetative Functions Apply to freshwater, saltwate	pr, brackish and mitigation systems		1		
	present) & no inappropriate species	3			
	Desirable trees/shrubs exhibit signs of stress (no seedlings) few	2			
a. Overstory/shrub canopy	inappropriate species present	_	2		
	Inappropriate trees/shrubs shading or overcoming desirable tree/shrubs	1	-		
	should be)	0			
	Assessment area exhibits <2% inappropriate herbaceous ground cover	3			
	for specific wetland systems and groundcover is present Assessment area contains >2% but <30% inappropriate herbaceous	-	-		
 Vegetative ground cover 	groundcover, or lack of groundcover >2% but < 30%	2	2 (exotic species and rip rap		
	Assessment area contains >30% to <70% inappropriate herbaceous groundcover, or lack of ground cover >30% to <70%	1	present)		
	Assessment area >70% inappropriate herbaceous groundcover or lack	0			
	of groundcover >/0%				
	Periphyton (Blue-green algae) present with average mat thickness >1	3			
	Periphyton (Blue-green algae) present with average mat thickness	-			
c. Periphyton mat coverage	between 3/4 in. to 1 1/4 in. (active & dead layer)	2	0		
	between 1/4 in. to 3/4 in. (active & dead layer)	1			
	Periphyton (Blue-green algae) not present or if pressent with average	0			
		0			
	< (or = to) 1 % exotic plant cover	3			
a. Category 1 and Category 2 exolic plants or (non-native)	>1 % to 10 % exotic plant cover	2	2		
apecies	> 65 % exotic plant cover	0			
	>2. pativo spocios communitios on site within accessoment	°			
e Habitat diversity (vegetative)	2 or 3 native species communities on site within assessment area	2	1		
······································	1 native species community with 75 % to 90 % coverage within	2	1		
(within assessment area)	assessment area	1	4		
	within assessment area	0			
	> 3 alternative habitats available (including upland)	3			
f. Biological diversity within 3000 feet	2 to 3 alternative habitats	2	Biscayne bay and		
(approximately 1/2 mile from edge of assessment area)	1 alternative habitat	1	Oleta River State		
	Same habitat type, or inappropriate / impacted	0	Park)		

Mitigation Bank Wetland Function Evaluation Matrix			Project:	Oleta River	
W.A.T.E.R Wetland Assessment Technique for Environmental Reviews Based on WBI, WQI, WRAP, HGM and 4th Priority Project List (PPL) with technical advise from EPA. FDEP. ACOE. MMFS. USF & W. SFWMD & Dade County			Reviewer: Date:	Jay Baker 2/11/2013	
Parameter/ Function	Scoring Criteria	Ratings	Polygon	Polygon	
3. Hydrologic Functions					
	Major connection (Flowing water/ river or floodplain/ uniform flow through natural systems)	3			
 Surface water budgelagy / about flow 	Moderate connection (Natural restriction of flow or Flowing water due to	2	3 (Serves as major		
Apply to freshwater, saltwater, brackish and mitigation systems	Minor connection (Runoff collection point, or uneven flow due to berms,	1	tidal connection)		
	atcnes, roadways etc.) Hydrologically isolated, no net lateral movement	0			
		3	_		
	> 8 months inundated with no reversals & every year drydown >5 months < 8 months or >5 years continuous inundation (look for	2	-		
b. Hydroperiod (normal year) fresh systems	strong water stains on persistent vegetation) >1 month < 5 months with possible reversals (look for soft or less	-	-		
	distinct water stains on persistent vegetation)	1	_		
	< 4 weeks cumulative annual inundation or < 2 weeks continuous inundation	0			
	>10 weeks of continuous inundation including soil saturation	3			
h 1 Alternata ta h. far	> 6 weeks but <10 weeks of continuous inundation including soil extraction	2	-		
D-1 Alternate to D. Tor	saturation	1	-		
Short Hydroperiod (normal year) fresh systems:	>2 weeks but <6 weeks of inudation, including soil saturation		-		
	<2 weeks of continuos inundation	0			
	Inundated by >90% high tides		-		
b-2 Alternate to b. for	Inundated by "spring" high tides (bi-monthly)	2	-		
Saliwater, brackish (lidal) systems	Inundated by storm surges only	0	-		
	Inundated by high "spring" tides (monthly) and flushed by fresh water	3			
	sheetflow every 10 days average	-	-		
b-3 Alternate to b. for	sheetflow every 30 days on the average	2	-		
High Marsh (Juncus-Distichlis)	Inundated by high "spring" tides (monthly) and exposed to rain only	1	-		
	Inundated by 500% high tides and exposed to rain only Inundated by high tides (daily) and/or recieves and maintains fresh	2			
	water at least into first half of dry season Inundated by high tides (daily) and/or recieves and maintains fresh	3	_		
<i>b-4 Alternate to b. for</i> Riverine systems	water during rainy season only Inundated by high tides (daily) and/or recieves fresh water but does not	2	1		
	maintain (reversal) during rainy season	1	_		
	reversals of fresh water (flashy)	0			
3. Hydrologic Functions continued		1			
	>1 ft. water depth for at least 2.5 months and <6 in. for >1 month (measure water mark/ lichen line), or water depth ideal for specific wetland system.	3			
	>6 in to 1 ft. for at least 2.5 months (measure water mark/ lichen line)	2			
c. Hydropattern (fresh system)	or water depth borderline over or under for specific wetland system <6 in. for at least 2.5 months (measure water mark/ lichen line) or water	-	-		
	depth incorrect for specific wetland system	ļ	-		
	comments, and/or wellfields, or these factors cause water depth to be too deep for specific system.	0			
	>1 ft. water depth <2 ft. on 90% high tides	3			
c-1 Alternate to c. for	> 6 in. water depth <1 ft. on >50% high tides	2	-		
Carrier, brachish (10al) Systems	< 6 in. water depth , but > than saturated	0			
	>10 in water depth <2 ft on regular basis during growing season	3			
c-2 Alternate to c. for	>5 in. to 10in, water depth on regular basis during growing season	2			
High Marsh (Juncus-Distichlis)	>1 in, to 5 in, water depth on regular basis during growing season	1			
	>0.0 in, to 1 in, water depth sporadically during growing season	0			
	>2 ft. water depth (main channel) <6 ft. for 8 months	3			
c-3 Alternate to c. for	>2 ft. water depth (main channel) <4 ft. for 6 months	2	3		
Riverine systems	>1 ft. water depth (main channel) <2.5 ft. for 4 months	1	5		
	<1 ft. water depth, but dry for >4 weeks (dry season)	0	1		

Mitigation Bank Wetland Function Evaluation Matrix W.A.T.E.R Wetland Assessment Technique for Environmental Reviews Based on WBI, WQI, WRAP, HGM and 4th Priority Project List (PPL) with technical advise from EPA, FDEP, ACOE, NMFS, USF & W, SFWMD & Dade County			Project:	Oleta River
			Date:	2/11/2013
			Polygon	Polygon
Parameter/ Function	Scoring Criteria	Ratings		
. Hydrologic Functions continued	<u></u>			T
	No indication of poor water quality (lab testing required, all values within acceptable range)	3		
	No visual indicators of poor water quality observed (1 value just over or under accentable range)	2	2 (based on visual	
. Water Quanty	Visual indicators of poor water quality questionable (2 values over or	1	observation)	
	under acceptable range) Visual indicators of poor water quality observed or lab verified (values		-	
	are out of acceptable range)	0		
	Unaltered	3		
. Intactness of historic topography (soil disturbance)	Slightly altered soil disturbance, < 10% of assessment area	2	_	
	Moderately altered soil disturbance, < 25% of assessment area	1	_	
	Extremely altered soil disturbance, may exceed 50% of assessment area	0	0	
	Organic soil classified hydric soil >12 in or any thickness over			
	bedrock/caprock with perched water table and either condition covering >90% of surface area	3		
Soils, organic (fresh systems)	Organic soil classified hydric soil >6 in. but <12 in. and covering >90% of surface area	2		
	Organic soil classified hydric soil >1 in. but <6 in. and covering >50%	1		
	but <90% of surface area		-	
	Organic soil classified non-hydric soil <1 in. for >50% of surface area	0		
	Sandy soil classified hydric soil with distinct mottling and concretions present in greater than 40% of horizon	3		
	Sandy soil classified hydric soil with mottling and concretions present in	2	-	
-1 Alternate to f. for Treshwater, saltwater systems	> 20% but < 40% of horizon. Sandy soil classified bydric soil with light or sparse mottling and	-	-	
···· ··· · · · · · · · · · · · · · · ·	concretions < 2 mm diameter or < 20% of horizon.	1	-	
	Sandy soil exhibits strong evidence of disturbance or mechanical manipulations or is fill material.	0		
	Calcareous loam >12 in. and >90 % of surface area	3		
-2 Alternate to f. for	Calcareous loam >6 in. to <12 in. and >90% of surface area	2		
Freshwater, saltwater, brackish (tidal) systems	Calcareous loam >1 in. to <6 in. and covering >50% but <90% of	1		
	Calcareous loam <1 in. for >50% of surface area	0	0	
1. Salinity Parameters Apply to freshwater, saltwater, b	rackish, hypersaline and mitigation systems - Choose 1			
	<2 parts per thousand (ppt)	3		
 Optimum salinity for fresh systems during growing 	2 to 3 parts per thousand (ppt)	2		
season based on mean high salinity for a normal year.	4 to 5 parts per thousand (ppt)	1	_	
Apply to freshwater systems within 5 miles of the coast	>5 parts per thousand (ppt)	0		-
a-1. Alternate to a.	6 to 8 parts per thousand (ppt)	3	-	
Optimum salinity for brackish systems during growing	9 to 13 parts per thousand (ppt)	2	_	
season based on mean high salinity for a normal year.	14 to 16 parts per thousand (ppt)	1	-	
+++) (2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	>16 parts per thousand (ppt)	0		
a-2. Alternate to a.	17 to 19 parts per thousand (ppt)	3	-	
Detimum salinity for saline systems during growing	20 to 22 parts per thousand (ppt)	2 1	-	
Apply to saline marsh (tidal) systems only	>25 parts per thousand (ppt)	0	-	
2. Alternate to a	26 to 41 parts per thousand (ppt)	3		
I-3. Alternate to a.	42 to 46 parts per thousand (ppt)	2	-	
eason based on mean high salinity for a normal year.	47 to 51 parts per thousand (ppt)	1	-	
Apply to hypersaline (tidal) systems only	>51 parts per thousand (ppt)	0	-	
a-4 Alternate to a.	bottom (lower) third between 12 to 25 ppt	3		
Optimum salinity for riverine/tidal creek system during	middle third between 5 to 11 ppt.			
rowing season based on mean high slainity for a normal	upper (top) third betweem 0 to 4 ppt.		1	
ear.	bottom (lower) third between 25 to 32 ppt	2		
Apply to riverine systems only	middle third between 6 to 24 ppt.			
	upper (top) third between 0 to 5 ppt.	4	2 (estimated)	
	middle third between 8 to 29 ppt	1		
	upper (top) third betweem 0 to 7 ppt.			
	bottom (lower) third between 35 to 50 ppt	0	1	
	middle third between 10 to 34 ppt.			
	upper (top) third betweem 0 to 9 ppt.			
Cotleur Hearing, Inc.	Cumulative	e Score (SC	31.00	
/.A. I.E. K. created by: Bill L. Maus	<u>Maximum Possible :</u> W.A T F R = Cumulative Score/Maximum Po	ssible Score) <u>54.00</u> 9 0.57	
	W.A. T.E. T Outhulative Ocore/WaXIIIuIII FC		. 0.07	

Oleta River		FUNCTIONAL MITIGATION	SITE SUITABILITY	S	ITE SUITABILITY	
W.A.T.E.R SCORE	MITIGATION ACREAGE	CREDITS	MULTIPLIER		CREDITS	
0.57	0.002	0.00114		1	0.0011	
vegetation removal, pile installation, shading, and placement of rip rap						