DRAFT SUPPLEMENTAL PROGRAMMATIC INDIVIDUAL ENVIRONMENTAL REPORT

MITIGATION FOR PROTECTED SIDE BOTTOMLAND HARDWOODS DRY

WESTBANK AND VICINITY HURRICANE STORM DAMAGE AND RISK REDUCTION MITIGATION

JEFFERSON PARISH, LOUISIANA

SPIER #37a

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1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Supplemental Programmatic Individual Environmental Report # 37a (SPIER # 37a) to evaluate changes to the approved Mitigation Plan (MP) for mitigating the impacts associated with construction of the West Bank and Vicinity (WBV) 100-year Hurricane and Storm Damage Risk Reduction System (HSDRRS) as presented in the Programmatic Individual Environmental Report # 37 West Bank and Vicinity Hurricane and Storm Damage Risk Reduction System Mitigation, Jefferson, Lafourche, Plaquemines and St. Charles Parishes, Louisiana (PIER #37) with a Decision Record (DR) signed on June 13, 2014. The term "100-year level of risk reduction," as it is used throughout this document, refers to a level of risk reduction that reduces the risk of hurricane surge and wave driven flooding that the New Orleans Metropolitan Area experiences to a 1 percent chance each year. The HSDRRS work consists of upgrading the existing system of levees, floodwalls and gates around the New Orleans Metropolitan Area to provide the 100-year level of risk reduction. The WBV portion of the HSDRRS is the work that is occurring on the west bank of the Mississippi River. A list of the abbreviations used in the PIER #37 is provided in appendix C.

SPIER #37a has been prepared in accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality's (CEQ) NEPA implementing regulations (40 Code of Federal Regulations [CFR] §1500-1508), as reflected in the USACE ER 200-2-2 (33 CFR §230). This SPIER has been prepared in lieu of a traditional environmental assessment (EA) or Environmental Impact Statement (EIS) pursuant to the CEQ approved NEPA Emergency Alternative Arrangements (40 CFR §1506.11). The Alternative Arrangements can be found at www.nolaenvironmental.gov, and are herein incorporated by reference.

The CEMVN published the Alternative Arrangements in the Federal Register on March 13, 2007 (72 FR 11337). This process was implemented to expeditiously complete environmental analysis for the 100-year level of the HSDRRS, formerly known as the Hurricane Protection System (HPS). The proposed actions are located in southeastern Louisiana (LA) and are part of the Federal effort to construct the HSDRRS in the New Orleans Metropolitan area after the destruction caused by Hurricanes Katrina and Rita.

This SPIER #37a identifies substitute projects for the protected side (PS) bottomland hardwoods dry (BLH-Dry) feature of the MP found in the PIER #37 and provides an assessment of the revised compensatory mitigation plan for the WBV HSDRRS impacts using the selected replacement projects.

Construction impacts of the WBV HSDRRS are described in Individual Environmental Reports (IERs) 12-17 and 33, and their associated Supplemental IERs (IERS). The IERs are available on www.nolaenvironmental.gov. The CEMVN continues to make a concerted effort to avoid and minimize environmental impacts to the maximum extent practicable while designing and constructing the HSDRRS. However, unavoidable impacts have occurred and continue to occur to fresh, intermediate, and brackish marsh, BLH-Dry and BLH-wet, and swamp.

Compensatory mitigation is an integral feature of the HSDRRS work. The CEMVN is required by the Water Resources Development Acts (WRDAs) of 1986 and 2007 to offset unavoidable habitat impacts through compensatory mitigation by replacing the lost habitat's functions and services in-kind to the extent possible. WRDA 1986, Section 906(d)(1), as amended by WRDA 2007, Section 2036(a), and by WRRDA 2014 Section 1040, provides additional requirements for

Corps' compensatory mitigation plans. Pursuant to these provisions, specific mitigation plans shall ensure that impacts to bottomland hardwood forests are mitigated in-kind and other habitat types are mitigated to not less than in kind conditions to the extent possible. Corps' Implementation Guidance for Section 2036(a) of the WRDA of 2007 states that compensatory mitigation should be located within the same hydrologic basin (watershed) as where the impacts occurred. The Clean Water Act (CWA) Section 404(b)(1) Guidelines also require compensatory mitigation for unavoidable habitat losses.

In accordance with the Alternative Arrangements, this draft SPIER will be distributed for a 30-day public review and comment period. A public meeting specific to the proposed action would be held if requested during the review period. Any comments received during that review period and public meeting would be considered part of the official record. After the 30-day comment period, and public meeting if requested, the CEMVN Commander would review all comments received and make a determination whether they rise to the level of being substantive. If no substantive comments are received the CEMVN Commander would make a decision on the proposed action. This decision would be documented in a decision record (DR). If a comment(s) is determined to be substantive, an Addendum to the SPIER responding to the comment(s) would be prepared and published for an additional 30-day public review and comment period. After the expiration of the second public comment period the CEMVN Commander would then make a decision on the proposed action that would be documented in a DR.

Unless otherwise indicated, all figures cited can be found in appendix A and all tables in appendix B.

1.1 PURPOSE AND NEED

The purpose of the proposed action is to compensate for habitat losses incurred during construction of the WBV HSDRRS to PS BLH-Dry which is the only feature of the WBV HSDRRS Mitigation Plan proposed for revision by this SPIER. All other general features identified in the approved mitigation plan (MP) remain as set forth in the PIER #37 and its Record of Decision and the Park approved mitigation plan remains the same as stated in the joint Environmental Assessment (EA) with the National Park Service entitled "Jean Lafitte National Historical Park and Preserve Mitigation Features, Environmental Assessment and National Historic Preservation Act Assessment of Effects, West Bank and Vicinity Hurricane and Storm Damage Risk Reduction System Mitigation, Jefferson Parish, Louisiana, PIER #37, TIER 1 EA, FONSI approved Dec 18, 2015 . The BLH-Dry habitat type is described in section 2.1 of the PIER #37. The proposed compensatory mitigation would replace the lost functions and services of the impacted habitat through enhancement activities designed to create/increase/improve the habitat functions and services at specific mitigation sites.

1.2 AUTHORITY

The authority for the proposed action was provided as part of legislation authorizing a number of HSDRRS projects spanning southeastern LA, including the Lake Pontchartrain and Vicinity (LPV) project and the WBV project. Additionally, Congress passed a series of supplemental appropriations acts following Hurricanes Katrina and Rita to repair and upgrade the projects damaged by these storms.

The WBV project was authorized by the WRDA of 1986 (P.L. [Public Law] 99-662, Section 401(b)). The WRDA of 1996 modified the project and added the Lake Cataouatche Project and

the East of Harvey Canal Project (P.L. 104-303, 101(b)(11) & P.L. 104-303, Section 101(a)(17)). The WRDA 1999 (P.L. 106-53, Section 328) combined the three projects into one project as the West Bank and Vicinity Hurricane Protection Project.

The Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act of 2006 (3rd Supplemental - PL 109-148, Chapter 3, Construction, and Flood Control and Coastal Emergencies) authorized accelerated completion of the WBV project and restoration of project features to design elevations at full Federal expense. The Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery of 2006 (4th Supplemental - PL 109-234, Title II, Chapter 3, Construction, and Flood Control and Coastal Emergencies and 6th Supplemental - PL 110-252, Title III, Chapter 3) authorizes modification to WBV to provide the level of protection necessary to achieve the certification required for participation in the National Flood Insurance Program; the replacement or reinforcement of floodwalls; and the construction of levee armoring at critical locations.

1.3 PUBLIC CONCERNS

Throughout the WBV basin, the public has expressed concern that sufficient funding be allocated for the HSDRRS mitigation efforts and that the HSDRRS mitigation is completed in a timely manner. Concern has also been expressed that mitigation banks are given the opportunity to sell credits to satisfy the HSDRRS mitigation requirement.

During the public review of the PIER #37, the Lafourche Parish community expressed concerns about the use of condemnation to acquire private lands for mitigation associated with the Lake Boeuf alternative. Concern was also expressed that conversion of agricultural land to forested wetlands would impact the community and its economy.

1.4 PRIOR REPORTS

A number of studies and reports on water resources development in the project area have been prepared by CEMVN, other Federal, state, and local agencies, research institutes, and individuals. Pertinent studies, reports, and projects are discussed in the following sections. Additional studies and reports were discussed in PIER #37 which is incorporated into this SPIER #37a by reference. The following documents can be found at www.nolaenvironmental.gov

Mitigation for impacts to the human and natural environment caused by construction of the WBV HSDRRS work within the Jean Lafitte National Historical Park and Preserve were analyzed in the joint EA entitled Jean Lafitte National Historical Park and Preserve Mitigation Features, Environmental Assessment and National Historic Preservation Act Assessment of Effects, West Bank and Vicinity Hurricane and Storm Damage Risk Reduction System Mitigation, Jefferson Parish, Louisiana, PIER #37, TIER 1 EA.

1.4.2 WBV HSDRRS IERs and Impacts

Impacts to the human and natural environment caused by construction of the WBV HSDRRS work were analyzed in IERs 12 – 17, and 33 and supplemental reports. Environmental impacts, including jurisdictional wetlands and non-jurisdictional bottomland hardwoods forest impacts were assessed in cooperation with an interagency mitigation team in accordance with the NEPA, the Fish and Wildlife Coordination Act, and Section 906(b) WRDA 1986 (as

amended) requirements. A summary discussion of impacts by IER can be found in appendix C-1 of the PIER #37.

A "habitat-based methodology" in the form of the wetland value assessment (WVA) model was used to assess impacts from construction of the HSDRRS work and future benefits to be obtained through the compensatory mitigation projects. The WVA model computes the difference in the habitat value over the period of analysis between the future without and future with project conditions. The difference is expressed as net average annual habitat units (AAHUs). For example, if the net change between the future without project condition (FWOP) and the future with project condition (FWP) over the 50-year period of evaluation is +0.2 over 100 acres, then that project would produce 20 AAHUs of ecological benefit. The same version of the model was used to calculate both the impacts from construction the HSDRRS work and future benefits to be obtained through the implementation of the mitigation. For further information regarding WVA models please see section 2.7.

1.4.3 Government Furnished Borrow IERs and Impacts

Mitigation for Government Furnished Borrow Sites
Impacts to the human and natural environment caused by the use of government furnished borrow were analyzed in IERs 18, 22, 25, and 28. Of the government furnished borrow sites approved for use in the HSDRRS construction, the only site with environmental impacts requiring mitigation utilized to date is the Churchill Farms Site assessed in IER18. The total impact for the site is 29.9 acres (10.62 AAHUs) of PS BLH-Dry, which would be mitigated with the other WBV HSDRRS impacts.

1.4.4 Contractor Furnished Borrow IERs and Impacts

Mitigation for Contractor Furnished Borrow Sites
To meet the extremely large need for borrow for the HSDRRS improvements, utilization of Contractor Furnished (CF) borrow was also employed by the CEMVN. Impacts to the human and natural environment caused by the use of CF borrow were analyzed in IERs 19, 23, 26, 29, 30, 31, 32, and 35. To date, no wetlands have been impacted by the excavation of borrow for the HSDRRS program. Mitigation for BLH-Dry habitats impacted under the CF borrow program is not addressed in this SPIER #37a since mitigation for those impacts is performed by either the land owner or the contractor utilizing the site prior to allowing the site to be utilized.

1.4.5 Mitigation Requirement

1.4.5.1 Revision of WBV HSDRRS Impacts

Because the IERs evaluating the HSDRRS risk reduction features were completed at the 35 percent level of design, the footprints stated in those IERs were, in many cases, a worst-case scenario (i.e., larger than necessary) footprint. Through advanced engineering and design, the CEMVN has made a concerted effort to avoid and minimize impacts to the environment to the maximum extent practicable. As such, in many cases, the predicted impacts anticipated in the HSDRRS IERs were significantly reduced as the projects proceeded to 100 percent design. Consequently, to accurately capture the impacts caused by construction of the HSDRRS, the mitigation PDT, in cooperation with the resource agencies, revised the original impact estimates utilizing the 95-100 percent design plans. Additionally, following identification of tentatively selected mitigation plan alternative found in the PIER #37, the revised impact estimates were again revisited and verified by the United States Fish and Wildlife Service (USFWS), some final

as-builts were received, and correction of NPS impacts based on the Omnibus Public Lands Management Act occurred, which resulted in further adjustment to the estimated impacts. Details of these revisions can be found in the PIER #37.

1.4.5.2 WBV Original Construction Impacts

Changes to the previously authorized WBV Hurricane Protection Project as assessed in EA 437 entitled "West Bank and Vicinity, New Orleans, Louisiana Hurricane Protection Project, Lake Cataouatche Levee Enlargement Highway 90 to Cataouatche Pump Stations" and EA 439 entitled "West Bank and Vicinity, New Orleans, Louisiana Hurricane Protection Project: Westwego to Harvey Canal Highway 45 Borrow Pits, Jefferson Parish, Louisiana" incurred impacts requiring mitigation. Because the impacts assessed in EAs 437 and 439 (Table 1.1) used a 100-year period of analysis and because the mitigation plan for those impacts was not fully developed in those EAs, a decision was made to re-assess those impacts using a 50 year period of analysis and to mitigate them along with the WBV HSDRRS impacts (which were also assessed using a 50 year period of analysis).

Table 1-0-1: WBV Original Construction Impacts

	PS BLH-Dry		FS BLH-Wet		FS Swamp	
EA	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs
439			21.50	15.10	88.5	50.71
437	162.10	58.95				
PS Total	162.10	58.95				
FS Total			21.50	15.10	88.50	50.71

1.4.5.3 WBV Original and HSDRRS Mitigation Requirement

Combining the WBV HSDRRS construction impacts, WBV HSDRRS government furnished borrow impacts and impacts from the original construction of the WBV hurricane protection system produced the following requirement for mitigation (see Table 1.2).

Table 1-0-2: WBV Original and HSDRRS Mitigation Requirement Habitat Type

Habitat Type	AAHUs Impacted
General PS BLH-Wet/Dry	200.27 AAHUs
General FS BLH-Wet	72.04 AAHUs
General FS Swamp	134.52 AAHUs
General FS Fresh Marsh	65.92 AAHUs
Park/404(c) FS BLH-Wet	3.12 AAHUs
Park/404(c) FS Swamp	7.19 AAHUs
Park/404(c) FS Fresh Marsh	3.03 AAHUs

This SPIER #37a evaluates the impacts of the MP with the substitute projects for the PS BLH-dry feature and proposes moving forward with construction of this feature.

1.6 INTEGRATION WITH OTHER INDIVIDUAL ENVIRONMENTAL REPORTS

The CEMVN prepared the first phase of the Comprehensive Environmental Document (CED) that evaluated the cumulative effects of the HSDRRS work on a system-wide scale. The CED

Phase 1 incorporated information from IERs completed by November 15, 2010 and public review of this document ended April 8, 2013. The next phase of the CED is under development and will include the HSDRRS mitigation plans, long-term monitoring and adaptive management commitments as well as IERs completed after November 15, 2010. A decision record will be executed following public review of the final phase of the CED.

2. ALTERNATIVE FORMULATION

The following sections walk the reader through the plan formulation process from identification of the approved MP in the PIER #37 and PIER #37, TIER 1 EA to events that have led us to this tentatively selected modified mitigation plan (TSMMP) presented in this supplemental document.

2.1 MITIGATION PLAN FORMULATION

The following mitigation projects were evaluated for each habitat type impacted from the WBV HSDRRS construction and constituted the final array of potential projects considered in the PIER #37. The mitigation project in Table 2-1 that is the subject of this supplemental document is highlighted in red and starred.

General BLH-Dry/BLH-Wet Protected Side Impacts

- Bayou Segnette PS BLH-Dry & BLH-Wet Enhancement
- Dufrene Ponds PS BLH-Wet Restoration
- Lake Boeuf PS BLH-Dry & BLH-Wet Restoration
- Plaquemines, Alt. 2 PS BLH-Wet Restoration
- General Mitigation Bank

General BLH-Wet Flood Side Impacts

- Dufrene Ponds FS BLH-Wet Restoration
- Lake Boeuf FS BLH-Wet Restoration
- Plaquemines, Alt. 2 FS BLH-Wet Restoration

General Swamp Flood Side Impacts

- Dufrene Ponds FS Swamp Restoration
- Lake Boeuf FS Swamp Restoration
- Plaquemines, Alt. 1 FS Swamp Restoration
- Plaquemines, Alt. 2 FS Swamp Restoration
- Salvador-Timken FS Swamp Restoration
- Simoneaux Ponds FS Swamp Restoration

General Fresh Marsh Flood Side Impacts

- Dufrene Ponds FS Marsh Restoration
- Jean Lafitte FS Marsh Restoration
- Plaquemines, Alt. 1 FS Marsh Restoration
- Salvador-Timken FS Marsh Restoration
- Simoneaux Ponds FS Marsh Restoration

Park/404(c) BLH-Wet Flood Side Impacts

- Jean Lafitte FS BLH-Wet Restoration

Park/404(c) Swamp Flood Side Impacts

- Jean Lafitte FS Swamp Restoration

Park/404(c) Marsh Flood Side Impacts

- Jean Lafitte FS Marsh Restoration

Screening of the above projects resulted in the identification of the following WBV HSDRRS MP that was approved by the CEMVN District Commander on June 13, 2014. Details of the screening process are located in chapter 2 of the PIER #37.

Table 2-1: PIER #37 Mitigation Plan

Habitat Type Impacted	Tentatively Selected Mitigation Project (TSMP)
General PS BLH-Wet/Dry	General Mitigation Bank*
General FS BLH-Wet	Lake Boeuf FS BLH-Wet Restoration
General FS Swamp	Lake Boeuf FS Swamp Restoration
General FS Fresh Marsh	Jean Lafitte FS Marsh Restoration
Park/404(c) FS BLH-Wet	Jean Lafitte FS BLH-Wet Restoration
Park/404(c) FS Swamp	Jean Lafitte FS Swamp Restoration
Park/404(c) FS Fresh Marsh	Jean Lafitte FS Marsh Restoration

* Projects are the subject of this SPIER #37a.

In accordance with the USACE Implementation Guidance for Section 2036 of the WRDA 2007, Mitigation for Fish and Wildlife and Wetlands Losses, as well as the standards and policies set forth in 33 CFR Part 332, compensatory mitigation was formulated to occur within the same watershed or hydrologic basin as the impacts and to replace the functions and services of each habitat type with functions and services of the same habitat type. The WBV HSDRRS Mitigation Basin boundaries coincide with the watershed boundaries except for the southern boundary. The southern boundary for planning purposes was limited to the intermediate/brackish marsh interface at 6 part per thousand (ppt) because the WBV HSDRRS work only impacted fresh marsh and the functions and services of fresh marsh could not be replaced in areas with salinities greater than those found in intermediate marsh systems.

In accordance with WRDA 1986, 33 U.S.C. 2283(d) and WRDA 2007 U.S.C. 2036(a) mitigation measures were required to either restore or enhance the same habitat types that were impacted (e.g. “habitat type for habitat type”) from the HSDRRS construction. In the case of impacts to BLH-Dry habitats, the PDT determined that the potential mitigation measures could involve restoring or enhancing BLH-Wet habitat instead of BLH-Dry habitat. This is possible because BLH-Wet habitat has an added hydrologic component that allows a greater diversity of species to thrive while still supporting the species that utilize BLH-Dry habitat. The result is an increase in habitat functions and services for BLH-Wet over and above what BLH-Dry would provide. The reverse would not be possible because using BLH-Dry to mitigate BLH-Wet would result in the loss of wetland related functions and services essential to that system. Similarly, impacts to fresh marsh habitats could involve restoring or enhancing intermediate marsh as intermediate

marsh provides similar functions and services for many of the same species utilizing fresh marsh.

With approval of the PIER #37 MP, CEMVN was able to move forward with the purchase of mitigation bank credits to satisfy the BLH-Wet portion of the PS BLH-Wet/Dry mitigation requirement on February 11, 2015.

PIER #37, TIER 1 EA MITIGATION PLAN FORMULATION

Impacts to JELA would be mitigated within the boundaries of JELA as per NPS Director's Order 77-1 requiring impacts occurring on a National Park (Park) to be mitigated on lands managed by the NPS, with the following recommended priority order: 1) within the same wetland system as the impacted wetland; 2) within the same watershed; or 3) in another watershed within the same NPS unit. Additionally, all unavoidable adverse impacts to the 404(c) would be mitigated within that area and/or on JELA as committed to by the CEMVN District Commander in his November 4, 2008 letter to the Regional Administrator for EPA Region 6 (see Appendix H of PIER 37, TIER 1). This commitment was also cited in EPA's May 27, 2009 Final Determination for the modification of the Section 404(c) determination for Bayou aux Carpes. The CEMVN is compensating for impacts to the three habitat types: fresh marsh, swamp and BLH-Wet within JELA.

BLH-Wet and Swamp
As final modeling was completed and the benefits of the projects refined, the design of the projects considered for mitigating the swamp and BLH-Wet Park/404c impacts presented in PIER #37 were modified. The modeling showed that gapping the northern Millaudon Canal berm, and gapping, instead of degrading, the original JL7 berm (adjacent to Horseshoe Canal) produced sufficient hydrologic benefits so as to mitigate all of the WBV HSDRRS Park/404c swamp impacts. As such, the filling of Horseshoe Canal (part of JL7) and the filling of the keyhole canals off of Bayou Barataria (JL8 and JL9) that were features of the recommended Park/404c swamp mitigation project in PIER #37 were dropped. Since the filling of Horseshoe Canal was dropped, degradation of the JL7 berm for borrow was un-necessary, which greatly reduced the impacts to BLH. Accordingly, the size of the Park/404c BLH-Wet mitigation project (JL14A) was also significantly reduced (Figure A-12).

Fresh Marsh
The design of the JL1B4 project has not changed since completion of the PIER #37.

2.2 MITIGATION PLAN RE-EVALUATION

Construction of most of the HSDRRS system is scheduled to be complete by December 2016, although construction on portions of the system, such as the permanent pumps on the Orleans Parish outfall canals and armoring of some levee reaches, will extend well beyond that date. WRDA 1986, Section 906 (33 U.S.C. 2283(a)) directs that mitigation occur before construction (of the project incurring the impact) or concurrent with construction. To comply with that requirement, the CEMVN has determined that all HSDDRS mitigation project construction contracts should be awarded before or as close as possible to December 2016. This directive adds an additional constraint on the planning and implementation of the WBV HSDRRS Mitigation projects. Projects in the PIER #37 MP that could be implemented before or closer to the December 2016 date would be ranked higher based on the screening criteria and planning constraints

The three projects identified in the PIER #37 MP that are at this time considered no longer desirable and/or implementable are the FS swamp and FS BLH-wet Lake Boeuf projects as well as the BLH-Dry portion of the PS BLH-Dry/BLH-Wet mitigation bank project. (The PS BLH-Wet requirement has been satisfied.) The FS swamp and FS BLH-Wet Lake Boeuf projects are considered not desirable due to a lack of support by the non-federal sponsor (NFS), and some members of the public and therefore are not considered acceptable projects. The PS BLH-Dry mitigation bank project currently cannot be implemented due to the lack of in-kind mitigation bank credits in the WBV basin.

Section 2.4.1 of the PIER #37 provides background information on the alternative evaluation process (AEP) utilized to compare projects mitigating for the same habitat type in the final array. In the PIER #37, section 2.8, Data Gaps and Uncertainties, under Implementation it was stated that "If any of the TSMP projects (features of the MP) could not be implemented, the CEMVN would either fall back to one of the other projects evaluated in the AEP in order of ranking for that habitat type or would, in coordination with the resource agencies and the NFS, explore other options to mitigate these impacts". Therefore the projects in the final array for general PS BLH-Dry were re-evaluated in an effort to identify potential substitute projects for this feature in the MP. In addition to evaluating these projects based on ability to implement the project as close to the HSDRRS construction completion deadline as possible, each of the projects in the final array was evaluated in terms of relative cost in light of the WBV HSDRRS Mitigation budget. Projects that were excessively expensive (whose costs would therefore jeopardize implementation of the other features of the MP) were eliminated from further consideration.

The projects in the final array for general FS BLH-Wet and FS Swamp are unacceptable to some members of the public and will undergo plan reformulation. Scoping meetings will be the first step of this process. Scoping meeting(s), which are open to the public, will be held in order for the CEMVN to receive feedback from the public regarding potential alternative mitigation sites that would be acceptable and feasible. The scoping meeting dates and locations will be published in the local paper.

2.3 RE-EVALUATION OF FINAL ARRAY PROJECTS FOR PS BLH-DRY

The following projects evaluated in the PIER #37 AEP for this habitat type were re-evaluated in an effort to find a potential substitute project for the general BLH-Dry portion of the PS BLH-Wet/Dry feature of the MP. Only one of these projects was found to be a feasible replacement project for the General PS BLH-DRY feature for the following reasons:

Table 2. ALTERNATIVE FORMULATION2: Final Array Projects Evaluated in AEP for General PS BLH-Wet/Dry Impacts

Rank	General PS BLH-Wet/Dry Projects	Issue:	Comments:
1	Mitigation Bank	Credit Availability	Only sufficient in basin credits were available to mitigate the BLH-Wet portion of the impacts. At this time, there are not sufficient credits available in the WBV basin to satisfy the BLH-dry requirement.

2	Lake Boeuf PS BLH-Dry & BLH-Wet Restoration Project (TSMP)	Acceptability	ROE not granted for this location. The NFS, and some members of the public are against utilizing these lands for mitigation.
3	Bayou Segnette PS BLH-Dry Enhancement Project	None	ROE was granted for this location.
4	Plaquemines, Option 2 PS BLH-Wet Restoration Project	Cost/Acceptability	ROE was not granted for this location. Condemnation would likely be required, increasing the time to implementation. Creating BLH from open water is costly
5	Dufrene Ponds PS BLH-Wet Restoration	Cost/Acceptability	ROE was not granted for this location. Condemnation would likely be required, increasing the time to implementation. Creating BLH from open water is costly

Review of the AEP projects for this habitat type found the Bayou Segnette PS BLH-Dry Enhancement Project would be implementable sooner than any of the others and at a reasonable cost; therefore it becomes the new TSMP for this habitat type. However, based on the evaluations discussed in PIER #37, the purchase of mitigation bank credits remains a preferred alternative to the Bayou Segnette PS BLH-Dry project. Consequently, if sufficient PS BLH mitigation bank credits become available in basin, consistent with the MP identified in PIER #37, those credits would be purchased before building the project at Bayou Segnette.

During design and in the evaluation of the PS BLH-Dry Projects in PIER #37, the Project Delivery Team (PDT) referred to the project proposed herein to compensate for PS BLH-Dry impacts as “Bayou Segnette” due to its location. However, there is an existing mitigation project near Bayou Segnette which is commonly referred to as “Pre-K Mitigation at Bayou Segnette” or “Bayou Segnette” for short. To avoid confusing the two projects, the PDT has changed the name of the proposed PS BLH-Dry Bayou Segnette mitigation project in this document to “Avondale Gardens”. Therefore, from here on, the PS BLH-Dry project previously identified as Bayou Segnette in PIER #37 will be referred to as Avondale Gardens for this modified mitigation plan.

2.3.1 Avondale Gardens (Bayou Segnette) PS BLH-Dry Enhancement

This project would involve enhancing an existing degraded BLH habitat as mitigation for general PS BLH-Dry impacts. The proposed feature is located on the Westbank of Jefferson Parish, Louisiana near Bayou Segnette State Park. Two locations have been identified within the project area, BLH West and BLH East (Appendix A-5).

BLH West is bounded by the Inner Cataouatche Canal on the southwest, a utility easement to the north and the Avondale Garden Canal to the east. The site is currently 1,000 acres. BLH East consists of three (3) sub units; 262 acres, 542 acres, and 189 acres totaling 993 acres. The units are bordered to the south by the Inner Cataouatche Canal, an existing mitigation site currently under construction by USACE to the east, the NOLA Motorsports Park to the north, and the Avondale Gardens Canal to the west.

Only one of the potential sites would be used for the project. The decision to use either the East site or the West site would be based on site conditions such as elevation, hydrology, ease of access, etc. At the selected site, approximately 920 acres of predominantly invasive and nuisance species would be eradicated and the area planted with native, high quality tree and shrub species. Due to the high density of invasive plant species, the project area would receive multiple herbicidal treatments prior to the initial planting of native, high-quality species. Approximately two months after the initial herbicidal treatment, the mitigation features would be mechanically cleared without grubbing. Large native trees and shrubs would be preserved during the mechanical clearing process to the greatest degree practicable. Woody debris generated during the clearing operations would be chipped and left within the mitigation features. Starting the following spring, multiple inspections and additional herbicidal treatments would be performed to ensure the project site is properly treated through the entire growing season.

Following the clearing activities, the features would be planted with high quality native trees. The planting would be performed in the winter after a full growing season of invasive species removal. The mitigation features would be planted with native BLH tree and shrub species in accordance with the BLH-Wet and BLH-Dry planting guidelines set forth in Appendix I.

2.3.2 Selection Rational

General PS BLH-Dry Impacts

Based on applicable statutes, regulations and guidance, compensating for construction impacts within the basin where those impacts occurred is an important goal. August 2009 USACE Implementation Guidance for WRDA 2007, Section 2036(a) states that mitigation planning efforts should identify and prioritize natural resource restoration as well as preserve existing natural resources that are important for maintaining or improving the ecological functions of the watershed. WRRDA 2014, Section 1040, requires use of a watershed approach for the design of mitigation projects. The USACE/EPA 2008 Mitigation Rule (33 CFR Part 332) also requires use of a watershed approach.

Currently there are insufficient mitigation bank credits available in the watershed to mitigate the PS BLH-Dry requirement. Of the viable options, the Avondale Gardens project is within the same watershed as the impacted habitat. Additionally, a contract for mitigation work at the site could be awarded sooner than any other project. As such, the Avondale Gardens PS BLH-Dry Enhancement in-basin project was selected as the tentatively selected replacement mitigation project (TSRMP) for the General PS BLH-Dry feature of the WBV HSDRRS TSMMP.

Avondale Gardens is the TSRMP for this habitat type because of current lack of mitigation bank credit availability in basin. However, if sufficient mitigation bank credits become available in-basin, consistent with the MP identified in PIER #37, those credits would be purchased before building a the project at Avondale Gardens.

2.3.3 Tentatively Selected Replacement Mitigation Project

General BLH-Dry Protected Side Impacts

- Avondale Gardens PS BLH-Dry Enhancement

2.4 TENTATIVELY SELECTED MODIFIED MITIGATION PLAN (TSMMP)

The MP presented in the PIER #37 would be modified with the replacement of the recommended project for the general PS BLH-Dry feature. The TSMMP with the new TSRMP for PS BLH-Dry feature is as follows:

Table 2-3: WBV HSDRRS Tentatively Selected Modified Mitigation Plan

Habitat Type	TSMMP Project	AAHUs Impacted	Mitigation Project Acres
General PS BLH-Wet	Mitigation Bank (already satisfied)	7.27 AAHUS	N/A
General PS BLH-Dry	Avondale Gardens	193 AAHUs	920.00
* General FS BLH-Wet	Lake Boeuf BLH-Wet Restoration (not implementable)	72.04 AAHUs	221.90
*General FS Swamp	Lake Boeuf Swamp Restoration (not implementable)	134.52 AAHUs	319.80
General FS Fresh Marsh	Jean Lafitte (approved plan)	65.92 AAHUs	138.00
Park/404(c) FS BLH-Wet	Jean Lafitte(approved plan)	5.2 AAHUs	8.2
Park/404(c) FS Swamp	Jean Lafitte(approved plan)	8.42 AAHUs	106
Park/404(c)FS Fresh Marsh	Jean Lafitte(approved plan)	3.03 AAHUs	20.40

*These projects are not implementable and are undergoing reformulation

2.5 WVA MODEL AND SEA LEVEL RISE ANALYSES FOR THE MITIGATION PLAN

WVA Model Certification

The WVA Bottomland Hardwood and Swamp Community Models used for the HSDRRS Mitigation completed model were certified in accordance with EC 1105-2-412 and approved for regional use November 8, 2011.

For details on the model reviews please refer to Appendix I of the WBV HSDRRS Mitigation PIER #37.

WVAs

The WVA methodology operates under the assumption that optimal conditions for general fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum level to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat; 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and 3) a mathematical formula that combines the Suitability Index for each variable into a single value for wetland habitat quality. That single value is referred to as the Habitat Suitability Index, or HSI.

The following WVA models (version 1.0) were used for the WBV HSDRRS mitigation effort: 1) CWPPRA, WVA Methodology, Bottomland Hardwood Community Model; 2) CWPPRA, WVA Methodology, Swamp Community Model; 3) and CWPPRA, WVA Methodology, Coastal Marsh Community Model for Fresh/Intermediate Marsh.

The WVA models assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. This standardized, multi-species, habitat-based methodology facilitates the assessment of project-induced impacts on fish and wildlife resources. The swamp WVA model consists of four variables: 1) stand structure; 2) stand maturity; 3) water regime; and 4) salinity. The Bottomland Hardwood Community Model, which was used for BLH-Wet and BLH-Dry features, consists of seven variables: 1) stand structure; 2) stand maturity; 3) understory/midstory; 4) hydrology; 5) size of contiguous forests areas; 6) suitability and traversability of surrounding land uses; and 7) disturbance.

Values for variables used in the models are derived for existing conditions and are estimated for conditions projected into the future if no mitigation efforts are applied (i.e., Future With Out Project or FWOP), and for conditions projected into the future if the proposed mitigation project is implemented (i.e., Future With Project or FWP), providing an index of habitat quality, or habitat suitability, for the period of analysis. The HSI is combined with the acres of habitat to generate a number that is referred to as “habitat units.” Expected project impacts/benefits are estimated as the difference in habitat units between the FWP scenario and the FWOP scenario. To allow comparison of WVA benefits to costs for overall project evaluation, total benefits are averaged over a 50-year period, with the result reported as AAHUs. WVA assumptions used for the WBV HSDRRS MP area located in Appendix E of the WBV HSDRRS Mitigation PIER #37.

Sea Level Rise Analysis

Wetland Acreage Predictions Under Increased Sea Level Rise (SLR) Rates

In compliance with USACE policy (EC1165-2-212), the performance of all projects under all three SLR scenarios was analyzed to verify selection of the TSMPs. Potential increases in SLR could affect the performance and therefore ability of a mitigation project to achieve replacement of the services and functions of the impacted habitat types. Because all of the mitigation projects were designed based on the intermediate SLR scenario to account for potential uncertainties in future SLR impacts, the risk of the proposed projects not successfully meeting the mitigation requirement due to SLR has been minimized.

The intent of compensatory mitigation is to offset unavoidable habitat losses by replacing those impacted habitats by restoring (re-establishment or rehabilitation), establishing (creation), or enhancing a naturally functioning system. Once the project meets its long term success criteria, it will experience natural successional phases common to that habitat type. Once the functions and services of the affected habitat have been replaced and the mitigation project becomes a naturally functioning, self-sustaining system which is protected and maintained in perpetuity, the compensatory mitigation obligation is satisfied.

Using USACE-predicted future water levels under the SLR scenarios, those water levels were converted into relative sea level rise (RSLR) rates, incorporating sea level rise effects measured at the gauges and land loss experienced in the extended project area for each project. No operations and maintenance activities were planned for any of the projects based on predicted future elevation changes. The WVA then utilized the RSLR rates and project design to predict

FWP acres left at the end of the 50-year period of analysis. Long term sustainability (percent land left at the end of the period of analysis) was used to analyze the impact the different SLR scenarios had on the project areas. Comparison between the long term sustainability numbers experienced under the intermediate and high SLR scenarios for all of the Corps constructed projects in the final array supported the ranking of the projects; namely all the Corps constructed TSMPs performed the best under the influence of both the intermediate and high SLR scenarios (all projects selected had the highest long term sustainability numbers). Details of the 3 SLR analyses can be found in Appendix B, Table 1.

2.6 DATA GAPS AND UNCERTAINTIES

Impact Assessment

The WBV mitigation requirement has been assessed for all the HSDRRS work through review of the 95-100 percent design plans and as-builts (to the extent as-builts were available). Once as-builts for the whole HSDRRS are complete, a final reassessment would be completed to ensure all impacts from construction of the HSDRRS are fully mitigated. If additional impacts are identified beyond what has been mitigated at that time, then an additional NEPA document would be prepared analyzing options to complete the outstanding mitigation. This document would be made available for public review and comment.

Tropical Storms

Tropical storm events can directly and indirectly contribute to coastal land loss through erosion from increased wave energies, removal and/or scouring of vegetation from storm surge and saltwater intrusion into estuaries and interior wetlands. Wetland loss and degradation of large areas can occur over a short period of time as a result of storms.

Approximately 52,480 acres of marsh were permanently or temporarily converted to open water in the Pontchartrain Basin following Hurricane Katrina, (Barras, 2009). There is a risk that a single storm event, or multiple storms over a short period of time, could significantly reduce or eliminate anticipated benefits of mitigation plans in areas susceptible to storm surge and shearing. All of the features of the TSMPA (and the associated costs and benefits found in Appendices B-7 and B-8 of PIER #37) are at some risk from storm damage. The extent of potential damage is dependent upon several unknown variables, including: the track and intensity of the storm, the development stage of the project, changes in future conditions in the study area, and variability of project performance from forecast conditions due to other factors of risk and uncertainty.

Increased Sea Level Rise and Subsidence

Increased sea level rise coupled with subsidence could convert emergent wetlands to shallow open water, and shallow open water to deeper water habitat, reducing or eliminating the effectiveness of mitigation plans.

Climate Change

Extreme changes in climate (temperature, rain, evaporation, wind) could result in conditions that cannot support the types of habitat restored, reducing the effectiveness of the mitigation plan. Extreme climate change could essentially eliminate the benefits of vegetative plantings, if the change resulted in plant mortality. The monitoring plan for all USACE constructed projects

would monitor the success of any vegetative plantings and includes provisions for replanting if mortalities become such that meeting the required success criteria is in jeopardy.

Errors in Analysis

Future conditions are inherently uncertain. The forecast of future conditions is limited by existing science and technology. Future conditions described in this study are based on an analysis of historic trends and the best available information. Some variation between forecast conditions and reality is certain. Mitigation features were developed in a risk-aware framework to minimize the degree to which these variations would affect planning decisions. However, errors in analysis or discrepancies between forecast and actual conditions could affect plan effectiveness.

All of the models used in this study are abstract mathematical representations of reality. Models simulate complex systems by simplifying real processes into expressions of their most basic variables. These tools assist with finding optimal solutions to problems, testing hypothetical situations, and forecasting future conditions based on observed data. No model can account for all relevant variables in a system. The interpretation of model outputs must consider the limitations, strengths, weaknesses, and assumptions inherent in model inputs and framework. Inaccurate assumptions or input errors could change benefits predicted by models used in this study. The potential for significant changes due to errors has been reduced through technical review, sensitivity analyses, and quality assurance procedures. However, there is inherent risk in reducing complex natural systems into the results of mathematic expressions driven by the simplified interaction of key variables.

WVA Model Uncertainties

WVAs models were run on the entire final array of mitigation projects using site-specific data collected at all project sites except for some portions of the Lake Boeuf projects. Right of entry (ROE) was not available for all portions of the Lake Boeuf projects at the time the WVAs were run. Where ROE was unavailable, assumptions were made based on aerial photography and field data was used from other similar projects for the WVAs at Lake Boeuf. We have reasonable confidence that these data are representative of actual site conditions, and that the WVAs have produced results representative of what would be found if ROE to the sites had been available.

Mitigation Bank Credit Availability

Whether in-basin mitigation banks may be capable of supplying the credits needed to meet any of the mitigation requirements at the time of solicitation is uncertain. Banks currently able to meet the mitigation requirements may not be able to do so at the time of solicitation. In addition, new banks able to meet the mitigation requirement may become approved by the time a solicitation is released. Accordingly, identification of particular banks that could be used to meet the mitigation requirement cannot occur with any degree of certainty and has not been done for this SPIER. Since the bank(s) that may ultimately be selected to provide the necessary mitigation credits is unknown, the existing conditions present at the bank site(s) are similarly unknown. Existing bank habitat quality varies depending on the success criteria met, as specified in the bank's MBI. Typically, as mitigation success criteria are met and the quality of the habitat increases within the bank, more credits are released for purchase.

Implementation

The timing for implementation is an uncertainty that must be considered. If the plan is not implemented in the near future, the existing conditions in the study area could degrade. The impact of the uncertainties associated with the future condition of the study area could increase mitigation costs, decrease mitigation benefits, or both.

If a proposed project becomes infeasible due to difficulties in implementation or changed conditions, the CEMVN will take appropriate action to ensure satisfaction of its mitigation requirement. For those features of the MP for which mitigation bank credits were the initial preferred alternative, if sufficient credits become available within the WBV basin, the preferred default alternative is the purchase of mitigation bank credits based on time to implement, reduced risk of project failure due to CEMVN oversight through its Regulatory program, and relief from operation and maintenance requirements.

The Lake Boeuf portions of the TSMP discussed in the PIER #37 are not considered desirable because they were unacceptable to the NFS, and the local community.

Mitigation for Coastal Zone Impacts

Louisiana Department of Natural Resources (LDNR) administers the Federal Coastal Zone Management Act in Louisiana through its Louisiana Coastal Resources Program (LCRP). Depending on the projects implemented, LDNR may determine that, in its view, such projects do not mitigate for coastal zone impacts. If deemed necessary, additional mitigation for coastal zone impacts may be required and would be assessed and coordinated in subsequent NEPA documents.

2.7 PROPOSED ACTION

The proposed action in this SPIER #37a consists of enhancing approximately 920 acres of BLH at the Avondale Gardens site to mitigate193 AAHUs of PS BLH-Dry impacts.

2.8 ALTERNATIVES TO THE PROPOSED ACTION

NEPA requires that in analyzing alternatives to a proposed action, a Federal agency consider an alternative of “No Action.” The No Action alternative evaluates the impacts associated with not implementing the proposed action and represents the Future Without Project (FWOP) condition against which alternatives considered in detail are compared. The FWOP provides a baseline essential for impact assessment and alternative analysis. This section presents the No Action Alternative in which the proposed action in PIER #37 would be implemented. However, because the project identified in PIER #37 for the general PS BLH-Dry feature of the MP (the purchase of in-basin mitigation bank credits) is not implementable, the CEMVN considers the No Action Alternative not a reasonable alternative that should be selected. For an evaluation of the No Action Alternative defined as not implementing mitigation for HSDRRS construction impacts, see PIER 37. That evaluation is incorporated by reference.

2.8.1 No Action Alternative

The analysis for the No Action alternative considers previous, current, and reasonably foreseeable future projects, which could impact the resources evaluated in the SPIER. The location of these

projects is shown in Appendix A-4. For the purpose of this analysis, a project is considered "reasonably foreseeable" if it meets one of the following criteria:

- USACE authorized ecosystem restoration , flood risk reduction, and/or navigation project with an anticipated Tentatively Selected Plan;
- CWPPRA project authorized at a Phase 2 – construction status;
- Coastal Impact Assistance Program (CIAP) ecosystem restoration or flood risk reduction project which is funded for construction;
- State of Louisiana Surplus-funded ecosystem restoration or flood risk reduction project funded for construction; or
- Louisiana Levee District permitted flood risk reduction project.

Under the no action alternative, the Barataria basin would continue a trend of land loss caused by both natural factors such as subsidence, erosion, tropical storms and sea level rise, and human factors such as flood risk reduction, canal dredging, development, interruption of accretion processes and oil and gas exploration.

Appendices B-10, B-11 and B-12 includes a of list projects involving wetland or ecosystem restoration activities considered part of the no action alternative that could counter, to a degree, the current land loss trends throughout the basin and the progression of wetlands to open water. In addition to the name, general location, and a general description of each project, the tables note whether a project directly overlaps with one of the mitigation projects evaluated in this SPIER or whether the extended boundary of the project's wetland value assessment overlaps with one of the mitigation projects evaluated in this SPIER.

In addition to these ecosystem restoration projects, a number of flood risk reduction and navigation projects have been built or would be built within the Barataria basin that would continue to influence the hydrodynamics within the basin. Previously constructed flood risk reduction and navigation projects include:

- Algiers Lock: The lock, constructed in 1956, provides a navigation passage between the Mississippi River and the Gulf Intracoastal Waterway via the Algiers Canal. The lock is operated and maintained by the USACE (American Canal Society, 1979).
- Algiers Non-federal Levee (Donner Canal Levee): This segment of the non-federal levee was built prior to the construction of the Algiers Canal in 1956 near the southern boundary between the Orleans and Jefferson Parish line to provide flood protection to the communities in the vicinity of Algiers and Cutoff in Orleans Parish, Louisiana. The levee is owned and under the authority of the Algiers Levee District (SLFPAW, 2012).
- Bayou Gauche Ring Levee (Sunset Levee): The construction of levees and pumping stations in the 1970s to prevent tidal surges from flooding developed areas in near the community of Paradis in northern St. Charles Parish (Schiltz, 2011).
- Coastal Protection and Restoration Authority (CPRA) and North Lafourche Conservation, Levee and Drainage District, Valentine to Larose Levee, TE-111: To provide flood protection improvements to the current flood protection system along approximately 2,000 linear feet of levee along Bayou Lafourche, from the town of Valentine to the town of Larose. The project is part of the Lockport-to-Larose Levee Project. The project was constructed in 2014 (CPRA, 2015).
- Empire Lock: The lock is located on the west bank of the Mississippi River at Mississippi River mile 29.5 and was originally constructed prior to 1936 to provide navigation between the Mississippi River and the Gulf of Mexico through the Empire Canal. It is

operated by the Louisiana Department of Transportation and Development (American Canal Society, 2012a).

- English Turn Non-Federal Levee (Donner Canal Levee): This segment of the non-federal levee was built prior to the construction of the Algiers Canal in 1956 to provide flood protection to the communities east of Algiers Canal on the west bank of Orleans Parish, Louisiana. The levee extends westerly along the southern Orleans Parish line from the west bank levee of the Mississippi River near Caernarvon and ties into the West Bank and Vicinity –East of Algiers federal levee near Highway 407. The levee is owned and under the authority of the Algiers Levee District (SLFPAW, 2012).
- Gulf Intracoastal Waterway (GIWW) Navigation System: A continuous waterway located inland and parallel to the Gulf of Mexico coast extending approximately 1,100 miles from Brownsville, Texas to Carrabelle, Florida. The federally authorized navigation project was designed to provide interstate commerce among the Gulf Coast States (Alperin, 1983; American Canal Society, 2012b).
- Harvey Canal Lock: The lock was constructed in the early 1930s by the USACE to provide a navigational passage between the Mississippi River and the GIWW via the Harvey Canal. The lock is operated and maintained by the USACE. (American Canal Society, 2012c)
- Mississippi River Levees: Mississippi River & Tributaries (MR&T) Project: The flood control plan authorized by the Flood Control Act of 1928 designed to control a Mississippi River flooding event which is greater than the 1927 flood within the lower Mississippi River Valley. The project includes levees, floodways, channel improvements and stabilization as well as tributary basin improvements (USACE, 2004a).
- Mississippi River Navigation Operations and Maintenance: Operations and maintenance of the Mississippi River by the USACE for navigational purposes.
- Oakville to La Reussite Non-federal Levee: The non-federal hurricane protection levee located in Plaquemines Parish was built in the late 1960s, early 1970s to reduce flood risk in the vicinity of the communities of Oakville, Jesuit Bend, Ollie, Naomi and La Reussite. The levee system is under the authority of the Plaquemines Parish West Bank Levee District and currently varies in elevation from 2 feet to 7 feet (USACE, 2009).
- State of Louisiana-Surplus Fund 2007 project, East of Harvey Canal Interim Hurricane Protection – Phase 1: The project was designed and constructed by the Southeast Flood Protection Authority - West as an interim non-federal flood protection levee, prior to the WBV HSDRRS floodwall construction, along the east side of the Harvey Canal from the sector gate at Lapalco Boulevard to the existing WBV levee at Hero Pump Station. The interim earthen flood protection levee was completed in July 2009. Due to its low elevation and the construction of the WBV HSDRSS in the area, it currently serves a temporary flood risk reduction from minor daily flooding events and closures of the West Closure Complex. The second phase of the project involves a study to evaluate the feasibility of elevating the interim levee to a permanent flood protection structure. Phase 2 is currently on hold in the planning phase. (McMenis 2012; CPRA 2012a)
- State of Louisiana-Surplus Fund 2007 project, Lafitte Tidal Protection, BA-75-3, 2007: The project is bordered by Bayou Barataria on the west, Goose Bayou to the north, The Pen to the west and Reserve Canal to the south. This project involves the uplift of existing levee segments originally constructed by the West Jefferson Levee District on the western shore of The Pen near the community of Lafitte, Louisiana to provide flood risk reduction to the community of Lafitte, Louisiana. Construction was completed. The portion of the project constructed by West Jefferson Levee District consists of earthen levees reinforced with sheet pile along the northwestern shore of The Pen from Goose

Bayou to Reserve Canal to provide limited flood risk reduction to the community of Lafitte, Louisiana. (Harper, 2012; CPRA 2012a)

- West Plaquemines Non-federal Levee: The non-federal hurricane protection levee was constructed in the late 1960s, early 1970s by the Plaquemines Parish government and private entities to reduce flooding risk to the communities between La Reussite and Point Celeste, Louisiana. The levee system is under the authority of the Plaquemines Parish West Bank Levee District and currently varies in elevation from 2 feet to 7 feet. (USACE, 2009).

Flood risk reduction and navigation projects currently under construction or reasonably foreseeable include:

- HSDRRS, WBV: The federal HSDRRS is currently under construction by the USACE to provide flood protection against a storm which has a 1% chance of occurring in a given year (100-year level of protection). The 91-mile risk reduction system includes the construction, enhancement and/or replacement of levees, floodwalls, floodgates, closure structures, and pumping stations to provide storm damage risk reduction to the New Orleans Metropolitan Area on the west bank of the Mississippi River including portions of Jefferson, Orleans, Plaquemines, and St. Charles parishes. The project was originally authorized and modified by the Water Resources Development Acts of 1986, 1996, 1999 and became known as the West Bank and Vicinity, Louisiana Hurricane Protection Project (WBVHPP). Additional emergency supplemental appropriations aimed at improving the system were authorized by Congress following Hurricane Katrina and include 3rd Supplemental-2006 (PL 109-148, Title 1,Chapter 3, [119 STAT. 2761-2763]), 4th Supplemental-2006 (PL 109-234, Title II, Chapter 3, [120 STAT. 454-455]), 5th Supplemental-2007 (PL 110-28, Title IV, Chapter3, [121 STAT. 153-154]), 6th Supplemental-2008 (PL 110-252, Title III, Chapter 3, [122 STAT. 2349-2350]), and 7th Supplemental-2009 (PL 110-329 Title I, Chapter 3 [122 STAT. 3589-3590]). Construction began in March 2007 and is over 92% complete. Anticipated completion date for the entire WBV HSDRRS system is December 2016 (USACE, 2012a; Salaam, 2015).

- Larose to Golden Meadow, Louisiana, Hurricane Protection Project (LGM): The project, originally authorized by the Flood Control Act of 1965 (PL-89-298), consists of approximately 48 miles of levees and floodwalls including two floodgates across Bayou Lafourche at the project's northern and southern ends. Eight (8) pumping stations were constructed in place of the authorized gravity drainage structures at the request and additional expense of the South Lafourche Levee District. The project is designed to protect the communities along the east and west banks of Bayou Lafourche, extending from Larose to just south of Golden Meadow in Lafourche Parish, Louisiana from tidal and hurricane surge flooding. The majority of the original 1965 project has been constructed as authorized, however due to subsidence and datum changes the project is not currently at the 1965 authorized elevations. A Post-Authorization Study(PAS) was initiated in 2009 to assess potential modifications to the system given changes in conditions and post-Katrina design criteria, however, after further investigations, it was determined that additional authorization would be required to address modifications to constructed features. The additional guidance focused the scope of the study to unconstructed features in accordance with the 1965 authorization. The study efforts are complete and a final report is expected by July 2015. The results of the investigation identified only one unconstructed feature of the project and it is expected to be complete by 2018. (Wilson-Prater, 2015; USACE, 1985).New Orleans to Venice (NOV) levee

project, St Jude to Venice: The federal hurricane protection levee project, originally authorized by the Flood Control Act of 1962, was designed to reduce the risk of flooding to the communities between St. Jude to Venice, Louisiana located on the west bank of the Mississippi River including the back levee in Plaquemines Parish. The project was approximately 85 percent complete prior to Hurricane Katrina. Following Hurricane Katrina, a levee upgrade was authorized by Congress to restore, armor, and accelerate the completion of the levees to the authorized design grade of 50-year (2%) level of storm risk reduction through additional emergency supplemental appropriations 3rd Supplemental-2006 (PL 109-148, Title 1,Chapter 3, [119 STAT. 2761-2763]), 4th Supplemental-2006 (PL 109-234, Title II, Chapter 3, [120 STAT. 454-455]), 6th Supplemental-2008 (PL 110-252, Title III, Chapter 3, [122 STAT. 2349-2350]), and 7th Supplemental-2009 (PL 110-329 Title I, Chapter 3 [122 STAT. 3589-3590]). Anticipated upgrades began in September 2012 and construction is expected to be completed by Fall 2020 (USACE, 2011b; Harris, 2015).

- New Orleans to Venice (NOV), Incorporation of Non-Federal Levees (NFL) into NOV: The NFL reduces the risk of flood inundation and protects evacuation routes for the communities between Oakville and St. Jude, Louisiana located on the west bank of the Mississippi River in upper Plaquemines Parish. The NFL connects to the West Bank and Vicinity HSDRRS levees at the Eastern Tie-In near Oakville, Louisiana. Proposed construction will heighten, strengthen and incorporate the NFL, into the federal NOV levee system. The levee components have been authorized by Congress following Hurricane Katrina to provide storm risk reduction through additional emergency supplemental appropriations 4th Supplemental-2006 (PL 109-234, Title II, Chapter 3, [120 STAT. 454-455]), 5th Supplemental-2007 (PL 110-28, Title IV, Chapter3, [121 STAT. 153-154]), and 6th Supplemental-2008 (PL 110-252, Title III, Chapter 3, [122 STAT. 2349-2350])). The Corps Risk Management Center (RMC) recently performed a risk analysis on certain reaches (reaches close to design completion and structures were omitted from the analysis) of the NFL and NOV levee systems. After evaluating the RMC risk assessment and recommendations, the USACE New Orleans/Vicksburg District (MVN/MVK) team determined that adapting the HSDRRS design guidelines for NOV and NFL represented the best opportunity to fulfill the project authority and provide maximum risk reduction with available funds. MVN/MVK team has requested concurrence with the RMC's recommendations and path forward from USACEHQ via memorandum through Mississippi Valley Division (MVD). Anticipated upgrades began in September 2012 and construction is expected to be completed by fall 2020. (USACE, 2011a; Harris, 2015).

- St. Charles Parish Levee – West Bank Magnolia Ridge Phase 1 (BA-85-1): The reduction to the risk of flooding to the communities near Boutte and Paradis, Louisiana on the west bank of Magnolia Ridge in St. Charles Parish by the construction of (Part 1) Magnolia Ridge Pump Station, (Part 2) upgrade of the existing non-federal earthen levee to meet the USACE standards with an estimated crown elevation of seven feet, (Part 3) Paradis Canal Gate~~s~~, and (Part 4) pipeline T-walls. Part 1 Engineering and Design (E&D) is currently 60% in, with anticipated start and end construction dates of June 2016 and December 2017 respectively pending funding being secured. Part 2 E&D is currently 5% complete with anticipated start and end construction dates of January 2017 and December 2017 respectively pending funding being secured. Part 3 E&D is currently is 5% complete with anticipated start and end construction dates of July 2017 and December 2018 respectively pending funding being secured. Part 4 is pending E&D task order, with anticipated start and end construction dates of January 2018 and

December 2018 respectively pending funding being secured. (Schiltz, 2012; St. Charles Parish, 2013; St. Charles Parish, 2015).

- St. Charles Parish Levee – West Bank Willowridge Phase 2 (BA-85-2): Construction of a non-federal levee with estimated crown elevation of seven feet, a pumping station and gates to reduce the risk of flooding in the vicinity of Willowridge in St. Charles Parish. The project is divided into three parts. Part 1 includes a seven feet levee lift between Peterson Canal and Willowridge Drive which is anticipated for completion in May 2015. Part 2 includes the construction of the Willowridge Pump Station and Part 3 includes the construction of tidal interchange structures and a seven foot levee lift from Willowridge Drive to Davis Diversion. The anticipated construction start dates for parts 2 and 3 are August 2015 and September 2015 respectively and construction end dates are December 2016 and September 2016 respectively (Schiltz, 2012; St Charles Parish, 2013; St. Charles Parish, 2015).

- St. Charles Parish Levee – West Bank Ellington Phase 3 (BA-85-3): The reduction to the risk of flooding in the vicinity of Ellington in St. Charles Parish, La but the construction of (Part 1) uplift non-federal levee with estimated crown elevation of seven feet, (Part 2) Ellington pump station, and (Part 3) pump stations and pipeline T-walls. Part 1 E&D is currently 70% complete in with anticipated begin and end construction dates of October 2015 and October 2017 respectively. Part 2 includes the construction of Ellington pump station which is currently 90% complete in E&D with anticipated begin and end construction dates of January 2017 and June 2018 respectively pending secured funding. Part 3 includes the construction of pump stations and pipeline T-walls which are currently 90% complete E&D in with anticipated begin and end construction dates of July 2018 and December 2019 respectively pending secured funding (Schiltz, 2012; St. Charles Parish, 2013; St. Charles Parish, 2015).

- State of Louisiana-Surplus Fund 2007 project, Jean Lafitte Tidal Protection, BA-75-1, 2007: This project involves the enhancement of existing levees originally constructed by the West Jefferson Levee District on the eastern and southern side of the community of Jean Lafitte, Louisiana. It also includes new levee construction and installation of floodwalls and floodgates along the eastern bank of Bayou Barataria and in gaps in the levee system on the eastern and southern side of Jean Lafitte, Louisiana to provide flood protection to the community within the Fischer School Basin. The project will be implemented by Jefferson Parish and the Lafitte Area Independent Levee District. Construction began in February 2014 with an anticipation completion date of September 2015. Funding for construction is also provided through Surplus Fund 2009 project, BA-75-4, Lafitte Levee Protection (Harper, 2012; CPRA, 2012a; CPRA, 2015).

3. AFFECTED ENVIRONMENT

3.1 ENVIRONMENTAL SETTING

WBV Basin

The WBV HSDRRS Mitigation Basin is bounded to the north by the Mississippi River starting east in Ascension Parish to west in Plaquemines Parish. In Plaquemines Parish, the boundary proceeds south then north and west bordering the southern portion of Lake Salvador before turning south again to Golden Meadow. It then turns northwest to Assumption Parish (Appendix

A-2). Major features in the WBV Mitigation basin include: Lakes Cataouatche and Salvador and their adjacent wetlands; Lac des Allemands and its adjacent wetlands and the Mississippi River.

Geomorphic and Physiographic Setting

Most of the present landmass of southeast LA was formed by deltaic processes of the Mississippi River. The WBV Basin is bounded on each side by a distributary ridge formed by the present and a former channel of the Mississippi River. Several large lakes occur between these ridges. The southern half of the basin consists of tidally influenced marshes. Freshwater and sediment input into the basin is limited by the flood protection levees along the Mississippi River and the closure of Bayou Lafourche at Donaldsonville. Riverine input into the basin's wetlands occurs through the Davis Pond diversion and the Naomi and West Pointe a la Hache siphons.

Climate

The West Bank basin is located within a subtropical latitude. The climate is influenced by the many water surfaces of the nearby wetlands, rivers, lakes, streams, and the Gulf of Mexico. Throughout the year, these water areas modify relative humidity and temperature conditions, decreasing the range between the extremes. Summers are long and hot, with an average daily temperature of 82° Fahrenheit (°F), average daily maximum of 91°F, and high average humidity. Winters are influenced by cold, dry polar air masses moving southward from Canada, with an average daily temperature of 54°F and an average daily minimum of 44°F. Annual precipitation averages 54 inches.

Wetlands and Other Surface Waters

Wet BLH forests in the WBV Basin are dominated by water oak, nuttall oak, green ash, red maple, and pignut hickory. Fresh marsh is dominated by cattail, water lily, iris, duckweed, cutgrass, wild rice, bullwhip and bulltongue. Swamps are dominated by bald cypress and water tupelo, which have regenerated since extensive logging of virgin forest more than 70 years ago. The Louisiana swamps generally lack a mature canopy as was present in the forests before logging occurred and have lower productivity where isolated from riverine influences (Shaffer et al., 2003). The greatest potential to restore and sustain coastal forests is near the Mississippi River where freshwater reintroductions may be implemented. Other local sources of freshwater may be municipal wastewater or storm water. Economically important natural resources associated with these swamps include fisheries of crawfish, blue catfish, and channel catfish, as well as logging. See Appendix A-1 for the habitats and their quantity found in the WBV Basin and Appendix B-2 for a list of plant species referenced in this document and their scientific names.

Wildlife

Louisiana's coastal wetlands support numerous neotropical and other migratory avian species, such as rails, gallinules, shorebirds, wading birds, and numerous songbirds. The rigors of long distance flight require most neotropical migratory birds to rest and refuel several times before they reach their final destination. Louisiana coastal wetlands provide neotropical migratory birds essential stopover habitat on their annual migration routes. The coastal wetlands in the WBV Basin provide important fish and wildlife habitats, especially transitional habitat between estuarine and marine environments, used for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements.

Emergent fresh, intermediate, and brackish wetlands are typically used by many different wildlife species, including: seabirds; wading birds; shorebirds; dabbling and diving ducks; raptors; rails; coots; and gallinules; nutria; muskrat; mink, river otter, wild hog and raccoon; rabbit; white-tailed deer; and American alligator. Emergent saline marshes are typically utilized by: seabirds; wading birds; shore birds; dabbling and diving ducks; rails, coots, and gallinules; other saline marsh residents and migrants; nutria; muskrat; mink, river otter, and raccoon; rabbits; deer; and American alligator (LCWCRTF & WCRA, 1999).

Open water habitats such as Lakes Salvador and Cataouatche provide wintering and multiple use functions for brown pelicans, seabirds, and other open water residents and migrants. Open water habitats provide wintering and multiple use functions for brown pelicans, seabirds, dabbling and diving ducks, coots, and gallinules as well as other open water residents and migrants (LCWCRTF & WCRA, 1999).

The bald eagle is protected under the Bald and Golden Eagle Protection Act ((BGEPA), and the Migratory Bird Treaty Act ((MBTA) 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.). In southeastern Louisiana parishes, eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water.

Colonial nesting waterbirds are protected under the Migratory Bird Treaty Act ((MBTA) 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.). Colonial nesting waterbirds are generally considered all species of herons, egrets, night herons, ibis, roseate spoonbill, anhinga and cormorants. These birds typically nest and forage in wetlands and open water areas.

A list of common wildlife species found in the WBV basin and their scientific names are located in Appendix B-3.

Threatened and Endangered Species

Within the State of Louisiana there are 33 animal and three plant species (some with critical habitat) under the jurisdiction of the USFWS and/or the NMFS, presently classified as endangered or threatened. The USFWS and the NMFS share jurisdictional responsibility for sea turtles and the Gulf sturgeon. Other species that were listed on the Endangered Species List but have since been de-listed because population levels have improved are the bald eagle and the brown pelican. Currently, American alligators and shovelnose sturgeon are listed as threatened under the Similarity of Appearance clause in the Endangered Species Act (ESA) of 1973, as amended but are not subject to ESA Section 7 consultation. See Appendix B-4 for listed species in the project area.

Fisheries, Aquatic Resources, and Water Quality

The NMFS oversees and manages our Nation's domestic fisheries through development and implementation of fishery management plans and actions. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), first enacted in 1976, amended in 1996, and reauthorized in 2006, is the primary law governing marine fisheries management in United States Federal waters to end overfishing, promote market-based management approaches, improve science, serve a larger role in decision-making, and enhance international cooperation.

Major water bodies within the basin that may be impacted include Lac des Allemands, Lake Boeuf, Bayou Gauche, Lake Salvador, Lake Cataouatche, and the Mississippi River. These water bodies and adjacent wetlands provide nursery and foraging habitats which support varieties of economically, recreationally, and ecologically important marine and freshwater

fishery species, including shrimp, bay anchovy, gizzard shad, buffalo, yellow bass, largemouth bass, sunfish, catfish, spotted gar, bowfin, mosquitofish, least killifish, sailfin molly, striped mullet, Atlantic croaker, Gulf menhaden, spotted and sand sea trout, southern flounder, black drum, and blue crab (see Appendix B-5 for full list of species). Some of these species also serve as prey for other fish species managed under the MSFCMA by the Gulf of Mexico Fishery Management Council (e.g., mackerel, snapper, and grouper) and highly migratory species managed by NMFS (e.g., billfish and shark).

The WBV Basin encompasses parts of three U.S. Geological Survey (USGS) Cataloging Units: 08090301 – East Central Louisiana Coastal Watershed, 08070100 - Lower Mississippi - Baton Rouge and 08090100 – Lower Mississippi-New Orleans. Within each of these Cataloging Units, the state has delineated hydrologic units, or sub-segments, within the state.

Section 305(b) of the Clean Water Act requires each state to monitor and report on surface and groundwater quality, which the Environmental Protection Agency (EPA) synthesizes into a report to Congress. The Louisiana Department of Environmental Quality (LDEQ) produces a Section 305(b) Water Quality Report that provides monitoring data and water quality summaries for hydrologic units (sub-segments) throughout the state.

Water quality criteria are elements of state water quality standards that represent the quality of water that will support a particular designated use. These criteria are expressed as constituent concentrations, levels, or narrative statements. There are currently eight designated uses adopted for Louisiana's surface waters: Primary Contact Recreation, Secondary Contact Recreation, Fish and Wildlife Propagation ("subcategory" for Limited Aquatic life and Wildlife), Drinking Water Supply, Oyster Propagation, Agriculture, and Outstanding Natural Resource Waters. Appendix A, figure 3 shows those hydrologic units or sub-segments in the WBV basin that contain water bodies that are considered "impaired" according to the 2010 Integrated Report.

Essential Fish Habitat

The MSFCMA (50 CFR 600) states that EFH is "those waters and substrate necessary for fish for spawning, breeding or growth to maturity" (16 United States Code [USC] 1802(10); 50 CFR 600.10). The 2005 amendments to the MSFCMA set forth a mandate for the NMFS of the National Oceanic and Atmospheric Administration, regional Fishery Management Councils (FMC), and other Federal agencies to identify and protect EFH of economically important marine and estuarine fisheries. A provision of the MSFCMA requires that FMCs identify and protect EFH for every species managed by a Fishery Management Plan (FMP) 16 USC 1853. The public places a high value on seafood and recreational and commercial opportunities provided by EFH. Specific categories of EFH include all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), sub-tidal vegetation (sea grasses and algae), and adjacent intertidal vegetation (marshes and mangroves). The existing emergent wetlands and shallow open water within the WBV Basin provide important habitat that may be classified as EFH, including transitional habitat between estuarine and marine environments used by migratory and resident fish, as well as other aquatic organisms for nursery, foraging, spawning, and other life requirements. Historically and currently, the area provides valuable recreational and commercial fishing habitat, oyster culture, and nursery areas for a wide variety of finfish and shellfish

Table 3-1 lists the expected salinity zones in WBV region mitigation sites and the abundance of the managed species expected (NOAA Mapper:

http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html or download of datasets at http://www.habitat.noaa.gov/protection/efh/newInv/index.html). Table 3-2 shows the EFH for the managed species expected in those areas.

Table 3-1: Salinity Zones and Abundance for Federally Managed Species in WBV Basin

Salinity Zone	Life Stage	Brown Shrimp	White Shrimp	Red Drum	Coastal Migratory Pelagic	Reef Fish
0 -0.5 ppt.	Adults		R	R		
	Eggs					
	Juveniles	C to HA	R to C	R		
	Larvae					
	Spawners					
0.5 - 5 ppt.	Adults	R	R	R to C		
	Eggs					
	Juveniles	C to HA	C to A	C	R	R
	Larvae					
	Spawners					

Relative Abundance: Blank - Not Present A – Abundant R – Rare HA - Highly Abundant
C – Common (Variation in abundance due to seasonality) (NMFS, 1998)

Table 3-2: Essential Fish Habitat for Life Stages

Species	Life Stage	Essential Fish Habitat
Brown Shrimp	Adults	Gulf of Mexico <110 m, Silt sand, muddy sand
	Juvenile	Marsh edge, SAV, tidal creeks, inner marsh
White Shrimp	Adults	Gulf of Mexico <33 m, Silt, soft mud
	Juvenile	Marsh edge, SAV, marsh ponds, inner marsh, oyster reefs
Red Drum	Adults	Gulf of Mexico & estuarine mud bottoms, oyster reef
	Juvenile	SAV, estuarine mud bottoms, marsh/water interface
Coastal Migratory Pelagic	Juvenile	Beaches, estuaries, inlets, Coastal & shelf, Gulf, pelagic
Reef fish	Juvenile	SAV, mangroves, sand, mud, reefs, hard bottom

Cultural Resources

Historic and prehistoric sites in the WBV Basin tend to be located along the natural levees of waterways that were used as transportation routes. The Mississippi River was the main means of transportation and its natural levees were the choice location for settlement. The surrounding coastal lakes and areas were gradually explored for natural resources and utilized as well. As the population along the Mississippi River increased, land along its natural levees became scarce. Settlers began to move further outward following waterways such as Bayou Lafourche, Bayou Segnette, Bayou Verret, Bayou des Allemands, and other bayous and rivers in the

coastal area. Borrow sources located in Lakes Salvador and Cataouatche also have the potential to contain submerged cultural resources.

Prehistoric sites include hunting and food processing camps, hamlets, and village sites. Native Americans relied on hunting, fishing, and gathering of plants. Discovered archeological sites in the basin represent the continuous span of human occupation in Louisiana's Mississippi River Delta region, from the Tchefuncte period (600-200 B.C.) to the Plaquemine period (a.d. 1000-1200).

Types of historic sites include domestic buildings, plantation sites, farmsteads, military sites, commercial sites, industrial sites, boat landings, and hunting and fishing camps along the coast. In addition to terrestrial historic sites, the project area has the potential to contain historic shipwrecks. Bayou Lafourche, Bayou Segnette, Bayou des Allemands, as well as the other bayous in the area, have been a major means of transportation in the Louisiana "bayou country" since prehistoric times. The smaller bayous that fill the basin connecting larger bayous and lakes were also used by the local Native Americans as well as by trappers, hunters, and fishermen. Watercraft from all time periods could be present in the area. Most of the vessels used historically in this area were vernacular watercrafts.

In the early 1900s, various subsistence activities that were initially developed prior to the 20th century became more commercial in nature. Moss, first gathered for the making of beds and as filler in the construction of houses, was commercially processed and sold to the upholstery business as stuffing for furniture and car seats. Following World War II, the moss industry declined as the result of the wide availability of foam rubber and the increased cost of gathering moss. The lumber industry that had flourished in the late 1800s continued to grow with the harvesting of cypress throughout south Louisiana. Lumber towns and sawmills dotted the landscape until most of the virgin cypress forests were cut and the lumber companies moved westward.

The trapping of animals in south Louisiana began with Native Americans and continued on into the 1900s. Otter, muskrat, and nutria were trapped in the marshes and provided furs for the garment industry all over the world. Hunting camps and processing stations were located throughout the marsh. The demand for furs has declined over the years. Nutria are trapped today for food and bounties, to keep the population from expanding and destroying the marsh, or from causing problems in municipal canals.

Seafood, one of the most important natural resources in south Louisiana, has continued to become more important to the economy of Louisiana. In the middle of the 19th century, methods of preservation (such as the drying of shrimp and canning of oysters) made it possible to export seafood. The introduction of the gasoline motor and refrigeration allowed fishermen greater access to markets in New Orleans and the larger towns inland from the coast. Seafood processing camps that had been established all over the coast in the 1800s, including Manila Village, Bayou St. Malo, and the Isle de Caminada, were abandoned after being hit by numerous tropical storms and hurricanes. In the 1900s, many of these fishermen established new settlement and seafood processing businesses along the major waterways leading away from the coast. Fishing remains a major economic activity in south Louisiana.

Rice and sugar remained major cash crops across the coastal parishes. By the eve of World War II, bad weather, plant diseases, and economic policies had almost destroyed sugar production in south Louisiana. Truck farming of vegetables and citrus to towns and cities provided fresh vegetables at local markets. Other industries developed in south Louisiana in the

1900s that have shaped the economy of the state. The oil industry began in the early 1900s and continues to be a major industry. Large oil fields are located in the marshy areas of south Louisiana and offshore. Pockets of sulfur and salt are located across south Louisiana. The extraction of these natural resources became major industrial activities.

All of these economic activities have contributed to the constructed environment of south Louisiana. In addition to the residential homes, public buildings, and commercial buildings, these industries have contributed to the south Louisiana landscape and to the heritage of the area. Historic standing structures, archaeological sites, and landscape features associated with man's activities in the coastal area may be significant cultural resources. The State of Louisiana, Office of Cultural Development's Division of Archaeology maintains information on over 12,000 archaeological sites and thousands of historic standing structures.

Recreational Resources

Recreation areas in the WBV Basin include Salvador Wildlife Management Area (WMA), Timken WMA, JELA, Bayou Segnette State Park, and Lake Boeuf Wildlife Management Area. Other recreational features are provided by parishes and historic communities that attract visitors to a variety of heritage and cultural festivals, historical sites, parks offering opportunities for passive and active recreation that include tennis courts, soccer and softball fields, swimming pools, and golf courses. There are 37 boat launches throughout the WBV Basin. Appendix B-7 shows the number of fishing licenses, hunting licenses and boat registrations as well as the percent of state licenses and boat registrations in the WBV Basin.

The Louisiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) provides a statewide inventory of recreation resources and identifies recreational needs. While regions defined in the SCORP do not fit perfectly within the WBV Basin, SCORP Region 1 and 3 and includes the WBV Basin. The state- and Federally-managed areas described previously represent just a portion of the more than 282,000 acres of recreational facilities inventoried for SCORP Region 1. Federal, state, parish, and municipal public recreational facilities within Region 1 provide more than 196,000 acres for hunting, 123 boat ramps, 1,833 picnic tables, 10 beaches, and 320-acres for camping with 263 tent sites and 1,739 trailer sites. Region 3 includes more than 107,000-acres for hunting, 194 boat lanes at 105 boat ramps; 131-acres with 365 tables for picnicking; 1 beach of 37-acres; and 71-acres for camping, 34 tent-sites and 422 trailer-sites. In a 2008 Residents Survey, most important activities for residents in Region 1 are visiting natural places, fishing, and visiting botanic gardens. Residents in Region 3 are identified fishing, visiting natural places, and public access to state waters as most important. Within the same survey, Region 1 residents had the highest participation rates in the following activities: driving for pleasure, fishing, and camping. Region 3 residents participated most in driving for pleasure, fishing, swimming, and camping.

Funds from the Land and Water Conservation Fund (L&WCF) have supported 65 different recreational projects within the same parishes as the WBV Basin since 1964. L&WCF provides funding for numerous boat ramps, other facilities or lands that enhance opportunities for recreation.

The following is a description of the federal and state recreation areas within the WBV Basin:

Salvador Wildlife Management Area

Salvador WMA is 31,520 acres and is located in St. Charles Parish, along the northwestern shore of Lake Salvador about 12 miles southwest of New Orleans. Access is limited to boat

travel via three major routes: Bayou Segnette from Westwego into Lake Cataouatche, then west to area; Sellers Canal to Bayou Verrett into Lake Cataouatche, then west to area; or via Bayou Des Allemands. Accessibility into the interior marshes is excellent via the many canals, bayous, and ditches on the area.

Game species include waterfowl, deer, rabbits, squirrels, rails, gallinules, and snipe. Furbearing animals present are mink, nutria, muskrat, raccoon, opossum, and otter. Salvador supports a large population of alligators and provides nesting habitat for the bald eagle.
Excellent freshwater fishing is available on Lake Salvador. Bass, bream, crappie, catfish, drum, and garfish are abundant. Commercial fishing is prohibited on the WMA. Non-consumptive forms of recreation available are boating, nature study, and picnicking.

Timken Wildlife Management Area
The Timken WMA is a 3,000-acre marsh island that is leased by the City Park Commission of New Orleans. The area is identified as Couba Island on maps; however, it has been named the Timken WMA after the former landowner who donated it to the City Park Commission of New Orleans. The area is located immediately east of the Salvador Wildlife Management Area and can be accessed by Lake Cataouatche. Like the Salvador WMA, Timken WMA consists of fresh to intermediate marsh and provides excellent habitat for waterfowl, furbearers, and alligators. Game species include waterfowl, deer, rabbits, squirrels, rails, gallinules, and snipe. Furbearing animals present are mink, nutria, muskrat raccoon, opossum, and otter.

Jean Lafitte National Historical Park and Preserve
JELA consists of six physically separated sites, including the Acadian Cultural Center; Prairie Acadian Cultural Center; Wetlands Acadian Cultural Center; Barataria Preserve; Chalmette Battlefield and National Cemetery; and French Quarter Visitor Center. Only the Barataria Preserve Unit is within the project area. The Barataria Preserve features trails and waterways through bottomland hardwood forests, swamps, and marsh. Additionally, there is an Education Center providing curriculum-based programming for school groups and a visitor center providing a film and exhibits. Hunting; trapping; and fishing, including commercial fishing, is permitted by the NPS at the preserve.

Bayou Segnette State Park
Bayou Segnette State Park offers recreational opportunities including, boating, fishing, canoeing, picnicking, playgrounds, a one mile nature trail, boat launches and a wave pool. Bass, catfish, bream, perch, redfish and trout are common in the area. Twenty waterfront cabins are available for overnight rental, as well as, 98 locations for RV and tent camping. The park also includes comfort stations with showers and laundry, an RV dump station, and a group camp with kitchen and dormitories for up to 120 people.

Lake Bouef WMA
The Lake Boeuf WMA is located east of Louisiana Highway 308, north of Raceland, Louisiana. The area includes approximately 800 acres of fresh marsh/swamp habitat and is accessible only by boat via Theriot Canal, Foret Canal, or Lake Boeuf. Hunting opportunities include archery, small game, waterfowl, and unmarked hogs.

Aesthetic Resources

The WBV Basin is a large area that includes an abundance of water resources, landscape types, terrain, historical and culturally significant features. In terms of public and institutional significance, the area boasts the Great River Road, which runs adjacent to the Mississippi River

Road, the Louisiana Scenic Bayou Byway, which runs from Donaldsonville south towards Houma, and the Wetlands Cultural Trail, which is made up of a plethora of roadways crisscrossing the area around Houma and southeast towards Larose and Golden Meadow. The byways in the basin range from state designated roads to All American Roads.

Land use varies across the spectrum, but the majority of uses include residential, agricultural and some light highway and commercial. There are a great number of urban areas including that of southern New Orleans (including Algiers, Harvey, Gretna, Westwego, Estelle, Timberlane, a.k.a. "the West Bank), and other smaller communities such as Larose, Raceland, and Donaldsonville, just to name a few. The majority of communities throughout the basin are cloistered along the banks of major waterways and roadways where natural levees and ridges can be found.

With the variety of land uses present, user activity is relatively high throughout the region. The region is filled with commuters going to and from the New Orleans Metro Area for work, hunters and fishermen, and shrimping and shipping, just to name a few.

Access throughout is abundant with major U.S. Highways and State Highways crisscrossing the region. This being said, there are still many areas and thousands of acres that are remote; where access can only be attained via watercraft.

Air Quality

The EPA, under the requirements of the Clean Air Act of 1963 (CAA), has established National Ambient Air Quality Standards (NAAQS) for seven contaminants, referred to as criteria pollutants (40 CFR 50). These are carbon monoxide, nitrogen dioxide, ozone, particulate matter (PM) less than 10 microns in diameter (PM_{10}), PM less than 2.5 microns in diameter ($PM_{2.5}$), lead, and sulfur dioxide. The NAAQS standards include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from the adverse effects associated with pollutants in the ambient air. The primary and secondary standards are presented in Table 3-5.

Areas that meet the NAAQS for a criteria pollutant are designated as being "in attainment;" areas where a criteria pollutant level exceeds the NAAQS are designated as being "in nonattainment." Currently, all parishes in the WBV Basin are in attainment of NAAQS standards.

Noise

The Noise Control Act of 1972 both regulates and promotes an environment for all Americans free from noise that jeopardizes their health or welfare. The Occupational Safety and Health Standards (29 CFR, part 1910) set standards regarding protection against the effects of noise exposure. Noise levels exceeding sound pressure levels are technically significant because noise can negatively affect the physiological or psychological well-being of an individual (Kryter, 1994). These effects can range from annoyance to adverse physiological responses, including permanent or temporary loss of hearing, and other types of disturbance to humans and animals, including disruption of colonial nesting birds. Noise is publicly significant because of the public's concern for the potential annoyance and adverse effects of noise on humans and wildlife.

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by EPA and has been adopted by most Federal agencies (USEPA 1974). A DNL of 65 weighted decibels (dBA) is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by EPA as a level below which there is no adverse impact (USEPA 1974).
Most parishes in the WBV Basin have noise ordinances addressing loud machinery. Noise is typically associated with human activities and habitations, such as the operation of commercial and recreational boats; water vessels; air boats, and other recreational vehicles; aircraft; machinery and motors; and human residential-related noise (air conditioner, lawn mower, etc.).

The Corps constructed project areas are generally remote and uninhabited. The noise from distant urban areas surrounding the uninhabited portions of the project area contributes little, if any, to the natural noise levels of the area.

Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

The WBV HSDDRS construction impacts would be mitigated in the Barataria Basin, between Bayou Lafourche and the Mississippi River. These resources are institutionally significant because of the NEPA of 1969; the Estuary Protection Act; the Clean Water Act; the River and Harbors Acts; the Watershed Protection and Flood Protection Act; and the Water Resources Development Acts. Of particular relevance is the degree to which the proposed action affects public health, safety, and economic well-being and the quality of the human environment. These resources are technically significant because the social and economic welfare of the Nation may be positively or adversely impacted by the proposed action. These resources are publicly significant because of the public's concern for health, welfare, and economic and social well-being from water resources projects.

Prime and Unique Farmlands

In 1980, the CEQ directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS). Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops *and that is available for these uses* [emphasis added]. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops.

There are no unique farmlands present within the WBV basin. However, prime farmlands are present and make up approximately 227,241.7 acres, or 27 percent of the soils; breakdown by parish is as shown in Appendix B-6. There are map units designated as prime farmlands at the Barataria Preserve of JELA. However, these areas are unavailable for agricultural uses because

of their incorporation into JELA. There are no map units designated as unique farmlands at the Barataria Preserve (Ibid.).

Natural & Scenic Rivers

In 1970, the Louisiana Legislature created the Louisiana Natural and Scenic Rivers System under the Wild and Scenic Rivers Act of 1968 (16 USC 1271-1287). The System was developed for the purpose of preserving, protecting, developing, reclaiming, and enhancing the wilderness qualities, scenic beauties, and ecological regimes of certain free-flowing Louisiana streams.

Certain activities are prohibited on designated Natural and Scenic Rivers because of their detrimental ecological impacts on the streams. These include, but are not limited to; channelization, clearing and snagging, channel realignment, reservoir construction, the commercial cutting of trees within 100 feet of the ordinary low water mark and the use of motor vehicles or other wheeled or tracked vehicles on a designated system stream. Scenic River Permits are required for all activities on or near System Rivers that may detrimentally impact the ecological integrity, scenic beauty or wilderness qualities of those rivers.

The only Natural and Scenic River in the WBV Basin is Bayou Des Allemands which is over six miles from the project area.

3.2 SIGNIFICANT RESOURCES

This section contains a list of the significant resources located in the vicinity of the proposed mitigation project, and describes in detail those resources that would be impacted, directly or indirectly, by construction of it. The significant resources impacted by the Lake Boeuf features are discussed in detail in PIER #37 and those impacted by the Jean Lafitte features are discussed in PIER #37, TIER 1 EA, therefore these impacts will not be discussed in detail in this document. Both documents are incorporated by reference. A summary of these resources can be found below.

The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of National, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. Further detail on the significance of each of these resources can be found by contacting the CEMVN, or on www.nolaenvironmental.gov, which offers information on the ecological and human value of these resources, as well as on the laws and regulations governing each resource. Search for “Significant Resources Background Material” in the website’s digital library for additional information. See Appendix A-1, for the habitats found in the WBV Basin. See Appendices B-2, B-3, B-4 and B-5, for scientific names of species identified throughout the document.

3.2.1 Summary of Significant Resources within Lake Boeuf FS BLH-Wet and Swamp Projects

This area is primarily bare land consisting mainly of agricultural lands. Animals that could be found within this area would be skunks, rabbits, deer, and various species of birds including raptors, red-winged blackbirds and swallows. None of the animals under USFWS and/or NMFS jurisdiction are expected to be found in the project area. The project is in an upland area and does not have any aquatic species or any EFH.

The CEMVN has elected to fulfill its obligations under Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended through the execution and implementation of a Programmatic Agreement that was executed on June 18, 2013. There have been no previous surveys for cultural resources conducted in the proposed Lake Boeuf project area. The area has been heavily disturbed by plowing and other activities, but there remains a possibility that intact cultural resources could exist below the plow line. Any cultural resources surveys determined to be necessary will be completed prior to the construction of any mitigation features, and the results of the surveys will be coordinated with the LA SHPO and federally recognized Indian Tribes for review in accordance with the stipulations of the Programmatic Agreement.

There are no developed recreation sites within the project area which is privately owned. This project is in Lafourche Parish which is currently in attainment of NAAQS. Noise is produced by consistent and sporadically heavy traffic on this road. The nearest major navigable waterway is Bayou Lafourche, which is adjacent to the Lake Boeuf project area. Sporadic boat traffic may produce noise levels that exceed 55 dBA within the area. Two Recognized Environmental Conditions (RECs), a natural gas pipeline and one oil well, are located in the project area.

According to 2010 U.S. Census data, 281 people live in 6 census blocks comprising the Lake Boeuf project area vicinity and are part of block group 1 of census tract 20900. Land proposed for restoration is typically used for agricultural purposes and most land owners live in homes fronting Highway 308. Census block data reveals under 10% of the residents are minority and about the same percentage of households are below the poverty level. A smaller number of mitigation sites are located in block group 2 of census tract 20900. About 38% of the households in this block group have incomes below the poverty level while census block data reveals that 90% are minority.

The entire Lake Boeuf PS BLH site is classified as Prime Farmlands; Cancienne silty clay loam, Cancienne silty loam, and Schriever clay. The majority of the site is currently being used for agriculture and includes some pasture land. There are no state recognized scenic streams in the vicinity of the project area.

3.2.2 Summary of Significant Resources within the Jean Lafitte Projects

Marsh, swamp and BLH habitats are predominant throughout the park. The park supports a diverse bird community. Moreover, it is part of one of the largest and most productive estuaries in the USA and serves as important habitat for wintering waterfowl, wading birds, and migrating shorebirds (Watson 2005). Other wildlife present within the park consists of white-tailed deer, feral hogs, nutria, beaver, muskrat, armadillo, frogs, snakes, alligators and more. There is potential for one listed species, the West Indian manatee, to be present in the project area.

The park incorporates a complex set of aquatic habitats, and the waters of the park are primarily fresh, with brackish influence. The combination of aquatic habitats allows for the potential presence of a number of fish fauna including seasonal migrants. The waterways of the park contain relatively low dissolved oxygen concentrations associated with very warm slow moving water. Eutrophication is a major issue for many water bodies associated with the park as canals provide direct channels for nutrient runoff. Of the proposed projects only the JL1B5 and JL1B4 projects and their borrow area are identified as EFH for coastal migratory pelagic, red drum, reef fish, and shrimp.

The park project area has strong probability for the presence of cultural resources. The Jean Lafitte National Historical Park and Preserve is a public park open daily to visitors for various

activities such as hiking, fishing and hunting. The proposed action is in Jefferson Parish which is currently in attainment of NAAQS. Common existing noise sources include on and off road vehicles of various types, heavy equipment and construction, a variety of vessels including airboats, a variety of aircraft including low-level military and passenger flights, firearms, and a nearby racetrack.

Population demographics were reviewed for the communities adjacent to the preserve. None of the adjacent communities is identified as an environmental justice community based on the available U.S. Census Bureau Data (2010). Several swamp tour companies are located adjacent to the preserve. The NPS intermittently issues permits for commercial fishing (often crabbing) in preserve waterways. Commercial fishers utilize navigation channels within and adjacent to the preserve.

No Recognized Environmental Conditions (RECs) were found within the proposed mitigation areas, and the mitigation areas contain no sites of interest which pose potential environmental concerns.

3.2.3 Avondale Gardens PS BLH-Dry Enhancement Project

3.2.3.1 Wetlands and Other Surface Waters

This area is primarily BLH forest consisting of wet and dry species, scrub/shrub and invasive species.

3.2.3.2 Wildlife

A great variety of mammals, birds, reptiles, and amphibians are found in the vicinity of the Avondale Gardens project. Species inhabiting the area include white-tailed deer, wild hogs, skunks, rabbits, squirrels, armadillos, and a variety of other smaller mammals. Various raptors such as barred owls, red-shouldered hawks, northern harriers (marsh hawks), American kestrel, and red-tailed hawks are present. Passerine birds present include sparrows, vireos, warblers, Northern mockingbirds, grackles, red-winged blackbirds, wrens, blue jays, northern cardinals, and crows. Many of these birds are present primarily during periods of spring and fall migrations. The area provides habitat for salamanders, toads, frogs, turtles, and several species of poisonous and nonpoisonous snakes. There are currently no documented bald eagle nests in the project area. Prior to construction, a nest survey would be conducted. If a nest is found the National Bald Eagle Management Guidelines (Appendix H) would be followed.

3.2.3.3 Threatened and Endangered Species

None of the animals under USFWS and/or NMFS jurisdiction are expected to be found in the project area.

3.2.3.4 Fisheries, Aquatic Resources, and Water Quality

The project is in an upland area and does not have any aquatic species. The water quality of the hydrologic unit encompassing this project footprint does not fully support two of its designated uses: Fish and Wildlife Propagation and Primary Contact Recreation. The suspected sources of this impairment includes drainage/filling/loss of wetlands, habitat modification other than hydromodification, littoral/shore area modification, forced drainage pumping, municipal point source discharge, sewage discharges in unsewered areas, and natural sources.

3.2.3.5 Essential Fish Habitat

The project is in an upland area and does not have any EFH.

3.2.3.6 Cultural Resources

Several surveys for cultural resources have been carried out within and adjacent to the proposed project area. In June of 2007, Coastal Environments, Inc. (CEI) undertook a cultural resources assessment for the U.S. Army Corps of Engineers, New Orleans District of a portion of the West Bank and Vicinity Hurricane Protection Levee in Jefferson Parish, Louisiana, in advance of proposed improvements to the levee system (Wells, et al. 2010). It was determined that there was a very low potential for cultural resources and no further work was recommended. There are two previously identified cultural resources located in or within one mile of the proposed project area. Site 16JE26, Reforestation Tract Site, is located within the boundaries of one of the proposed BLH-Dry Enhancement project areas. Site 16JE26 was recorded in 1997 (Jones, et al. 1997), and was determined to be potentially eligible for listing to the National Register of Historic Places (NRHP). Site 16JE133 is located approximately 800 meters from the proposed project area and is identified as a potential prehistoric "extraction locale." When initially recorded, an intact midden deposit was identified consisting of shell. The site was revisited in 1997 and the site record was updated to indicate the presence of prehistoric ceramics and human remains on the surface of the site (Jones et al. 1997).

The CEMVN has elected to fulfill its obligations under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, through the execution and implementation of a Programmatic Agreement. The Programmatic Agreement was developed in consultation with the Advisory Council on Historic Preservation, the Louisiana State Historic Preservation Officer (LA SHPO), federally-recognized Indian tribes, and other identified interested parties. Any cultural resources surveys determined to be required will be completed prior to the start of construction activities for the proposed action, and the results of surveys will be coordinated with the LA SHPO and federally-recognized Indian tribes for review in accordance with the stipulations of the Programmatic Agreement.

The following federally-recognized Indian tribes were invited to participate in the development of the Programmatic Agreement: Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and the Tunica-Biloxi Tribe of Louisiana.

The CEMVN, in consultation with the LA SHPO, has taken measures to identify other interested parties and organizations to participate in the development and execution of the Programmatic Agreement. The CEMVN notified interested parties and the public of the development of the Programmatic Agreement through mailings. The Programmatic Agreement was executed on 18 June 2013, and the CEMVN will follow the stipulations as outlined in that agreement with respect to any cultural resources identified at the site.

3.2.3.7 Recreational Resources

There are no developed recreation sites located in the project area which is privately owned. The Avondale Gardens East mitigation area is approximately ½ mile west of Bayou Segnette State Park and ¼ mile south of NOLA Motorsports Park.

3.2.3.8 Aesthetic Resources

The area is relatively flat terrain mixed with a variety of water resources. Vegetation in the area is a mixture of invasive species and dense hardwoods. The forestation cover is dense. Overall access to the site is limited, with Nicole Boulevard located well to the north. The primary access comes from Bayou Segnette State Park. User activity is relatively low in this region, and primarily relegated to Bayou Segnette State Park. There are no Federal or State designated Scenic Byways in the area. Bayou Segnette State Park is a state protected land.

3.2.3.9 Air Quality

This project is in Jefferson Parish which is currently in attainment of NAAQS.

3.2.3.10 Noise

Adjacent communities are extensively developed, primarily as residential and commercial properties. The NOLA Motorsports Park is located approximately one half of a mile from the eastern most side of the Avondale Gardens East site and from the closest residential area. The operation of the NOLA Motorsports Park is a significant source of ambient noise in the area. With the onset of construction along the perimeter of the developed area, the adverse effects of noise created by construction activities would be introduced. Noise would be created from high-powered machinery and human activities within the project area and emanate various distances beyond the project site until the noise energy dissipates. Because of the proximity of the construction site to the developed area, and the density of the vegetative buffer, the number of residential and commercial properties exposed to the adverse impacts of noise is minimal.

There are two major thoroughfares, Lapalco Blvd and Highway 18, located north of the project area. Noise is produced by consistent and sporadically heavy traffic on these roads. The Outer Lake Cataouatche Canal is located south of the project area and sporadic boat traffic may produce noise levels that exceed 55 dBA within the area.

3.2.3.11 Hazardous, Toxic, and Radioactive Waste

One Recognized Environmental Condition (REC), an active producing oil well, was found within the proposed Avondale Gardens PS BLH-Dry Enhancement Project. A petroleum product pipeline crosses the features and may be considered a potential REC. Three plugged and abandoned dry hole oil wells are also located in the proposed Avondale Gardens project area.

3.2.3.12 Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

The project is located on the west bank of the Mississippi River in Westwego, LA. All of the forested site is privately-owned. According to 2010 U.S. Census data, there are no residents located within the boundaries of the Avondale Gardens PS BLH-Dry Enhancement Project. The nearest residential area is located approximately one-half mile from the project site. There are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries. The nearest major thoroughfare is Avondale Garden Road.

3.2.3.13 Prime and Unique Farmland

No prime farmlands are located at this site.

3.2.3.14 Natural & Scenic Rivers

Bayou Segnette State Park is a state protected land. There are no state recognized scenic streams in the vicinity of the project area.

4. ENVIRONMENTAL CONSEQUENCES OF THE FINAL ARRAY OF MITIGATION PROJECTS

4.1 INTRODUCTION

This section describes the direct, indirect and cumulative effects of the potential replacement project for the PS BLH-Dry feature. Table 4-1 shows those significant resources found within the WBV mitigation basin, and notes whether they would be impacted (adversely or beneficially) by implementation of the project. The period of impact analysis begins when project construction begins and generally extends 50 years for USACE projects.

Table 4-1: Significant Resources in the Project Study Area

Significant Resource	Impacted	Not Impacted
Wetlands		X
Fisheries and EFH		X
Wildlife	X	
Threatened or Endangered Species		X
Water Quality		X
Cultural Resources	X	
Recreational Resources		X
Air Quality	X	
Aesthetics	X	
Socioeconomic Resources: Land Use, Transportation and Environmental Justice		X
Prime Farmland		X

Direct impacts are those that are caused by the action and occur at the same time and place (40 CFR §1508.8(a)). Indirect impacts are those that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)). Cumulative impacts are the effects on the environment that results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future action, regardless of what agency or person undertakes such actions. More information on the Cumulative impacts is discussed in section 6.

The impacts analysis for the Lake Boeuf and Jean Lafitte projects are discussed in PIER #37 and PIER #37, TIER 1 EA respectively and therefore will not be discussed in detail in this document. A summary table is provided below.

Table 4-2: Impacts of Significant Resources by Lake Boeuf and Jean Lafitte Projects

Resource	Lake Boeuf Projects	Jean Lafitte Projects
Wetlands	Not impacted	Beneficial impact
Fisheries and EFH	Not impacted	Temporary adverse impacts Long term benefit

Wildlife	Potential temporary adverse impacts Long term benefit	Potential temporary adverse impacts Long term benefit
Threatened and Endangered Species	Not impacted	Not impacted
Water Quality	Not impacted	Temporary adverse impacts
Cultural Resources	Potential for impact	Not impacted
Recreational Resources	Not impacted	Temporary impacts Long term switch in recreational use
Air Quality	Temporary impacts	Temporary impacts
Aesthetics	Temporary adverse impact long term benefit	Not impacted
Socioeconomic Resources: Land Use, Transportation and Environmental Justice	Impacted	Temporary adverse and beneficial impacts
Prime Farmland	Impacted	Not impacted

The following resources would not be impacted by the proposed project and therefore will not be discussed further: Threatened and endangered species, fisheries and water quality, essential fish habitat, recreation, navigation, commercial fisheries, prime and unique farmlands and natural and scenic rivers.

4.2 MITIGATION FOR GENERAL PS BLH-DRY IMPACTS: Avondale Gardens Enhancement Project

4.2.1 Wetlands and other Surface Waters

Direct Impacts
There could be a beneficial impact to wetlands depending on which site is utilized for the project. BLH-East would be planted with BLH-Wet species due to the elevations and hydrology of that specific site. Approximately 920 acres of existing early successional BLH species and invasive species would be replaced with high quality BLH species. BLH-West would not offer benefits to wetlands as the elevation and hydrology of that specific site is conducive to the support of BLH-Dry species.

Indirect and Cumulative Impacts
Implementation of this project would reduce the conversion of BLH to nonnative species. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin could help retard the loss of wetland bottomland hardwood species.

4.2.2 Wildlife

Direct Impacts
Any wildlife present at the time of construction would be temporarily displaced to adjacent habitat due to noise, movement and vibration. Slower moving species may perish during construction. Wildlife species would return once construction is complete.

Indirect Impacts
Beneficial impacts would be the enhancement of approximately 920 acres of BLH habitat which would offer better shelter and foraging grounds for various species such as deer, rabbit, squirrel, songbirds and raptors. If bald eagle nests are discovered, the National Bald Eagle Management Guidelines (appendix G) would be followed to avoid and minimize impacts.

Cumulative Impacts
This project would prevent an overall loss in the basin of BLH habitat necessary for many wildlife species. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin, would help retard the loss of wildlife and overall decline of wildlife species within the basin and would be beneficial to preserving the species bio-diversity.

4.2.3 Cultural Resources

Direct Impacts
A review of the Louisiana Division of Archaeology Cultural Resources Map and Cultural Resources Management Bibliography showed that previous research in the project area has identified cultural resources that could be directly impacted by the proposed project. Several surveys have been conducted in the proposed project area, but there is a potential that additional cultural resources could exist within portions of the project area that have not previously been surveyed. Activities associated with this project have the potential to directly impact previously undocumented cultural resources. The stipulations of the Programmatic Agreement executed on June 18, 2013 would be followed. As individual project features are developed, survey strategies and the Area of Potential Effect will be coordinated with the LA SHPO, federally-recognized Indian tribes, and other interested parties as required by the Programmatic Agreement. Identified cultural resources that are determined to be eligible for listing or are listed on the NRHP would be avoided. If avoidance is not possible, mitigation strategies would be developed in accordance with the stipulations of the Programmatic Agreement.

Indirect and Cumulative Impacts
The erosion caused by natural forces and human activity would continue to impact cultural resources in the project area. Erosion within the project area could threaten the existence and integrity of cultural resources. The implementation of measures to restore ecosystems and habitat could work to reduce continued erosion, and prevent exposure and impact to significant cultural resources.

Implementation of this project would work synergistically with other ecosystem restoration projects in coastal Louisiana to restore degraded habitats to their historic conditions. Cumulative impacts to cultural resources would be the additive combination of impacts by this and other Federal, state, local, and private restoration efforts. Additional evaluations of such impacts would be completed following the cultural resources investigations.

4.2.4 Aesthetic Resources

Direct Impacts
The introduction of bottomland hardwoods will greatly enhance the visual resources of the Avondale Gardens project region. Public view sheds of the new plantings will be extremely limited.

Indirect and Cumulative Impacts
Temporary impacts could potentially occur due to construction efforts in the area. Increased traffic due to construction vehicles, dust, debris and increased noise volumes could affect residents of the area. These temporary impacts should return to normal upon completion of the project.

The project would not add measurably to cumulative impacts to visual resources in the study area. Cumulative impacts would be the incremental direct and indirect impacts of implementing the proposed action combined with the continued activities of growth and development in the area. These incremental direct and indirect impacts would be in addition to the direct and indirect impacts of visual resources in the region, Louisiana and the Nation caused by other restoration projects, destruction of natural habitats due to human development and the evolution of the landscape due to natural processes.

4.2.5 Air Quality

Direct Impacts
During construction of this project, an increase in air emissions could be expected. These emissions could include 1) exhaust emissions from operations of various types of non-road construction equipment such as a hydro axe, skidder, ATV etc. and 2) fugitive dust due to earth disturbance. Emission of fugitive dust near the construction area is not anticipated to be a problem as the majority of the work is anticipated to be completed by hand and the neighborhoods to the north and east are buffered by forest.

Any site-specific construction effects would be temporary and dust emissions, if any, would be controlled using standard BMPs. Air quality would return to pre-construction conditions shortly after the completion of construction activities. Because the project area is in Jefferson parish which is in attainment of NAAQS, a conformity analysis is not required.

Indirect Impacts
Any impacts to air quality would be localized in and near the project area. Emissions and dust would quickly dissipate. Impacts beyond the project area would be negligible.

Cumulative Impacts
Cumulative impacts to air quality in the project area due to construction of this project in addition to the other construction activities within the WBV basin that may be occurring concurrently would be temporary and would be very minimal, especially considering there would be no placement of dredged material to create fugitive dust. After the construction period, there would be no incremental contribution to cumulative air quality impacts.

4.2.6 Noise

Direct and Indirect Impacts
Backhoes, hydro-axes, gyro-tracks, mulchers, and dump trucks would be the primary pieces of equipment used for construction of this project. These pieces of equipment exceed noise levels above 55 dBA at 50 feet. Noise levels may result in wildlife avoiding the project area during construction; however, movement of equipment during construction would result in the same avoidance behaviors from wildlife species. In addition, noise levels quickly drop off once a buffer (e.g. vegetation) is established between the noise source and the receptor. No impact to human populations is anticipated as noise levels would quickly drop off due to the vegetative buffer surrounding the project area.

Cumulative Impacts
Construction of this project is not anticipated to add significantly to the cumulative effect of noise in the WBV basin as the construction activities would be temporary, the area is buffered by vegetation, and wildlife would avoid the project area would occur due to the movement of machinery in the area even without the additional noise.

4.2.7 Hazardous, Toxic, and Radioactive Waste

Direct, Indirect and Cumulative Impacts
One REC and one potential REC are located in the Avondale Gardens Enhancement Project area. Mitigation project construction will mainly involve eradicating Chinese tallow trees and replanting of native BLH species. As long as the construction traffic involved in the mitigation process follows proper precautions, there is a low probability of encountering HTRW or petroleum products in the proposed mitigation area. Project construction will not contribute HTRW to the site. Oil and gas exploration and additional land development in the area could contribute to cumulative impacts but there are no known exploration or development projects scheduled for this area.

4.2.8 Socioeconomics/Land Use, Environmental Justice and Transportation

Direct, Indirect and Cumulative Impacts
According to 2010 U.S. Census data, there is a residential community located a half mile from the Avondale Gardens PS BLH-Dry Enhancement project site. Impacts associated with construction activities are not expected to cause adverse EJ impacts to the residents as they are not within 1,000 feet of the site (see noise section 4.2.2.7) and are buffered by dense vegetation. There also would not be any adverse transportation impacts to an EJ community as delivery of plant material and construction equipment will take place on a four-lane, principal arterial road, Highway 90. Additionally, the number of truck trips is expected to be minimal and the trucks would not use any minor arterial nor urban or local roads. There are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries. Therefore, there would be no conversion of land use from on purpose to another. However, the construction of a mitigation project on this area will forever prevent its development for another purpose. Minimal indirect land use impacts may occur when privately owned land is converted to public use. No impacts to employment, businesses, industry, public facilities and services, community and regional growth community cohesion, or tax revenues and property values are anticipated to occur with construction of this project.

There would be no direct and only minimal indirect impacts to transportation in nearby residential areas during construction due to heavy vehicle traffic in the vicinity of the restoration site during mobilization and demobilization phases. It is expected that once the necessary construction equipment is on site that no additional transportation impacts would occur until the project construction is complete and the equipment is removed from the site.

The cumulative impacts of the projects, when added to other past, present, and reasonably foreseeable ecosystem restoration, mitigation and construction projects in the basin would minimally and temporarily affect socio-economic resources. Due to the relatively small size of the Avondale Gardens PS BLH-Dry Enhancement Project, the temporary nature of the project activities and the duration of enhancement projects, the Avondale Gardens PS BLH-Dry Enhancement Project would add very little and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the WBV basin and would not contribute significantly to cumulative impacts to socio-economic resources in the basin.

5. ENVIRONMENTAL CONSEQUENCES OF MITIGATION PLAN ALTERNATIVES

5.1 INTRODUCTION

This section describes the direct and indirect effects of the proposed projects when combined to make up the MMPAs.

Although this SPIER is programmatic in nature, one of the individual mitigation projects in each of the MMPAs has sufficiently detailed design as to be fully assessed and would not require additional NEPA documentation. This mitigation project is termed the "Constructible Feature" in each alternative. The purchase of mitigation bank credits for PS BLH-Wet/Dry impacts was evaluated and included in the RMP in PIER #37 and mitigation bank credits were purchased for PS BLH-Wet impacts. This constructible feature is included as part of all MMPAs discussed below.

In the event sufficient credits to mitigate the PS BLH-Dry requirement become available in the WBV basin prior to implementation of a Corps-constructed mitigation project, CEMVN would evaluate whether to purchase credits consistent with the PIER #37 RMP based on relative costs and schedule.

The Programmatic Features of the mitigation plan require further design at a feasibility level for which the details and impacts would be released in subsequent tiered NEPA documents. PIER #37, TIER 1 EA has been prepared in collaboration with the National Park Service (NPS) to evaluate implementation of the features of the mitigation plan located on Jean Lafitte National Historic Park and Preserve (JLNHPP), thereby making them constructible. The TIER 1 EA was released for public review from October 13, 2015 through November 12, 2015. The PIER #37 TIER 1 EA has a finding of no significant impact which was signed by the District Commander on December 18, 2015.

5.2 ALTERNATIVES

Natural and scenic rivers would not be impacted by any of the alternatives and therefore will not be discussed further in this section.

5.2.1 No Action Alternative

Explanation of the No Action Alternative: The Decision Record for PIER #37 recommended a comprehensive mitigation plan to compensate for impacts to all habitat types; it approved the purchase of mitigation bank credits to compensate for impacts to PS BLH-Wet/Dry for implementation. The remaining features of the plan were to be further assessed through additional NEPA evaluation. However, the purchase of credits to mitigate for PS BLH-Dry impacts was not implementable due to a lack of available credits in the WBV basin. Credits were purchased to satisfy the PS BLH-Wet requirements. Consequently, the PS BLH-Dry requirement is still outstanding. Because the purchase of credits to compensate for PS BLH impacts was approved after a complete NEPA evaluation, that feature of the RMP is considered the "no action" alternative.

PIER #37 fully evaluated the "No Action" alternative formulated as not compensating for habitat losses caused by construction of the WBV HSDRRS. That analysis is incorporated by reference.

Direct and Indirect Impacts

The MP approved in PIER #37, the purchase of in-basin BLH-Wet mitigation bank credits to compensate for PS BLH-Dry impacts, would be implemented. The impacts would be the same as discussed in PIER #37. None of the resources would incur new impacts by the purchase of BLH credits from a mitigation bank within the WBV basin as the mitigation banks exist as part of the baseline conditions in the future without project condition.

However, there currently are not sufficient in-basin mitigation bank credits to satisfy the PS BLH-Dry mitigation requirements. Consequently, the purchase of credits to compensate for PS BLH-Dry impacts is not currently feasible.

5.2.2 Tentatively Selected Modified Mitigation Plan Alternative (TSMMPA)

The TSMMPA (Table 5.1) contains all the projects in PIER #37's RMP and PIER #37, TIER 1 EA except for the project selected for the PS BLH-Dry feature. Although this is a programmatic NEPA document, one of the projects that makes up the TSMMPA is fully assessed and is recommended for implementation. This project, termed "Constructible Feature" (or "constructible portion"), mitigates general (e.g. non-park/404c) BLH-Dry impacts and would consist of the Avondale Gardens BLH-Dry enhancement project. The projects that comprise the remainder of the WBV HSDRRS MMPA are termed "Programmatic Features". These programmatic features require further design at a feasibility level for which the details and impacts will be released in a forthcoming NEPA document that will tier from this programmatic NEPA document. A joint EA has been prepared in collaboration with the National Park Service to evaluate mitigation projects in the Jean Lafitte National Historic Park and was signed on December 18, 2015 by the District Commander.

Table 5-1: Projects that make up the TSMMPA

Habitat Type	Mitigation Projects in MMPA	Constructible/Programmatic
General PS BLH-Wet/Dry	Avondale Gardens BLH-Dry Enhancement	Constructible
General FS BLH-wet	Lake Boeuf BLH-Wet Restoration	Programmatic
General FS Swamp	Lake Boeuf Swamp Restoration	Programmatic
General FS Marsh	Jean Lafitte Marsh Restoration	Approved
Park/404(c) FS BLH-Wet	Jean Lafitte BLH-Wet Restoration	Approved
Park/404(c) FS Swamp	Jean Lafitte Swamp Restoration	Approved
Park/404(c) FS Fresh Marsh	Jean Lafitte Fresh Marsh Restoration	Approved

5.2.2.1 Wetlands and other Surface Waters

5.2.2.1.1 Programmatic Features

Direct and Indirect Impacts

Approximately 222 acres of agricultural land would be converted to BLH-Wet at the Lake Boeuf project site. Approximately 320 acres of agricultural land would be converted to swamp at the Lake Boeuf project site.

5.2.2.1.2 Constructible Feature

Direct Impacts

There would no impact to wetlands as approximately 920 acres of existing early successional upland BLH habitat would be replaced with high quality BLH species at the upland Avondale Gardens project site.

Indirect Impacts

This plan, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the loss of BLH species.

5.2.2.2 Wildlife

5.2.2.2.1 Programmatic Features

Direct Impacts

Approximately 222 acres of agricultural land would be converted to BLH-Wet at the Lake Boeuf project site. Approximately 320 acres of agricultural land would be converted to swamp at the Lake Boeuf project site. Any wildlife present at the time of construction would be temporarily displaced to adjacent habitat due to noise, movement and vibration. It is anticipated those species would return to an improved habitat type once construction is complete. *Indirect Impacts*

The conversion of agricultural fields to BLH and swamp habitat would offer better shelter and foraging grounds for wildlife such as squirrels, rabbits, deer, raccoon, songbirds and raptors. It is anticipated that species diversity would improve with the conversion of agricultural land to BLH and swamp habitat.

5.2.2.2.2 Constructible Feature

Direct Impacts

Approximately 920 acres of existing early successional BLH habitat would be replaced with high quality BLH species at the Avondale Gardens project site. Any wildlife present at the time of construction would be temporarily displaced to adjacent habitat due to noise, movement and vibration. It is anticipated those species would return once construction is complete.

Indirect Impacts

Beneficial impacts would be the enhancement of approximately 920 acres of BLH habitat which would offer better shelter and foraging grounds for wildlife such as squirrels, rabbits, deer, raccoon, songbirds and raptors. It is anticipated that species diversity would improve with the conversion of agricultural land to BLH and swamp habitat.

5.2.2.3 Threatened and Endangered Species

5.2.2.3.1 Programmatic Features

Direct and Indirect Impacts

None of the animals under USFWS and/or NMFS jurisdiction are expected to be found in the project area either before, during or after construction; therefore no impacts are anticipated.

5.2.2.3.2 Constructible Feature

Direct and Indirect Impacts

None of the animals under USFWS and/or NMFS jurisdiction are expected to be found in the project area either before, during or after construction; therefore no impacts are anticipated.

5.2.2.4 Fisheries, Aquatic Resources and Water Quality

5.2.2.4.1 Programmatic Features

Direct and Indirect Impacts

There would be no direct or indirect impacts to fisheries or aquatic resources due to the construction of this plan since the proposed project sites presently do not contain fisheries or aquatic resources. There would be no direct or indirect impacts to water quality as the project site does not contain open water nor is it connected to a water body.

5.2.2.4.2 Constructible Feature

Direct and Indirect Impacts

There would be no direct or indirect impacts to fisheries or aquatic resources due to the construction of this plan since the proposed project site presently does not contain fisheries or aquatic resources. There would be no direct or indirect impacts to water quality as the project site does not contain open water nor is it connected to a water body.

5.2.2.5 Essential Fish Habitat

5.2.2.5.1 Programmatic Features

Direct and Indirect Impacts

There would be no direct or indirect impacts to EFH due to the construction of this project since the area presently does not currently contain EFH.

5.2.2.5.2 Constructible Feature

Direct and Indirect Impacts

There would be no direct or indirect impacts to EFH due to the construction of this project since the area presently does not contain EFH.

5.2.2.6 Cultural Resources

5.2.2.6.1 Programmatic Features

Direct Impacts

Activities associated with implementation of the Programmatic Features could have a direct impact on existing or as yet undiscovered cultural resources. Additional analysis for impacts to cultural resources would be conducted and documented in supplemental NEPA documents for the Programmatic Features. The stipulations of the Programmatic Agreement executed on June 18, 2013 would be followed. As individual project features are developed for the Programmatic Features, survey strategies and the Area of Potential Effect will be coordinated with the LA SHPO, Federally recognized Tribes, and other interested parties as required by the Programmatic Agreement. Identified cultural resources that are determined to be eligible for listing or are listed on the NRHP would be avoided. If avoidance is not possible, mitigation strategies would be developed in accordance with the stipulations of the Programmatic Agreement.

Indirect Impacts

The erosion and land loss caused by natural forces and human activity would continue to impact cultural resources in the WBV basin. The loss of land would continue to threaten the existence

and integrity of cultural resources sites. The implementation of measures to restore ecosystems and habitat could work to reduce continued land loss and erosion, and prevent exposure and impact to significant cultural resources.

Implementation of this project would work synergistically with other ecosystem restoration projects in coastal Louisiana to stop the erosion and land loss that generally threatens cultural resources. Cumulative impacts to cultural resources would be the additive combination of impacts by this and other Federal, state, local, and private restoration efforts.

5.2.2.6.2 Constructible Feature

Direct Impacts

Activities associated with this project have the potential to directly impact cultural resources in the project sites. A review of previous research in the Avondale Gardens BLH-Dry enhancement project area identified cultural resources that could be directly impacted by the proposed project. Several surveys have been conducted in the Avondale Gardens project area, but there is a potential that additional cultural resources could exist within portions of the project area not previously surveyed. Activities associated with this project have the potential to directly impact cultural resources in the project area.

The project would be assessed for its effect on historic properties, and survey strategies and the Area of Potential Effect would be coordinated with the LA SHPO, tribes, and other interested parties as in accordance with the stipulations of the Programmatic Agreement as executed on June 18, 2013. Identified cultural resources that are determined to be eligible for listing or are listed on the NRHP will be avoided. If avoidance is not possible, mitigation strategies would be developed in accordance with the stipulations of the Programmatic Agreement.

Indirect Impacts

The erosion and land loss caused by natural forces and human activity would continue to impact cultural resources elsewhere in the project area. The loss of land threatens the existence and integrity of cultural resources. The implementation of these measures to restore ecosystems and habitat could work to reduce continued land loss and erosion, and prevent exposure and impact to significant cultural resources.

5.2.2.7 Recreational Resources

5.2.2.7.1 Programmatic Features

Direct and Indirect Impacts

Conversion of private land to public land may allow opportunities for public recreational activities depending on the how the land is managed in the future. However, these areas are not currently used for recreation and future management is unpredictable. No direct or indirect impacts are anticipated.

5.2.2.7.2 Constructible Feature

Direct and Indirect Impacts

Conversion of private land to public land may allow opportunities for public recreational activities depending on the how the land is managed in the future. However, these areas are not currently used for recreation and future management is unpredictable. No direct or indirect impacts are anticipated.

5.2.2.8 Aesthetic Resources

5.2.2.8.1 Programmatic Features

Direct and Indirect Impacts

The introduction of BLH and swamp would greatly enhance the visual resources of the project region. Temporary impacts could potentially occur due to construction efforts in the area.

5.2.2.8.2 Constructible Feature

Direct and Indirect Impacts

The enhancement of BLH would enhance the visual resources of the project region. Temporary impacts could potentially occur due to construction efforts in the area.

5.2.2.9 Air Quality

5.2.2.9.1 Programmatic Features

Direct Impacts

During construction of the Lake Boeuf Restoration project features, an increase in air emissions could be expected. These emissions could include 1) exhaust emissions from operations of material delivery and removal/dump trucks and various types of non-road construction equipment such as loaders, excavators, etc. and 2) fugitive dust due to earth disturbance. The principal air quality concern associated with the proposed activities is emission of fugitive dust near construction areas due to anticipated earth work. The on-road trucks and private autos used to access the work area would also contribute to construction phase air pollution in the project neighborhood when traveling along local roads.

Indirect Impacts

Any site-specific construction effects would be temporary and dust emissions, if any, would be controlled using standard BMPs. Air quality would return to pre-construction conditions shortly after the completion of construction activities. Because the project area is in a parish which is in attainment of NAAQS, a conformity analysis is not required.

5.2.2.9.2 Constructible Feature

Direct Impacts

During construction of the Avondale Gardens BLH Dry an increase in air emissions could be expected. These emissions could include 1) exhaust emissions from operations of material delivery and removal/dump trucks and various types of non-road construction equipment such as loaders, excavators, etc. and 2) fugitive dust due to earth disturbance. The principal air quality concern associated with the proposed activities is emission of fugitive dust near construction areas due to anticipated earth work. The on-road trucks and private autos used to access the work area would also contribute to construction phase air pollution in the project neighborhood when traveling along local roads.

Indirect Impacts

Any site-specific construction effects would be temporary and dust emissions, if any, would be controlled using standard BMPs. Air quality would return to pre-construction conditions shortly after the completion of construction activities. Because the project areas are in parishes in attainment of NAAQS, a conformity analysis is not required.

5.2.2.10 Noise

5.2.2.10.1 Programmatic Features

Direct and Indirect Impacts

Backhoes would be the primary pieces of equipment used for construction of most of the alternatives. Additional construction equipment includes hydro-axes, gyro-tracks, mulchers and dump trucks. These pieces of equipment exceed noise levels above 55 dBA. See Appendix B-8 for list of equipment and associated dBA. Noise levels may result in wildlife avoiding the project area during construction; however, movement of equipment during construction would result in the same avoidance behaviors from wildlife species. In addition, noise levels quickly drop off once a buffer (e.g. vegetation) is established between the noise source and the receptor. As such, any wildlife in the adjacent habitats should be largely undisturbed by the additional noise from construction of these features.

5.2.2.10.2 Constructible Feature

Direct and Indirect Impacts

Residences and commercial facilities near the Avondale Gardens Project could experience higher than ambient noise levels during construction. However, these levels would be temporary during the period of construction and would be limited to daylight hours.

5.2.2.11 Hazardous, Toxic, and Radioactive Waste

5.2.2.11.1 Programmatic Features

Direct, and Indirect

None of the projects sites identified a high probability of encountering HTRW. There are, however, natural-gas and crude-oil pipelines, an injection well, and one directionally-drilled oil well located in several features of the Lake Boeuf restoration sites that must be avoided during the mitigation work.

There is a very low probability that the proposed restoration of habitat would encounter HTRW or introduce toxic materials into the mitigation areas. The project may proceed without further investigation of HTRW. If the project location or methods change the probability of HTRW may need to be re-investigated.

5.2.2.11.2 Constructible Feature

Direct, and Indirect
One REC and one potential REC are located in the Avondale Gardens Enhancement Project area. Mitigation will mainly involve eradicating Chinese tallow trees and replanting of native BLH species. As long as the construction traffic involved in the mitigation process follows proper precautions, there is a low probability of encountering HTRW or petroleum products in the proposed mitigation area. Cumulative impacts may include additional oil and gas explorations and additional land development but there are no known exploration or development projects scheduled for this area.

5.2.2.12 Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

5.2.2.12.1 Programmatic Features

Direct and Indirect Impacts

According to 2010 U.S. Census data, there are no residents living within the boundaries of the project area. There are no anticipated impacts to population, housing, or minority or low-income areas. There is agricultural property within the constructive area, although there are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries therefore there will be no direct impacts to land use. There will be direct land use impacts when privately owned land is converted to public use.

There would be no direct and only minimal indirect impacts to transportation in nearby residential areas during construction activities from heavy vehicle traffic in the vicinity of the restoration sites. It is expected that once the necessary construction equipment is on site that no additional transportation impacts would occur until the project construction is complete and the equipment is removed from the site.

5.2.2.12.2 Constructible Feature

Direct and Indirect Impacts

There are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries; therefore there will be no direct impacts to those types of land uses. The project site would involve a conversion of privately owned land to public use.

5.2.2.13 Prime and Unique Farmland

5.2.2.13.1 Programmatic Features

Direct and Indirect

Approximately 546.2 acres of Prime Farmland (NRCS, 2013) would be impacted by the TSMPA and the associated mitigation roadways including 160.8 acres of Cancienne silty clay loam, 86.7 acres of Cancienne sity loam, and 298.7 acres of Schriever clay. This total includes a reduction in 9.4 acres of impact (including reduction of 5.9 acres of Cancienne silty clay loam, reduction of 1.8 acres of Cancienne sity loam, and a reduction of 1.7 acres of Schriever clay) due to the overlap in required mitigation roadways between the Lake Boeuf FS BLH-Wet and Lake Boeuf FS Swamp projects.

If both of these projects are mitigated separately, the impacts are as follows: approximately 240.6 of these acres (NRCS, 2013) would be impacted by the Lake Boeuf FS BLH-Wet Restoration Project and the associated mitigation roadways including 79.7 acres of Cancienne silty clay loam, 51.5 acres of Cancienne sity loam, and 109.4 acres of Schriever clay. Approximately 315 acres (NRCS, 2013) would be impacted by the Lake Boeuf FS Swamp Restoration Project and the associated mitigation roadways including 87 acres of Cancienne silty clay loam, 37 acres of Cancienne silty loam, and 191 acres of Schriever clay.

Once these sites are developed for mitigation, these areas could not be used as productive farmland in the future.

The TSMPA would result in impacts to 160.8 acres of Cancienne silty clay loam, 86.7 acres of Cancienne sity loam, and 298.7 acres of Schriever clay, which is less than 0.6% of theses soils currently found in Lafourche Parish, being removed from future potential agricultural development. Since the majority of the 546.2 acres impacted is presently farmed, current agricultural production in the parish would be affected.

5.2.2.13.2 Constructible Feature

Direct and Indirect Impacts

There are no anticipated impacts as to prime and unique farmlands in the Avondale Gardens project area.

6.0 CUMULATIVE IMPACTS

NEPA requires a Federal agency to consider not only the direct and indirect impacts of a proposed action, but also the cumulative impacts of the action. Cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts were addressed for each project and resource in the preceding sections and include both beneficial and adverse impacts depending on the resource. This section provides an overview of other actions, projects, and occurrences that may contribute to the cumulative impacts previously discussed.

Appendix B-9 shows the impacts of other past, present and reasonably foreseeable projects in the WBV and LPV basins on the significant resources documented in this SPIER. The ecosystem restoration type projects in the basins work to enhance and restore historic ecosystem processes within the basins. Although these projects may result in temporal impacts and tradeoffs among the species within the significant resources, their overall effects on the system from a human and natural environmental perspective would be wholly positive. Though impacts to the natural environment from construction of these projects have been avoided to the maximum extent practicable, remaining unavoidable impacts would require mitigation. Environmental Justice impacts have been avoided during design of these projects; however, these projects have resulted in impacts to the aesthetics and recreational opportunities within the system. Some of these projects have had impacts to cultural resources in the basin; however, those impacts have been mitigated by excavating the site, removing the cultural pieces, and documenting the site. In the same vein, construction of many of the structural features (e.g. levee systems) in the FWOP has resulted in the protection of cultural sites found within the protection of the levee system. Ecosystem restoration plans in the WBV basin and in the region that improve estuarine habitat also provide benefits to the commercial fishing industry.

As provided in the Council on Environmental Quality-approved NEPA Emergency Alternative Arrangements, CEMVN is preparing a Comprehensive Environmental Document to evaluate the cumulative impacts associated with the construction of the HSDRRS, including the mitigation plans. Phase 1 of the CED was released for public review in 2013. Overall cumulative impacts from implementation of all features in the TSMMPA will be presented in Phase 2 of the CED which will be released in 2016. The evaluation of cumulative impacts discussed in the CED, Phase 1 is incorporated herein by reference.

6.1 No Action

The No Action Alternative would be the plan previously approved in PIER #37 and PIER #37, TIER 1 EA and the associated Decision Record and FONSI. The impacts would be the same

as discussed in the PIER #37 and PIER #37, TIER 1 EA, which are incorporated by reference. Below is a summary of the cumulative impacts of the No Action alternative.

6.1.1 Programmatic Features

The No Action Alternative would prevent an overall loss in the basin of fresh marsh as well as BLH-Wet, BLH-Dry and swamp habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the loss of wetlands and combat the current trend of conversion of marsh to open water. There would be an overall loss of open water habitat in the WBV basin, but no permanent adverse impacts are anticipated because this habitat is prevalent throughout the basin. Impacts to SAVs would be mitigated along with the plan mitigating for fresh marsh.

6.1.2 Constructible Features

No new cumulative impacts to any resource would be incurred from the purchase of credits from a previously approved mitigation bank for the HSDRRS mitigation under the No Action Alternative. Since the purchase of mitigation bank credits would occur at an existing approved bank and since permitted banks exist as reasonably foreseeable projects in the FWOP conditions, the constructible feature would only have new potential impacts on the availability of mitigation bank credits for BLH-Wet in the basin.

Implementation of the no action alternative in consideration of the impacts of all other past, present, and reasonably foreseeable projects have on the significant resources in the basin would be cumulatively neutral as it would offset the loss of 261.96 AAHUs of BLH habitat within the WBV basin without incurring any new adverse impacts.

6.2 TSMMPA

6.2.1 Programmatic Features

The TSMMPA would prevent an overall loss in the basin of BLH-Wet, and swamp habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the loss of wetlands.

6.2.2 Constructible Features

The TSMMPA would prevent an overall loss in the basin of BLH habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the loss of wetlands.

6.2.2.1 Wetlands and Other Surface Waters

The TSMMPA would prevent an overall loss in the basin of fresh marsh as well as BLH-Wet, BLH-Dry and swamp habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the loss of wetlands and combat the current trend of conversion of marsh to open water. There would be an overall loss of open water habitat in the WBV basin, but no permanent adverse impacts are anticipated because this habitat is prevalent throughout the basin. Impacts to SAVs would be mitigated along with the TSMPA mitigating for fresh marsh.

6.2.2.2 Wildlife

The TSMMPA would prevent an overall loss in the basin of wetland habitat necessary for many wildlife species. This project, in conjunction with other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin would help retard the overall decline of wildlife species within the basin and would be beneficial in preserving species bio-diversity.

6.2.2.3 Threatened and Endangered Species

Potential cumulative impacts to the threatened or endangered species (manatee and Pallid sturgeon) that could occur in the vicinity of the project area from construction of the TSMMPA would involve the combined adverse effects on each species from the other projects within the WBV basin. Due to the large size of the lakes, the relatively small size of the borrow areas, the temporary nature of the borrow activities, the sediments in the borrow area, the depth of excavation, the use of cutterhead dredges for borrow procurement, the duration of dredging, the ability of benthic species to quickly re-colonize the borrow areas, the ability of T&E species to avoid the project area during the construction period, and the use of protection measures the TSMMPA would add very little and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the basin and would not contribute significantly to cumulative impacts to threatened and endangered species or their habitat in the basin.

6.2.2.4 Fisheries, Aquatic Resources, and Water Quality

Although there would be a loss of open water from construction of the mitigation plan, these habitats are found in abundance throughout the WBV basin. The resulting marsh would be cumulatively neutral in the form of additional spawning, nursery, forage and cover habitat for important fish species in the WBV basin because these projects offset losses due to construction of the WBV HSDRRS. Though construction of these projects would result in the loss of fisheries habitat, some fish, and temporary impacts to water quality and benthic habitat, this habitat is abundant throughout the basin, impacts to existing fisheries are minimal, and water quality and benthic species would rebound once project construction is complete. As such, construction of the mitigation project would result in minimal loss to fisheries, aquatic resources, and water quality experienced in the basin from the past, present and reasonably foreseeable projects in the basin. The reinstitution of BLH, fresh marsh and swamp in areas that are currently open water could provide indirect benefits to fisheries in the future by providing nutrients to the system in the form of detritus. As a result of borrow placement and the type of containment utilized for this project, land adjacent to the mitigation project may receive material suspended in the dredge effluent. This would nourish adjacent marsh habitat and may cause adjacent shallow open water to become shallower or be filled; encouraging the existing habitat to move through early successional phases faster.

These temporary impacts to water quality would add incrementally to similar cumulative impacts throughout the WBV basin as other projects are constructed, causing temporary decreases in water quality throughout the basin. However, those projects that include marsh restoration as well as the proposed action for HSDRRS Mitigation could have the long-term beneficial impact of increased dissolved oxygen and increased filtration which helps control local turbidity. The temporary water impacts from placement and borrow excavation are not anticipated to be substantial enough to cause water quality impairment under the standards of Louisiana Administrative Code, Title 33, Part IX, Chapter 11. Although there would be a loss of open water

from construction of the mitigation projects, open water is found in abundance throughout the WBV basin.

6.2.2.5 Essential Fish Habitat

This project would cause one type of EFH in the WBV basin to be replaced by another type of EFH. The switching of EFH types from construction of the proposed project is not anticipated to have a significant impact to the overall quantity of EFH in the WBV basin. Impacts to cover and foraging for managed species are not anticipated to cause significant increases in cumulative impacts to managed species from the implementation of FWOP condition projects as the borrow area is small in size compared to the available EFH habitat in the basin providing similar habitat. The conversion of EFH to non EFH would be mitigated for and as such not cause a cumulative impact.

6.2.2.6 Cultural Resources

Cumulative impacts to cultural resources would be the additive combination of impacts by this and other Federal, state, local, and private restoration efforts. Additional evaluations of such impacts would be completed following the cultural resources investigations. Cumulatively, water resource and other development projects have the potential to impact cultural resources in both positive and negative ways. Beneficial impacts may include protection from continued erosion, soil loss and subsidence. Negative impacts may include disturbance due to construction activities. Habitat restoration projects such as these cumulatively may result in greater protection to cultural resources by protecting the restoration sites from natural erosion and from human development activity.

6.2.2.7 Recreational Resources

Restoration/enhancement of fish and wildlife habitat would increase use of the project sites by desirable species which would consequently provide a better recreational experience. Recreational impacts could be considered cumulatively beneficial when added to the recreational opportunities provided at adjacent refuges and other existing recreational areas in the basin. However, since this is mitigation, which replaces impacted habitats, recreational resources dependent on these habitats would merely shift from the area of impact to the area of mitigation, preventing the loss of recreational resources in the basin. The impacts associated with utilization of the borrow sites for construction of the mitigation projects would be short term and not result in a significant increase in cumulative impacts to recreational resources in the basin.

6.2.2.8 Aesthetic Resources

Approximately 100 acres of open water would be converted to fresh marsh, BLH-Wet, and swamp thus increasing the types of land mass, vegetation and wildlife that is viewable. Overall, this impact is expected to be minor since there are approximately 124,000 acres of water in the WBV Basin. Additionally, restoration/enhancement of fish and wildlife habitat would increase use of the project sites by desirable species which would consequently provide a better viewing experience at adjacent recreational areas, major roadways, and private lands. The impacts associated with utilization of the borrow sites for construction of the mitigation projects would be short term and not result in a significant increase in cumulative impacts to visual resources in the basin.

6.2.2.9 Air Quality

Cumulative impacts to air quality in the project area due to construction of TSMMPA in addition to the other construction activities within the WBV basin that may be occurring concurrently would be temporary and would be very minimal, especially considering that placement of dredged material would not create fugitive dust. After the construction period, there would be no incremental contribution to cumulative air quality impacts due to the proposed action. All project areas are located in parishes in attainment of NAAQS.

6.2.2.10 Noise

Construction of the TSMMPA is not anticipated to add significantly to the cumulative effect of noise in the WBV basin as the construction activities would be temporary and restricted to daylight hours. Most of the projects are situated in remote areas and noise from construction activities buffered by vegetation.

6.2.2.11 Hazardous, Toxic, and Radioactive Waste

No cumulative impacts are anticipated.

6.2.2.12 Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

Since the purchase of mitigation bank credits would occur at an existing approved bank and since permitted banks exist as reasonably foreseeable projects in the FWOP conditions no cumulative impacts to socioeconomics/land use, environmental justice, transportation, navigation and commercial fisheries would be incurred from the purchase of these credits for the HSDRRS mitigation. However, depending on the amount of BLH-Dry, BLH-Wet and swamp mitigation bank credits available at the time of credit purchase for the HSDRRS mitigation, use of mitigation bank credits to offset HSDRRS BLH-Dry, BLH-Wet and swamp impacts may significantly reduce the number of credits available to permittees to compensate for BLH and swamp impacts authorized by Department of the Army Section 10/404 permits. In the event sufficient credits are not available to offset impacts associated with a proposed permit, the district engineer would determine appropriate permittee responsible compensatory mitigation based on the factors described in 33 CFR Part 332.3(b).

Impacts from restoration projects can temporarily disrupt transportation, navigation and commercial fishing in project areas during construction activities including dredging and material placement in the restoration areas. Land use impacts, such as impacts to commercial/industrial properties and public facilities impacts are not anticipated as TSMPs are typically located in unpopulated areas. However, agricultural land in the Lake Boeuf Restoration area would be directly impacted as it is proposed to be converted from private to public use. Additionally, development of the Avondale Gardens project is proposed on one of the few remaining large undeveloped tracts in Jefferson Parish. Construction of that project would leave less undeveloped land available for future development for other purposes.

The cumulative impacts of the projects, when added to other past, present, and reasonably foreseeable ecosystem restoration, mitigation or construction projects in the basin would minimally and temporarily affect socio-economic resources. Due to the relatively small number of mitigation bank credits to be purchased, the remote and generally unpopulated areas where the projects would be constructed, the temporary nature of the project construction activities and the duration of enhancement projects, the TSMPA would add very few and only temporary adverse impacts to any other impacts resulting from past, present and reasonably foreseeable

projects in the region and would not contribute significantly to cumulative impacts to socio-economic resources in the basin.

6.2.2.13 Prime and Unique Farmland

Since the majority of the Lake Boeuf PS BLH-Wet and Swamp project areas are presently farmed, a loss of agricultural production in the parish would occur. However, the cumulative impacts to prime and unique farmland in the project area due to construction of TSMMPA would affect such a small amount of prime farmland as to have a negligible effect on agricultural production in the parish.

6.2.2.14 Natural and Scenic Rivers

No scenic streams are located in the project area.

7. MITIGATION SUCCESS CRITERIA, MITIGATION MONITORING AND REPORTING, AND ADAPTIVE MANAGEMENT

General success criteria and monitoring including planting guidelines for the mitigation projects can be found in Appendix H. Specific success criteria and monitoring for the Lake Boeuf FS BLH-Wet and Swamp Restoration Project and the Avondale Gardens PS BLH-Dry Enhancement project can be found in Appendix E.

The purpose of adaptive management activities in the life-cycle of the project is to address ecological and other uncertainties that could prevent successful implementation of a project. Adaptive management (AM) also establishes a framework for decision making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust management/mitigation actions. Hence, early implementation of AM and monitoring allows for a project that can succeed under a wide range of conditions and can be adjusted as necessary. Furthermore, careful monitoring of project outcomes both advances scientific understanding and helps adjust operations changes as part of an iterative learning process. See Appendix F for the AM Plan.

Each Corps constructed MP would have a contingency plan for taking corrective actions in cases where monitoring demonstrates that the mitigation feature is not achieving ecological success in accordance with its success criteria. For the MP feature where credits would be purchased from a mitigation bank, the mitigation bank must be in compliance with the requirements of the USACE Regulatory Program and its MBI, which specifies the management, monitoring, and reporting required to be performed by the bank. Purchase of mitigation bank credits relieves the CEMVN and NFS of the responsibility for monitoring and of demonstrating mitigation success.

An effective monitoring program is required to determine if the project outcomes are consistent with the identified success criteria (WRDA 2007, Section 2036). A Monitoring Plan has been developed for the Corps constructed feature within the TSMMPA (Appendix E). The plan identifies success criteria and targets, a general schedule for the monitoring events and the specific content for the monitoring reports that measure progress towards meeting the success criteria. A detailed monitoring plan including transects, sampling plots, gage locations, and monitoring frequency would be developed once designs are complete. The detailed monitoring plan for the TSMMPA is located in Appendix E. The detailed AM Plan for the TSMMPA is located in Appendix F.

The proposed mitigation action could include construction, with the NFS responsible for operation and maintenance of functional portions of work as they are completed. On a cost shared basis, USACE would monitor completed mitigation to determine whether additional construction, invasive species control and/or planting are necessary to achieve mitigation success. USACE would undertake additional actions necessary to achieve mitigation success in accordance with cost sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved initial success criteria, monitoring would be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, USACE would consult with other agencies and the NFS to determine whether operational changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve ecological success, USACE would implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost sharing requirements, availability of funding, and current budgetary and other guidance.

8. COORDINATION AND CONSULTATION

8.1 PUBLIC INVOLVEMENT

Extensive public involvement has been sought in planning the mitigation for HSDRRS impacts. A public notice of the NEPA Alternative Arrangements was published in the Federal Register on 13 March 2007 (Federal Register Volume 72, No. 48) which included a commitment to analyze alternatives to determine appropriate mitigation. The notice is also available on the website www.nolaenvironmental.gov.

The following public meetings were held to obtain public input on the planning process for WBV HSDRRS mitigation, to obtain any suggestions on potential projects to mitigate WBV HSDRRS impacts, and to update the public on the project status:

1. 31 August 2009 at U.S. Army Corps of Engineers Office in New Orleans, LA
2. 13 May 2010 at Delgado Community College Westbank in Algiers, LA
3. 17 May 2010 at Westwego Tassin Senior Center in Westwego, LA
4. 19 May 2010 at NP Trist Middle School in Meraux, LA
5. 9 December 2010 at Westwego Tassin Senior Center in Westwego, LA
6. 31 July 2012 at Westwego Tassin Senior Center in Westwego, LA
7. 21 May 2014 at Mathews Government Complex in Mathews, LA

Public notices for each meeting ran in local newspapers and press releases were disseminated to the media in advance of each meeting. The public was able to provide verbal comments during the meetings, written comments after each meeting in person, by mail, and via www.nolaenvironmental.gov. Additional, public comments are accepted anytime during the IER process via www.nolaenvironmental.gov. The presentations given at all of these meetings can be found at www.nolaenvironmental.gov.

Draft PIER #37 was distributed for a 30-day public review and comment period on April 2, 2014 and the Decision Record was signed on June 13, 2014. During the public review of PIER #37, the community expressed concerns about the use of condemnation of private lands for mitigation associated with the Lake Boeuf alternative. Concern has also been expressed that

conversion of agricultural land to forested wetlands would impact the community and its economy.

PIER #37, TIER 1 EA was distributed for a 30-day public review and comment period from October 13, 2015 through November 12, 2015. The TIER 1 EA was finalized with an approved FONSI December 18, 2015.

This Draft SPIER #37a is being distributed for a 30-day public review and comment period.

8.2 AGENCY COORDINATION

Preparation of this SPIER #37a has been coordinated with appropriate Congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. An interagency environmental team was established for this project in which Federal and state agency staff played an integral part in the project planning and alternative project analysis phases of the project (members of this team are listed in Appendix I). This interagency environmental team was integrated with the PDT to assist in the planning of this project and to complete a determination of the potential direct and indirect impacts of the proposed action. The following agencies, as well as other interested parties, are receiving copies of this draft SPIER #37a:

U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service
U.S. Environmental Protection Agency, Region VI
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NMFS
U.S. Natural Resources Conservation Service
Louisiana Advisory Council on Historic Preservation
Governor's Executive Assistant for Coastal Activities
Louisiana Department of Wildlife and Fisheries
Louisiana Department of Natural Resources, Coastal Management Division
Louisiana Department of Natural Resources, Coastal Restoration Division
Louisiana Department of Environmental Quality
Louisiana State Historic Preservation Officer
Coastal Protection and Restoration Authority Board

Coordination with resource agencies will be on going as CEMVN develops the NEPA document(s) for each programmatic feature.

The Corps submitted a consistency determination to LDNR on 14 July 2015 per section 307 of the Coastal Zone Management Act of 1972 (16 USC 1451). Consistency was received on 07 December 2015 (Appendix J).

Section 106 of the NHPA, as amended, requires federal agencies to take into account the effects of an undertaking on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment prior to approval of an undertaking. The CEMVN has elected to fulfill its obligations under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, through the execution and implementation of a Programmatic Agreement. The Programmatic Agreement was developed in consultation with the Advisory Council on Historic Preservation, the Louisiana State Historic Preservation Officer (LA SHPO), federally-recognized Indian tribes, and other identified interested parties. The

Programmatic Agreement was executed on 18 June 2013 (Appendix J), and the CEMVN will comply with the agreed upon stipulations.

Eleven Federally-recognized tribes that have an interest in the region have been given the opportunity to review the proposed action.

Coordination with the USFWS on the Alternative Arrangements process was initiated by letter on 13 March 2007, and concluded on 6 August 2007. A draft Fish and Wildlife CAR for the SPIER #37a was provided by the USFWS on 29 Dec 2015. The draft CAR concluded that the USFWS does not object to the construction of the proposed project provided that fish and wildlife conservation recommendations are implemented concurrently with project implementation. A copy of the draft report is provided in Appendix J. The USFWS project-specific recommendations for the SPIER #37a proposed action are listed below:

> The Service supports the Corps' current mitigation features and recognizes that additional Tiered IERs may be need to address individual mitigation features that are still in early design phases. We support the Corps' plan to mitigate impacts to fish and wildlife resources associated with WBV HSDRRS provided that the following fish and wildlife conservation recommendations are incorporated into future project planning and implementation and outstanding issues are adequately resolved via ongoing planning efforts:
>
> 1. Prior to beginning work on IERs tiered off of this SPIER the Corps should coordinate with the natural resource agencies to ensure that necessary information to conduct detailed project planning/design and finalize the WVA analysis is developed and available. Final sizing of mitigation must be based on revised WVAs conducted on advanced project designs
>
> CEMVN Response 1: Concur. Coordination with the natural resource agencies to ensure that necessary information to conduct detailed project planning/design and finalize the WVA analysis will occur as early in the process as possible. Final sizing of mitigation would be based on revised WVAs conducted on advanced project designs.
>
> 2. Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, Water Control Plans, or other similar documents) should be coordinated with the Service, NMFS, LDWF, EPA and Louisiana Department of Natural Resources (LDNR). The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.
>
> CEMVN Response 2: The USFWS and other resource agencies would be provided an opportunity to review and comment on the proposed HSDRRS mitigation plans during the project feasibility study and Pre-Construction Engineering and Design.
>
> 3. Impacts to Essential Fish Habitat (EFH) should be avoided and minimized to the greatest extent possible. Because impacts to designated EFH habitat may need to be mitigated the Corps should coordinated with the NMFS regarding this need and maintain an account of all EFH habitats (e.g., openwater, marsh) impacted and mitigated.

CEMVN Response 3: Concur. The USACE would seek to avoid impacts to EFH and would coordinate with NMFS on any unavoidable impacts.

4. Impacts to wetland habitat (including SAV habitat) and non-wet BLH associated with the construction of the mitigation features should be avoided and minimized to the greatest extent possible. The Corps shall fully compensate for any unavoidable losses of wetland habitat or non-wet BLH caused by mitigation features through sizing (i.e., boundary adjustments) of the mitigation features in close coordination with the natural resource agencies.

   CEMVN Response 4: Concur

5. If applicable, a General Plan for mitigation lands should be developed by the Corps, the Service, and the managing natural resource agency in accordance with Section 3(b) of the FWCA.

   CEMVN Response 5: Concur

6. A fully defined mitigation plan should be included in the authorizing report and Decision Record. The mitigation plan should be developed including locations and AAHUs vetted through the natural resource agencies. Only existing mitigation banks and existing credits released by Corps Regulatory Branch may be considered.

   CEMVN Response 6: Concur; however, the Corps may also consider the purchase of credits from the Corps-approved State of Louisiana In Lieu Fee Program.

7. We recommend that the Corps consider the availability of credits at a bank and within a hydrologic unit when evaluating the mitigation bank alternative to avoid exhausting credits available for individual landowners/permittees within a particular hydrologic unit.

   CEMVN Response 7: Acknowledged

8. If mitigation credits are purchased from a mitigation bank the Service requests that a copy of the letter from the banker acknowledging the acquisition is provided to the Service for our files.

   CEMVN Response 8: Concur

9. If mitigation lands are purchased for inclusion within publicly managed lands, those lands may need to meet certain requirements. Land-managing natural resource agencies may have requirements that must be met prior to accepting mitigation lands; therefore, if they are proposed as a manager of a mitigation site they should be contacted early in the planning phase regarding such requirements. The local sponsor should also be made aware of the above requirements should it be their responsibility to transfer mitigation lands to the land-managing agency.

   CEMVN Response 9: If mitigation lands are purchased for inclusion within publicly managed lands, the CEMVN would work to meet the basic mitigation land requirements to the maximum extent possible. The Non-Federal Sponsor is responsible for operation and maintenance of the HSDRRS project, including the

mitigation features. Where mitigation features are located on Federal lands, the appropriate agency and the Non-Federal Sponsor would need to coordinate management of the mitigation project. Where mitigation projects are to be constructed on lands within a Federal agency's jurisdiction, that agency will be consulted regarding any requirements that will be applicable to those lands.

10. The Corps should continue to coordinate with land managing agencies during planning of mitigation features that may be built on their lands or lands to be turned over to them for management. Coordination should continue until construction of the projects are complete and prior to any subsequent maintenance. Please contact Mr. John Lavin at 1-888-677-1400 regarding work on the Bayou Segnette State Park which is operated by the Louisiana Department of Culture, Recreation and Tourism, Office of State Parks areas.

    CEMVN Response 10: Concur.

11. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation and/or maintenance of mitigation lands, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest

    CEMVN Response 11: Project Partnership Agreements (PPAs) between the Federal government and the Non-Federal Sponsor (CPRA in this case) have been executed for the LPV and WBV HSDRRS projects, and these PPAs provide the requisite high level of confidence that the Non-Federal Sponsor will fulfill its obligations to operate and to maintain the HSDRRS mitigation projects. In the event that the Non-Federal Sponsor fails to perform, CEMVN has the right to complete, operate, maintain, repair, rehabilitate, or replace any project feature, including mitigation features. However, such an action would not relieve the Non-Federal Sponsor of its responsibility to meet its obligations and would not preclude the Federal government from pursuing any remedy at law or equity to ensure the Non-Federal sponsor's performance.

12. Any proposed change in mitigation features or plans should be coordinated in advance with the Service, NMFS, LDWF, EPA and LDNR.

    CEMVN Response 12: Concur

13. The Service encourages the Corps to finalize mitigation plans and proceed to mitigation construction so that it will be concurrent with project construction. If construction is not concurrent with mitigation implementation then revising the impact and mitigation period-of-analysis to reflect additional temporal losses will be required.

    CEMVN Response 13: The USACE shares your goal of implementing mitigation as quickly as possible. If delays are experienced such that mitigation project implementation takes longer than what was previously estimated, the USACE would work with the resource agencies to determine whether such delays could necessitate extending the current period of analysis associated with the habitat impacts and whether additional temporal loss to the habitats in question would result in a larger mitigation requirement.

14. The Service recommends that the Corps immediately finalize selection and approval of mitigation and augmentation features in coordination with federal and state natural resource agencies and with required approval from EPA. All necessary studies for the mitigation and augmentation features have been completed and agencies have reached agreement on those features. Further, the Service recommends that all such mitigation and augmentation features be implemented as soon as possible. All terms and conditions specified in the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination should be followed with regard to mitigation and augmentation requirements.

    CEMVN Response 14: The CEMVN continues to work in coordination with the IET to finalize selection of the augmentation features. The CEMVN is working to include the augmentation features in the TIER addressing WBV HSDRRS impacts to the JLNHPP and 404(c) area. The USACE will comply with the terms and conditions of the EPA Bayou aux Carpes 404(c) modification and will fulfill its obligations under that modification as quickly as possible given agency resource constraints.

15. The Corps should immediately develop a long-term monitoring plan for the Bayou aux Carpes 404(c) area, as required under the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination. The plan should be coordinated with the natural resources agencies and approved by EPA. All terms and conditions specified in the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination with regard to the long-term monitoring and operation plan should be followed. Once approved, that plan should be implemented as soon as possible.

    CEMVN Response 15: Concur, development of long-term monitoring plan for the Bayou aux Carpes 404(c) area, as required under the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination will proceed as quickly as possible and will be coordinated with coordinated with the natural resources agencies and approval sought by EPA.

16. The Service recommends that all of the terms and conditions outlined in the EPA Bayou aux Carpes 404(c) 2009 modification be implemented without delay. The Corps is responsible for funding all mitigation and augmentation features in this agreement. A link to the 2009 final modified determination may be found at www.nolaenvironmental.gov under the EPA heading for IER 12.

    CEMVN Response 16: Concur.

17. The Service recommends that the Corps work with the natural resource agencies to refine the "GUIDELINES – WET BLH HABITAT ENHANCEMENT, SWAMP HABITAT RESTORATION, AND SWAMP HABITAT ENHANCEMENT" and incorporate all changes in the Mitigation Success Criteria and Mitigation Monitoring: Marsh Mitigation Features from the LPV PIER 36 and the Bayou Sauvage Task Force Guardian BLH mitigation monitoring plan.

    CEMVN Response 17: The guidelines cited by USFWS, which actually now include guidelines for fresh marsh and intermediate marsh mitigation (Appendix L in PIER 37), were originally developed as very generalized guidelines for use in developing and evaluating potential LPV and WBV HSDRRS mitigation projects that would be Corps-constructed. The main objective for these guidelines was to help ensure

consistency between LPV and WBV mitigation projects as regards things such as future with project WVA models, mitigation design concepts, and estimated mitigation costs (construction, implementation, maintenance, monitoring and reporting, etc.).

See appendices D and E for project-specific information pertaining to the proposed mitigation work plan, mitigation success criteria, mitigation monitoring and reporting, mitigation management/maintenance, and proposed adaptive management plan for each TSMP. The project-specific mitigation information developed would supersede the cited general guidelines and would incorporate lessons learned from the Bayou Sauvage project.

18. The Service recommends a two month period between herbicide application and mechanical clearing of invasive species. The proposed one month period may not allow sufficient time for herbicides to travel into the root system and work, thus encouraging greater stump sprouting which may increase the amount of future herbicide applications.

    CEMVN Response 18: Concur. The plans will reflect a two month period between herbicide applications.

19. The Service recommends that the Corps maintain full responsibility for any BLH mitigation project for a minimum of 4-years post planting. Documentation should be provided to demonstrate funding obligation for the Corps to fulfill initial success criteria at a minimum.

    CEMVN Response 19: Presently, the USACE intends to issue a Notice of Construction Completion (NCC) for authorized Corps-constructed mitigation projects to the Non-Federal Sponsor (NFS) for functional portions of the mitigation as they are complete (e.g. project would shift from the "construction" phase to the "operation, maintenance, repair, replacement, and rehabilitation" or OMRR&R phase at this point). However, the USACE would if necessary undertake certain mitigation activities necessary to meet the project's initial success criteria. These activities would vary depending on the specifics of the mitigation plan and its associated success criteria. Note that while the USACE would complete mitigation construction and certain activities after the NCC is issued, all these activities would be subject to standard cost-sharing provisions and the availability of funds.

20. The Service recommends that all mitigation planning documents should describe in detail actions needed by the Corps and/or the local sponsor if mitigation is not succeeding as planned.

    CEMVN Response 20: Concur. See appendices E and F.

21. The Corps should avoid adverse impacts to bald eagle and osprey nesting locations and wading bird colonies through careful design project features and timing of construction. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

    CEMVN Response 21: The clearing of forested wetlands would be conducted in the fall or winter, if practicable, to avoid and minimize impacts to nesting migratory birds.

If colonial-nesting wading birds (CNWBs) are anticipated to nest in forested areas slated for clearing during the nesting season, the USACE would likely employ other measures to avoid impacts to active CNWB nests, viable eggs in such nests, and nesting young, such as implementation of a CNWB nesting prevention/abatement plan. Any such plan would first be coordinated with USFWS.

22. We recommend that the Corps re-initiate ESA consultation with this office to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their habitat. Subsequently, ESA consultation should be reinitiated should the proposed project features change significantly or are not implemented within one year of the last ESA consultation with this office.

    CEMVN Response 22: Concur. The USACE would fulfill its consultation responsibilities as required under the ESA.

9. COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Construction would not commence until the proposed action achieves environmental compliance with all applicable laws and regulations, as described in this section. Environmental compliance would be achieved upon coordination of this SPIER #37a with appropriate agencies, organizations, and individuals for their review and comments; resolution of all Fish and Wildlife Coordination Act recommendations and LDNR concurrence with the determination that the proposed action is consistent, to the maximum extent practicable, with the LCRP established under section 307 of the Coastal Zone Management Act of 1972 (16 USC 1451). Further coordination would be completed to achieve environmental compliance as the TIERs are being developed.

The following coordination and analysis is ongoing:

- Endangered Species Act: USFWS and NMFS concurrence that the Lake Boeuf FS Swamp and BLH-Wet Restoration and the Avondale Gardens PS BLH-Dry Enhancement Projects would have no effect on any endangered or threatened species or completion of ESA section 7 consultation; In a letter dated July 27, 2015, the USFWS concurred that the proposed plan would have “no effect” on T&E resources.

- Coastal Zone Management Act: LDNR concurrence with the determination that the Hwy 307 Bayou Boeuf FS BLH-wet and Swamp Restoration and Avondale Gardens PS BLH-Dry Projects are consistent, to the maximum extent practicable with the LCRP; a coastal zone determination was submitted to LDNR on July 15, 2015; LDNR requested a 15 day extension on September 15, 2015 and the Corps requested a 45 day extension on October 1, 2015. Consistency was received December 7, 2015.

- Clean Air Act: Louisiana Department of Environmental Quality concurrence or resolution of all LDEQ comments on the air quality impact analysis;

- Magnuson-Stevens Fishery Management Act: NMFS acceptance or resolution of all EFH recommendations.

- National Historic Preservation Act, Section 106 - CEMVN compliance with stipulations agreed to in the programmatic agreement executed June 18, 2013.

10. FUTURE MITIGATION NEEDS

Once As-Builts (final plans documenting what was actually built) for all HSDRRS contracts are complete, the mitigation PDT, along with the resource agencies, would revisit the impacts to all habitat types from the HSDRRS construction (including open water). Completion of this effort would result in a final computation of impacts and may necessitate the expansion of the proposed HSDRRS mitigation projects in order to fully mitigate all HSDRRS impacts. For any habitat type where mitigation has already been constructed, an expansion of that mitigation project would be considered. Other options to that expansion providing adequate compensatory mitigation, such as mitigation banks, would also be analyzed. Any expansion, and option to that expansion, would be presented to the public in the CED, Phase 2.

11. CONCLUSION

11.1 RECOMMENDED DECISION

Recommend approval of the constructible portion of the WBV HSDRRS Mitigation TSMMPA: The Avondale Gardens PS BLH-Dry enhancement project to fulfill the general PS BLH- Dry mitigation requirements.

Additionally, CEMVN recommends further evaluation and agency coordination for the programmatic features of the TSMMPA. A joint EA, PIER #37, TIER 1 EA, has been prepared in collaboration with the NPS to complete the evaluation of those features. The FONSI was signed on December 18, 2015.

11.2 PREPARED BY

The point of contact for this SPIER #37a is Tammy Gilmore, USACE New Orleans District CEMVN-PDN-CEP. Table 11-1 lists the preparers of relevant sections of this report. Ms. Gilmore can be reached at the U.S. Army Corps of Engineers, New Orleans District; Coastal Environmental Planning Section, P.O. Box P.O. Box 60267, 7400 Leake Avenue; New Orleans, LA 70118.

Table 11-1: SPIER Preparation Team

Position/SPIER Section	Team Member
RPEDS Environmental HSDRRS Reviewer/DQC	Sandra Stiles, USACE
Environmental Project Manager	Tammy Gilmore & Elizabeth Behrens, USACE
Fisheries, Aquatic Resources, EFH, and Water Quality	Nathan Dayan, USACE, Christina Saltus, USACE-ERDC
Wetlands and other surface waters, Wildlife, and Threatened and Endangered Species	Tammy Gilmore, USACE
Socioeconomics/Land Use/Environmental Justice, Transportation, Navigation, and Commercial Fisheries	Andrew Perez and Joseph Mann, USACE
Air	Joseph Musso, USACE-ERDC
Noise	Patricia Leroux, USACE
Cultural Resources	Eric Williams, USACE

Recreation	Deborah Wright, USACE
Aesthetics	Kelly McCaffrey, USACE
HTRW	Joseph Musso, USACE
Mitigation Plan, Success Criteria, Planting Plan	Clay Carithers, USACE
Document Organization and Formatting	Tammy Gilmore, USACE

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APPENDIX A

Figures

Figure A-1: WBV HSDRRS Mitigation Basin Habitats
Figure A-2: WBV Mitigation Basin
Figure A-3: Hydrologic Units that Encompass Both a Project Footprint and an "Impaired" Waterbody
Figure A-4: Projects Considered in the Future Without Project (FWOP) Condition or No Action Alternative
Figure A-5: Avondale Gardens Mitigation Sites
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Figure A-11: Jean Lafitte Marsh Restoration for Park/404(c) impacts
Figure A-12: Jean Lafitte BLH-Wet and Swamp Restoration Projects for Park/404(c) impacts

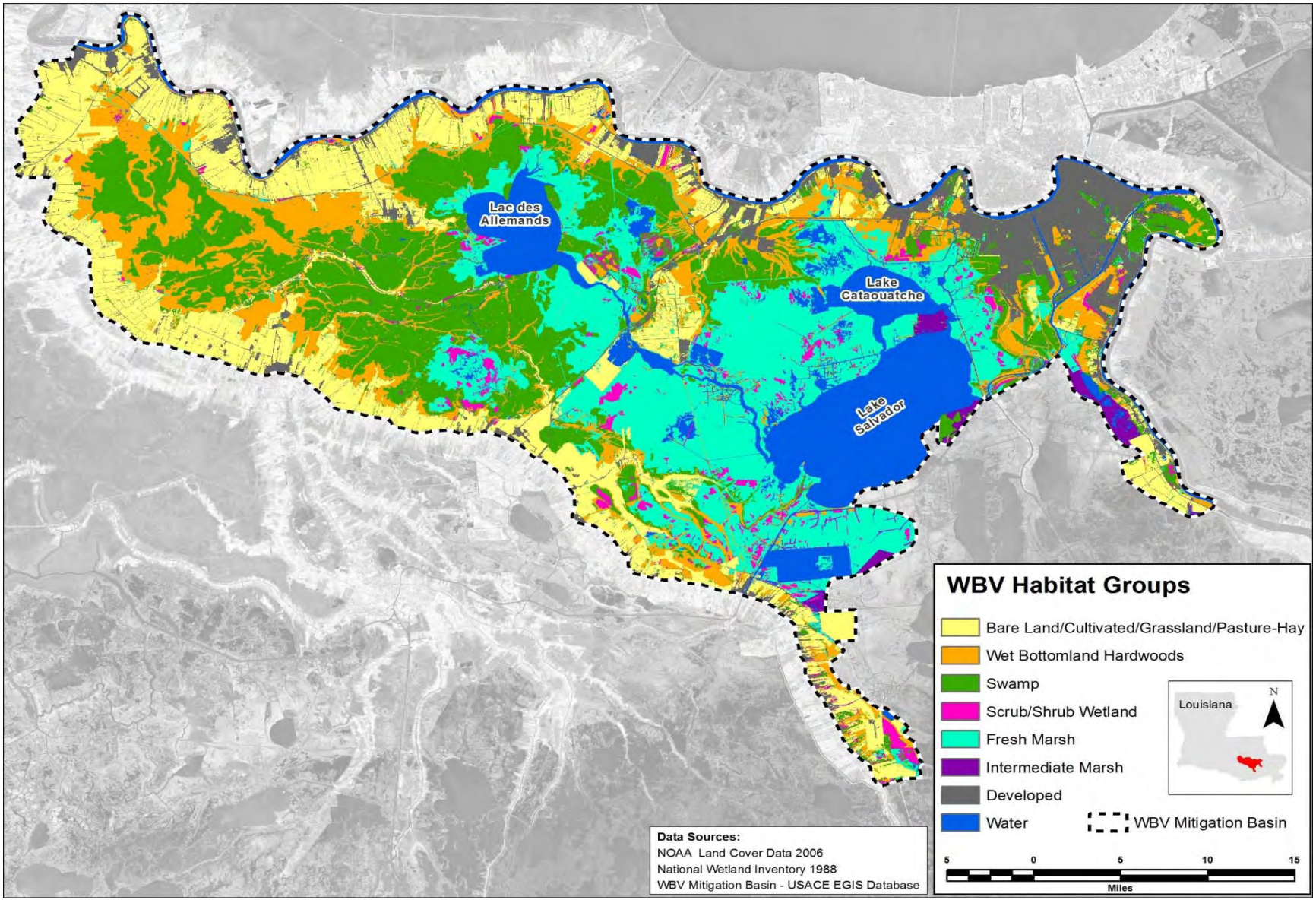

Figure A-1: WBV HSDRRS Mitigation Basin Habitats

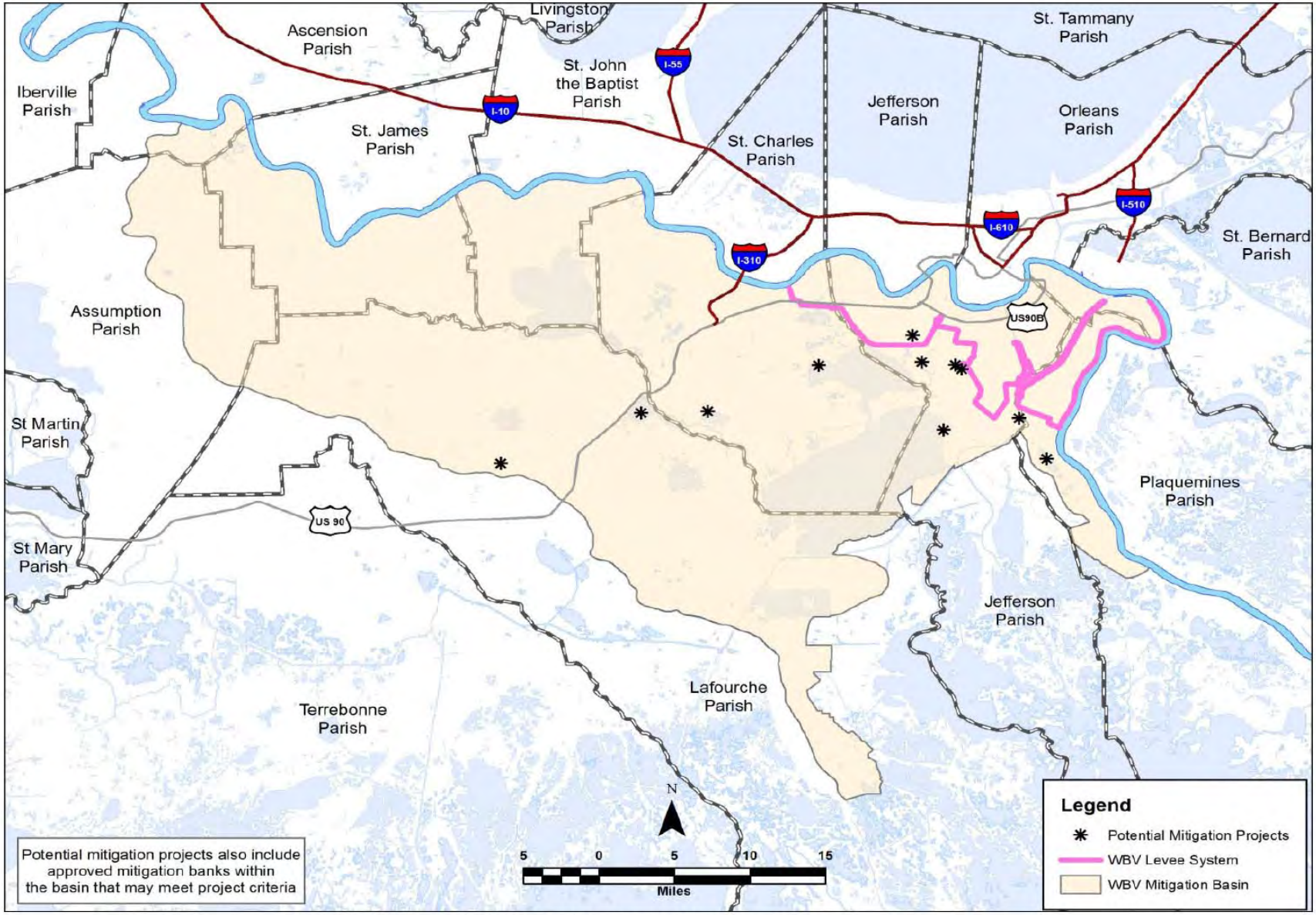

Figure A-2: WBV Mitigation Basin

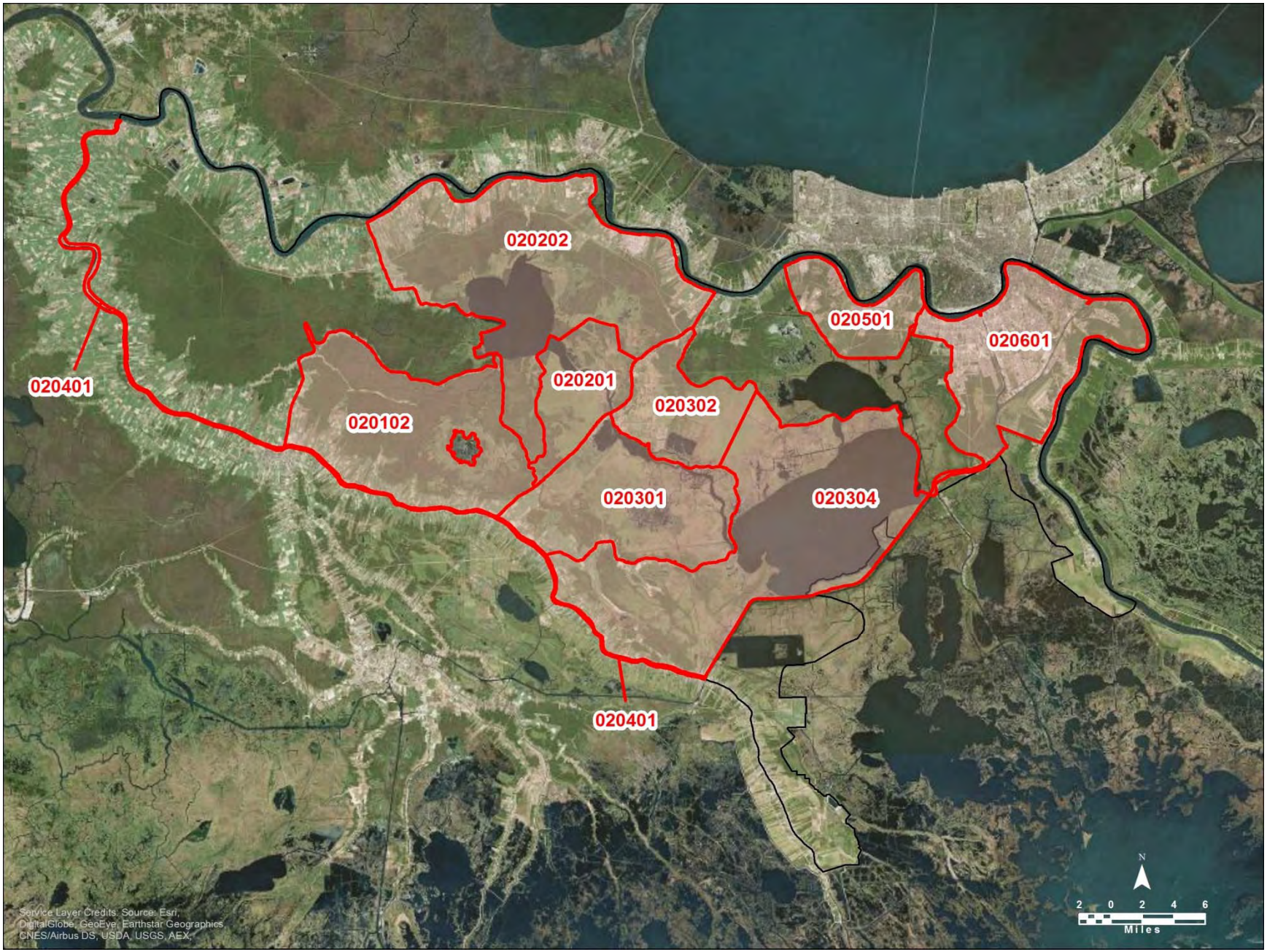

Figure A-3: Hydrologic Units that Encompass Both a Project Footprint and an "Impaired" Waterbody

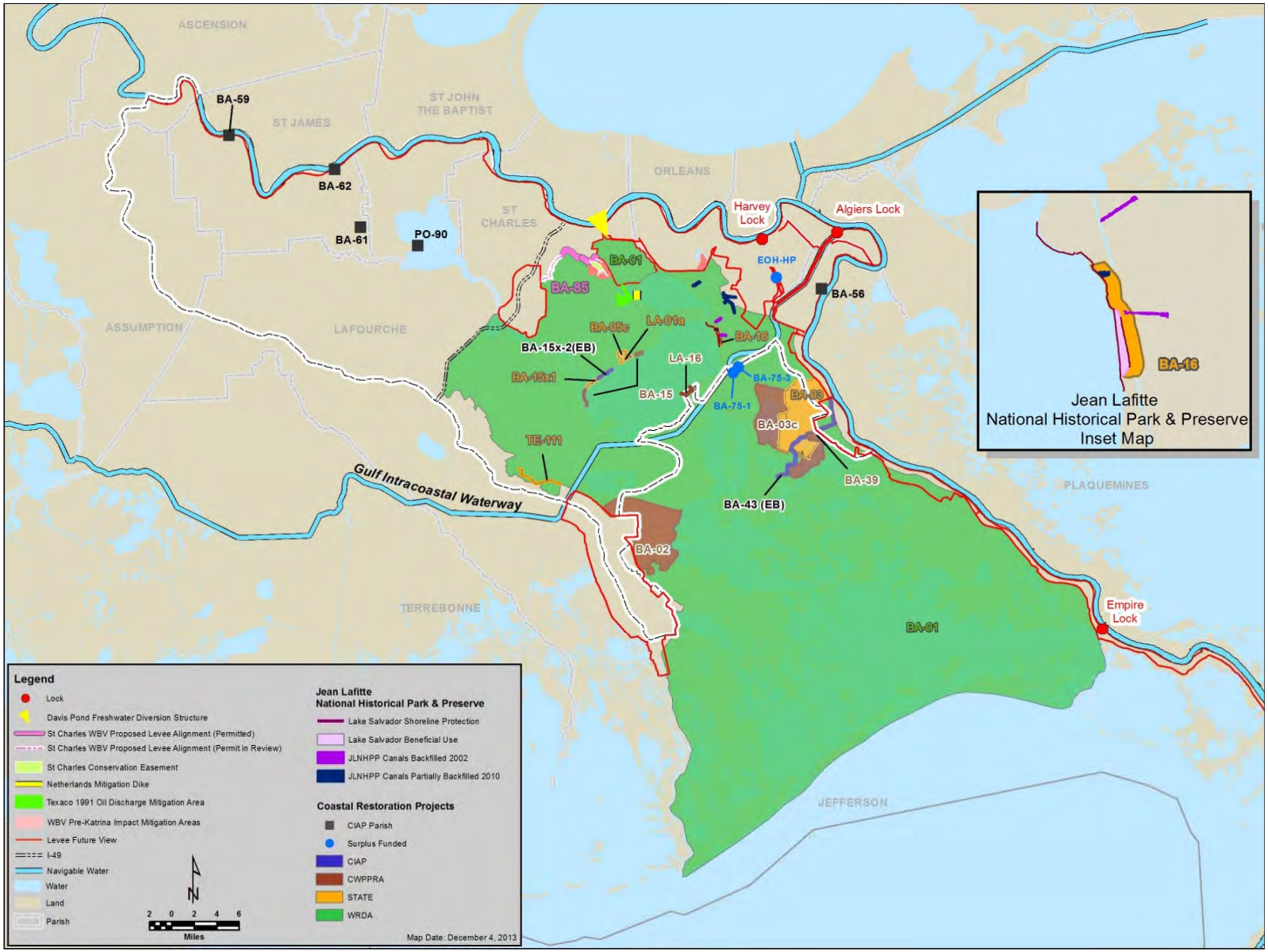

Figure A-4: Projects Considered in the Future Without Project (FWOP) Condition or No Action Alternative

Figure A-5: Avondale Gardens Mitigation Sites

Figure A-6: Lake Boeuf FS BLH-Wet Mitigation Site

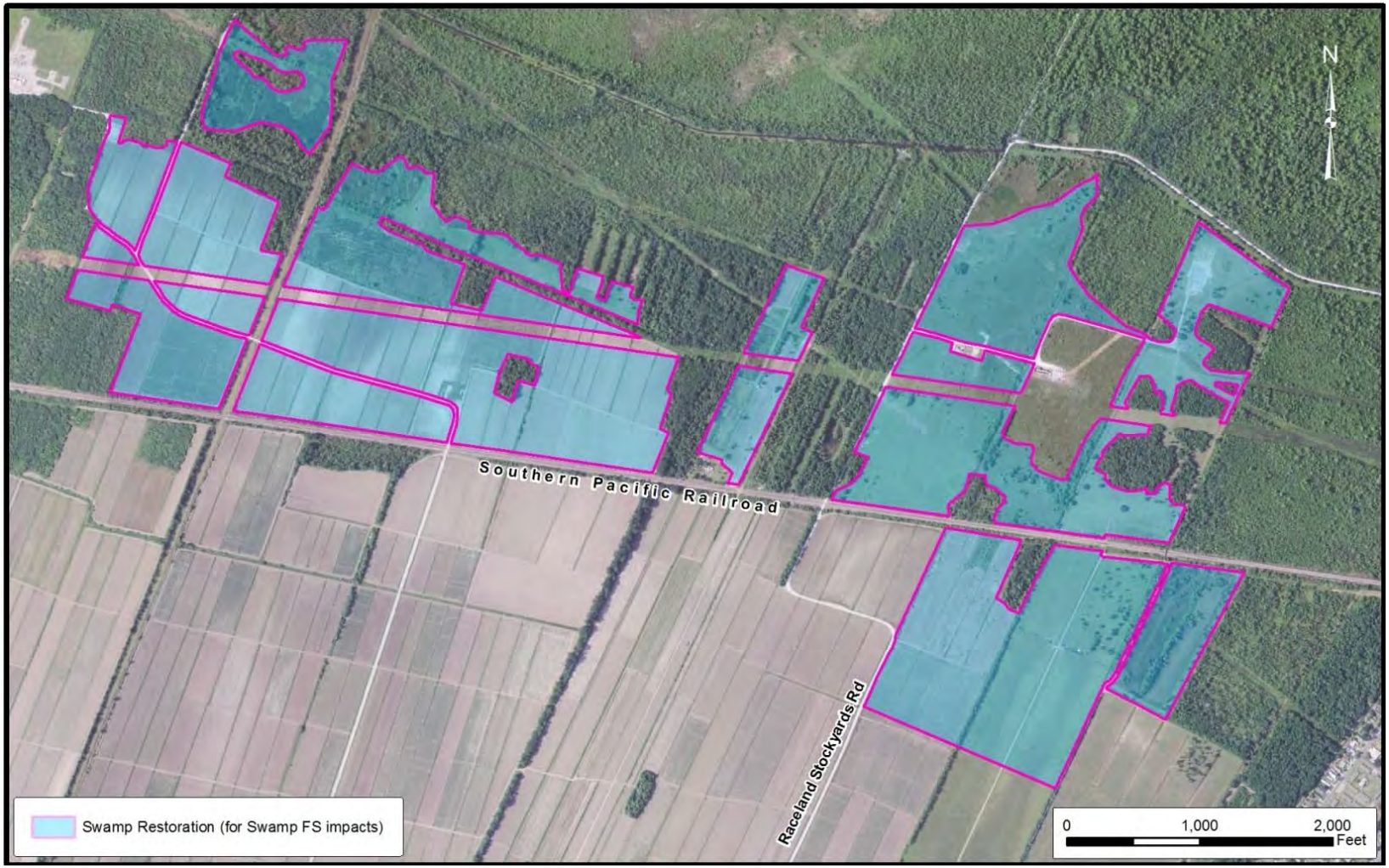

Figure A-7: Lake Boeuf FS Swamp Mitigation Site

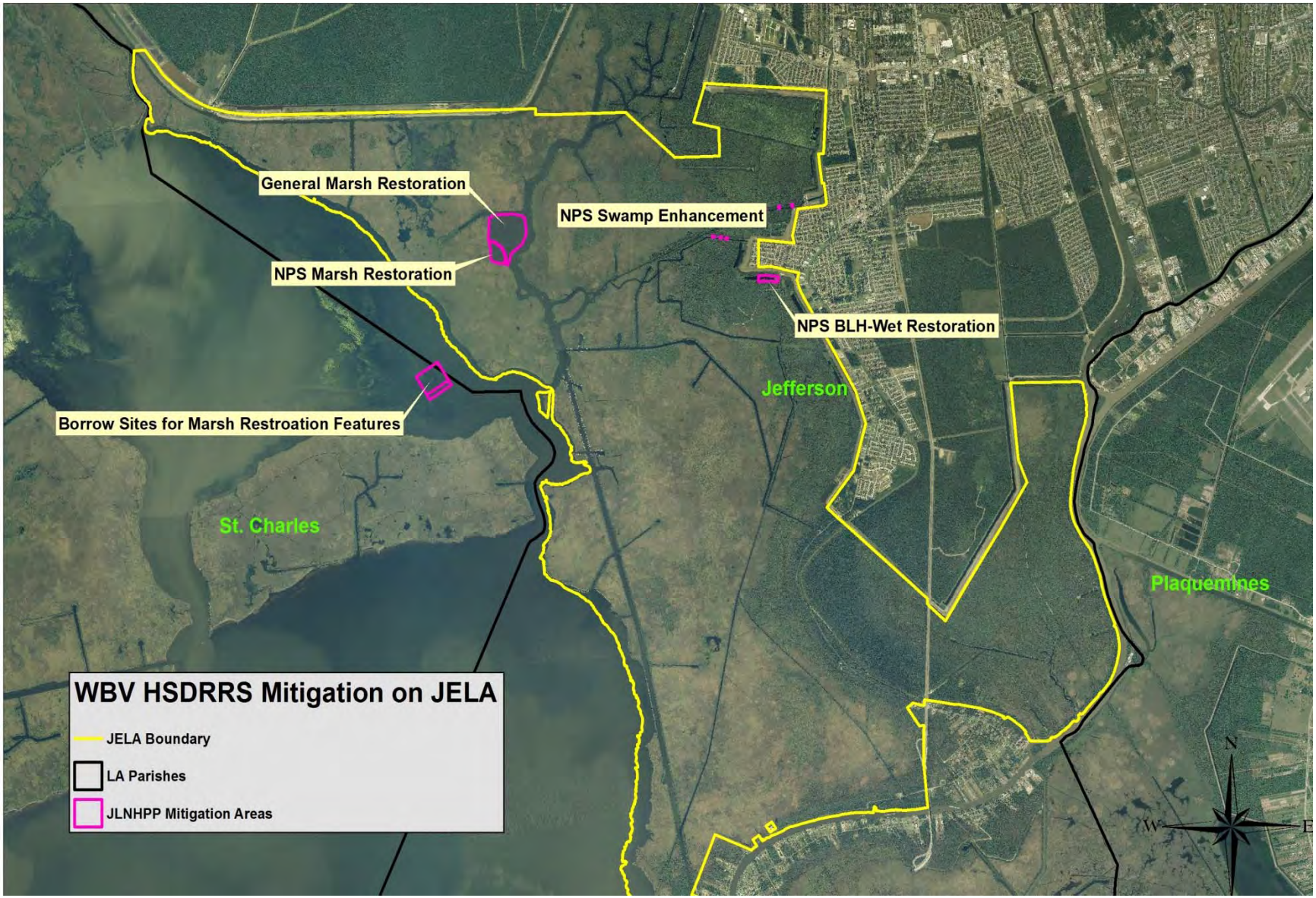

Figure A-8: PIER 37, TIER 1 Approved Action

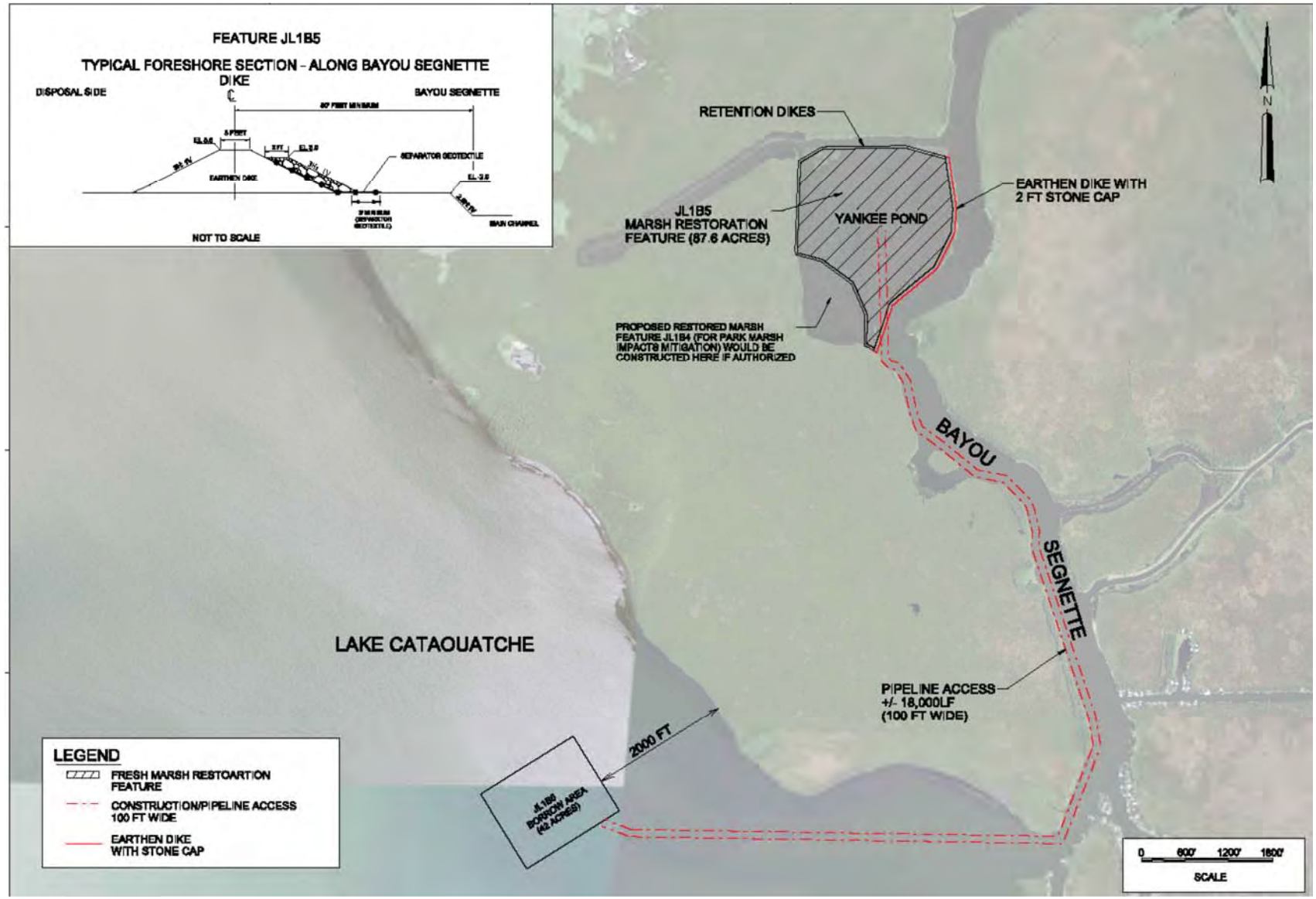

Figure A-9: Jean Lafitte Marsh Restoration for General impacts at Yankee Pond

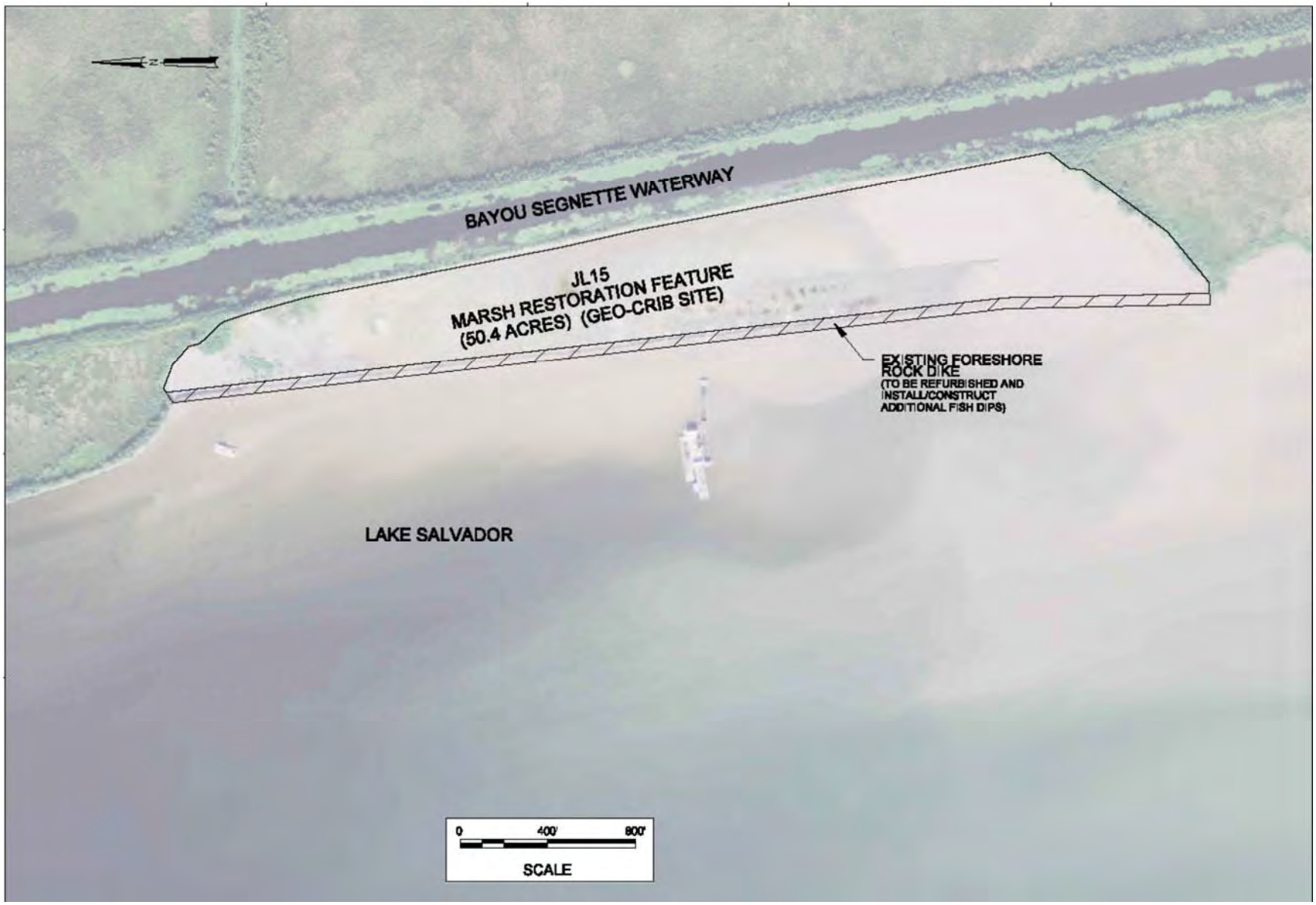

Figure A-10: Jean Lafitte Marsh Restoration for General impacts at Geocrib

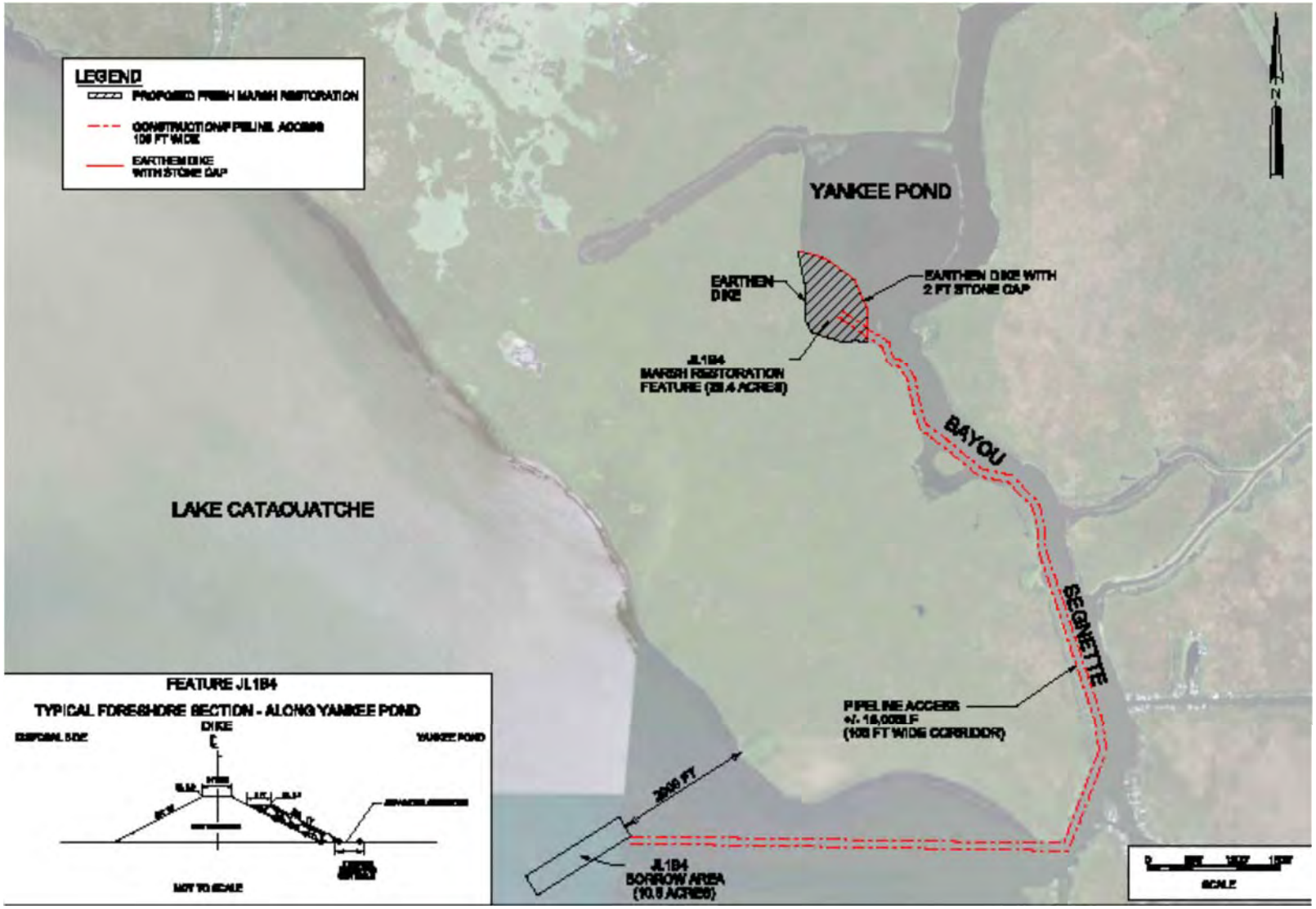

Figure A-11: Jean Lafitte Marsh Restoration for Park/404(c) impacts

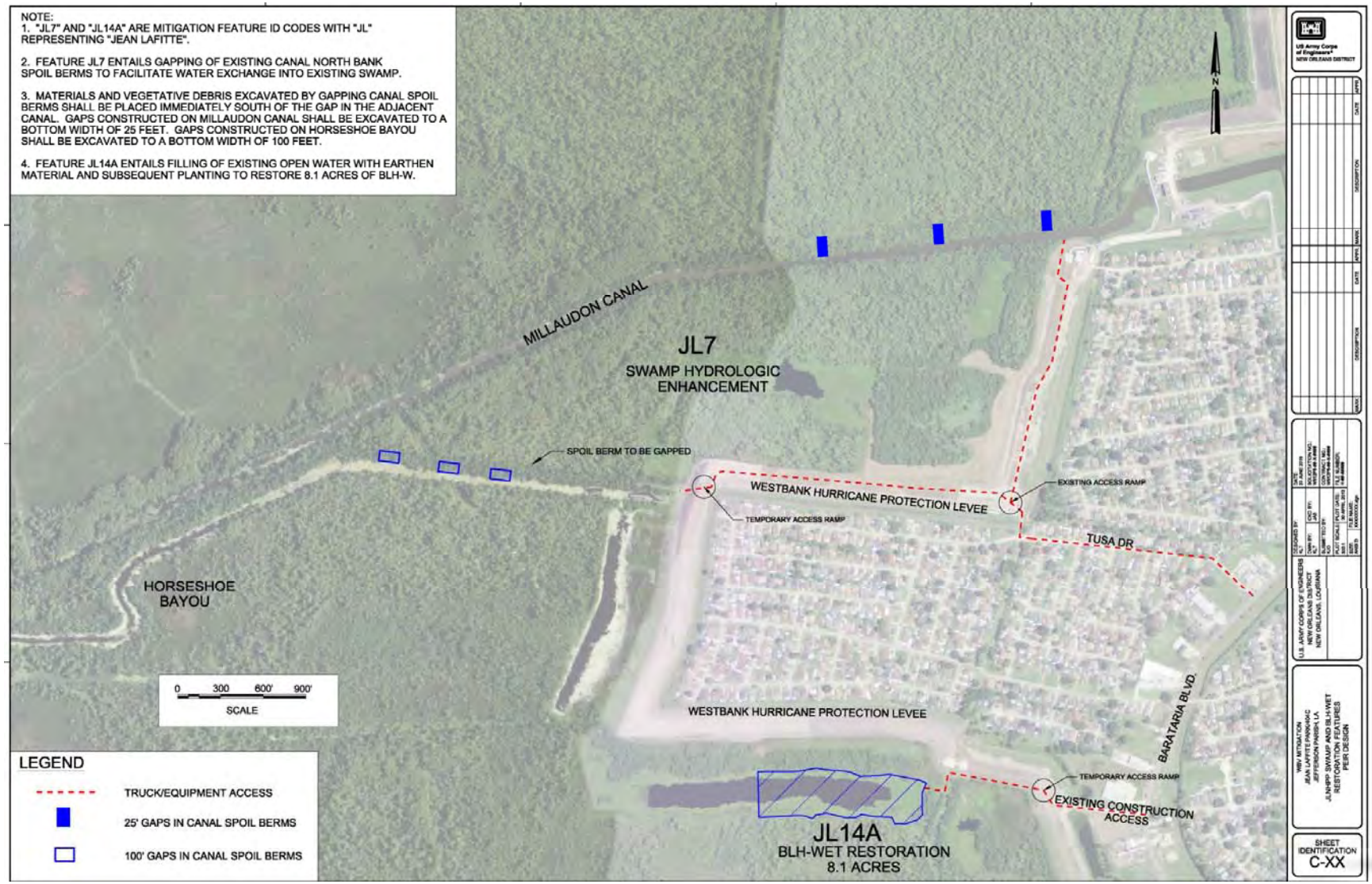

Figure A-12: Jean Lafitte BLH-Wet and Swamp Restoration Projects for Park/404(c) impacts

APPENDIX B

Tables

Table B-1: Three SLR Scenario Analysis

Mitigation Site	Proposed Habitat	Mitigation Feature ID	Acres	Total Net Gain AAHUs			Mitigation Potential (AAHUs / acre)			HSI at End of Period of Analysis (forested habitats; FWP)			Variable V1 Value (%) At End of Period of Analysis (marsh habitats; FWP)		
				Low SLR	Int. SLR	High SLR	Low SLR	Int. SLR	High SLR	Low SLR	Int. SLR	High SLR	Low SLR	Int. SLR	High SLR
Bayou Segnette	BLH-Dry	BS2 (D1)	1121.03	232.26	232.26	232.26	0.21	0.21	0.21	0.68	0.68	0.68	--	--	--
Bayou Segnette	BLH-Dry	BS4 (D3)	21.56	4.62	4.62	4.62	0.21	0.21	0.21	0.68	0.68	0.68	--	--	--
Bayou Segnette	BLH-Dry	BS6 (D2)	68.84	14.49	14.49	14.49	0.21	0.21	0.21	0.68	0.68	0.68	--	--	--
Bayou Segnette	BLH-Wet	BS3 (W3), HSDRRS	253.19	76.76	76.76	76.76	0.30	0.30	0.30	0.96	0.96	0.96	--	--	--
Dufrene Ponds	BLH-Wet	DP1 (B2)	471.88	307.69	305.50	299.19	0.65	0.65	0.63	0.68	0.67	0.64	--	--	--
Dufrene Ponds	BLH-Wet	DP4 (B1)	190.63	90.90	90.26	87.96	0.48	0.47	0.46	0.66	0.65	0.62	--	--	--
Dufrene Ponds	Swamp	DP2 (S1)	210.08	88.99	89.00	74.40	0.42	0.42	0.35	0.60	0.60	0.32	--	--	--
Dufrene Ponds	Fresh Marsh	DP3 (M2)	220.74	117.97	114.24	90.38	0.53	0.52	0.41	--	--	--	95.43	91.90	0.00
Dufrene Ponds	Fresh Marsh	DP5 (M1)	108.32	56.57	55.11	46.15	0.52	0.51	0.43	--	--	--	97.73	95.33	0.00
Lake Boeuf	BLH-Dry	LB3 (D1)	375.77	169.89	169.89	169.89	0.45	0.45	0.45	0.66	0.66	0.66	--	--	--
Lake Boeuf	BLH-Wet	LB1 (W1)	145.65	86.59	86.59	86.59	0.59	0.59	0.59	0.86	0.86	0.86	--	--	--
Lake Boeuf	BLH-Wet	LB2 (W2)	66.59	37.83	37.83	37.83	0.57	0.57	0.57	0.82	0.82	0.82	--	--	--
Lake Boeuf	BLH-Wet	LB4 (W5)	110.04	64.53	64.53	64.53	0.59	0.59	0.59	0.85	0.85	0.85	--	--	--
Lake Boeuf	BLH-Wet	LB5 (W3)	51.38	31.03	31.03	31.03	0.60	0.60	0.60	0.87	0.87	0.87	--	--	--
Lake Boeuf	BLH-Wet	LB7 (W4)	90.69	51.38	51.38	51.38	0.57	0.57	0.57	0.82	0.82	0.82	--	--	--

Lake Boeuf	Swamp	LB6 (S1)	13.15	6.07	5.80	5.42	0.46	0.44	0.41	0.85	0.68	0.54	--	--	--
Lake Boeuf	Swamp	LB8 (S2)	26.71	11.95	11.88	11.10	0.45	0.44	0.42	0.73	0.68	0.53	--	--	--
Lake Boeuf	Swamp	LB9 (S3)	91.61	42.64	40.76	38.08	0.47	0.44	0.42	0.85	0.68	0.53	--	--	--
Mitigation Site	**Proposed Habitat**	**Mitigation Feature ID**	**Acres**	**Total Net Gain AAHUs**			**Mitigation Potential (AAHUs / acre)**			**HSI at End of Period of Analysis (forested habitats; FWP)**			**Variable V1 Value (%) At End of Period of Analysis (marsh habitats; FWP)**		
				Low SLR	**Int. SLR**	**High SLR**	**Low SLR**	**Int. SLR**	**High SLR**	**Low SLR**	**Int. SLR**	**High SLR**	**Low SLR**	**Int. SLR**	**High SLR**
Plaquemines Alt. 1	Swamp	P1 (S1)	150.35	68.39	65.87	61.49	0.45	0.44	0.41	0.79	0.68	0.67	--	--	--
Plaquemines Alt. 1	Fresh Marsh	P2 (M1)	312.18	129.53	132.99	102.93	0.41	0.43	0.33	--	--	--	97.53	96.34	0.00
Plaquemines Alt. 2	BLH-Wet	P3 (B1)	566.25	356.33	356.33	356.33	0.63	0.63	0.63	0.93	0.93	0.93	--	--	--
Plaquemines Alt. 2	Swamp	P4 (S1)	106.36	48.39	46.60	43.50	0.45	0.44	0.41	0.79	0.68	0.67	--	--	--
Salvador - Timken	Swamp	ST1 (S1)	183.78	81.23	78.47	69.28	0.44	0.43	0.38	0.71	0.60	0.33	--	--	--
Salvador - Timken	Fresh Marsh	ST2 (M1)	324.89	147.90	146.00	115.09	0.46	0.45	0.35	--	--	--	99.00	95.33	0.00
Jean Lafitte, General Mitigation	Fresh Marsh	JL1B (M4B), Mitigation Feature Portion	117.58	56.21	51.81	46.68	0.48	0.44	0.40	--	--	--	97.78	93.85	0.00
Jean Lafitte, General Mitigation	Fresh Marsh	JL4 (M3), Mitigation Feature Portion	46.62	8.52	8.32	6.49	0.18	0.18	0.14	--	--	--	0.00	0.00	0.00

Jean Lafitte, General Mitigation	Existing Fresh Marsh	JL1B (M4B), Shoreline Protection Portion	13.70	6.55	6.04	5.44	0.48	0.44	0.40	--	--	--	100.00	100.00	0.00
Mitigation Site	**Proposed Habitat**	**Mitigation Feature ID**	**Acres**	**Total Net Gain AAHUs**			**Mitigation Potential (AAHUs / acre)**			**HSI at End of Period of Analysis (forested habitats; FWP)**			**Variable V1 Value (%) At End of Period of Analysis (marsh habitats; FWP)**		
				Low SLR	**Int. SLR**	**High SLR**	**Low SLR**	**Int. SLR**	**High SLR**	**Low SLR**	**Int. SLR**	**High SLR**	**Low SLR**	**Int. SLR**	**High SLR**
Jean Lafitte, General Mitigation	Existing Fresh Marsh	JL4 (M3), Shoreline Protection Portion	329.59	60.21	58.85	45.91	0.18	0.18	0.14	--	--	--	39.14	35.11	0.00
Jean Lafitte, Park/404c Mitigation, BLH Alt. 1	BLH-Wet	JL12 (B2)	16.83	10.46	10.56	10.35	0.62	0.63	0.62	0.91	0.93	0.88	--	--	--
Jean Lafitte, Park/404c Mitigation, BLH Alt. 1	BLH-Wet	JL13 (B3)	20.55	12.72	12.85	12.60	0.62	0.63	0.61	0.91	0.93	0.87	--	--	--
Jean Lafitte, Park/404c Mitigation, BLH Alt. 1	BLH-Wet	JL14 (B4)	16.75	10.63	10.73	10.52	0.63	0.64	0.63	0.93	0.95	0.90	--	--	--
Jean Lafitte, Park/404c Mitigation, BLH Alt. 2	BLH-Wet	JL15 (B1)	54.00	20.16	20.16	19.37	0.37	0.37	0.36	0.89	0.89	0.83	--	--	--

Jean Lafitte, Park/404c Mitigation, BLH Alt. 2	BLH-Wet	JL17 (B3)	5.4	3.45	3.45	3.38	0.64	0.64	0.63	0.94	0.94	0.90	--	--	--
Jean Lafitte, Park/404c Mitigation, BLH Alt. 2	BLH-Wet	JL18	18.6	11.90	11.90	11.67	0.64	0.64	0.63	0.94	0.94	0.90	--	--	--

Table B-2: Plant Species

Common Name	Scientific Name
American elm	*Ulmus americana*
American sycamore	*Platanus occidentalis*
Bald cypress	*Taxodium distichum*
Black willow	*Salix nigra*
Boxelder	*Acer negundo*
Bulltongue	*Sagittaria lancifolia*
Buttonbush	*Cephalanthus occidentalis*
California bullwhip	*Scirpus californicus*
Cattail	*Typha latifolia*
Cedar elm	*Ulmus crassifolia*
cutgrass	*Zizaniopsis miliaceae*
Common persimmon	*Diospyros virginiana*
duckweed	*Lemna sp.*
Eastern cottonwood	*Populus deltoides*
Green ash	*fraxinus pennsylvanica*
Honey locust	*Gleditsia triacanthos*
Iris	*Iris L.*
Nuttall oak	*Quercus nuttallii*
Pignut hickory	*Carya glabra*
Planertree	*Planera aquatica*
Red maple	*Acer rubrum*
Red mulberry	*Morus rubra*
Sugarberry	*Celtis laevigata*
Sweetgum	*Liquidambar styraciflua*
Water lily	*Nymphaea odorata*
Water Oak	*Quercus nigra*
Water tupelo/tupelogum	*Nyssa aquatica*
Wild rice	*Zizania aquatica*

Table B-3: Common Wildlife Species Found in the WBV Basin

Common Name	Scientific Name
American alligator	*Alligator missippiensis*
American beaver	*Castor canadensis*
American coot	*Fulica americana*
American kestrel	*Falco sparverius*
American white pelican	*Pelecanus erythrorhynchos*
American widgeon	*Anas americana*
Bald eagle	*Haliaeetus leucocephalus*
Banded water snake	*Nerodia fasciata*
Barred owl	*Strix varia*
Belted kingfisher	*Ceryle alcyon*
Black skimmer	*Rynchops niger*
Black-necked stilt	*Himantopus mexicanus*
Blue-winged teal	*Anas discors*
Boat-tailed grackle	*Quiscalus major*
Bobcat	*Lynx rufus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Bronze frog	*Rana clamitans*
Brown pelican	*Pelecanus occidentalis*
Bufflehead	*Bucephala albeola*
Bullfrog	*Rana catesbeiana*
Carolina wren	*Thryothorus ludovicianus*
Cattle egret	*Bubulcus ibis*
Clapper rail	*Rallus longirostris*
Common grackle	*Quiscalus quiscalus*
Common moorhen	*Gallinula chloropus*
Common snapping turtle	*Chelydra serpentine*
Common yellowthroat	*Geothlypis trichas*
Cotton mouse	*Peromyscus gossypinus*
Coyote	*Canis latrans*
Diamondback terrapin	*Malaclemys terrapin*
Double-crested cormorant	*Phalacrocorax auritus*
Eastern pipistrelle	*Pipistrellus subflavus*
Eastern cottontail rabbit	*Sylvilagus floridanus*
Eastern wood-pewee	*Contopus virens*
Evening bat	*Nycticeius humeralis*
Feral hog	*Sus scrofa*
Forster's tern	*Sterna forsteri*
Fulvous harvest mouse	*Reithrodontomys fulvescens*
Gadwall	*Anas strepera*
Glossy ibis	*Plegadis falcinellus*
Gray fox	*Urocyon cinereoargenteus*
Great blue heron	*Ardea herodias*
Great egret	*Casmerodius albus*

Greater yellowlegs	*Tringa melanoleuca*
Green anole	*Anolis carolinensis*
Green-backed heron	*Butorides striatus*
Green sea turtle	*Chelonia mydas*
Green treefrogs	*Hyla cinerea*
Green-winged teal,	*Anas crecca*
Ground skink	*Scincella lateralis*
Gulf coast toad	*Bufo valliceps*
Gull-billed tern	*Sterna nilotica*
Herring gull	*Larus argentatus*
Hispid cotton rat	*Sigmodon hispidus*
House mouse	*Mus musculus*
Kemp's ridley sea turtle	*Lepidochelys kempii*
Killdeer	*Chardrius vociferous*
Laughing gull	*Larus atricilla*
Lesser scaup	*Aythya affinis*
Lesser yellowlegs	*Tringa flavipes*
Loggerhead sea turtle	*Caretta caretta*
Lesser Scaup	*Aythya affinis*
Mallard	*Anas platyrhyncos*
Marsh rice rat	*Oryzomys palustris*
Marsh wren	*Cistothorus palustris*
Mink	*Mustela vison*
Mottled duck	*Anas fulvigula*
Mourning Dove	*Zenaida macroura*
Muskrat	*Ondatra zibethicus*
Nine-banded armadillo	*Dasypus novemcinctus*
Northern cardinal	*Cardinalis cardinalis*
Northern mockingbird	*Mimus polyglottos*
Northern pintail	*Anas acuta*
Northern raccoon	*Procyon lotor*
Northern Shoveler	*Anas clypeata*
Northern yellow bat	*Lasiurus intermedius*
Norway rat	*Rattus norvegicus*
Nutria	*Myocastor coypus*
Olivaceous cormorant	*Phalacrocorax brasilianus*
Pig frog	*Rana grylio*
Rafinesque's big-eared bat	*Plecotus rafinesquii*
Red bat	*Lasiurus borealis*
Red-eared slider	*Trachemys scripta*
River otter	*Lutra canadensis*
Red fox	*Vulpes vulpes*
Redhead	*Aythya americana*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*

Red-winged blackbird	*Agelaius phoeniceus*
Ring-billed gull	*Larus delawarensis*
Roof rat	*Rattus rattus*
Seaside sparrow	*Ammodramus maritimus*
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Snowy egret	*Egretta thula*
Southern leopard frog	*Rana sphenocephala*
Squirrel treefrogs	*Hyla squirella*
Stinkpot	*Sternotherus odoratus*
Swamp rabbit	*Sylvilagus aquaticus*
Tricolored heron	*Egretta tricolor*
West Indian manatee	*Trichechus manatus*
Western cottonmouth	*Agkistrodon piscivorus*
White-eyed vireo	*Vireo griseus*
White-faced ibis	*Plegadis chihi*
White-footed mouse	*Peromyscus leucopus*
White ibis	*Eudocimus albus*
White-tail deer	*Odocoileus virginiana*
Wood duck	*Aix sponsa*
Yellow-crowned night-heron	*Nycticorax violaceus*

Table B-4: Project Parishes and LA Threatened and Endangered Species

Species	Parish	Critical Habitat	Status	Jurisdiction	
				USFWS	NFMS
Animal					
Louisiana Black Bear (*Ursus americanus luteolus*)	St. C, St. J, O, Pl	X	T	X	
*West Indian Manatee (*Trichechus manatus*)	Asc, J, L, O, Pl, St. C, St. J, St. JB,		E	X	
Alabama Heelsplitter Mussel (*Potamilus inflatus*)	Asc, St. JB,		T	X	
Gulf sturgeon (*Acipenser oxyrinchus desotoi*)	Asc, J, L, Pl, St. J, St. C, St. JB,		T	X	X
*Pallid sturgeon (*Scaphirhynchus albus*)	Asc, J, O, Pl, St. J, St. C, St. JB,		E	X	
Piping plover (*Charadrius melodus)*	J, L, O, Pl	X	T	X	
Red knot *(Calidris canutus)*	J, L, Pl		T	X	
Green Sea Turtle (*Chelonia mydas*)	J, L, Pl		T	X	X
Hawksbill Sea Turtle (*Eretomchelys imbricata*)	J, L, Pl		E	X	X
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	J, L, Pl		E	X	X
Leatherback Sea Turtle (*Dermochelys coriacea*)	J, L, Pl		E	X	X
Loggerhead Sea Turtle (*Caretta caretta*)	J, L, Pl		T	X	X

Table B-5: Fish and Aquatic Species Found in the WBV Basin

Common Name	Scientific Name
Atlantic croaker	*Micropogonias undulatus*
American oyster	*Crassostrea virginica*
Asiatic clam	*Corbicula fluminea*
bay anchovy	*Anchoa mitchilli*
bighead carp	*Hypophthalmichthys nobilis*
black drum	*Pogonias cromis*
blue crab	*Callinectes sapidus*
blue catfish	*Ictalurus furcatus*
bluegill	*Lepomis macrochirus*
bowfin	*Amia calva*
brown shrimp	*Farfantepenaeus aztecus*
buffalo	*Ictiobus bubalus*
channel catfish	*Ictalurus punctatus*
common carp	*Cyprinus carpio*
crawfish	*Procambarus sp.*
freshwater drum	*Aplodinotus grunniens*
Gizzard shad	*Dorosoma cepedianum*
grass carp	*Ctenopharyngodon idella*
Gulf menhaden	*Brevoortia patronus*
Gulf sturgeon	*Acipenser oxyrinchus desotoi*
hardhead catfish	*Ariopsis felis*
inland silverside	*Menidia beryllina*
largemouth bass	*Micropterus salmoides*
least killifish	*Heterandria formosa*
mosquitofish	*Gambusia affinis*
paddlefish	*Polyodon spathula*
pallid sturgeon	*Scaphirhynchus albus*
rainwater killifish	*Lucania parva*
redear sunfish	*Lepomis microlophus*
redfish/ red drum	*Sciaenops ocellatus*
Rio Grande cichlid	*Cichlasoma cyanoguttatum*
sand sea trout	*Cynoscion arenarius*
sailfin molly	*Poecilia latipinna*
sheepshead	*Archosargus probatocephalus*
sheepshead minnow	*Cyprinodon variegatus*
shovelnose sturgeon	*Scaphirhynchus platorynchus*
silver carp	*Hypophthalmichthys molitrix*
southern flounder	*Paralichthys lethostigma*
Spanish mackerel	*Scomberomorus maculatus*
spot	*Leiostomus xanthurus*
Spotted gar	*Lepisosteus oculatus*
spotted sea trout	*Cynoscion nebulosus*
striped mullet	*Mugil cephalus*

warmouth	*Lepomis gulosus*
white shrimp	*Litopenaeus setiferus*
Yellow bass	*Morone mississippiensis*
yellow bullhead	*Ameiurus natalis*
Zebra mussel	*Dreissena polymorpha*

Table B-6. Prime Farmland Soils

Parish	Acreage*	% of All Soils*
Ascension	8,499.6	83.7
Assumption	30,431.9	55.3
Jefferson	28,231.3	30.8
Lafourche	60,877.7	20.2
Orleans	7,036.5	52.7
Plaquemines	8,467.9	23.2
St Bernard	0.0	0
St Charles	31,360.9	17.3
St James	37,011.4	41.9
St John the Baptist	15,324.5	25.9
TOTAL	227,241.7	27.1

*Acreages and percentages are based on the portions of the parish that fall within the WBV mitigation basin boundary.

Table B7: **2012 Fishing, Hunting Licenses & 2011 Boating Licenses Sold by Parish and in the WBV Basin**

Parish	Resident Salt *	NR Salt*	Resident Fresh*	NR Fresh*	Residential Hunting*	NR Hunting *	Boat
Assumption	1,833	13	2,971	3	1,186	0	3,607
St. James	2,027	1	2,456	1	763	0	2,135
St. John the Baptist	3,609	7	3,973	7	861	0	2,269
La Fourche	14,628	33	15,556	33	4,464	2	11,878
St. Charles	5,519	17	5,930	19	1,477	0	4,343
Jefferson	30,860	171	31,707	184	4,935	5	18,627
Orleans	11,544	98	12,059	122	1,466	6	4,649
Plaquemines	3,400	15	3,464	16	1,100	1	3,937
Total WBV Basin	**73,420**	**355**	**78,116**	**385**	**16,252**	**14**	**51,445**

Information is provided by the Louisiana Dep artment of Wildlife and Fisheries (www.wlf.louisiana.gov)

* Numbers are for one license per year per individual; Salt= salt water fishing; Fresh =fresh water fishing; NR =Non-resident; Boat= boat licenses

Table B-8: Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 ft., U. S. Dept. of Trans. study 1979	Average Noise Level (dBA) 50 ft., CA/T Project study 1994	Typical Noise Level (dBA) 50 ft., U. S. Dept. of Trans. study 1995	Lmax Noise (dBA) 50 ft., CA/T Project Spec. 721.560
Air Compressor		85	81	80
Backhoe	84	83	80	80
Chain Saw				85
Compactor	82		82	80
Compressor	90	85		80
Concrete Truck		81		85
Concrete Mixer			85	85
Concrete Pump			82	82
Concrete Vibrator			76	80
Crane, Derrick	86	87	88	85
Crane, Mobile		87	83	85
Dozer	88	84	85	85
Drill Rig		88		85
Dump Truck		84		84
Excavator				85
Generator	84	78	81	82
Gradall		86		85
Grader	83		85	85
Hoe Ram		85		90
Impact Wrench			85	85
Jackhammer*		89	88	85
Loader	87	86	85	80
Paver	80		89	85

Pile Driver, Impact		101	101	95
Pile Driver, Sonic			96	95
Pump	80		85	77
Rock Drill			98	85
Roller			74	80
Scraper	89		89	85
Slurry Machine		91		82
Slurry Plant				78
Truck	89	85	88	84
Vacuum Excavator				85

* There are 82 dBA @ 7 meter rated jackhammers (90 lb. class) available. This would be equivalent to 74 dBA @ 50 ft. These are silenced with molded intricate muffler tools.

Table B-9: Cumulative Impacts of Past Present and Reasonably Foreseeable Projects in the WBV Basin

Project Name	Project Type	Wetlands and Other Surface Waters	Wildlife	Threatened and Endangered Species	Fisheries, Aquatic Resources, and Water Quality	Essential Fish Habitat	Cultural Resources	Recreational Resources	Aesthetic Resources	Air Quality	Noise	Socioeconomics	Environmental Justice
CIAP BA-43 (EB): EB-Long Distance Mississippi River Sediment Pipeline	Diversion	+	+/-	o	+/-	+/-	o	+/-	o	o	o	o	o
CWPPRA BA-39: Mississippi River Sediment Delivery System - Bayou Dupont	Diversion	+	+/-	o	+/-	+/-	o	+/-	o	o	o	o	o
State of Louisiana BA-03: Naomi Siphon Diversion	Diversion	+	+/-	o	+/-	+/-	o	+/-	o	o	o	o	o
WRDA BA-01: Davis Pond Freshwater Diversion and Forced Drainage Area	Diversion	+	+/-	o	+/-	+/-	o	+/-	o	o	o	o	o
CIAP BA-62: West Bank Wastewater Assimilation Plant	Habitat Enhancement	+	+	o	o	+/-	o	+/-	o	o	o	o	o
CIAP (PO-90) WLDS-SP: West Lac Des Allemands Shoreline Protection	Habitat Preservation	+	+	o	+/-	+/-	o	o	+	o	o	o	o
CIAP BA-61: West Bank Wetland Conservation and Protection	Habitat Preservation	+	+	o	o	o	o	o	+	o	o	o	o
CWPPRA LA-16 Non-rock Alternatives to Shoreline Protection Demonstration	Habitat Preservation	+	+	o	+/-	+/-	o	o	+	o	o	o	o
National Park Service: Jean Lafitte National Historic Park Beneficial Use Site	Habitat Preservation	+	+	o	-	-	o	o	o	o	o	o	o
National Park Service: Lake Salvador Shoreline Protection 2011	Habitat Preservation	+	+	o	+/-	+/-	o	o	o	o	o	o	o
Pre-Katrina WBV Mitigation: Land Acquisition and BLH Mitigation	Habitat Preservation	+	+	o	o	o	o	o	+	o	o	o	o
State of Louisiana BA05c: Baie de Chactas	Habitat Preservation	+	+	o	+/-	+/-	o	o	o	o	o	o	o
State of Louisiana BA-15x1: Lake Salvador Shoreline Protection Extension Project	Habitat Preservation	+	+	o	+/-	+/-	o	o	o	o	o	o	o

Project Name	Project Type	Wetlands and Other Surface Waters	Wildlife	Threatened and Endangered Species	Fisheries, Aquatic Resources, and Water Quality	Essential Fish Habitat	Cultural Resources	Recreational Resources	Aesthetic Resources	Air Quality	Noise	Socioeconomics	Environmental Justice
State of Louisiana BA-16: Bayou Segnette	Habitat Preservation	+	+	o	+/-	+/-	o	o	o	o	o	o	o
Surplus Funds 2007 BA-75-1: Jean Lafitte Tidal Protection/Fishers basin	Habitat Preservation	+	+	o	+/-	+/-	o	o	o	o	o	o	o
Texaco Oil Spill Mitigation: Texaco Oil Discharge Mitigation 1991 (Netherlands Area)	Habitat Preservation	+	+	o	+/-	+/-	o	o	o	o	o	o	o
US Department of Justice: St Charles Levee Conservation Easement	Habitat Preservation	+	+	o	o	o	o	o	+	o	o	o	o
National Park Service: Lake Salvador Shoreline Protection 1997 shoreline protection and geocrib	Habitat Preservation	+	+	o	+/-	+/-	o	o	o	o	o	o	o
National Park Service: Lake Salvador Shoreline Protection 2005	Habitat Preservation	+	+	o	+/-	+/-	+	+	o	o	o	o	o
CIAP BA-15x-2 (EB): EB-Lake Salvador Shoreline Protection Phase III	Habitat Restoration	+	+	o	+/-	+/-	o	+	o	o	o	o	o
CWPPRA BA-15: Lake Salvador Shore Protection Demonstration	Habitat Restoration	+	+	o	+/-	+/-	o	+	o	o	o	o	o
CWPPRA BA-03c: Naomi Outfall Management	Hydrologic Restoration	+	+	o	+/-	+/-	o	o	o	o	o	o	o
CWPPRA BA-02: GIWW (Gulf Intracoastal Waterway) to Clovelly Hydrologic Restoration	Hydrologic Restoration	+	+	o	+/-	+/-	o	o	o	o	o	o	o
National Park Service: 2002 Jean Lafitte National Historic Park Canal Partial Back Fillings	Marsh Creation	+	+	o	-	-	o	+	o	o	o	o	o
National Park Service: 2010 Jean Lafitte National Historic Park Canal Partial Back Fillings	Marsh Creation	+	+	o	-	-	o	+	o	o	o	o	o
State of Louisiana LA-01a: Dedicated Dredging Program - Lake Salvador	Marsh Creation	+	+	o	+/-	-	o	+	o	o	o	o	o
CIAP BA-59: Waterline Booster Pump Station, West Bank	Structure	+/-	+/-	o	+/-	o	o	-	-	o	o	+	o

Project Name	Project Type	Wetlands and Other Surface Waters	Wildlife	Threatened and Endangered Species	Fisheries, Aquatic Resources, and Water Quality	Essential Fish Habitat	Cultural Resources	Recreational Resources	Aesthetic Resources	Air Quality	Noise	Socioeconomics	Environmental Justice
Louisiana DOTD: Future I-49 Corridor	Structure	+/-	+/-	o	o	-	o	-	-	o	+	+	o
US Army Corps of Engineers: Davis Pond Freshwater Diversion Structure	Structure	+/-	+/-	o	o	o	o	-	-	o	o	o	o
Algiers Lock	Structure	+/-	+/-	o	-	-	o	+/-	-	o	o	-	o
Algiers Non-federal Levee (Donner Canal Levee)	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
Bayou Gauche Ring Levee (Sunset Levee)	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
Coastal Protection and Restoration Authority (CPRA) and North Lafourche Conservation, Levee and Drainage District, Valentine to Larose Levee, TE-111	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
Empire Lock	Structure	+/-	+/-	o	-	-	o	+/-	-	o	o	-	o
English Turn Non-federal Levee (Donner Canal Levee)	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
GIWW Navigation System	Structure	+/-	+/-	o	+/-	+/-	+/-	+/-	o	o	o	+	o
Harvey Canal Lock	Structure	+/-	+/-	o	-	-	o	+/-	-	o	o	-	o
Hurricane and Storm Damage Risk Reduction System (HSDRRS), West Bank and Vacinity	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
Larose to Golden Meadow, Louisiana, Hurricane Protection Project (LGM)	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
Mississippi River Levees : MR&T Project	Structure	+/-	+/-	o	-	-	+/-	-	-	o	o	+	o
Mississippi River Navigation Operations and Maintenance	Structure	+/-	+/-	o	+/-	+/-	o	-	o	o	o	+	o
New Orleans to Venice (NOV) levee project, Incorporation of Non-fedeal Levees (NFL) into NOV	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
New Orleans to Venice (NOV) levee project, St. Jude to Venice	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
Oakville to La Reussite Non-federal Levee	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o

Project Name	Project Type	Wetlands and Other Surface Waters	Wildlife	Threatened and Endangered Species	Fisheries, Aquatic Resources, and Water Quality	Essential Fish Habitat	Cultural Resources	Recreational Resources	Aesthetic Resources	Air Quality	Noise	Socioeconomics	Environmental Justice
St. Charles Parish Levee - West Bank Ellington Phase 3 (BA-85-3)	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
St. Charles Parish Levee - West Bank Magnolida Ridge Phase 1 (BA-85-1)	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
St. Charles Parish Levee - West Bank Willow Ridge Phase 2 (BA-85-2)	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
State of Louisiana - Surplus Fund 2007 project, Lafitte Tidal Protection, BA-75-3, 2007	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
State of Louisiana Surplus Fund 2007 Project - East of Harvey Canal Interim Hurricane Protection - Phase 1	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
State of Louisiana- Surplus Fund 2007 project, Jean Lafitte Tidal Protection, BA-75-1, 2007	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o
West Plaquemines Non-federal Levee	Structure	+/-	+/-	o	o	o	o	-	-	o	o	+	o

+ positive effect, - negative effect, o no effect, +/- both positive and negative effects

Table B-10. Previously Constructed Wetland or Ecosystem Restoration Projects in Barataria Basin

Program	Parish	Year Constructed	Description	Direct Overlap	Extended Boundary Overlap
CIAP BA-15x-2 (EB): EB-Lake Salvador Shoreline Protection Phase III	St Charles	2009	A shoreline protection located near Bayou des Allemands along the northwestern Lake Salvador shoreline tying into the western BA-15 CWPPRA shoreline protection feature and extending approximately 3 miles east. *+#	No	No
CIAP BA-59: Waterline Booster Pump Station, West Bank	St. James	2010	Constructed in 2010, the project includes the installation of a waterline booster pump station in Welcome, Louisiana along Louisiana Highway 18 on the west bank of the Mississippi River in St. James Parish.*+#	No	No
CIAP BA-61: West Bank Wetland Conservation and Protection	St. James	2010	Acquisition and preservation of approximately 235 acres of existing wetlands along Louisiana Highway 20 in St. James Parish near the communities of South Vacherie and Chackbay to protect the natural habitat from future development. The purchase was completed in 2010. *+#	No	No
CWPPRA BA-03c: Naomi Outfall Management	Jefferson, Plaquemines	2002	The management of freshwater, sediment and nutrients diverted from the Mississippi River via the Naomi Siphon (BA-03) into the project area located between the communities of Naomi/La Reusitte and Lafitte in Jefferson Parish, Louisiana including The Pen. The project goal is to decrease salinities and reduce marsh loss.*	No	Yes

CWPPRA BA-02: GIWW (Gulf Intracoastal Waterway) to Clovelly Hydrologic Restoration	Lafourche	2000	Inhibit salinity increases within the project area by the use of hydrologic restoration features such as plugs and weirs to prevent salt water intrusion and decrease marsh loss. Shoreline protection features along the Bay L'Ours were also constructed to prevent wave induced erosion and reduce marsh loss. The project is located east of the communities of Larose and Cutoff in Lafourche Parish, Louisiana and adjacent to Little Lake. *	No	No
CWPPRA BA-15: Lake Salvador Shore Protection Demonstration	St Charles	1998	The project was constructed in two Phases. The first phase included the construction of shoreline protection features along the northern shoreline of Lake Salvador east of Baie du Cabanage to investigate the performance of various structural shoreline protection designs in unstable soil conditions and high wave energy environments. Phase II of the project included a continuous rock structure approximately 8,000 feet in length along the western section of the lake near the entrance of Bayou des Allemands. The objective of this project was to maintain the shoreline integrity and prevent interior marsh loss. *	No	No

CWPPRA BA-39: Mississippi River Sediment Delivery System - Bayou Dupont	Jefferson, Plaquemines	2010	Dredged material from the Mississippi River near La Reussite, Louisiana was pumped into confined open water areas south of Cheniere Traverse Bayou and adjacent to the West Plaquemines non-federal levee using a pipeline conveyance system to create and restore marsh. Additional grant funded received by the State of Louisiana from The American Recovery and Reinvestment Act of 2009 (ARRA) was added to this project to create approximately 100 additional acres of marsh. *	No	No
National Park Service/USACE: Lake Salvador Shoreline Protection 1997 Shoreline Protection	Jefferson	1997	A shoreline protection barrier was built by the USACE under the authority of the National Parks and Recreation Act of November 10, 1978 (PL 95-625) to protect the Jean Lafitte National Historical Park and Preserve lands from wave induced erosion in an area of the central eastern Lake Salvador shoreline where potential breaching was possible between the Lake Salvador shoreline and the Bayou Segnette Waterway. The wave break is approximately 8,000 feet long (USACE, 1995).	Yes	No

National Park Service/USACE: Lake Salvador Shoreline Protection 2005	Jefferson	2004-2005	Shoreline protection features were constructed by the USACE within the Jean Lafitte National Historical Park and Preserve along the northeastern Lake Salvador shoreline from the entrance of Bayou Bardeaux southeast along the Lake Salvador shoreline until it meets the National Park Service breakwater constructed in 1997. The goal of this project is to protect the JLNHPP lands and archaeological sites from wave induced erosion (USACE, 2004b).	No	No
National Park Service: 2002 Jean Lafitte National Historical Park & Preserve Canal Partial Back Fillings	Jefferson	2002	Jean Lafitte National Historical Park & Preserve canals backfilled in 2002 to restore marsh integrity (Haigler, 2011).	No	Yes
National Park Service: 2010 Jean Lafitte National Historical Park & Preserve Canal Partial Back Fillings	Jefferson	2010	Jean Lafitte National Historical Park & Preserve canals partially backfilled in 2010 to restore marsh integrity (Haigler, 2011).	No	Yes

National Park Service/USACE: Jean Lafitte National Historical Park & Preserve Beneficial Use Site	Jefferson	2011	The beneficial use of dredged material from Bayou Segnette Waterway and additional material from Algiers Canal associated with the construction of the West Closure Complex/HSDRSS were placed in the site bounded by the 1997 NPS wave break features on the west, existing marsh lands to the north and south, and the 1994 State of Louisiana BA-16 rock dike to the east. The project will provide improved shoreline stability (Minton, 2011).	Yes	No
National Park Service/USACE: Lake Salvador Shoreline Protection 2011	Jefferson	2011	Construction consisted of placement of rock on the floodside of the geocrib area and repairing existing rock dike on the Jean Lafitte National Historical Park and Preserve -along the eastern Lake Salvador shoreline adjacent to the geocrib constructed in 1997. The feature is owned by NPS (O'Cain, 2012).	Yes	No
State of Louisiana BA-03: Naomi Siphon Diversion	Jefferson, Plaquemines	1992	The Naomi Siphon diversion is located on the west bank of the Mississippi River near the communities of Naomi and LaReussitte, Louisiana. The maximum flow capacity of the diversion is 2,100 cfs and is designed to divert freshwater, nutrients and sediment from the Mississippi River into the adjacent wetlands near Naomi, Louisiana. *	No	Yes
State of Louisiana BA05c: Baie de Chactas	St Charles	1990	Construction of a rock shoreline protection feature between the northwest shoreline of Lake Salvador and Baie du Cabanage in order to reduce erosion, stabilize the shoreline, and prevent shoreline breaching. *	No	Yes

State of Louisiana BA-15x1: Lake Salvador Shoreline Protection Extension Project	St Charles	2005	The shoreline protection project included the construction of a rock dike along the northeastern shoreline of Lake Salvador tying into the BA-15 Phase II CWPPRA project and extending approximately 10,000 feet northeast. The project is designed to maintain the shoreline integrity and reduce interior marsh loss. *	No	No
State of Louisiana BA-16: Bayou Segnette	Jefferson	1994; 1998	A shoreline protection feature along a narrow strip of spoil bank and marsh which separates the Bayou Segnette Waterway from Lake Salvador and a barrier across an abandoned canal that connects the two water bodies was constructed in 1994 to reduce wave induced erosion of marsh habitats within the JLNHPP. Maintenance of the structure occurred in 1998-1999. *	Yes	Overlap was taken into considerati on in USGS analysis
State of Louisiana LA-01a: Dedicated Dredging Program - Lake Salvador	St Charles	1999	A Dedicated Dredging Program project which included the placement of dredged material in open water areas of Baie du Cabanage within the Salvador Wildlife Management Area where narrow marsh strips exists between Lake Salvador and the bay. The project goal is the restoration of marsh habitat and the reduction of shoreline breaching into the adjacent open water bodies. *	No	No

Table B-11: Reasonably Foreseeable Future Wetland or Ecosystem Restoration Projects in Barataria Basin

Program	Parish	Description	Direct Overlap	Extended Boundary Overlap
CIAP BA-43 (EB): EB-Long Distance Mississippi River Sediment Pipeline	Jefferson, Lafourche, Plaquemines	The deposition of dredged material from the Mississippi River by long distance pipeline from the Mississippi River to locations within central Barataria Basin for marsh creation and restoration. Project is currently under construction and is expected to be completed by December 2015.*+ #	No	No
CIAP BA-62: West Bank Wastewater Assimilation Plant	St. James	Construction of a wetland assimilation treatment plant in Vacherie, Louisiana for disbursement of treated sewerage effluent into a predominantly cypress/tupelo forested wetland area in St James Parish to increase wetland vegetation health. Grant application is anticipated in the near future with construction scheduled to begin in June 2014 and anticipated construction completed in June 2015.*+#	No	No
CIAP PO-90: West Lac Des Allemands Shoreline Protection	St John the Baptist	Shoreline protection is to be constructed along the western shore of Lac des Allemands from “Pleasure Bend” westward to Pointe Aux Herbes in St John the Baptist Parish, Louisiana. The goal of the project is reduce shoreline erosion. Construction began in January 2013 and is anticipated of completion in August 2014.*+#	No	No
CWPPRA LA-16 Non-rock Alternatives to Shoreline Protection Demonstration	Jefferson	Project goals are to demonstrate different alternatives to rock shoreline protection methods by testing several different products along highly erosive shorelines in areas that are not conducive to construction with rock (CPRA, 2013b)	No	No

Pre-Katrina WBV Mitigation: Land Acquisition and BLH Mitigation	St Charles	Mitigation for Pre-Katrina West Bank and Vicinity Hurricane Protection project impacts by land acquisition, preservation, and management of lands along the St Charles Parish ridge and adjacent to Bayou Segnette State Park. Anticipated Bayou Segnette land acquisition completed by July 2014 and anticipated construction complete by Winter 2016. Anticipated St Charles land acquisition completed by March 2015 and anticipated completion date prior to Winter 2016. (USACE, 2012b).	No	Yes

Table B-12: Additional Authorized Projects in Barataria Basin

Program	Parish	Description	Direct Overlap	Extended Boundary Overlap
Louisiana DOTD/FHWA: Future I-49 South, Raceland to the Westbank Expressway (700-92-0011)	St. Charles; Lafourche	Proposed construction of an elevated extension to US Interstate 49 South along the US 90 corridor from the Louisiana Highway 1 interchange in Raceland, Louisiana to the Westbank Expressway near Ames Boulevard in Marrero, Louisiana. The project also includes the connection of the southern terminus of US Interstate 310 with US Interstate 49. The Record of Decision for the project was signed in January 2008 (USDOT, 2008).	No	Yes
US Department of Justice: St Charles Levee Conservation Easement	St. Charles	St Charles Levee Conservation Easement was authorized and created in 1999 by the U.S. Department of Justice as a conservation area resulting from a federal settlement with Rathborne Land Company to resolve allegations of unpermitted development of wetlands (Scallan, 2010).	No	No

(*Data source is CPRA, 2012a; + Data sources is CPRA, 2010

APPENDIX C

ABBREVIATIONS

AAHU	Average Annual Habitat Units
AEP	Alternatives Evaluation Process
AM	Adaptive Management
BLH-Dry	Bottomland Hardwood Dry
BLH-Wet	Bottomland Hardwood Wet
BMP	Best Management Practice
CAA	Clean Air Act
CAR	Coordination Act Report
CED	Comprehensive Environmental Document
CEMVN	U.S Army Corps of Engineers Mississippi Valley Division, U.S. Army Corps of Engineers New Orleans District
CEQ	Council on Environmental Quality
CF	Contractor Furnished
CFR	Code of Federal Regulations
CIAP	Coastal Impact Assistance Program
CNWB	Colonial-nesting wading birds
CRMS	Coastwide Reference Monitoring System
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
dB	Decibel
dBA	Weighted Decibel
DNL	Day-Night Average Sound Level
DOI	Department of Interior
DR	Decision Record
EA	Environmental Assessment
ECO-PCX	National Ecosystem Restoration Planning Center of Expertise
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ER	Engineering Regulation
ESA	Endangered Species Act
°F	Fahrenheit
FMC	Fisheries Management Council
FMP	Fisheries Management Plan
FONSI	Finding of No Significant Impact
FS	Flood Side
FWP	Future with Project
FWOP	Future without Project
GIWW	Gulf Intracoastal Waterway
HPS	Hurricane Protection System
HSDRRS	Hurricane and Storm Damage Risk Reduction System
HIS	Habitat Suitability Index
HTRW	Hazardous, Toxic, or Radioactive Waste

IER	Individual Environmental Report
IERS	Supplemental Individual Environmental Report
LA	Louisiana
LaCPR	Louisiana Coastal Protection and Restoration
LCRP	Louisiana Coastal Resources Program
LCWCRTF	Louisiana Coastal Wetlands Conservation and Restoration Task Force
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LDEQ	Louisiana Department of Environmental Quality
LIDAR	Laser Identification Detection and Ranging
LPV	Lake Pontchartrain and Vicinity
L&WCF	Land and Water Conservation Fund
MBI	Mitigation Banking Instrument
MPA2	Mitigation Plan Alternative 2
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
TSMMP	Tentatively Selected Modified Mitigation Plan
NAAQS	National Ambient Air Quality Standards
NCC	Notice of Construction Complete
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOV	New Orleans to Venice
NWR	National Wildlife Refuge
PDT	Project Delivery Team
PED	Preconstruction Engineering & Design
PIER	Programmatic Individual Environmental Report
PL	Public Law
ppt	Parts per Thousand
PM	Particulate Matter
PS	Protected Side
RDB	Right Descending Bank
REC	Recognized Environmental Conditions
RMP	Recommended Mitigation Plan
ROD	Record of Decision
ROE	Right of Entry
RSLR	Relative Sea Level Rise
SAV	Submerged Aquatic Vegetation
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Office
SHS	State Historic Site
TIER	Tiered Individual Environmental Report
TSMP	Tentatively Selected Mitigation Project
TSMPA	Tentatively Selected Mitigation Plan Alternative
USACE	U.S Army Corps of Engineers
USC	United States Code
USFWS	US Fish and Wildlife Service
USGS	United States Geological Survey

WBV	West Bank and Vicinity
WCRA	Wetlands Conservation and Restoration Authority
WMA	Wildlife Management Area
WRDA	Water Resources Development Act
WVA	Wetland Value Assessment
ZIP	Zone Improvement Plan

APPENDIX D

Guidelines for Mitigating Open Water Impacts

FINAL GUIDELINES CONCERNING MITIGATION OF IMPACTS TO OPEN WATER HABITATS AND THE USE OF WVA MODELS TO EVALUATE SUCH IMPACTS
August 2014

1 INTRODUCTION

This document is intended to provide guidance concerning mitigation of impacts to open water habitats resulting from Hurricane & Storm Damage Risk Reduction System (HSDRRS) civil works projects, including impacts generated by HSDRRS mitigation activities. It also provides guidance concerning the use of Wetland Value Assessment (WVA) models to evaluate these impacts.

The guidance contained herein is not applicable to the evaluation of impacts to open water areas within marsh habitats, or to mitigation of such impacts. Coastal marsh habitats frequently include open water areas that are interspersed with the vegetated marsh features, forming a mosaic of marsh (land) areas and open water areas. Impacts to open water areas within marsh habitats will continue to be addressed as part of the overall marsh landscape. For now, the appropriate WVA marsh community model will continue to be used to evaluate proposed impacts to the marsh/open water complex, since the marsh community models already incorporate a means of assessing project impacts to both the marsh components and the open water components of marsh habitats.

At this time, the guidance contained herein is also not applicable to the evaluation and mitigation of impacts to open water areas involving CEMVN civil works projects other than HSDRRS projects. It is anticipated that this guidance will ultimately be adopted for other CEMVN civil works projects in coastal Louisiana, at which time this guidance will be updated accordingly.

2 MITIGATION FOR IMPACTS TO OPEN WATER HABITATS

2.1 Determination of Whether Mitigation Is or Is Not Required

Mitigation of impacts to open water habitats will typically be required for the following scenarios:

A. Any fill impact (deposition of fill) that will:
   (a) Affect open water habitat that is classified by the National Marine Fisheries Service (NMFS) as Essential Fish Habitat (EFH; i.e. NMFS asserts EFH jurisdiction over the affected habitat), and;
   (b) The impact will cause the affected open water area to become non-aquatic habitat.
   Note that, as a very general rule of thumb, NMFS may or may not assert EFH jurisdiction over open water areas in freshwater settings that are non-tidal, but typically will assert EFH jurisdiction over open water areas found in other salinity regimes (i.e. intermediate, brackish, saline) and may assert EFH jurisdiction over open water areas in tidal freshwater settings. Also note that the exception to mitigation requirements addressed in item (3) below may be applicable to the impact scenario described above.

B. Any fill impact to an open water area containing Submerged Aquatic Vegetation (SAV), regardless of the percent cover accounted for by SAV, provided that the impact is anticipated to result in the permanent loss of SAV.
   Note that for this scenario, the WVA model used to evaluate the impact would encompass the entire impact footprint (i.e. areas with SAV patches and areas lacking SAV). Also note that when determining SAV presence and coverage, both native and invasive/exotic SAV species will be considered (i.e. the total SAV cover will include the cover accounted for by native species and the cover accounted for by invasive/exotic species combined). Also note that the exception to mitigation requirements addressed in item (3) below may be applicable to the impact scenario described above.

C. Any excavation (dredging) impact to an open water area containing SAV, regardless of the percent cover accounted for by SAV, which adversely affects the SAV but will not result in the creation of anoxic conditions in the affected area.
Note that for this scenario, the WVA model used to evaluate the impact would only be applicable to the SAV patches (i.e. the impacts to the open water areas lacking SAV would not be considered in the model). Note that the exception to mitigation requirements addressed in item (3) below may be applicable to the impact scenario described above.

D. Any excavation impact to an open water area designated as EFH that will result in the creation of permanent anoxic conditions in the affected area, regardless of whether SAV is present or not.
Note that it may be difficult to predict whether a proposed action would result in permanent anoxic conditions. Rather than assuming mitigation will be necessary when there are uncertainties, the approach may be to conduct monitoring of the affected area following implementation of the proposed action to determine whether anoxic conditions have developed and then determine mitigation requirements based on this monitoring. Coordinate with NMFS during project planning to determine the best approach. Note that the exception to mitigation requirements addressed in item (3) below may be applicable to the impact scenario described above.

E. Any fill or excavation impact that adversely affects open water habitat where SAV is present <u>and</u> the SAV species include seagrasses, regardless of the percent cover accounted for by the SAV and regardless of the percentage of the total SAV cover accounted for by seagrasses. As used herein, seagrass species include; turtle grass (*Thalassia testudinum*), Manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), star grass (*Halophila englemannii*), and paddle grass (*Halophilia decipiens*).
Note that for this scenario, the WVA model used to evaluate the impact would encompass the entire impact footprint (i.e. areas with SAV patches and areas lacking SAV).

F. Any fill or excavation impact that adversely affects open water habitat that is designated as oyster seed grounds by the Louisiana Department of Wildlife and Fisheries (LDWF).

Mitigation of impacts to open water habitats will <u>not</u> typically be required for the following scenarios:

(1) The proposed action involves dredging that will only impact an open water area where no SAV is present, even if the affected area is EFH. This does <u>not</u> apply to dredging that will: (a) adversely impact open water areas designated as oyster seed grounds by LDWF, or; (b) result in the creation of permanent anoxic conditions in the affected area and the affected area is EFH.

(2) The proposed action involves filling an open water area such that the affected area will <u>not</u> be converted to non-aquatic habitat. This does <u>not</u> apply to: (a) fill activities that will result in the permanent loss of SAV, even though the affected area may remain inter-tidal, or; (b) fill activities that will adversely impact open water areas designated as oyster seed grounds by LDWF.

(3) The proposed action will adversely impact <1 acre within a single open water area (i.e. one impact encompassing <1 acre), even if SAV is present, <u>or</u>; the proposed action will adversely impact multiple open water areas but the total of the impact polygons will affect <1 acre (i.e. cumulative impact is <1 acre), even if SAV is present. This does <u>not</u> apply to actions that will adversely impact: (a) open water areas designated as oyster seed grounds by LDWF; (b) open water areas with SAV and the SAV includes seagrasses; (c) open water areas classified by NMFS as EFH, although there may be limited cases when the stated mitigation exemption may be applied to EFH. The reader is cautioned that the exemption to mitigation requirements addressed in this item may not be applicable to other situations not specifically addressed in (3)(a) through (3)(c). One should coordinate directly with US Fish and Wildlife Service (USFWS) and NMFS regarding specifics of the proposed action before assuming this exemption is applicable.

Mitigation for temporary impacts to open water areas through actions such as excavating (dredging) temporary construction access canals, followed by back-filling of the affected area, may or may not be

required even in cases where SAV, excluding seagrasses, and/or EFH will be impacted. The need for mitigation will be assessed on a case-by-case basis.

Be aware that there could be special circumstances that mandate mitigation of adverse impacts to open water habitats, regardless of the exceptions to mitigation discussed in items (1) through (3) above. Examples include, but are not necessarily limited to: actions that would also adversely affect threatened or endangered species; actions that would also adversely affect federally designated critical habitat; actions that would also adversely affect federally managed species. Another example involves proposed dredging of EFH whereby a substantial acreage of open water habitat lacking SAV will be permanently impacted in such a way that the depth of dredging will preclude colonization by SAV.

Before mitigation will be considered, one should also note that any proposed project that will adversely impact open water habitats will still be subject to demonstrating that all practicable measures to avoid the impact have been taken, that the proposed impact is not avoidable, and that all practicable measures to minimize unavoidable impacts have been taken.

2.2 Type and Location of Mitigation

As a preface to the following discussion, keep in mind that the guidance contained in the Federal Register, Vol. 73, No. 70, Section 332.3(b) concerning the type and location of compensatory mitigation will be applicable to mitigation proposed as compensation for impacts to open water habitats. In general, this guidance indicates that: (a) Mitigation should be within the same watershed as the impact, or, in the case of marine impacts, within the same marine ecological system; (b) The preferential order (i.e. preferred hierarchy) for mitigation is: use of a mitigation bank; use of in-lieu fee program credits; a watershed approach where the goal is to provide the greatest benefits to the watershed (includes on-site mitigation, off-site mitigation, mitigation banks, in-lieu fee program, out-of-kind mitigation); on-site, in-kind mitigation; off-site and/or out-of-kind mitigation.

In general, the preferred method of compensating impacts to open water habitats containing SAV will be in-kind (type-for-type) mitigation through measures such as creation or restoration of SAV beds in existing open water areas or enhancement of open water areas to promote development of SAV beds. However, out-of-kind mitigation in the form of marsh creation, restoration, or enhancement will also be acceptable in most cases. Factors that will be considered in determining whether the mitigation should be in-kind may include, but are not limited to: (a) the relative prevalence of SAV beds within the watershed/basin; (b) the density of SAV species in the area that will be impacted; (c) the persistence of SAV beds in the area that will be impacted (e.g. how persistent SAV cover is during a typical year); (d) the ability to achieve successful in-kind mitigation.

If mitigation will be provided through marsh creation, restoration, or enhancement activities, the marsh should be similar to the predominant marsh type (i.e. fresh, intermediate, brackish, or saline) in the area where the open water impact occurs, provided that this marsh type is capable of replacing most of the functions and values of the affected open water habitat (particularly as regards the fish and wildlife species that could utilize the affected open water habitat). The marsh mitigation feature should include components that allow access to the marsh by fish and other aquatic organisms and must be intertidal. The location of the marsh mitigation feature should be within the same watershed/basin as the impacted habitat.

In some cases, a proposed action that will impact open water habitats may also impact marsh habitats, thereby requiring mitigation for the marsh impact. There may also be cases where the establishment of proposed mitigation features used to compensate for project impacts to non-open water habitats (ex. mitigation for impacts to marsh, swamp, and/or bottomland hardwood habitats) will impact open water habitats. Assuming one or more marsh mitigation features will be included as part of the overall project mitigation plan, the proposed marsh mitigation may be utilized to compensate for the open water habitat impacts as well as for the marsh impacts. In this case, the marsh mitigation feature(s) used as compensation for the open water impacts should be the feature(s) closest to the location of the open water impacts.

3 EVALUATION OF IMPACTS TO OPEN WATER HABITATS

If mitigation of adverse impacts to open water habitats is required, the open water component of the appropriate WVA marsh model will typically be used to determine the net loss of functions and values (net loss of Average Annual Habitat Units or AAHUs) that will result from the impacts. It must be demonstrated that the proposed mitigation for such impacts will fully compensate for the lost functions and values. This will be accomplished through use of the appropriate WVA marsh model (all components of the marsh model if mitigation will be provided via marsh creation, restoration, or enhancement; the open water component of the marsh model if mitigation will be provide via open water habitat creation, restoration, or enhancement). If the net gain in AAHUs that will result from the proposed mitigation is equal to or greater than the net loss of AAHUs that will result from the impact, then it will typically be assumed that the proposed mitigation adequately compensates for the proposed impact.

One should note that impact/mitigation assessment methods other than the WVA methodology may be used. Such methods will need to be approved on a case-by-case basis.

In situations where mitigation of impacts to open water habitats is not required, such impacts must still be quantified, evaluated, and discussed in an appropriate NEPA document. However, WVA models (or other impact assessment methods) will not need to be used as part of the impact evaluation.

Federal Register, Vol. 46, No. 15 (USFWS Mitigation Policy) sets forth guidance concerning how USFWS may make recommendations concerning mitigation. This guidance is not applicable to mitigation for impacts to threatened or endangered species. Within the cited document, four “resource categories” are used to indicate that the level of mitigation recommended will be consistent with the fish and wildlife resource values involved.

In general, USFWS categorization of impacts to open water habitats will be as follows. The reader is cautioned, however, that there may be exceptions to the generalizations that follow; hence, direct coordination with USFWS is always recommended.

Resource Category 4
Impacts to open water bottoms, regardless of depth, with no SAV present (even if the proposed action causes the affected area to become non-tidal). Typically, USFWS would not recommend mitigation for such impacts unless the impact will adversely affect LDWF oyster seed grounds or NMFS requests mitigation for EFH impacts. USFWS would discourage impacts, to the extent feasible, and would advise that measures to minimize impacts to water quality (particularly in the case of proposed borrow areas) be taken as part of the proposed action.

Resource Category 3
Impacts to SAV beds in open water habitats. Typically, USFWS would recommend mitigation for such impacts and would require that appropriate mitigation sequencing be employed (impact avoidance and minimization) prior to considering mitigation. USFWS would seek to ensure the mitigation proposed adequately replaces the lost functions and values that would result from the impact, but would not necessarily require in-kind mitigation as long as there is no net loss of habitat value. USFWS may not require mitigation in cases described under the mitigation exemption described in section 2.1(3).

Resource Category 2
Impacts to SAV beds in open water habitats. Typically, USFWS would recommend mitigation for such impacts and would require that appropriate mitigation sequencing be employed (impact avoidance and minimization) prior to considering mitigation. USFWS would seek to ensure the mitigation proposed adequately replaces the lost functions and values that would result from the impact and would normally require in-kind mitigation. However, it is acknowledged that “in-kind” mitigation may be difficult and somewhat unpredictable compared to marsh mitigation. Therefore, "out-of-kind” mitigation would be accepted, that being marsh creation of the same type as that occurring closest to the impacted site or similar aquatic habitat restoration.

4 WVA MODELS FOR IMPACTS TO OPEN WATER HABITATS

Components of the WVA models for coastal marsh communities will be utilized to determine the net loss of AAHUs that will result from the proposed impacts to existing open water habitats. Note that all of the formulas addressed herein are directly obtained from the document entitled "Coastal Wetlands Planning, Protection and Restoration Act, Wetland Value Assessment Methodology, Coastal Marsh Community Models", dated March 19, 2010. This methodology is presently being considered for interim regional approval by the USACE, with the interim approval period lasting 3 years. It is possible that the WVA Marsh Community Model may ultimately be revised for USACE final certification. Such a revision may alter the formulas set forth below.

The reader is further advised that the guidance that follows indicates one can use either the predominant marsh type present near the area where the open water impact or open water mitigation will occur, or one can use the average annual salinity near the impact/mitigation area to determine which formulas should be used. The average annual salinity should be used only in cases where there are no nearby marsh habitats present. Otherwise, the predominant marsh habitat type should be used to determine the appropriate formulas.

4.1 Habitat Suitability Index (HSI) Formulas for Open Water Habitats

The following formulas will be used to determine Habitat Suitability Index (HSI) values for affected open water areas:

(A) If the majority of nearby marsh habitats are fresh or intermediate marshes and/or the average annual salinity in the affected open water area ranges from 0 to <5 ppt:

$$HSI = [\{ 3.5 \times (SIV_2^3 \times SIV_6)^{(1/4)} \} + (SIV_3 + SIV_4 + SIV_5) / 3] / 4.5$$

(B) If the majority of nearby marsh habitats are brackish marshes and/or the average annual salinity in the affected open water area is ranges from 5 to 16 ppt:

$$HSI = [\{ 3.5 \times (SIV_2^3 \times SIV_6^2)^{(1/5)} \} + (SIV_3 + SIV_4 + SIV_5) / 3] / 4.5$$

(C) If the majority of nearby marsh habitats are saline marshes and/or the average annual salinity in the affected open water area is >16 ppt:

$$HSI = [\{ 3.5 \times (SIV_2^3 \times SIV_6^{2.5})^{(1/3.5)} \} + (SIV_3 + SIV_4 + SIV_5) / 3] / 4.5$$

where $SIV_\#$ is the Suitability Index (SI) value for the indicated model variable ($V_\#$, i.e. variables V_2 through V_6), as determined from applicable suitability index graphs set forth in the marsh community model. V_2 = % SAV cover; V_3 = marsh edge & interspersion; V_4 = % of open water area ≤ 1.5 feet deep; V_5 = mean salinity, in ppt, during the growing season; V_6 = aquatic organism access.

4.2 Benefit Assessment Formulas (AAHU Formulas) for Open Water Habitats

The typical formulas for calculating net AAHUs for marsh habitats are:

(A) Formula for fresh and intermediate marshes:

$$AAHUs = [(2.1 \times (Marsh\ AAHUs)) + (Open\ Water\ AAHUs)] / 3.1$$

(B) Formula for brackish marshes:

$$AAHUs = [(2.6 \times (Marsh\ AAHUs)) + (Open\ Water\ AAHUs)] / 3.6$$

(C) Formula for saline marshes:

AAHUs = [(3.5 x (Marsh AAHUs)) + (Open Water AAHUs)] / 4.5

When evaluating strictly open water habitats, there would be no marsh habitats interspersed within the boundaries of the open water habitats being considered. Given this, the number of marsh AAHUs would be zero and the preceding formulas are reduced to the following when computing the final AAHUs for open water habitats:

(A) If the majority of nearby marsh habitats are fresh or intermediate marshes and/or the average annual salinity in the affected open water area ranges from 0 to <5 ppt:

Final Open Water AAHUs = Open Water AAHUs / 3.1

(B) If the majority of nearby marsh habitats are brackish marshes and/or the average annual salinity in the affected open water area is ranges from 5 to 16 ppt:

Final Open Water AAHUs = Open Water AAHUs / 3.6

(C) If the majority of nearby marsh habitats are saline marshes and/or the average annual salinity in the affected open water area is >16 ppt:

Final Open Water AAHUs = Open Water AAHUs / 4.5

4.3 Example of Using Weighted Averages for Model Variable Input

Conditions may vary considerably within a given open water habitat being evaluated, particularly as regards SAV cover. The following provides an example of using weighted averages to arrive at appropriate SI values when performing WVA analyses for such conditions.

Example Scenario:
Project will impact a single open water area. The overall impact "footprint" (polygon) encompasses 200 acres. Within this footprint, 3 separate areas (polygons A, B, and C) contain SAV whereas the remainder of the footprint area contains no SAV. The water depth varies. Data for impact acreages, SAV cover, and water depth are:

- Polygon A – 10 acres, SAV cover = 90%, water depth = 3 feet.
- Polygon B – 40 acres, SAV cover = 10%, water depth = 1 foot.
- Polygon C – 20 acres, SAV cover = 70%, water depth = 2 feet.
- Polygon D (remainder of overall impact footprint excluding polygons A thru C) – 130 acres, SAV cover = 0%, water depth = 3 feet.

Assuming the WVA analysis will only be run for the areas containing SAV (a total of 70 acres), weighted averages would be as follows:

- V2 (% SAV) = [(90% x 10/70) + (10% x 40/70) + (70% x 20/70)] = 38.6% weighted avg. SAV cover.
- V4 (% Open Water ≤1.5 feet deep) = [(0% x 10/70) + (100% x 40/70) + (0% x 20/70)] = 57% weighted avg. open water ≤1.5 feet deep.

If the WVA analysis will be run for the entire impact footprint, weighted averages would be as follows:

- V2 (% SAV) = [(90% x 10/200) + (10% x 40/200) + (70% x 20/200) + (0% x 130/200)] = 13.5% weighted avg. SAV cover.
- V4 (% Open Water ≤1.5 feet deep) = [(0% x 10/200) + (100% x 40/200) + (0% x 20/200) + (0% x 130/200)] = 20% weighted avg. open water ≤1.5 feet deep.

APPENDIX E

DRAFT SUPPLEMENTAL PROGRAMMATIC INDIVIDUAL ENVIRONMENTAL REPORT (SPIER) 37a

MONITORING PLAN AND SUCCESS CRITERIA

PROTECTED SIDE BOTTOM LAND HARDWOOD FORESTS

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INTRODUCTION

This document follows the monitoring and success criteria guidelines developed for the West Bank and Vicinity Hurricane Storm Damage and Risk Reduction System (HSDRRS) Mitigation Program. The guidelines were developed by the U.S. Army Corps of Engineers (USACE) in coordination with an Interagency Team and the non-Federal project sponsor (NFS). The original general guidelines for plantings, success criteria, and monitoring were included as Appendix L in PIER 37 and are included here by reference. This appendix outlines the refined project specific monitoring, reporting and success criteria for the mitigation features included in SPIER 37a. The specific mitigation features are fully described in SPIER 37a and include the following:

- Protected Side Bottomland Hardwoods (BLH) Dry
    - Mitigation Banks
    - Avondale Gardens

It should be noted that even though the proposed mitigation actions under SPIER 37a include the potential purchase of credits from a mitigation bank this appendix only details the project specific information for the constructible mitigation features at Avondale. In the event that mitigation bank credits are purchased the mitigation success criteria, mitigation monitoring and reporting requirements, and mitigation management and maintenance activities for will be set forth in the Mitigation Banking Instrument (MBI) for each particular bank. The bank sponsor (bank permittee) will be responsible for these activities rather than the USACE and/or the local Sponsor. USACE Regulatory staff will review the mitigation bank monitoring reports and conduct periodic inspections of mitigation banks to ensure compliance with mitigation success criteria stated in the MBI.

The proposed mitigation actions under SPIER 37a at Avondale Gardens site include construction of BLH habitat with the NFS responsible for operation and maintenance of functional portions of work as they are completed. On a cost shared basis, the USACE will monitor completed the mitigation to determine whether additional construction, invasive species control and/or plantings are necessary to achieve mitigation success. The USACE will undertake additional actions necessary to achieve mitigation success in accordance with cost sharing applicable to the project and subject to the availability of funds. Once the USACE determines that the mitigation has achieved initial success criteria, monitoring will be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, USACE will consult with other agencies and the NFS to determine whether operational changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve ecological success, USACE will implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost sharing requirements, availability of funding, and current budgetary and other guidance.

The respective responsibilities for the construction, monitoring and maintenance of the mitigation features at Avondale Gardens:

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1. Construction and planting (the "construction phase") - performed by the USACE per applicable cost-sharing;

2. After construction and planting, the USACE issues Notice of Construction Complete (NCC) and provides the Operation, Maintenance, Repair, Replacement, and Rehabilitation manual to the NFS (the "O&M phase");

3. Notwithstanding NCC, the USACE will monitor the project on a cost-shared basis until it reaches its Initial Success Criteria;

4. If, after NCC but before Initial Success Criteria are achieved, the project needs additional construction, invasive species control or planting, the USACE will perform these items subject to applicable cost-sharing and availability of funds;

5. After Initial Success Criteria are achieved, the NFS will monitor project;

6. If, after Initial Success Criteria are achieved, there is a problem that can be corrected through a change in operation, the NFS will be responsible to change its operation of the project; and

7. If, after Initial Success Criteria are achieved, there is a problem that requires structural changes, USACE will implement adaptive management according to applicable cost-sharing and subject to availability of funds.

MITIGATION SUCCESS CRITERIA

The success criteria for the BLH project feature was initially included in the PIER Appendix L and are presented below and summarized in Table 1.

Success Criteria-Bottomland Hardwood Forest Enhancement- Avondale Gardens

The success (performance) criteria for BLH-Dry (Avondale Gardens) habitats are included.

1. General Construction

A. Complete all necessary initial earthwork and related construction activities in accordance with the mitigation work plan as well as the final project plans and specifications. These requirements classify as initial success criteria.

2. Native Vegetation

A. Complete initial planting of canopy and midstory species in accordance with the authorized initial planting plan described in PIER 37 Appendix L and SPEIR 37a Appendix I. This requirement classifies as an initial success criterion.

B. 1 Year Following Completion of Initial Plantings (at end of first growing season following the year plants are first installed) –

- Achieve a minimum average survival of 50 percent of planted canopy species (i.e. achieve a minimum average canopy species density of 269 seedlings/ac.). The surviving plants must approximate the species composition and the species percentages specified in the initial plantings component of the Mitigation Work Plan. These criteria would apply to the initial plantings as well as any subsequent replantings necessary to achieve this initial success requirement.
- Achieve a minimum average survival of 80% of planted midstory species (i.e. achieve a minimum average midstory species density of 108 seedlings/ac.). The surviving plants must approximate the species composition percentages specified in the initial plantings component of the Planting Plan. These criteria will apply to the initial plantings as well as any subsequent replantings necessary to achieve this initial success requirement.

C. 4 Years Following Completion of Initial Plantings –

- Achieve a minimum average density of 269 living native canopy species per acre (planted trees and/or naturally recruited native canopy species).
- Achieve an average cover of 60% living, native, hard mast-producing species and 40% living soft-mast producing species in the canopy stratum (planted trees and/or naturally recruited native canopy species). These criteria will thereafter remain in effect for the duration of the overall monitoring period. Modifications to these criteria could be necessary for reasons such as avoidance of tree thinning if thinning is not warranted and the long-term effects of sea level rise on tree survival. Proposed modifications must first be approved by the USACE in coordination with the Interagency Team.
- Achieve a minimum average density of 75 living native midstory species per acre (planted midstory and/or naturally recruited native midstory species).
- The requirements above classify as intermediate success criteria; with the exception that the requirement to demonstrate vegetation satisfies the USACE hydrophytic vegetation criteria throughout the duration of the overall monitoring period classifies as a long-term success criterion.

D. Within 10 Years Following Completion of Initial Plantings –

- Attain a minimum average canopy cover of 80% by planted canopy species and/or naturally recruited native canopy species. This criterion will thereafter remain in effect for the duration of the overall monitoring period. This requirement to meet the specified minimum average cover within 10 years following completion of initial plantings classifies as an intermediate success criterion. The requirement to meet the specified minimum average cover for the duration of the overall monitoring period classifies as a long-term success criterion.

E. 15 Years Following Completion of Initial Plantings –

- Average cover by native species in the midstory stratum must be greater than 20%. This criterion will thereafter remain in effect for the duration of the overall monitoring period. This requirement classifies as intermediate and long term success criteria.

  Note: The requirement that the above criteria remain in effect for the duration of the overall monitoring period may need to be modified later due to factors such as the effect

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of sea level rise on vegetative cover. Proposed modifications must first be approved by the USACE in coordination with the Interagency Team.

3. Invasive and Nuisance Vegetation

A. Complete the initial eradication of invasive and nuisance plant species. This requirement classifies as an initial success criterion.

B. Maintain all areas such that they are essentially free from invasive and nuisance plant species immediately following a given maintenance event and such that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5 percent of the total average plant cover during periods between maintenance events. Note -These criteria must be satisfied throughout the duration of the overall monitoring period. Until such time that monitoring responsibilities are transferred from the USACE to the NFS, this requirement classifies as an initial success criterion. Following the transfer of monitoring responsibilities, this requirement classifies as a long-term success criterion.

4. Topography

A. Following completion of initial construction activities, demonstrate that at least 80% of the total area within each feature is within approximately 0.5 feet of the proposed target soil surface elevation (e.g. the desired soil surface elevation). This requirement classifies as an initial success criterion.

5. Thinning of Native Vegetation (Timber Management)

The USACE, in cooperation with the Interagency Team, may determine that thinning of the canopy and/or midstory strata is warranted to ensure the achievement of success criteria within the plan. This determination would be made approximately 15 to 20 years following completion of initial plantings. If, under normal climatic conditions, two or more successive monitoring reports do not indicate average growth rates for the species installed and site conditions are being achieved then remedial actions will be discussed with the resource agencies. If it is decided that timber management efforts are necessary, the NFS would develop a Timber Stand Improvement/Timber Management Plan, and associated long-term success criteria, in coordination with the USACE and Interagency Team. Following approval of the plan, the NFS would perform the necessary thinning operations and demonstrate that these operations have been successfully completed. Timber management activities would only be allowed for the operations that have been successfully completed.

Reference Table 2. Desired stand conditions for bottomland hardwood forests within the MS Alluvial Valley. (Page 23) in the following Handbook:

LMVJV Forest Resource Conservation Working Group. 2007. Restoration. Mangement, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat. Edited by R. Wilson, K. Ribbeck, S. King, and D. Twedt.

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Table 1. Summary of Standard BLH Success Criteria

Performance Categories	**Mitigation Success Criteria BLH at Avondale Gardens**	
Mitigation Construction	Criteria 1A: Complete necessary initial earthwork and construction activities.	
Native Vegetation	Criteria 2A: Complete initial plantings. Criteria 2B: 1 year after initial plantings achieve: • Survival of ≥50% canopy species. • Survival of ≥80% midstory species. Criteria 2C: 4 years after initial plantings achieve: • ≥269 living native canopy species per acre. • 60% living, native hard mast trees per acre in the canopy stratum. • 40% living soft mast species in the canopy stratum. • 75 living native midstory species per acre • If applicable in final design BLH-wet must meet hydrophytic vegetation criteria. Criteria 2D: Within 10 years after initial plantings, achieve: ≥80% coverage by native canopy species. Criteria 2E: 15 years after initial plantings, achieve: • >20% cover by native midstory species.	
Invasive and Nuisance Vegetation (INV)	Criteria 3A. Complete initial Eradication of INV. Criteria 3B. Maintain <5% cover by INV.	
Topography	Criteria 4A: After completion of construction, ≥ 80% of total area must be within 0.5 ft of target elevation.	
Thinning of Native Vegetation	Criteria 5: TBD; at 15 to 20 years following initial plantings PDT will determine if thinning of canopy and midstory strata is warranted.	

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Hydrology	Criteria 6A: Ground surface elevations must be conducive to establishment and support of hydrophytic vegetation, and re-establishment and maintenance of hydric soil characteristics. Criteria 6B: 2 years following attainment of survivorship criteria, demonstrate wetland hydrology has been reestablished.	

MITIGATION MONITORING GUIDELINES

Reference Document for Monitoring

All project monitoring would follow the procedures detailed within this monitoring plan in concert with the procedures outlined in the following document: A Standard Operating Procedures Manual for the Coast-wide Reference Monitoring System (CRMS)– Wetlands: Methods for Site Establishment, Data Collection, and Quality Assurance/Quality Control, prepared by the Louisiana Coastal Protection and Restoration Authority, January 27, 2012. The referenced document is specific to coastal Louisiana wetlands and provides very detailed methodology for conducting field. The detailed methods provided in the CRMS Standard Operating Procedures Manual are incorporated by reference and are intended to supplement the procedures documented within this monitoring plan.

Bottomland Hardwood Forest Enhancement- Avondale Gardens

Baseline Monitoring Report

The mitigation site would be monitored and a baseline monitoring report prepared after final construction is complete. See Table 2. Monitoring and reporting requirements for the baseline report include the following items:

A. A detailed discussion of all mitigation activities completed.

B. A description of the various features and habitats within the mitigation site.

C. A plan view drawing of the mitigation site showing the approximate boundaries of the mitigation features (ex. planted areas, areas only involving eradication of invasive and nuisance plant species; surface water management features, etc.), monitoring plots, monitoring transect locations, sampling quadrats locations, photo station locations and, if applicable, piezometer and staff gage locations. The proposed locations for the permanent monitoring transect locations, sampling plot locations, quadrats, photo station locations, and piezometer and staff gage locations will be identified once the final designs for the mitigation site are completed. The final locations will be determined and documented during the initial site visit and baseline monitoring report. Once finalized the final monitoring design will need to be coordinate with the USACE. If available aerial imagery of the mitigation site will also be included.

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D. An as-built survey of finished grades for any relatively large areas subject to topographic alterations and an as-built survey of any surface water drainage features, drainage culverts, and/or water control structures constructed. Detailed surveys of topographic alterations simply involving the removal of existing linear features such as berms/spoil banks, or involving the filling of existing linear ditches or canals, will not be required. However, the as-built survey will include spot cross-sections of such features sufficient to represent typical conditions. The as-built survey must include a survey of areas where existing berms, spoil banks, or levees have been breached in sporadic locations.

E. A detailed inventory of all canopy and midstory species planted, including the number of each species planted and the stock size planted. In addition, provide a breakdown itemization indicating the number of each species planted in a particular portion of the mitigation site and correlate this itemization to the various areas depicted on the plan view drawing of the mitigation site.

F. Photographs documenting conditions in the mitigation feature at the time of monitoring would be included. Photos would be taken at permanent photo stations within the mitigation feature. The number of photo stations required as well as the locations of these stations will vary depending on the mitigation site and will be determined once the specific mitigation features for BLH within the Avondale Gardens site have been identified. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in an updated monitoring plan. At least two photos would be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next.

G. Various qualitative observations would be made in the mitigation site to help assess the status and success of mitigation and maintenance activities. These observations would include: General estimate of the average percent cover by native plant species; general estimates of the average percent cover by invasive and nuisance plant species; general observations concerning colonization of the mitigation site by volunteer native plant species; general condition of native vegetation; trends in the composition of the plant community; wildlife utilization as observed during monitoring; observations regarding general surface inundation indicators. General observations made during the course of monitoring would also address potential problem zones and other factors deemed pertinent to the success of the mitigation program.

H. A summary assessment of all data and observations along with recommendations as to actions necessary to help meet mitigation and management/maintenance goals and mitigation success criteria.

I. A brief description of anticipated maintenance/management work to be conducted during the period from the current monitoring report to the next monitoring report.

<u>Additional Monitoring Reports</u>

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All monitoring reports generated after the initial baseline report as indicated in Table 2 would provide the following information unless otherwise noted:

J. All items listed for the baseline monitoring report with the exception of: (a) the topographic/as-built survey, unless additional topographic/as-built surveys are available; (b) the inventory of planted species; although such an inventory must be provided in any monitoring report generated for a year in which a feature is re-planted to meet applicable success criteria.

K. Quantitative plant data collection and results. Methodology includes a combination of various sized plots for measuring the canopy, midstory, and understory/groundcover.

- Permanent Plots: Quantitative plant data collected from permanent monitoring plots measuring approximately 90 feet X 90 feet in size or from circular plots having a radius of approximately 53 feet. The permanent monitoring plots will be located within mitigation areas where initial planting of canopy and midstory species is necessary. Whichever method is chosen for the initial monitoring report must be followed for all subsequent reports. The number of plots necessary as well as the location and length of each transect will vary depending on the mitigation site will be determined once the specific mitigation features have been identified.

  - Data recorded in each permanent plot will include:
    - number of living planted canopy species present and the species composition;
    - number of living planted midstory species present and the species composition;
    - average density of all native species in the canopy stratum,
    - the total number of each species present the canopy stratum,
    - the wetland indicator status of each species the canopy stratum;
    - average cover by native species in the canopy stratum;
    - average density of all native species in the midstory stratum,
    - the total number of each species present midstory stratum,
    - and the wetland indicator status of each species midstory stratum;
    - average cover by native species in the midstory stratum
    - average percent cover accounted for by invasive plant species (all vegetative strata combined)
    - average percent cover accounted for by nuisance plant species (all vegetative strata combined).

- Transects: Quantitative plant data collected from either: (1) permanent transects sampled using the point-centered quarter method with a minimum of 20 sampling points established along the course of each transect, or; (2) permanent belt transects approximately 50 feet wide. The methodology chosen for the initial monitoring report must be followed for all subsequent reports. The number of transects necessary as well as the location and length of each transect will vary

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depending on the mitigation site and will be determined once the specific mitigation features have been identified.

Data recorded from the sampling transects will include:

- average density of living planted canopy species present and the species composition;
- average density of living planted midstory species present and the species composition;
- average density of all native species in the canopy stratum along with the species composition and the wetland indicator status of each species;
- average percent cover by all native species in the canopy stratum; average height of native species in the canopy stratum;
- average density of native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species;
- average percent cover by native species in the midstory stratum;
- average height of native species in the midstory stratum;
- if present, average percent cover accounted for by invasive species present in the canopy and midstory strata (combined).

- Quadrats: Quantitative data concerning plants in the understory (ground cover) stratum and concerning invasive and nuisance plant species will be gathered from sampling quadrats. These sampling quadrats will be established either along the axis of the belt transects discussed above, or at sampling points established along point-centered quarter transects discussed above, depending on which sampling method is used. Each sampling quadrat will be approximately 2 meters X 2 meters in size. The methodology chosen for the initial monitoring report must be followed for all subsequent reports. The number of quadrats necessary as well as the location and length of each quadrat will vary depending on the mitigation site and will be determined once the specific mitigation features for BLH have been identified.

  Data recorded from the sampling quadrats will include:

  - average percent cover by native subcanopy species;
  - composition of native subcanopy species and the wetland indicator status of each species;
  - average percent cover by invasive plant species;
  - average percent cover by nuisance plant species.

L. A brief description of maintenance and/or management work performed since the previous monitoring report along with a discussion of any other significant occurrences would be included.

M. A summary of water elevation data (NAVD88 or current) collected from a water level recorder in the same immediate hydrologic area of the mitigation site. As determined by the USACE and the IET, if a nearby Coastwide Reference Monitoring System

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[CRMS] station is available, its data may be used. If no CRMS station is available, a data logger must be installed immediately adjacent to the project. Water level data will be collected to provide average annual mean, high and low water levels as determined by the USACE and the IET. Once hydrology success criteria have been satisfied, water level monitoring will no longer be required. However, monitoring reports generated subsequent to the attainment of success criteria will include a general discussion of water levels and hydroperiod based on qualitative observations (e.g., wrack lines, water marks, etc.) and CRMS or other publicly available water level data in the same immediate hydrologic area.

N. A brief description of maintenance and/or management work performed since the previous monitoring report along with a discussion of any other significant occurrences would be included.

O. In addition to the above items, the monitoring report prepared upon completion of the final mitigation construction activities and the monitoring report prepared for 3 years following completion of final mitigation construction activities would include a topographic survey of each restoration feature. These surveys would cover the same components as described for the topographic survey conducted for the baseline monitoring report. In addition to the surveys themselves, each of the two monitoring reports involving topographic surveys would include an analysis of the data as regards attainment of applicable topographic success criteria. If the second survey indicates topographic success criteria have not been achieved and supplemental topographic alterations are necessary, then another topographic survey may be required following completion of the supplemental alterations. This determination would be made by the USACE in coordination with the Interagency Team and NFS.

P. Re-planting of certain areas within the mitigation site may be necessary to ensure attainment of applicable native vegetation success criteria. Any monitoring report submitted following completion of a re-planting event must include an inventory of the number of each species planted and the stock size used. It must also include a depiction of the areas re-planted, cross-referenced to a listing of the species and number of each species planted in each area.

<u>Monitoring Reports Involving Timber Management Activities</u>

In cases where timber management activities (thinning of trees and/or shrubs in the canopy and/or midstory strata) have been approved by the USACE in coordination with the Interagency Team, monitoring would be required in the year immediately preceding and in the year following completion of the timber management activities (i.e. pre-timber management and post-timber management reports). These reports must include data and information that are in addition to the typical monitoring requirements. The NFS's proposed Timber Stand Improvement/Timber Management Plan must include the proposed monitoring data and information that would be included in the pre-timber management and post-timber management monitoring reports. The proposed monitoring plan must be approved by the USACE in coordination with the Interagency Team prior to the monitoring events and implementation of the timber management activities.

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Monitoring Reports Following Re-Planting Activities

Re-planting of certain areas within the mitigation site may be necessary to ensure attainment of applicable native vegetation success criteria. Any monitoring report submitted following completion of a re-planting event must include an inventory of the number of each species planted and the stock size used. It must also include a depiction of the areas re-planted, cross-referenced to a listing of the species and number of each species planted in each area.

MONITORING SCHEDULE, RESPONSIBILITIES AND COSTS

Bottomland Hardwood Forest Enhancement- Avondale Gardens

Monitoring for BLH will typically take place in late summer of the year of monitoring, but may be delayed until later in the growing season due to site conditions or other unforeseen circumstances. Monitoring reports will be submitted by December 31 of each year of monitoring. Monitoring reports will be provided to the USACE, the NFS, and the agencies comprising the Interagency Team. See Table 2 and 3 for a schedule of the currently proposed monitoring events. The timing of these events may be modified or shifted once the final project design and construction schedule have been identified.

The USACE will be responsible for conducting the monitoring events and preparing the associated monitoring reports until such time that the following mitigation success criteria are achieved (criteria follow numbering system used in success criteria section):

1. General Construction – 1.A
2. Native Vegetation – 2.A and 2.B.
3. Invasive & Nuisance Vegetation – 3A, plus 3B until such time as monitoring responsibilities are transferred to the NFS.
4. Topography – 4A

Monitoring events associated with the above will include the first or baseline monitoring event plus annual monitoring events thereafter until the monitoring responsibilities are transferred to the NFS. The NFS will be responsible for conducting the required monitoring events and preparing the associated monitoring reports after the USACE has demonstrated the mitigation success criteria listed above have been achieved. The issuance of Notice of Construction Complete and the transfer of monitoring duties to the NFS should typically occur during the first quarter of the year immediately following submittal of the monitoring report that demonstrates attainment of the relevant performance criteria, subject to the provisions identified in the Introduction section.

Once monitoring duties have been transferred to the NFS, the next monitoring event will typically take place during the year that attainment of success criterion 2.C (native vegetation criterion applicable 4 years after completion of initial plantings) must be demonstrated. Thereafter, monitoring will typically be conducted every 5 years throughout the 50-year period of analysis. See Table 2 and 3 for the currently proposed monitoring events. The timing of these events may be shifted once the final project design and construction schedule have been identified.

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If the initial survival criteria for planted canopy and midstory species are not achieved (i.e. the 1-year survival criteria specified in native vegetation success criteria 2.B), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that all survival criteria have been satisfied (i.e. that corrective actions were successful). The USACE will conduct this additional monitoring and prepare the monitoring reports. The USACE will also purchase and install any supplemental plants needed to attain this success criterion, subject to the provisions mentioned in the Introduction section.

If the native vegetation success criteria specified for 4 years following completion of initial plantings are not achieved (i.e. native vegetation success criteria 2.C), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that these criteria have been satisfied. The NFS will be responsible for conducting this additional monitoring and preparing the monitoring reports.

Once monitoring responsibilities have transferred to the NFS, the NFS will retain the ability to modify the monitoring plan and the monitoring schedule should this become necessary due to unforeseen events or to improve the information provided through monitoring. Twenty years following completion of initial plantings, the number of monitoring plots and/or monitoring transects that must be sampled during monitoring events may be reduced substantially if it is clear that mitigation success is proceeding as anticipated. Any significant modifications to the monitoring plan or the monitoring schedule must first be approved by the USACE in coordination with the Interagency Team.

Table 2 and 3 provides a cost estimate based on the currently available information and may need to be revised in the future as additional information regarding the mitigation feature designs and construction schedule become available.

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Table 2. Mitigation Monitoring Report Schedule and Costs for BLH Enhancement at Avondale Gardens

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Target Year	**Work Item**	**Work Item Description**	**Estimated Cost**
0	Begin Construction	Start of mitigation construction activities	
1	Complete Construction	Finish clearing, grubbing, grading (excavation; ditch & berm removal), drainage alterations, etc.	
	Topographic/As-Built Survey	Perform as-built topographic survey of areas in enhancement. Includes survey of any structures installed plus cross-sections of significant ditches or berms removed, and for any new drainage features. Results documented in mitigation monitoring report.	
	Invasive/Nuisance Plant Eradication	Initial eradication of invasive and nuisance plant species in enhancement features. Ground application.	
	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
2	Initial Plantings*	Install canopy and midstory species	
	Nutria Guards*	Install nutria guards for all initial plantings.	
	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	
3	Topographic/As-Built Survey	Perform as-built topographic survey of areas in enhancement. Includes survey of any structures installed plus cross-sections of significant ditches or berms removed, and for any new drainage features. Results documented in mitigation monitoring report.	
	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
	Analysis for Notice of Construction Complete	Review As-Builts and O&M manual.	
	NCC	Issue Notice of Construction Complete to the Non-Federal Sponsor. The USACE will continue to monitor and conduct activities necessary to ensure initial success criteria are met	
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	
4	Additional Plantings*	Re-plant restoration features where plant survival success criteria not achieved	
	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
	Monitoring & Report*	Perform field mitigation monitoring. Submit report by Dec. 31. This monitoring required only if area had to be replanted in TY4 per success criteria requirements.	
	Review and Coordination	Review monitoring report from prior year and other data as compared to success criteria. Coordination with Interagency Team as needed.	
5	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31. Report also accomplished added monitoring needed due to re-planting.	
	Review and Coordination	Review monitoring report from prior year and other data as compared to success criteria. Coordination with Interagency Team as needed.	
6	Analysis for Success Criteria	Review monitoring report from prior year and other data to make initial success criteria determination and whether additional actions needed.	

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	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
7	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	
	Analysis for satisfaction of initial success criteria.	Review monitoring report from prior year and other data to make initial success criteria determination.	
	NFS Monitoring	Non-Federal Sponsor assumes monitoring responsibility. Note: transfer occurs early this year unless topographic corrections and/or additional plantings required.	
10	Invasive/Nuisance Plant Eradication`	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
12	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748
	Review and Coordination	Review monitoring report from TY12 and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
17	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$140,387
	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
22	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748
	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
27	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748
	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
32	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748
	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
37	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748
	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
42	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748

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	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
47	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748
	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
52	Invasive/Nuisance Plant Eradication	Follow-up eradication of invasive and nuisance plant species in enhancement features. Ground application.	$200,000
	Monitoring & Report	Perform field mitigation monitoring. Submit report by Dec. 31.	$121,748
	Review and Coordination	Review monitoring report and other data as compared to success criteria. Coordination with Interagency Team as needed.	$5,000
		TOTAL	$8,502,655
		TOTAL + 15% Contingency	$9,778,053
NOTES			
*The costs for topographic/as-built surveys needed for monitoring may not all be included in the cost for the "monitoring and report" events and may be covered by some engineering costs.			
*Cost for initial plantings should already be in Engineering's cost estimate; thus not repeated herein. *Assume mitigation features will require 1 re-planting event to meet vegetation success criteria. For cost, assume that 20% of the total quantity of plants used in the initial planting will be the quantity needed for re-planting.			
*The contract to obtain plants for initial planting will need to be issued at least 13 to 14 months prior to the date that plants will be installed since the plants must be 1 year old at the time of installation (must start growing the plants at the nursery). *Some costs savings maybe found by combining the BLH and Swamp monitoring under this SPIER. Those potential cost saving are not estimated within this document.			

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APPENDIX F

DRAFT SUPPLEMENTAL PROGRAMMATIC INDIVIDUAL ENVIRONMENTAL REPORT (SPIER) 37a

ADAPTIVE MANAGEMENT

PROTECTED SIDE BOTTOM LAND HARDWOOD FORESTS

1.0. Introduction

This Adaptive Management (AM) Plan is for the Avondale Gardens mitigation site included in SPIER 37a which is designed to mitigate for bottomland hardwood impacts. The mitigation feature is fully described in SPIER 37a. The Water Resources Development Act (WRDA) of 2007, Section 2036(a) and U.S Army Corps of Engineers (USACE) implementation guidance for Section 2036(a) (CECW-PC Memorandum dated August 31, 2009: "Implementation Guidance for Section *2036 (a) of the Water Resources Development* Act of 2007 (WRDA 2007) – Mitigation for Fish and Wildlife and Wetland Losses") require adaptive management be included in all mitigation plans for fish and wildlife habitat and wetland losses. Full descriptions of the mitigation projects are included in the Supplemental Individual Environmental Report (SPIER) 37a.

It should be noted that even though the proposed mitigation actions under SPIER 37a include the potential purchase of credits from a mitigation bank this appendix only details the Adaptive Management planning for the constructible mitigation features at Avondale Gardens. In the event that mitigation bank credits are purchased the mitigation management and maintenance activities for the mitigation bank credits will be set forth in the Mitigation Banking Instrument (MBI) for each particular bank. The bank sponsor (bank permittee) will be responsible for these activities rather than the USACE and/or the local Sponsor. USACE Regulatory staff reviews mitigation bank monitoring reports and conducts periodic inspections of mitigation banks to ensure compliance with mitigation success criteria stated in the MBI.

2.0. Adaptive Management Planning

Initial adaptive management planning was conducted during the planning process for the SPIER 37a. Adaptive management planning elements included: 1) development of a Conceptual Ecological Model (CEM), 2) identification of key project uncertainties and associated risks, 3) evaluation of the mitigation projects as a candidate for adaptive management and 4) the identification of potential adaptive management actions (contingency plan) to better ensure the mitigation project meets identified success criteria. The adaptive management plan is a living document and will be refined as necessary as new mitigation project information becomes available.

2.1. Conceptual Ecological Model

A CEM was developed to identify the major stressors and drivers affecting the proposed mitigation projects under SPIER 37a (see Table 1). The CEM does not attempt to explain all possible relationships of potential factors influencing the mitigation sites; rather, the CEM presents only those relationships and factors deemed most relevant to obtaining the required acres/average annual habitat units (AAHUs). Furthermore this CEM represents the current understanding of these factors and will be updated and modified, as necessary, as new information becomes available.

Table 1. Conceptual Ecological Model

Alternatives/Issues/Drivers	Protected Side BLH Avondale Gardens	Mitigation Banks
Freshwater Input	+/-	*
Salinity Impacts	-	*
Subsidence	-	*
Sea Level Rise	-	*
Runoff	-	*
Vegetative Invasive Species	-	*
Herbivory	-	*
Hydrology	+/-	*
Topography (elevation)	+/-	*

Key to Cell Codes:
- = Negative Impact/Decrease
+ = Positive Impact/Increase
+/- = Duration Dependent
*Issues and drivers assumed to be addressed by Mitigation Bank sponsors

2.2. Sources of Uncertainty and Associated Risks

A fundamental tenet underlying adaptive management is decision making and achieving desired project outcomes in the face of uncertainties. There are many uncertainties associated with restoration of the coastal systems. The project delivery team identified the following uncertainties during the planning process.

A. Climate change, such as relative sea level rise, drought conditions, and variability of tropical storm frequency, intensity, and timing
B. Subsidence and water level trends at the mitigation sites
C. Uncertainty Relative to Achieving Ecological Success:
    i. Water, sediment, and nutrient requirements for BLH and Swamp
    ii. Magnitude and duration of wet/dry cycles for BLH and Swamp
    iii. Nutrients required for desired productivity for BLH and Swamp
    iv. Growth curves based on hydroperiod and nutrient application for BLH and Swamp
    v. Tree litter production based on nutrient and water levels for BLH and Swamp
    vi. Tree propagation in relation to management/regulation of hydroperiod for BLH

D. Loss rate of vegetative plantings due to herbivory
E. Long-Term Sustainability of Project Benefits

2.3. Adaptive Management Evaluation

As part of PIER 37 and SPIER 37a the project sites were evaluated and planned through the AEP to develop a project with minimal risk and uncertainty. The items listed below were incorporated into the mitigation project implementation plan and Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) plans to minimize project risks.

- Specified success criteria (i.e., mitigation targets)
- Detailed planting guidelines for BLH and Swamp
- Invasive species control
- Supplementary plantings as necessary (contingency)
- Corrective actions to meet topographic and hydrologic success as required (contingency)

Subsequently, as part of the adaptive management planning effort the mitigation project features were re-evaluated against the CEM and sources of uncertainty and risk were identified to determine if there was any need for additional actions and costs under the adaptive management plan to ensure that the project meets the required success criteria. Based on the uncertainties and risks associated with the project implementation the following contingency actions have been identified to be implemented if needed to ensure the required AAHUs are met.

Potential Action #1. Additional vegetative plantings as needed to meet identified success criteria.

Uncertainties addressed: A,B,C,D, E

Potential Action #2. Additional earthwork at mitigation sites (by adding sediment or degrading) to obtain elevations necessary for BLH vegetative establishment and maintenance.

Uncertainties addressed: A,B,C,E

Potential Action #3. Invasive species control to ensure survival of native species and meet required success criteria.

Uncertainties addressed: E

Actions 1 and 3 are not recommended as separate adaptive management actions since they are already built into the mitigation plan and success criteria identified in Appendix E. In the event that monitoring reveals the project does not meet the identified vegetation, or hydrologic success criteria, additional plantings or construction activities are already accounted for and would be conducted under the mitigation project. Specific measures to implement Action 2, if determined necessary to achieve project benefits, would be coordinated with the NFS and other agencies to determine the appropriate course of action. If it is determined that the project benefits are significantly compromised because of improper elevation, additional fill material may need to be pumped into or removed from the project area. Due to the impact the addition of fill to the

mitigation projects once they have been planted would incur, lifts to the projects are not currently considered as a viable remedial action. Instead, increasing the size of the existing mitigation project or mitigating the outstanding balance of the mitigation requirement elsewhere or through the purchase of mitigation bank/ILF credits would be options that could be considered through additional coordination with the NFS and the IET. However, such options would have to undergo further analysis in a supplemental NEPA document.

Action 2 is potentially a very costly action. Before implementing such an action, the Corps would coordinate with the NFS and other agencies to determine if other actions, such as purchasing of credits in a mitigation bank or building additional mitigation elsewhere, would be more cost-effective options to fulfill any shortfalls in the overall project success. The USACE would be responsible for performing any necessary corrective actions subject to availability of funding, but the overall cost would be shared with the NFS according to the project cost-share agreement.

The USACE would be responsible for the proposed mitigation construction and would monitor the project until the initial success criteria are met. Initial construction and monitoring would be funded in accordance with all applicable cost-share agreements with the NFS. The USACE would monitor (on a cost-shared basis) the completed mitigation to determine whether additional construction, invasive/nuisance plant species control, and/or plantings are necessary to achieve initial mitigation success criteria. Once the USACE determines that the mitigation has met the initial success criteria, monitoring would be performed by the NFS as part of its OMRR&R obligations. If after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, the USACE would consult with other agencies and the NFS to determine the appropriate management or remedial actions required to achieve ecological success. The USACE would retain the final decision on whether or not the project's required mitigation benefits are being achieved and whether or not remedial actions are required. If structural changes are deemed necessary to achieve ecological success, the USACE would implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost-sharing requirements, availability of funding, and current budgetary and other guidance.

APPENDIX G

PROTECTED SPECIES PROTECTION MEASURES

Manatee and Pallid Sturgeon Best Management Practices

Manatees: All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 ft of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the Louisiana Department of Wildlife and Fisheries (LDWF), Natural Heritage Program (225/765-2821).

Pallid sturgeon: All contract personnel associated with the project would be informed of the potential presence of Pallid sturgeon. When lowering the ladder, the pumping rate should be reduced to the slowest speed feasible while the cutterhead is being lowered to the channel bottom. The cutterhead should remain completely buried in the channel bottom during dredging operations. If pumping water through the cutterhead is deemed necessary to dislodge material, or to clean the pumps, the pumping rate should be reduced to the lowest rate feasible while raising the ladder until the cutterhead is at least at mid-depth at which point the pumping rate can then be increased Dredging for borrow would occur via hydraulic cutterhead dredge. Entrainment of Pallid sturgeon is not expected since hydraulic dredges are slow moving and use of them is not known to impact this species. As such, no direct impacts to Pallid sturgeon are anticipated.

NATIONAL BALD EAGLE MANAGEMENT GUIDELINES

U.S. Fish and Wildlife Service

May 2007

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INTRODUCTION

The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The MBTA and the Eagle Act protect bald eagles from a variety of harmful actions and impacts. The U.S. Fish and Wildlife Service (Service) developed these National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. A variety of human activities can potentially interfere with bald eagles, affecting their ability to forage, nest, roost, breed, or raise young. The Guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act.

The Guidelines are intended to:

(1) Publicize the provisions of the Eagle Act that continue to protect bald eagles, in order to reduce the possibility that people will violate the law,

(2) Advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles, and

(3) Encourage additional nonbinding land management practices that benefit bald eagles (see Additional Recommendations section).

While the Guidelines include general recommendations for land management practices that will benefit bald eagles, the document is intended primarily as a tool for landowners and planners who seek information and recommendations regarding how to avoid disturbing bald eagles. Many States and some tribal entities have developed state-specific management plans, regulations, and/or guidance for landowners and land managers to protect and enhance bald eagle habitat, and we encourage the continued development and use of these planning tools to benefit bald eagles.

Adherence to the Guidelines herein will benefit individuals, agencies, organizations, and companies by helping them avoid violations of the law. However, the Guidelines themselves are not law. Rather, they are recommendations based on several decades of behavioral observations, science, and conservation measures to avoid or minimize adverse impacts to bald eagles.

The U.S. Fish and Wildlife Service strongly encourages adherence to these guidelines to ensure that bald and golden eagle populations will continue to be sustained. The Service realizes there may be impacts to some birds even if all reasonable measures are taken to avoid such impacts. Although it is not possible to absolve individuals and entities from liability under the Eagle Act or the MBTA, the Service exercises enforcement discretion to focus on those individuals, companies, or agencies that take migratory birds without regard for the consequences of their actions and the law, especially when conservation measures, such as these Guidelines, are available, but have not been implemented. The Service will prioritize its enforcement efforts to focus on those individuals or entities who take bald eagles or their parts, eggs, or nests without implementing appropriate measures recommended by the Guidelines.

The Service intends to pursue the development of regulations that would authorize, under limited circumstances, the use of permits if "take" of an eagle is anticipated but unavoidable. Additionally, if the bald eagle is delisted, the Service intends to provide a regulatory mechanism to honor existing (take) authorizations under the Endangered Species Act (ESA).

During the interim period until the Service completes a rulemaking for permits under the Eagle Act, the Service does not intend to refer for prosecution the incidental "*take*" of any bald eagle under the MBTA or Eagle Act, if such take is in full compliance with the terms and conditions of an incidental take statement issued to the action agency or applicant under the authority of section 7(b)(4) of the ESA or a permit issued under the authority of section 10(a)(1)(B) of the ESA.

The Guidelines are applicable throughout the United States, including Alaska. The primary purpose of these Guidelines is to provide information that will minimize or prevent violations only of *Federal* laws governing bald eagles. In addition to Federal laws, many states and some smaller jurisdictions and tribes have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines. If you are planning activities that may affect bald eagles, we therefore recommend that you contact both your nearest U.S. Fish and Wildlife Service Field Office (see the contact information on p.16) and your state wildlife agency for assistance.

LEGAL PROTECTIONS FOR THE BALD EAGLE

The Bald and Golden Eagle Protection Act

The Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb'' means:

> "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle=s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

A violation of the Act can result in a criminal fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

The Migratory Bird Treaty Act
The MBTA (16 U.S.C. 703-712), prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors. Implementing regulations define "take" under the MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect."

Copies of the Eagle Act and the MBTA are available at: http://permits.fws.gov/ltr/ltr.shtml.

State laws and regulations
Most states have their own regulations and/or guidelines for bald eagle management. Some states may continue to list the bald eagle as endangered, threatened, or of special concern. If you plan activities that may affect bald eagles, we urge you to familiarize yourself with the regulations and/or guidelines that apply to bald eagles in your state. Your adherence to the Guidelines herein does not ensure that you are in compliance with state laws and regulations because state regulations can be more specific and/or restrictive than these Guidelines.

NATURAL HISTORY OF THE BALD EAGLE

Bald eagles are a North American species that historically occurred throughout the contiguous United States and Alaska. After severely declining in the lower 48 States between the 1870s and the 1970s, bald eagles have rebounded and re-established breeding territories in each of the lower 48 states. The largest North American breeding populations are in Alaska and Canada, but there are also significant bald eagle populations in Florida, the Pacific Northwest, the Greater Yellowstone area, the Great Lakes states, and the Chesapeake Bay region. Bald eagle distribution varies seasonally. Bald eagles that nest in southern latitudes frequently move northward in late spring and early summer, often summering as far north as Canada. Most eagles that breed at northern latitudes migrate southward during winter, or to coastal areas where waters remain unfrozen. Migrants frequently concentrate in large numbers at sites where food is abundant and they often roost together communally. In some cases, concentration areas are used year-round: in summer by southern eagles and in winter by northern eagles.

Juvenile bald eagles have mottled brown and white plumage, gradually acquiring their dark brown body and distinctive white head and tail as they mature. Bald eagles generally attain adult plumage by 5 years of age. Most are capable of breeding at 4 or 5 years of age, but in healthy populations they may not start breeding until much older. Bald eagles may live 15 to 25 years in the wild. Adults weigh 8 to 14 pounds (occasionally reaching 16 pounds in Alaska) and have wingspans of 5 to 8 feet. Those in the northern range are larger than those in the south, and females are larger than males.

Where do bald eagles nest?

Breeding bald eagles occupy "territories," areas they will typically defend against intrusion by other eagles. In addition to the active nest, a territory may include one or more alternate nests (nests built or maintained by the eagles but not used for nesting in a given year). The Eagle Act prohibits removal or destruction of both active and alternate bald eagle nests. Bald eagles exhibit high nest site fidelity and nesting territories are often used year after year. Some territories are known to have been used continually for over half a century.

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human-made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.

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The range of breeding bald eagles in 2000 (shaded areas). This map shows only the larger concentrations of nests; eagles have continued to expand into additional nesting territories in many states. The dotted line represents the bald eagle's wintering range.

When do bald eagles nest?

Nesting activity begins several months before egg-laying. Egg-laying dates vary throughout the U.S., ranging from October in Florida, to late April or even early May in the northern United States. Incubation typically lasts 33-35 days, but can be as long as 40 days. Eaglets make their first unsteady flights about 10 to 12 weeks after hatching, and fledge (leave their nests) within a few days after that first flight. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later.

The bald eagle breeding season tends to be longer in the southern U.S., and re-nesting following an unsuccessful first nesting attempt is more common there as well. The following table shows the timing of bald eagle breeding seasons in different regions of the country. The table represents the range of time within which the majority of nesting activities occur in each region and does not apply to any specific nesting pair. Because the timing of nesting activities may vary within a given region, you should contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16) and/or your state wildlife conservation agency for more specific information on nesting chronology in your area.

Chronology of typical reproductive activities of bald eagles in the United States.

Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.
SOUTHEASTERN U.S. (FL, GA, SC, ~~NC~~, AL, MS, LA, TN, KY, AR, eastern 2 of TX)											
Nest Building											
	Egg Laying/Incubation										
		Hatching/Rearing Young									
					Fledging Young						
CHESAPEAKE BAY REGION (NC, VA, MD, DE, southern 2 of NJ, eastern 2 of PA, panhandle of WV)											
		Nest Building									
				Egg Laying/Incubation							
					Hatching/Rearing Young						
								Fledging Young			
NORTHERN U.S. (ME, NH, MA, RI, CT, NY, northern 2 of NJ, western 2 of PA, OH, WV exc. panhandle, IN, IL, MI, WI, MN, IA, MO, ND, SD, NB, KS, CO, UT)											
			Nest Building								
					Egg Laying/Incubation						
						Hatching/Rearing Young					
									Fledging Young		
PACIFIC REGION (WA, OR, CA, ID, MT, WY, NV)											
				Nest Building							
					Egg Laying/Incubation						
						Hatching/Rearing Young					
									Fledging Young		
SOUTHWESTERN U.S. (AZ, NM, OK panhandle, western 2 of TX)											
		Nest Building									
				Egg Laying/Incubation							
					Hatching/Rearing Young						
								Fledging Young			
ALASKA											
					Nest Building						
							Egg Laying/Incubation				
								Hatching/Rearing Young			
Ing Young											Fledg-
Sept.	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**March**	**April**	**May**	**June**	**July**	**Aug.**

How many chicks do bald eagles raise?
The number of eagle eggs laid will vary from 1-3, with 1-2 eggs being the most common. Only one eagle egg is laid per day, although not always on successive days. Hatching of young occurs on different days with the result that chicks in the same nest are sometimes of unequal size. The overall national fledging rate is approximately one chick per nest, annually, which results in a healthy expanding population.

What do bald eagles eat?
Bald eagles are opportunistic feeders. Fish comprise much of their diet, but they also eat waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. Because they are visual hunters, eagles typically locate their prey from a conspicuous perch, or soaring flight, then swoop down and strike. Wintering bald eagles often congregate in large numbers along streams to feed on spawning salmon or other fish species, and often gather in large numbers in areas below reservoirs, especially hydropower dams, where fish are abundant. Wintering eagles also take birds from rafts of ducks at reservoirs and rivers, and congregate on melting ice shelves to scavenge dead fish from the current or the soft melting ice. Bald eagles will also feed on carcasses along roads, in landfills, and at feedlots.

During the breeding season, adults carry prey to the nest to feed the young. Adults feed their chicks by tearing off pieces of food and holding them to the beaks of the eaglets. After fledging, immature eagles are slow to develop hunting skills, and must learn to locate reliable food sources and master feeding techniques. Young eagles will congregate together, often feeding upon easily acquired food such as carrion and fish found in abundance at the mouths of streams and shallow bays and at landfills.

The impact of human activity on nesting bald eagles
During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in the following table.

Nesting Bald Eagle Sensitivity to Human Activities

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to ¼ mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them.

The impact of human activity on foraging and roosting bald eagles

Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites for purposes of feeding and sheltering. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. Roost sites are usually in mature trees where the eagles are somewhat sheltered from the wind and weather. Human activities near or within communal roost sites may prevent eagles

from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles.

Where a human activity agitates or bothers roosting or foraging bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles. The circumstances that might result in such an outcome are difficult to predict without detailed site-specific information. If your activities may disturb roosting or foraging bald eagles, you should contact your local Fish and Wildlife Service Field Office (see page 16) for advice and recommendations for how to avoid such disturbance.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT NEST SITES

In developing these Guidelines, we relied on existing state and regional bald eagle guidelines, scientific literature on bald eagle disturbance, and recommendations of state and Federal biologists who monitor the impacts of human activity on eagles. Despite these resources, uncertainties remain regarding the effects of many activities on eagles and how eagles in different situations may or may not respond to certain human activities. The Service recognizes this uncertainty and views the collection of better biological data on the response of eagles to disturbance as a high priority. To the extent that resources allow, the Service will continue to collect data on responses of bald eagles to human activities conducted according to the recommendations within these Guidelines to ensure that adequate protection from disturbance is being afforded, and to identify circumstances where the Guidelines might be modified. These data will be used to make future adjustments to the Guidelines.

To avoid disturbing nesting bald eagles, we recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees.

The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there are little or no forested or topographical buffers, such as in many western states, distance alone must serve as the buffer. Consequently, in open areas, the distance between the activity and the nest may need to be larger than the distances recommended under Categories A and B of these guidelines (pg. 12) if no landscape buffers are present. The height of the nest above the ground may also ameliorate effects of human activities; eagles at higher nests may be less prone to disturbance.

In addition to the physical features of the landscape and nest site, the appropriate size for the distance buffer may vary according to the historical tolerances of eagles to human activities in particular localities, and may also depend on the location of the nest in relation

to feeding and roosting areas used by the eagles. Increased competition for nest sites may lead bald eagles to nest closer to human activity (and other eagles).

Seasonal restrictions can prevent the potential impacts of many shorter-term, obtrusive activities that do not entail landscape alterations (e.g. fireworks, outdoor concerts). In proximity to the nest, these kinds of activities should be conducted only outside the breeding season. For activities that entail both short-term, obtrusive characteristics and more permanent impacts (e.g., building construction), we recommend a combination of both approaches: retaining a landscape buffer *and* observing seasonal restrictions.

For assistance in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, we encourage you to contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16).

Existing Uses

Eagles are unlikely to be disturbed by routine use of roads, homes, and other facilities where such use pre-dates the eagles' successful nesting activity in a given area. Therefore, in most cases *ongoing* existing uses may proceed with the same intensity with little risk of disturbing bald eagles. However, some *intermittent, occasional, or irregular* uses that pre-date eagle nesting in an area may disturb bald eagles. For example: a pair of eagles may begin nesting in an area and subsequently be disturbed by activities associated with an annual outdoor flea market, even though the flea market has been held annually at the same location. In such situations, human activity should be adjusted or relocated to minimize potential impacts on the nesting pair.

ACTIVITY-SPECIFIC GUIDELINES

The following section provides the Service=s management recommendations for avoiding bald eagle disturbance as a result of new or intermittent activities proposed in the vicinity of bald eagle nests. Activities are separated into 8 categories (A – H) based on the nature and magnitude of impacts to bald eagles that usually result from the type of activity. Activities with similar or comparable impacts are grouped together.

In most cases, impacts will vary based on the visibility of the activity from the eagle nest and the degree to which similar activities are already occurring in proximity to the nest site. Visibility is a factor because, in general, eagles are more prone to disturbance when an activity occurs in full view. For this reason, we recommend that people locate activities farther from the nest structure in areas with open vistas, in contrast to areas where the view is shielded by rolling topography, trees, or other screening factors. The recommendations also take into account the existence of similar activities in the area because the continued presence of nesting bald eagles in the vicinity of the existing activities indicates that the eagles in that area can tolerate a greater degree of human activity than we can generally expect from eagles in areas that experience fewer human impacts. To illustrate how these factors affect the likelihood of disturbing eagles, we have incorporated the recommendations for some activities into a table (categories A and B).

First, determine which category your activity falls into (between categories A – H). If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity represented.

If your activity is under A or B, our recommendations are in table form. The vertical axis shows the degree of visibility of the activity from the nest. The horizontal axis (header row) represents the degree to which similar activities are ongoing in the vicinity of the nest. Locate the row that best describes how visible your activity will be from the eagle nest. Then, choose the column that best describes the degree to which similar activities are ongoing in the vicinity of the eagle nest. The box where the column and row come together contains our management recommendations for how far you should locate your activity from the nest to avoid disturbing the eagles. The numerical distances shown in the tables are the closest the activity should be conducted relative to the nest. In some cases we have included additional recommendations (other than recommended *distance* from the nest) you should follow to help ensure that your activity will not disturb the eagles.

Alternate nests

For activities that entail permanent landscape alterations that may result in bald eagle disturbance, these recommendations apply to both active and alternate bald eagle nests. Disturbance becomes an issue with regard to alternate nests if eagles return for breeding purposes and react to land use changes that occurred while the nest was inactive. The likelihood that an alternate nest will again become active decreases the longer it goes unused. If you plan activities in the vicinity of an alternate bald eagle nest and have information to show that the nest has not been active during the preceding 5 breeding seasons, the recommendations provided in these guidelines for avoiding disturbance around the nest site may no longer be warranted. The nest itself remains protected by other provisions of the Eagle Act, however, and may not be destroyed.

If special circumstances exist that make it unlikely an inactive nest will be reused before 5 years of disuse have passed, and you believe that the probability of reuse is low enough to warrant disregarding the recommendations for avoiding disturbance, you should be prepared to provide all the reasons for your conclusion, including information regarding past use of the nest site. Without sufficient documentation, you should continue to follow these guidelines when conducting activities around the nest site. If we are able to determine that it is unlikely the nest will be reused, we may advise you that the recommendations provided in these guidelines for avoiding disturbance are no longer necessary around that nest site.

This guidance is intended to minimize disturbance, as defined by Federal regulation. In addition to Federal laws, most states and some tribes and smaller jurisdictions have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines.

Temporary Impacts

For activities that have temporary impacts, such as the use of loud machinery, fireworks displays, or summer boating activities, we recommend seasonal restrictions. These types of activities can generally be carried out outside of the breeding season without causing disturbance. The recommended restrictions for these types of activities can be lifted for alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched (depending on the distance between the alternate nest and the active nest).

In general, activities should be kept as far away from nest trees as possible; loud and disruptive activities should be conducted when eagles are not nesting; and activity between the nest and the nearest foraging area should be minimized. If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity addressed, or contact your local U.S. Fish and Wildlife Service Field Office for additional guidance.

If you believe that special circumstances apply to your situation that increase or diminish the likelihood of bald eagle disturbance, or if it is not possible to adhere to the guidelines, you should contact your local Service Field Office for further guidance.

Category A:
Building construction, 1 or 2 story, with project footprint of ½ acre or less.
Construction of roads, trails, canals, power lines, and other linear utilities.
Agriculture and aquaculture – new or expanded operations.
Alteration of shorelines or wetlands.
Installation of docks or moorings.
Water impoundment.

Category B:
Building construction, 3 or more stories.
Building construction, 1 or 2 story, with project footprint of more than ½ acre.
Installation or expansion of marinas with a capacity of 6 or more boats.
Mining and associated activities.
Oil and natural gas drilling and refining and associated activities.

	If there is no similar activity within 1 mile of the nest	***If there is similar activity closer than 1 mile from the nest***
If the activity will be visible from the nest	660 feet. Landscape buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.
If the activity will not be visible from the nest	Category A: 330 feet. Clearing, external construction, and landscaping between 330 feet and 660 feet should be done outside breeding season. Category B: 660 feet.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping within 660 feet should be done outside breeding season.

The numerical distances shown in the table are the closest the activity should be conducted relative to the nest.

Category C. Timber Operations and Forestry Practices

- Avoid clear cutting or removal of overstory trees within 330 feet of the nest at any time.

- Avoid timber harvesting operations, including road construction and chain saw and yarding operations, during the breeding season within 660 feet of the nest. The distance may be decreased to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched.

- Selective thinning and other silviculture management practices designed to conserve or enhance habitat, including prescribed burning close to the nest tree, should be undertaken outside the breeding season. Precautions such as raking leaves and woody debris from around the nest tree should be taken to prevent crown fire or fire climbing the nest tree. If it is determined that a burn during the breeding season would be beneficial, then, to ensure that no take or disturbance will occur, these activities should be conducted only when neither adult eagles nor young are present at the nest tree (i.e., at the beginning of, or end of, the breeding season, either before the particular nest is active or after the young have fledged from that nest). Appropriate Federal and state biologists should be consulted before any prescribed burning is conducted during the breeding season.

- Avoid construction of log transfer facilities and in-water log storage areas within 330 feet of the nest.

Category D. Off-road vehicle use (including snowmobiles). No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet.

Category E. Motorized Watercraft use (including jet skis/personal watercraft). No buffer is necessary around nest sites outside the breeding season. During the breeding season, within 330 feet of the nest, (1) do not operate jet skis (personal watercraft), and (2) avoid concentrations of noisy vessels (e.g., commercial fishing boats and tour boats), except where eagles have demonstrated tolerance for such activity. Other motorized boat traffic passing within 330 feet of the nest should attempt to minimize trips and avoid stopping in the area where feasible, particularly where eagles are unaccustomed to boat traffic. Buffers for airboats should be larger than 330 feet due to the increased noise they generate, combined with their speed, maneuverability, and visibility.

Category F. Non-motorized recreation and human entry (e.g., hiking, camping, fishing, hunting, birdwatching, kayaking, canoeing). No buffer is necessary around nest sites outside the breeding season. If the activity will be visible or highly audible from the nest, maintain a 330-foot buffer during the breeding season, particularly where eagles are unaccustomed to such activity.

Category G. Helicopters and fixed-wing aircraft.
Except for authorized biologists trained in survey techniques, avoid operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity.

Category H. Blasting and other loud, intermittent noises.
Avoid blasting and other activities that produce extremely loud noises within 1/2 mile of active nests, unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area. This recommendation applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks that are intended for licensed public display.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT FORAGING AREAS AND COMMUNAL ROOST SITES

1. Minimize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas.

2. Locate long-term and permanent water-dependent facilities, such as boat ramps and marinas, away from important eagle foraging areas.

3. Avoid recreational and commercial boating and fishing near critical eagle foraging areas during peak feeding times (usually early to mid-morning and late afternoon), except where eagles have demonstrated tolerance to such activity.

4. Do not use explosives within ½ mile (or within 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the U.S. Fish and Wildlife Service and your state wildlife agency.

5. Locate aircraft corridors no closer than 1,000 feet vertical or horizontal distance from communal roost sites.

ADDITIONAL RECOMMENDATIONS TO BENEFIT BALD EAGLES

The following are additional management practices that landowners and planners can exercise for added benefit to bald eagles.

1. Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within ½ mile from water.

2. Where nests are blown from trees during storms or are otherwise destroyed by the elements, continue to protect the site in the absence of the nest for up to three (3) complete breeding seasons. Many eagles will rebuild the nest and reoccupy the site.

3. To avoid collisions, site wind turbines, communication towers, and high voltage transmission power lines away from nests, foraging areas, and communal roost sites.

4. Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers, and poles. If possible, bury utility lines in important eagle areas.

5. Where bald eagles are likely to nest in human-made structures (e.g., cell phone towers) and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfering with structure performance.

6. Immediately cover carcasses of euthanized animals at landfills to protect eagles from being poisoned.

7. Do not intentionally feed bald eagles. Artificially feeding bald eagles can disrupt their essential behavioral patterns and put them at increased risk from power lines, collision with windows and cars, and other mortality factors.

8. Use pesticides, herbicides, fertilizers, and other chemicals only in accordance with Federal and state laws.

9. Monitor and minimize dispersal of contaminants associated with hazardous waste sites (legal or illegal), permitted releases, and runoff from agricultural areas, especially within watersheds where eagles have shown poor reproduction or where bioaccumulating contaminants have been documented. These factors present a risk of contamination to eagles and their food sources.

CONTACTS

The following U.S. Fish and Wildlife Service Field Offices provide technical assistance on bald eagle management:

Alabama	Daphne	(251) 441-5181
Alaska	Anchorage	(907) 271-2888
	Fairbanks	(907) 456-0203
	Juneau	(907) 780-1160
Arizona	Phoenix	(602) 242-0210
Arkansas	Conway	(501) 513-4470
California	Arcata	(707) 822-7201
	Barstow	(760) 255-8852
	Carlsbad	(760) 431-9440
	Red Bluff	(530) 527-3043
	Sacramento	(916) 414-6000
	Stockton	(209) 946-6400
	Ventura	(805) 644-1766
	Yreka	(530) 842-5763
Colorado	Lakewood	(303) 275-2370
	Grand Junction	(970) 243-2778
Connecticut	(See New Hampshire)	
Delaware	(See Maryland)	
Florida	Panama City	(850) 769-0552
	Vero Beach	(772) 562-3909
	Jacksonville	(904) 232-2580
Georgia	Athens	(706) 613-9493
	Brunswick	(912) 265-9336
	Columbus	(706) 544-6428
Idaho	Boise	(208) 378-5243
	Chubbuck	(208) 237-6975
Illinois/Iowa	Rock Island	(309) 757-5800
Indiana	Bloomington	(812) 334-4261
Kansas	Manhattan	(785) 539-3474
Kentucky	Frankfort	(502) 695-0468
Louisiana	Lafayette	(337) 291-3100
Maine	Old Town	(207) 827-5938
Maryland	Annapolis	(410) 573-4573
Massachusetts	(See New Hampshire)	
Michigan	East Lansing	(517) 351-2555
Minnesota	Bloomington	(612) 725-3548
Mississippi	Jackson	(601) 965-4900
Missouri	Columbia	(573) 234-2132
Montana	Helena	(405) 449-5225
Nebraska	Grand Island	(308) 382-6468
Nevada	Las Vegas	(702) 515-5230
	Reno	(775) 861-6300
New Hampshire	Concord	(603) 223-2541
New Jersey	Pleasantville	(609) 646-9310
New Mexico	Albuquerque	(505) 346-2525
New York	Cortland	(607) 753-9334
	Long Island	(631) 776-1401
North Carolina	Raleigh	(919) 856-4520
	Asheville	(828) 258-3939
North Dakota	Bismarck	(701) 250-4481
Ohio	Reynoldsburg	(614) 469-6923
Oklahoma	Tulsa	(918) 581-7458
Oregon	Bend	(541) 383-7146
	Klamath Falls	(541) 885-8481
	La Grande	(541) 962-8584
	Newport	(541) 867-4558
	Portland	(503) 231-6179
	Roseburg	(541) 957-3474
Pennsylvania	State College	(814) 234-4090
Rhode Island	(See New Hampshire)	
South Carolina	Charleston	(843) 727-4707
South Dakota	Pierre	(605) 224-8693
Tennessee	Cookeville	(931) 528-6481
Texas	Clear Lake	(281) 286-8282
Utah	West Valley City	(801) 975-3330
Vermont	(See New Hampshire)	
Virginia	Gloucester	(804) 693-6694
Washington	Lacey	(306) 753-9440
	Spokane	(509) 891-6839
	Wenatchee	(509) 665-3508
West Virginia	Elkins	(304) 636-6586
Wisconsin	New Franken	(920) 866-1725
Wyoming	Cheyenne	(307) 772-2374
	Cody	(307) 578-5939

National Office
U.S. Fish and Wildlife Service
Division of Migratory Bird Management
4401 North Fairfax Drive, MBSP-4107
Arlington, VA 22203-1610
(703) 358-1714
http://www.fws.gov/migratorybirds

State Agencies

To contact a state wildlife agency, visit the Association of Fish & Wildlife Agencies' website at http://www.fishwildlife.org/where_us.html

GLOSSARY

The definitions below apply to these National Bald Eagle Management Guidelines:

Communal roost sites – Areas where bald eagles gather and perch overnight – and sometimes during the day in the event of inclement weather. Communal roost sites are usually in large trees (live or dead) that are relatively sheltered from wind and are generally in close proximity to foraging areas. These roosts may also serve a social purpose for pair bond formation and communication among eagles. Many roost sites are used year after year.

Disturb – To agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle=s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

Fledge – To leave the nest and begin flying. For bald eagles, this normally occurs at 10-12 weeks of age.

Fledgling – A juvenile bald eagle that has taken the first flight from the nest but is not yet independent.

Foraging area – An area where eagles feed, typically near open water such as rivers, lakes, reservoirs, and bays where fish and waterfowl are abundant, or in areas with little or no water (i.e., rangelands, barren land, tundra, suburban areas, etc.) where other prey species (e.g., rabbit, rodents) or carrion (such as at landfills) are abundant.

Landscape buffer – A natural or human-made landscape feature that screens eagles from human activity (e.g., strip of trees, hill, cliff, berm, sound wall).

Nest – A structure built, maintained, or used by bald eagles for the purpose of reproduction. An **active** nest is a nest that is attended (built, maintained or used) by a pair of bald eagles during a given breeding season, whether or not eggs are laid. An **alternate** nest is a nest that is not used for breeding by eagles during a given breeding season.

Nest abandonment – Nest abandonment occurs when adult eagles desert or stop attending a nest and do not subsequently return and successfully raise young in that nest for the duration of a breeding season. Nest abandonment can be caused by altering habitat near a nest, even if the alteration occurs prior to the breeding season. Whether the eagles migrate during the non-breeding season, or remain in the area throughout the non-breeding season, nest abandonment can occur at any point between the time the eagles return to the nesting site for the breeding season and the time when all progeny from the breeding season have

dispersed.

Project footprint – The area of land (and water) that will be permanently altered for a development project, including access roads.

Similar scope – In the vicinity of a bald eagle nest, an existing activity is of similar scope to a new activity where the types of impacts to bald eagles are similar in nature, and the impacts of the existing activity are of the same or greater magnitude than the impacts of the potential new activity. Examples: (1) An existing single-story home 200 feet from a nest is similar in scope to an additional single-story home 200 feet from the nest; (2) An existing multi-story, multi-family dwelling 150 feet from a nest has impacts of a greater magnitude than a potential new single-family home 200 feet from the nest; (3) One existing single-family home 200 feet from the nest has impacts of a lesser magnitude than three single-family homes 200 feet from the nest; (4) an existing single-family home 200 feet from a communal roost has impacts of a lesser magnitude than a single-family home 300 feet from the roost but 40 feet from the eagles' foraging area. The existing activities in examples (1) and (2) are of similar scope, while the existing activities in example (3) and (4) are not.

Vegetative buffer – An area surrounding a bald eagle nest that is wholly or largely covered by forest, vegetation, or other natural ecological characteristics, and separates the nest from human activities.

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APPENDIX H

General Mitigation Guidelines

GENERAL MITIGATION GUIDELINES: PLANTINGS, SUCCESS CRITERIA, MONITORING, AND OTHER GENERAL GUIDANCE

INTRODUCTION

This document contains general mitigation guidelines applicable to both the LPV HSDRRS Mitigation Project and the WBV HSDRRS Mitigation Project. They were developed by the USACE in coordination with the Interagency Team and the Non-Federal Sponsor (NFS). These guidelines served to help develop plans for the final array of mitigation projects considered and also served to help estimate preliminary mitigation construction, mitigation monitoring/reporting, and mitigation management/maintenance costs associated with the final array of mitigation projects considered.

It is important to understand that the guidelines addressed herein were not intended to serve as the final mitigation program/plan for a particular Tentatively Selected Mitigation Project (TSMP) addressed in Section 2 of the Programmatic Individual Environmental Report (PIER) for the WBV HSDRRS Mitigation. More detailed and project-specific mitigation plans for each TSMP will be prepared during the process of preparing the Tiered IER (TIER) covering a particular TSMP. Such mitigation plans, including components such as planting plans, success criteria, monitoring/reporting requirements, management/maintenance plans, etc., will be prepared by the USACE in coordination with the Interagency Team and the Non-Federal Sponsor. However, such final mitigation plans would not deviate substantially as regards the basic tenents set forth in this document.

It is also important to understand that certain provisions will apply to any Corps-constructed mitigation project. Some, but not necessarily all, of these provisions are discussed in the following paragraph.

The proposed mitigation actions will include construction, with the Non-Federal Sponsor responsible for operation and maintenance of functional portions of work as they are completed. On a cost shared basis, USACE will monitor completed mitigation to determine whether additional construction, invasive/nuisance plant species control, and/or plantings are necessary to achieve mitigation success. USACE will undertake additional actions necessary to achieve mitigation success in accordance with cost sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved initial success criteria, monitoring will be performed by the Non-Federal Sponsor as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, USACE will consult with other agencies and the Non-Federal Sponsor to determine whether operational changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve ecological success, USACE will implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost sharing requirements, availability of funding, and current budgetary and other guidance.

MITIGATION PLANTING GUIDELINES

PLANTING GUIDELINES FOR BOTTOMLAND HARDWOOD (BLH) HABITATS

Canopy species will be planted on 9-foot centers (average) to achieve a minimum initial stand density of 538 seedlings (trees) per acre. Midstory species will be planted on 18-foot centers (average) to achieve a minimum initial stand density of 134 seedlings per acre. Stock will be at least 1 year old, at least 2 feet in height, have a minimum root collar diameter of 3/8 inch, have a root length of at least 8 to 10 inches with at least 4 to 8 lateral roots, and must be obtained from a registered licensed regional nursery/grower and of a regional eco-type species properly stored and handled to ensure viability. The plants will typically be installed during the period from December through March 15 (planting season/dormant season); however, unanticipated events such as spring flooding may delay plantings until late spring or early summer. The seedlings will be installed in a manner that avoids monotypic rows of canopy and midstory species (i.e. goal is to have spatial diversity and mixture of planted species). If herbivory may threaten seedling survival, then

seedling protection devices such as wire-mesh fencing or plastic seedling protectors will be installed around each planted seedling.

Species for Wet Bottomland Hardwood Habitats (BLH-Wet Habitats)

The canopy species installed will be in general accordance with the species lists provided in Tables 1A and 1B. Plantings will be conducted such that the total number of plants installed in a given area consists of approximately 60% hard mast-producing species (Table 1A) and approximately 40% soft mast-producing species (Table 1B). The species composition of the plantings for each of the two groups of canopy species (e.g. hard mast species and soft mast species) should mimic the percent composition guidelines indicated in Tables 1A and 1B. However, site conditions (factors such as hydrologic regime, soils, composition of existing native canopy species, etc.) and planting stock availability may necessitate deviations from the species lists and/or the percent composition guidelines indicated in these tables. In general, a minimum of 3 hard mast species and a minimum of 3 soft mast species should be utilized.

The midstory species installed will be selected from the species list provided in Table 1C. Plantings will consist of at least 3 different species. The species used and the proportion of the total midstory plantings represented by each species (percent composition) will be dependent on various factors including site conditions (composition and frequency of existing native midstory species, hydrologic regime, soils, etc.) and planting stock availability.

Table 1A: Preliminary Planting List for Wet Bottomland Hardwood Habitat, Hard Mast-Producing Canopy Species (60% of Total Canopy Species)

Common Name	Scientific name	Percent Composition
Nuttall oak	*Quercus nuttalli, Q. texana*	30% - 40%
Willow oak	*Quercus phellos*	30% - 40%
Water oak	*Quercus nigra*	5%
Overcup oak	*Quercus lyrata*	10% - 20%
Swamp chestnut oak	*Quercus michauxii*	10% - 20%
Water hickory	*Carya aquatica*	10% - 20%

Table 1B: Preliminary Planting List for Wet Bottomland Hardwood Habitat, Soft Mast-Producing Canopy Species (40% of Total Canopy Species)

Common Name	Scientific name	Percent Composition
Drummond red maple	*Acer rubrum* var. *drummondii*	15% - 25%
Sugarberry	*Celtis laevigata*	15% - 25%
Green ash	*Fraxinus pennsylvanica*	15% - 25%
Sweetgum	*Liquidambar styraciflua*	10% - 20%
American elm	*Ulmus americana*	10% - 20%
Bald cypress	*Taxodium distichum*	5% - 15%

Table 1C: Preliminary Planting List for Wet Bottomland Hardwood Habitat, Midstory Species

Common Name	Scientific name	Percent Composition
Saltbush	*Baccharis halimifolia*	TBD
Buttonbush	*Cephalanthus occidentalis*	TBD
Roughleaf dogwood	*Cornus drummondii*	TBD
Mayhaw	*Crataegus opaca*	TBD
Green hawthorn	*Crataegus viridis*	TBD
Common persimmon	*Diospyros virginiana*	TBD
Honey locust	*Gleditsia triacanthos*	TBD
Possumhaw	*Ilex decidua*	TBD
Dahoon holly	*Ilex cassine*	TBD
Red mulberry	*Morus rubra*	TBD
Wax myrtle	*Myrica cerifera*	TBD

TBD = To Be Determined

Species for Dry Bottomland Hardwood Habitats (BLH-Dry Habitats)

The canopy species installed will be in general accordance with the species lists provided in Tables 2A and 2B. Plantings will be conducted such that the total number of plants installed in a given area consists of approximately 50% hard mast-producing species (Table 2A) and approximately 50% soft mast-producing species (Table 2B). The species composition of the plantings for each of the two groups of canopy species (e.g. hard mast species and soft mast species) should mimic the percent composition guidelines indicated in Tables 2A and 2B. However, site conditions (factors such as hydrologic regime, soils, composition of existing native canopy species, etc.) and planting stock availability may necessitate deviations from the species lists and/or the percent composition guidelines indicated in these tables. In general, a minimum of 3 hard mast species and a minimum of 3 soft mast species should be utilized.

The midstory species installed will be selected from the species list provided in Table 2C. Plantings will consist of at least 3 different species. The species used and the proportion of the total midstory plantings represented by each species (percent composition) will be dependent on various factors including site conditions (composition and frequency of existing native midstory species, hydrologic regime, soils, etc.) and planting stock availability.

Table 2A: Preliminary Planting List for Dry Bottomland Hardwood Habitat, Hard Mast-Producing Canopy Species (50% of Total Canopy Species)

Common Name	Scientific name	Percent Composition
Nuttall oak	*Quercus nuttalli* or *Q. texana*	10%
Willow oak	*Quercus phellos*	10%
Water oak	*Quercus nigra*	20%
Live oak	*Quercus virginiana*	20%
Cherrybark oak	*Quercus pagoda*	5%
Sweet Pecan	*Carya illinoensis*	20%
Southern red oak	*Quercus falcata*	5%
Cow oak	*Quercus michauxii*	10%

Table 2B: Preliminary Planting List for Dry Bottomland Hardwood Habitat, Soft Mast-Producing Canopy Species (50% of Total Canopy Species)

Common Name	Scientific name	Percent Composition
Drummond red maple	*Acer rubrum* var. *drummondii*	10%
Sugarberry	*Celtis laevigata*	15%
Green ash	*Fraxinus pennsylvanica*	15%
Sweetgum	*Liquidambar styraciflua*	20%
American elm	*Ulmus americana*	10% - 20%
Common persimmon	*Diospyros virginiana*	15%
Red mulberry	*Morus rubra*	5 - 10%
American sycamore	*Platanus occidentalis*	0 - 5%
River birch	*Salix nigra*	0 - 5%
Honey locust	*Gleditsia triacanthos*	0 – 5%

Table 2C: Preliminary Planting List for Dry Bottomland Hardwood Habitat, Midstory Species

Common Name	Scientific name	Percent Composition
Roughleaf dogwood	*Cornus drummondii*	TBD
Mayhaw	*Crataegus opaca*	TBD
Green hawthorn	*Crataegus viridis*	TBD
Deciduous holly	*Ilex decidua*	TBD
Yaupon	*Ilex vomitoria*	TBD
Palmetto	*Sabal minor*	TBD
Southern wax myrtle	*Morella cerifera*	TBD
Southern magnolia	*Magnolia grandiflora*	TBD
Southern crabapple	*Malus angustifolia*	TBD
Eastern red cedar	*Juniperus virginiana* var. *virginiana*	TBD
Elderberry	*Sambucus canadensis*	TBD

TBD = To Be Determined

Deviations from Typical Planting Guidelines

Proposed mitigation features that involve restoration will commonly require planting the entire feature using the prescribed planting guidance addressed in the preceding sections. In contrast, mitigation features that involve enhancement will often require adjustments to the typical plant spacing/density guidelines and may further require adjustments to the guidelines pertaining to species composition.

Where initial enhancement activities include the eradication of invasive and nuisance plant species, significant numbers of native canopy and/or midstory species may remain, but in a spatial distribution that leaves relatively large “gaps” in the canopy stratum and/or the midstory stratum. In such cases, areas measuring approximately 25 feet by 25 feet that are devoid of native canopy species should be planted and areas measuring approximately 45 feet by 45 feet that are devoid of native midstory species should be planted.

The initial enhancement actions involved within a particular mitigation site could include a variety measures such as the eradication of invasive and nuisance plant species, topographic alterations (excavation, filling, grading, etc.), and hydrologic enhancement actions (alterations to drainage patterns/features, installation of water control structures, etc.). These actions may result in areas of variable size that require planting of both canopy and midstory species using the typical densities/spacing described previously. There may also be areas where several native canopy and/or midstory species remain, thus potentially altering the general guidelines described as regards the spacing of plantings, and/or the species to be planted, and/or the percent

composition of planted species. Similarly, areas that must be re-planted due to failure in achieving applicable mitigation success criteria may involve cases where the general guidelines discussed above will not necessarily be applicable.

Given these uncertainties, initial planting plans specific to enhancement features will be required and must be specified in the Mitigation Work Plan for the mitigation site. The initial planting plans will be developed by the USACE in cooperation with the Interagency Team. Initial plantings will be the responsibility of the USACE. If re-planting of an area is necessary following initial plantings, a specific re-planting plan must also be prepared and must be approved by the USACE in cooperation with the Interagency Team prior to re-planting. With the exception of any re-planting actions necessary to attain the initial survivorship success criteria (i.e. survival required 1 year following completion of initial plantings), the NFS will be responsible for preparing re-planting plans and conducting re-planting activities, subject to the provisions mentioned in the Introduction section. Re-planting necessary to achieve the initial survivorship criteria will be the responsibility of the USACE. subject to the provisions mentioned in the Introduction section.

PLANTING GUIDELINES FOR SWAMP HABITATS

Canopy species will be planted on 9-foot centers (average) to achieve a minimum initial stand density of 538 seedlings (trees) per acre. Midstory species will be planted on 18-foot centers (average) to achieve a minimum initial stand density of 134 seedlings per acre. Stock used for canopy species will be at least 1 year old, at least 3 feet tall, and have a root collar diameter that exceeds 0.5 inch. Stock used for midstory species will be at least 1 year old and will be at least 3 feet tall. All stock must be obtained from a registered licensed regional nursery/grower and of a regional eco-type species properly stored and handled to ensure viability. The plants will typically be installed during the period from December through March 15 (planting season/dormant season); however, unanticipated events may delay plantings until late spring or early summer. The seedlings will be installed in a manner that that avoids monotypic rows of canopy and midstory species (i.e. goal is to have spatial diversity and mixture of planted species). If herbivory may threaten seedling survival, then seedling protection devices such as wire-mesh fencing or plastic seedling protectors will be installed around each planted seedling.

The canopy species installed will be in general accordance with the species lists provided in Table 3A. The species composition of the plantings should mimic the percent composition guidelines indicated in this table. However, site conditions (factors such as hydrologic regime, soils, composition of existing native canopy species, etc.) and planting stock availability may necessitate deviations from the species lists and/or the percent composition guidelines indicated. In general, a minimum of 3 canopy species should be utilized, the plantings must include baldcypress and tupelogum (water tupelo), and baldcypress should typically comprise at least 50% of the total number of seedlings installed.

The midstory species installed will be selected from the species list provided in Table 3B. Plantings will consist of at least 2 different species. The species used and the proportion of the total midstory plantings represented by each species (percent composition) will be dependent on various factors including site conditions (composition and frequency of existing native midstory species, hydrologic regime, soils, etc.) and planting stock availability.

Table 3A: Preliminary Planting List for Swamp Habitat, Canopy Species

Common Name	Scientific name	Percent Composition
Bald cypress	*Taxodium distichum*	60% - 75%
Tupelogum	*Nyssa aquatic*	20% - 25%
Green ash	*Fraxinus pennsylvanica*	10% - 15%
Drummond red maple	*Acer rubrum* var. *drummondii*	5%
Bitter pecan	*Carya x lecontei*	5% - 10%

Table 3B: Preliminary Planting List for Swamp Habitat, Midstory Species

Common Name	Scientific name	Percent Composition
Buttonbush	*Cephalanthus occidentalis*	TBD
Roughleaf dogwood	*Cornus drummondii*	TBD
Swamp privet	*Forestiera acuminata*	TBD
Possumhaw	*Ilex decidua*	TBD
Virginia willow	*Itea virginica*	TBD
Wax myrtle	*Myrica cerifera*	TBD
Swamp rose	*Rosa palustris*	TBD
American snowbell	*Styrax americanus*	TBD

TBD = To Be Determined

Deviations from Typical Planting Guidelines

Proposed mitigation features that involve restoration will commonly require planting the entire feature using the prescribed planting guidance addressed in the preceding sections. In contrast, mitigation features that involve enhancement will often require adjustments to the typical plant spacing/density guidelines and may further require adjustments to the guidelines pertaining to species composition.

For swamp enhancement projects that include the eradication of invasive and nuisance plant species, significant numbers of native canopy and/or midstory species may remain, but in a spatial distribution that leaves relatively large “gaps” in the canopy stratum and/or the midstory stratum. In such cases, areas measuring approximately 25 feet by 25 feet that are devoid of native canopy species should be planted and areas measuring approximately 45 feet by 45 feet that are devoid of native midstory species should be planted.

The initial enhancement actions involved within a particular swamp enhancement mitigation site could include a variety of measures such as the eradication of invasive and nuisance plant species, topographic alterations (excavation, filling, grading, etc.), and hydrologic enhancement actions (alterations to drainage patterns/features, installation of water control structures, etc.). These actions may result in areas of variable size that require planting of both canopy and midstory species using the typical densities/spacing described above. There may also be areas where several native canopy and/or midstory species remain, thus potentially altering the general guidelines described as regards the spacing of plantings, and/or the species to be planted, and/or the percent composition of planted species. Similarly, areas that must be re-planted due to failure in achieving applicable mitigation success criteria may involve cases where the general guidelines discussed above will not necessarily be applicable.

Given these uncertainties, initial planting plans specific to a mitigation site will be required and must be specified in the Mitigation Work Plan for the site. The initial planting plans will be developed by the USACE in cooperation with the Interagency Team. Initial plantings will be the responsibility of the USACE. If re-planting of an area is necessary following initial plantings, a specific re-planting plan must also be prepared and must be approved by the USACE in cooperation with the Interagency Team prior to re-planting. With the exception of any re-planting actions necessary to attain the initial survivorship success criteria (i.e. survival required 1 year following completion of initial plantings), the NFS will be responsible for preparing re-planting plans and conducting re-planting activities, subject to the provisions contained in the Introduction section. Re-planting necessary to achieve the initial survivorship criteria will be the responsibility of the USACE, subject to the aforementioned provisions.

PLANTING GUIDELINES FOR MARSH HABITATS

Planting Guidelines for Intermediate and Brackish Marsh Habitats

Herbaceous species will be planted on 7-foot centers (average) to achieve a minimum density of 889 plants per acre. Stock will typically be either 4-inch container size or bare-root or liner stock, depending on the species involved. The required stock size for each plant species proposed for installation must be specified in the Mitigation Work Plan. Plants must be obtained from a registered licensed regional nursery/grower and of a regional eco-type species properly stored and handled to ensure viability. Plant installation should be conducted during the period from March 15 through June 15. Planting should not be undertaken later than approximately July 15, although planting during the early fall may be deemed acceptable on a case-by-case basis.

Species installed in proposed intermediate marsh habitats will be selected from the species list provided in Table 4. Plantings will consist of at least 2 different species. The species used and the proportion of the total plantings represented by each species will be dependent on various factors including site conditions and planting stock availability.

Table 4: Preliminary Planting List for Intermediate Marsh Habitats

Common Name	Scientific Name
California bulrush	*Schoenoplectus californicus*
Black needle rush	*Juncus roemerianus*
Giant cutgrass	*Zizaniopsis miliacea*
Marsh-hay cordgrass	*Spartina patens*
Maidencane	*Panicum hemitomon*
Common threesquare	*Schoenoplectus americanus*
Big cordgrass	*Spartina cynosuroides*
Seashore paspalum	*Paspalum vaginatum*

Species installed in proposed brackish marsh habitats will be selected from the species list provided in Table 5. Plantings will consist of at least 2 different species. The species used and the proportion of the total plantings represented by each species will be dependent on various factors including site conditions and planting stock availability.

Table 5: Preliminary Planting List for Brackish Marsh Habitats

Common Name	Scientific Name
Marsh-hay cordgrass	*Spartina patens*
Black needle rush	*Juncus roemerianus*
Smooth cordgrass	*Spartina alterniflora*
Common threesquare	*Schoenoplectus americanus*
Saltmarsh bulrush	*Schoenoplectus robustus*
Salt grass	*Distchilis spicata*

Planting Guidelines for Fresh Marsh Habitats

Planting of fresh marsh habitats is not proposed since it is anticipated that desirable fresh marsh vegetation would rapidly colonize such habitats through natural recruitment. Should the initial vegetation success criteria for such features not be achieved however, supplemental planting of herbaceous species would be conducted to help insure the establishment of sufficient vegetative cover. Stock will typically be either 4-inch container size or bare-root or liner stock, depending on the species involved. The required stock size for each plant

species proposed for installation must be specified in the Mitigation Work Plan. Plants must be obtained from a registered licensed regional nursery/grower and of a regional eco-type species properly stored and handled to ensure viability. Plant installation should be conducted during the period from March 15 through June 15. Planting should not be undertaken later than approximately July 15, although planting during the early fall may be deemed acceptable on a case-by-case basis.

The plant species to be installed would be determined based on field inspections of the mitigation site as would the planting plan (e.g. location of supplemental plantings and density of such plantings). Potential species to be installed could include such plants as maidencane, giant cutgrass, arrowheads (*Sagittaria* spp.), pickerelweed (*Pontederia cordata*), arrow arum (*Peltandra virginica*), smartweed (*Polygonum* spp.), common rush (*Juncus effusus*), pennyworts (*Hydrocotyle* spp.), and spikerush (*Eleocharis* spp.), although other species could be utilized. Typically at least two different species would be utilized.

Deviations from Typical Planting Guidelines

Initial planting plans specific to an intermediate marsh or to a brackish marsh mitigation site will be required and must be specified in the Mitigation Work Plan for the site. The initial planting plans will be developed by the USACE in cooperation with the Interagency Team. Initial plantings will be the responsibility of the USACE, subject to the provisions set forth in the Introduction section. If re-planting of an area is necessary following initial plantings, a specific re-planting plan must also be prepared and must be approved by the USACE in cooperation with the Interagency Team prior to re-planting.

It may be determined that the initial planting of brackish marsh features would best be conducted in phases. Using this approach, a certain percentage of the total number of plants required would be installed in the year that final marsh construction activities are completed while the remainder would be installed in the following year. The determination of whether to use phased planting or to install all the necessary plants upon completion of construction activities will be made during the final design phase of the mitigation project. The proposed planting scheme would be subject to review and approval by the Interagency Team.

As previously discussed, planting of fresh marsh features could be necessary if the initial vegetative cover goal is not achieved. Re-planting of intermediate marsh features and/or brackish marsh features could also be required if the initial plant survivorship goal is not attained or if initial vegetative cover goals are not achieved. In such cases, re-planting or supplemental planting of such mitigation features would be the responsibility of the USACE (subject to the provisions in the Introduction section). Once the initial success criteria are achieved, the NFS will be responsible for conducting any re-planting activities necessary to achieve success, subject to the provisions in the Introduction section. All re-planting plans will be subject to review and approval by the USACE and Interagency Team prior to plant installation. These plans may deviate from the general planting guidelines as regards the density of plantings, the species utilized, or the plant stock size in an effort to rapidly establish appropriate vegetative cover.

ADDITIONAL MITIGATION GUIDELINES

GUIDELINES FOR THE ERADICATION AND CONTROL OF INVASIVE AND NUISANCE PLANT SPECIES

The eradication of invasive and nuisance plant species may incorporate a variety of eradication methods including mechanized removal (ex. hydroaxes, gyro-tracs, heavy machinery used in areas slated for topographic alterations), non-mechanized removal (use of hand implements such as chain saws and machetes, direct uprooting by hand), aerial herbicide applications (applications using aircraft), and ground herbicide applications (on-the-ground applications using backpack sprayers, hypo-hatchet, tube-injector, wick applicators, etc.). Only ground herbicide applications would be used in marsh habitats. Regardless of the methods involved, care will be exercised to avoid damage to desirable native species to the greatest extent practicable.

During the initial eradication process in forested habitats, larger quantities of felled materials may be removed from the mitigation site and disposed in a duly-licensed facility. Some felled woody plants may be chipped

on-site with the chips spread in a layer not exceeding approximately 3 to 4 inches thick. Felled woody plants may also be gathered and stacked "teepee" style in scattered locations. In certain cases, larger invasive trees may be killed and allowed to remain standing if it is determined this would not interfere with mitigation goals. The Mitigation Work Plan must address the specific measures proposed to conduct initial eradication efforts, including handling of vegetative debris, and the recommended measures for the subsequent control of invasive and nuisance plant species.

The USACE will be responsible for the initial eradication of invasive and nuisance plants as well as for any subsequent eradication efforts until such time that the mitigation monitoring responsibilities are transferred to the NFS, pursuant to the provisions contained in the Introduction section. Thereafter, the NFS will be responsible for the successful control and eradication of invasive and nuisance plant species, subject to the cited provisions. The management objectives will be to maintain the mitigation site such that it is essentially free from invasive and nuisance plant species immediately following a given maintenance event and such that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5% of the total average plant cover during periods between maintenance events.

GUIDELINES FOR CLEARING, GRADING, AND OTHER EARTHWORK ACTIVITIES

Enhancement or restoration activities in certain mitigation areas where the proposed habitat is BLH or swamp may include alterations to existing topography. This includes an array of potential actions such as lowering grades over relatively large areas, breaching or removal of existing berms and spoil banks, filling of drainage canals and ditches, construction of containment berms, etc. The construction process could involve mechanized clearing and grubbing of the areas to be graded followed by the actual grading work.

Prior to the clearing, grubbing, grading, and related earthwork activities, the exact limits of zones requiring clearing and grading/earthwork will be determined in the field and will be marked with protective barriers such as flagging, ropes, stakes, silt fence, enviro-fence, or a combination of such items. These marker barriers will remain in place until grading activities are completed. Prior to initiation of the clearing and grading/earthwork activities, silt fences or similar erosion/sediment control devices will also be installed at appropriate locations adjacent to existing wetlands to control erosion and sediment transport. These erosion/sediment control devices will remain in place until earthwork activities are completed and the disturbed areas are stabilized. Machinery/vehicle ingress and egress routes to the areas requiring earthwork will be restricted to avoid unnecessary damage to nearby upland and wetland areas.

Cleared vegetation will typically be removed from the mitigation site for disposal either within a duly licensed off-site disposal facility. There may be instances, however, where the cleared vegetation may be burned on-site or may be mulched on-site. Soil removed during the grading/earthwork process will either be disposed off-site in a licensed facility or used within the mitigation site as fill if the material is suitable and fill is needed. All other debris generated during the clearing and grading process will be disposed in a duly-licensed off-site facility.

If grading or other earthwork activities are necessary, the Mitigation Work Plan must include detailed plans depicting the required activities (ex. grading contours, cross-sections, stormwater pollution prevention plans, etc.). These plans will be developed by the USACE in coordination with the Interagency Team. The USACE will be responsible for the successful completion of all initial earthwork activities, subject to the provisions stated in the Introduction section. The NFS will typically be responsible for any subsequent earthwork activities necessary for the proper maintenance of the mitigation site, subject to the provisions stated in the Introduction section. However if the primary purpose of the initial grading/earthwork activities is to enhance site hydrology, then the USACE will typically be responsible for conducting any additional grading/earthwork activities necessary to ensure the hydrologic enhancement objectives (success criteria) are achieved, subject to the provisions contained in the Introduction section. Once it is demonstrated that these objectives have been satisfied, the NFS will then be responsible for any further earthwork activities needed to ensure proper maintenance, subject to the provisions mentioned in the Introduction section.

The construction of all proposed marsh habitats (fresh, intermediate, and brackish marshes) and the construction of some BLH restoration and swamp restoration features will be achieved by adding fill to

existing open water areas. The Mitigation Work Plan for such construction must include a detailed Stormwater Pollution Prevention Plan that minimizes potential impacts to adjacent natural habitats and minimizes degradation of water quality in off-site areas. The USACE will be responsible for preparation of this plan and for the successful completion of all initial construction activities, subject to the provisions found in the Introduction section. Once the applicable topographic success criteria have been achieved, the NFS will thereafter be responsible for any topographic alterations necessary to achieve mitigation success, subject to the provisions set forth in the Introduction section.

GUIDELINES FOR SURFACE WATER MANAGEMENT FEATURES AND STRUCTURES

Enhancement or restoration efforts in some mitigation areas may include construction of surface water management systems and/or installation of water conveyance or water control structures (ex. drainage culverts, flap gates, weirs). If such actions are necessary, the Mitigation Work Plan must include detailed plans for these activities as well as operational specifications if applicable. These plans and specifications will be developed by the USACE in coordination with the Interagency Team. The USACE will be responsible for the successful construction of any surface water management features, drainage structures, and water control structures, subject to the provisions discussed in the Introduction section. The NFS will typically be responsible for the subsequent maintenance and operation activities required, subject to the provisions set forth in the Introduction section.

It is noted that there is a strong preference for mitigation sites that are self-sustaining from a hydrologic perspective. While active water management might be needed in the short-term for establishment of plantings or other reasons, sites that require active hydrologic management to achieve long-term success should generally be avoided.

SWAMP HYDROLOGY GUIDELINES

The optimal hydrologic regime for baldcypress/tupelogum swamps involves both seasonal flooding and good surface water exchange between a particular swamp and adjacent systems. The typical hydroperiod should include several periods of flooding (inundation) and drawdown, or a “pulsing” hydrology. Surface water should be present for extended periods, especially during portions of the growing season, but should be absent (water table at or below the soil surface) by the end of the growing season in most years. At a minimum, standing surface water should be absent for approximately 2 months during the growing season once every 5 years. Abundant and consistent freshwater input from riverine systems is most desirable, as is relatively consistent surface water flow through the swamp during flooded periods. However, other sources of sheetflow into the swamp can be similarly beneficial. The main objective is to have sufficient surface water exchange between the swamp and adjacent habitats. Situations involving permanent flooding and/or no surface water exchange should be avoided when possible.

The following provides some general hydrologic guidelines for mitigation projects involving swamp restoration and for those mitigation projects involving swamp enhancement where enhancement of the existing hydrologic regime is a component of the mitigation work program. It is emphasized that these are merely guidelines and the attainment of one or more of these guidelines may not be possible in some situations.

- Strive for a minimum of about 200 consecutive days but no more than roughly 300 consecutive days of inundation (flooding). This period of inundation should overlap a portion of the growing season (preferably the early portion or late portion).
- Strive for a minimum of roughly 40 to 60 consecutive days during the growing season where the water table is at or below the soil surface (i.e. non-inundated period). This non-inundated period should preferably occur during the middle portion of the growing season. The non-inundated period should not exceed approximately 90 to 120 days.
- Strive to achieve an average maximum (peak) water table elevation that ranges between approximately 1.0 feet to 2.0 feet above the soil surface (i.e. depth of average peak inundation is 1.0 to 2.0 feet). Water table elevations greater than 2 feet above the soil surface may occur, however such occurrences should be of relatively short duration (i.e. brief “spikes” in the depth of inundation).

- Locate the mitigation area such that it naturally receives freshwater inputs via surface flow from adjacent lands and such that, during periods of inundation, there is good sheet flow through the mitigation area including a means for surface water discharge from the mitigation area. If the mitigation area cannot be located to attain these goals naturally, then mitigation activities should include actions to achieve these goals to the greatest degree practicable (e.g. include measures to provide for good surface water exchange between the swamp and adjacent systems), while at the same time not jeopardizing hydrology objectives pertaining to the swamp's hydroperiod.

WET BOTTOMLAND HARDWOOD HYDROLOGY GUIDELINES

The optimal hydrologic regime for wet bottomland hardwood (BLH) forests also involves both brief seasonal flooding and sufficient surface water exchange between the forest and adjacent systems. Wet BLH forests (BLH-Wet habitats) are commonly flooded for some portion of the year, although the timing, extent, depth, duration, and source of floodwaters can be highly variable. The hydroperiod commonly includes temporary flooding for brief periods during the growing season; however the water table is typically below the soil surface for the majority of the growing season. When flooding (inundation) does occur, freshwater input from riverine systems is most desirable as is relatively consistent surface water flow through the forest. Having good surface water exchange between the BLH forest and adjacent habitats is the primary objective, thus other sources of sheetflow into the forest besides riverine sources can be similarly beneficial.

The following provides some general hydrologic guidelines for mitigation projects involving BLH-Wet habitat restoration and for those mitigation projects involving BLH-Wet habitat enhancement where enhancement of the existing hydrologic regime is a component of the mitigation work program. These are simply guidelines and the attainment of one or more of these guidelines may not be possible in some situations.

- Avoid extended periods of inundation, particularly during the early portion of the growing season. Brief periods of flooding typically should occur during the winter and early spring, but the water table should be greater than 1 foot below the soil surface for an extended period during the growing season.
- The hydroperiod should be such that the forest is irregularly inundated or soils are saturated to the soil surface for a period ranging from approximately 15 to 30 days during the growing season.
- Locate the mitigation area such that it naturally receives occasional freshwater inputs via surface flow from adjacent lands and such that, during periods of inundation, there is good sheet flow through the mitigation area including a means for surface water discharge from the mitigation area. If the mitigation area cannot be located to attain these goals naturally, then mitigation activities should include actions to achieve these goals to the greatest degree practicable (e.g. include measures to provide for good surface water exchange between the BLH forest and adjacent systems), while at the same time not jeopardizing hydrology objectives pertaining to the forest's hydroperiod.

MITIGATION SUCCESS CRITERIA AND MITIGATION MONITORING: BOTTOMLAND HARDWOOD MITIGATION FEATURES (BLH-Wet and BLH-Dry)

MITIGATION SUCCESS CRITERIA

The success (performance) criteria described herein are applicable to both proposed BLH-Wet habitats and BLH-Dry habitats, unless otherwise indicated.

1. General Construction

A. As applicable, complete all necessary initial earthwork and related construction activities in Mitigation TY1 (2014), and in accordance with the mitigation work plan as well as the final project plans and specifications. The necessary activities will vary with the mitigation site. Examples include, but are not limited to: clearing, grubbing, and grading activities; construction of new water management features (weirs, flap-gates, diversion ditches, etc.); modifications/alterations to existing water control structures and surface water management systems; construction of perimeter containment dikes and installation of fill (dredged sediments or other soil). These requirements classify as initial success criteria.

B. For mitigation features established in existing open water areas, complete all final construction activities in Mitigation TY2 (2015), and in accordance with the mitigation work plan as well as the final project plans and specifications. The necessary activities will vary with the mitigation site. Examples include, but are not limited to: degrading or "gapping" of perimeter retention dikes; construction of water management structures (weirs, etc.). These requirements classify as initial success criteria.

2. Native Vegetation

A. Complete initial planting of canopy and midstory species in accordance with the authorized initial planting plan. This requirement classifies as an initial success criterion.

B. 1 Year Following Completion of Initial Plantings (at end of first growing season following the year plants are first installed) –

- Achieve a minimum average survival of 50% of planted canopy species (i.e. achieve a minimum average canopy species density of 269 seedlings/ac.). The surviving plants must approximate the species composition and the species percentages specified in the initial plantings component of the Mitigation Work Plan. These criteria will apply to the initial plantings as well as any subsequent replantings necessary to achieve this initial success requirement.
- Achieve a minimum average survival of 85% of planted midstory species (i.e. achieve a minimum average midstory species density of 114 seedlings/ac.). The surviving plants must approximate the species composition percentages specified in the initial plantings component of the Mitigation Work Plan. These criteria will apply to the initial plantings as well as any subsequent replantings necessary to achieve this initial success requirement.
- The requirements above classify as initial success criteria.

C. 4 Years Following Completion of Initial Plantings –

- Achieve a minimum average density of 300 living native canopy species per acre (planted trees and/or naturally recruited native canopy species).
- Achieve a minimum average density of 120 living, native, hard mast-producing species in the canopy stratum but no more than approximately 150 living hard-mast producing species in the canopy stratum (planted trees and/or naturally recruited native canopy species). The remaining trees in the canopy stratum must be comprised of soft-mass producing native species. These criteria will thereafter remain in effect for the duration of the overall monitoring period. Modifications to these criteria could be necessary for reasons such as avoidance of tree thinning if thinning is not warranted and the long-term effects of sea level rise on tree survival. Proposed modifications must first be approved by the USACE in coordination with the Interagency Team.
- Achieve a minimum average density of 85 living native midstory species per acre (planted midstory and/or naturally recruited native midstory species).
- For BLH-Wet habitats only -- Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria. This criterion (requirement) will thereafter remain in effect for the duration of the overall monitoring period.
- The requirements above classify as intermediate success criteria; with the exception that the requirement to demonstrate vegetation satisfies USACE hydrophytic vegetation criteria throughout the duration of the overall monitoring period classifies as a long-term success criterion.

D. Within 10 Years Following Completion of Initial Plantings –

- Attain a minimum average cover of 80% by planted canopy species and/or naturally recruited native canopy species. This criterion will thereafter remain in effect for the duration of the overall monitoring period. This requirement to meet the specified minimum average cover within 10 years following completion of initial plantings classifies as an intermediate success criterion. The requirement to meet the specified minimum average cover for the duration of the overall monitoring period classifies as a long-term success criterion.

E. 15 Years Following Completion of Initial Plantings –

- Achieve a minimum average density of 75 living native plants per acre in the midstory stratum (planted midstory and/or naturally recruited native midstory species). This requirement classifies as an intermediate success criterion.

F. 25 Years Following Completion of Initial Plantings –

- Average cover by native species in the midstory stratum must be greater than 20% but cannot exceed 50%. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- Average cover by native species in the understory stratum must be greater than 30% but cannot exceed 60%. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- The requirements above classify as long-term success criteria.

Note: The requirement that the above criteria remain in effect for the duration of the overall monitoring period may need to be modified later due to factors such as the effect of sea level rise on vegetative cover. Proposed modifications must first be approved by the USACE in coordination with the Interagency Team.

3. Invasive and Nuisance Vegetation

A. Complete the initial eradication of invasive and nuisance plant species. This requirement classifies as an initial success criterion.

B. Maintain all areas such that they are essentially free from invasive and nuisance plant species immediately following a given maintenance event and such that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5% of the total average plant cover during periods between maintenance events. Note -These criteria must be satisfied throughout the duration of the overall monitoring period. Until such time that monitoring responsibilities are transferred from the USACE to the NFS, this requirement classifies as an initial success criterion. Following the transfer of monitoring responsibilities, this requirement classifies as a long-term success criterion.

4. Topography

A. For mitigation features requiring earthwork to attain desired grades (excluding areas restored from existing open water features) – Following completion of initial construction activities (anticipated in TY1, 2014), demonstrate that at least 80% of the total graded area within each feature is within approximately 0.5 feet of the proposed target soil surface elevation (e.g. the desired soil surface elevation). This requirement classifies as an initial success criterion.

B. For mitigation features restored from existing open water areas – (a) In the year that final construction activities are completed (anticipated in TY2, 2015), demonstrate that at least 80% of the total graded area within each feature is within approximately 0.5 feet of the proposed target soil surface elevation (e.g. the desired soil surface elevation), and; (b) In the year after final construction activities are completed, demonstrate that at least 85% of the total graded area within each feature is within approximately 0.5 feet of the proposed target soil surface elevation. These requirements classify as initial success criteria.

5. Thinning of Native Vegetation (Timber Management)

The USACE, in cooperation with the Interagency Team, may determine that thinning of the canopy and/or midstory strata is warranted to maintain or enhance the ecological value of the site. This determination will be made approximately 15 to 20 years following completion of initial plantings. If it is decided that timber management efforts are necessary, the NFS will develop a Timber Stand Improvement/Timber Management Plan, and associated long-term success criteria, in coordination with the USACE and Interagency Team. Following approval of the plan, the NFS will perform the necessary thinning operations and demonstrate these operations have been successfully completed. Timber management activities will only be allowed for the purposes of ecological enhancement of the mitigation site.

6. Hydrology (applicable to BLH-Wet habitats only)

A. In a year having essentially normal rainfall, demonstrate that the water table is less than or equal to 12 inches below the soil surface for a period of at least 14 consecutive days. This requirement classifies as an intermediate success criterion.

B. If the mitigation program includes actions intended to enhance site hydrology or hydroperiod, demonstrate that the affected site is irregularly inundated or soils are saturated to the soil surface for a period ranging from 7% to approximately 13% of the growing season during a year having essentially normal rainfall. The Mitigation Work Plan for a specific site may establish more specific hydrologic enhancement goals. If this is the case, demonstrate attainment of the specific goals identified in the plan. These hydrology/hydroperiod requirements classify as long-term success criteria.

MITIGATION MONITORING GUIDELINES

The following guidelines for mitigation monitoring and reporting are applicable to both BLH-Wet and BLH-Dry habitats unless otherwise indicated.

"Time Zero" Monitoring Report (Monitoring Report #1)

Shortly after completion of all initial mitigation activities (e.g. initial eradication of invasive and nuisance plants, first/initial planting of native species, completion of initial earthwork, grading, surface water management system alterations/construction, etc.), the mitigation site will be monitored and a "time zero" or "baseline" monitoring report prepared. Information provided will typically include the following items:

- A detailed discussion of all mitigation activities completed.
- A description of the various features and habitats within the mitigation site.
- A plan view drawing of the mitigation site showing the approximate boundaries of different mitigation features (ex. planted areas, areas only involving eradication of invasive and nuisance plant species; surface water management features, etc.), monitoring transect locations, sampling plot locations, photo station locations, and, if applicable, piezometer and staff gage locations.
- An as-built survey of finished grades for any relatively large areas subject to topographic alterations and an as-built survey of any surface water drainage features, drainage culverts, and/or water control structures constructed. Detailed surveys of topographic alterations simply involving the removal of existing linear features such as berms/spoil banks, or involving the filling of existing linear ditches or canals, will not be required. However, the as-built survey will include spot cross-sections of such features sufficient to represent typical conditions. The as-built survey must include a survey of areas where existing berms, spoil banks, or levees have been breached in sporadic locations. For mitigation areas involving habitat restoration in existing open water areas, the as-built survey must include a topographic survey of the entire restoration feature.
- A detailed inventory of all canopy and midstory species planted, including the number of each species planted and the stock size planted. In addition, provide a breakdown itemization indicating the number of each species planted in a particular portion of the mitigation site and correlate this itemization to the various areas depicted on the plan view drawing of the mitigation site.

Additional Monitoring Reports

All monitoring reports generated after the initial "time zero" report will typically provide the following information unless otherwise noted:

- A plan view drawing of the mitigation site showing the approximate boundaries of different mitigation features (ex. planted areas, areas only involving eradication of invasive and nuisance plant species; surface water management features, etc.), monitoring transect locations, sampling plot locations, photo station locations, and, if applicable, piezometer and staff gage locations.

- A brief description of maintenance and/or management and/or mitigation work performed since the previous monitoring report along with a discussion of any other significant occurrences.

- Photographs documenting conditions in the mitigation site at the time of monitoring. Photos will be taken at permanent photo stations within the mitigation site. At least two photos will be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next. The number of photo stations required as well as the locations of these stations will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. For mitigation features involving habitat enhancement rather than restoration, the permanent photo stations will primarily be established in areas slated for planting of canopy and midstory species, but some may also be located in areas where plantings are not needed.

- Quantitative plant data collected from permanent monitoring plots measuring approximately 90 feet X 90 feet in size or from circular plots having a radius of approximately 53 feet. Data recorded in each plot will include: number of living planted canopy species present and the species composition; number of living planted midstory species present and the species composition; average density of all native species in the canopy stratum, the total number of each species present, and the wetland indicator status of each species; average cover by native species in the canopy stratum; average density of all native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species; average cover by native species in the midstory stratum; average percent cover accounted for by invasive plant species (all vegetative strata combined); average percent cover accounted for by nuisance plant species (all vegetative strata combined). The permanent monitoring plots will be located within mitigation areas where initial planting of canopy and midstory species is necessary. The number of plots required as well as the locations of these plots will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. Typically there will be at least one monitoring plot for every 20 acres planted.

- Quantitative plant data collected from either: (1) permanent transects sampled using the point-centered quarter method with a minimum of 20 sampling points established along the course of each transect, or; (2) permanent belt transects approximately 50 feet wide. The number of transects necessary as well as the location and length of each transect will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. Data recorded from the sampling transects will include: average density of living planted canopy species present and the species composition; average density of living planted midstory species present and the species composition; average density of all native species in the canopy stratum along with the species composition and the wetland indicator status of each species; average percent cover by all native species in the canopy stratum; average height of native species in the canopy stratum; average density of native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species; average percent cover by native species in the midstory stratum; average height of native species in the midstory stratum; if present, average percent cover accounted for by invasive and nuisance species present in the canopy and midstory strata (combined).

- Quantitative data concerning plants in the understory (ground cover) stratum and concerning invasive and nuisance plant species will be gathered from sampling quadrats. These sampling quadrats will be established either along the axis of the belt transects discussed above, or at sampling points established along point-centered quarter transects discussed above, depending on which sampling method is used. Each sampling quadrat will be approximately 2 meters X 2 meters in size. The total number of sampling quadrats needed along each sampling transect will be determined by the USACE

with the Interagency Team and will be specified in the Mitigation Monitoring Plan. Data recorded from the sampling quadrats will include: average percent cover by native subcanopy species; composition of native subcanopy species and the wetland indicator status of each species; average percent cover by invasive plant species; average percent cover by nuisance plant species.

- For BLH-Wet habitats only -- A summary of rainfall data collected during the year preceding the monitoring report based on rainfall data recorded at a station located on or in close proximity to the mitigation site. Once all hydrology success criteria have been achieved, collection and reporting of rainfall data will no longer be required.

- For BLH-Wet habitats only -- A summary of water table elevation data collected from piezometers coupled with staff gages installed within the mitigation site. Data (water table elevations) will be collected at least bi-weekly. Once the monitoring indicates the water table may be rising to an elevation that would meet hydrologic success criteria, water table elevations will be collected on a daily basis until it is evident the success criteria has been satisfied. The schedule of water table elevation readings can shift back to a bi-weekly basis for the remainder of the monitoring period. The number of piezometers and staff gages required as well as the locations of these devices will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. Once hydrology success criteria have been satisfied, water table monitoring will no longer be required. However, monitoring reports generated subsequent to the attainment of success criteria will include a general discussion of water levels and hydroperiod based on qualitative observations.

- Various qualitative observations will be made in the mitigation site to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimates of the average percent cover by native plant species in the canopy, midstory, and understory strata; general estimate of the average percent cover by invasive and nuisance plant species; general estimates concerning the growth of planted canopy and midstory species; general observations concerning the colonization by volunteer native plant species. General observations made during the course of monitoring will also address potential problem zones, general condition of native vegetation, trends in the composition of the plant communities, wildlife utilization as observed during monitoring, and other pertinent factors.

- For mitigation features restored from existing open water areas, provide an as-built topographic survey of all such mitigation features in the year immediately following the “time zero” monitoring event. No additional topographic surveys will typically be required following this second survey. However if the second survey indicates topographic success criteria have not been achieved and supplemental topographic alterations are necessary, then another topographic survey may be required following completion of the supplemental alterations. This determination will be made by USACE in coordination with the Interagency Team.

- A summary assessment of all data and observations along with recommendations as to actions necessary to help meet mitigation and management/maintenance goals and mitigation success criteria.

- A brief description of anticipated maintenance/management work to be conducted during the period from the current monitoring report to the next monitoring report.

Monitoring Reports Involving Timber Management Activities

In cases where timber management activities (thinning of trees and/or shrubs in the canopy and/or midstory strata) have been approved by the USACE in coordination with the Interagency Team, monitoring will be required in the year immediately preceding and in the year following completion of the timber management activities (i.e. pre-timber management and post-timber management reports). These reports must include data and information that are in addition to the typical monitoring requirements. The NFS’s proposed Timber Stand Improvement/Timber Management Plan must include the proposed monitoring data and information that will be included in the pre-timber management and post-timber management monitoring reports. The

proposed monitoring plan must be approved by the USACE in coordination with the Interagency Team prior to the monitoring events and implementation of the timber management activities.

Monitoring Reports Following Re-Planting Activities

Re-planting of certain areas within the mitigation site may be necessary to ensure attainment of applicable native vegetation success criteria. Any monitoring report submitted following completion of a re-planting event must include an inventory of the number of each species planted and the stock size used. It must also include a depiction of the areas re-planted, cross-referenced to a listing of the species and number of each species planted in each area.

MITIGATION MONITORING SCHEDULE AND RESPONSIBILITIES

Monitoring will typically take place in late summer of the year of monitoring, but may be delayed until later in the growing season due to site conditions or other unforeseen circumstances. Monitoring reports will be submitted by December 31 of each year of monitoring. Monitoring reports will be provided to the USACE, the NFS, and the agencies comprising the Interagency Team. . The various monitoring and reporting responsibilities addressed in this section are all subject to the provisions set forth in the Introduction section.

The USACE will be responsible for conducting the monitoring events and preparing the associated monitoring reports until such time that the following mitigation success criteria are achieved (criteria follow numbering system used in success criteria section):

1. General Construction – 1.A or 1.B, as applicable.
2. Native Vegetation – A and B.
3. Invasive & Nuisance Vegetation – A, plus B until such time as monitoring responsibilities are transferred to the NFS.
4. Topography – A, as applicable, or B, as applicable.

Monitoring events associated with the above will include the “time zero” (first or baseline) monitoring event plus annual monitoring events thereafter until the monitoring responsibilities are transferred to the NFS. The years applicable to these monitoring events will vary depending on the type of mitigation involved (restoration or enhancement) and site conditions present at the time mitigation activities are initiated. For example, the first monitoring event may occur in 2014 (TY2) for certain mitigation sites while this event may not occur until 2015 (TY3) for other mitigation sites.

The NFS will be responsible for conducting the required monitoring events and preparing the associated monitoring reports after the USACE has demonstrated the mitigation success criteria listed above have been achieved. The overall responsibility for management, maintenance, and monitoring of the mitigation will typically be transferred to the Sponsor during the first quarter of the year immediately following submittal of the monitoring report that demonstrates attainment of said criteria, subject to the provisions identified in the Introduction section.

Once monitoring responsibilities have been transferred to the NFS, the next monitoring event will typically take place during the year that attainment of success criterion 2.C (native vegetation criterion applicable 4 years after completion of initial plantings) must be demonstrated. Thereafter, monitoring will typically be conducted every 5 years throughout the 50-year period of analysis (based on 50-year period of analysis beginning in 2013 (TY0) and ending in 2063 (TY50)).

If the initial survival criteria for planted canopy and midstory species are not achieved (i.e. the 1-year survival criteria specified in native vegetation success criteria 2.B), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that all survival criteria have been satisfied (i.e. that corrective actions were successful). The USACE will be responsible for conducting this additional monitoring and preparing the monitoring reports. The USACE will also be responsible for the purchase and installation of supplemental plants needed to attain this success criterion, subject to the provisions mentioned in the Introduction section.

If the native vegetation success criteria specified for 4 years following completion of initial plantings are not achieved (i.e. native vegetation success criteria 2.C), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that these criteria have been satisfied. The NFS will be responsible for conducting this additional monitoring and preparing the monitoring reports. The NFS will also be responsible for the purchase and installation of supplemental plants needed to attain these success criteria.

If timber management activities conducted in the mitigation features by the NFS, the NFS will be responsible for conducting the additional monitoring and preparing the associated monitoring reports necessary for such activities (e.g. one monitoring event and report in the year immediately preceding timber management activities and one monitoring event and report in the year that timber management activities are completed).

The year in which mitigation features are first planted, a key milestone triggering the start of mitigation monitoring, may vary depending on the type of mitigation involved and the mitigation construction activities involved. In certain cases, it is also possible that the BLH mitigation features may be established along with other mitigation features like swamp or marsh habitats at the same mitigation site. Such factors make it necessary to develop a reasonable and efficient monitoring schedule at the time final mitigation plans are generated. This schedule must be in general accordance with the guidance provided above and will be prepared by the USACE in coordination with the Interagency Team and the NFS.

Once monitoring responsibilities have transferred to the NFS, the NFS will retain the ability to modify the monitoring plan and the monitoring schedule should this become necessary due to unforeseen events or to improve the information provided through monitoring. Twenty years following completion of initial plantings, the number of monitoring plots and/or monitoring transects that must be sampled during monitoring events may be reduced substantially if it is clear that mitigation success is proceeding as anticipated. Any significant modifications to the monitoring plan or the monitoring schedule must first be approved by the USACE in coordination with the Interagency Team.

MITIGATION SUCCESS CRITERIA AND MITIGATION MONITORING: SWAMP MITIGATION FEATURES

MITIGATION SUCCESS CRITERIA

The success criteria specified herein apply to both swamp restoration projects and swamp enhancement projects unless otherwise indicated.

1. General Construction

A. As applicable, complete all necessary initial earthwork and related construction activities in Mitigation TY1 (2014) and in accordance with the mitigation work plan as well as the final project plans and specifications. The necessary activities will vary with the mitigation site. Examples include, but are not limited to: clearing, grubbing, and grading activities; construction of new water management features (weirs, flap-gates, diversion ditches, etc.); modifications/alterations to existing water control structures and surface water management systems; construction of perimeter containment dikes and installation of fill (dredged sediments or other soil). These requirements classify as initial success criteria.

B. For mitigation features established in existing open water areas, complete all final construction activities in Mitigation TY2 (2015), in accordance with the mitigation work plan as well as the final project plans and specifications. The necessary activities will vary with the mitigation site. Examples include, but are not limited to: degrading or “gapping” of perimeter retention dikes; construction of water management structures (weirs, etc.). These requirements classify as initial success criteria.

2. Native Vegetation

A. Complete initial planting of canopy and midstory species in accordance with the authorized initial planting plan. This requirement classifies as an initial success criterion.

B. 1 Year Following Completion of Initial Plantings (at end of first growing season following the year plants are first installed) –

- Achieve a minimum average survival of 50% of planted canopy species (i.e. achieve a minimum average canopy species density of 269 seedlings/ac.). The surviving plants must approximate the species composition and the species percentages specified in the initial plantings component of the Mitigation Work Plan. These criteria will apply to the initial plantings as well as any subsequent replantings necessary to achieve this initial success requirement.
- Achieve a minimum average survival of 85% of planted midstory species (i.e. achieve a minimum average midstory species density of 114 seedlings/ac.). The surviving plants must approximate the species composition percentages specified in the initial plantings component of the Mitigation Work Plan. These criteria will apply to the initial plantings as well as any subsequent replantings necessary to achieve this initial success requirement.
- The requirements above classify as initial success criteria.

C. 4 Years Following Completion of Initial Plantings –

- Achieve a minimum average density of 250 living native canopy species per acre (planted trees and/or naturally recruited native canopy species).
- Achieve a minimum average density of 125 living baldcypress trees (planted trees and/or naturally recruited native canopy species). The species composition of the additional native canopy species present must be generally consistent with the planted ratios for such species.
- Achieve a minimum average density of 85 living native midstory species per acre (planted midstory and/or naturally recruited native midstory species).
- Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- The requirements above classify as intermediate success criteria; with the exception that the requirement to demonstrate vegetation satisfies USACE hydrophytic vegetation criteria throughout the duration of the overall monitoring period classifies as a long-term success criterion.

D. Within 15 Years Following Completion of Initial Plantings –

- Achieve one of the two following vegetative cover requirements:
  1. The average percent cover by native species in the canopy stratum is at least 50%, <u>and</u>; the average percent cover by native species in the midstory stratum exceeds 33%, <u>and</u>; the average percent cover by native species in the ground cover stratum (herbaceous cover) exceeds 33%.
  2. The average percent cover by native species in the canopy stratum is at least 75%, and: (a) the average percent cover by native species in the midstory stratum exceeds 33%, or; (b) the average percent cover by native species in the ground cover stratum (herbaceous cover) exceeds 33%.
- The requirements above classify as intermediate success criteria.

E. Within 45 Years Following Completion of Initial Plantings –

- Demonstrate that the average diameter at breast height (DBH) of living baldcypress trees exceeds 10 inches. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- Demonstrate that the average DBH of the other living native trees in the canopy stratum (trees other than baldcypress) exceeds 12 inches. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- Demonstrate that the average total basal area accounted for by all living native trees in the canopy stratum combined exceeds approximately 161 square feet per acre. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- The requirements above classify as long-term success criteria.

F. 45 Years Following Completion of Initial Plantings –
- Demonstrate that a minimum of 160 living native trees remain in the canopy stratum.
- Demonstrate that either success criteria D.1 or D.2 above have been maintained.
- The requirements above classify as long-term success criteria.

Note: The above requirements may need to be modified later due to factors such as the effects of sea level rise or salinity on vegetative cover. Proposed modifications must first be approved by the USACE in coordination with the Interagency Team.

3. Invasive and Nuisance Vegetation

A. Complete the initial eradication of invasive and nuisance plant species. This requirement classifies as an initial success criterion.

B. Maintain all areas such that they are essentially free from invasive and nuisance plant species immediately following a given maintenance event and such that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5% of the total average plant cover during periods between maintenance events. These criteria must be satisfied throughout the duration of the overall monitoring period. Until such time that monitoring responsibilities are transferred from the USACE to the NFS, this requirement classifies as an initial success criterion. Following the transfer of monitoring responsibilities, this requirement classifies as a long-term success criterion.

4. Topography

A. For mitigation features requiring earthwork to attain desired grades (excluding areas restored from existing open water features – Following completion of initial construction activities (anticipated in TY1, 2014), demonstrate that at least 80% of the total graded area within each feature is within approximately 0.5 feet of the proposed target soil surface elevation (e.g. the desired soil surface elevation). This requirement classifies as an initial success criterion.

B. For mitigation features restored from existing open water areas – (a) In the year that final construction activities are completed (anticipated in TY2, 2015), demonstrate that at least 80% of the total graded area within each feature is within approximately 0.5 feet of the proposed target soil surface elevation (e.g. the desired soil surface elevation), and; (b) In the year after final construction activities are completed, demonstrate that at least 85% of the total graded area within each feature is within approximately 0.5 feet of the proposed target soil surface elevation. These requirements classify as initial success criteria.

5. Thinning of Native Vegetation (Timber Management)

The USACE, in cooperation with the Interagency Team, may determine that thinning of the canopy and/or midstory strata is warranted to maintain or enhance the ecological value of the site. This determination will likely be made after it is demonstrated that the average total basal area accounted for by living native canopy species exceeds 170 square feet per acre. If it is decided that timber management efforts are necessary, the NFS will develop a Timber Stand Improvement/Timber Management Plan, and associated long-term success criteria, in coordination with the USACE and Interagency Team. Following approval of the plan, the NFS will perform the necessary thinning operations and will demonstrate the successful completion of these operations. Timber management activities will only be allowed for the purposes of ecological enhancement of the mitigation site.

6. Hydrology

The following applies to mitigation features involving swamp restoration and to those involving swamp enhancement where hydrologic enhancement is a component of the mitigation program.

A. In a year having essentially normal rainfall, demonstrate compliance with each of the following criteria:

- Achieve inundation of the majority of the mitigation area for a minimum of 200 consecutive days but for no more than approximately 300 consecutive days, preferably with periods of inundation overlapping a portion of the growing season.
- Achieve non-inundation of the majority of the mitigation (water table at or below the soil surface) for a minimum of approximately 60 consecutive days but for no more than approximately 90 consecutive days, preferably during the period from June through August.
- The average maximum (peak) water table elevation must range between approximately 1.0 feet to 2.0 feet above the soil surface.
- The requirements above classify as intermediate success criteria.

Note: The specific mitigation work program generated for the mitigation area may include deviations from one or more of the above criteria to better reflect the desired wetland hydroperiod. Such deviations must be approved by the USACE in coordination with the Interagency Team, and would supersede the above criteria once approved.

The following applies to swamp enhancement mitigation areas where hydrologic enhancement is not a component of the mitigation program.

B. In a year having essentially normal rainfall, demonstrate that the water table is less than or equal to 12 inches below the soil surface for a period of at least 14 consecutive days. This requirement classifies as an intermediate success criterion.

MITIGATION MONITORING GUIDELINES

"Time Zero" Monitoring Report (Monitoring Report #1)

Shortly after completion of all initial mitigation activities (e.g. initial eradication of invasive and nuisance plants, first/initial planting of native species, completion of initial earthwork, grading, surface water management system alterations/construction, etc.), the mitigation site will be monitored and a "time zero" or "baseline" monitoring report prepared. Information provided will typically include the following items:

- A detailed discussion of all mitigation activities completed.

- A description of the various features and habitats within the mitigation site.

- A plan view drawing of the mitigation site showing the approximate boundaries of different mitigation features (ex. planted areas, areas only involving eradication of invasive and nuisance plant species; surface water management features, etc.), monitoring transect locations, sampling plot locations, photo station locations, and piezometer and staff gage locations.

- An as-built survey of finished grades for any relatively large areas subject to topographic alterations and an as-built survey of any surface water drainage features, drainage culverts, and/or water control structures constructed. Detailed surveys of topographic alterations simply involving the removal of existing linear features such as berms/spoil banks, or involving the filling of existing linear ditches or canals, will not be required. However, the as-built survey will include spot cross-sections of such features sufficient to represent typical conditions. The as-built survey must include a survey of areas where existing berms, spoil banks, or levees have been breached in sporadic locations. For mitigation features involving habitat restoration in existing open water areas, the as-built survey must include a topographic survey of the entire restoration feature.

- A detailed inventory of all canopy and midstory species planted, including the number of each species planted and the stock size planted. In addition, provide a breakdown itemization indicating the number of each species planted in a particular portion of the mitigation site and correlate this itemization to the various areas depicted on the plan view drawing of the mitigation site.

Additional Monitoring Reports

All monitoring reports generated after the initial "time zero" report will typically provide the following information unless otherwise noted:

- A plan view drawing of the mitigation site showing the approximate boundaries of different mitigation features (ex. planted areas, areas only involving eradication of invasive and nuisance plant species; surface water management features, etc.), monitoring transect locations, sampling plot locations, photo station locations, and piezometer and staff gage locations.

- A brief description of maintenance and/or management and/or mitigation work performed since the previous monitoring report along with a discussion of any other significant occurrences.

- Photographs documenting conditions in the mitigation site at the time of monitoring. Photos will be taken at permanent photo stations within the mitigation site. At least two photos will be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next. The number of photo stations required as well as the locations of these stations will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. Permanent photo stations will primarily be established in areas slated for planting of canopy and midstory species. For mitigation involving swamp enhancement, some photo stations may also be located in areas where plantings are not needed.

- Quantitative plant data collected from permanent monitoring plots measuring approximately 80 feet X 80 feet in size. Data recorded in each plot will include: number of living planted canopy species present and the species composition; number of living planted midstory species present and the species composition; average density of all native species in the canopy stratum, the total number of each species present, and the wetland indicator status of each species; average percent cover by native species in the canopy stratum; average density of all native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species; average percent cover by native species in the midstory stratum; average percent cover accounted for by invasive plant species (all vegetative strata combined); average percent cover accounted for by nuisance plant species (all vegetative strata combined). In addition to these data, the following information will be recorded for native tree species in the canopy stratum: the average diameter at breast height (DBH; expressed in inches) of baldcypress trees; average DBH of all other native tree species excluding baldcypress; the average total basal area of living native trees (expressed in square feet per acre). The DBH of planted canopy species will not need to be documented until the average DBH of these trees reaches approximately 2 inches. Total basal area data will also not need to be documented until such time that the average total basal area is estimated to exceed approximately 100 square feet per acre. The permanent monitoring plots will typically be located within mitigation areas where initial planting of canopy and midstory species is necessary. The number of plots required as well as the locations of these plots will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan.

- Quantitative data concerning plants in the understory (ground cover) stratum and concerning invasive and nuisance plant species will be gathered from permanent sampling quadrats nested within the permanent monitoring plots described above. There will be a total of 4 quadrats with each quadrat measuring approximately 2 meters X 2 meters in size. Data recorded from the sampling quadrats will include: average percent cover by native ground cover species; composition of native ground cover species and the wetland indicator status of each species; average percent cover by invasive plant species; average percent cover by nuisance plant species.

- Quantitative plant data collected from either: (1) permanent transects sampled using the point-centered quarter method with a minimum of 20 sampling points established along the course of each transect, or; (2) permanent belt transects approximately 50 feet wide. The number of transects necessary as well as

the location and length of each transect will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. Data recorded from the sampling transects will include: average density of living planted canopy species present and the species composition; average density of living planted midstory species present and the species composition; average density of all native species in the canopy stratum along with the species composition and the wetland indicator status of each species; average percent cover by all native species in the canopy stratum; average density of native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species; average percent cover by native species in the midstory stratum; if present, average percent cover accounted for by invasive and nuisance species present in the canopy and midstory strata (combined). In addition to these data, the following information will be recorded for native tree species in the canopy stratum: the average diameter at breast height (DBH; expressed in inches) of baldcypress trees; average DBH of all other native tree species excluding baldcypress; the average total basal area of living native trees (expressed in square feet per acre). The DBH of planted canopy species will not need to be documented until the average DBH of these trees reaches approximately 2 inches. Total basal area data will also not need to be documented until such time that the average total basal area is estimated to exceed approximately 100 square feet per acre.

- Quantitative data concerning plants in the understory (ground cover) stratum and concerning invasive and nuisance plant species will be gathered from sampling quadrats. These sampling quadrats will be established either along the axis of the belt transects discussed above, or at sampling points established along point-centered quarter transects discussed above, depending on which sampling method is used. Each sampling quadrat will be approximately 2 meters X 2 meters in size. The total number of sampling quadrats needed along each sampling transect will be determined by the USACE with the Interagency Team and will specify be specified in the Mitigation Monitoring Plan. Data recorded from the sampling quadrats will include: average percent cover by native ground cover species; composition of native ground cover species and the wetland indicator status of each species; average percent cover by invasive plant species; average percent cover by nuisance plant species.

- A summary of rainfall data collected during the year preceding the monitoring report based on rainfall data recorded at a station located on or in close proximity to the mitigation site. Once all hydrology success criteria have been achieved, collection and reporting of rainfall data will no longer be required.

- A summary of water table elevation data collected from piezometers coupled with staff gages installed within the mitigation site. The number of piezometers and staff gages required as well as the locations of these devices will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. Data (water table elevations) will be collected at least bi-weekly throughout the year. For mitigation areas involving swamp enhancement where hydrologic enhancement is not a component of the mitigation program, it may also be necessary to collect water table elevations on a daily basis over the course of 3 to 4 weeks in order to demonstrate that the water table is less than or equal to 12 inches below the soil surface for a period of at least 14 consecutive days during the growing season. Once it is demonstrated that all applicable hydrology success criteria have been satisfied, water table monitoring will no longer be required. However, monitoring reports generated subsequent to the attainment of success criteria will include a general discussion of water levels and hydroperiod based on qualitative observations.

- Various qualitative observations will be made in the mitigation site to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimates of the average percent cover by native plant species in the canopy, midstory, and ground cover strata; general estimate of the average percent cover by invasive and nuisance plant species; general estimates concerning the growth of planted canopy and midstory species; general observations concerning the colonization by volunteer native plant species; general observations regarding the growth of non-planted native species in the canopy and midstory strata. General observations made during the course of monitoring will also address potential problem zones, general condition of native vegetation, trends in the

composition of the plant communities, wildlife utilization as observed during monitoring, and other pertinent factors.

- For mitigation features restored from existing open water areas, provide an as-built topographic survey of all such mitigation features in the year immediately following the "time zero" monitoring event. No additional topographic surveys will typically be required following this second survey. However if the second survey indicates topographic success criteria have not been achieved and supplemental topographic alterations are necessary, then another topographic survey may be required following completion of the supplemental alterations. This determination will be made by USACE in coordination with the Interagency Team.

- A summary assessment of all data and observations along with recommendations as to actions necessary to help meet mitigation and management/maintenance goals and mitigation success criteria.

- A brief description of anticipated maintenance/management work to be conducted during the period from the current monitoring report to the next monitoring report.

Monitoring Reports Involving Timber Management Activities

In cases where timber management activities (thinning of trees and/or shrubs in the canopy and/or midstory strata) have been approved by the USACE in coordination with the Interagency Team, monitoring will be required in the year immediately preceding and in the year following completion of the timber management activities (i.e. pre-timber management and post-timber management reports). These reports must include data and information that are in addition to the typical monitoring requirements. The NFS's proposed Timber Stand Improvement/Timber Management Plan must include the proposed monitoring data and information that will be included in the pre-timber management and post-timber management monitoring reports. The proposed monitoring plan must be approved by the USACE in coordination with the Interagency Team prior to the monitoring events and implementation of the timber management activities.

Monitoring Reports Following Re-Planting Activities

Re-planting of certain areas within the mitigation site may be necessary to ensure attainment of applicable native vegetation success criteria. Any monitoring report submitted following completion of a re-planting event must include an inventory of the number of each species planted and the stock size used. It must also include a depiction of the areas re-planted, cross-referenced to a listing of the species and number of each species planted in each area.

MITIGATION MONITORING SCHEDULE AND RESPONSIBILITIES

Monitoring will typically take place in late summer of the year of monitoring, but may be delayed until later in the growing season due to site conditions or other unforeseen circumstances. Monitoring reports will be submitted by December 31 of each year of monitoring. Monitoring reports will be provided to the USACE, the NFS, and the agencies comprising the Interagency Team. The various monitoring and reporting responsibilities addressed in this section are all subject to the provisions set forth in the Introduction section.

The USACE will be responsible for conducting the monitoring events and preparing the associated monitoring reports until such time that the following mitigation success criteria are achieved (criteria follow numbering system used in success criteria section):

1. General Construction – 1.A or 1.B, as applicable.
2. Native Vegetation – A and B.
3. Invasive & Nuisance Vegetation – A, plus B until such time as monitoring responsibilities are transferred to the NFS.
4. Topography – A, as applicable, or B, as applicable.

Monitoring events associated with the above will include the "time zero" (first or baseline) monitoring event plus annual monitoring events thereafter until the mitigation monitoring responsibility is transferred to the NFS. The years applicable to these monitoring events will vary depending on the type of mitigation involved (restoration or enhancement) and site conditions present at the time mitigation activities are initiated. For example, the first monitoring event may occur in 2014 (TY2) for certain mitigation sites while this event may not occur until 2015 (TY3) for other mitigation sites.

The NFS will be responsible for conducting the required monitoring events and preparing the associated monitoring reports after the USACE has demonstrated the mitigation success criteria listed above have been achieved. The overall responsibility for management, maintenance, and monitoring of the mitigation will typically be transferred to the NFS during the first quarter of the year immediately following submittal of the monitoring report that demonstrates attainment of said criteria.

Once monitoring responsibilities have been transferred to the NFS, the next monitoring event will take place during the year that attainment of success criterion 2.C (native vegetation criterion applicable 4 years after completion of initial plantings) must be demonstrated. Thereafter, monitoring will typically be conducted every 5 years throughout the 50-year period of analysis (based on 50-year period of analysis beginning in 2013 (TY0) and ending in 2063 (TY50)).

If the initial survival criteria for planted canopy and midstory species are not achieved (i.e. the 1-year survival criteria specified in native vegetation success criterion 2.B), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that all survival criteria have been satisfied (i.e. that corrective actions were successful). The USACE will be responsible for conducting this additional monitoring and preparing the monitoring reports. The USACE will also be responsible for the purchase and installation of supplemental plants needed to attain this success criterion.

If the native vegetation success criteria specified for 4 years following completion of initial plantings are not achieved (i.e. native vegetation success criterion 2.C), a monitoring report will be required for each consecutive year until two annual sequential reports indicate that these criteria have been satisfied. The NFS will be responsible for conducting this additional monitoring and preparing the monitoring reports. The NFS will also be responsible for the purchase and installation of supplemental plants needed to attain this success criterion.

If timber management activities conducted in the mitigation features by the NFS, the NFS will be responsible for conducting the additional monitoring and preparing the associated monitoring reports necessary for such activities (e.g. one monitoring event and report in the year immediately preceding timber management activities and one monitoring event and report in the year that timber management activities are completed).

The year in which mitigation features are first planted, a key milestone triggering the start of mitigation monitoring, may vary depending on the type of mitigation involved and the mitigation construction activities involved. In certain cases, it is also possible that the BLH mitigation features may be established along with other mitigation features like swamp or marsh habitats at the same mitigation site. Such factors make it necessary to develop a reasonable and efficient monitoring schedule at the time final mitigation plans are generated. This schedule must be in general accordance with the guidance provided above and will be prepared by the USACE in coordination with the Interagency Team and the NFS.

Once monitoring responsibilities have transferred to the NFS, the NFS will retain the ability to modify the monitoring plan and the monitoring schedule should this become necessary due to unforeseen events or to improve the information provided through monitoring. Twenty years following completion of initial plantings, the number of monitoring plots and/or monitoring transects that must be sampled during monitoring events may be reduced substantially if it is clear that mitigation success is proceeding as anticipated. Any significant modifications to the monitoring plan or the monitoring schedule must first be approved by the USACE in coordination with the Interagency Team.

MITIGATION SUCCESS CRITERIA AND MITIGATION MONITORING:
MARSH MITIGATION FEATURES (Fresh, Intermediate, and Brackish Marsh Habitats)

MITIGATION SUCCESS CRITERIA

The success (performance) criteria described herein are applicable to all proposed marsh habitats (fresh marsh, intermediate marsh, and brackish marsh restoration features), unless otherwise indicated.

1. General Construction

A. Within approximately 8 months following the start of mitigation construction, complete all initial mitigation construction activities (e.g. construction of temporary retention/perimeter dikes, placement of fill (borrow material/dredged material) into mitigation site, construction of permanent dikes if applicable, etc.), in accordance with the mitigation work plan and in accordance with final project plans and specifications. These requirements classify as initial success criteria

B. Approximately 1 year following completion of all initial mitigation construction activities (when the restored marsh feature has attained the desired target soil surface elevation) complete all final mitigation construction activities, in accordance with the mitigation work plan and in accordance with final project plans and specifications. Such activities could include, but are not limited to: degrading temporary retention dikes such that the areas occupied by these dikes have a surface elevation equivalent to the desired target marsh elevation; completion of armoring, if required, of any permanent dikes; “gapping” or installation of “fish dips” in permanent dikes; and construction of trenasses or similar features within marsh features as a means of establishing shallow water interspersion areas within the marsh. Finishing the aforementioned construction components will be considered as the “completion of final mitigation construction activities”. As noted, this is anticipated to occur approximately 1 year after placement of fill material in the mitigation feature is completed. The requirements stated herein classify as initial success criteria.

2. Topography

A. Upon completion of final mitigation construction activities (approximate Target Year 2) –
- Demonstrate that at least 80% of each mitigation feature has a surface elevation that is within 0.5 feet of the desired target surface elevation. This requirement classifies as an initial success criterion.

B. 1 Year following completion of final mitigation construction activities (approximate Target Year 3) –
- Demonstrate that at least 80% of the mitigation site has a surface elevation that is within 0.5 feet of the desired target surface elevation. This requirement classifies as an initial success criterion.

C. 3 years following completion of final mitigation construction activities (approximate Target Year 5) –
- Demonstrate that at least 90% of the mitigation site has a surface elevation that is within the functional marsh elevation range. This requirement classifies as an intermediate success criterion.

Notes: The desired target elevation for each marsh feature will be determined during the final design phase. The “functional marsh elevation range”, i.e. the range of the marsh surface elevation that is considered adequate to achieve proper marsh functions and values, will also be determined during the final design phase. The target elevation and functional marsh elevation range will be determined by the USACE in conjunction with the Interagency Team. These determinations will apply to the topographic success criteria above and could potentially alter the marsh area percentages set forth in these criteria.

3. Native Vegetation

A. For intermediate marsh and brackish marsh restoration features only –
- Complete initial marsh planting in accordance with applicable initial marsh planting guidelines. This requirement classifies as an initial success criterion.

B. For fresh marsh restoration features only; 1 year following completion of final mitigation construction activities:
- Achieve a minimum average cover of 50%, comprised of native herbaceous species.
- Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- The requirements above classify as initial success criteria; with the exception that the requirement to demonstrate vegetation satisfies USACE hydrophytic vegetation criteria throughout the duration of the overall monitoring period classifies as a long-term success criterion.

C. For intermediate marsh and brackish marsh restoration features only; 1 year following completion of initial plantings–
- Attain at least 80% survival of planted species, or; Achieve a minimum average cover of 25%, comprised of native herbaceous species (includes planted species and volunteer species).
- Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria. This criterion will thereafter remain in effect for the duration of the overall monitoring period.
- The requirements above classify as initial success criteria; with the exception that the requirement to demonstrate vegetation satisfies USACE hydrophytic vegetation criteria throughout the duration of the overall monitoring period classifies as a long-term success criterion.

D. For fresh marsh restoration features only; 3 years following completion of final mitigation construction activities:
- Achieve a minimum average cover of 85%, comprised of native herbaceous species. This requirement classifies as an intermediate success criterion.

E. For intermediate marsh and brackish marsh restoration features only; 3 years following completion of initial plantings –
- Achieve a minimum average cover of 75%, comprised of native herbaceous species (includes planted species and volunteer species). This requirement classifies as an intermediate success criterion.

F. For all marsh restoration features (fresh, intermediate, and brackish) –
- For the period beginning 5 years following completion of final mitigation construction activities and continuing through 20 years following completion of final mitigation construction activities, maintain a minimum average cover of 80%, comprised of native herbaceous species. This requirement classifies as a long-term success criterion.

4. Invasive and Nuisance Vegetation

A. Complete the initial eradication of invasive and nuisance plant species within 1 year of completion of final mitigation construction activities. This requirement classifies as an initial success criterion.

B. Maintain all areas such that they are essentially free from invasive and nuisance plant species immediately following a given maintenance event and such that the total average vegetative cover accounted for by invasive and nuisance species each constitute less than 5% of the total average plant cover during periods between maintenance events. These criteria must be satisfied throughout the duration of the overall monitoring period. Until such time that monitoring responsibilities are transferred from the USACE to the NFS, this requirement classifies as an initial success criterion. Following the transfer of monitoring responsibilities, this requirement classifies as a long-term success criterion.

MITIGATION MONITORING GUIDELINES

The guidelines for mitigation monitoring provided herein are applicable to all the types of marshes being restored (i.e. fresh, intermediate, and brackish) unless otherwise indicated.

"Time Zero" Monitoring Report (First Monitoring Report)

The mitigation site will be monitored and a "time zero" or "baseline" monitoring report prepared. Information provided will typically include the following items:

- A detailed discussion of all mitigation activities completed.

- A plan view drawing of the mitigation site showing the approximate boundaries of the restored marsh features, significant interspersion features established within the marsh features (as applicable), monitoring transect locations, sampling plot locations, photo station locations, and staff gage locations.

- An as-built survey of surface elevations (topographic survey) within each marsh feature, along with an as-built survey of any permanent dikes constructed as part of the marsh restoration features including any "gaps" or "fish dips" established in such dikes. If a particular marsh feature is immediately adjacent to existing marsh habitat, the topographic survey will include spot elevations collected within the existing marsh habitat near the restored marsh feature. In addition to the survey data, an analysis of the data will be provided addressing attainment of topographic success criteria.

- Photographs documenting conditions in each restored marsh feature at the time of monitoring. Photos will be taken at permanent photo stations within the marsh features. At least two photos will be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next. The number of photo stations required as well as the locations of these stations will vary depending on the mitigation site. The USACE will make this determination in coordination with the Interagency Team and will specify the requirements in the Mitigation Monitoring Plan. At a minimum, there will be at least 4 photo stations established within each marsh feature.

- For restored intermediate marsh and brackish marsh features only -- A detailed inventory of all species planted, including the number of each species planted and the stock size planted. For mitigation sites that include more than one restored marsh feature, provide a breakdown itemization indicating the number of each species planted in each marsh and correlate this itemization to the marsh features depicted on the plan view drawing of the mitigation site.

- Water level elevation readings collected at the time of monitoring from a single staff gage installed within one of the restored marsh features. The location of the staff gage will be determined by the USACE in coordination with the Interagency Team during the final design phase of the mitigation project and will be specified in the Mitigation Monitoring Plan. The monitoring report will provide the staff gage data along with mean high and mean low water elevation data as gathered from a tidal elevation recording station in the general vicinity of the mitigation site. The report will further address estimated mean high and mean low water elevations at the mitigation site based on field indicators.

- Various qualitative observations will be made in the mitigation site to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimate of the average percent cover by native plant species; general estimates of the average percent cover by invasive and nuisance plant species; general observations concerning colonization of the mitigation site by volunteer native plant species; general condition of native vegetation; trends in the composition of the plant community; wildlife utilization as observed during monitoring (including fish species and other aquatic organisms); the condition of interspersion features (tidal channels, trenasses, depressions, etc.) constructed within the marsh features, noting any excessive scouring and/or siltation occurring within such features; the natural formation of interspersion features within restored marshes; observations regarding general surface water flow characteristics within marsh interspersion features; the general condition of "gaps", "fish dips", or similar features constructed in permanent dikes; if present, the general condition of any armoring installed on permanent dikes. General observations made during the course of monitoring will also address potential problem zones and other factors deemed pertinent to the success of the mitigation program.

- A summary assessment of all data and observations along with recommendations as to actions necessary to help meet mitigation and management/maintenance goals and mitigation success criteria.

- A brief description of anticipated maintenance/management work to be conducted during the period from the current monitoring report to the next monitoring report.

Additional Monitoring Reports

All monitoring reports generated after the initial "time zero" report will provide the following information unless otherwise noted:

- All items listed for the "time zero" (baseline) monitoring report with the exception of: (a) the topographic/as-built survey, although additional topographic/as-built surveys are required for specific monitoring reports (see below); (b) the inventory of planted species; although such an inventory must be provided in any monitoring report generated for a year in which a restored intermediate or brackish marsh feature is re-planted to meet applicable success criteria, and such an inventory must be provided in any monitoring report generated for a year in which a restored fresh marsh feature is planted to meet applicable success criteria.

- Quantitative data concerning plants in the ground cover stratum. Data will be collected from permanent sampling quadrats established at approximately equal intervals along permanent monitoring transects established within each marsh feature. Each sampling quadrat will be approximately 2 meters X 2 meters in size, although the dimensions of each quadrat may be increased if necessary to provide better data in planted marsh features. The number of monitoring transects and number of sampling quadrats per transect will vary depending on the mitigation site. This will be determined the USACE in coordination with the Interagency Team during the final design phase of the mitigation project and the resulting requirements, including quadrat dimensions, will be specified in the final Mitigation Monitoring Plan for the project. Data recorded from the sampling quadrats will include: average percent cover by native plant species; average percent cover by invasive plant species; average percent cover by nuisance plant species; composition of plant species and the wetland indicator status of each species. The average percent survival of planted species (i.e. number of living planted species as a percentage of total number of plants installed) will also be recorded in intermediate and brackish marsh features. However, data for percent survival of planted species will only be recorded until such time as it is demonstrated that success criteria for plant survivorship has been achieved.

- A brief description of maintenance and/or management work performed since the previous monitoring report along with a discussion of any other significant occurrences.

- In addition to the above items, the monitoring report prepared for 1 year following completion of mitigation construction activities (estimated TY3) and the monitoring report prepared for 3 years following completion of mitigation construction activities (estimated TY5) will include a topographic survey of each marsh restoration feature. These surveys will cover the same components as described for the topographic survey conducted for the "time zero" monitoring report. In addition to the surveys themselves, each of the two monitoring reports involving topographic surveys will include an analysis of the data as regards attainment of applicable topographic success criteria. If the second survey indicates topographic success criteria have not been achieved and supplemental topographic alterations are necessary, then another topographic survey may be required following completion of the supplemental alterations. This determination will be made by USACE in coordination with the Interagency Team.

Monitoring Reports Following Re-Planting Activities in Intermediate or Brackish Marsh Features & Monitoring Reports Following Planting Activities in Fresh Marsh Features

Re-planting of certain areas within restored intermediate and/or brackish marsh habitats may be necessary to ensure attainment of applicable native vegetation success criteria. Planting of herbaceous species within restored fresh marsh features may also be necessary to attain applicable native vegetation success criteria.

Any monitoring report submitted following completion of a re-planting event (for intermediate and brackish marshes) and any monitoring report submitted following completion of initial plantings (for fresh marshes) must include an inventory of the number of each species planted and the stock size used. It must also include a depiction of the areas re-planted or those planted, as applicable, cross-referenced to a listing of the species and number of each species planted in each area.

MITIGATION MONITORING SCHEDULE AND RESPONSIBILITIES

Monitoring will typically take place in mid to late summer of the year of monitoring, but may be delayed until later in the growing season due to site conditions or other unforeseen circumstances. Monitoring reports will be submitted by December 31 of each year of monitoring. Monitoring reports will be provided to the USACE, the NFS, and the agencies comprising the Interagency Team. The various monitoring and reporting responsibilities addressed in this section are all subject to the provisions set forth in the Introduction section.

The USACE will be responsible for conducting the monitoring events and preparing the associated monitoring reports until such time that the following mitigation success criteria are achieved (criteria follow numbering system used in success criteria section):

1. General Construction – A and B.
2. Topography – A and B.
3. Native Vegetation – For intermediate marsh and brackish marsh features, criteria 3.A and 3.C; for fresh marsh features, criteria 3.B.
4. Invasive & Nuisance Vegetation – A, plus B until such time as monitoring responsibilities are transferred to the NFS.

Monitoring events associated with the above will include the “time zero” (first or baseline) monitoring event (estimated in TY2, 2015) and a second monitoring event 1 year after the time zero monitoring event (estimated in TY3, 2016). The USACE will be responsible for conducting these monitoring activities and preparing the associated monitoring reports.

The NFS will be responsible for conducting the required monitoring events and preparing the associated monitoring reports after the USACE has demonstrated the mitigation success criteria listed above have been achieved. The overall responsibility for management, maintenance, and monitoring of the mitigation will typically be transferred to the NFS during the first quarter of the year immediately following submittal of the monitoring report that demonstrates attainment of said criteria. Once monitoring responsibilities have been transferred to the NFS, the next monitoring event should take place in 2019 (TY5) in order to demonstrate attainment of success criteria 2.C and either 3.D (for fresh marsh) or 3.E (for intermediate and brackish marsh). Thereafter, monitoring will be conducted every 5 years throughout the remaining 50-year period of analysis (based on 50-year period of analysis beginning in 2013 (TY0) and ending in 2063 (TY50)).

In certain cases it is possible that the marsh mitigation features may be established along with other mitigation features, like swamp or bottomland hardwood habitats, at the same mitigation site. This scenario could require some adjustments to the typical monitoring schedule described above in order to develop a reasonable and efficient monitoring schedule that covers all the mitigation features. Such adjustments, if necessary, would be made at the time final mitigation plans are generated. This schedule must be in general accordance with the guidance provided above and will be prepared by the USACE in coordination with the Interagency Team and the NFS.

If certain success criteria are not achieved, failure to attain these criteria would trigger the need for additional monitoring events not addressed in the preceding paragraphs. The USACE would be responsible for conducting such additional monitoring and preparing the associated monitoring reports. The following lists instances requiring additional monitoring that would be the responsibility of the USACE:

(A) For intermediate and brackish marsh features –

- If the initial survival criterion for planted species or the initial vegetative cover criterion are not achieved (i.e. the criteria specified in success criteria 3.C), a monitoring report will be required for each

consecutive year until two sequential annual reports indicate that the applicable survival criterion or vegetative cover criteria have been satisfied (i.e. that corrective actions were successful). The USACE would also be responsible for the purchase and installation of supplemental plants needed to attain the success criteria.

(B) For fresh marsh features --

- If the initial vegetative cover criterion is not achieved (i.e. the requirement specified in success criteria 3.B), a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the applicable vegetative cover criteria have been satisfied (i.e. that corrective actions were successful). Since failure to meet the success criterion would mandate planting the subject marsh, the USACE would also be responsible for the purchase and installation of the required plants.

(C) For all types of marsh features (fresh, intermediate, brackish) –

- If topographic success criteria 2.A or 2.B are not achieved, a monitoring report will be required for each consecutive year until two sequential annual reports indicate the applicable criteria have been satisfied. Since failure to meet topographic success criteria would mandate corrective actions such as addition of fill, removal of fill, or other actions to change grades within the subject marsh feature, the USACE would also be responsible for performing the necessary corrective actions.

There could also be cases where failure to attain certain success criteria would trigger the need for additional monitoring events for which the NFS would be responsible:

(A) For intermediate and brackish marsh features –

- If the vegetative cover criterion specified for 3 years after the initial planting of marsh features is not achieved (i.e. success criterion 3.E), a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the vegetative cover criterion has been satisfied. The Sponsor would also be responsible for the purchase and installation of supplemental plants needed to attain the success criterion.

(B) For fresh marsh features --

- If the vegetative cover criterion specified for 3 years after completion of mitigation construction activities is not achieved (i.e. success criterion 3.D), a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the vegetative cover criterion has been satisfied. The Sponsor would also be responsible for the purchase and installation of supplemental plants needed to attain the success criterion.

(C) For all types of marsh features (fresh, intermediate, brackish) –

- If the topographic success criterion 2.C is not achieved, a monitoring report will be required for each consecutive year until two sequential annual reports indicate success criteria have been satisfied. Since failure to meet this topographic success criteria would mandate corrective actions such as addition of fill, removal of fill, or other actions to change grades within the subject marsh feature, the Sponsor would also be responsible for performing the necessary corrective actions.

- Native vegetation success criterion 3.F is applicable to the period extending from 5 years through 20 years following completion of mitigation construction activities and is applicable to all marsh features. If this criterion is not satisfied at the time of monitoring, the NFS would be responsible for implementing corrective actions. Such actions could include installing additional plants in the subject marsh (probable course of action), adding sediment to the subject marsh in problem zones (marsh nourishment), or a combination of these activities. Under this scenario, a monitoring report will be required for each consecutive year following completion of the corrective actions until two sequential annual reports indicate that the vegetative cover criterion has been attained. The NFS would be responsible for conducting these additional monitoring events and preparing the associated monitoring reports.

Once monitoring responsibilities have been transferred to the NFS, the NFS will retain the ability to modify the monitoring plan and the monitoring schedule should this become necessary due to unforeseen events or to

improve the information provided through monitoring. Twenty years following completion of mitigation construction activities, the number of monitoring transects and/or quadrats that must be sampled during monitoring events may be reduced substantially if it is clear that mitigation success is proceeding as anticipated. Any significant modifications to the monitoring plan or the monitoring schedule must first be approved by the USACE in coordination with the Interagency Team.

DEFINITION OF TERMS

Certain terms used herein shall have the meaning discussed in the following section.

Interagency Team
The "Interagency Team" consists of representatives from the following resource agencies; US Fish and Wildlife Service, National Marine Fisheries Service, US Environmental Protection Agency, Louisiana Department of Wildlife and Fisheries, State of Louisiana Office of Coastal Protection and Restoration, Louisiana Department of Natural Resources. In cases where proposed mitigation features will be established within Jean Lafitte National Historical Park and Preserve, representatives from the National Park Service would also comprise the Interagency Team.

Non-Federal Sponsor (NFS)
This term refers to the Non-Federal Sponsor for the mitigation projects. In this case, the NFS is the Louisiana Coastal Protection & Restoration Authority Board (CPRAB).

Target Year
This document often refers to mitigation "target years" or a particular mitigation "target year" (abbreviated "TY"). Target Year 0 (TY0) is the year in which mitigation construction activities are anticipated to commence, which is presently estimated to occur in calendar year 2013. Target years increase from this time forward. Hence, based on construction beginning in 2013, target year 1 (TY1) would be calendar year 2014, target year 2 (TY2) would be calendar year 2015, etc.

Invasive Plant Species
All plant species identified as invasive or as non-indigenous (exotic) in the following two sources:

> Louisiana Aquatic Invasive Species Task Force. 2005. State Management Plan for Aquatic Invasive Species in Louisiana, Appendix B. Invasive Species in Louisiana (plants). Center for Bioenvironmental Research, Tulane & Xavier Universities, New Orleans, LA.
> (Website - http://is.cbr.tulane.edu/docs_IS/LAISMP7.pdf)
>
> Barataria-Terrebonne National Estuary Program (BTNEP). 2012. Exotic Invasive Species of the Barataria-Terrebonne, Invasive Species in Louisiana. BTNEP, Thibodaux, LA. (Website - http://invasive.btnep.org/invasivesvsnatives/invasivesinla2list.aspx)

In addition, invasive plant species include; Japanese climbing fern (*Lygodium japonicum*), tall fescue (*Festuca arundinacea*), chinaberry (*Miscanthus sinensis*), Brazilian vervain (*Verbena litoralis* var. *brevibrateata*), coral ardisia (*Ardisia crenata*), Japanese ardisia (*Ardisia japonica*), cogon grass (*Imperata cylindrical*), golden bamboo (*Phyllostachys aurea),* and rescuegrass (*Bromus catharticus*).

Nuisance Plant Species
Nuisance plant species will include native species deemed detrimental due to their potential adverse competition with desirable native species. Nuisance plant species identified for the mitigation project include; dog-fennel (*Eupatorium* spp.), ragweed (*Ambrosia* spp.), cattail (*Typha* spp.), grapevine (*Vitis* spp.), wild balsam apple (*Momordica charantia*), climbing hempvine (*Mikania scandens, M. micrantha*), pepper vine (*Ampelopsis arborea*), common reed (*Phragmites australis*), catbrier (*Smilax* spp.), blackberry (*Rubus* spp.), black willow (*Salix nigra*), and box elder (*Acer negundo*). Following completion of the initial mitigation activities (e.g. placement of fill, initial plantings), the preceding list may be expanded to include other nuisance plant species. Any such addition to the list would be based on the results of the standard monitoring reports. The

determination of whether a particular new plant species should be considered as a nuisance species and therefore eradicated or controlled would be determined by the USACE in coordination with the Non-Federal Sponsor and Interagency Team.

Native Plant Species
This category includes all plant species that are not classified as invasive plant species and are not considered to be nuisance plant species.

USACE Hydrophytic Vegetation Criteria
Reference to satisfaction of USACE hydrophytic vegetation criteria (i.e. plant community is dominated by hydrophytic vegetation) shall mean that sampling of the plant community demonstrates that one or more of the hydrophytic vegetation indicators set forth in the following reference is achieved:

> USACE. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0); ERDC/EL TR-10-20. USACE Engineer Research and Development Center, Vicksburg, MS.

Wetland Indicator Status of Plant Species
The wetland indicator status of plants is a means of classifying the estimated probability of a species occurring in wetlands versus non-wetlands. Indicator categories include; obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), and obligate upland (UPL). The wetland indicator status of a particular plant species shall be as it is set forth in the following reference (the "2012 National Wetland Plant List), using the Region 2 listing contained therein. However, if the USACE approves and adopts a new list in the future, then the currently approved list will apply.

> Lichvar, Robert W. and J.T. Kartesz. 2009. North American Digital Flora: National Wetland Plant List, version 2.4.0 (https://wetland_plants.usace.army.mil). USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH and BONAP, Chapel Hill, NC.

Growing Season
As used herein, the growing season is considered to be the period from April through October of any given year, although some deviation from this typical range is allowed.

Planting Season
This is generally considered to be the period from approximately December 15 through March 15, although some deviation from this typical range is allowed.

Point-Centered Quarter Method
A plot-less method of forest sampling. Use of this method will be in general compliance with the applicable methodology described in the following reference:

> Cottam, Grant and J. T. Curtis. 1956. The use of distance measures in phytosociological sampling. Ecology, 37(3):451-460.

Piezometer
Typically a small-diameter observation well employed as a means of measuring water elevations in the surficial aquifer (water table elevations). Piezometers used for monitoring purposes should be constructed in general accordance with the following reference, unless otherwise approved by the USACE:

> U. S. Army Corps of Engineers. 2005. Technical standard for water-table monitoring of potential wetland sites. ERDC TN-WRAP-05-02. Vicksburg, MS: U.S. Army Engineer Research and Development Center. (website - http://el.erdc.usace.army.mil/wrap/pdf/tnwrap05-2.pdf)

Interspersion Features

This term refers to shallow open water features situated within marsh habitats. Examples include tidal channels, creeks, trenasses, and relatively small, isolated ponds. Emergent vegetation is typically absent in such features although they may contain submerged aquatic vegetation. They provide areas of foraging and nursery habitat for fish and shellfish along with associated predators, and provide loafing areas for waterfowl and other waterbirds. The marsh/open water interface forms an ecotone where post-larval and juvenile organisms can find cover and where prey species frequently concentrate.

APPENDIX I

INTERAGENCY ENVIRONMENTAL TEAM

Stephanie Zumo	Coastal Protection and Restoration Authority Board
Barry Bleichner	Coastal Protection and Restoration Authority Board
Elizabeth Davoli	Coastal Protection and Restoration Authority Board
Jeffrey Harris	Louisiana Department of Natural Resources
Frank Cole	Louisiana Department of Natural Resources
Tim Killeen	Louisiana Department of Natural Resources
Kyle Balkum	Louisiana Department of Wildlife & Fisheries
Heather Finley	Louisiana Department of Wildlife & Fisheries
Clifford Melius	Louisiana Office of State Parks
Patrick Williams	National Marine Fisheries Service
Richard Hartman	National Marine Fisheries Service
David Walther	U.S. Fish & Wildlife Service
Angela Trahan	U.S. Fish & Wildlife Service
David Castellanos	U.S. Fish & Wildlife Service
Catherine Breaux	U.S. Fish & Wildlife Service
Barbara Keeler	U.S. Environmental Protection Agency
John Ettinger	U.S. Environmental Protection Agency
Guy Hughes	U.S. National Park Service
Dusty Haigler	U.S. National Park Service

APPENDIX J

AGENCY CORRESPONDENCE

Cultural Programmatic Agreement

Coordination Act Report

Coastal Zone Consistency

ESA

Final

Programmatic Agreement
Among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
And
The Advisory Council on Historic Preservation
Regarding the
Hurricane Storm Damage Risk Reduction System (HSDRRS)
Lake Pontchartrain & Vicinity and
West Bank & Vicinity
Mitigation Projects

WHEREAS, Hurricane Katrina and Hurricane Rita resulted in major damage to businesses, residences and infrastructure and to the Federal and non-Federal flood control and hurricane and storm damage reduction structures in the Greater New Orleans Metropolitan area, in Louisiana in August and September 2005; and

WHEREAS, Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (4th Supplemental) and Public Law 110-28, U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 (5th Supplemental), and Public Law 110-252, Supplemental Appropriations Act, 2008 (6th Supplemental) direct the Secretary of the Army, through the Chief of Engineers, to accelerate completion of unconstructed portions, to raise levee and floodwall heights and to otherwise improve the Lake Pontchartrain & Vicinity (LPV) and the West Bank & Vicinity (WBV) hurricane and storm damage risk reduction projects to provide the level of protection necessary to achieve the certification required to participate in the National Flood Insurance Program; and

WHEREAS, the projects will be implemented with funds appropriated by Congress for Flood Control and Coastal Emergencies related to Hurricane Katrina as set forth above in the area covered by the disaster declaration made by President George W. Bush under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, 88 Stat 143, as amended (42 U.S.C. sec. 121 et seq); and

WHEREAS, the USACE has elected to fulfill its obligations under Section 106 of the National Historic Preservation Act of 1966, as amended through the execution and implementation of this Programmatic Agreement (Agreement) as provided in 36 CFR Part 800; and

WHEREAS, the USACE has negotiated Emergency Alternative Arrangements with the Council on Environmental Quality (Federal Register Volume 72, Number 48, Tuesday, March 13, 2007) to comply with the National Environmental Policy Act (NEPA) and its

implementing regulations (40 CFR Part 1500) for proposed actions with significant environmental effects that respond to the emergency, pursuant to 40 CFR 1506.11. Pursuant to the Emergency Alternative Arrangements, proposed actions are to be evaluated in an Individual Environmental Report (IER); and

WHEREAS, the USACE seeks to avoid and minimize environmental impacts to the maximum extent practical while developing the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS), and when habitat losses occur, the Corps will offset such losses through compensatory environmental mitigation. Compensatory environmental mitigation is an important part of the HSDRRS effort and could include habitat creation, restoration and/or enhancement. Separate plans to compensate for habitat losses caused by HSDRRS construction are being developed for LPV and WBV; and

WHEREAS, the USACE notified the Advisory Council on Historic Preservation (ACHP) of the potential for this undertaking to adversely affect historic properties pursuant to the ACHP's regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (16 USC 470f); and

WHEREAS, the ACHP accepted the invitation to participate in consultation to develop this agreement and to seek ways to avoid, minimize, or mitigate adverse effects; and

WHEREAS, the USACE, the ACHP, Louisiana State Historic Preservation Officer (LA SHPO), and federally recognized Indian Tribes as defined under 36 CFR 800.16(m), and other appropriate consulting parties have consulted to develop this Agreement to define efficient and cost effective processes for taking into consideration the effects of the LPV and WBV Mitigation projects upon historic properties pursuant to 36 CFR 800.14(b) consistent with the NEPA Emergency Alternative Arrangements and in the public interest; and

WHEREAS, the USACE acknowledges federally recognized Indian Tribes as sovereign nations which have a unique government-to-government relationship with the federal government and its agencies; USACE further acknowledges its Trust Responsibility to those federally recognized Indian Tribes; and

WHEREAS, the USACE, has notified affected federally recognized Indian Tribes and shall fulfill its tribal consultation responsibilities through ongoing consultation with federally recognized Indian Tribes that attach religious and cultural significance to historic properties that may be affected by the undertaking; and

WHEREAS, the USACE will invite any interested federally recognized Indian Tribe to sign this Agreement as an Invited Signatory Party, and those federally recognized Indian Tribes not requesting to sign this Agreement as an Invited Signatory Party will be invited to sign as a Concurring Party; and

WHEREAS, the USACE, in coordination with the LA SHPO, has taken appropriate measures to identify other consulting parties and to invite such parties to participate in the development and execution of this Agreement; and

WHEREAS, the USACE has requested the participation of local governments and the public by mail and will take appropriate steps to involve and notify those parties, as appropriate, during the implementation of the terms of this Agreement; and

NOW, THEREFORE, the USACE, ACHP, and LA SHPO agree that the implementation of the following stipulations will evidence that the USACE has taken into account the effects of the HSDRRS LPV and WBV Mitigation projects upon historic properties.

STIPULATIONS

The USACE shall adhere to the process and protocols set forth in this Agreement.

I. Tribal Consultation

A. The USACE has invited the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and Tunica-Biloxi Indian Tribe to consult in the development of the Programmatic Agreement. The Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, and the Mississippi Band of Choctaw Indians have participated in the development of the Programmatic Agreement and will sign the Programmatic Agreement as an Invited Signatory Party (hereafter also known as "signatory Indian Tribes"). The USACE will provide the signatory Indian Tribes with a copy of the Final Programmatic Agreement.

B. The USACE shall provide the signatory Indian Tribes with copies of all plans, determinations, and findings that are provided to the LA SHPO to assist in identifying activities that are part of the HSDRRS LPV and WBV Mitigation projects.

II. Public Involvement

A. The USACE, in coordination with the LA SHPO, shall identify and provide members of the public likely to be interested in the effects of the HSDRRS LPV and WBV Mitigation projects upon historic properties

with a description of the undertaking and the provisions of the Agreement.

B. The USACE will involve the public through the National Environmental Policy Act (NEPA) process, which affords all persons, organizations and government agencies the opportunity to review and comment on proposed major federal actions that are evaluated by a NEPA document.

C. The USACE will release a draft IER for the HSDRRS LPV Mitigation projects and a draft IER for the WBV Mitigation projects to the public for a review period of thirty (30) calendar days. Substantive comments received during this review period will be incorporated into the final IERs. The development of this Agreement will be communicated to the public during the IER development process and comments will be solicited regarding the Agreement and any other historic preservation concerns.

D. To the extent permitted under applicable federal laws and regulations, including Section 304 of the NHPA, the USACE will release to the public, documents developed pursuant to this Agreement, effects determinations, and Interim Progress Reports.

III. Other Consulting Parties

A. The USACE, in coordination with LA SHPO, will continue efforts during the duration of this Agreement to identify other parties with demonstrated interests in preservation issues and invite them to participate as consulting parties.

B. The USACE will document the consulting parties in the consultation process for each of the IERs and maintain it as part of the project record.

C. If any dispute arises about the right to be recognized as a consulting party, the USACE will contact the ACHP and provide all appropriate documentation. The ACHP will participate in the resolution of the issue.

IV. Determination of HSDRRS Mitigation Projects

A. If the USACE determines that it is appropriate and environmentally preferable based on consideration of relevant factors to mitigate the loss of habitat caused by construction of the HSDRRS through purchase of Mitigation Bank Credits, the purchase of such credits would have no effects on historic properties. If USACE purchases Mitigation Bank Credits to offset identified losses of habitat, documentation of the

purchase of Mitigation Bank Credits will be provided to all Signatories to this agreement as evidence that the USACE has met its obligations under Section 106 of the NHPA for this project. If Mitigation Bank Credits are purchased to partially offset habitat losses, USACE will provide documentation of that purchase to all Signatories as evidence that USACE has met its obligations under Section 106 of the NHPA for that portion of the project.

B. If USACE determines that it is environmentally preferable based on consideration of relevant factors to construct mitigation projects to offset habitat losses caused by the HSDRRS, USACE will develop Corps-constructed mitigation proposals. For all Corps-constructed mitigation proposals developed by USACE to compensate for habitat losses due to development of the HSDRRS, the USACE will ensure that each individual proposal will be assessed for its effect on historic properties as outlined in this Agreement.

C. For Mitigation proposed on National Park Service lands within the Jean Lafitte National Historical Park and Preserve, the USACE will assess those proposals for effects to historic properties in accordance with this Agreement. The National Park Service will conduct its own consultation with the LA SHPO and Indian Tribes in accordance with Section 106 of the NHPA independently of this Agreement. The USACE will continue to coordinate with the National Park Service to ensure that information being provided to the LA SHPO and Indian Tribes is consistent between the two agencies.

V. Identification and Evaluation of Historic Properties for Corps-Constructed Mitigation Projects

A. The USACE, in consultation with the LA SHPO and signatory Indian Tribes, will define and document the area of potential effect (APE) for each proposed Corps-constructed mitigation project activity area. The APE associated with each activity area will anticipate the potential for direct, indirect, and cumulative effects upon historic properties. The reasonable and good faith identification and evaluation efforts will be limited to the APE.

B. Following the delineation of the APE for each Corps-constructed mitigation project, the USACE will ensure that a reasonable and good faith effort to identify historic properties within it will be conducted. The USACE will ensure that the results of the identification efforts for each recommended mitigation project are documented in a report that meets the standards of the Louisiana Division of Archaeology, and will ensure that the reports are submitted to the LA SHPO and signatory Indian

Tribes for review and comment. The USACE will ensure that the comments provided by the LA SHPO and signatory Indian Tribes are incorporated into a final report for each Corps-constructed mitigation project. The USACE will ensure that all collections and associated records developed from each Corps-constructed mitigation project identification effort are curated in accordance with 36 CFR 79.

C. At the completion of the Identification effort, historic properties identified within an APE will be assessed for their eligibility for the National Register of Historic Places following 36CFR800.4(c), if such properties cannot be avoided through project design. If eligible properties cannot be avoided, the USACE will proceed in accordance with Stipulation VII. If undetermined properties cannot be avoided, the USACE, in consultation with LA SHPO and signatory Indian Tribes, will develop plans to evaluate the eligibility of each property. The USACE will ensure that the results of the evaluation efforts for each mitigation project are documented in a report that meets the standards of the Louisiana Division of Archaeology, and will ensure that the reports are submitted to the LA SHPO and signatory Indian Tribes for review and comment. The USACE will ensure that the comments provided by the LA SHPO and signatory Indian Tribes are incorporated into a final report for each Corps-constructed mitigation project evaluation effort. The USACE will ensure that all collections and associated records developed from each Corps-constructed mitigation project evaluation effort are curated in accordance with 36 CFR 79.

D. In the event of disagreement between the USACE, LA SHPO, and/or signatory Indian Tribes concerning the eligibility of a property for listing in the National Register of Historic Places under 36 CFR 60, the USACE shall request a formal determination of eligibility for that property from the Keeper of the National Register of Historic Places (Keeper). The determination by the Keeper will serve as the final decision regarding the National Register eligibility of the property.

VI. Coordination of Effects Determinations

A. All standard response timeframes established by 36 CFR 800 will apply to this Agreement, unless an alternative response timeframe is agreed to by the LA SHPO and signatory Indian Tribes. The USACE may request expedited review by the LA SHPO and Indian Tribes on a case by case basis. Such expedited review period shall not be less than 15 calendar days.

B. Electronic mail (email) will serve as the official correspondence method for all communications regarding this Programmatic Agreement and its

provisions. See Appendix A for a list of contacts and email addresses. Contact information in Appendix A may be updated as needed without an amendment to this Agreement. It is the responsibility of each Signatory and Invited Signatories to immediately inform the USACE of any changes in the name, address, email address or phone number of any point-of-contact for the Signatory and Invited Signatories. The USACE will forward this information to the Signatories and Invited Signatories by email. The failure of any party to this Agreement to notify the USACE of changes to their point-of-contacts information shall not be grounds for asserting that notice of a proposed action was not received.

C. The USACE shall evaluate the effects of an Action on historic properties in a holistic manner and will not segment activities. In the event the USACE determines that any aspect of the Action will have an effect or adverse effect on a historic property within the Action's APE, the entire Action will be reviewed accordingly.

D. Consultation under this Agreement will be concluded for USACE findings of *no historic properties affected* and *no adverse effect* when the LA SHPO and signatory Indian Tribes have reviewed the written documentation and do not object with the USACE finding, and subject to the provisions of this Agreement.

E. Following submission of written documentation to the SHPO and signatory Indian tribes, the USACE may propose a finding of *no adverse effect with conditions*, as appropriate. Such conditions may include, but are not limited to:

    1. Avoidance and/or preservation in-place of historic properties;

    2. Modifications or conditions to ensure consistency with the Secretary of Interior's *Standards for the Treatment of Historic Properties* and applicable guidelines.

F. Should the LA SHPO or signatory Indian Tribes object to the USACE's findings of *no historic properties affected*, findings of *no adverse effect*, findings of *no adverse effect with conditions*, or should USACE determine that it cannot accept conditions requested by LA SHPO and/or signatory Indian Tribes, the USACE shall seek to resolve such objection through consultation in accordance with Stipulation XI Dispute Resolution Provisions of this Agreement.

VII. Resolution of Adverse Effects

A. If USACE, in consultation with the LA SHPO and Indian Tribes, determines that the implementation of a project activity may result in an adverse effect upon historic properties as defined in 36 CFR 800.5(a) (1) and (2) of the ACHP's regulations, the USACE shall notify the LA SHPO, the ACHP, signatory Indian Tribes, other interested parties and the public. If the project activity will affect a National Historic Landmark, USACE shall also notify the National Park Service (NPS). The Adverse Effect notification shall include the following documentation:

1. Summary description of the activity area;

2. Summary of identification efforts in accordance with this Agreement;

3. Summary analysis of effects to historic properties;

4. Summary of alternatives considered to avoid adverse effects;

5. Proposed standard mitigation measures in accordance with Stipulation VIII of this Agreement; and

6. Request for ACHP comment and involvement, as appropriate.

B. The ACHP, LA SHPO, signatory Indian Tribes, interested parties, including NPS, as appropriate, and the public shall be afforded an opportunity to review and to comment on the adverse effect notification for a period of thirty (30) days after receipt of the adverse effect notification.

C. Should the USACE, LA SHPO, and signatory Indian Tribes disagree on the proposed mitigation measures, the USACE shall seek to resolve such objection through consultation in accordance with Stipulation XI. Dispute Resolution of this Agreement.

VIII. Standard Mitigation Measures

A. The USACE, in coordination with the LA SHPO, ACHP, and signatory Indian Tribes will develop Standard Mitigation Measures for adverse effects to historic properties. Standard mitigation measures will be tailored to the significance of the historic property, and may include but are not limited to the following:

1. Public Interpretation and development of educational materials;

2. Documentation consistent with the Level II Standards of the Historic American Building Survey/ Historic American Engineering Record (HABS/HAER);

3. Historical, Architectural or Archeological Monographs;

4. Rehabilitation of historic buildings in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* (36 CFR 68);

5. Off-site mitigation, including acquisition of property or preservation easements on property, as appropriate, containing threatened resources of comparable significance in circumstances where there is an imminent need to proceed with construction activity and it is in the public interest;

6. Ethnographic studies;

7. Studies of traditional cultural properties;

8. Relocation of historic properties to sites that the LA SHPO agrees possess similar overall character; and

9. Data recovery for archeological properties where data recovery has been determined to be the appropriate treatment whether or not they are eligible for the National Register under criterion "D."

B. In the event that, in the opinion of the LA SHPO, ACHP, and/or signatory Indian Tribes, standard mitigation measures as proposed are not adequate or are inappropriate to resolve adverse effects, the USACE, LA SHPO, and signatory Indian Tribes will consult to negotiate different or additional mitigation measures. Other consulting parties may express their concerns regarding the adequacy of the mitigation through written comments submitted to any of the signatories to the Agreement. Once consulting parties agree to the terms of the expanded mitigation, such agreement will be formalized through an MOA executed and implemented pursuant to 36 CFR 800.6(c). If there is a disagreement that cannot be resolved, the formal dispute provisions at Section XI will be implemented.

IX. Unanticipated Discoveries and Effects

A. In the event that the USACE discovers a previously unidentified historic property, including archeological sites, human remains, and properties of traditional religious and cultural significance to Indian Tribes, during the execution of the project, the USACE immediately shall secure the jobsite and suspend work in the vicinity of the affected resource. If the USACE determines that the proposed work has or will adversely affect a previously unidentified historic property or a known historic property in an unanticipated manner, the USACE shall notify the LA SHPO and signatory Indian Tribes immediately. The USACE, in consultation with the LA SHPO and Indian Tribes, will develop a treatment plan or Standard Mitigation Measures agreement. The USACE will implement the plan or Standard Mitigation Measures agreement once agreed to by the LA SHPO and signatory Indian Tribes.

B. USACE shall insure that all contractors are made aware of the requirements of this Agreement. In the event that a contractor discovers a previously unidentified historic property, the contractor shall immediately notify the USACE and refrain from further project activities within the immediate vicinity of the discovery and shall take reasonable efforts to avoid and minimize harm to the historic property. USACE shall implement additional measures to secure the historic property for safety and security concerns, as appropriate.

C. In the event that previously unidentified -adverse effects to historic properties are identified following the completion of work within an activity area, any party may provide the USACE with evidence of such effects for a period of twelve (12) months from the completion of the Corps-constructed mitigation project that may have caused the adverse effect. The USACE, in consultation with the LA SHPO, signatory Indian Tribes, and ACHP will review the effect in accordance with the provisions of this agreement.

D. If the USACE, LA SHPO, Indian Tribes, consulting parties, or member of the public, as appropriate cannot agree on an appropriate course of action to address the discovery situation, the USACE shall initiate the dispute resolution process set forth in Stipulation XI.

X. Treatment of Human Remains

A. The USACE recognizes that the respectful treatment of human remains and funerary objects is a paramount concern. The USACE will ensure

that the views of living descendants, including Indian Tribes, and other interested parties, are fully considered in the decision-making process.

B. Unanticipated discovery of human remains

1. When human remains or indications of a burial are discovered, the individual(s) who made the discovery shall immediately notify the local law enforcement and the USACE, New Orleans District.

2. In the event that the USACE is notified of a previously unidentified burial, including burial sites, human skeletal remains, or burial artifacts, on private or state land during the execution of any of the Undertakings, the USACE will ensure that the procedures established in the Louisiana Unmarked Human Burial Sites Preservation Act (La. R.S. 8:671-681) will be followed.

3. In the event that the USACE is notified of a previously unidentified burial, including burial sites, human remains or funerary objects, on federal or tribal land during the execution of any of the undertakings, the USACE will ensure that procedures established by the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 and the regulations that implement it (43 CFR Part 10) and the Archaeological Resources Protection Act of 1979 (Public Law 96-95; 16 U.S.C. 470aa-mm), as amended, and implementing regulations (43 CFR Part 7) will be followed.

4. The USACE shall have an archaeologist immediately survey or resurvey the general area where the remains were found to determine the nature of the remains and evaluate the possibility of preserving the remains in place or whether they will need to be exhumed/moved. Federally recognized Indian Tribes likely to have a cultural affiliation with the remains will be notified by telephone immediately in accordance with 43 CFR 10.4(b). If possible Tribal representative(s) shall be present to advise on appropriate treatment of the exposed remains and on the most appropriate long-term solution.

5. The USACE shall provide information collected on the nature of the remains and a recommended plan of action pursuant to 43 CFR 10.5(e) within five (5) working days to the signatory Indian Tribes and the LA SHPO. The USACE shall consult with all relevant parties to determine the appropriate course of

action with regard to the human remains and any accompanying artifacts, grave goods, or funerary objects.

6. All signatories to the PA agree that the most appropriate treatment, if feasible, is to protect the remains and permanently preserve the burial in situ.

7. If the USACE, after consultation, determines that protection, avoidance, or repair is not feasible, disinterment shall be conducted in accordance with methods and procedures developed in accordance with the appropriate federal and state laws and in consultation with the signatory Indian Tribes and the LA SHPO.

8. The USACE may authorize the activity in the direct discovery areas to resume as soon as the remains have been removed from the ground.

XI. Dispute Resolution

A. Except for the resolution of eligibility issues, as set forth in Stipulation VI. D. above, should the LA SHPO, Indian Tribes, or member of the public disagree on the implementation of the provisions of this agreement, they will notify the USACE, who will seek to resolve such objection through consultation.

B. If the dispute cannot be resolved through consultation, USACE shall forward all documentation relevant to the dispute to the ACHP, including any proposed resolution identified during consultation. Within seven (7) calendar days after receipt of all pertinent documentation, the ACHP may:

1. Provide USACE with recommendations to take into account in reaching final decision regarding the dispute; or

2. Notify USACE that it will comment pursuant to 36 CFR 800.7(c) and provide formal comments within twenty-one (21) calendar days.

C. Any recommendation or comment provided by ACHP will be understood to pertain only to the subject of the dispute, and USACE's responsibilities to fulfill all actions that are not subject of the dispute will remain unchanged.

D. If the ACHP does not provide USACE with recommendations or notification of its intent to provide formal comments within seven (7) calendar days, USACE may assume that the ACHP does not object to its recommended approach and it will proceed accordingly.

XII. Administration and Duration of this Agreement

A. This Programmatic Agreement will remain in effect for eight (8) years from the date of execution, unless extended for a two-year period by written agreement negotiated by all signatories.
B. The USACE, LA SHPO, and signatory Indian Tribes shall meet annually to evaluate the effectiveness of this Agreement. The USACE shall coordinate such annual meetings following the execution of this Agreement.

XIII. Comprehensive Review

A. At the conclusion of all of the distinct project actions, the USACE will analyze the HSDRRS LPV and WBV Mitigation undertaking holistically to identify cumulative effects upon historic properties.

B. Holistic analysis of the undertaking's cumulative effects will be coordinated with the preparation of the draft supplemental comprehensive environmental document to be prepared in accordance with the NEPA Emergency Alternative Arrangements approved by the Council on Environmental Quality.

C. The USACE, in coordination with the signatories to this Agreement, shall identify and shall implement additional mitigation measures to address adverse cumulative effects, as appropriate.

XIV. Amendment and Termination

A. Notwithstanding any provision of this Agreement, any signatory may request in writing that it be amended and shall include in such request the reasons for the proposed amendment. The signatories will consult to consider the requested amendment. The USACE will initiate consultation within thirty (30) days of receipt of the written request. Any amendment will be in writing and will be signed by the USACE, the LA SHPO, the signatory Indian Tribes, and the ACHP, and shall be effective on the date of the final signature.

B. Any Invited Signatory Party may terminate its participation in this Agreement by providing thirty (30) days advance written notification to all other parties. In the event of termination by one signatory, the Agreement will remain in effect for the USACE and other signatories.

Execution of this PA by the USACE, the LA SHPO, and ACHP and implementation of its terms, evidences that the USACE has taken into account the effects of the HSDRRS LPV and WBV Mitigation projects upon historic properties and has afforded the ACHP an opportunity to comment.

Final

Programmatic Agreement
Among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer
And
The Advisory Council on Historic Preservation
Regarding the
Hurricane Storm Damage Risk Reduction System (HSDRRS)
Lake Pontchartrain & Vicinity and West Bank & Vicinity
Mitigation Projects

Signatories:

United States Army Corps of Engineers

By: _____ Date: 17 May 2013
Colonel Edward Fleming
District Commander
U.S. Army Corps of Engineers, New Orleans District

Louisiana State Historic Preservation Officer

By: _____ Date: May 7, 2013
Pam Breaux
Louisiana State Historic Preservation Officer
Louisiana Office of Cultural Development

Advisory Council on Historic Preservation

By: _____ Date: 6/18/13
John M. Fowler
Executive Director
Advisory Council on Historic Preservation

Final

Programmatic Agreement
Among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer
And
The Advisory Council on Historic Preservation
Regarding the
Hurricane Storm Damage Risk Reduction System (HSDRRS)
Lake Pontchartrain & Vicinity and West Bank & Vicinity
Mitigation Projects

Invited Signatory Party:

Choctaw Nation of Oklahoma

By:_____ Date:_____
Gregory E. Pyle, Chief

Final

Programmatic Agreement
Among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer
And
The Advisory Council on Historic Preservation
Regarding the
Hurricane Storm Damage Risk Reduction System (HSDRRS)
Lake Pontchartrain & Vicinity and West Bank & Vicinity
Mitigation Projects

Invited Signatory Party:

Jena Band of Choctaw Indians

By: B. Cheryl Smith Date: 4-29-13
B. Cheryl Smith, Principal Chief

Choctaw Nation of Oklahoma

P.O. Box 1210 • Durant, OK 74702-1210 • (580) 924-8280

Gregory E. Pyle
Chief

Gary Batton
Assistant Chief

May 3, 2013

U.S. Army Corps of Engineers, New Orleans District
ATTN: Joan M. Exnicios
Chief, Environmental Planning Branch
P.O. Box 60267
New Orleans, LA 70160-0267

RE: Programmatic Agreement for the Hurricane and Storm Damage Risk Reduction System (HSDRRS), Lake Pontchartrain and Vicinity (LPV) and West Bank and Vicinity (WBV) Mitigation Project, Louisiana

Ms. Exnicios,

The Choctaw Nation of Oklahoma thanks you for the consultation regarding the above mentioned Programmatic Agreement. I have attached a copy of the agreement along with all the signed signature pages. If you have any questions or concerns please contact us at the Choctaw Nation Historic Preservation Office, 580-924-8280 Ext 2631.

Sincerely,

Dr. Ian Thompson
Director, Historic Preservation Department
Tribal Archaeologist, NAGPRA Specialist

By: Lindsey Huffman

Lindsey Huffman
Administrative Assistant
lhuffman@choctawnation.com
Choctaw Nation of Oklahoma
P.O. Drawer 1210
Durant, OK 74701

Preserving America's Heritage

June 18, 2013

Ms. Joan Exnicios
Chief, Environmental Branch
U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

REF: Hurricane and Storm Damage Risk Reduction System, Lake Pontchartrain-West Bank and Vicinity

Dear Ms. Exnicios:

Enclosed is the executed Programmatic Agreement for the referenced program. By carrying out the terms of the Agreement, the Corps of Engineers will have fulfilled its responsibilities under Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's regulations.

If you have any questions, please call Dr. Tom McCulloch at 202-606-8554 or via email at tmcculloch@achp.gov

Sincerely,

Caroline D. Hall
Assistant Director
Federal Property Management Section
Office of Federal Agency Programs

Enclosure

ADVISORY COUNCIL ON HISTORIC PRESERVATION
1100 Pennsylvania Avenue NW, Suite 803 • Washington, DC 20004
Phone: 202-606-8503 • Fax: 202-606-8647 • achp@achp.gov • www.achp.gov

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
December 29, 2015

Colonel Richard L. Hansen
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Hansen:

Please reference your office's Supplemental Programmatic Individual Environmental Report (SPIER #37a) that is being prepared under the approval of the Council on Environmental Quality (CEQ) and that will partially fulfill the U.S. Army Corps of Engineers' (Corps) compliance with the National Environmental Policy Act of 1969 (NEPA) (83 Stat. 852, as amended; 42 U.S.C. 4321- 4347). Individual Environmental Reports are CEQ-approved alternative arrangements for compliance with NEPA that would allow expedited implementation of improved hurricane protection measures in Louisiana. Work proposed under this SPIER would mitigate impacts resulting from the improved hurricane protection measures and would be conducted under the authority of Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4). That law authorized the Corps to upgrade two existing hurricane protection projects (i.e., the Westbank and Vicinity of New Orleans [WBV] and the Lake Pontchartrain and Vicinity [LPV]) in the Greater New Orleans area in southeast Louisiana.

The Fish and Wildlife Service provides the enclosed report to assist your staff in fulfilling mitigation needs associated with those efforts in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report does not constitute the report of the Secretary of the Interior as required by Section 2(b) of that Act. Furthermore, additional comments are provided in accordance with provisions of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d), and the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.). Copies of this draft report were provided to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries and their comments will be incorporated into the final report.

We will continue to work closely with your staff to ensure that fish and wildlife resources are conserved. Toward that end, please have your staff advise Mr. David Walther (337/291-3122) if you or your staff has any questions regarding this matter.

Sincerely,

for Brad S. Rieck
Deputy Field Supervisor
Louisiana Ecological Services Office

cc: Jean Lafitte National Historical Park and Preserve, New Orleans, LA
National Marine Fisheries Service, Baton Rouge, LA
Environmental Protection Agency, Dallas, TX
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD), Baton Rouge, LA
LA CPRA, Baton Rouge, LA

Fish and Wildlife Coordination Act Report
for the
Hurricane and Storm Damage Risk Reduction System (HSDRRS), Supplemental Programmatic Individual Environmental Report (SPIER) 37a
West Bank and Vicinity (WBV)
Mitigation Plans

PROVIDED TO
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

PREPARED BY
DAVID WALTHER

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
LAFAYETTE, LOUISIANA
DECEMBER 2015

U.S. FISH AND WILDLIFE SERVICE – SOUTHEAST REGION

CORPS OF ENGINEERS

HURRICANE AND STORM DAMAGE RISK REDUCTION SYSTEM
SUPPLEMENTAL PRORAMMATIC INDIVIDUAL REPORT 37
WEST BANK AND VICINITY
MITIGATION PLANS

FISH AND WILDLIFE COORDINATION ACT REPORT

Prepared by
David Walther
U.S. Fish and Wildlife Service
Lafayette, Louisiana

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EXECUTIVE SUMMARY

This Fish and Wildlife Coordination Act (FWCA) Report of the Fish and Wildlife Service (Service) documents proposed mitigation measures for impacts to forested areas and fresh marsh resulting from the Corps of Engineers' (Corps) activities associated with implementation of the Hurricane and Storm Damage Risk Reduction System (HSDRRS), West Bank and Vicinity (WBV) project. Our findings and recommendations are presented in accordance with the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and have been developed on the basis of surveys and analyses of project impacts and potential improvement of mitigation areas for fish and wildlife resources. This report does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act. The Service has provided copies of this report to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF), and their comments will be incorporated into the final report.

This report addresses the mitigation plan for the WBV hurricane protection project and it also supplements our November 26, 2007, Draft FWCA Report that provided twenty-six programmatic recommendations for the HSDRRS authorized work to help avoid and minimize impacts to fisheries, wetlands, forested habitats, migratory birds, and public lands, and incorporates and supplements the numerous FWCA Reports provided for the work authorized under 4th and 5th Supplemental Appropriations Acts. This report also supplements our May 27, 2014, report that addressed proposed mitigation features in the Corps Programmatic Individual Environmental Report (PIER) 37 for WBV impacts. Impacts and mitigation needs resulting from government- (IER 18) and contractor-provided borrow areas have been addressed in an October 25, 2007, and a November 1, 2007, FWCA reports, respectively, therefore this report will not address those project features.

The Corps is preparing Individual Environmental Reports (IER) under the approval of the Council on Environmental Quality to partially fulfill compliance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321- 4347). IERs are an alternative arrangement for NEPA compliance that has allowed expedited implementation of improved hurricane protection measures.

The Corps has previously prepared PIER 37 and a subsequent Supplemental Programmatic Individual Environmental Report (SPIER) to identify mitigation plans for WBV HSDRRS impacts. The Corps is now preparing another SPIER (i.e., SPIER 37a) to address further modifications to mitigation plans presented in the SPIER; that modified mitigation plan is the subject of this report. The Corps has also released a draft tiered IER (TIER 1) from PEIR 37 that addresses mitigation for impacts to the Jean Lafitte National and Historical Park and Preserve (JLNHPP) and the Environmental Protection Agency Final Determination under the Clean Water Act (CWA) Section 404(c) referred to as the Bayou aux Carpes 404(c) area. Because that TIER presents changes and more details regarding those mitigation plans and we have prepared a FWCA report for that TIER this report will not address any of those mitigation features. However, augmentation features for the Bayou aux Carpes 404(c) area are addressed in this report because they were not included in that TIER. In addition, impacts to fresh marsh that were not located on JLNHPP will be mitigated within the same mitigation site as the impacts to

JLNHPP fresh marsh impacts. Therefore, non-park fresh marsh impacts will also be addressed in that TIER and not in this report.

The SPIER 37a addresses the implementation of the modified tentatively selected mitigation plan (MTSMP) which consists only of the replacement of invasive species dominated forests with native BLH species at the Bayou Segnette site to fully offset the loss of protected side (i.e., located within the levee) bottomland hardwood (BLH)-Wet and BLH-Dry habitats. Our previous draft report on SPIER 37, which was withdrawn from public review, included mitigation for BLH-Wet and swamp habitats at the Highway 307 Bayou Bouef mitigation site. The following table displays the WBV HSDRRS impacts and mitigation projects that make up the current MTSMP. Those mitigation features being constructed on the JLNHPP are not being addressed in this SPIER but have been addressed in PIER 37, TIER 1. Once feasibility level of design of the mitigation features is complete, NEPA compliance for those projects would be documented in IERs tiering (TIERs) off the PIER. ESA coordination on the constructible features covered in the TIERs would be submitted at the time of TIER completion. Continued coordination with the interagency team is essential throughout the finalization of engineering and design of the mitigation features. Additional Service recommendations may be provided in supplemental reports as those plans are more fully developed.

WBV HSDRRS Modified Tentatively Selected Mitigation Plan

Habitat Type	**MTSMP Project**	**AAHUs Impacted**	**Mitigation Project Acres**
General PS BLH-Wet/Dry[1]	Bayou Segnette	200.27	920.00
General FS BLH-Wet[1]	To be determined	72.04	130.00
General FS Swamp[1]	To be determined	134.52	330.00
General FS Fresh Marsh[2]	JLNHPP	65.92	138.00
Park/404(c) FS BLH-Wet[2]	JLNHPP	3.12	12.16
Park/404(c) FS Swamp[2]	JLNHPP	7.19	20.44
Park/404(c)FS Fresh Marsh[2]	JLNHPP	3.03	20.40

[1]Use of mitigation banks to fully mitigate impacts is a constructible alternative.
[2] These features are only being addressed in the Service's report for TIER 1.

Implementation of the proposed mitigation plans is predicted to improve and maintain the habitat value of the BLH habitat for fish and wildlife to ensure adverse impacts are fully offset. Mitigation-area habitat values would increase due to the increased quantity and quality of mast-producing trees, and moderate increases in shrub and herbaceous cover after planting of forested areas.

For work authorized within the Bayou aux Carpes 404(c) area, Environmental Protection Agency (EPA) outlined terms and conditions in a 2009 Modification of the Bayou aux Carpes Clean Water Act (CWA) Section 404(c) Final Determination. Alterations to the Bayou aux Carpes 404(c) area would be ameliorated through the construction of mitigation and augmentation features. Selection and implementation of the final augmentation features and development of a long-term monitoring plan remain to be accomplished.

The Service supports the Corps' current mitigation features and recognizes that additional Tiered IERs may be need to address individual mitigation features that are still in early design phases. We support the Corps' plan to mitigate impacts to fish and wildlife resources associated with WBV HSDRRS provided that the following fish and wildlife conservation recommendations are incorporated into future project planning and implementation and outstanding issues are adequately resolved via ongoing planning efforts:

1. Prior to beginning work on IERs tiered off of this SPIER the Corps should coordinate with the natural resource agencies to ensure that necessary information to conduct detailed project planning/design and finalize the WVA analysis is developed and available. Final sizing of mitigation must be based on revised WVAs conducted on advanced project designs

2. Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, Water Control Plans, or other similar documents) should be coordinated with the Service, NMFS, LDWF, EPA and Louisiana Department of Natural Resources (LDNR). The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

3. Impacts to Essential Fish Habitat (EFH) should be avoided and minimized to the greatest extent possible. Because impacts to designated EFH habitat may need to be mitigated the Corps should coordinated with the NMFS regarding this need and maintain an account of all EFH habitats (e.g., openwater, marsh) impacted and mitigated.

4. Impacts to wetland habitat (including SAV habitat) and non-wet BLH associated with the construction of the mitigation features should be avoided and minimized to the greatest extent possible. The Corps shall fully compensate for any unavoidable losses of wetland habitat or non-wet BLH caused by mitigation features through sizing (i.e., boundary adjustments) of the mitigation features in close coordination with the natural resource agencies.

5. If applicable, a General Plan for mitigation lands should be developed by the Corps, the Service, and the managing natural resource agency in accordance with Section 3(b) of the FWCA.

6. A fully defined mitigation plan should be included in the authorizing report and Decision Record. The mitigation plan should be developed including locations and AAHUs vetted through the natural resource agencies. Only existing mitigation banks and existing credits released by Corps Regulatory Branch may be considered.

7. We recommend that the Corps consider the availability of credits at a bank and within a hydrologic unit when evaluating the mitigation bank alternative to avoid exhausting credits available for individual landowners/permittees within a

particular hydrologic unit.

8. If mitigation is credits are purchased from a mitigation bank the Service requests that a copy of the letter from the banker acknowledging the acquisition is provided to the Service for our files.

9. If mitigation lands are purchased for inclusion within publicly managed lands, those lands may need to meet certain requirements. Land-managing natural resource agencies may have requirements that must be met prior to accepting mitigation lands; therefore, if they are proposed as a manager of a mitigation site they should be contacted early in the planning phase regarding such requirements. The local sponsor should also be made aware of the above requirements should it be their responsibility to transfer mitigation lands to the land-managing agency.

10. The Corps should continue to coordinate with land managing agencies during planning of mitigation features that may be built on their lands or lands to be turned over to them for management. Coordination should continue until construction of the projects are complete and prior to any subsequent maintenance. Please contact Mr. John Lavin at 1-888-677-1400 regarding work on the Bayou Segnette State Park which is operated by the Louisiana Department of Culture, Recreation and Tourism, Office of State Parks areas.

11. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation and/or maintenance of mitigation lands, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest

12. Any proposed change in mitigation features or plans should be coordinated in advance with the Service, NMFS, LDWF, EPA and LDNR.

13. The Service encourages the Corps to finalize mitigation plans and proceed to mitigation construction so that it will be concurrent with project construction. If construction is not concurrent with mitigation implementation then revising the impact and mitigation period-of-analysis to reflect additional temporal losses will be required.

14. The Service recommends that the Corps immediately finalize selection and approval of mitigation and augmentation features in coordination with federal and state natural resource agencies and with required approval from EPA. All necessary studies for the mitigation and augmentation features have been completed and agencies have reached agreement on those features. Further, the Service recommends that all such mitigation and augmentation features be implemented as soon as possible. All terms and conditions specified in the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination should be followed with regard to mitigation and augmentation requirements.

15. The Corps should immediately develop a long-term monitoring plan for the Bayou aux Carpes 404(c) area, as required under the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination. The plan should be coordinated with the natural resources agencies and approved by EPA. All terms and conditions specified in the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination with regard to the long-term monitoring and operation plan should be followed. Once approved, that plan should be implemented as soon as possible.

16. The Service recommends that all of the terms and conditions outlined in the EPA Bayou aux Carpes 404(c) 2009 modification be implemented without delay. The Corps is responsible for funding all mitigation and augmentation features in this agreement. A link to the 2009 final modified determination may be found at www.nolaenvironmental.gov under the EPA heading for IER 12.

17. The Service recommends that the Corps work with the natural resource agencies to refine the "GUIDELINES – WET BLH HABITAT ENHANCEMENT, SWAMP HABITAT RESTORATION, AND SWAMP HABITAT ENHANCEMENT" and incorporate all changes in the Mitigation Success Criteria and Mitigation Monitoring: Marsh Mitigation Features from the LPV PIER 36 and the Bayou Sauvage Task Force Guardian BLH mitigation monitoring plan.

18. The Service recommends a two month period between herbicide application and mechanical clearing of invasive species. The proposed one month period may not allow sufficient time for herbicides to travel into the root system and work, thus encouraging greater stump sprouting which may increase the amount of future herbicide applications.

19. The Service recommends that the Corps maintain full responsibility for any BLH mitigation project for a minimum of 4-years post planting. Documentation should be provided to demonstrate funding obligation for the Corps to fulfill initial success criteria at a minimum.

20. The Service recommends that all mitigation planning documents should describe in detail actions needed by the Corps and/or the local sponsor if mitigation is not succeeding as planned.

21. The Corps should avoid adverse impacts to bald eagle and osprey nesting locations and wading bird colonies through careful design project features and timing of construction. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

22. We recommend that the Corps re-initiate ESA consultation with this office to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their habitat. Subsequently, ESA consultation should be reinitiated should the proposed project features change significantly or are not implemented within one year of the last ESA consultation with this office.

INTRODUCTION

This draft Fish and Wildlife Coordination Act (FWCA) Report of the Fish and Wildlife Service (Service) addresses the mitigation plan for project-associated impacts to wet and dry bottomland hardwoods (BLH) by the Corps of Engineers' (Corps) for activities associated with implementation of the Hurricane and Storm Damage Risk Reduction System (HSDRRS), West Bank and Vicinity (WBV) Project. Our findings and recommendations are presented in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and have been developed on the basis of surveys and analyses of project impacts and potential improvement of mitigation areas for fish and wildlife resources. This report does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act. Furthermore, additional comments are provided in accordance with provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), and the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), The Service has provided copies of this report to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF), and their comments will be incorporated into the final report.

Hurricane Katrina, a Category 3 storm, made landfall on the west bank of the Mississippi River and continued northeastward with the eye crossing Plaquemines, St. Bernard, Orleans and St. Tammany parishes in Louisiana. Hurricane surge inundated lower elevation areas in southeast Louisiana, and overtopped hurricane and flood control levees. As a result and under the authority of Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (4th Supplemental) and Public Law 110-28, U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 (5th Supplemental), the Corps improved two existing hurricane protection projects [i.e., Westbank and Vicinity of New Orleans (WBV) and Lake Pontchartrain and Vicinity (LPV)] in the Greater New Orleans area. The Corps is preparing Individual Environmental Reports (IER) under the approval of the Council on Environmental Quality (CEQ). Those IERs will partially fulfill the Corps compliance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321- 4347). IERs are a CEQ-approved alternative arrangement for compliance with NEPA that has allowed expedited implementation of improved hurricane protection measures.

The Corps is preparing a Supplemental Programmatic IER (SPIER) to address additional mitigation plan modifications for project-associated impacts. SPIER 37a addresses the implementation of the modified tentatively selected mitigation plan (MTSMP) which consists of the replacement of invasive species dominated forests with native BLH species at the Bayou Segnette site to fully offset the loss of BLH-Wet and BLH-Dry habitats. SPIER 37, which was withdrawn from public review, included the Highway 307 Bayou Boeuf mitigation site that was designed to fully offset the loss of flood-side BLH-Wet and swamp habitats. However, inability to secure needed land rights to implement that feature resulted in its elimination as an alternative. Use of mitigation banks to partially or fully achieve mitigation needs is considered a

constructible alternative to the MTSMP. The other mitigation features of the plan will be addressed in subsequent NEPA documents, or Tiered Individual Environmental Reports (TIERs). This report supplements our November 26, 2007, Draft FWCA Report that provided twenty-six programmatic recommendations for the HSDRRS authorized work to help avoid and minimize impacts to fisheries, wetlands, forested habitats, migratory birds, and public lands, and incorporates, and supplements the numerous FWCA Reports provided for the work authorized under 4th and 5th Supplemental for the WBV Hurricane Protection Project only (i.e., IERs 11-17, including supplemental documents). This report also supplements our May 27, 2014, report that addressed proposed mitigation features for WBV impacts in the Corps Programmatic Individual Environmental Report (PIER) 37 and our July 9, 2015, draft report on SPIER 37 . Impacts and mitigation needs resulting from government and contractor provided borrow areas (IER 18) have been addressed in an October 2007, a November 2007, and an October 2013 FWCA reports, respectively, therefore this report will not address those project features.

DESCRIPTIONS OF THE AREA'S FISH AND WILDLIFE RESOURCES

As previously mentioned, the Service has provided several FWCA Reports for the entire HSDRRS project. Those reports contain a thorough discussion of the significant fish and wildlife resources (including those habitats) that occur within the study area. For brevity, that discussion is incorporated by reference herein but the following brief descriptions are provided to update the previously mentioned information.

The study area is located within the Mississippi River Deltaic Plain of the Lower Mississippi River Ecosystem. Portions of Jefferson, Orleans, St. Charles and Plaquemines Parishes are included in the study area. Higher elevations occur on the natural levees of the Mississippi River and its distributaries. Developed lands are primarily associated with natural levees, but extensive wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development. Federal, State, and local levees have been installed for flood protection purposes, often with negative effects on adjacent wetlands. Navigation channels such as the Gulf Intracoastal Waterway (GIWW), including the Harvey Canal portion, the Bayou Segnette Waterway and the Barataria Bay Waterway are also prominent landscape features, as are extensive oil and gas industry access channels and pipeline canals, all of which have altered the landscapes hydrology. Extensive wetlands and associated shallow open waters dominate the landscape outside the flood control levees. Major water bodies include Lakes Cataouatche and Salvador located south of the project area and the Mississippi River which bisects the project area.

Habitat types in the project area include forested wetlands [i.e., bottomland hardwoods (BLH) and/or swamps], non-wet BLH, marsh, open water, and developed areas. Due to urban development and a forced-drainage system, the hydrology of most of the forested habitat within the levee system has been altered. The forced-drainage system has been in operation for many years, and subsidence is evident throughout the areas enclosed by levees.

Wetlands (forested, marsh, and scrub-shrub) within the study area provide plant detritus to adjacent coastal waters and thereby contribute to the production of commercially and recreationally important fishes and shellfishes. Wetlands in the project area also provide

valuable water quality functions such as reduction of excessive dissolved nutrient levels, filtering of waterborne contaminants, and removal of suspended sediment. In addition, coastal wetlands buffer storm surges reducing their damaging effect to man-made infrastructure within the coastal area.

Factors that will strongly influence future fish and wildlife resource conditions outside of the protection levees include freshwater input and loss of coastal wetlands. Depending upon the deterioration rate of marshes, the frequency of occasional short-term saltwater events may increase. Under that scenario, tidal action in the project area may increase gradually as the buffering effect of marshes is lost, and use of that area by estuarine-dependent fishes and shellfish tolerant of saltwater conditions would likely increase. Regardless of which of the above factors ultimately has the greatest influence, freshwater wetlands and forested areas within and adjacent to the project area will probably experience losses due to development, subsidence, and erosion.

The ongoing loss of coastal Louisiana wetlands (approximately 1,149 square miles between 1956 and 2004; average loss rate of 24 square miles per year) was exacerbated by Hurricanes Katrina and Rita in 2005. Those hurricanes caused an initial loss of wetlands equivalent to 9 years (approximately 217 square miles) of mean annual losses (Barras 2007). Louisiana wetlands provide 26 percent of the seafood landed in the conterminous United States and over 5 million migratory waterfowl utilize those wetlands every year. In addition, those wetlands provide protection to coastal towns, cities and their infrastructure, as well as important infrastructure for the nation's oil and gas industry.

Non-wet BLH within the project area also provide habitat for wildlife resources. Between 1932 and 1984, the acreage of BLH in Louisiana declined by 45 percent (Rudis and Birdsey 1986). By 1970, Jefferson Parish was classified as entirely urban or non-forested in the U.S. Forest Service's forest inventory with most of this loss resulting from development within drained, potentially non-wet areas inside the hurricane protection levees. A large percentage of the original BLH within the Mississippi River floodplain in the Deltaic Plain are located within levees. However, losses of that habitat type are not regulated or mitigated with the exception of impacts resulting from Corps projects as required by Section 906(b) of the Water Resources Development Act of 1986 and Section 2036 (a) of the Water Resource Development Act of 2007.

Mammals known to occur in the project-area BLH and marsh habitats include mink, raccoon, swamp rabbit, nutria, river otter, and muskrat. Those habitats also support a variety of birds including herons, egrets, ibises, least bittern, rails, gallinules, neotropic cormorant, white pelican, pied-billed grebe, black-necked stilt, sandpipers, gulls, and terns. Forested and scrub-shrub habitats within the study area also provide habitat for many resident passerine birds and essential resting areas for many migratory songbirds including warblers, orioles, thrushes, vireos, tanagers, grosbeaks, buntings, flycatchers, and cuckoos (Lowery 1974). Many of these and other passerine birds have undergone a decline in population primarily due to habitat loss.

Given the extent of development and drainage, waterfowl use within the hurricane protection system is likely minimal, except in the adjacent wetlands outside the levees. Swamps, fresh and

intermediate marshes usually receive greater waterfowl utilization than brackish and saline marshes because they generally provide more waterfowl food.

The Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.) and the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) offer protection to many bird species within the project area including colonial nesting birds, osprey, and the bald eagle (*Haliaeetus leucocephalus*). We continue to recommend that a qualified biologist inspect proposed work sites for the presence of undocumented nesting colonies during the nesting season (e.g. February through September depending on the species). If colonies exist work should not be conducted within 1,000 feet of the colony during the nesting season.

On-site personnel should also be informed of the possible presence of nesting bald eagles and ospreys within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest is located within 660 feet of the proposed activities, the Corps should completed an on-line evaluation (http://www.fws.gov/southeast/es/baldeagle) to determine potential disturbance to nesting bald eagles and any protective measures necessary. A copy of that evaluation should be provided to this office. If assistance is needed in completing the evaluation please contact this office.

Open water habitat in the study area consists of drainage canals; major waterways including the GIWW, Barataria Waterway, and Mississippi River; and Lakes Cataouatche and Salvador. Drainage canals do not support significant fishery resources because of dense vegetation, poor water quality, and inadequate depth. Freshwater sport fishes present in the project area, but outside of the levees, include largemouth bass, crappie, bluegill, redear sunfish, warmouth, channel catfish, and blue catfish. Other fishes likely to be present include yellow bullhead, freshwater drum, bowfin, carp, buffalo, and gar. Estuarine-dependent fishes and shellfishes such as Atlantic croaker, red drum, spot, sand seatrout, spotted seatrout, southern flounder, Gulf menhaden, striped mullet, brown shrimp, white shrimp, and blue crab are found in the intermediate to saline marshes of Lakes Cataouatche and Salvador and adjacent waterbodies.

Some of the waterbodies in the project area meet criteria for primary and secondary contact recreation and partially meets criteria for fish and wildlife propagation, while others do not meet the criteria for fish and wildlife propagation (LDEQ 2012). Causes determined by the Louisiana Department of Environmental Quality (LDEQ) for not fully meeting fish and wildlife propagation criteria include excessive nutrients, organic enrichment, low dissolved oxygen levels, flow and habitat alteration, pathogens and noxious aquatic plants. Indicated sources of those problems include hydromodification, habitat modification, recreational activities, and unspecified upstream sources. Municipal point sources, urban runoff, storm sewers, and onsite wastewater treatment systems are also known contributors to poor water quality in the area.

Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; P.L. 104-297) set forth a new mandate for National Oceanic Atmospheric Administration's National Marine Fisheries Service (NMFS), regional fishery

management councils (FMC), and other federal agencies to identify and protect important marine and anadromous fish habitat. The Essential Fish Habitats (EFH) provisions of the Magnuson-Stevens Act support one of the nation's overall marine resource management goals of maintaining sustainable fisheries. Essential to achieving this goal is the maintenance of suitable marine fishery habitat quality and quantity. Detailed information on Federally-managed fisheries and their EFH is provided in the 1999 generic amendment of the Fishery Management Plans (FMP) for the Gulf of Mexico prepared by the Gulf of Mexico FMC (GMFMC). The generic FMP subsequently was updated and revised in 2005 and became effective in January 2006 (70 FR 76216). NMFS administers EFH regulations. Categories of EFH in the project area include the estuarine waters, estuarine emergent wetlands and mud, sand, and shell water bottoms, and rock substrates.

Coastal wetlands also provide nursery and foraging habitat that supports economically important marine fishery species such as spotted seatrout, sand seatrout, southern flounder, Atlantic croaker, spot, gulf menhaden, striped mullet, white mullet, killifish, anchovies, and blue crab. Some of these species serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks). Portions of the WBV study area have been designated as EFH for post-larval, juvenile, and sub-adult life stages of brown shrimp, white shrimp, and red drum. Under future without project conditions there would be no change to EFH.

Where tidally-influenced waters designated as EFH are converted to a non-tidal elevation, loss of EFH would result. Should EFH be impacted, those losses should be quantified and presented in the Corps report. Close coordination with the NMFS is recommended because mitigation for those impacts is necessary. Tracking of all designated EFH marsh and tidal water impacts to help NMFS assess impacts to that resource is recommended.

Endangered and Threatened Species

To aid the Corps in complying with their proactive consultation responsibilities under the Endangered Species Act (ESA), the Service provided a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District in a June 22, 2011, electronic mail transmittal to the Corps. The Corps made a "no effect" determination in a July 7, 2015, letter to the Service for all mitigation projects included in SPIER 37. The Service concurred with that determination because there are no known threatened or endangered species or critical habitat in the proposed mitigation project areas. Should a proposed project be modified the Service requests that the Corps re-consult regarding potential impacts to any listed species or their critical habitat.

Public/Protected Lands

Lands within public ownership/oversight impacted by the WBV project include the Barataria Preserve unit of JLNHPP managed by the National Park Service (NPS), some lands within the Bayou aux Carpes 404(c) area which also has Environmental Protection Agency (EPA) oversight, and the Bayou Segnette State Park which is managed by the Louisiana Office of State Parks.

Because mitigation for impacts to the JLNHPP and Bayou aux Carpres 404(c) area are currently being addressed in TIER 1 to the PIER that the Service has prepared a supplemental Coordination Act Report for, those mitigation features will not be addressed in this document.

Located in the IER 15 project area is the Bayou Segnette State Park which is operated by the Louisiana Department of Culture, Recreation and Tourism, Office of State Parks. Please contact Mr. John Lavin at 1-888-677-1400 regarding proposed mitigation in or on property that may be turned over to that park for management.

The Service continues to recommend and support the mitigation of public lands impacts to be done on public lands within the managing agencies jurisdiction. If mitigation lands are purchased for inclusion within a managed area, those lands may have to meet certain requirements; individual agencies may have different requirements therefore each agency should be contacted. If an agency is proposed as a manager of a mitigation site they should also be contacted early in the planning phase regarding such requirements and costs.

PROJECT IMPACTS AND MITIGATION

Project impacts resulted primarily from the expansion of levee right-of-way (ROW) and construction of levees, borrow pits, floodwalls, navigable floodgates, and associated features. Because development is ongoing within the hurricane protection levees and Task Force Guardian (TFG) restored hurricane protection to pre-Hurricane Katrina levels, the Service has assumed that project-induced development is insignificant and that implementation of the HSDRRS project would not further induce development to areas not already developed or planned for development. Construction and implementation of the WBV hurricane protection project improvements resulted in impacts to forested wetlands and estuarine and non-estuarine emergent marsh some of which occurred on public lands (Table 1). In addition to impacts related to the construction of the HSDRRS project, impacts to fish and wildlife habitats during the construction of mitigation projects may occur. Impacts that would occur within the footprint of the mitigation feature have been evaluated in the Wetland Value Assessment (WVA) and the mitigation area will be reconfigured to offset those impacts. However, the location of access ROWs, staging areas, and borrow areas have not been finalized nor assessed by the resource agencies at this time. Coordination with the natural resource agencies during advanced design (i.e., post 35% design) is recommended in order to ensure that the agencies are granted adequate time to provide input into the design. This will ensure that unnecessary impacts are avoided and mitigation project are designed to effectively offset impacts.

FWCA reports and supplemental reports were provided as project designs changed or post-construction impacts were calculated. This report derives lost AAHUs from the latest impact acreage calculations utilizing Geographic Information System ROW data provided by the Corps and recent aerial photography.

The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981)

Table 1. WBV Mitigation Required.

Habitat Type	AAHUs Impacted
General PS BLH-Wet/Dry[1]	261.96 AAHUs
General FS BLH-Wet[2]	121.78 AAHUs
General FS Swamp	134.52 AAHUs
General FS Fresh Marsh	65.92 AAHUs
Park/404(c) FS BLH-Wet	3.08 AAHUs
Park/404(c) FS Swamp	7.19 AAHUs
Park/404(c) FS Fresh Marsh	3.20 AAHUs

[1]PS signifies the protected side of the levee.
[2]FS signifies the flood side of the levee.

identifies four resource categories that are used to ensure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values impacted. For impacts that occurred entirely within the existing ROW (i.e., maintained, non-wet grassland) and/or impacted low quality non-wet or prevalent habitats (e.g., open water without aquatic vegetation, dry fields, etc.) the Service did not recommend mitigation as they are Category 4 Resources. Considering the high value of forested wetlands for fish and wildlife and the relative scarcity of that habitat type, those wetlands were designated as Resource Category 2, the mitigation goal for which is no net loss of in-kind habitat value. Degraded (i.e., non-wet) BLH forests and any wet pastures that were impacted were placed in Resource Category 3 due to their reduced value to wildlife, fisheries and lost/degraded fish and wildlife functions. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value. To ensure no net loss of in-kind habitat value the mitigation plan includes the restoration and enhancement of BLH habitat and the restoration of marsh and swamp habitat.

Impacts to open water bottoms are anticipated as a result of borrow activities. Regardless of depth, open water bottoms with no submerged aquatic vegetation (SAVs) will remain a Category 4 Resource; impacts to those areas are discouraged, if feasible, and measures to minimize impacts to water quality from borrow sites should be incorporated. General guidelines for borrow design have been provided in Appendix A of our previous reports for PIER 37; however, close coordination with the resource agencies should continue during the design of borrow sites. SAV beds are currently considered a Category 2, and lost functions and values should be replaced. However, because of the relatively low success rate of SAV replanting, mitigating in-kind may not be practicable. Potential impacts to any SAVs should first go through the mitigation sequencing of avoidance, minimization, and rectification, prior to compensation of impacts.

Because open water bottoms without SAVs are considered a Category 4 Resource for our trust resources the Service does not recommend mitigation. However, some tidally-influenced unvegetated water bottoms are designated as EFH, and the conversion of that habitat to a non-tidal elevation would result in a loss of EFH. Should EFH be impacted, coordination with the NMFS is recommended as mitigation for impacts to these areas is necessary.

Public/Protected Lands

For work authorized by IER 12 and within the Bayou aux Carpes 404(c) area, EPA outlined terms and conditions in a 2009 Modification of the Bayou aux Carpes CWA Section 404(c) Final Determination. The Corps is responsible for funding and implementing all mitigation and augmentation features approved in accordance with the stipulations of this agreement. The Corps must also seek final approval from EPA for any mitigation feature offsetting impacts to the 404(c) area as stipulated in that determination. A link to the 2009 final modified determination may be found at www.nolaenvironmental.gov under the EPA heading for IER 12 and an excerpt of the determination is attached in Appendix A.

Mitigation procedures and requirements regarding impacts within the Bayou aux Carpes 404(c) area are being coordinated with the EPA, Service, USGS, NMFS, NPS, and other state representatives on the interagency review team. The District Commander for the Corps, in a letter to the Regional Administrator for EPA Region 6 dated November 4, 2008, committed to mitigate for all unavoidable adverse impacts to the Bayou aux Carpes CWA Section 404(c) area within the Bayou aux Carpes CWA Section 404(c) area and/or Jean Lafitte National Historical Park and Preserve, as determined by EPA and the resource agencies. Furthermore, the Corps committed that mitigation projects will be designed and implemented concurrently with the design and construction of the project. The District Commander in that letter also stated that "full mitigation within this unique environment may require mitigation in addition to acres indicated by the Wetland Value Assessment."

Based on the minimum mitigation that the Corps has committed to and is required to perform pursuant to Section 2036 of the Water Resources Development Act of 2007, as well as on the Corps' commitment to provide additional mitigation and augmentation features, EPA believes that the discharges of dredged or fill material associated with the Corps' West Closure Complex (a HSDRRS project feature) would not result in unacceptable adverse effects to the Bayou aux Carpes wetland resources. Additionally, EPA expects the final mitigation plan to be adequate to offset unavoidable impacts consistent with mitigation regulations (33 CFR 332) with the goal to ensure no net loss of either wetland acres or functions. EPA must agree with the proposed mitigation plan prior to the plan being finalized. In addition to mitigation, project augmentation measures will be considered by the interagency team to enhance the wetland functions and values of the site and provide added compensation for any unavoidable impacts.

The Corps is required to develop a long-term site monitoring plan, to be approved in writing by EPA, after consulting with the federal and state natural resource agencies on the interagency review team. EPA will make the determination as to whether the monitoring plan is adequate and appropriate, and that plan will be documented in a Memorandum of Agreement signed by the interagency review team. The Corps is responsible for ensuring implementation of the plan for the first 50 years of the project life. The long-term monitoring plan will focus on both the mitigation and augmentation features, as well as the impacts of the floodwall. The plan should provide for making adjustments if the mitigation or augmentation features prove not to perform as expected. Though it is not expected that the Corps would need to make future adjustments to

the floodwall, the effects of the floodwall are to be monitored to determine unexpected impacts which may warrant other corrective actions.

Habitat Assessments

To quantify project impacts to fish and wildlife resources and anticipated benefits resulting from the proposed mitigation the WVA methodology was utilized. Habitat units fluctuate in response to changes in habitat quality, represented by the Habitat Suitability Index (HSI), and/or quantity (acres); those changes are predicted for various target years over the project life (i.e., 50 years), for future without-project and future with-project scenarios. Target years (TY) were selected for this analysis to capture the effects of important biological events. Values for model variables were obtained from site visits to the area, previous wetland assessments in similar habitats, communication with personnel knowledgeable about the study area and similar habitats, and review of aerial photographs and reports documenting fish and wildlife habitat conditions in the study area and similar habitats. For all the habitat assessments, the products of the resulting HSI values and acreage estimates were then summed and annualized for each habitat type to determine the AAHUs available. The net change (increase or decrease) in AAHUs under future with-project conditions, compared to future without-project conditions, provides a quantitative comparison of anticipated project impact/benefits in AAHUs. By dividing the AAHU by the proposed mitigation project acreage a management or mitigation potential per acre is determined which can then be used to resize the project once mitigation needs are refined. Refinement is limited by the level of design, with each increasing detailed design level resulting in a more detailed WVA analysis. The final refinement should result in an equal replacement of impacted AAHUs with mitigated AAHUs (i.e., one to one ratio). Contractors for the Corps conducted the WVA analysis for some mitigation sites with review by state and federal natural resource agencies; the Service conducted the remaining WVAs. Further explanation of how impacts/benefits are assessed with the WVA and an explanation of the assumptions affecting HSI values are available from the Corps New Orleans District. Impact assessments and mitigation benefit assessments considered sea-level rise, subsidence, accretion, and historic marsh loss trends and were coordinated with other state and federal agencies.

The Service encourages the Corps to finalize mitigation plans and proceed to mitigation construction so that it will be concurrent with construction of remaining storm damage reduction project features and revising the impact and mitigation period-of-analysis to reflect additional temporal losses will not be required.

TENTATIVELY SELECTED PLANS

Screening and selection criteria used by the Corps and the natural resource agencies has been previously provided in IERs and previous Service reports, therefore, they will not be provided in this report. The project delivery team (PDT) evaluated the final array of alternatives; through the alternative evaluation process (AEP) the Tentatively Selected Plan (TSP) (Table 2) for mitigating impacts for the WBV hurricane protection project was identified.

However, after identifying the TSP the Corps came to a determination that lands within the CIT Tract would not be considered impacts occurring on JLNHPP. Because mitigation on NPS lands were sized to included mitigation for impacts in the CIT Tract the Corps re-assessed impacts to the JLNHPP and the mitigation requirement for both Park/404(c) and Non- Park/404(c) BLH and swamp were adjusted accordingly.

Table 2. Previous Proposed Mitigation for HSDRRS WBV Impacts.

Habitat Type Impacted	**TSP**
Non-Park PS BLH-Wet/Dry	General Mitigation Bank
Non-Park FS BLH-Wet	Lake Boeuf FS BLH-Wet Restoration
Non- Park FS Swamp	Lake Boeuf FS Swamp Restoration
Non- Park FS Fresh Marsh	JLNHPP FS Marsh Restoration
Park/404(c) FS BLH-Wet	JLNHPP FS BLH-Wet Restoration
Park/404(c) FS Swamp	JLNHPP FS Swamp Restoration
Park/404(c) FS Fresh Marsh	JLNHPP FS Marsh Restoration

Additional changes to proposed mitigation features resulted from the reassessment of impacts using the 95-100% HSDRRS design plans, as well as available HSDRRS as-built plans. This resulted in a change in the mitigation requirement for most habitat types. The proposed projects mitigating for general BLH and swamp, as well as Park/404(c) BLH and swamp impacts were affected the most. This resulted in some projects previously evaluated in the AEP being dropped from further consideration because the mitigation sites could no longer contain all proposed mitigation due to the increased requirement.

Modified Tentatively Selected Mitigation Plan

To be in compliance with mitigation requirements (i.e., concurrent with construction) in the Water Resources Development Act of 1986 (WRDA 86) the District Commander required all mitigation alternatives to have begun construction prior to December 2016. This resulted in the elimination of additional mitigation alternatives that were identified in PIER 37 (Table 3).

Changes to the previously authorized WBV Hurricane Protection Project as assessed in Environmental Assessment (EA) 437 entitled "West Bank and Vicinity, New Orleans, Louisiana Hurricane Protection Project, Lake Cataouatche Levee Enlargement Highway 90 to Cataouatche Pump Stations" and EA 439 entitled "West Bank and Vicinity, New Orleans, Louisiana Hurricane Protection Project: Westwego to Harvey Canal Highway 45 Borrow Pits, Jefferson Parish, Louisiana" incurred impacts requiring mitigation. Because the impacts assessed in those EAs used a 100-year period of analysis and because the mitigation plan for those impacts was not fully developed, a decision was made to re-assess those impacts using a 50 year period of analysis and to mitigate them along with the WBV HSDRRS impacts (which were also assessed using a 50 year period of analysis).

The mitigation plan as presented in SPIER 37 was further modified by substituting the Lake Boeuf project with the Highway (Hwy) 307 project for the FS BLH-Wet feature; that plan is being referred to as the WBV Modified Tentatively Selected Mitigation Plan as displayed in Table 4. However, the inability to obtain land rights resulted in the removal of the Hwy 307

feature, therefore, the mitigation proposals in SPIER 37a and in this report only includes the Bayou Segnette and mitigation bank features.

Table 3. Previous Proposed Revised WBV Mitigation TSP.

Habitat Type	TSPA Project(s)	Status
Non-Park PS BLH-Wet	Mitigation Bank	Implemented on February 11, 2015
Non-Park PS BLH-Dry	Mitigation Bank	Eliminated: lack of in-kind mitigation bank credits
Non-Park FS BLH-Wet	Lake Boeuf, Plaquemines, and Dufrene Ponds	Eliminated: Implementation schedule extends beyond December 2016[1]
Non-Park FS Swamp	Lake Boeuf, Plaquemines, and Simoneaux Ponds	Eliminated: Implementation schedule extends beyond December 2016[1]

[1] District Commander required all mitigation alternatives to have begun construction prior to December 2016 to be in compliance with WRDA 86 requiring mitigation to be implemented prior to or concurrent with construction.

Table 4. WBV HSDRRS Modified Tentatively Selected Mitigation Plan (MTSMP).

Habitat Type	MTSMP Project	AAHUs Impacted	Mitigation Project Acres
General PS BLH-Wet/Dry[1]	Mitigation Bank/ Bayou Segnette	200.27	920.00
General FS BLH-Wet[2]	To be determined	72.04	130.00
General FS Swamp[2]	To be determined	134.52	330.00
General FS Fresh Marsh[3]	JLNHPP	65.92	138.00
Park/404(c) FS BLH-Wet[3]	JLNHPP	3.12	12.16
Park/404(c) FS Swamp[3]	JLNHPP	7.19	20.44
Park/404(c)FS Fresh Marsh[3]	JLNHPP	3.03	20.40

[1] Only this mitigation feature is being proposed for implementation in this report and the Corps SPIER 37a.
[2] Inability to obtain land rights precludes implementation of the Hwy 307 Bayou Boeuf feature so impacts to these habitats will be addressed in future IER documents.
[3] These programmatic features are currently being addressed in the Service's report for TIER 1.

Wetland value assessments were conducted to determine each project's mitigation potential. As the project is refined the mitigation potential may be adjusted. Should further development of feature designs result in a lower mitigation potential, a supplemental FWCA report may be

necessary.

For all BLH and swamp, plantings should be done in accordance with the GUIDELINES – WET BLH HABITAT ENHANCEMENT, SWAMP HABITAT RESTORATION, AND SWAMP HABITAT ENHANCEMENT" however those guidelines are still in draft form and need to be finalized. The Service recommends that the Corps work with the natural resource agencies to refine that document and incorporate all changes in the Mitigation Success Criteria and Mitigation Monitoring: Marsh Mitigation Features from the LPV PIER 36 and the Bayou Sauvage Task Force Guardian BLH mitigation monitoring plan.

Bayou Segnette Protected Side BLH-Dry

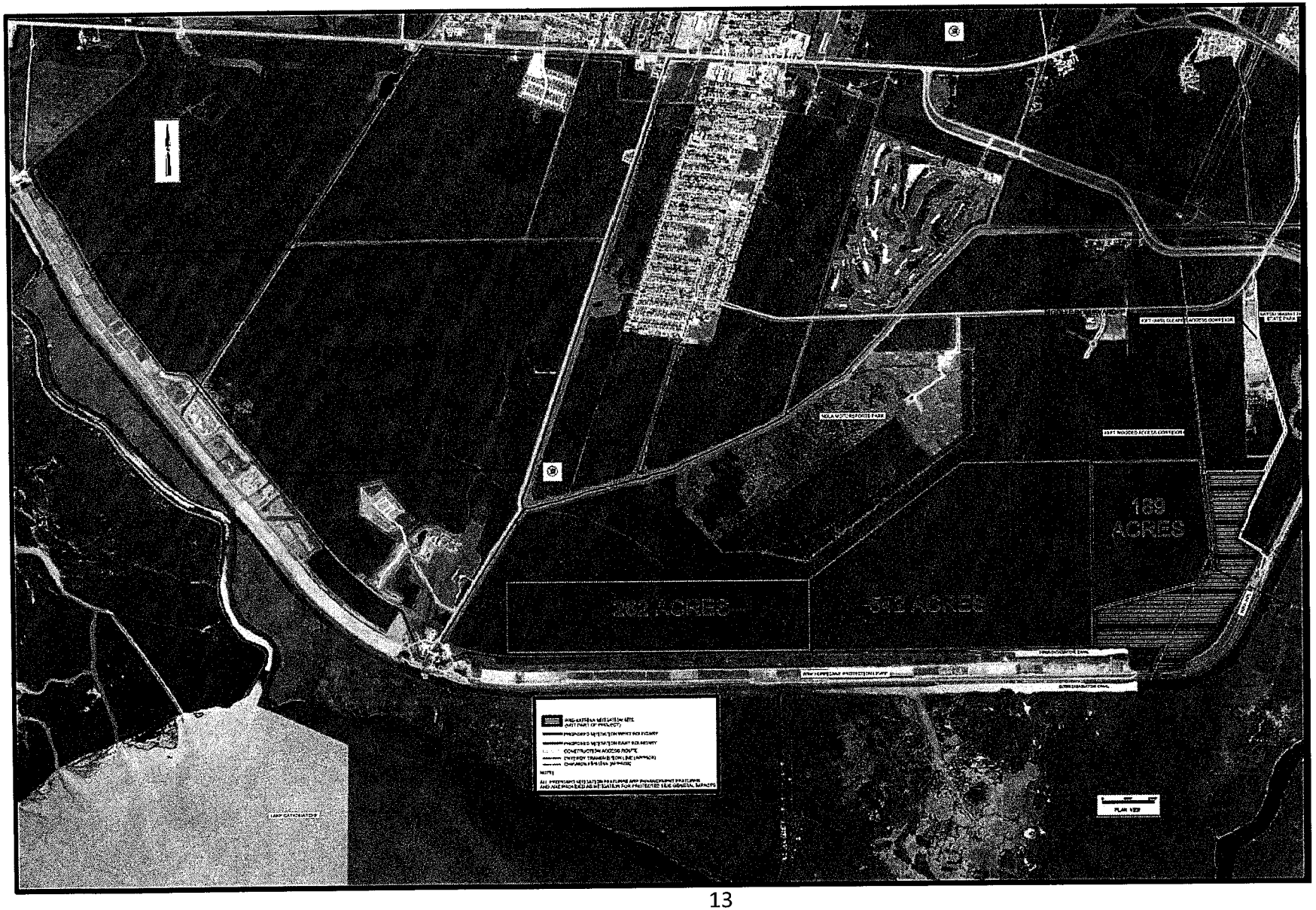
This alternative would involve enhancing an existing degraded forest habitat (populated with invasive species) as mitigation for BLH-Wet and BLH-Dry protected side impacts. The alternative would be located adjacent to or in the vicinity of the Bayou Segnette State Park, on the protected side of the hurricane protection levee in Jefferson Parish. Two locations have been identified within that area. The two options are identified as BLH West and BLH East. BLH West is currently 1,000 acres and BLH East is 993 acres. The mitigation goal is to enhance approximately 920 acres by removing the existing invasive trees and planting the same area with native BLH tree and mid-story species to generate approximately 193 AAHUs.

Due to the high density of invasive plant species, the project area would receive multiple herbicidal treatments prior to the initial planting of native, high-quality BLH canopy and midstory species. Initially the entire area would be aerial sprayed in late summer or early fall. Approximately one month after the initial aerial spraying, the mitigation features would be mechanically cleared without grubbing. Starting the following spring, multiple inspections and additional herbicidal treatments would be performed to ensure the project site is properly treated through the entire growing season. Large native trees and shrubs would be preserved during the mechanical clearing process when practicable. Woody debris generated during the clearing operations would be chipped and left within the mitigation features. Following the clearing activities, the features would be planted with high quality native BLH tree and shrub species. Ongoing invasive species control would be necessary. It is estimated that this phase would require approximately two to three years for completion. However, if sufficient mitigation bank credits become available in basin, consistent with the mitigation plan identified in PIER 37, those credits would be purchased before building the Bayou Segnette mitigation project.

Hwy 307 Bayou Boeuf Restoration

The proposed project was located in Lafourche Parish along Hwy 307 between Raceland and Des Allemandes, however, the inability to obtain necessary land rights to implement mitigation precluded the use of this alternative. Therefore, impacts to flood-side BLH-Wet and swamp habitats will be addressed in a subsequent IER document.

Figure 1: Bayou Segnette BLH-Wet/Dry Enhancement Mitigation Site (Corps of Engineers)



Mitigation Bank Alternative

If implementation of the Bayou Segnette site becomes infeasible or if it cannot provide sufficient credits to mitigate all impacts the Corps would purchase credits from an active mitigation bank that is in compliance with the requirements of the Corps Regulatory Program, which includes monitoring and reporting by the owner/operator. Selection of the mitigation bank would occur through a "Request for Qualifications/Request for Proposal" process, through which any mitigation bank having the appropriate number and resource type of credits available could submit a proposal for selling credits. In order to qualify, a bank would have to be in compliance with an approved mitigation banking instrument, including an approved mitigation plan and appropriate real estate and financial assurances. The Corps would utilize in basin banks, however, depending on credit availability, credit purchase could occur outside the basin. The certified version of the WVA would be run on the mitigation banks to ensure that the assessment of the functions and services provided by the mitigation bank would fully replace the lost functions and services. If mitigation credits are purchased from a mitigation bank the Service requests that a copy of the letter from the banker acknowledging the acquisition be provided to the Service for our files to document completion of that mitigation increment.

FISH AND WILDLIFE CONSERVATION MEASURES

The goal of the mitigation plan is to provide for equal replacement of the habitat units lost due to improvements to the hurricane protection project. The equal replacement compensation goal specifies that the gain of one habitat unit can be used to offset the loss of one habitat unit. Achieving this goal would re-establish and maintain BLH habitat. The objectives of the mitigation measures for the forested areas would be to establish and maintain a high diversity of native mast- and fruit-producing trees and shrubs, maximize herbaceous and shrub-layer canopy cover while maintaining a semi-mature to mature age structure.

Current benefits projected for the MTSMP are based on general assumptions of the project area and design. As the Corps further refines proposed mitigation features, detailed designs should be provided to the natural resource agencies so that recommendations can be provided in an appropriate timeframe and more accurate habitat assessments can be completed. Further, as mitigation plans are refined, the Corps, Service, EPA, LDWF, and NMFS would need to evaluate the plans against the accrued and anticipated benefits and the effect of implementing the proposal on achievement of the mitigation plan goal. Any changes that would prevent the mitigation goal from being achieved would not be recommended for implementation. Furthermore, the following activities are not permitted within a mitigation area for the life of the project:

1. Placing, filling, storing, or dumping of refuse, trash, vehicle bodies or parts, rubbish, debris, junk, waste, or other such items on the property.
2. Mechanized land clearing or deposition of soil, shell, rock or other fill on the property without prior request for approval, excluding the existing ROWs.
3. Cutting, removal or destruction of vegetation on the property except in accordance with the restoration plan.
4. Grazing of cattle or other livestock on the property that has been restored or enhanced.

5. Commercial, industrial, agricultural, or residential uses of the property.
6. No other human activities that result in the material degradation of habitat within the area shall occur.

However, it is understood that the mitigation plan shall not prohibit hunting, fishing, trapping, non-consumptive recreational pursuits and exploration and production of minerals. Exploration and production of minerals shall be conducted in accordance with all applicable laws and regulations. The Service acknowledges that such activities have the potential to reduce the ability of the area to achieve the mitigation goal, depending on the extent of the impacts to the mitigation lands.

Modification and finalization of the "GUIDELINES – WET BLH HABITAT ENHANCEMENT, SWAMP HABITAT RESTORATION, AND SWAMP HABITAT ENHANCEMENT" is needed. This plan addresses restoration and enhancement techniques such as reforestation planting, Chinese tallow tree removal and control methods; monitoring guidelines, schedule and responsibilities; success criteria; and some remedial actions. The Service has provide recommendations to the tree species list and the percentages proposed for planting to ensure successful reforestation, while some modifications have been made some revisions are still needed. In a 2005 report the Service provided Chinese tallow tree removal and control methods for WBV mitigation, since that time the methodology has changed to improve the success of such efforts. The Service also provided recommendations for the plan in our September 25, 2013, comment letter on the Draft Programmatic IER for the LPV mitigation. These revised methods should be incorporated into the mitigation reforestation plan. The methodology proposed to determine reforestation and restoration of jurisdictional wetland success should be modified to more closely reflect those standards utilized by mitigation banks.

The Service recommends that the Corps maintain full responsibility for any mitigation project for a minimum of 4-years post planting. That would allow the 4-year success criteria to be evaluated, prior to turning operation and maintenance responsibilities over to the local sponsor. Based on our experience, it would be virtually impossible to reasonably forecast the likely future success of the mitigation project based solely on mitigation activities accomplished prior to this time. The second monitoring event, performed 4 years after the initial mitigation activities, would provide significantly more insight into the continued development, success, and effectiveness of the implemented features.

At this time the mitigation planning documents do not describe in detail actions needed by the Corps and/or the local sponsor if mitigation is not succeeding as planned. The Service recommends that this important component of the mitigation plan be immediately developed.

The Service encourages the Corps to finalize mitigation plans and proceed to mitigation construction so that it will be concurrent with project construction and revising the impact and mitigation period-of-analysis to reflect additional temporal losses would not be required.

While we are generally in support of the Modified Tentatively Selected Mitigation Plan alternative which includes using mitigation banks, we are concerned that selecting the mitigation bank alternative could have negative repercussions. The Corps has the opportunity and resources to construct a "permittee-responsible" mitigation project. By going to a

mitigation bank, the Corps could exhaust credits available in any one mitigation bank thus creating a hardship on an individual landowner/permittee. Mitigation banks provide a cost savings and feasible mitigation alternative for the individual landowner. A mitigation bank serves the individual landowner who does not have the resources to construct a mitigation project or whose project typically does not require the amount of mitigation that warrants a self-mitigation project. We recommend that the Corps consider the availability of credits at a bank and within a hydrologic unit when evaluating the mitigation bank alternative to avoid exhausting all credits available within a hydrologic unit for individual landowners/permittee.

SERVICE POSITION AND RECOMMENDATIONS

The Service supports the Corps' current mitigation features and recognizes that additional Tiered IERs may be need to address individual mitigation features that are still in early design phases. We support the Corps' plan to mitigate impacts to fish and wildlife resources associated with WBV HSDRRS provided that the following fish and wildlife conservation recommendations are incorporated into future project planning and implementation and outstanding issues are adequately resolved via ongoing planning efforts:

1. Prior to beginning work on IERs tiered off of this SPIER the Corps should coordinate with the natural resource agencies to ensure that necessary information to conduct detailed project planning/design and finalize the WVA analysis is developed and available. Final sizing of mitigation must be based on revised WVAs conducted on advanced project designs

2. Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, Water Control Plans, or other similar documents) should be coordinated with the Service, NMFS, LDWF, EPA and Louisiana Department of Natural Resources (LDNR). The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

3. Impacts to Essential Fish Habitat (EFH) should be avoided and minimized to the greatest extent possible. Because impacts to designated EFH habitat may need to be mitigated the Corps should coordinated with the NMFS regarding this need and maintain an account of all EFH habitats (e.g., open water, marsh) impacted and mitigated.

4. Impacts to wetland habitat (including SAV habitat) and non-wet BLH associated with the construction of the mitigation features should be avoided and minimized to the greatest extent possible. The Corps shall fully compensate for any unavoidable losses of wetland habitat or non-wet BLH caused by mitigation features through sizing (i.e., boundary adjustments) of the mitigation features in close coordination with the natural resource agencies.

5. If applicable, a General Plan for mitigation lands should be developed by the Corps, the Service, and the managing natural resource agency in accordance with

Section 3(b) of the FWCA.

6. A fully defined mitigation plan should be included in the authorizing report and Decision Record. The mitigation plan should be developed including locations and AAHUs vetted through the natural resource agencies. Only existing mitigation banks and existing credits released by Corps Regulatory Branch may be considered.

7. We recommend that the Corps consider the availability of credits at a bank and within a hydrologic unit when evaluating the mitigation bank alternative to avoid exhausting credits available for individual landowners/permittees within a particular hydrologic unit.

8. If mitigation is credits are purchased from a mitigation bank the Service requests that a copy of the letter from the banker acknowledging the acquisition is provided to the Service for our files.

9. If mitigation lands are purchased for inclusion within publicly managed lands, those lands may need to meet certain requirements. Land-managing natural resource agencies may have requirements that must be met prior to accepting mitigation lands; therefore, if they are proposed as a manager of a mitigation site they should be contacted early in the planning phase regarding such requirements. The local sponsor should also be made aware of the above requirements should it be their responsibility to transfer mitigation lands to the land-managing agency.

10. The Corps should continue to coordinate with land managing agencies during planning of mitigation features that may be built on their lands or lands to be turned over to them for management. Coordination should continue until construction of the projects are complete and prior to any subsequent maintenance. Please contact Mr. John Lavin at 1-888-677-1400 regarding work on the Bayou Segnette State Park which is operated by the Louisiana Department of Culture, Recreation and Tourism, Office of State Parks areas.

11. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation and/or maintenance of mitigation lands, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest

12. Any proposed change in mitigation features or plans should be coordinated in advance with the Service, NMFS, LDWF, EPA and LDNR.

13. The Service encourages the Corps to finalize mitigation plans and proceed to mitigation construction so that it will be concurrent with project construction. If construction is not concurrent with mitigation implementation then revising the impact and mitigation period-of-analysis to reflect additional temporal losses will be required.

14. The Service recommends that the Corps immediately finalize selection and approval of mitigation and augmentation features in coordination with federal and state natural resource agencies and with required approval from EPA. All necessary studies for the mitigation and augmentation features have been completed and agencies have reached agreement on those features. Further, the Service recommends that all such mitigation and augmentation features be implemented as soon as possible. All terms and conditions specified in the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination should be followed with regard to mitigation and augmentation requirements.

15. The Corps should immediately develop a long-term monitoring plan for the Bayou aux Carpes 404(c) area, as required under the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination. The plan should be coordinated with the natural resources agencies and approved by EPA. All terms and conditions specified in the EPA 2009 Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination with regard to the long-term monitoring and operation plan should be followed. Once approved, that plan should be implemented as soon as possible.

16. The Service recommends that all of the terms and conditions outlined in the EPA Bayou aux Carpes 404(c) 2009 modification be implemented without delay. The Corps is responsible for funding all mitigation and augmentation features in this agreement. A link to the 2009 final modified determination may be found at www.nolaenvironmental.gov under the EPA heading for IER 12.

17. The Service recommends that the Corps work with the natural resource agencies to refine the "GUIDELINES – WET BLH HABITAT ENHANCEMENT, SWAMP HABITAT RESTORATION, AND SWAMP HABITAT ENHANCEMENT" and incorporate all changes in the Mitigation Success Criteria and Mitigation Monitoring: Marsh Mitigation Features from the LPV PIER 36 and the Bayou Sauvage Task Force Guardian BLH mitigation monitoring plan.

18. The Service recommends a two month period between herbicide application and mechanical clearing of invasive species. The proposed one month period may not allow sufficient time for herbicides to travel into the root system and work, thus encouraging greater stump sprouting which may increase the amount of future herbicide applications.

19. The Service recommends that the Corps maintain full responsibility for any BLH mitigation project for a minimum of 4-years post planting. Documentation should be provided to demonstrate funding obligation for the Corps to fulfill initial success criteria at a minimum.

20. The Service recommends that all mitigation planning documents should describe in detail actions needed by the Corps and/or the local sponsor if mitigation is not succeeding as planned.

21. The Corps should avoid adverse impacts to bald eagle and osprey nesting locations and wading bird colonies through careful design project features and timing of construction. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

22. We recommend that the Corps re-initiate ESA consultation with this office to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their habitat. Subsequently, ESA consultation should be reinitiated should the proposed project features change significantly or are not implemented within one year of the last ESA consultation with this office.

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Appendix A

Modification of Bayou aux Carpes CWA Section 404(c) Final Determination

Excerpt Only – This is not a complete document

B. Modification and Conditions

The October 16, 1985, Bayou aux Carpes Final Determination is hereby modified, subject to conditions specified below, by adding the following: The US Army Corps of Engineers may discharge dredged or fill material for the purpose of constructing the West Closure Complex alternative, as described by Colonel Alvin B. Lee, District Commander for the New Orleans District, in the November 4, 2008, letter requesting modification of the 1985 Bayou aux Carpes 404(c) FD. In this letter (Appendix 1), Colonel Lee requested modification of the 404(c) designation of the site to allow for the construction of a 4,200 foot floodwall and earthen berm within a 100 ft by 4,200 ft corridor along the eastern boundary of the Bayou aux Carpes 404(c) site, Jefferson Parish, Louisiana.

As stated above, this modification is subject to the specific conditions that EPA found were necessary in order for the Agency to grant this modification. The conditions are consistent with EPA and Corps regulations for mitigation and must be implemented in order for any discharges of dredged or fill material to comply with the terms of the 1985 Bayou aux Carpes 404(c) Final Determination. Not-with-standing the fact that the conditions contained in the Final Determination are binding requirements on the Corps, in order to demonstrate the high level of inter-agency cooperation and commitment that compensatory mitigation projects will be provided and maintained, a letter agreeing to the conditions below must be provided by the Corps to EPA (e.g., a formal, documented commitment from a government agency or public authority) (33 CFR 332.3 (n)), as soon as possible and in any event prior to any construction activities authorized by this Final Determination modification. The District Commander for the New Orleans Corps District must provide in writing to EPA AAOW a commitment to plan, design, ensure full funding, implement and monitor all mitigation, augmentation and monitoring measures that are conditions on which this modification was based to the satisfaction of EPA. EPA recognizes that full funding of the mitigation, augmentation and monitoring measures is subject to the availability of appropriated funds, however the District Commander for the New Orleans Corps District would agree to request through the Corps' budget process the funding that is necessary to fully implement and monitor the mitigation, augmentation and monitoring measures as detailed below.

As set forth in this modification, this action is reflective of a unique set of circumstances. The modification granted today does not have any bearing on any other CWA Section 404(c) designations or modification requests. Each CWA Section 404(c) designation represents a unique situation that responds to a specific set of parameters unlike any other.

i. Project Design and Construction

1. During final project design, the New Orleans District of the Corps (Corps) shall utilize all feasible engineering and construction practices to reduce impacts to the Bayou aux Carpes CWA Section 404(c) wetlands.[1]

2. During project construction, the Corps shall comply with the conservation recommendations as specified in the "Fish and Wildlife Coordination Act Report, Individual Environmental Report (IER) 12, Harvey to Algiers" (February 18, 2009), or as they may be amended by the USFWS, Ecological Service, Lafayette.

ii. Mitigation

1. The New Orleans District of the Corps shall insure full funding and implementation of mitigation measures to compensate for the unavoidable adverse impacts of the project. EPA will make the final determination as to whether compensation is adequate, appropriate, and satisfactorily implemented in a timely manner.

2. The New Orleans District of the Corps shall obtain written approval from EPA Region 6, after consulting with the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (GNOHSDRRS) interagency review team, prior to implementing any mitigation feature. At a minimum, the Corps shall document for EPA Region 6 the concurrence or non-concurrence on each mitigation feature by the National Park Service (Jean Lafitte National Historical Park and Preserve), US Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), US Geological Survey (USGS), Louisiana Department of Natural Resources, Louisiana Department of Environmental Quality, and Louisiana Department of Wildlife and Fisheries.

3. The New Orleans District of the Corps shall be responsible for obtaining all necessary permits and conducting all required regulatory coordination and approvals prior to implementing any mitigation feature. The Corps shall coordinate with the Jean Lafitte National Historical Park and Preserve to determine the appropriate lead agency for conducting the interagency coordination and approval processes and shall obtain all necessary National Park Service permits.

iii. Augmentation Features

1. The New Orleans District of the Corps shall insure full funding and implementation of augmentation features to enhance the wetland functions and values of the site. EPA will make the determination as to whether augmentation features are adequate, appropriate, and satisfactorily implemented in a timely manner.

2. The New Orleans District of the Corps shall obtain written approval from EPA Region 6, after consulting with the GNOHSDRRS interagency review team, prior to implementing any augmentation feature. At a minimum, the Corps shall document for EPA Region 6 the

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[1] This commitment was stated in a November 4, 2008, request for Section 404(c) modification letter to Mr. Lawrence E. Starfield, Deputy Regional Administrator EPA Region 6 from Colonel Alvin B. Lee, District Commander for the New Orleans District for the US Army Corps of Engineers (Appendix 1). Note: enclosed documents referenced in this letter are not attached in Appendix 1, but can be found in EPA Region 6 Recommended Determination dated April 2, 2009.

concurrence or non-concurrence on each augmentation feature by the NPS (Jean Lafitte National Historical Park and Preserve), USFWS, NMFS, USGS, Louisiana Department of Natural Resources, Louisiana Department of Environmental Quality, and Louisiana Department of Wildlife and Fisheries.

3. The Corps shall be responsible for obtaining all necessary permits and conducting all required regulatory coordination and approvals prior to implementing any augmentation feature. The Corps shall coordinate with the Jean Lafitte National Historical Park and Preserve to determine the appropriate lead agency for conducting the interagency coordination and approval processes and shall obtain all necessary National Park Service permits.

iv. Long-term Monitoring and Operation

1. The New Orleans District of the Corps shall coordinate the development of a long-term site monitoring plan, to be approved in writing by EPA, after consulting with the GNOHSDRRS interagency review team. EPA will make the determination as to whether the monitoring plan is adequate and appropriate.

2. The New Orleans District of the Corps and EPA Region 6 shall develop and sign a Memorandum of Agreement with those willing and active State, federal, and local participants with natural resource management missions who have participated on the IER # 12 [2]interagency review team. The Memorandum of Agreement shall document the commitment to participate in the planning and analyses specified by the long-term monitoring plan.

3. The New Orleans District of the Corps shall obtain written approval from EPA Region 6, after consulting with the GNOHSDRRS interagency review team, prior to implementing the long-term monitoring plan. At a minimum, the Corps shall document for EPA Region 6 the concurrence or non-concurrence on the long-term monitoring plan by the NPS (Jean Lafitte National Historical Park and Preserve), USFWS, NMFS, USGS, Louisiana Department of Natural Resources, Louisiana Department of Environmental Quality, and Louisiana Department of Wildlife and Fisheries.

4. The New Orleans District of the Corps shall be responsible for ensuring implementation of a long-term site monitoring plan, to extend no less than the first 50 years of the Corps project life, unless otherwise addressed in a long-term agreement with another party approved by EPA.[3] The long-term monitoring plan for the Bayou aux Carpes Modification mitigation and augmentation features will focus on monitoring both the mitigation and augmentation features, as well as the

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[2] The Corps has divided the study area for the GNOHSDRRS into 17 project component areas. Each of these component areas will report on plans for those areas in Individual Environmental Reports (IERs). The proposed plans for the Bayou aux Carpes CWA Section 404(c) area are reported in IER #12.

[3] The ultimate responsibility to plan, design, fully fund, implement and monitor all mitigation, augmentation and monitoring measures that are conditions on which this determination was based are the responsibility of the U.S. Army Corps of Engineers. Although the Corps may enter into long term agreements with another party with respect to the work authorized by this modification, such agreements do not obviate the Corps' responsibility for meeting the conditions of this modification, and any concerns EPA may have will be raised with the Corps, not other involved parties.

impacts of the floodwall. The plan should provide for making adjustments if the mitigation or augmentation features prove not to perform as expected. Though it is not expected that the Corps would need to make future adjustments to the floodwall, the effects of the floodwall are to be monitored to determine unexpected impacts which may warrant other corrective actions.

5. The New Orleans District of the Corps shall provide EPA Region 6 with digital aerial photography of the site (season and flood stage to be determined jointly) prior to constructing the floodwall along the perimeter of the site and annually for the first five years after its construction, and at other times as specified by EPA Region 6.

6. The New Orleans District of the Corps shall gather the monitoring data and report results to EPA Region 6 annually, on a schedule to be specified by EPA Region 6, each year for the first five years, and at other times as specified by EPA Region 6.

7. Throughout the life of the project, the New Orleans District of the Corps shall ensure that any necessary adaptive construction modifications, including removal or repair, of any mitigation or augmentation feature is instituted based on the recommendations of EPA.

8. In the event that EPA determines during the life of the project that operation, maintenance, or long-term management by the Corps of the flood protection/risk reduction features, mitigation features, or augmentation features is causing unanticipated and unacceptable wetland impacts, EPA may modify the terms of these conditions.

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

July 15, 2015

Regional Planning and
Environment Division South

Mr. Don Haydel
Acting Administrator
Louisiana Department of Natural Resources
Interagency Affairs, Compliance, and Field Services Division
P.O. Box 44487
Baton Rouge, LA 70804-4487

Dear Mr. Haydel:

Enclosed for your review is a modification to our coastal zone consistency determination (CZD) (C20140014) which addressed implementation of the constructible features of the Programmatic Individual Environmental Report (PIER) #37, Titled "West Bank and Vicinity (WBV) Hurricane and Storm Damage Risk Reduction System (HSDRRS) Mitigation Plan" with a signed Decision Record on June 13, 2014. The modification to the CZD addresses the applicable Louisiana Coastal Use Guidelines for implementation of the modified mitigation projects for flood side BLH-Wet and swamp and protected side BLH-Dry.

Currently the CEMVN is analyzing implementation of the projects in a Supplemental Programmatic Individual Environmental Report (SPIER) entitled "West Bank and Vicinity (WBV), Hurricane and Storm Damage Risk Reduction System (HSDRRS) Mitigation Project Jefferson, St. Charles, Lafourche, and Plaquemines Parishes, Louisiana SPIER #37a". The proposed projects mitigate impacts to general flood side BLH-Wet and swamp and general protected side BLH-Dry.

This office is seeking your concurrence with the enclosed CZD, if possible, within 45 days of the date of this letter. Please contact Tammy Gilmore at 504-862-1002 if you have any questions.

Sincerely,

Sandra Stiles

for Joan M. Exnicios
Chief, Environmental Planning Branch

MODIFIED CONSISTENCY DETERMINATION (C20140014)

Louisiana Coastal Use Guidelines

West Bank and Vicinity (WBV),
Hurricane and Storm Damage Risk Reduction System (HSDRRS) Mitigation Project
Jefferson, and Lafourche, Louisiana

SPIER #37a

INTRODUCTION

Section 307 of the Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et. seq. requires that "each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." In accordance with Section 307, a modification to Consistency Determination C20140014 has been prepared for the purchase of mitigation bank credits for non-Park/404(c) protected side (PS) bottomland hardwoods impacts incurred from the construction of the WBV, HSDRRS. Coastal Use Guidelines were written in order to implement the policies and goals of the Louisiana Coastal Resources Program, and serve as a set of performance standards for evaluating projects. Compliance with the Louisiana Coastal Resources Program, and therefore, Section 307, requires compliance with applicable Coastal Use Guidelines.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the WBV, HSDRRS Mitigation project is to replace the lost functions and services of habitats impacted by the WBV HSDRRS construction as required by the Federal Water Pollution Control Act, and WRDA 1986 and 2007. A programmatic individual environmental report (PIER) was completed in June 2014 that presented the whole plan for mitigating the WBV HSDRRS impacts, but only recommended moving forward with implementing the part of the approved mitigation plan that included the purchase mitigation bank credits for non-Park/404(c) PS impacts to bottomland hardwoods (BLH) Dry and BLH-Wet habitats. LDNR provided Coastal Zone Consistency #C20140014 for this constructible feature of the plan and BLH-Wet mitigation bank credits were purchased to satisfy some the non-Park/404(c) PS BLH-Dry/Wet impacts. Since that time, three of the features of the mitigation plan have become un-implementable. As such, SPIER #37a is being completed to evaluate substitute projects for the FS BLH-Wet, FS swamp and PS BLH-Dry features of the mitigation plan and make those features constructible as well. The decision to prepare a SPIER and recommend implementation of only part of the tentatively selected modified mitigation plan (TSMMP) was made in an effort to complete as much mitigation as possible concurrent with construction of projects incurring the impact as required by WRDA 1986, 33 U.S.C. 2283(a).

DESCRIPTION OF THE PROPOSED ACTION

The SPIER #37a TSMMP consists of a combination of pump and fill operations in interior open water areas to create fresh marsh, swamp, and BLH-Wet habitat on and adjacent to Jean

Lafitte National Historic Park and Preserve (JLNHPP); elevation manipulation, invasive species eradication and reforestation on existing agricultural fields to enhance/restore/create BLH-Wet, BLH-Dry and swamp habitats, and the purchase of BLH-Wet/Dry and swamp mitigation bank credits to address the WBV HSDRRS mitigation requirement. The following are the WBV HSDRRS mitigation projects that make up the TSMMP, however, only the construction of the Hwy 307 Bayou Boeuf projects, the Bayou Segnette project or the purchase of mitigation bank credits for general FS BLH-Wet, FS swamp and PS BLH-Dry impacts are recommended as constructible features of the plan and proposed for implementation at this time. Designs for the projects identified as Programmatic Features of the mitigation plan are underway and currently PIER #37, TIER 1 EA is being prepared in collaboration with the National Park Service (NPS) to evaluate implementation of the programmatic features of the mitigation plan thereby making them constructible. The EA is scheduled to be released soon and may be available for public review at the same time SPIER #37 is out for public review. Coastal Zone Consistency determinations on the constructible features covered in the TIERs would be submitted at the time of TIER completion.

CONSTRUCTIBLE FEATURES

If a proposed project becomes infeasible due to difficulties in implementation or changed conditions, the CEMVN will take appropriate action to ensure satisfaction of its mitigation requirement. If any of the TSMMP projects could not be implemented, the CEMVN would default to one of the other alternatives evaluated in this SPIER. The other alternatives involve the purchase of out of basin (watershed) mitigation bank credits. In accordance with the USACE Implementation Guidance for the WRDA of 2007- Section 2036(c), Wetlands Mitigation, if mitigation bank credits are not available in the same watershed, documentation of the analysis and of the rational for leaving the watershed is necessary (see attachment).

MITIGATION FOR NON-PARK PS BLH-DRY AND BLH-WET

As part of the approved mitigation plan in PIER #37, MVN purchased credits from 1 bank (Enterprise Woodlands) in the WBV basin for non-Park/404c PS BLH-Wet impacts. The purchase of mitigation bank credits for non-Park/404c PS BLH-Dry impacts is awaiting sufficient in basin credit availability. LDNR provided Coastal Zone Consistency #C20140014 for this constructible feature of the plan.

Under SPIER #37a, Bayou Segnette PS BLH-Dry enhancement (figure 3) is the tentatively selected project for the PS BLH-Dry feature and recommended as a constructible feature of the WBV HSDRRS Mitigation Plan. The proposed project is located adjacent to the Bayou Segnette State Park, on the protected side of the hurricane protection levee in Jefferson Parish. The proposed site is bounded to the south by the existing Westbank Hurricane Protection Levee (HPL) and to the north by Nicolle Boulevard and the NOLA Motorsports Park.

Two locations have been identified within the Bayou Segnette area. Both sites are currently populated with invasive tree species. The two options are identified as BLH West and BLH East. BLH West is 1,000 acres and BLH East is 993 acres. Target mitigation effort is to enhance approximately 920 acres by removing the existing invasive trees and planting the same

area with desired high quality trees to mitigate 193 AAHUs.

Due to the high density of invasive plant species, the project area would receive multiple herbicidal treatments prior to the initial planting of native, high-quality species. Initially the entire area would be aerial sprayed in late summer or early fall. Approximately two months after the initial aerial spraying, the mitigation features would be mechanically cleared without grubbing. Large native trees and shrubs would be preserved during the mechanical clearing process to the greatest degree practicable. Woody debris generated during the clearing operations would be chipped and left within the mitigation features. Following the clearing activities, the features would be planted with high quality native BLH tree and shrub species.

An alternative to the Bayou Segnette TSMMP would be the purchase of credits from an active mitigation bank that is in compliance with the requirements of the USACE Regulatory Program, which include monitoring and reporting by the owner/operator. Selection of the mitigation bank would occur through a "Request for Qualifications/Request for Proposal" process, through which any mitigation bank having the appropriate number and resource type of credits available could submit a proposal for selling credits. In order to qualify, a bank would have to be in compliance with an approved mitigation banking instrument, including an approved mitigation plan and appropriate real estate and financial assurances. CEMVN would utilize in basin banks, however, depending on credit availability, credit purchase could occur outside the basin.
If credits are purchased from a mitigation bank, non-Park/404c protected side BLH-dry impacts would be mitigated with the purchase of BLH-Dry or Wet credits equaling 193 Average Annual Habitat Units (AAHUs).

MITIGATION FOR NON-PARK/404 (c) FS BLH -WET

Under SPIER #37a, Hwy 307 Bayou Boeuf BLH-Wet Restoration (figure 2) is the tentatively selected project for the FS BLH-Wet feature and recommended as a constructible feature of the WBV HSDRRS Mitigation Plan. The proposed project is located in Lafourche Parish along Highway 307 between Raceland and Des Allemandes. The entire footprint consists of approximately 521 acres of current or abandoned agricultural fields. Within the 521 acres, approximately 137 acres would be used for BLH-Wet restoration. All proposed footprint elevations are at or above that desired for BLH-Wet restoration (+2.5 feet to 3.25 feet NAVD88), therefore no outside borrow is required for this proposed restoration action. If sites that are above desired elevations fall within the final selected footprint for BLH-Wet restoration, these areas will be degraded, and material will be hauled to lower areas within the project footprint. All such earth moving efforts will be achieved with dozers, trucks, and backhoes.

The entire proposed footprint is contained within a perimeter water retention dike, certain portions of which would be degraded to reconnect the restoration project with adjacent swamp/BLH habitat. There are ditches adjacent to the dikes that would be filled or partially filled during dike degrading.

Once cultural surveys are complete, layout of the project features would be based on existing LIDAR data, which can be clearly mapped to confirm existing elevations. In general the features will be laid out (1) to avoid cultural sites, (2) to minimize required earth moving from high to

low areas, (3) maximize the remaining higher elevations for ongoing farming, (4) minimize the need for retention dike realignment to maintain the integrity of remaining agricultural fields, and (5) accommodate the potential for swamp restoration which is also being considered within this footprint.

In general, the worst case scenario would require scraping of approximately 1.5feet to 0.5feet of topsoil in the higher areas to achieve elevations within the desired range. This material would remain on-site, to be truck hauled or pushed by dozer to areas of existing lower elevations. It is envisioned that the majority of the acres required could simply be planted at the existing elevation once the water retention dikes have been degraded. As the vast majority of the potential project footprint(s) is existing agricultural fields, little to no anticipated clearing would be required. What little woody or vegetative debris which requires removal would be stockpiled and burned on site. The project would then be planted with BLH species.

An alternative to the Hwy 307 TSMMP would be the purchase of credits from an active mitigation bank that is in compliance with the requirements of the USACE Regulatory Program, which include monitoring and reporting by the owner/operator. Selection of the mitigation bank would occur through a "Request for Qualifications/Request for Proposal" process, through which any mitigation bank having the appropriate number and resource type of credits available could submit a proposal for selling credits. In order to qualify, a bank would have to be in compliance with an approved mitigation banking instrument, including an approved mitigation plan and appropriate real estate and financial assurances. CEMVN would utilize in basin banks, however, depending on credit availability, credit purchase could occur outside the basin.
If credits are purchased from a mitigation bank, non-Park/404c flood side BLH-Wet impacts would be mitigated with the purchase of BLH-Wet credits equaling 72.04 Average Annual Habitat Units (AAHUs).

MITIGATION FOR NON-PARK/404 (c) FLOOD SIDE SWAMP IMPACTS

Under SPIER #37a, Hwy 307 Bayou Boeuf Swamp Restoration (figure 2) is the tentatively selected project for the FS Swamp feature and recommended as a constructible feature of the WBV HSDRRS Mitigation Plan. The proposed project is located in Lafourche Parish along Highway 307 between Raceland and Des Allemandes. The entire footprint consists of approximately 521 acres of current or abandoned agricultural fields. Within the 521 acres, approximately 330 acres would be used for swamp restoration. All proposed footprint elevations are at or above that desired for swamp restoration (+2.5 feet to 0.0 feet NAVD88), therefore no outside borrow is required for this proposed restoration action. If sites that are above desired elevations fall within the final selected footprint for swamp restoration, these areas will be degraded, and material will be hauled to lower areas within the project footprint. All such earth moving efforts will be achieved with dozers, trucks, and backhoes.

The entire proposed footprint is contained within a perimeter water retention dike, certain portions of which would be degraded to reconnect the restoration project with adjacent swamp/BLH habitat. There are ditches adjacent to the dikes that would be filled or partially filled during dike degrading.

Once cultural surveys are complete, layout of the project features would be based on existing LIDAR data, which can be clearly mapped to confirm existing elevations. In general the features would be laid out (1) to avoid cultural sites, (2) to minimize required earth moving from high to low areas, (3) maximize the remaining higher elevations for ongoing farming, (4) minimize the need for retention dike realignment to maintain the integrity of remaining agricultural fields, and (5) accommodate the potential for swamp restoration which is also being considered within this footprint.

In general, the worst case scenario would require scraping of approximately 1.0feet to 0.5feet of topsoil in the higher areas to achieve elevations within the desired range. This material would remain on-site, to be truck hauled or pushed by dozer to areas of existing lower elevations. It is envisioned that the majority of the acres required could simply be planted at the existing elevation once the water retention dikes have been degraded. As the vast majority of the potential project footprint(s) is existing agricultural fields, little to no anticipated clearing would be required. What little woody or vegetative debris which requires removal would be stockpiled and burned on site. The project would then be planted with swamp species.

An alternative to the Hwy 307 TSMMP would be the purchase of credits from an active mitigation bank that is in compliance with the requirements of the USACE Regulatory Program, which include monitoring and reporting by the owner/operator. Selection of the mitigation bank would occur through a "Request for Qualifications/Request for Proposal" process, through which any mitigation bank having the appropriate number and resource type of credits available could submit a proposal for selling credits. In order to qualify, a bank would have to be in compliance with an approved mitigation banking instrument, including an approved mitigation plan and appropriate real estate and financial assurances. CEMVN would utilize in basin banks, however, depending on credit availability, credit purchase could occur outside the basin.

If credits are purchased from a mitigation bank, non-Park/404c flood side swamp impacts would be mitigated with the purchase of swamp credits equaling 134.52 AAHUs.

PROGRAMMATIC FEATURES (not recommended for construction in this SPIER)

MITIGATION FOR NON-PARK/404 (c) FLOOD SIDE FRESH MARSH IMPACTS

The Jean Lafitte FS Fresh Marsh Restoration Project mitigation project would involve restoration of FS fresh marsh habitats. Two restoration features are proposed. Feature JL1B5 would be built in an open water portion of Yankee pond (29° 51'09.52"N 90° 10'27.90W), would occupy approximately 91.2 acres, and would be located within the Park (figure 4). Feature JL15 (figure 5) would be situated in an area along the shoreline of Lake Salvador (29° 46'45.47"N 90° 09'05.70W) where prior work has already largely established a marsh platform that was previously an open water portion of the lake. Feature JL15 would encompass a total of approximately 55.5 acres. Portions of this feature would overlap Park property, while the remaining portions would overlap lands not currently owned by NPS. Both of the marsh restoration features would be located in Jefferson Parish.

Approximately 8,400 linear feet of retention dike would be required for JL1B5. Of the total

8,400 linear feet of dikes, approximately 3,100 linear feet would be armored/capped with stone. This armored dike segment would be located along the eastern boundary of feature of JL1B5 adjacent to Bayou Segnette.

Marsh restoration would require approximately 600,000 cubic yards of material hydraulically dredged from Lake Cataouatche. The borrow site would be approximately 1,200 feet x 1,500 feet (roughly 42.0 acres) with a maximum cut of 10 feet. The pipeline would be approximately 18,000 linear feet and routed adjacent to the western bank of Bayou Segnette. As the pipeline would need to cross a portion of Lake Cataouatche, a small segment of submerged pipeline would be installed at the crossing with appropriate signage to ensure safe passage of vessels over the line. Throughout the initial construction phase, project construction would be coordinated with the US Coast Guard.

The initial target marsh elevation in JL1B5 would be +3.5 feet with a final target elevation of approximately +1.0 to +1.5 feet. It is estimated that the initial project construction activities discussed above would require approximately 5 to 6 months. The final construction phase would begin following settlement and dewatering of the created marsh platform.

Fish dips (essentially armored gaps) would be constructed in the armored dike segment. The fish dips would allow water exchange and provide aquatic organism access to the marsh feature. It is anticipated that the final phase of construction activities (degrading dikes, constructing trenasses and fish dips, installation of dike armoring) would require approximately 3 to 4 months.
As part of the proposed project, the JL15 footprint would be degraded to design grade elevation of +1.0 to +1.5 feet. Fish dips would be constructed in this dike. The fish dips would allow water exchange and provide aquatic organism access to the marsh feature. It is anticipated that the final phase of JL15 construction activities (re-grading the marsh platform, refurbishment of rock dike, constructing fish dips) would require approximately 4 to 5 months.

MITIGATION FOR PARK/404 (c) BLH-WET IMPACTS

The Jean Lafitte BLH-Wet Restoration Project would involve restoring native BLH-Wet habitats in an existing open water area (an existing borrow pit). The project would be located in Jefferson Parish. The proposed restoration features would include JL14A (approximately 6.28 acres), and JL14B (approximately 5.88 acres), as shown in figure 6. Both features would be located within the Park, adjacent to the West Bank HPL (29° 50’37.43”N 90° 07’40.43W).

Features JL14A and JL14B would be constructed by placing fill material in the borrow pit to establish earthen platforms for the restored habitats. The mitigation features would be filled with an estimated 18 feet of sand to elevation -0.0 feet. A 4-foot clay cap to elevation +3.5 feet would then be placed on top of the sand fill. It is anticipated that it would take approximately 1 year for the fill materials to settle to the desired final target grade of elevation +2.0 feet.

Approximately 400,000 cubic yards of sand fill and 80,000 cubic yards of the clay cap would be required to fill the 12.2 acres being restored to BLH-Wet habitats. These borrow materials would be obtained from off-site government furnished and/or contractor furnished borrow pits.

Project access would be via two roadways extending west from Barataria Boulevard.
An appropriate traffic control plan would be implemented during the initial construction phase to minimize traffic congestion and safety hazards. Establishment of the construction access routes would require clearing a corridor, roughly 20-feet wide, through existing wetland habitats.

The initial construction phase would last roughly 9 to 10 months. Plantings would be in accordance with the BLH-Wet planting guidelines. This secondary construction phase, would likely last approximately 3 to 4 months.

MITIGATION FOR PARK/404 (c) SWAMP IMPACTS

The Jean Lafitte Swamp Restoration Project would involve restoring native swamp habitats in primarily existing open water areas. The project would be located in Jefferson Parish. The proposed restoration features would include JL7 (29° 50'59.34"N 90° 08'17.87W) (approximately 11.31 acres) as shown in figure 6, and JL8 (29° 47'39.71"N 90° 04'11.82W) (approximately 5.00 acres) and JL9 (29° 47'18.21"N 90° 04'04.32W) (approximately 4.13 acres) as shown in figure 7. All three features would be located in the Park, while features JL8 and JL9 would also be located within the 404c area.

Proposed feature JL7 would encompass a segment of an existing man-made canal, although the far eastern end of this feature would encompass a previously filled and disturbed upland area. A portion of an existing spoil berm running along the north side of JL7 would be cleared and degraded (excavated) to use as a source of fill to establish feature JL7. The existing upland area within the eastern end of JL7's footprint would also be cleared and degraded.

Another component of the JL7 swamp restoration would involve excavating "gaps" in the existing spoil berms adjacent to both sides of Millaudon Canal. Each gap would be degraded to approximately elevation 1.0 feet to match the existing grades typically found in nearby swamp habitats.

The quantity of fill that would be obtained from the degrading of the spoil berm adjacent to JL7 and from degrading the existing upland portion of JL7 is approximately 35,000 cubic yards. Combining this with the material obtained from degrading the Millaudon Canal gaps would yield a total of roughly 36,600 cubic yards that would be placed in the existing canal portion of JL7 to establish the platform for the proposed JL7 swamp. However, it is estimated that an additional 140,000 cubic yards of fill (borrow) would be required to bring the canal portion of JL7 to the initial target grade elevation.

Project access would be via two roadways extending west from Barataria Boulevard.
Due to the anticipated volume of dump truck traffic, an appropriate traffic control plan would be implemented during the initial construction phase to minimize traffic congestion and safety hazards.

The initial construction phase to establish feature JL7 would require an estimated 8.5 to 9.5 months. Once settled, the restoration feature would be planted native swamp canopy and midstory species.

The proposed restoration features JL8 and JL9 would encompass existing canals that would be filled and planted to restore native swamp habitat. Two construction access corridors would be required to build features JL8 and JL9. There are existing spoil berms on the north and south sides of both restoration features which would be "gapped" to improve surface flow and exchange. Each gap would be degraded to approximately elevation 1.0 feet to match the existing grades typically found in nearby swamp habitats.

It is estimated that approximately 3,600 cubic yards of fill would be obtained through construction of the spoil berm gaps. However, it is estimated that an additional 135,000 cubic yards of fill would be required to establish the earthen platforms for the restored swamp features. This borrow material would be bucket dredged from the GIWW. The proposed borrow area would be approximately 70 feet wide and 5,000 feet long (17.2 acres) and would be dug to 4 feet below existing grade with an allowable 1 foot of overdepth. All activities within the GIWW would be coordinated with the US Coast Guard as to not impede navigation.

The initial construction of JL8 and JL9 would require about 3 to 4 months. The final construction phase (e.g. initial planting of features JL8 and JL9) would require roughly 2 to 3 weeks.

MITIGATION FOR PARK/404 (c) FRESH MARSH IMPACTS

The Jean Lafitte FS Fresh Marsh Restoration mitigation project would involve restoring fresh marsh habitat from open water. The single proposed marsh restoration feature, JL1B4 (figure 8), would encompass approximately 20.4 acres, located in Jefferson Parish within the Park (29° 50'53.05"N 90° 10'37.92W). Restoration work would involve establishing a land platform for the new marsh habitat proposed.

Approximately 3,780 linear feet of retention dike would be required. Of the total 3,780 linear feet of dikes, approximately 1,780 linear feet would be armored/capped with stone during the second project construction phase. Fish dips would be constructed in the armored dike segment. The initial target marsh elevation (elevation of slurry fill) would be +3.5 feet. It is estimated that the initial project construction activities discussed above would require approximately 3 to 4 months. The final target elevation of this feature is approximately +1.0 to +1.5 feet. The final construction phase would begin following settlement and dewatering of the created marsh platform. In conjunction with this dike degrading effort, trenasses would be constructed as necessary to serve as tidal creeks to facilitate water exchange and create shallow water interspersion features within JL1B4. It is anticipated that the final phase of construction activities (degrading dikes, constructing trenasses and fish dips, installation of dike armoring) would require approximately 3 to 4 months.

Marsh restoration would require approximately 150,000 cubic yards of material from Lake Cataouatche. The borrow site would be approximately 1,500 feet by 300 feet (roughly 10.3 acres) with a maximum cut of 10 feet. The pipeline would be routed adjacent to the western bank of Bayou Segnette. Throughout the initial construction phase, project construction would be coordinated with the US Coast Guard.

GUIDELINES APPLICABLE TO ALL USES

Guideline 1.1 The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.

Response 1.1: Acknowledged.

Guideline 1.2 Conformance with applicable water and air quality laws, standards and regulations, and with those other laws, standards and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.

Response 1.2: none of the work is taking place in open water or waters of the United States and therefore neither a 404(b)(1) or a Water Quality Certificate is required. The parishes that the work will take place in are in attainment and any air quality impacts are expected to be minimal, temporary and localized (dust and vehicle exhaust) and would not put the parishes out of attainment.

Guideline 1.3 The guidelines include both general provisions applicable to all uses and specific provisions applicable only to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to the situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.

Response 1.3: Acknowledged.

Guideline 1.4 These guidelines are not intended to nor shall they be interpreted so as to result in an involuntary acquisition or taking of property.

Response 1.4: Acknowledged.

Guideline 1.5 No use or activity shall be carried out or conducted in such a manner as to constitute a violation of the terms of a grant or donation of any lands or water-bottoms to the State or any subdivision thereof. Revocations of such grants and donations shall be avoided.

Response 1.5: Acknowledged.

Guideline 1.6 Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines.

a) type, nature and location of use.

b) elevation, soil and water conditions and flood and storm hazard characteristics of site.

c) techniques and materials used in construction, operation and maintenance of use.

d) existing drainage patterns and water regimes of surrounding area including flow, circulation,

quality, quantity and salinity; and impacts on them.

e) availability of feasible alternative sites or methods – for implementing the use.

f) designation of the area for certain uses as part of a local program.

g) economic need for use and extent of impacts of use on economy of locality.

h) extent of resulting public and private benefits.

i) extent of coastal water dependency of the use.

j) existence of necessary infrastructure to support the use and public costs resulting from use.

k) extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited.

1) proximity to, and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forest lands.

m) the extent to which regional, state and national interests are served including the national interest in resources and the siting of facilities in the coastal zones as identified in the coastal resources program.

n) proximity to, and extent of impacts on, special areas, particular areas, or other areas of particular concern of the state program or local programs.

o) likelihood of, and extent of impacts of, resulting secondary impacts and cumulative impacts.

p) proximity to and extent of impacts on public lands or works, or historic, recreational or cultural resources.

q) extent of impacts on navigation, fishing, public access, and recreational opportunities.

r) extent of compatibility with natural and cultural setting.

s) extent of long term benefits or adverse impacts.

Response 1.6: Acknowledged.

<u>Guideline 1.7</u> It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, operated and maintained to avoid to the maximum extent practicable significant:

a) reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow.

Response 1.7: a) No reductions anticipated. Restoration of BLH-Wet and swamp habitat and reconnection of the project area to the coastal zone would slightly increase the natural supply of sediment and nutrients into the coastal system.

b) adverse economic impacts on the locality of the use and affected governmental bodies.

Response 1.7: b) There would be no significant adverse economic impacts.

c) detrimental discharges of inorganic nutrient compounds into coastal waters.

Response 1.7: c) None anticipated as the projects are not located near coastal waters.

d) alterations in the natural concentration of oxygen in coastal waters.

Response 1.7: d) None anticipated as the projects are not located near coastal waters.

e) destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and waterbottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features.

Response 1.7: e) The proposed project would re-establish wetland forests and reconnect them to the coastal zone.

f) adverse disruption of existing social patterns.

Response 1.7: f) No social impacts are anticipated.

g) alterations of the natural temperature regime of coastal waters.

Response 1.7: g) None anticipated as the projects are not located near coastal waters..

h) detrimental changes in existing salinity regimes.

Response 1.7: h) None anticipated as the projects are located inland and do not include any type of water control structures.

i) detrimental changes in littoral and sediment transport processes.

Response 1.7: i) None anticipated as the projects are located inland and do not include any type of sediment transport.

j) adverse effects of cumulative impacts.

Response 1.7: j) None anticipated. Cumulative impacts to the coastal zone are expected to be beneficial as restored wetlands would be reconnected to the coastal zone.

k) detrimental discharges of suspended solids into coastal waters, including turbidity resulting

from dredging.

Response 1.7: k) None anticipated as the projects are not located near any coastal waters and doesn't dredging.

l) reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest.

Response 1.7: l) None anticipated as the projects are expected to restore the hydrology of the areas.

m) discharges of pathogens or toxic substances into coastal waters.

Response 1.7: m) None anticipated as best management practices would be utilized and the projects are not near coastal waters.

n) adverse alteration or destruction of archaeological, historical, or other cultural resources.

Response 1.7: n) None anticipated. The project strives to avoid any potential archaeological sites by waiting to finalizing its location within the 521 acre Hwy 307 project area once cultural surveys are complete.

o) fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas.

Response 1.7: o) The Hwy 307 site is currently farmed and is not an undisturbed or biologically highly productive wetland area. The Bayou Segnette site is currently forested with predominately invasive Chinese tallow.

p) adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands.

Response 1.7: p) The project areas are not unique or valuable habitat.

q) adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern.

Response 1.7: q) None anticipated as the projects are not located on public lands.

r) adverse disruptions of coastal wildlife and fishery migratory patterns.

Response 1.7: r) None anticipated. Any impacts to wildlife are expected to be beneficial.

s) land loss, erosion and subsidence.

Response 1.7: s) None anticipated as the projects would plant forest species

t) increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards.

Response 1.7: t) None anticipated

u) reductions in the long-term biological productivity of the coastal ecosystem.

Response 1.7: u) The proposed project would actually increase the long-term biological productivity of the coastal ecosystem.

Guideline 1.8 In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with the guideline if the permitting authority finds, after a systematic consideration of all pertinent information regarding the use, the site and the impacts of the use as set forth in guideline 1.6, and a balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from non-compliance with the modified standard and there are no feasible and practical alternative locations, methods and practices for the use that are in compliance with the modified standard and:

a) significant public benefits will result from the use, or;

b) the use would serve important regional, state or national interests, including the national interest in resources and the siting of facilities in the coastal zone identified in the coastal resources program, or;

c) the use is coastal water dependent.

The systematic consideration process shall also result in a determination of those conditions necessary for the use to be in compliance with the guideline. Those conditions shall assure that the use is carried out utilizing those locations, methods and practices which maximize conformance to the modified standard; are technically, economically, environmentally, socially and legally feasible and practical and minimize or offset those adverse impacts listed in guideline 1.7 and in the guideline at issue.

Response 1.8: Acknowledged.

Guideline 1.9 Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.

Response 1.9: Acknowledged.

Guideline 1.10 These guidelines are not intended to be, nor shall they be, interpreted to allow expansion of governmental authority beyond that established by La. R.S. 49:213.1 through

213.21, as amended; nor shall these guidelines be interpreted so as to require permits for specific uses legally commenced or established prior to the effective date of the coastal use permit program nor to normal maintenance or repair of such uses.

Response 1.10: Acknowledged.

If the CEMVN was unable to implement the Hwy 307 Bayou Boeuf BLH-Wet Restoration project, then the CEMVN would purchase sufficient in-kind mitigation bank credits to mitigate 72.04 Average Annual Habitat Units (AAHUs) of FS BLH-Wet impacts. This purchase would occur in basin unless sufficient in-kind, in-basin credits are lacking. If sufficient in-kind, in-basin credits are unavailable; in-kind, out of basin credits within the Louisiana coastal zone would be utilized. The actual mitigation banks available at the time of credit purchase are uncertain: Some banks may not have enough credits remaining, some may close, and other banks may come on line. As such, the particular mitigation bank(s) to be utilized is (are) unknown at this time. Since the impacts from constructing any permitted bank have been assessed through NEPA compliance achieved during the Regulatory permitting process and as such, exist as reasonably foreseeable projects in the Future Without Project (FWOP) conditions, no new direct, indirect or cumulative impacts to significant resources in the coastal zone would be incurred from the purchase of these credits for the WBV HSDRRS mitigation.

GUIDELINES FOR LEVEES

These guidelines are not applicable as the proposed action does not include any levee work.

GUIDELINES FOR LINEAR FACILITIES

These guidelines are not applicable as the proposed action does not include any linear facilities

GUIDELINES FOR DREDGED MATERIAL DEPOSITION

These guidelines are not applicable as the proposed action for construction does not include dredged material deposition

GUIDELINES FOR SHORELINE MODIFICATION

These guidelines are not applicable as the proposed action would not occur along shorelines therefore does not include shoreline alteration.

GUIDELINES FOR SURFACE ALTERATIONS

Guideline 6.1 Industrial, commercial, urban, residential, and recreational uses are necessary to provide adequate economic growth and development. To this end, such uses will be encouraged in those areas of the coastal zone that are suitable for development. Those uses shall be consistent with the other guidelines and shall, to the maximum extent practicable, take place only:

a) on lands five feet or more above sea level or within fast lands; or

b) on lands which have foundation conditions sufficiently stable to support the use, and where flood and storm hazards are minimal or where protection from these hazards can be reasonably well achieved, and where the public safety would not be unreasonably endangered; and

1) the land is already in high intensity of development use, or

2) there is adequate supporting infrastructure, or

3) the vicinity has a tradition of use for similar habitation or development

Response: Not applicable. The proposed action would be wetland habitat restoration.

Guideline 6.2 Public and private works projects such as levees, drainage improvements, roads, airports, ports, and public utilities are necessary to protect and support needed development and shall be encouraged. Such projects shall, to the maximum extent practicable, take place only when:

a) they protect or serve those areas suitable for development pursuant to Guideline 6.1; and

b) they are consistent with the other guidelines; and

c) they are consistent with all relevant adopted state, local and regional plans.

Response: Not applicable. The proposed action would be wetland habitat restoration.

Guideline 6.4 To the maximum extent practicable wetland areas shall not be drained -or filled. Any approved drain or fill project shall be designed and constructed using best practical techniques to minimize present and future property damage and adverse environmental impacts.

Response: Acknowledged. The areas that would be altered are agricultural lands and forested areas that are predominantly tallow. No draining or filling is necessary for implementation of the project.

Guideline 6.5 Coastal water dependent uses shall be given special consideration in permitting because of their reduced choice of alternatives.

Response: Not Applicable.

Guideline 6.6 Areas modified by surface alteration activities shall, to the maximum extent practicable, be re-vegetated, refilled, cleaned and restored to their predevelopment condition upon termination of the use.

Response: Acknowledged. The project includes planting of BLH and swamp species.

Guideline 6.7 Site clearing shall to the maximum extent practicable be limited to those areas immediately required for physical development.

Response: Acknowledged. The only areas to be cleared are the areas that would be planted with swamp and BLH species.

Guideline 6.8 Surface alterations shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Alterations in wildlife preserves and management areas shall be conducted in strict accord with the requirements of the wildlife

management body.

Response: Not Applicable. No surface alterations would take place within critical wildlife areas, wildlife preserves or management areas.

Guideline 6.9 Surface alterations which have high adverse impacts on natural functions shall not occur, to the maximum extent practicable, on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees, or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes.

Response: Not Applicable. No surface alterations would take place on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees, or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes.

Guideline 6.10 The creation of low dissolved oxygen conditions in the water or traps for heavy metals shall be avoided to the maximum extent practicable.

Response: Not Applicable. All work would take place on land.

Guideline 6.11 Surface mining and shell dredging shall be carried out utilizing the best practical techniques to minimize adverse environmental impacts.

Response: Not Applicable.

Guideline 6.12 The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.

Response: Not Applicable.

Guideline 6.13 Surface alteration sites and facilities shall be designed, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment and minimize other adverse impacts.

Response: Concur. Best management practices will be used.

Guideline 6.14 To the maximum extent practicable only material that is free of contaminants and compatible with the environmental setting shall be used as fill.

Response: Concur, although no use of fill is anticipated.

GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS

These guidelines are not applicable as the proposed action does not include hydrologic and sediment transport modifications.

GUIDELINES FOR DISPOSAL OF WASTES

The proposed action would not involve the disposal of wastes and, therefore, these guidelines are not applicable.

GUIDELINES FOR USES THAT RESULT IN THE ALTERATION OF WATERS DRAINING INTO COASTAL WATERS

These guidelines are not applicable as the proposed action would not involve the alteration of waters draining into coastal water.

GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES

The proposed action would not involve oil, gas, and other mineral activities and, therefore, these guidelines are not applicable

OTHER STATE POLICIES INCORPORATED INTO THE PROGRAM

Section 213.8A of Act 361 directs the Secretary of DOTD, in developing the LCRP, to include all applicable legal and management provisions that affect the coastal zone or are necessary to achieve the purposes of Act 361 or to implement the guidelines effectively. It states:

The Secretary shall develop the overall state coastal management program consisting of all applicable constitutional provisions, laws and regulations of this state which affect the coastal zone in accordance with the provisions of this Part and shall include within the program such other applicable constitutional or statutory provisions, or other regulatory or management programs or activities as may be necessary to achieve the purposes of this Part or necessary to implement the guidelines hereinafter set forth.

The constitutional provisions and other statutory provisions, regulations, and management and regulatory programs incorporated into the LCRP are identified and described in Appendix 1. A description of how these other authorities are integrated into the LCRP and coordinated during program implementation is presented in Chapter IV. Since all of these policies are incorporated into the LCRP, federal agencies must ensure that their proposed actions are consistent with these policies as well as the coastal use guidelines. (CZMA, Section 307)

CONSISTENCY DETERMINATION

This Coastal Zone Consistency determination has been completed on the mitigation for the constructible features of the WBV HSDRRS MTSMP; namely the construction of the Hwy 307 Bayou Boeuf BLH-Wet and swamp Restoration project, the Bayou Segnette BLH-Dry project or the purchase of in-kind mitigation bank credits to mitigate impacts to 72.04 AAHUs of BLH-Wet habitat, 134.52 AAHUs of swamp habitat and 193 AAHUs of BLH-Dry habitat. Since the TSMMP would restore approximately 137 acres of BLH-Wet habitat, 330 acres of swamp habitat, 920 acres of BLH-Dry habitat and reconnect such acreage with the coastal zone or optionally, since the impacts from constructing any permitted bank have been assessed through NEPA compliance achieved during the Regulatory permitting process no new direct, indirect or cumulative impacts to significant resources in the coastal zone would be incurred from mitigating the WBV HSDRRS FS BLH-Wet and swamp and PS BLH-Dry impacts.

Coastal Zone Consistency determinations on the constructible features covered in the TIERs (currently programmatic features in this SPIER) would be submitted at the time of TIER completion.

Based on this evaluation, the U. S. Army Corps of Engineers, New Orleans District, has

determined that the implementation of the proposed action is consistent, to the maximum extent practicable, with the State of Louisiana's Coastal Resources Program.

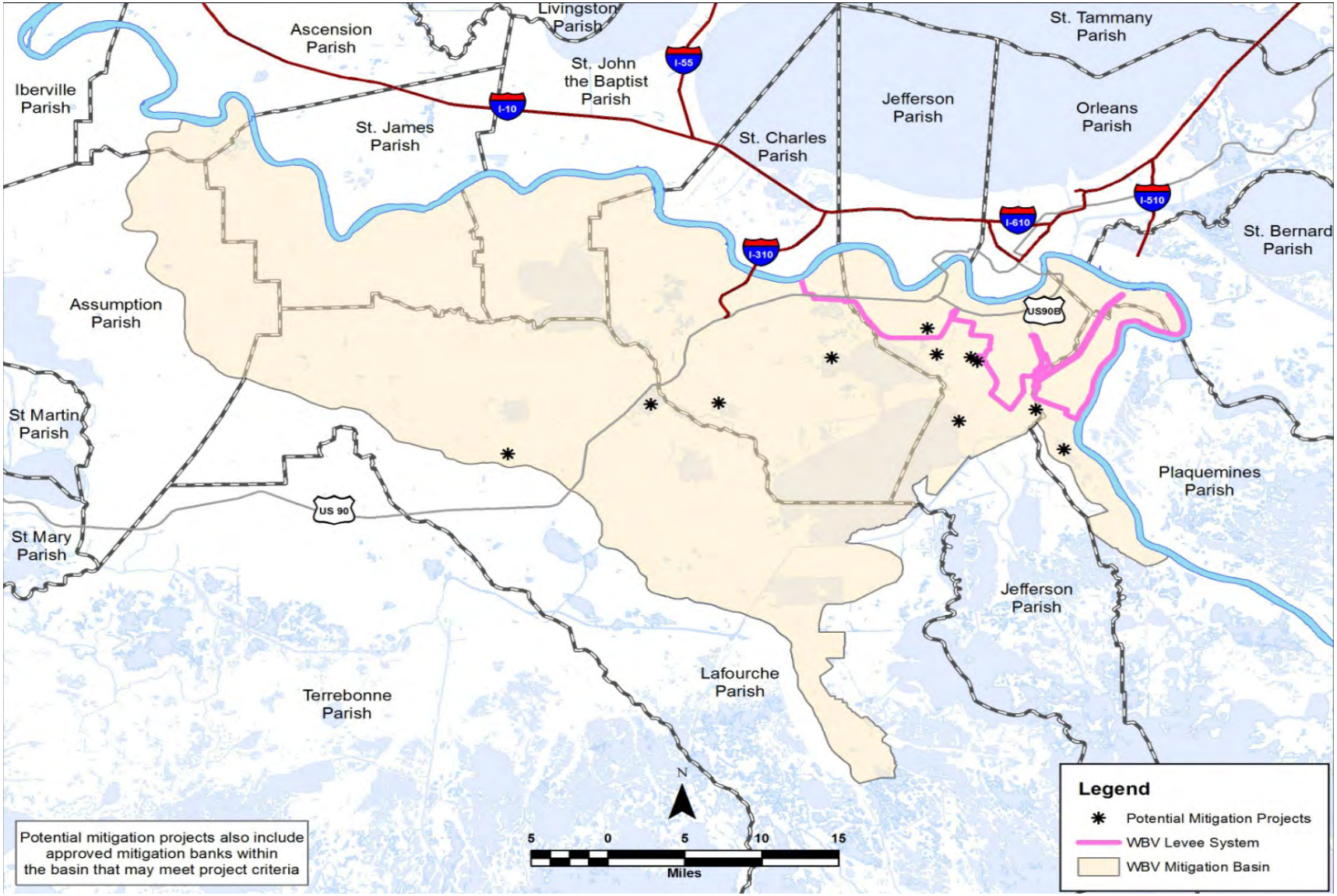

Figure 1. WBV HSDRRS TSMMP

Figure 2: Hwy 307 Bayou Boeuf BLH-Wet and Swamp Restoration Project

Figure 3: Bayou Segnette (Avondale Gardens) BLH-Dry Enhancement

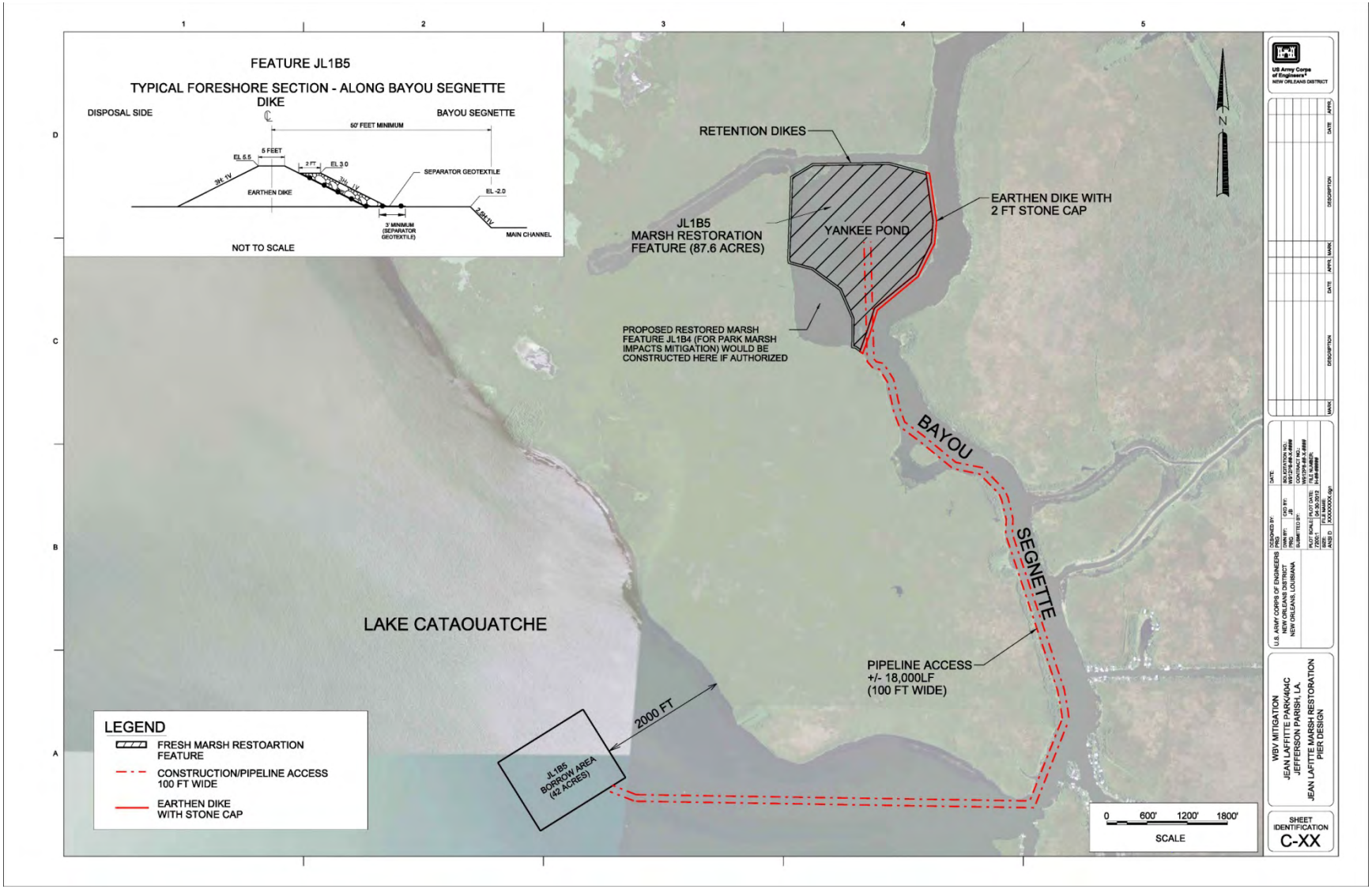

Figure 4: Jean Lafitte FS Fresh Marsh Restoration Project Mitigation Project (not recommended for construction)

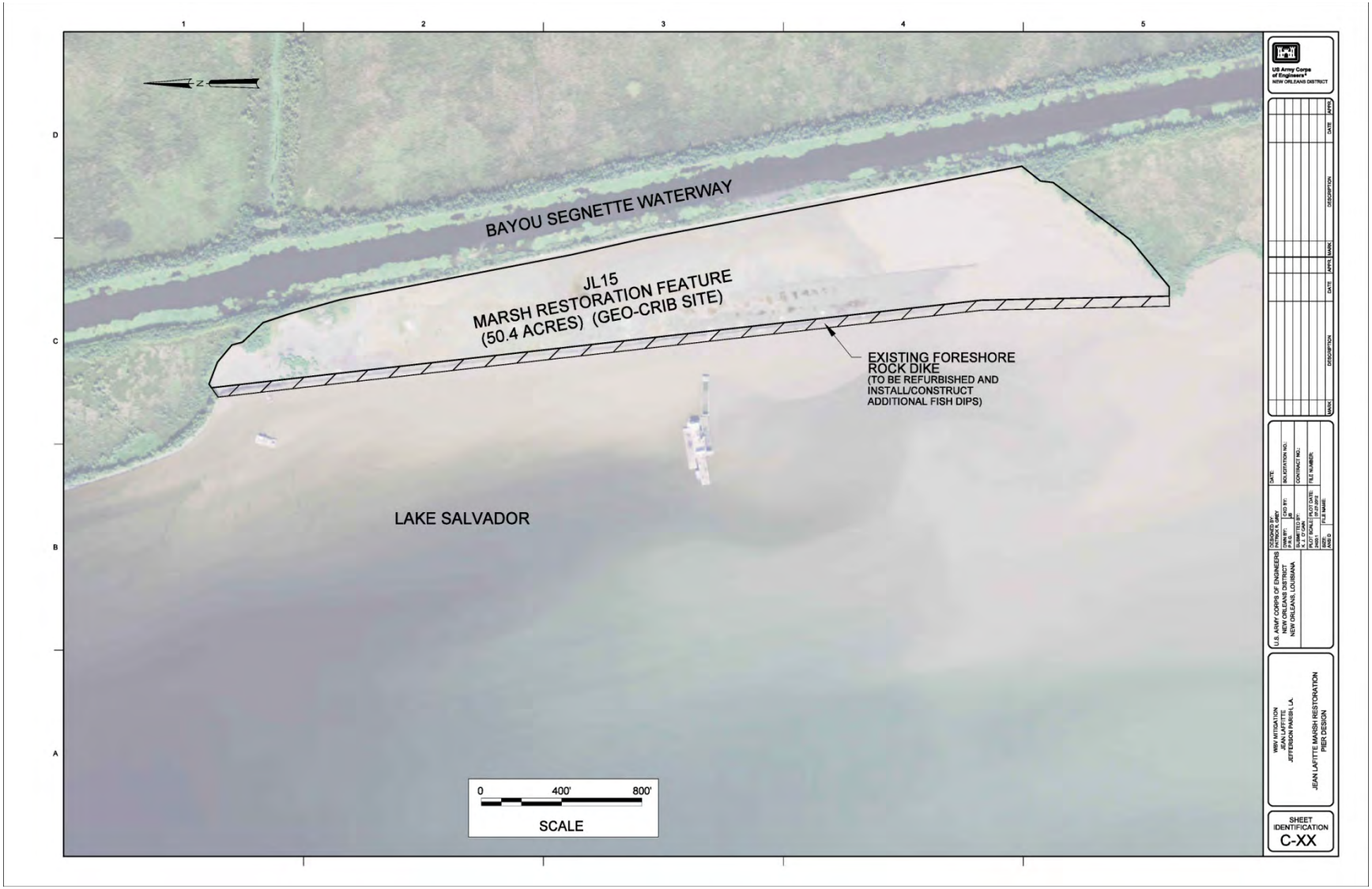

Figure 5: Jean Lafitte FS Fresh Marsh Restoration (JL15) Project Mitigation Project (not recommended for construction)

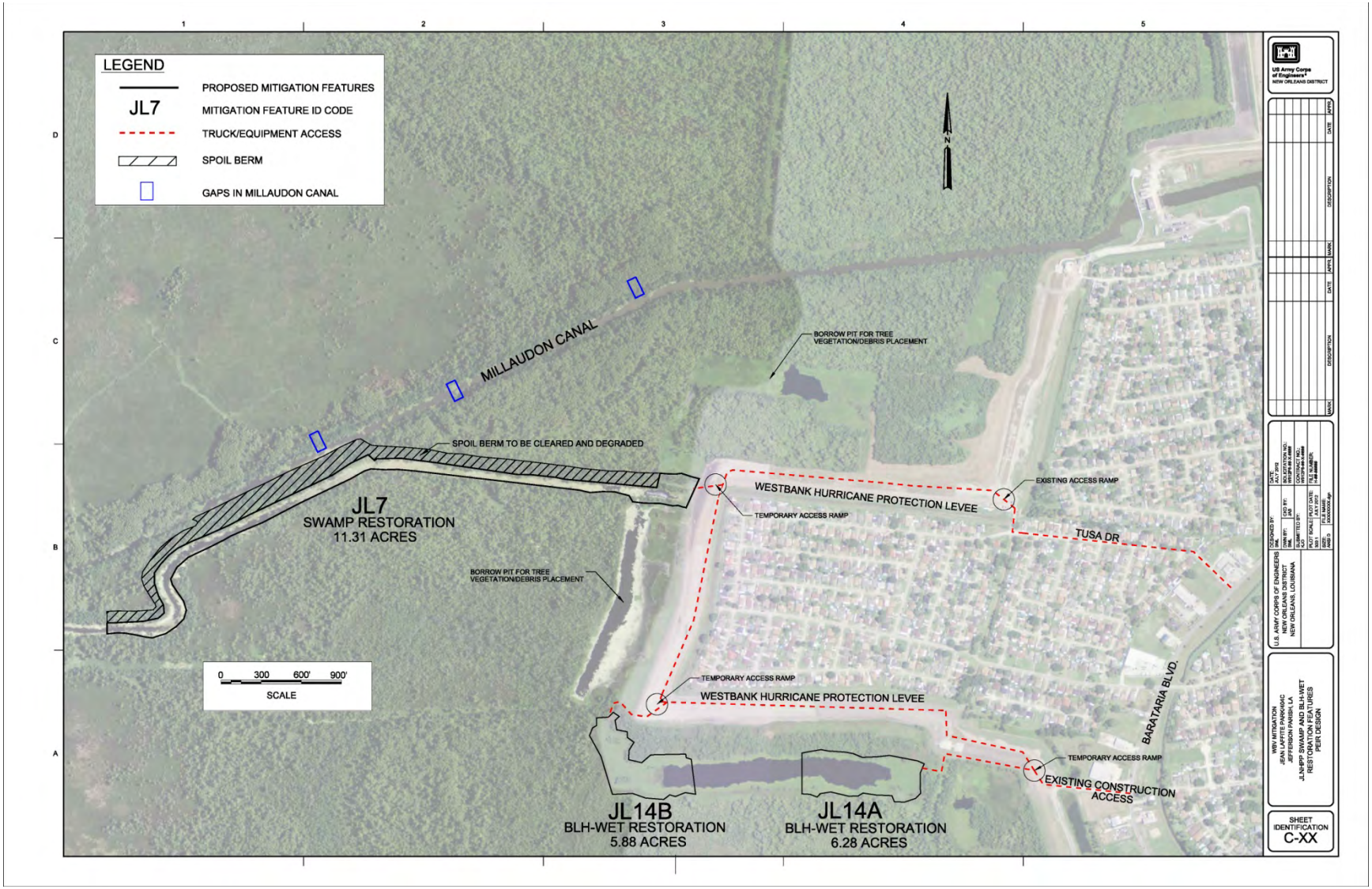

Figure 6: Jean Lafitte BLH-wet/Swamp Restoration (JL14A, JL14B, and JL7) Project Mitigation Project
(not recommended for construction)

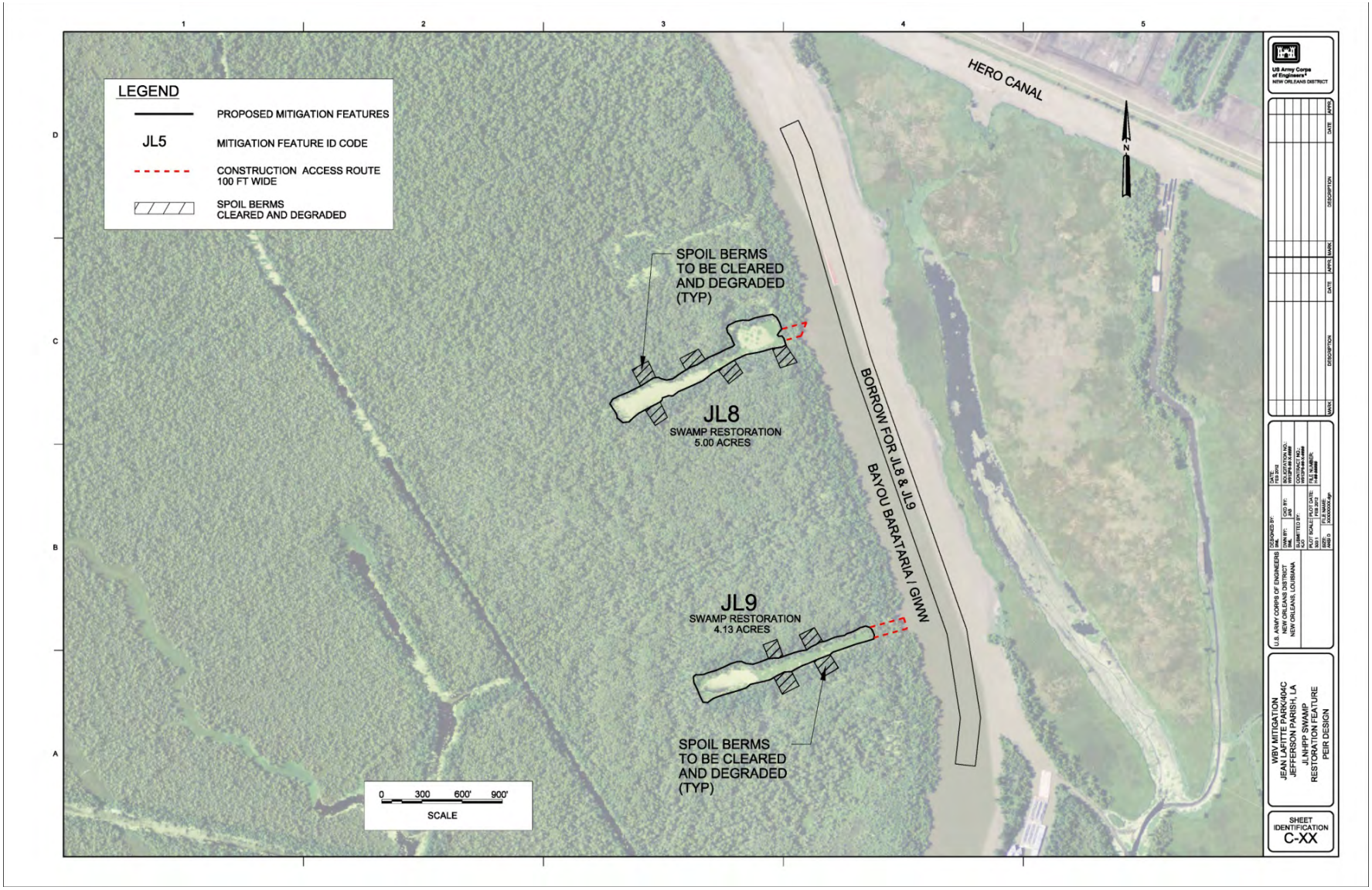

Figure 7: Jean Lafitte Swamp Restoration (JL8 and JL9) Mitigation Project (not recommended for construction)

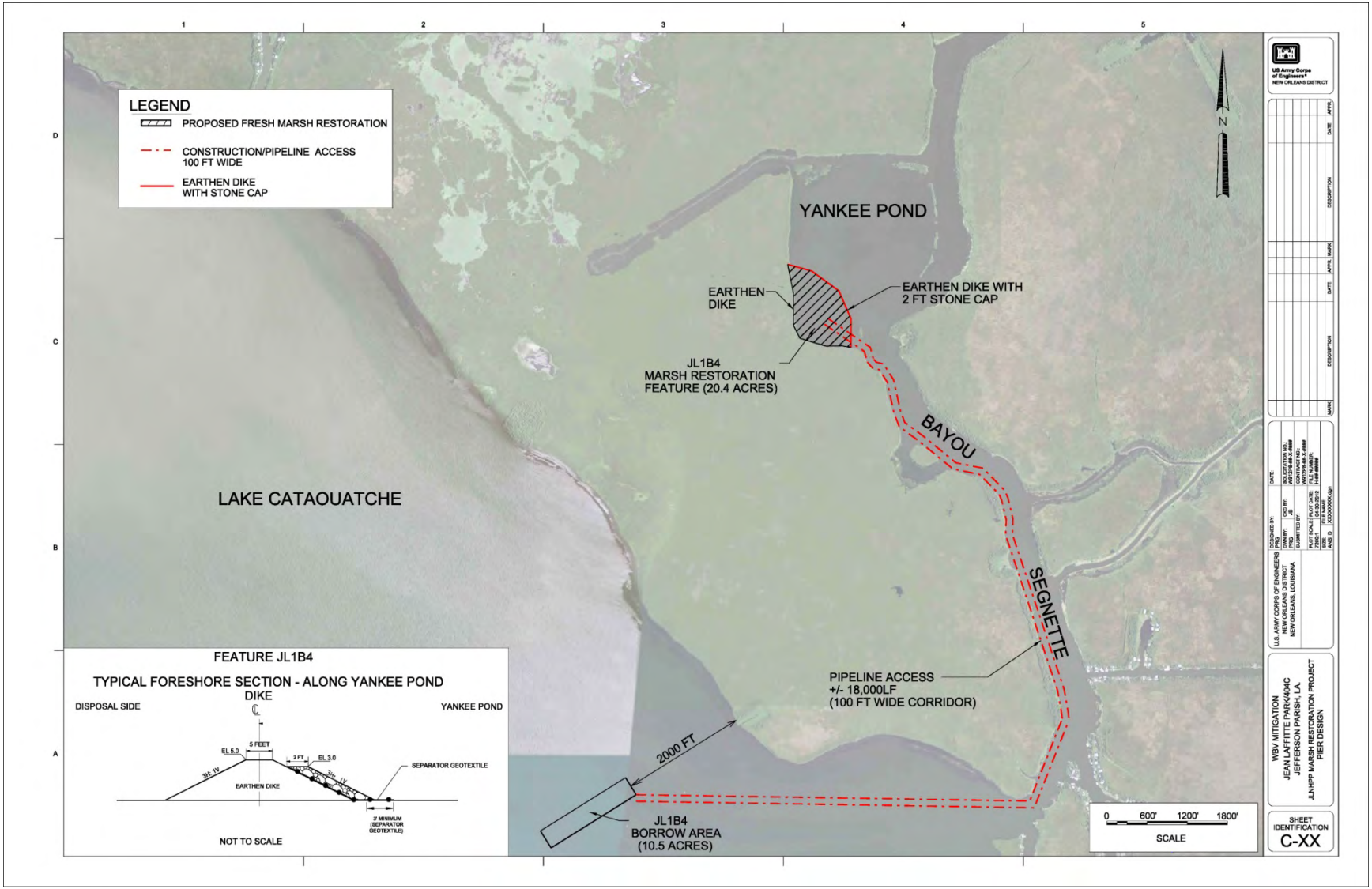

Figure 8: Jean Lafitte Marsh Restoration (JL1B4) Mitigation Project (not recommended for construction)

BOBBY JINDAL
GOVERNOR

STEPHEN CHUSTZ
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

September 15, 2015

Tammy Gilmore
Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

RE: **C20140014 mod 02,** Coastal Zone Consistency – Time Extension
New Orleans District, Corps of Engineers
Direct Federal Action
SPIER # 37a for Bayou Segnette enhancement project and two Bayou Boeuf restoration projects
Jefferson and Lafourche Parishes, **Louisiana**

Dear Ms. Gilmore:

This office has received the above referenced federal application for consistency review with the approved Louisiana Coastal Resources Program in accordance with Section 307(c) of the Federal Coastal Zone Management Act of 1972, as amended. NOAA Regulations on Federal Consistency, at 15 CFR Section 930.41(a), allow 60 days for the review of Direct Federal Activities, and at Section 930.41(b) allow an additional 15 days with appropriate applicant notification. Please be advised that, by this letter, Interagency Affairs/Field Services Division is requesting the 15 day time extension.

A final determination will be made within the authorized time period, ending October 2, 2015. If you have any questions concerning this matter please contact Carol Crapanzano of the Consistency Section at (225) 342-9425 or 1-800-267-4019.

Sincerely yours,

/S/ Don Haydel
Acting Administrator
Interagency Affairs/Field Services Division

DH/SK

Post Office Box 44487 • Baton Rouge, Louisiana 70804-4487
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GOVERNOR

STEPHEN CHUSTZ
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

October 2, 2015

Tammy Gilmore
Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

RE: **C20140014 mod 02,** Coastal Zone Consistency
New Orleans District, Corps of Engineers
Direct Federal Action
SPIER # 37a for Bayou Segnette enhancement project and two Bayou Boeuf restoration projects
Jefferson and Lafourche Parishes, **Louisiana**

Dear Ms. Gilmore:

This office has received the above referenced federal application for consistency review with the approved Louisiana Coastal Resources Program in accordance with Section 307(c) of the Federal Coastal Zone Management Act of 1972, as amended. NOAA Regulations on Federal Consistency, at 15 CFR 930.41(a), allow 60 days for the review of Direct Federal Activities. An additional 15 days with appropriate applicant notification along with mutually agreed upon, additional time are allowed at 930.41(b). The Office of Coastal Management is hereby requesting an additional 45-day review time in accordance with your email dated October 1, 2015.

A final determination will be made within the authorized time period ending November 17, 2015. If you have any questions concerning this matter please contact Carol Crapanzano of the Consistency Section at (225) 342-9425 or 1-800-267-4019.

Sincerely yours,

/S/ Don Haydel
Acting Administrator
Interagency Affairs/Field Services Division

DH/SK

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This project has been reviewed for effects to Federal trust resources under our jurisdiction and currently protected by the Endangered Species Act of 1973 (Act). The project, as proposed,
(✓) Will have no effect on those resources
( ) Is not likely to adversely affect those resources.
This finding fulfills the requirements under Section 7(a)(2) of the Act.

Acting Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service

27 July 2015
Date

ESA MEMO

To: Jeff Weller, USFWS
646 Cajundome Blvd., Suite 400
Lafayette, LA 70506
Fax: (337) 291-3139

From: Tammy Gilmore
FAX: (504) 862-2088
Date: June 22, 2015

Subject: ESA coordination for SPIER 37, West Bank and Vicinity (WBV), Hurricane and Storm Damage Risk Reduction System (HSDRRS) Mitigation Project Jefferson, St. Charles, Lafourche, and Plaquemines Parishes, Louisiana

Dear Mr. Weller:

Attention: David Walther

The U.S. Army Corps of Engineers (USACE), New Orleans District (MVN), is preparing to perform the work described in Supplemental Programmatic Individual Environmental Report (SPIER) #37, "West Bank and Vicinity (WBV), Hurricane and Storm Damage Risk Reduction System (HSDRRS) Mitigation Project Jefferson, St. Charles, Lafourche, and Plaquemines Parishes, Louisiana." We are requesting concurrence with our threatened and endangered species determination of "No Effect".

Project Description

The SPIER #37 modified tentatively selected mitigation plan (MTSMP) consists of a combination of pump and fill operations in interior open water areas to create fresh marsh, swamp, and BLH-Wet habitat on and adjacent to Jean Lafitte National Historic Park and Preserve (JLNHPP); elevation manipulation and reforestation on existing agricultural fields to enhance/restore/create BLH-Wet, BLH-Dry and swamp habitats, and the purchase of BLH-Wet/Dry and swamp mitigation bank credits to address the WBV HSDRRS mitigation requirement. The following are the WBV HSDRRS mitigation projects that make up the MTSMP, however, <u>only the construction of the Hwy 307 Bayou Boeuf project, the Bayou Segnette project or the purchase of mitigation bank credits for general FS BLH-Wet, FS swamp and PS BLH-Dry impacts are being recommended as constructible features of the plan and proposed for implementation at this time</u>. Following the SPIER, designs for the projects identified as Programmatic Features of the mitigation plan would be completed. Once feasibility level of design for the programmatic features is complete, NEPA compliance for those projects would be documented in IERs tiering off the PIER (TIERs). ESA coordination on the constructible features covered in the TIERs would be submitted at the time of TIER completion.

<u>CONSTRUCTIBLE FEATURES</u>

MITIGATION FOR NON-PARK PS BLH-DRY AND BLH-WET

As part of the approved mitigation plan in PIER 37, MVN purchased credits from 1 bank (Enterprise Woodlands) in the WBV basin for non-Park/404c PS BLH-Wet impacts. The purchase of mitigation bank credits for non-Park/404c PS BLH-Dry impacts is awaiting sufficient in basin credit availability.

Under SPIER 37, Bayou Segnette PS BLH-Dry enhancement (figure 1) is the tentatively selected project for the PS BLH-Dry feature and a constructible feature of the WBV HSDRRS Mitigation Plan. The proposed project is located adjacent to the Bayou Segnette State Park, on the protected side of the hurricane protection levee in Jefferson Parish. The proposed site is bounded to the south by the existing Westbank Hurricane Protection Levee (HPL) and to the north by Nicolle Boulevard and the NOLA Motorsports Park.

Two locations have been identified within the Bayou Segnette area. Both sites are currently populated with invasive tree species. The two options are identified as BLH West and BLH East. BLH West is currently 1,000 acres and BLH East is 993 acres. Target mitigation effort is to enhance approximately 920 acres by removing the existing invasive trees and planting the same area with desired high quality trees to mitigate 193 AAHUs.

Due to the high density of invasive plant species, the project area would receive multiple herbicidal treatments prior to the initial planting of native, high-quality species. Initially the entire area would be aerial sprayed in late summer or early fall. Approximately one month after the initial aerial spraying, the mitigation features would be mechanically cleared without grubbing. Large native trees and shrubs would be preserved during the mechanical clearing process to the greatest degree practicable. Woody debris generated during the clearing operations would be chipped and left within the mitigation features. Following the clearing activities, the features would be planted with high quality native BLH tree and shrub species.

MITIGATION FOR NON-PARK/404 (c) FS BLH -WET

Under SPIER 37, Hwy 307 Bayou Boeuf BLH-Wet Restoration (figure 2) is the tentatively selected project for the FS BLH-Wet feature and a constructible feature of the WBV HSDRRS Mitigation Plan. The proposed project is located in Lafourche Parish along Highway 307 between Raceland and Des Allemandes. The entire footprint consists of approximately 521 acres of current or abandoned agricultural fields. Within the 521 acres, approximately 137 acres would be used for BLH-Wet restoration. All proposed footprint elevations are at or above that desired for BLH-Wet restoration (+2.5 feet to 3.25 feet NAVD88), therefore no outside borrow is required for this proposed restoration action. If sites that are above desired elevations fall within the final selected footprint for BLH-Wet restoration, these areas will be degraded, and material will be hauled to lower areas within the project footprint. All such earth moving efforts will be achieved with dozers, trucks, and backhoes.

The entire proposed footprint is contained within a perimeter water retention dike, certain portions of which would be degraded to reconnect the restoration project with adjacent swamp/BLH habitat. There are ditches adjacent to the dikes that would be filled or partially filled during dike degrading.

Once cultural surveys are complete, layout of the project features would be based on existing LIDAR data, which can be clearly mapped to confirm existing elevations. In general the features will be laid out (1) to avoid cultural sites, (2) to minimize required earth moving from high to low areas, (3) maximize the remaining higher elevations for ongoing farming, (4) minimize the need for retention dike realignment to maintain the integrity of remaining agricultural fields, and (5) accommodate the potential for swamp restoration which is also being considered within this

footprint.

In general, the worst case scenario would require scraping of approximately 1.5' to 0.5' of topsoil in the higher areas to achieve elevations within the desired range. This material would remain on-site, to be truck hauled or pushed by dozer to areas of existing lower elevations. It is envisioned that the majority of the acres required could simply be planted at the existing elevation once the water retention dikes have been degraded. As the vast majority of the potential project footprint(s) is existing agricultural fields, little to no anticipated clearing would be required. What little woody or vegetative debris which requires removal would be stockpiled and burned on site. The project would then be planted with BLH species.

<u>or</u>

MVN would purchase credits from an active mitigation bank that is in compliance with the requirements of the USACE Regulatory Program, which include monitoring and reporting by the owner/operator. Selection of the mitigation bank would occur through a "Request for Qualifications/Request for Proposal" process, through which any mitigation bank having the appropriate number and resource type of credits available could submit a proposal for selling credits. In order to qualify, a bank would have to be in compliance with an approved mitigation banking instrument, including an approved mitigation plan and appropriate real estate and financial assurances. CEMVN would utilize in basin banks, however, depending on credit availability, credit purchase could occur outside the basin. If credits are purchased from a mitigation bank, non-Park/404c flood side BLH-Wet impacts would be mitigated with the purchase of BLH-Wet credits equaling 72.04 Average Annual Habitat Units (AAHUs).

MITIGATION FOR NON-PARK/404 (c) FLOOD SIDE SWAMP IMPACTS

Under SPIER 37, Hwy 307 Bayou Boeuf Swamp Restoration (figure 2) is the tentatively selected project for the FS Swamp feature and a constructible feature of the WBV HSDRRS Mitigation Plan. The proposed project is located in Lafourche Parish along Highway 307 between Raceland and Des Allemandes. The entire footprint consists of approximately 521 acres of current or abandoned agricultural fields. Within the 521 acres, approximately 330 acres would be used for swamp restoration. All proposed footprint elevations are at or above that desired for swamp restoration (+2.5 feet to 0.0 feet NAVD88), therefore no outside borrow is required for this proposed restoration action. If sites that are above desired elevations fall within the final selected footprint for swamp restoration, these areas will be degraded, and material will be hauled to lower areas within the project footprint. All such earth moving efforts will be achieved with dozers, trucks, and backhoes.

The entire proposed footprint is contained within a perimeter water retention dike, certain portions of which would be degraded to reconnect the restoration project with adjacent swamp/BLH habitat. There are ditches adjacent to the dikes that would be filled or partially filled during dike degrading.

Once cultural surveys are complete, layout of the project features would be based on existing LIDAR data, which can be clearly mapped to confirm existing elevations. In general the features will be laid out (1) to avoid cultural sites, (2) to minimize required earth moving from high to

low areas, (3) maximize the remaining higher elevations for ongoing farming, (4) minimize the need for retention dike realignment to maintain the integrity of remaining agricultural fields, and (5) accommodate the potential for swamp restoration which is also being considered within this footprint.

In general, the worst case scenario would require scraping of approximately 1.0' to 0.5' of topsoil in the higher areas to achieve elevations within the desired range. This material would remain on-site, to be truck hauled or pushed by dozer to areas of existing lower elevations. It is envisioned that the majority of the acres required could simply be planted at the existing elevation once the water retention dikes have been degraded. As the vast majority of the potential project footprint(s) is existing agricultural fields, little to no anticipated clearing would be required. What little woody or vegetative debris which requires removal would be stockpiled and burned on site. The project would then be planted with swamp species.

or

MVN would purchase credits from an active mitigation bank that is in compliance with the requirements of the USACE Regulatory Program, which include monitoring and reporting by the owner/operator. Selection of the mitigation bank would occur through a "Request for Qualifications/Request for Proposal" process, through which any mitigation bank having the appropriate number and resource type of credits available could submit a proposal for selling credits. In order to qualify, a bank would have to be in compliance with an approved mitigation banking instrument, including an approved mitigation plan and appropriate real estate and financial assurances. CEMVN would utilize in basin banks, however, depending on credit availability, credit purchase could occur outside the basin. If credits are purchased from a mitigation bank, non-Park/404c flood side swamp impacts would be mitigated with the purchase of swamp credits equaling 134.52 AAHUs.

PROGRAMMATIC FEATURES

MITIGATION FOR NON-PARK/404 (c) FLOOD SIDE FRESH MARSH IMPACTS

The Jean Lafitte FS Fresh Marsh Restoration Project mitigation project would involve restoration of FS fresh marsh habitats. Two restoration features are proposed. Feature JL1B5 would be built in an open water portion of Yankee pond (29° 51'09.52"N 90° 10'27.90W), would occupy approximately 91.2 acres, and would be located within the Park (figure 4). Feature JL15 (figure 5) would be situated in an area along the shoreline of Lake Salvador (29° 46'45.47"N 90° 09'05.70W) where prior work has already largely established a marsh platform that was previously an open water portion of the lake. Feature JL15 would encompass a total of approximately 55.5 acres. Portions of this feature would overlap Park property, while the remaining portions would overlap lands not currently owned by NPS. Both of the marsh restoration features would be located in Jefferson Parish.

Approximately 8,400 linear feet of retention dike would be required for JL1B5. Of the total 8,400 linear feet of dikes, approximately 3,100 linear feet would be armored/capped with stone. This armored dike segment would be located along the eastern boundary of feature of JL1B5 adjacent to Bayou Segnette.

Marsh restoration would require approximately 600,000 cubic yards of material hydraulically dredged from Lake Cataouatche. The borrow site would be approximately 1,200 feet x 1,500 feet (roughly 42.0 acres) with a maximum cut of 10 feet. The pipeline would be approximately 18,000 linear feet and routed adjacent to the western bank of Bayou Segnette. As the pipeline would need to cross a portion of Lake Cataouatche, a small segment of submerged pipeline would be installed at the crossing with appropriate signage to ensure safe passage of vessels over the line. Throughout the initial construction phase, project construction would be coordinated with the US Coast Guard.

The initial target marsh elevation in JL1B5 would be +3.5 feet with a final target elevation of approximately +1.0 to +1.5 feet. It is estimated that the initial project construction activities discussed above would require approximately 5 to 6 months. The final construction phase would begin following settlement and dewatering of the created marsh platform.

Fish dips (essentially armored gaps) would be constructed in the armored dike segment. The fish dips would allow water exchange and provide aquatic organism access to the marsh feature. It is anticipated that the final phase of construction activities (degrading dikes, constructing trenasses and fish dips, installation of dike armoring) would require approximately 3 to 4 months.
As part of the proposed project, the JL15 footprint would be degraded to design grade elevation of +1.0 to +1.5 feet. Fish dips would be constructed in this dike. The fish dips would allow water exchange and provide aquatic organism access to the marsh feature. It is anticipated that the final phase of JL15 construction activities (re-grading the marsh platform, refurbishment of rock dike, constructing fish dips) would require approximately 4 to 5 months.

MITIGATION FOR PARK/404 (c) BLH-WET IMPACTS

The Jean Lafitte BLH-Wet Restoration Project would involve restoring native BLH-Wet habitats in an existing open water area (an existing borrow pit). The project would be located in Jefferson Parish. The proposed restoration features would include JL14A (approximately 6.28 acres), and JL14B (approximately 5.88 acres), as shown in figure 6. Both features would be located within the Park, adjacent to the West Bank HPL (29° 50'37.43"N 90° 07'40.43W).

Features JL14A and JL14B would be constructed by placing fill material in the borrow pit to establish earthen platforms for the restored habitats. The mitigation features would be filled with an estimated 18 feet of sand to elevation -0.0 feet. A 4-foot clay cap to elevation +3.5 feet would then be placed on top of the sand fill. It is anticipated that it would take approximately 1 year for the fill materials to settle to the desired final target grade of elevation +2.0 feet.

Approximately 400,000 cubic yards of sand fill and 80,000 cubic yards of the clay cap would be required to fill the 12.2 acres being restored to BLH-Wet habitats. These borrow materials would be obtained from off-site government furnished and/or contractor furnished borrow pits.

Project access would be via two roadways extending west from Barataria Boulevard.
An appropriate traffic control plan would be implemented during the initial construction phase to minimize traffic congestion and safety hazards. Establishment of the construction access routes would require clearing a corridor, roughly 20-feet wide, through existing wetland habitats.

The initial construction phase would last roughly 9 to 10 months. Plantings would be in accordance with the BLH-Wet planting guidelines. This secondary construction phase, would likely last approximately 3 to 4 months.

MITIGATION FOR PARK/404 (c) SWAMP IMPACTS

The Jean Lafitte Swamp Restoration Project would involve restoring native swamp habitats in primarily existing open water areas. The project would be located in Jefferson Parish. The proposed restoration features would include JL7 (29° 50'59.34"N 90° 08'17.87W) (approximately 11.31 acres) as shown in figure 6, and JL8 (29° 47'39.71"N 90° 04'11.82W) (approximately 5.00 acres) and JL9 (29° 47'18.21"N 90° 04'04.32W) (approximately 4.13 acres) as shown in figure 7. All three features would be located in the Park, while features JL8 and JL9 would also be located within the 404c area.

Proposed feature JL7 would encompass a segment of an existing man-made canal, although the far eastern end of this feature would encompass a previously filled and disturbed upland area. A portion of an existing spoil berm running along the north side of JL7 would be cleared and degraded (excavated) to use as a source of fill to establish feature JL7. The existing upland area within the eastern end of JL7's footprint would also be cleared and degraded.

Another component of the JL7 swamp restoration would involve excavating "gaps" in the existing spoil berms adjacent to both sides of Millaudon Canal. Each gap would be degraded to approximately elevation 1.0 feet to match the existing grades typically found in nearby swamp habitats.

The quantity of fill that would be obtained from the degrading of the spoil berm adjacent to JL7 and from degrading the existing upland portion of JL7 is approximately 35,000 cubic yards. Combining this with the material obtained from degrading the Millaudon Canal gaps would yield a total of roughly 36,600 cubic yards that would be placed in the existing canal portion of JL7 to establish the platform for the proposed JL7 swamp. However, it is estimated that an additional 140,000 cubic yards of fill (borrow) would be required to bring the canal portion of JL7 to the initial target grade elevation.

Project access would be via two roadways extending west from Barataria Boulevard.
Due to the anticipated volume of dump truck traffic, an appropriate traffic control plan would be implemented during the initial construction phase to minimize traffic congestion and safety hazards.

The initial construction phase to establish feature JL7 would require an estimated 8.5 to 9.5 months. Once settled, the restoration feature would be planted native swamp canopy and midstory species.

The proposed restoration features JL8 and JL9 would encompass existing canals that would be filled and planted to restore native swamp habitat. Two construction access corridors would be required to build features JL8 and JL9. There are existing spoil berms on the north and south sides of both restoration features which would be "gapped" to improve surface flow and exchange. Each gap would be degraded to approximately elevation 1.0 feet to match the existing

grades typically found in nearby swamp habitats.

It is estimated that approximately 3,600 cubic yards of fill would be obtained through construction of the spoil berm gaps. However, it is estimated that an additional 135,000 cubic yards of fill would be required to establish the earthen platforms for the restored swamp features. This borrow material would be bucket dredged from the GIWW. The proposed borrow area would be approximately 70 feet wide and 5,000 feet long (17.2 acres) and would be dug to 4 feet below existing grade with an allowable 1 foot of overdepth. All activities within the GIWW would be coordinated with the US Coast Guard as to not impede navigation.

The initial construction of JL8 and JL9 would require about 3 to 4 months. The final construction phase (e.g. initial planting of features JL8 and JL9) would require roughly 2 to 3 weeks.

MITIGATION FOR PARK/404 (c) FRESH MARSH IMPACTS

The Jean Lafitte FS Fresh Marsh Restoration mitigation project would involve restoring fresh marsh habitat from open water. The single proposed marsh restoration feature, JL1B4 (figure 8), would encompass approximately 20.4 acres, located in Jefferson Parish within the Park (29° 50'53.05"N 90° 10'37.92W). Restoration work would involve establishing a land platform for the new marsh habitat proposed.

Approximately 3,780 linear feet of retention dike would be required. Of the total 3,780 linear feet of dikes, approximately 1,780 linear feet would be armored/capped with stone during the second project construction phase. Fish dips would be constructed in the armored dike segment. The initial target marsh elevation (elevation of slurry fill) would be +3.5 feet. It is estimated that the initial project construction activities discussed above would require approximately 3 to 4 months. The final target elevation of this feature is approximately +1.0 to +1.5 feet. The final construction phase would begin following settlement and dewatering of the created marsh platform. In conjunction with this dike degrading effort, trenasses would be constructed as necessary to serve as tidal creeks to facilitate water exchange and create shallow water interspersion features within JL1B4. It is anticipated that the final phase of construction activities (degrading dikes, constructing trenasses and fish dips, installation of dike armoring) would require approximately 3 to 4 months.

Marsh restoration would require approximately 150,000 cubic yards of material from Lake Cataouatche. The borrow site would be approximately 1,500 feet by 300 feet (roughly 10.3 acres) with a maximum cut of 10 feet. The pipeline would be routed adjacent to the western bank of Bayou Segnette. Throughout the initial construction phase, project construction would be coordinated with the US Coast Guard.

Occurrence of Protected, Threatened and Endangered Species

None of the listed species, under the jurisdiction of USFWS, for Lafourche and Jefferson parish are found in the project areas (USFWS 2015). Bald eagles and migratory birds may be present within the project areas; however, no known nests or rookeries exist at this time. Surveys will be conducted prior to construction to determine if any nests become active within the project area.

If nests are found, no work would take place within 660 feet for bald eagles and 1,000 feet for colonial nesting birds.

Conclusion and Determination

We believe that the project, as planned, would have no effect on any federally-listed threatened or endangered species or their critical habitat as none exist within the project areas. Please review this plan and inform us whether or not you agree with our determination. If you have any questions about the project or need additional information please telephone me at (504) 862-1002.

Literature Cited

U.S. Fish & Wildlife Service (USFWS). Endangered Species Program. 2015. http://www.fws.gov/lafayette/pdf/LA_T&E_Species_List.pdf

Figure 1: Bayou Segnette BLH-Wet/Dry Enhancement

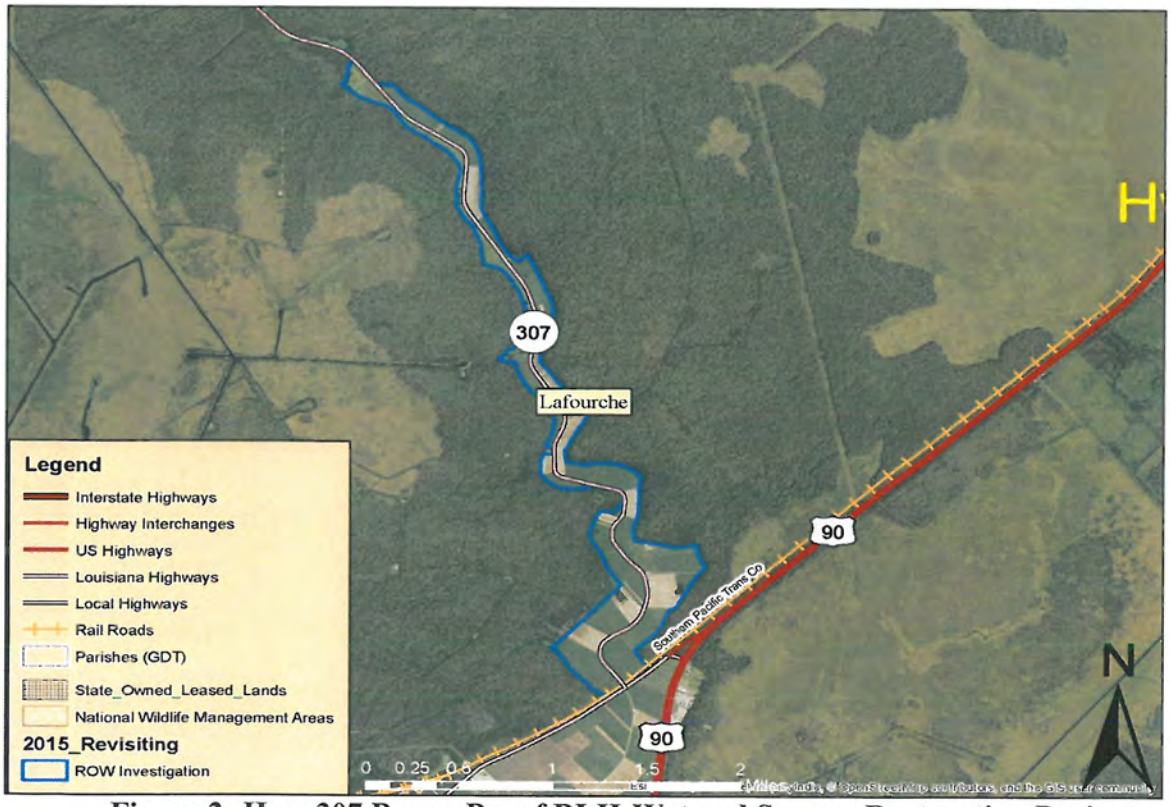

Figure 2: Hwy 307 Bayou Boeuf BLH-Wet and Swamp Restoration Project

APPENDIX K

WVA ASSUMPTIONS AND RESULTS

Wetland Value Assessment (WVA) Project Information Sheet

August 2011

Prepared for:
U.S. Army Corps of Engineers
New Orleans District

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Project Name: West Bank and Vicinity (WBV) Hurricane Storm Damage and Risk Reduction System (HSDRRS) Mitigation: Bayou Segnette Dry Bottomland Hardwood (BLH-Dry) Restoration

Project Type: BLH-Dry Restoration

Project Area:

The proposed BLH-Dry restoration features (Table 1) are located in and near Bayou Segnette State Park, south of United States (U.S.) Highway 90 and Nicolle Boulevard, and north of the West Bank HSDRRS Levee in Jefferson Parish, Louisiana (Attachment A, Figure 1). All three BLH-Dry restoration features are largely forested, although a relatively small portion of D3 (BS3) has been cleared. The forests presently contain heavy infestations of invasive plant species, primarily Chinese tallow (*Triadica sebifera*).

Table 1. Bayou Segnette BLH-Dry Restoration Features

Feature ID	Poly ID	Acres	Net Average Annual Habitat Units (AAHUs)	Mitigation Potential (AAHUs/acre)
D1	BS2	1121.03	232.26	0.21
D2	BS6	21.56	4.62	0.21
D3	BS3	68.84	14.49	0.21
TOTALS	-	**1,211.43**	**251.37**	-

Objectives:

The three BLH-Dry features within the Bayou Segnette mitigation area would convert 1,211.43 acres of existing Chinese tallow forest into BLH-Dry habitat. No shoreline protection features are currently proposed for this project. The proposed enhancement activities would involve the eradication of invasive and nuisance plant species, followed by planting of desirable native canopy and mid-story species. No change would be made to the existing hydrologic platform. However, modifications may be made to some existing drainage ditches within feature D3. Refer to the U.S. Army Corps of Engineers, New Orleans District (CEMVN) Project Description document for more project details.

Wetland Value Assessment:

The WVA will evaluate 1,211.43 acres of BLH-Dry restoration. For the comparison of alternatives, the area within the polygons analyzed by U.S. Geological Survey (USGS) is assumed to be 100 percent (%) Chinese tallow forests, and BLH-Dry restoration would occur throughout the entire polygon.

Project assumptions and methods were developed by CEMVN in coordination with the interagency team and the contractor. Habitat boundaries were identified by incorporating the following resources:

- Field investigations (Attachment B)
- Geographic Information System (GIS) software
- 2007 USGS vegetation data
- 2007 National Wetland Inventory (NWI) data
- Natural Resources Conservation Service (NRCS) soil data
- Coastwide Reference Monitoring System (CRMS) salinity data
- Previous WVAs

WVA Variables:

Variable V_1 – Stand Structure:
Table 2 describes the composition classes defined by percent cover of mast-producing tree species. General assumptions were developed by CEMVN in coordination with the interagency team for Future with Project (FWP) conditions (Table 3). Currently, all the Bayou Segnette BLH-Dry restoration features are Chinese tallow forests. Soils in the mitigation area include Allemands muck, Barbary muck, Kenner muck, and Larose muck (Attachment A, Figure 2). Under Future Without Project (FWOP) conditions, land use is not expected to change, and the area would remain a Class 1 because Chinese tallow is considered a non-mast producing tree. TY 8 was included in the WVA analysis to capture the general assumption that planted trees will achieve a Class 5 once they reach 7 years old.

Table 2. Tree Species Composition (V_1) Descriptions in BLH Habitat Analysis

Class	Description
Class 1	Less than 25% of canopy consists of mast or other edible seed-producing trees
Class 2	25 to 50% of overstory canopy consists of mast or edible seed-producing trees, but hard mast producers are less than 10% of the canopy
Class 3	25 to 50% of overstory canopy consists of mast or edible seed-producing trees, but hard mast producers are more than 10% of the canopy
Class 4	Greater than 50% of overstory canopy consist of mast or other edible seed-producing trees, but hard mast producers are less than 20% of the canopy
Class 5	Greater than 50% of overstory canopy consist of mast or other edible seed-producing trees, but hard mast producers are less than 20% of the canopy

Table 3. FWP V_1 Stand Structure Assumptions

Target Year (TY)	General Assumption
0	Class 1 (Chinese tallow forest)
1	Class 1
2	Class 1
8	Class 5
20	Class 5
50	Class 5

Following completion of the initial eradication of invasive and nuisance plants, the BLH-Dry features would be planted with native canopy and mid-story species in the same manner as described for the BLH-Wet plantings (i.e., 538 canopy trees per acre and 109 mid-story species stems per acre). The list of canopy species and the list of mid-story species that may be used for these plantings have not yet been generated. It is anticipated that these lists and general BLH-Dry planting guidelines will be prepared in the near future by CEMVN in coordination with the interagency team.

Variable V_2 – Stand Maturity:
Currently, the features are dominated by invasive Chinese tallow with an average diameter at breast height (DBH) of 4 inches. FWOP values and assumptions for the V_2 variable are described below in Table 4. For FWP analyses, it was assumed that one-year-old trees would be planted in TY 2, so the age for each TY was assumed to be 1 year less than the corresponding TY (e.g., age 1 at TY 2, age 7 at TY 8, age 19 at TY 20) at all features for the life of each project (see Table 4).

Table 4. V_2 Stand Maturity Assumptions

TY	Age	DBH (inches)	Specific Assumptions
FWOP			
0	0.00	4.00	Based on field investigations, average DBH of existing Chinese tallow is 4 inches.
1	0.00	4.30	Young tree in-growth projection (USFWS).*
50	0.00	16.70	BLH site in-growth projection (USFWS).*
FWP			
0	0.00	4.00	Existing conditions.
1	0.00	0.00	All existing vegetation cleared.
2	1.00	0.00	Projections based on planted trees only.
8	7.00	0.00	Projections based on planted trees only.
20	19.00	0.00	Projections based on planted trees only.
50	49.00	0.00	Projections based on planted trees only.

*In-growth projection sheets can be found within the Bayou Segnette WVA workbook.

Variable V_3 – Understory / Mid-story:
General assumptions for understory and mid-story percent cover for all features (FWP) were developed by CEMVN in coordination with the interagency team (Table 5). FWOP conditions were determined on an interagency field visit in May 2011 and previous field work by USFWS from June 2006 for the IER 15. Previous WVA data can be found in the Bayou Segnette WVA workbook.

Table 5. Understory and Mid-story Assumptions

TY	Understory (%)	Mid-story (%)	Specific Assumption
FWOP			
0	60.00	70.00	Based on field observations and previous WVA data*.
1	55.00	75.00	N/A
50	40.00	65.00	As Chinese tallow thickets become denser, the understory would become shaded out and be reduced.
FWP			
0	60.00	70.00	Based on field observations and previous WVA data.
1	0.00	0.00	General assumption.
2	100.00	0.00	General assumption.
8	50.00	50.00	General assumption.
20	25.00	60.00	General assumption.

Table 5, continued

TY	Understory (%)	Mid-story (%)	Specific Assumption
50	35.00**	30.00**	Based on site-specific conditions. Area would be dewatered and project design would make it unlikely for Relative Sea Level Rise (RSLR) to impact understory and mid-story cover.

N/A=not applicable
* Previous WVA data located in Bayou Segnette WVA workbook for WBV Mitigation project.
**Specific Assumptions

Variable V_4 – Hydrology:
Currently, there is no hydrologic exchange at any of the Bayou Segnette mitigation area features. D1 (BS2), D2 (BS6), and D3 (BS3) feature areas are dewatered and pumped dry (Table 6). Exchange between the mitigation features and other waterbodies is effectively eliminated by levee and pump systems. No change would be made to the existing hydrologic platform (refer to CEMVN Project Description for more information). It was assumed that all features would remain dewatered and that the project design would ensure that no water exchange would occur for the 50-year life of the project (see Table 6).

Table 6. Hydrologic Projections for Bayou Segnette BLH-Dry

TY	Duration*	Exchange	Specific Assumption
FWOP			
0	Dewatered	None	Area is drained and pumped dry.
1	Dewatered	None	No change expected; area is drained and pumped dry.
50	Dewatered	None	No change expected; area is drained and pumped dry.
FWP			
0	Dewatered	None	Area is drained and pumped dry.
1	Dewatered	None	No change expected; conditions would remain throughout life of the project.
2	Dewatered	None	No change expected; conditions would remain throughout life of the project.
8	Dewatered	None	No change expected; conditions would remain throughout life of the project.
20	Dewatered	None	No change expected; conditions would remain throughout life of the project.
50	Dewatered	None	No change expected; conditions would remain throughout life of the project.

*Duration assumption developed by CEMVN in coordination with the interagency team.

Variable V_5 - Size of Contiguous Forested Area:
The size of contiguous forested areas near each mitigation feature was calculated using GIS software. General assumptions developed by CEMVN in coordination with the interagency team include:

- A non-forested corridor (e.g., road, canal) less than 75 feet wide does not constitute a break.
- The mitigation polygon is not classified as “forested” until TY 20.
- At TY 20 and all TYs thereafter, the mitigation polygon is included in the calculation of forested acreages.

For all BLH-Dry features, FWOP and FWP TY 0 to 50 were evaluated as a Class 5 since the adjacent forest was greater than 500 acres in any situation.

Variable V_6 – Suitability and Traversability of Surrounding Land Uses:
The suitability and traversability of the surrounding land use was calculated using GIS software to create a 0.5-mile buffer around each feature (Table 7; Attachment A, Figure 3). For FWOP and FWP analyses at D1 (BS2), it was assumed that a proposed automobile racetrack would be built by TY 8, and approximately 535 acres of the 0.5-mile buffer accounted for the racetrack footprint. Forest in this area would be converted to developed land, and the resulting change in land use was assumed to be -13% for V_6 forested variable and +13% for V_6 development variable for FWOP TY 50 and FWP TY 8 to TY 50. The decrease in forested area and increase in developed area surrounding D1 (BS2) resulted in a lower suitability index (SI) value for V_6 (see Bayou Segnette WVA workbook). It was assumed that the land uses surrounding the D2 (BS6) and D3 (BS3) features would remain the same for FWOP and FWP analyses because the automobile racetrack is not included within their 0.5-mile buffers.

Table 7. Suitability and Traversability of Surrounding Land Uses

Feature	TY	Forest/Marsh	Abandoned Agriculture	Pasture/Hay	Active Agriculture*	Development
FWOP						
D1	0	73.31	0.00	0.97	3.63	22.09
	1	73.31	0.00	0.97	3.63	22.09
	50	60.31	0.00	0.97	3.63	35.09
D2	0	78.79	0.00	0.00	7.47	13.74
	1	78.79	0.00	0.00	7.47	13.74
	50	78.79	0.00	0.00	7.47	13.74
D3	0	72.21	0.00	2.76	4.57	20.46
	1	72.21	0.00	2.76	4.57	20.46
	50	72.21	0.00	2.76	4.57	20.46
FWP						
D1	0	73.31	0.00	0.97	3.63	22.09
	1	73.31	0.00	0.97	3.63	22.09
	2	73.31	0.00	0.97	3.63	22.09
	8	60.31	0.00	0.97	3.63	35.09
	20	60.31	0.00	0.97	3.63	35.09
	50	60.31	0.00	0.97	3.63	35.09
D2	0	78.79	0.00	0.00	7.47	13.74
	1	78.79	0.00	0.00	7.47	13.74
	2	78.79	0.00	0.00	7.47	13.74
	8	78.79	0.00	0.00	7.47	13.74
	20	78.79	0.00	0.00	7.47	13.74
	50	78.79	0.00	0.00	7.47	13.74
D3	0	72.21	0.00	2.76	4.57	20.46
	1	72.21	0.00	2.76	4.57	20.46
	2	72.21	0.00	2.76	4.57	20.46
	8	72.21	0.00	2.76	4.57	20.46
	20	72.21	0.00	2.76	4.57	20.46
	50	72.21	0.00	2.76	4.57	20.46

*Includes open water

Variable V_7 – Disturbance:
Table 8 describes the distance and type classes applicable for Variable V_7.

Table 8. Distance and Type Classes for V_7

Distance Class	Description	Type Class	Description
1	0 to 50 feet away	1	Constant/major disturbance (e.g., highways, industrial)
2	50.1 to 500 feet away	2	Frequent/moderate disturbance (e.g., residential, moderately used waterways and roadways)
3	>500 feet away	3	Seasonal/intermittent disturbance (e.g., agriculture)
		4	Insignificant disturbance (e.g., individual homes, lightly used roads and waterways)

Existing conditions distance and type classes by polygon were determined by averaging the major disturbance factors surrounding each mitigation polygon (Table 9). All distances were measured using aerial photography from the perimeter of the BLH mitigation polygon closest to the disturbance.

Table 9. Distance Class and Type (TY 0 to TY 7)

Feature	Disturbance	Type	Class
D1	Inner Cataouatche Canal	4	3
	Office Park	2	2
	Staging Area	2	3
	Nicolle Road	2	1
	LaPalco Blvd.	2	3
	AVERAGE	**2**	**2**
D2	Inner Cataouatche Canal	4	3
	Staging Area	2	2
	Park Camping	3	1
	AVERAGE	**3**	**2**
D3	Staging Area	2	1
	Nicolle Road	2	1
	Office Park	2	3
	LaPalco Blvd.	2	3
	Inner Cataouatche Canal	4	3
	AVERAGE	**2**	**2**

It was assumed that the proposed automobile racetrack would be built by TY 8 (Table 10). However, when considered with other disturbances, none of the features experienced a change in the average disturbance type or class, even when the constructed automobile racetrack was included.

Table 10. Distance Class and Type (TY 8 to TY 50)

Feature	Disturbance	Type	Class
D1	Inner Cataouatche Canal	4	3
	Office Park	2	2
	Staging Area	2	3
	Nicolle Road	2	1
	LaPalco Blvd.	2	3
	Racetrack	1	1
	AVERAGE	**2**	**2**

Table 10, continued

Feature	Disturbance	Type	Class
D2	Inner Cataouatche Canal	4	3
	Staging Area	2	2
	Park Camping	3	1
	Racetrack	1	3
	AVERAGE	**3**	**2**
D3	Staging Area	2	1
	Nicolle Road	2	1
	Office Park	2	3
	LaPalco Blvd.	2	3
	Inner Cat Canal	4	3
	Racetrack	1	3
	AVERAGE	**2**	**2**

General Notes:
The area has been effectively dewatered and pumped dry. RSLR, subsidence, and salinity is not anticipated to impact the Bayou Segnette BLH-dry mitigation features regardless of FWOP or FWP conditions based on existing hydrology.

LPV & WBV HSDRRS MITIGATION:
WETLAND VALUE ASSESSMENT (WVA) MODEL ASSUMPTIONS AND RELATED GUIDANCE
(Revised/Updated: 3 March 2012)

PREFACE

Several of the assumptions set forth in this document are based on mitigation implementation schedules. Many sections include specified WVA model target years (TYs) and calendar years applicable to assumptions, and a few sections outline anticipated mitigation construction (i.e. mitigation implementation) schedules. It is critical for the WVA analyst to understand that this document has not been revised to account for changes to the mitigation implementation/construction schedules. It is therefore imperative for the analyst to obtain the most recent mitigation implementation/construction schedule for a particular mitigation project from CEMVN prior to running WVA models. The analyst may then need to modify some of the WVA model assumptions and guidelines presented herein to account for differences between the present mitigation implementation/construction schedule and the schedule(s) that were assumed in generating this document.

This document supersedes the WVA model assumptions/guidance document that was used when WVA models were first run for the final array of mitigation alternatives addressed in the LPV and WBV Engineering Alternatives Report. It should be applied when conducting WVA analyses for the Tentatively Selected Plans (TSPs) selected for meeting LPV and WBV mitigation needs. A separate document will be generated to address model assumptions applicable to evaluating impacts to open water habitats.

1.1 BOTTOMLAND HARDWOOD MODEL – GENERAL ASSUMPTIONS

V1 – Tree Species Association/Composition (in canopy stratum – percentage of trees that are hard mast or other edidble-seed producing trees and percentage that are soft mast, non-mast/inedible seed producing trees)

BLH-Wet restore, FWP scenario:

- Of the total trees initially planted, 60% will be hard mast-producing species and 40% will be soft mast-producing species. Assume this species composition ratio (i.e. 60% of trees are hard mast-producing and 40% are soft mast-producing) will remain static over the entire period of analysis (i.e. remains the same from time of planting throughout all subsequent model target years).
- Assume Class 5 is achieved once the planted trees are 10 years old. This class remains the same thereafter (i.e. Class 5 for all subsequent target years). Note that trees will be approximately 1 year old at the time they are initially planted. Thus, Class 5 is achieved 9 years after the time of initial planting.

General Notes:

- Do not classify Chinese tallow as a "mast or other edible-seed producing tree". Consider it a non-mast producing tree. Although it is an invasive species, one must still include this species regarding its contribution to percent cover in the canopy, midstory, and ground cover strata when it is present on a site (applicable to FWP scenario at TY0 and applicable to FWOP scenario for all model target years).

V2 – Stand Maturity (average age or dbh of dominant and codominant canopy trees)

BLH-Wet and BLH-Dry restore and enhance, FWP scenario -----

- Guidance as to how factors like subsidence and sea level rise might affect this variable (especially if the mitigation site becomes flooded for long durations, since the growth of trees may be adversely affected and certain tree species could die) -----
  If the mitigation feature (polygon) is designed such that flooding at the end of the project life will not impact tree survival, i.e. flooding is <12% of the growing season (33 days) and is no more than 20% to 30% of the non-growing season, then trees should not be adversely affected. However, if the site design does not achieve this goal, then adjust the tree growth spreadsheet such that typical growth is reduced by

at least 10% once flooding exceeds 20-30% of the non-growing season or is 12% or more of the growing season (Conner et al.; Francis 1983).

General Notes:

- Include the DBH of Chinese tallow when working with this variable (for FWOP scenario in all model target years and for FWP scenario at TY0). The same guidance would apply to other invasive species in the canopy stratum.
- For planted trees – You can use the age of the trees in lieu of their DBH when running the model (applies to all target years from time of planting throughout model run). Assume trees planted will be approximately 1 year old when they are first installed.

V3 – Understory/Midstory (percent cover)

BLH-Wet and BLH-Dry restore, FWP scenario --
Assumptions applicable to restoration features built in existing open water areas and for any restoration features that require deposition of fill to achieve target grades:

TY	Year	Assumption	
0	2013	Understory = 0% // Midstory = 0%	Refer to Note 1
1	2014	Understory = 0% // Midstory = 0%	
2	2015	Understory = 100% // Midstory = 0%	
20	2033	Understory = 25% // Midstory = 60%	
50	2063	Understory = 35% // Midstory = 30%	Refer to Note 2

Notes:

1. This assumption is applicable to restoration features built in existing open water areas. For restoration polygons built in other areas that are not open water or are only partially open water, values for cover in the understory and midstory strata must be based on site-specific conditions existing prior to the start of construction.
2. The specified values are based on the assumption that normal flooding conditions are present (i.e. desirable depth and duration of inundation). These values will need to be adjusted if sea-level rise is anticipated to increase flooding of the particular mitigation polygon to a degree whereby growth and/or survival of plant species in the understory and/or midstory strata are adversely impacted.
3. Keep in mind that canopy and midstory species will not be planted in restoration features built in open water areas until 1 year after the initial fill (borrow) has been placed in the mitigation feature. This allows 1 year of fill settlement prior to plantings.

BLH-Wet restore and BLH-Dry restore, FWP scenario --
Assumptions applicable to restoration features that do <u>not</u> require deposition of fill to achieve target grades:

TY	Year	Assumption	
0	2013	Refer to Note 1	
1	2014	Understory = 100% // Midstory = 0%	
20	2033	Understory = 25% // Midstory = 60%	
50	2063	Understory = 35% // Midstory = 30%	Refer to Note 2

Notes:

1. Values for cover in the understory and midstory strata must be based on site-specific conditions existing prior to the start of construction.
2. The specified values are based on the assumption that normal flooding conditions are present (i.e. desirable depth and duration of inundation). These values will need to be adjusted if sea-level rise is anticipated to increase flooding of the particular mitigation polygon to a degree whereby growth and/or survival of plant species in the understory and/or midstory strata are adversely impacted.

General Notes:

- Cover accounted for by Chinese tallow and other invasive and nuisance plant species must be included in the percent cover data (applicable to FWOP scenario in all model target years and to FWP scenario at TY0).

- Changes in hydrology could result from factors such as sea-level rise and subsidence. An increase in the duration of flooding will typically decrease the understory cover and, to a lesser degree, decrease the midstory cover.

V4 – Hydrology (flooding duration and water flow/exchange)

BLH-Wet restore, FWP scenario -----
Assumptions applicable to restoration features built in existing open water areas and for restoration features that require deposition of fill to achieve target grades.

TY	Year	Assumption	
0	2013	Baseline conditions (score based on existing hydrology)	
1	2014	Duration = dewatered // Exchange = none	
2	2015	Duration = temporary	Refer to Note 1
20	2033	Duration = temporary	Refer to Note 1
50	2063	Duration = temporary	Refer to Notes 1 and 2

Notes:
1. Scoring of water flow/exchange component of hydrology must be based on site-specific conditions anticipated.
2. The specified value for flooding duration is based on the assumption that normal flooding conditions are present (i.e. desirable depth and duration of inundation). This value will need to be adjusted if sea-level rise is anticipated to significantly increase the duration of flooding in the particular mitigation polygon. In many cases, it is probable that the duration may shift from temporary to seasonal.

BLH-Wet restore & BLH-Wet enhance, FWP scenario -----
Assumptions applicable to restoration features that do not require deposition of fill to achieve target grades and to BLH-Wet enhancement features where hydrologic enhancement is a component of the mitigation design.

TY	Year	Assumption	
0	2013	Baseline conditions (score based on existing hydrology)	
1	2014	Duration = temporary	Refer to Note 1
2	2015	Duration = temporary	Refer to Note 1
20	2033	Duration = temporary	Refer to Note 1
50	2063	Duration = temporary	Refer to Notes 1 and 2

Notes:
1. Scoring of water flow/exchange component of hydrology must be based on site-specific conditions anticipated.
2. The specified value for flooding duration is based on the assumption that normal flooding conditions are present (i.e. desirable depth and duration of inundation). This value will need to be adjusted if sea-level rise is anticipated to significantly increase the duration of flooding in the particular mitigation polygon. In many cases, it is probable that the duration may shift from temporary to seasonal.
3. For BLH-Wet enhancement features that do not include measures to enhance existing hydrology as part of the mitigation design, the scoring of variable V4 must be based on site-specific conditions hence no general assumptions are applicable.

BLH-Dry restore or enhance, FWP scenario -----
- Score flooding duration as “dewatered” during all target years used in the model.

V5 – Size of Contiguous Forested Area

BLH-Wet & BLH-Dry restore, FWP scenario:
- Do not consider the mitigation polygon to classify as “forested” until the planted trees are 10 years old. Remember that trees will be 1 year old when they are first installed; hence, the mitigation polygon would classify as forested 9 years following the year of initial planting. Prior to this target year, the trees initially planted in the mitigation polygon will be considered as either understory or midstory cover. For the target year when the planted trees reach 10 years old and for all model target years thereafter, the planted trees will be considered large enough for the mitigation polygon to be considered a forest. Hence at the target

year planted trees reach 10 years old and all target years thereafter, the mitigation polygon can be included in the calculation of forested acreages (along with contiguous forested areas outside the mitigation polygon).

BLH-Wet and BLH-Dry restoration or enhancement, FWP and FWOP scenarios:

- For areas outside the mitigation polygons, assume the conditions present at TY0 will remain unchanged throughout the life of the mitigation project. As used here, the term "mitigation polygons" refers to all proposed mitigation polygons regardless of the target habitat proposed. For example, a particular mitigation site could contain both a BLH-wet restoration polygon and a swamp restoration polygon. Under the FWP scenario, one would assume that the 2 restoration polygons would become forested over time but existing forested areas outside the limits of these polygons would remain forested throughout the period of analysis. Under the FWOP scenario, existing conditions would prevail in both the 2 restoration polygons and in the areas outside the limits of these polygons throughout the period of analysis.

General Notes:

- When scoring this variable for the FWP scenario, the area within the mitigation polygon itself as well as the adjacent "non-mitigation" areas are combined to generate the total forested acreage. However, remember the assumption that planted trees in restoration features will not be considered large enough for the feature to classify as a forest until the planted trees are 10 years old.
- When evaluating the size of contiguous forested areas, non-forested corridors <75 feet wide will not constitute a break in the forest area contiguity.

<u>V6 – Suitability and Traversability of Surrounding Land Uses (within 0.5 mile of site perimeter)</u>

BLH-Wet and BLH-Dry restoration or enhancement, FWP scenario:

- When scoring a given BLH mitigation polygon, include the nearby or adjacent mitigation polygons in your assessment of land use types by assuming their land use type is the habitat type proposed (i.e. the target habitat type). However, one must consider the TY that the nearby/adjacent mitigation polygon will actually shift from its existing habitat type to the target habitat type. For example, if the adjacent mitigation polygon is a marsh restoration feature then the change from the existing habitat type (open water typically) to the target marsh habitat would not occur until TY2 (2015).

BLH-Wet and BLH-Dry restoration or enhancement, FWP and FWOP scenarios:

- When evaluating this variable, typically assume that land uses in lands outside the mitigation polygons will score the same under the FWP and FWOP scenarios. In other words, typically assume that the existing conditions present in TY0 will remain unchanged over the life of the mitigation project. One would typically not consider potential future land development rates when scoring this variable due to the uncertainty of long-term development trends. Exceptions to this general approach would include:
    - Situations where there is a high level of confidence that a particular area is slated for a significant change in land use (ex. construction of I-49 through the Dufrene Ponds mitigation site).
    - Situations where it is anticipated that the "land use" (habitat type) will significantly change over time due to the effects of sea-level rise and land loss (ex. existing adjacent marsh lands rated as highly suitable/traversable changing to open water, a much lower score, due to shoreline erosion or other land loss factors).

<u>V7 – Disturbance (sources of disturbance vs. distance from site perimeter to disturbance source)</u>

BLH-Wet and BLH-Dry restoration or enhancement, FWP and FWOP scenarios:

- For consistency purposes, assume baseline conditions affecting the scoring of this variable will not change over time. In other words, typically assume that the existing conditions present in TY0 will remain unchanged over the life of the mitigation project. For the WBV mitigation alternatives, there will be two exceptions to this general approach:
    - Bayou Signette – The variable score will need to change over time to account for building the nearby racetrack project.
    - Dufrene Ponds -- The variable score will need to change over time to account for the construction of the I-49 highway.

General Notes:

- When scoring this variable, all distances are measured from the perimeter of the BLH mitigation polygon itself.

1.2 NOTES REGARDING CONSTRUCTION & PLANTING OF BLH MITIGATION AREAS

Typical Estimated Project Construction Timelines -----

All projects – Begin construction around September 2013.

For BLH restoration areas built in existing open water features and for any other BLH restoration areas that require deposition of fill material as part of the construction process:

- Sept. 2013 – Begin construction.
- May 2014 – Complete construction.
- May 2015 – Initial grade settles to desired target grade (1 year after end of construction). If applicable, perimeter dikes constructed are degraded or gapped at this time.
- Dec. 2015 – Install plants (or could be installed in Jan. or Feb. of 2016).

For BLH restoration that do not require deposition of fill as part of the construction process:

- Sept. 2013 – Begin construction.
- Feb. 2014 – End construction (but could be as late as March or April of 2014 if much is earthwork required).
- March. 2014 – Install plants (earliest scenario for site requiring minimal earthwork).
- Dec. 2014 – Install plants (earliest scenario for site requiring substantial earthwork).

For BLH enhancement areas:

- Sept. 2013 – Begin construction (includes start of invasive plant eradication).
- Jan. 2014 – End construction (but could be as late as Feb. or March of 2014).
- March 2014 – Install plants.

Notes:

1. All of the above timelines are preliminary and are subject to refinement as plans are refined for a particular mitigation site.
2. Planting of canopy and midstory species in March should be avoided if possible since conditions could be adversely dry, thereby decreasing the survival of plantings.
3. Chemical eradication of invasive/nuisance hardwood species such as Chinese tallow should be done during the growing season. Greatest effectiveness may be realized if chemical treatment is applied from August through October when most energy is being used for root development.

Planting of BLH-Wet and BLH-Dry Restoration Areas -----

Initial plantings will be:

- Canopy species: plant on 9-foot centers (538 trees/acre); of total trees planted, 60% will be hard mast-producing species and 40% will be soft mast-producing species.
- Midstory species (shrubs and small trees): plant on 20-foot centers (109 seedlings per acre).
- Stock size (canopy and midstory species): 1 year old, 1.5 feet tall (minimum).

Planting of BLH-Wet and BLH-Dry Enhancement Areas -----

Initial plantings will follow the same guidelines as for BLH-Wet and BLH-Dry restoration areas regarding the general density of installed plants and the stock used. Where initial enhancement activities include the eradication of invasive and nuisance plant species, significant numbers of native canopy and/or midstory species may remain, but in a spatial distribution that leaves relatively large “gaps” in the canopy stratum and/or the midstory stratum. In such cases, areas measuring approximately 25 feet by 25 feet that are devoid of native canopy species should be planted and areas measuring approximately 45 feet by 45 feet that are devoid of native midstory species should be planted.

The typical guideline of having 60% of the canopy species planted be hard mast-producing and 40% of the canopy species planted be soft mast-producing may be altered in situations where several native trees remain after eradicating invasive/nuisance species. For example if the remaining native trees are predominantly soft mast-producing species, then a greater proportion of the planted trees would be hard-mast producing. The objective would be to have the ultimate canopy composition (planted trees after reaching canopy strata plus existing trees) be close to a 60%:40% ratio of hard mast to soft mast species.

1.3 BOTTOMLAND HARDWOOD WVA MODEL – TARGET YEARS FOR MODELS

Use the target years specified below when analyzing BLH restoration polygons built in existing open water features and for any other BLH restoration polygons that require deposition of fill material as part of the construction process:

TY	Year	
0	2013	Baseline conditions (assume construction starts in 2014 even though anticipated start is late 2013)
1	2014	Initial construction activities begin and are completed. No plants installed.
2	2015	Restoration feature settles to desired target grade. Any associated perimeter containment dikes are degraded or gapped. Plants installed. Temporary flooding duration (target flooding duration/target hydroperiod) achieved.
11	2024	Class 5 is achieved re V1. Planted areas class as forested re V5.
20	2033	For V3, Understory = 25% // Midstory = 60%
50	2063	End of project life for a HSDRRS mitigation feature.

Use the target years specified below when analyzing BLH restoration polygons that do <u>not</u> require deposition of fill material as part of the construction process, and when analyzing BLH enhancement polygons:

TY	Year	
0	2013	Baseline conditions (assume construction starts in 2014 even though anticipated start is late 2013)
1	2014	Initial construction activities begin and are completed. Initial eradication of invasive & nuisance plant species is started and completed. Plants are installed (either in March or in December depending on construction activities. Appropriate planting season extends from November through February). Temporary flooding duration (target flooding duration/target hydroperiod) achieved.
10	2023	Class 5 is achieved re V1. Planted areas class as forested re V5.
20	2033	For V3, Understory = 25% // Midstory = 60%
52	2065	End of project life for a HSDRRS mitigation feature (adjusted end to be consistent with final TY used in impact WVAs).

NOTE:
The user of these guidelines is cautioned that the construction schedule for proposed mitigation features may not follow the construction schedule assumed in the preceding sections. If this is the case, the model target years and their associated model assumptions may have to be adjusted accordingly.

2.1 SWAMP MODEL – GENERAL ASSUMPTIONS

V1 – Stand Structure (percent closure or Cover: overstory, midstory, herbaceous)

Swamp restore, FWP scenario --
Assumptions applicable to restoration features built in existing open water areas and for any restoration features that require deposition of fill to achieve target grades. If construction involves substantial excavation and grading rather than filling, use the next assumptions table rather than this one.

TY	Year	Assumption
0	2013	Baseline conditions (site-specific)
1	2014	Class 1
2	2015	Class 1
3	2016	Class 2
15	2028	Class 6
35	2048	Class 6
50	2063	Refer to Note 1

Notes:

1. Over time, sea-level rise and possibly subsidence could adversely affect the hydrologic regime (increased flooding duration, increased depth of inundation). Salinity could increase in some areas concurrent with sea-level rise. These factors are anticipated to adversely affect plant growth and survival. Thus, cover in the midstory and herbaceous (ground cover) strata are anticipated to decrease over time, as could percent cover in the canopy stratum to a lesser degree. This potential reduction must be evaluated on a site-specific basis, factoring in considerations such as the proposed grade of the mitigation polygon relative to the projected sea-level rise elevation, changes in salinity, etc. As a general "rule of thumb", one may anticipate the stand structure to decrease from Class 6 in TY35 to Class 4 by TY50. However, it is emphasized that the decrease in class score over time must be evaluated on a case-by-case basis.

Swamp restore, FWP scenario --
Assumptions applicable to restoration features involving substantial excavation and grading as part of the initial construction efforts. If fill is required via pumping of sediments into the feature, use the preceding assumptions table.

TY	Year	Assumption
0	2013	Baseline conditions (site-specific)
1	2014	Class 1
2	2015	Class 1
15	2028	Class 6
35	2048	Class 6
52	2065	Refer to Note 1 in preceding assumptions table

General Notes:

- Include the cover accounted for by Chinese tallow and other invasive plant species when working with this variable (for FWOP scenario in all model target years and for FWP scenario at TY0).
- For swamp enhancement features, FWP scenario --- The evaluation of existing canopy, midstory, and understory will be done via field data collection for this variable. The growth of planted species will be estimated from a growth calculator that is based on pertinent research. Assumptions will have to be made about the correlation between plant growth and observed coverage. The values will be averaged to get a single HSI for this variable. Planted canopy species should not be factored into the overstory coverage estimate until TY15. They will be considered either as part of understory cover (earlier) or midstory cover (later) prior to TY15.

V2 – Stand Maturity (average DBH of canopy trees; plus total basal area all trees)

Swamp restore, FWP scenario --
Assumptions applicable to restoration features built in existing open water areas and for any restoration features that require deposition of fill to achieve target grades. If construction involves substantial excavation and grading rather than filling, use the next assumptions table rather than this one.

TY	Year	Assumptions – Density of Trees	Assumptions – DBH of Planted Trees
0	2013	Baseline conditions.	N/A
1	2014	0 trees/ac.	N/A
2	2015	538 trees/ac. (trees installed, initial density)	Cypress = 0.2" // Tupelo = 0.3"
3	2016	269 trees/ac. (50% survival of planted trees)	Cypress = 0.2" // Tupelo = 0.5"
4	2017	258 trees/ac. (48% survival of planted trees)	
15	2028	215 trees/ac. (40% survival of planted trees)	Cypress = 3.5" // Tupelo = 4.1"
35	2048	161 trees/ac. (30% survival of planted trees)	Cypress = 8.2" // Tupelo = 9.6"
50	2063	161 trees/ac. (30% survival of planted trees)	Cypress = 11.9" // Tupelo = 14.0"

Swamp restore, FWP scenario --
Assumptions applicable to restoration features, or the portions thereof, involving substantial excavation and grading as part of the initial construction efforts. If fill is required via pumping of sediments into the feature, use the preceding assumptions table concerning tree densities.

TY	Year	Assumptions – Density of Trees	Assumptions – DBH of Planted Trees
0	2013	Baseline conditions.	N/A
1	2014	538 trees/ac. (trees installed; initial density)	Cypress = 0.2" // Tupelo = 0.3"
2	2015	269 trees/ac. (50% survival of planted trees)	Cypress = 0.2" // Tupelo = 0.5"
3	2016	258 trees/ac. (48% survival of planted trees)	
15	2028	215 trees/ac. (40% survival of planted trees)	Cypress = 3.5" // Tupelo = 4.1"
35	2048	161 trees/ac. (30% survival of planted trees)	Cypress = 8.2" // Tupelo = 9.6"
52	2065	161 trees/ac. (30% survival of planted trees)	Cypress = 11.9" // Tupelo = 14.0"

Swamp restore, FWP scenario ---

- Assume 70% of the trees planted will be cypress and that 30% of the trees planted will be tupelo or other non-cypress species. Assume that this ratio will remain constant over time once the trees are planted.

Swamp enhance, FWP scenario ---

- Do not factor planted trees into the site DBH calculations until TY15. Prior to TY15, the planted trees will be considered as being in the understory or midstory strata.

General Notes:

- Factors such as sea-level rise and increased salinity over time may adversely affect the growth and/or survival of planted trees and existing trees. These factors must be considered when assessing this variable and may require adjustments to the assumed density of planted trees (as regards survival of trees) and the assumed dbh of planted trees indicated in the preceding tables. The FWS spreadsheet used to predict tree growth (reference the "BLH Site Ingrowth" spreadsheet) includes correction factors used to adjust typical growth rates to account for trees subject to stressors like excessive inundation or salinity. These correction factors should be used for target years in which one anticipates the stress factors may significant enough to affect tree growth. The stage in the project life that the effects become significant must be determined on a case-by-case basis.

V3 – Water Regime (flooding duration and water flow/exchange)

Swamp restore, FWP scenario --
Assumptions applicable to restoration features built in existing open water areas and for any restoration features that require deposition of fill to achieve target grades. If construction involves substantial excavation and grading rather than filling, use the next assumptions table rather than this one.

TY	Year	Assumption
0	2013	Baseline conditions (score based on existing hydrology)
1	2014	Duration = permanent // Exchange = none
2	2015	Duration = seasonal Refer to Note 1
15	2028	Duration = seasonal Refer to Note 1
35	2048	Duration = seasonal or semi-permanent Refer to Notes 1 and 2
50	2063	Duration = semi-permanent or permanent Refer to Notes 1 and 2

Notes:
1. Scoring of water flow/exchange component of hydrology must be based on site-specific conditions anticipated.
2. During the latter portions of the project life, flooding duration may be affected by sea-level rise. Swamp mitigation features are designed to have seasonal flooding once the features are constructed and have reached the desired target grade elevation. Sea-level rise will likely increase the duration of flooding. This effect will be site-specific and must be evaluated on a case-by-case basis. Sea-level rise will also likely affect the water flow/exchange. For a site that has limited exchange during early years, this may actually improve exchange for a period of years (ex. increase from low exchange in TY2 to moderate exchange in TY15). As the sea-level rise continues over time, however, the effect may be to reduce exchange (ex. decrease from moderate exchange in TY35 to low exchange in TY50). The degree to which sea-level rise affects flow/exchange over time must also be evaluated on a case-by-case basis.

Swamp restore, FWP scenario --
Assumptions applicable to restoration features, or the portions thereof, involving substantial excavation and grading as part of the initial construction efforts. If fill is required via pumping of sediments into the feature, use the preceding assumptions table.

TY	Year	Assumption
0	2013	Baseline conditions (score based on existing hydrology)
1	2014	Duration = seasonal Refer to Note 1
2	2015	Duration = seasonal Refer to Note 1
15	2028	Duration = seasonal Refer to Note 1
35	2048	Duration = seasonal or semi-permanent Refer to Notes 1 and 2
50	2063	Duration = semi-permanent or permanent Refer to Notes 1 and 2

Notes:
Notes 1 and 2 are the same as in the preceding table.

V4 – Mean High Salinity During the Growing Season (salinity re baldcypress & other trees)

General Notes:
- For current and near-term salinities, use the Coastwide Reference Monitoring System (CRMS) data (website http://www.lacoast.gov/crms%5Fviewer/) and USGS gage data (website http://waterdata.usgs.gov/la/nwis/rt) where available. Future salinities should be forecast using reasonable estimates and best professional judgment (in the absence of hydrologic and hydrodynamic modeling).

Other WVA Swamp Model Guidance

The WVA procedural manual and Swamp Community Model text advises that habitat classification data and aerial photos should be used to determine a conversion rate of swamp to marsh. Based on this evaluation, the guidance states that areas of swamp converting to fresh marsh should be evaluated as open water habitat using the fresh marsh model. The determination of appropriate conversion rates would be quite complicated in the project area. Hence, this issue will not be addressed as part of the WVA analyses.

2.2 NOTES REGARDING CONSTRUCTION & PLANTING OF SWAMP MITIGATION AREAS

Typical Estimated Project Construction Timelines -----

All projects – Begin construction around September 2013.

For swamp restoration areas built in existing open water features and for any other swamp restoration areas that require deposition of fill material as part of the construction process:

- Sept. 2013 – Begin construction.
- May 2014 – Complete construction.
- May 2015 – Initial grade settles to desired target grade (1 year after end of construction). If applicable, perimeter dikes constructed are degraded or gapped at this time.
- Dec. 2015 – Install plants (or could be installed in Jan. or Feb. of 2016).

For swamp restoration areas involving extensive excavation and earthwork but that do not require deposition of fill as part of the construction process:

- Sept. 2013 – Begin construction.
- March 2014 – End construction (but could be as late as May of 2014; also, subsequent grading may be required in some areas after an as-built survey completed in order to correct any deficiencies).
- Dec. 2014 – Install plants.

For swamp enhancement areas:

- Sept. 2013 – Begin construction (includes start of invasive plant eradication).
- Jan. 2014 – End construction (but could be as late as Feb. or March of 2014).
- March 2014 – Install plants.

Note: All of the above timelines are preliminary and are subject to refinement as plans are refined for a particular mitigation site.

Planting of Swamp Restoration Areas -----

Initial plantings will be:

- Canopy species: plant on 9-foot centers (538 trees/acre); of total trees planted, approximately 70% will be cypress while the remaining trees will consist of tupelo and other non-cypress species.
- Midstory species (shrubs and small trees): plant on 20-foot centers (109 seedlings per acre).
- Stock size (minimums): Canopy species = 1 year old, 3 feet tall, 0.5” root collar; Midstory species = 1 year old, 3 feet tall.

Planting of Swamp Enhancement Areas -----

Initial plantings will follow the same guidelines as for swamp restoration areas regarding the general density of installed plants and the stock used. Where initial enhancement activities include the eradication of invasive and nuisance plant species, significant numbers of native canopy and/or midstory species may remain, but in a spatial distribution that leaves relatively large “gaps” in the canopy stratum and/or the midstory stratum. In such cases, areas measuring approximately 25 feet by 25 feet that are devoid of native canopy species should be planted and areas measuring approximately 45 feet by 45 feet that are devoid of native midstory species should be planted.

The typical guideline of having roughly 70% of the canopy species planted be cypress and 30% of the canopy species planted be tupelo and other non-cypress species may be altered in situations where several native trees remain after eradicating invasive/nuisance species. For example, if the remaining native trees are almost all cypress, then a greater proportion of the planted trees may consist of non-cypress species. Similarly, the composition of the species planted might also be altered to be more representative of the species composition present in nearby healthy swamp habitats.

2.3 SWAMP WVA MODEL – TARGET YEARS FOR MODELS

Typically use the target years specified below when analyzing swamp restoration polygons built in existing open water features and for any other swamp restoration polygons that require deposition of fill material as part of the construction process:

TY	Year	
0	2013	Baseline conditions (assume construction starts in 2014 even though anticipated start is late 2013)
1	2014	Initial construction activities begin and are completed. No plants installed. V1 = Class 1; V3 = permanent duration.
2	2015	Restoration feature settles to desired target grade. Any associated perimeter containment dikes are degraded or gapped. Plants installed. V1 = Class 1; V2 = 538 trees/ac.; V3 = seasonal duration.
3	2016	V1 = Class 2; V2 = 269 trees/ac.; V3 = seasonal duration.
4	2017	V1 = Class 2; V2 = 258 trees/ac.; V3 = seasonal duration.
15	2028	V1 = Class 6; V2 = 215 trees/ac.; V3 = seasonal duration.
35	2048	V1 = Class 6; V2 = 161 trees/ac.; V3 = seasonal or semi-permanent duration.
50	2063	End of project life for a HSDRRS mitigation feature. V2 = 161 trees/ac.; V3 = semi-permanent or permanent duration.

Typically use the target years specified below when analyzing swamp restoration polygons that do <u>not</u> require deposition of fill material as part of the construction process, and when analyzing BLH enhancement polygons:

TY	Year	
0	2013	Baseline conditions (assume construction starts in 2014 even though anticipated start is late 2013)
1	2014	Initial construction activities begin and are completed. Initial eradication of invasive & nuisance plant species is started and completed. Plants are installed (either in March or in December depending on construction activities. Appropriate planting season extends from November through February). V1 = Class 1; V2 = 538 trees/ac.; V3 = seasonal duration.
2	2015	V1 = Class 2; V2 = 269 trees/ac.; V3 = seasonal duration.
3	2016	V1 = Class 2; V2 = 258 trees/ac.; V3 = seasonal duration.
15	2028	V1 = Class 6; V2 = 215 trees/ac.; V3 = seasonal duration.
35	2048	V1 = Class 6; V2 = 161 trees/ac.; V3 = seasonal or semi-permanent duration.
50	2063	End of project life for a HSDRRS mitigation feature (adjusted end to be consistent with final TY used in impact WVAs). V2 = 161 trees/ac.; V3 = semi-permanent or permanent duration.

The user of these guidelines is cautioned that the construction schedule for proposed mitigation features may not follow the construction schedule assumed in the preceding sections. If this is the case, the model target years and their associated model assumptions may have to be adjusted accordingly.

3.1 FRESH MARSH MODEL – GENERAL ASSUMPTIONS

V1 – Percent of Wetland Area Covered by Emergent Vegetation

Marsh restore, FWP scenario:

TY	Year	Assumption
0	2013	Baseline conditions.
1	2014	10% credit.
3	2016	50% credit.
5	2018	100% credit.
6	2019	100% credit.

Note: Assume the created elevation settles to target grade by TY3. After TY5, cover of the land acres after land loss is applied will remain optimal until conditions in the mitigation polygon shift to open water (based on Ronny magic spreadsheet calculations).

FWOP scenario:
2010 land rolled forward by applying 3 years of loss.

General Notes:

1. Typically, no existing project benefits are considered under FWOP. Project sites were typically selected to avoid overlap with existing non-diversion projects. In the case of existing diversions, either the effect of the diversion is assumed to be captured in the historic loss rate or the diversion would have to substantially fill in the project site FWOP to affect the net changes under V1 and V4, plus marsh creation gets optimal credit on its own if or until accretion does not keep pace with RSLR. Doing marsh creation in diversion areas may be more sustainable. However, not capturing that potential higher sustainability effect within the WVA would be more conservative for compensatory purposes (i.e., would generate less AAHUs and require more acres), but would not allow differentiation between sites with or without existing diversion influence where that influence is not captured in the historic loss rate.

   In limited cases, some existing project benefits are indeed considered under FWOP. Coordinate directly with CEMVN to determine whether any benefits from existing projects should be considered under the FWOP scenario.
2. Under the FWP scenario, begin applying land loss once the marsh fill has settled to the desired target grade (i.e. in TY2, one year after completion of initial fill placement). The USGS loss rates derived from a linear regression will be applied using a linear loss rate.
3. For the FWP scenario, one must subtract the acreage of interior borrow areas (borrow used to build dikes) from the total acreage of marsh land to derive the percentage of the total feature acreage that will count as marsh land. These borrow areas will have a greater settlement rate than will other portions of the mitigation feature. Seek engineering input as to what percentage of the borrow area footprint will settle to an elevation whereby the area would be considered as shallow open water rather than marsh land.
4. For the FWP scenario, one must also subtract the acreage of any trenasses initially constructed from the total acreage of marsh land to derive the acreage that will count as marsh land. These trenasses will count as shallow open water areas (assuming they are not excavated over 1.5 feet deep in relation to the marsh surface elevation).
5. For the FWP scenario, only those portions of earthen retention dikes that fall within the intertidal range can be included in the marsh restoration feature acreage. Portions of such dikes that are not degraded such that their crest elevation is equal to the final marsh target elevation cannot be counted in the acreage of the marsh feature, nor can portions of the dikes that will remain underwater. Similarly, the footprints occupied by proposed foreshore dikes (rock dikes) cannot be counted in the acreage of the marsh feature.
6. It is assumed that proposed fresh marsh restoration features will not be planted. Instead, it is assumed that suitable vegetative cover will develop rapidly via natural recruitment and colonization of the feature.
7. For the FWP scenario, land loss will be assumed to begin once the restored marsh feature has settled to the desired target grade. This will occur 1 year after the initial construction (dike construction, placement of fill as slurry) has occurred.

V2 – Percent Open Water Area Covered by Submerged Aquatic Vegetation

Marsh restore, FWP scenario:

TY	Year	Assumption
0	2013	Baseline conditions (existing conditions).
1	2014	0%
3	2016	0%
5	2018	Same as baseline cover by SAV.
6	2019	Increase baseline SAV cover by 15%, then hold this through TY25 (i.e. the SI value plateaus).
25	2038	See guidance for TY6.
50	2063	50% of baseline cover by SAV.

Marsh restore, FWOP scenario:
TY50 (2063) = 30% of baseline

Note:
Base the SAV cover estimates on the average cover during the peak of the growing season. SAVs do not include floating aquatics (but do include floating-leaf aquatics).

General Notes:
Fresh and intermediate marshes often support diverse communities of floating-leaved and submerged aquatic plants that provide important food and cover to a wide variety of fish and wildlife species. A fresh/intermediate open water area with no aquatics is assumed to have low suitability (SI=0.1). Optimal conditions (SI=1.0) are assumed to occur when 100 percent of the open water is dominated by aquatic vegetation. Habitat suitability may be assumed to decrease with aquatic plant coverage approaching 100 percent due to the potential for mats of aquatic vegetation to hinder fish and wildlife utilization; to adversely affect water quality by reducing photosynthesis by phytoplankton and other plant forms due to shading; and contribute to oxygen depletion spurred by warm-season decay of large quantities of aquatic vegetation. These effects are highly dependent on the dominant aquatic plant species, their growth forms, and their arrangement in the water column; thus, it is possible to have 100 percent cover of a variety of floating and submerged aquatic plants without the above-mentioned problems due to differences in plant growth form and stratification of plants through the water column. Because predictions of which species may dominate at any time in the future would be tenuous, at best, the EnvWG decided to simplify the graph and define optimal conditions at 100 percent aquatic cover.

SAV coverage is site specific and should be considered on a case-by-case basis. However, in an attempt to provide some general assumptions, the following project specific conditions should be considered when assessing SAV coverage for FWP and FWOP:

- Water depth
- Project area location: inland/protected vs. open to lake or bay processes
- Salinity levels
- Nutrient input (e.g. within diversion outfall area)
- Rate of land loss and RSLR

Restoring marsh within open water areas will reduce wave fetch, increase shallow open water and buffer inland areas increasing tidal lag. Generally, SAV coverage should increase as a result. In some cases existing conditions are already optimal for SAV coverage and, therefore, under FWP conditions percent cover should be maintained.

Consideration of the rate of land loss and RSLR for the project life should also be factored in. For FWOP, an area supporting SAV coverage will likely continue to experience subsidence and marsh loss resulting in reduced SAV coverage, and potentially reaching a point of habitat collapse where SAV is not supported. While under FWP conditions the area will continue to experience subsidence and marsh loss, it is assumed that the rate of loss has been reduced as a result of bringing in external sediment.

For sites located in freshwater diversion outfall areas, SAV coverage will likely be maintained for FWP and FWOP conditions due to nutrient input. Consideration should still be given for land loss rates, RSLR, and juxtaposition to and coalescence with large open water areas.

V3 – Marsh Edge and Interspersion

Marsh restore, FWP scenario:

TY	Year	Assumption
0	2013	Baseline conditions (existing conditions).
1	2014	100% Class 5
3	2016	100% Class 3
5	2018	50% Class 3 and 50% Class 1
6	2019	100% Class 1

Notes:
When assigning SI values to variable V3, the percent marsh values (variable V1) should also be considered and interspersion classes developed accordingly. This could result in assumptions that differ from those indicated above.
Between TY6 and TY50, one must use best professional judgment coupled with land loss projections to determine appropriate SI values for variable V3.

V4 – Percent of the Open Water Area ≤ 1.5 Feet Deep (in relation to marsh surface)

Marsh restore, FWP scenario:

TY	Year	Assumption
0	2013	Baseline conditions (existing conditions).
1	2014	Any marsh lost becomes shallow open water.
3	2016	Any marsh lost becomes shallow open water.
5	2018	Any marsh lost becomes shallow open water.
6	2019	Any marsh lost becomes shallow open water.
50	2063	1/6th of the shallow open water becomes deep based on 0.5 feet of subsidence.

Marsh restore, FWOP scenario:

- Marsh lost between TY1 & TY50 becomes shallow open water.
- At TY50, 1/3 of existing shallow water becomes deep (based on subsidence rate used in determining SLR adjustment).

V5 – Salinity

Assume salinity scores will be the same for FWP and FWOP scenarios.

Assume salinity values will not change enough over time to force a shift from the fresh marsh model to the brackish marsh model.

Data Source --
CRMS site http://www.lacoast.gov/crms2/Home.aspx - Click on Basic Viewer under the Mapping link. Click on the nearest data station and then select the Water tab to get the salinities. The data are approximately average annual and most appropriate for the Brackish Marsh and Saline Marsh models if the period of record doesn't have an anomalous event (e.g., drought, unusual FW diversion operation). Average annual salinity may be accepted on a case-specific basis for the Fresh Marsh/Intermediate Marsh model as well.

V6 – Aquatic Organism Access (% wetland accessible & type of access)

Marsh restore, FWP scenario:

TY	Year	Assumption
0	2013	Baseline conditions (existing conditions).
1	2014	0.0001 (supratidal; retention dikes not gapped or degraded)
3	2016	0.0001 (supratidal; retention dikes have been gapped or degraded)
5	2018	1.0 (intertidal)
6	2019	1.0 (intertidal)
50	2063	1.0 (intertidal)

Note:
Suggested minimum standard for "gapping" containment dikes or similar dikes is no less than one 25-foot wide gap (bottom width) every 1,000 feet, with the "gap" excavated to the desired average marsh elevation. The preferred standard is one 25-foot wide gap (bottom width) every 500 feet, with the "gap" excavated to the pre-project elevation (i.e. the water bottom). If the project design does not provide the minimum gapping, then the organism access values indicated above will need to be adjusted accordingly (re the maximum score attained as of TY5).

Marsh restore, FWOP scenario:
The structure rating is based on site specific, existing conditions and how those may change over time with land loss.

3.2 INTERMEDIATE MARSH MODEL – GENERAL ASSUMPTIONS AS THEY DIFFER FROM FRESH MARSH MODEL ASSUMPTIONS

V1 – Percent of Wetland Area Covered by Emergent Vegetation

Marsh restore, FWP scenario:

Calendar Year	TY	Planted Marsh Platform (credit)	50% planting rate (credit)	Unplanted Marsh Platform (credit)
2013	0 (baseline)			
2014	1 (supratidal)	10%	5%	0%
2016	3 (supratidal)	25%	17.5%	15%
2018	5 (intertidal)	100%	50%	50%
2019	6 (intertidal)	100%	100%	100%

Note: Assume 7-ft center planting densities.

3.3 BRACKISH MARSH MODEL – GENERAL ASSUMPTIONS AS THEY DIFFER FROM FRESH MARSH MODEL ASSUMPTIONS

V1 – Percent of Wetland Area Covered by Emergent Vegetation

Marsh restore, FWP scenario:

Calendar Year	TY	Planted Marsh Platform (credit)	50% planting rate (credit)	Unplanted Marsh Platform (credit)
2013	0 (baseline)			
2014	1 (supratidal)	10%	5%	0%
2016	3 (supratidal)	25%	17.5%	15%
2018	5 (intertidal)	100%	50%	50%
2019	6 (intertidal)	100%	100%	100%

Note: Assume 7-ft center planting densities.

V2 – Percent Open Water Area Covered by Submerged Aquatic Vegetation

Marsh restore, FWP scenario:

TY	Year	Assumption
0	2013	Baseline conditions (existing conditions).
1	2014	0%
3	2016	0%
5	2018	Same as baseline conditions.
6	2019	Increase baseline by 10%, then maintain this through TY25 (i.e. SI value plateaus).
25	2038	See guidance for TY6.
50	2063	25% of baseline conditions.

Marsh restore, FWOP scenario:
TY50 (2063) = 15% of baseline conditions.

General Notes:
Brackish marshes also have the potential to support aquatic plants that serve as important sources of food and cover for several species of fish and wildlife. Although brackish marshes generally do not support the amounts and kinds of aquatic plants that occur in fresh/intermediate marshes, certain species, such as widgeon-grass, and coontail and milfoil in lower salinity brackish marshes, can occur abundantly under certain conditions. Those species, particularly widgeon-grass, provide important food and cover for many species of fish and wildlife. Therefore, the V_2 Suitability Index graph in the brackish marsh model is identical to that in the fresh/intermediate model.

3.4 ADDITIONAL GUIDANCE FOR MARSH RESTORATION FEATURES PROPOSED IN AREAS WHERE THERE IS NO SIGNIFICANT LAND LOSS OVER TIME

The guidance provided herein is only applicable to proposed marsh restoration (marsh creation) features located in areas where data indicate no land loss will occur over the life of the mitigation project. For proposed marsh restoration features located in areas where there will be land loss, the general assumptions previously provided for use in running WVA marsh models will remain applicable.

V1 - % of Wetland Area Covered by Emergent Vegetation

Guidance for determining how much of the restored marsh feature will be land and how much will be shallow open water:

- Assume 1% of the total feature acreage will be open water in TY1 and 99% of the total acreage will be land.
- After TY1, increase the open water area by 0.075% each year using the total feature acreage to determine the acreage increase. Decrease the total acreage of land accordingly.

Example Calculation:
Assume the proposed marsh restoration feature encompasses 100 acres that can all be counted as marsh land. At TY1, the land area will be 99% of the 100 acres while the open water area will be 1% of the 100 acres.
The increase in the open water area per year after TY1 and the decrease in the land area per year after TY1 will be: 0.075% X 100 acres = 0.075 acre per year.

Determination of land area and open water area:

TY	Land Acres	Open Water Acres	Open Water Calculation	Land Calculation
1	99.00	1.00	100 ac.*0.01	100 ac.*0.99
3	98.85	1.15	(1.0 ac. at TY1) + (2 yrs * 0.075 ac./yr.) = A	(99.0 ac. at TY1) - A
5	98.70	1.30	(1.0 ac. at TY1) + (4 yrs * 0.075 ac./yr.) = B	(99.0 ac. at TY1) - B
6	98.625	1.375	(1.0 ac. at TY1) + (5 yrs * 0.075 ac./yr.) = C	(99.0 ac. at TY1) - C
21	97.50	2.50	(1.0 ac. at TY1) + (20 yrs * 0.075 ac./yr.) = D	(99.0 ac. at TY1) - D
25	97.20	2.80	(1.0 ac. at TY1) + (24 yrs * 0.075 ac./yr.) = E	(99.0 ac. at TY1) - E
50	95.325	4.675	(1.0 ac. at TY1) + (49 yrs * 0.075 ac./yr.) = F	(99.0 ac. at TY1) - F

Determination of land area covered by emergent vegetation (marsh area):

TY	Land Acres	Marsh Acres	Marsh Area Calculation
1	99.00	9.9	99.0 ac. land * 0.10 (i.e. 10% of land covered by emergent vegetation)
3	98.85	49.425	98.85 ac. land * 0.50 (i.e. 50% of land covered by emergent vegetation)
5	98.70	98.70	98.70 ac. land * 1.00 (i.e. 100% of land covered by emergent vegetation)
6	98.625	98.625	98.70 ac. land * 1.00 (i.e. 100% of land covered by emergent vegetation)
21	97.50	97.50	97.50 ac. land * 1.00 (i.e. 100% of land covered by emergent vegetation)
25	97.20	97.20	97.20 ac. land * 1.00 (i.e. 100% of land covered by emergent vegetation)
50	95.325	95.325	95.325 ac. land * 1.00 (i.e. 100% of land covered by emergent vegetation)

Notes:

1. Values for TY0 will be based on existing conditions within the marsh restoration features.
2. The general assumptions applicable to determining the percentage of the marsh feature acreage (e.g. land acreage) that is covered by emergent vegetation remain the same as those set forth in the original fresh marsh WVA model guidance. These assumptions are: TY1 = 10%; TY3 = 50%; TY5 = 100%; TY6 = 100%.
3. Refer to the notes under the variable V1 assumptions for fresh marsh models concerning how features such as dikes, interior borrow areas, and constructed trenasses must be handled as regards the acreage of marsh land.

V4 – Percent of the Open Water Area ≤1.5 Feet Deep (relative to marsh surface)

Assume all of the open water areas that develop within the marsh feature (see variable V1 guidance) will be less than or equal to 1.5 feet deep. This assumption is applicable to target years 1 through 50.

3.5 PROJECT CONSTRUCTION NOTES FOR RESTORED MARSHES

The typical anticipated schedule for initial construction associated with the proposed marsh restoration features is as follows:

- Sept. 2013 – Begin construction
- May 2014 – Complete construction
- May 2015 – Initial marsh grade settles to target grade (1 year after end of construction). Degrade containment dikes, and/or install “fish gaps”, and or establish gaps in other dikes.
- 2015 – Install plants (intermediate marsh and brackish marsh features only).

Note that none of the proposed fresh marsh restoration features will be planted. It was assumed that these areas would be sufficiently vegetated via natural recruitment and colonization. Planting would only occur if sufficient vegetative cover (herbaceous) does not develop through natural processes.

Remember that it is very important to review the most detailed design plans available (e.g. initial 35% design plans (drawings), or 65%+ design plans), and the project description narrative associated with these plans. These descriptions and drawings contain important information for specific mitigation features/sites that will affect assumptions used in the WVA models.

3.6 MARSH MODELS – MODEL TARGET YEARS

Typically use the target years specified below when analyzing marsh restoration polygons built in existing open water features:

TY	Year	
0	2013	Baseline conditions (assume construction starts in 2014 even though anticipated start is late 2013)
1	2014	Initial construction activities begin and are completed. No plants installed. V1 = 10% credit (but see calcs for areas where there is no land loss). V2 = 0%. V3 = 100% Class 5. V4 = lost land becomes shallow water. V6 = 0.0001.
3	2016	Restoration feature settles to desired target grade. Any associated perimeter containment dikes are degraded or gapped. Plants installed in intermediate and brackish marsh features (no planting in fresh marsh features since none required). V1 = 50% credit (but see calcs for areas where there is no land loss). V2 = 0%. V3 = 100% Class 3. V4 = lost land becomes shallow water. V6 = 0.0001.
5	2018	V1 = 100% credit (but see calcs for areas where there is no land loss). V2 = baseline SAV cover. V3 = 50% Class 3 and 50% Class 5. V4 = lost land becomes shallow water. V6 = 1.0
6	2019	V1 = 50% credit (but see calcs for areas where there is no land loss). V2 = increase baseline SAV cover by 15%. V4 = lost land becomes shallow water. V6 = 1.0
25	2038	V2 = increase baseline SAV cover by 15%.
50	2063	End project life. V2 = 50% of baseline SAV (FWP). V3 = 100% Class 3. V4 = 1/6th of shallow open water becomes deep (FWP); but if no land loss, all open water remains shallow. V6 = 1.0

The user of these guidelines is cautioned that the construction schedule for proposed mitigation features may not follow the construction schedule assumed in the preceding sections. If this is the case, the model target years and their associated model assumptions may have to be adjusted accordingly.

4.1 RELATED TOPICS – LAND LOSS AND ACCRETION

LAND LOSS RATES

To remain consistent with the WVAs run for the levees (including those for the 57-year period of analysis), the linear loss rates must be calculated in the linear loss spreadsheet. This requires 1984 to 2010 mitigation analysis/land change data from USGS within which a particular time period is chosen depending on water levels taken at that time with efforts to pick years that allow for the greatest time during this range. Data selection is subject to interagency approval. The rate should be calculated in acres/year for integration with below methods on SLR and accretion.

The land loss rate applied to restored marshes will be 50% of the background (FWOP) loss rate. However, land loss rates will revert back to baseline rates after 10 inches of soil have formed/accreted above the initially created marsh platform. Based on input from Dr. Andy Nyman and other academics, plant roots extend downward a maximum of approximately 10 inches below the marsh surface. Consequently, when the plant roots are no longer in contact with the created platform, loss rates revert back to those of the adjoining marshes (i.e., background loss rate).

Derivation and Application of Land Loss Rates

A linear regression is applied to USGS' hyper-year (hyper temporal) data of the extended boundary. The slope of the regression line provides the acres of marsh lost for the extended boundary during the years of USGS analysis. By dividing the slope (marsh lost in acres) by the acreage at the beginning of the USGS evaluation period (e.g. 1984), the percent loss rate is determined for the extended boundary. (Note: USGS provides a percent loss rate by dividing the marsh lost in acres by the total acres of the extended polygon, which is why the percent loss rates are different.)

The project area FWOP loss rate (in acres/year) is determined by applying the extended boundary percent loss rate to the marsh acres in the project area at the beginning of the USGS period of analysis (e.g. 1984 in this case) under FWOP. The project area FWP loss rate is determined by multiplying the acres of the marsh creation area by the percent loss rate and dividing by 2 to apply the 50% reduction in loss for marsh creation.

ACCRETION

Utilize the following accretion rates when running WVA models:

- Fresh Marsh and Intermediate Marsh = 7.2 mm/year.
- Brackish Marsh = 7.7 mm/year.

Accretion is incorporated into determining when the background loss rate resumes within a created marsh area. Normally, the loss of mechanically created or nourished marsh is considered to be half of background loss rate. In the year when post-construction accretion exceeds 10 inches, the loss rate returns to the background loss rate. However, when created marshes are higher than natural marshes, there could be a delay in the loss rate change. Depending on the mechanically created marsh elevation post-construction, cumulative accretion assumes a 3-year settling period (marsh creation sites are assumed to achieve full functionality and vegetation coverage 3 years after construction).

Marsh collapse is a 10-year period that begins when the calculated cumulative accretion deficit reaches limits determined by staff working on the modeling for the 2012 Coastal Master Plan (see below). Typically, the collapse criteria are reached only during the High SLR scenario, however this generalization may not hold true in all cases.

Collapse Threshold Ranges Used in Master Plan Work

- Intermediate Marsh (cm): Low = 30.7; High = 38.0; Median = 34.4
- Brackish Marsh (cm): Low = 20.0; High = 25.8; Median = 22.9.
- Saline Marsh (cm): Low = 16.0; High = 25.0; Median = 20.5.

Collapse threshold selected as the median range for type of marsh indicated. First year of collapse is the year when the Cumulative Accretion Deficit (inundation) is equal to or greater than the median range.

Accelerated Sea Level Rise

The land loss rates determined as described above, are for the constant historic or low SLR scenario (1.7 mm/yr). Based on water level gages and known historic SLR rates, the Corps has identified RSLR rates under the historic SLR scenario, and under the intermediate and high SLR scenarios. The intermediate and high SLR scenarios would result in gradually accelerating SLR rates and it is assumed that those scenarios would result in accelerating land loss rates. Using Corps-predicted water level rise, RSLR rates can be determined. RSLR rates are then converted into an annual adjustment factor that increases wetland loss rates in proportion to the magnitude of the RSLR rate. The annual wetland loss rate adjustment factors are based on a positive relationship observed between wetland loss rates and RSLR rates from coastwide non-fresh marshes. In this relationship, RSLR was calculated as the sum of subsidence per statewide subsidence zones (see Figure 1) plus a eustatic SLR rate of 1.7 mm/yr. Recent land loss rates in percent per year were plotted against RSLR determined for those subsidence zones.

Although this is approaching the limits of rigor for WVA, each of the above methods carry substantial averaging and compounding uncertainty. Users should be aware of the general limits of accuracy and avoid adding more complexity unless deemed necessary and reasonable.

4.2 RELATED TOPICS - GENERAL SHORELINE PROTECTION ISSUES

Hard structures (foreshore dikes, rock dikes, breakwaters) get credit for preventing 100% of loss from shoreline erosion as long as the structure is maintained. If it is not maintained, then a linear decrease in effectiveness must be assumed beginning after the end of the maintenance period. For example, if a rock dike is assumed to need a lift every 14 years but the last lift was at year 14 (TY14), then beginning TY28 (for the rock) it would have a linear decrease in effectiveness to the point of not reducing shoreline erosion at all by TY42.

Vegetative plantings get credit for reducing shoreline erosion by 50% until TY20. After TY20, the area would revert to 100% of the shoreline erosion rate.

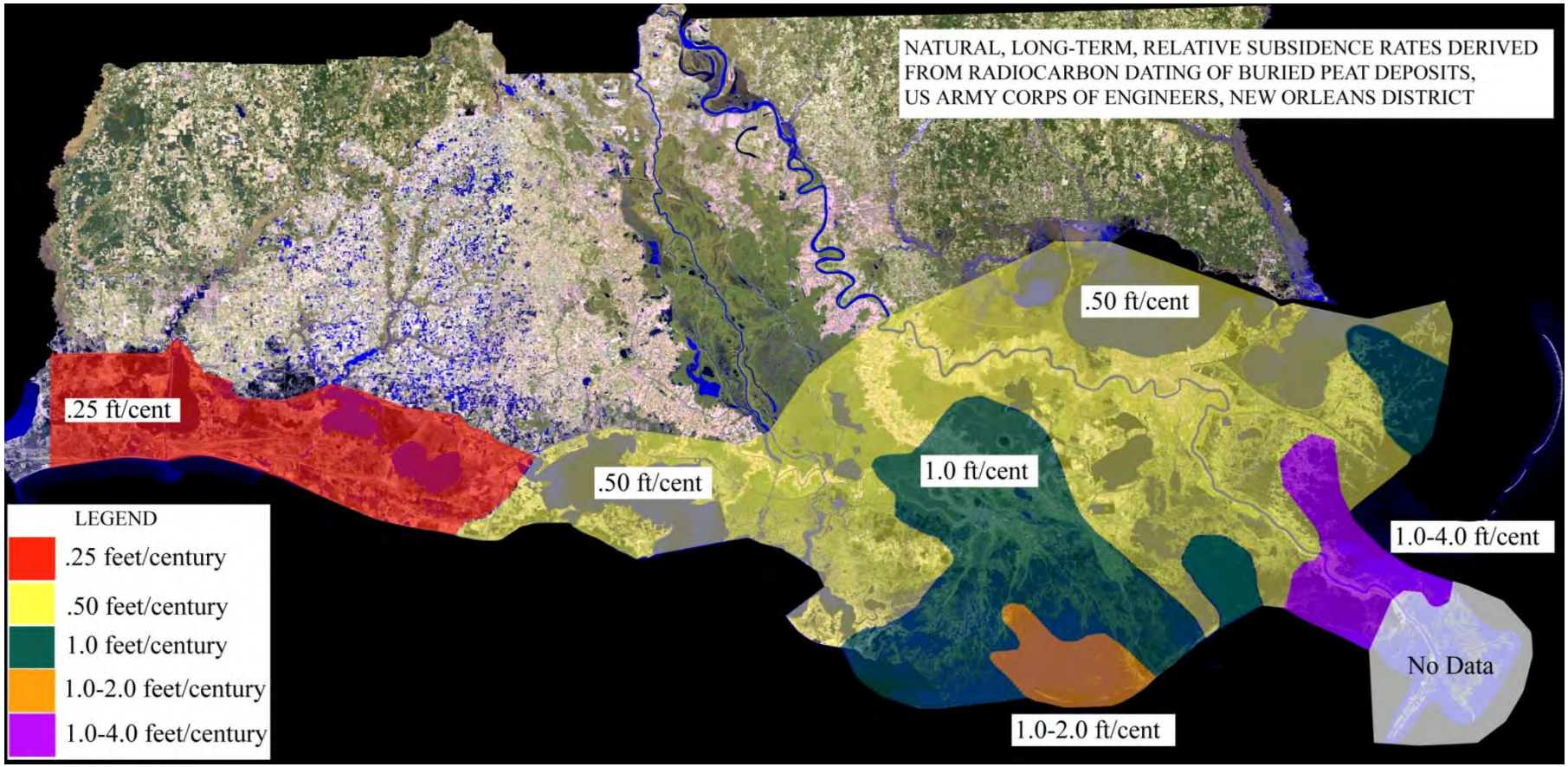

Figure 1. Long-term relative subsidence rates.

APPENDIX 1
Predicting Abrupt Marsh Collapse

(from MRGO Ecosystem Restoration Study methods doc, 3 Feb 2012)

Ronny Paille - USFWS

Research by Nyman et al. (1993) and Nyman et al. (2006) suggests that coastal marshes may undergo rapid degradation and conversion to open water beyond a critical rate of submergence/inundation. Louisiana Coastal Protection and Restoration Authority (CPRA) personnel working to model marsh loss for the 2012 Louisiana Coastal Master Plan have used statewide Coastal Reference Monitoring System data to develop plant productivity vs inundation (i.e., accretion deficit) relationships. From those relationships, they identified inundation ranges at the primary production low-end points (Table 1) to predicting onset of abrupt marsh collapse (Coastal Protection and Restoration Authority of Louisiana 2012). In this study, the median values by habitat type were used to predict onset of abrupt marsh collapse.

Table 1. Cumulative accretion deficits assumed to initiate marsh collapse.

Marsh Type	Range Low Limit (cm)	Range High Limit (cm)	Range Median (cm)
Intermediate	30.7	38.0	34.4
Brackish	20.0	25.6	22.8
Saline	16.0	25.0	20.5

It is assumed that it will take 10 years for the collapsing wetland landscape to completely convert to open water (the 10-year period was assumed to account for wetlands of varying elevations). These values incorporated the average area accretion rate of 7.4 mm per year (Table 2).

Table 2. Study area accretion measurements.

Site	Date	Wetland Type	Method	Accretion rate (cm yr-1)	Source
Breton Sound	1963-1999	Freshwater	^{137}Cs	0.65 ± 0.18	DeLaune and Pezeshki, 2003
Caernarvon diversion	1999	Freshwater	feldspar	1.57 ± 0.05*	Lane et al., 2006
Violet diversion	1999	Saline	feldspar	0.44 ± 0.01*	Lane et al., 2006
Central Wetlands				0.47	U.S. Army Corps *
St. Bernard Parish (Shell Beach)	1963-1992	Saline	^{137}Cs	0.54 ± 0.13	DeLaune et al., 1992
Rigolets	1963-1992	Saline	^{137}Cs	0.77 ± 0.09	DeLaune et al., 1992
Caernarvon	1963-1992	Freshwater	^{137}Cs	0.75 ± 0.12	DeLaune et al., 1992
				Avg. = 0.74	

** personal communication, Mr. Del Britsch, New Orleans District, U.S. Army Corps of Engineers*

Using this average accretion rate and the water level increases associated with sea level rise (post the SLR baseline year of 2011, see Figure 1), the cumulative accretion and cumulative water level rise were calculated for each year within the project life. The accretion deficit may then be calculated as the difference between the cumulative water level rise and the cumulative accretion. Based on those calculations, the collapse criteria were determined (Table 3).

Figure 1. Shell Beach predicted relative sea level rise estimates.

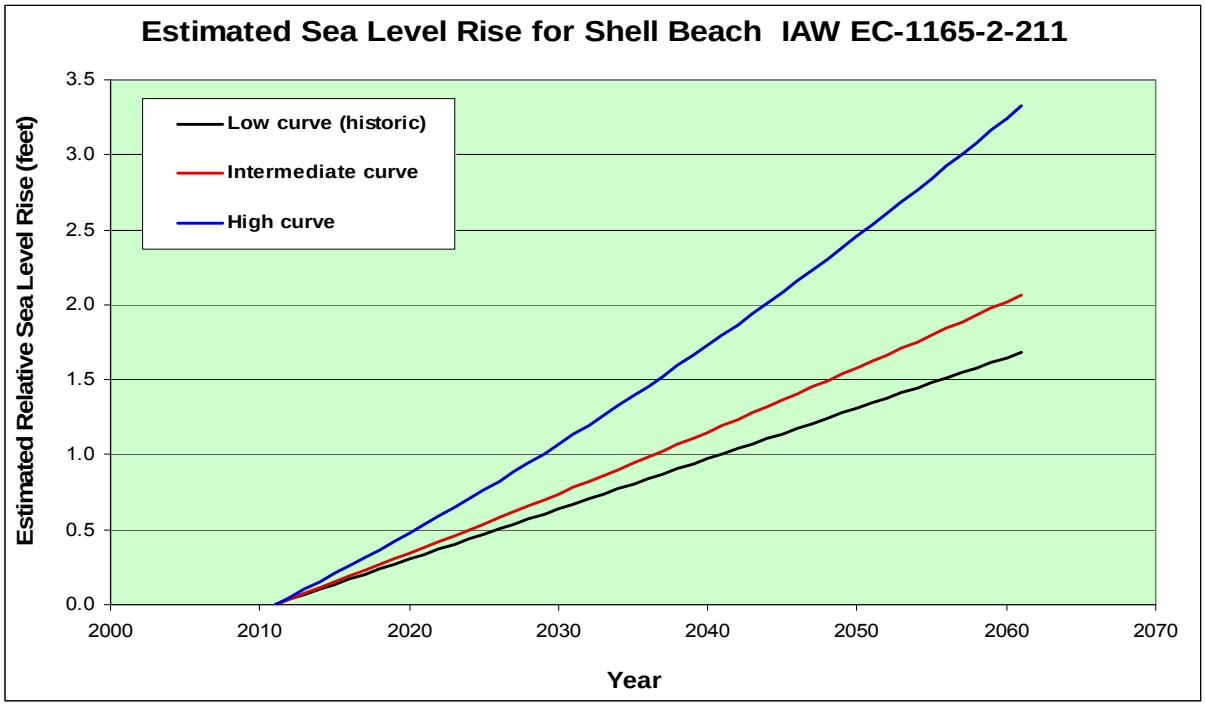

Table 3 Years when marsh collapse is predicted to begin.

SLR Scenario	Year Marsh Collapse Begins		
	INT marsh	BR marsh	SAL marsh
Med SLR	**	2058	2054
High SLR	2044	2035	2033

** *collapse occurs beyond the 50-year project life*

According to this analysis, marsh collapse would begin in 2033 and 2035 for saline and brackish marshes, respectively, under the High RSLR scenario. Under the medium SLR scenario, collapse would begin in 2054 and 2058 for saline and brackish marshes, respectively.

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