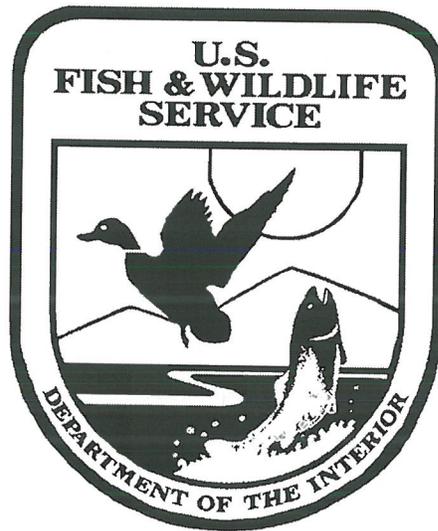


**Fish and Wildlife Coordination Act Report  
for the  
Programmatic Individual Environmental Report 36**

**Bayou Sauvage, Turtle Bayou, and New Zydeco Ridge Restoration Projects  
St. Tammany and Orleans Parishes, Louisiana**

**PIER 36, SUPPLEMENT 1**



PROVIDED TO  
NEW ORLEANS DISTRICT  
U.S. ARMY CORPS OF ENGINEERS  
NEW ORLEANS, LOUISIANA

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ECOLOGICAL SERVICES  
LAFAYETTE, LOUISIANA

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U.S. FISH AND WILDLIFE SERVICE – SOUTHEAST REGION

CORPS OF ENGINEERS

Programmatic Individual Environmental Report 36

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PIER 36, SUPPLEMENT 1

FISH AND WILDLIFE COORDINATION ACT REPORT

MITIGATION PLAN

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September 2015

This Fish and Wildlife Coordination Act (FWCA) Report of the U.S. Fish and Wildlife Service (Service) addresses the mitigation plan for refuge impacts resulting from the improved hurricane protection measures to the Lake Pontchartrain and Vicinity (LPV) project. Please reference Programmatic Individual Environmental Report (PIER 36) and the Supplemental Individual Environmental Report (SIER 1) addressing the final array of mitigation alternatives. Those reports are prepared under the approval of the Council on Environmental Quality (CEQ) and 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 SIER would mitigate impacts to on-refuge intermediate marsh (protected-side), on-refuge and non-refuge brackish marsh (flood-side), and bottomland hardwood (BLH) wetland habitats resulting from the improved hurricane protection measures to the Lake Pontchartrain and Vicinity (LPV) project 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., Westbank and Vicinity of New Orleans and Lake Pontchartrain and Vicinity) in the Greater New Orleans area in southeast Louisiana, also known as the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS).

The Service provides this report to assist your staff in fulfilling mitigation needs associated with those efforts in accordance with the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report constitutes the report of the Secretary of the Interior as required by Section 2(b) of the FWCA. Copies of this report have been provided to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries. NMFS comments have been incorporated into this final report (Appendix F). 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 Corps has selected the following mitigation projects to mitigate impacts to the above-referenced habitat on refuge lands as well as brackish marsh impacts that occurred off-refuge:

- Bayou Sauvage Flood-side (BSFS) Brackish Marsh Restoration (refuge and non-refuge impacts)
- New Zydeco BLH Habitat (wet) Creation Project (refuge impacts)
- New Zydeco Brackish Marsh Restoration (refuge and mitigation project associated impacts)
- Turtle Bayou North Protected-side/Non-tidal Intermediate Marsh Restoration (refuge impacts)

This report incorporates and supplements our October 28, 2013, FWCA Report provided during the development of the PIER 36, as well as 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. This report also incorporates, and supplements the numerous FWCA Reports provided for the work authorized under 4<sup>th</sup> and 5<sup>th</sup> Supplemental for the LPV Hurricane Protection Project only (i.e., IERS 1-11, including supplemental documents). 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, however the following information is provided to update the previously mentioned reports and provide specific information and recommendations.

## PROJECT IMPACTS & MITIGATION PLAN

As a result of HSDRRS impacts to protected-side, intermediate marsh and bottomland hardwood habitat, and flood-side, brackish marsh and bottomland hardwood habitat, mitigation plans are jointly being developed by the Corps, the Service and the NMFS. The current plan consists of acquisition and management of lands on the Bayou Sauvage National Wildlife Refuge (NWR) in Orleans Parish, Louisiana, and management of lands on the Big Branch Marsh NWR in St. Tammany Parish, Louisiana. Impacts listed in Table 1 are based on 95-100% design levee impacts.

Table 1: LPV HSDRRS Project Impacts Addressed in SIER#1

Habitat	Levee Side	AAHUs*	Acres
Brackish Marsh	FS	118.06	226.47
Refuge Brackish Marsh	FS	8.79	24.59
Refuge Intermediate Marsh	PS	41.29	86.34
Refuge BLH-Wet Flood side	FS	8.91	22.85
Refuge BLH-Wet Protected side	PS	83.92	164.52

\*AAHUs = average annual habitat units

### Bayou Sauvage Flood-Side Brackish Marsh (Refuge and Non-Refuge) Restoration Feature

Mitigation of brackish marsh impacts that occurred on and off-refuge is proposed on private lands and the Bayou Sauvage NWR in Orleans Parish, LA (Appendix A). Project features include the creation of approximately 59 acres of marsh creation at the BSFS 4 location, which is currently privately owned, and 201 acres of marsh creation and nourishment at the BSFS 5 location on Bayou Sauvage NWR. According to the Service's Wetland Value Assessment (WVA), the Bayou Sauvage Flood-side Brackish Marsh Restoration project, as proposed, would provide 102.6 net average annual habitat units (AAHUs) of the required 126.85 AAHUs (8.79 AAHUs of on-refuge brackish marsh and 118.06 of non-refuge brackish marsh mitigation). See the Service's WVA project information sheet (Appendix B) for further information regarding existing conditions and future-with and future-without project conditions. The remaining 32.35 AAHUs could be mitigated at additional open water areas of the Bayou Sauvage location or New Zydeco location.

### New Zydeco Bottomland Hardwood Habitat Creation Feature

To mitigate 92.83 AAHUs of flood-side and protected-side BLH impacts on refuge lands as well as off refuge lands, the Corps proposes to create approximately 159 acres of BLH habitat in open water areas that were historically estuarine marsh habitats (Appendix A). Mitigation will occur

within open water areas west of U.S. Highway 90 and north of Salt Bayou in St. Tammany Parish, Louisiana, on Big Branch Marsh NWR. According to the Service's WVA, the New Zydeco BLH Habitat Creation project would provide the required mitigation through creating 155 acres of the proposed 159 acres of BLH habitat based on a mitigation potential of 0.60 AAHUs per acre. See the Service's WVA project information sheet (Appendix B) for further information regarding existing conditions and future-with and future-without project conditions.

#### New Zydeco Brackish Marsh Restoration Feature

Due to the creation of BLH habitat within estuarine waters, 159 acres of tidally-influenced estuarine (wetland) habitat characterized as submerged aquatic vegetated (SAV) habitat, will be converted to a non-wetland, or upland habitat. Mitigation for removing those wetland functions from the watershed should be offset. According to the Service's WVA, approximately 21.2 AAHUs would be lost based on a 159-acre area.

To offset those impacts, the Corps is evaluating the restoration of marsh in conjunction with the New Zydeco BLH Habitat Creation feature (Appendix A). The loss of 21.2 AAHUs (159 acres of SAV habitat) would require the restoration of approximately 66.3 acres of marsh. That acreage is assuming a mitigation potential of 0.32 AAHUs per acre based on previous assessments of restoring marsh within Big Branch Marsh NWR.

Further, SIER #1 addressed expansion of the New Zydeco marsh creation feature on Big Branch Marsh NWR by 82.3 acres to accommodate a portion of the brackish marsh mitigation shortfall, providing 26.4 AAHUs. This would result in at least 148.6 acres of marsh restoration on Big Branch Marsh NWR. The Corps' proposed project feature is currently designed to include 160 acres of marsh restoration.

#### Turtle Bayou North Protected-side/Non-tidal Intermediate Marsh Restoration Feature

To mitigate 41.29 AAHUs of intermediate marsh impacts that occurred on the refuge and on the protected side of the flood protection system, and therefore considered to be disconnected from tidal influences, the Corps proposes restoring protected-side marsh within the Bayou Sauvage NWR, north of Turtle Bayou in Orleans Parish, LA (Appendix A). Project features include the creation of approximately 118 acres of marsh within an open water area north of Turtle Bayou. According to the Service's WVA the Turtle Bayou restoration project would provide 0.38 AAHUs per acre resulting in 24.2 AAHUs. See the Service's WVA project information sheet (Appendix B) for further information regarding existing conditions and future-with and future-without project conditions.

HSDRRS project activities are located in the Mississippi River Deltaic Plain. Habitats (bottomland hardwoods, swamp, and estuarine marshes) within this area have decreased because of urbanization, especially adjacent to the New Orleans metropolitan area, and conversion to agriculture along the adjacent natural river levees. Other factors contributing to the loss of those habitats include hydrologic alterations associated with navigation channels, isolation from historic riverine overbank flows by flood-control levees, oil and gas exploration, extraction and

transportation activities, sea-level rise, and subsidence. Due to their value and scarcity, in-kind compensation for project-induced losses to estuarine marsh and bottomland hardwood habitat habitats would be implemented. Avoidance and minimization of impacts to wetlands and incorporation of environmental features, when feasible, into levee designs were Corps' planning objectives. A more detailed description of the habitats and their value to fish and wildlife resources was presented in our October 28, 2013, FWCA Report and herein incorporated by reference.

The Service quantified unavoidable project impacts on wildlife resources and calculated mitigation needs and benefits through the use of WVA. 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 period-of-analysis (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 mitigation potential per acre was determined. That mitigation potential was used to refine the project size to meet the mitigation needs. Further explanation of how impacts/benefits are assessed with the WVA and an explanation of the assumptions affecting HSI values are available for review at the Service's Louisiana Ecological Services Office. 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.

## Mitigation Sites and Plans

The proposed mitigation areas found in Appendix A and detailed in the WVA project information sheets (Appendix B) are within the Pontchartrain Basin and are considered to be located in the "middle" Pontchartrain Basin along with the areas of impact. Implementation of the mitigation plans would maintain and/or increase fish and wildlife resource values via the improvement and re-establishment of estuarine marsh and bottomland hardwood habitat. The proposed mitigation plans are being developed to offset losses to intermediate and brackish marshes and bottomland hardwood habitats and includes the purchase of protective easements (or fee-title) and the construction of restoration projects (containment dike construction, dedicated dredging, and filling of open water areas) within Bayou Sauvage NWR and on private lands to be transferred to Bayou Sauvage and Big Branch Marsh NWRs. Mitigation lands, if not currently owned by the NWR, are to be purchased by the Corps or the Non-Federal Sponsor, the Coastal Protection and Restoration Authority Board, and transferred to the NWR. Management of the lands will be accomplished via a license, cooperative agreement, or other similar instrument.

### Future-without Mitigation

Under future without-management conditions, the proposed wetland mitigation areas are predicted to remain either in private ownership for the New Zydeco project and portions of the Bayou Sauvage project area or in public ownership for the Bayou Sauvage and Turtle Bayou North projects. None of the proposed project areas are expected to be restored under the future without mitigation scenario. For the Bayou Sauvage brackish marsh and New Zydeco BLH projects, without management it is likely that shorelines and remnant interior marshes will further deteriorate and portions of the Bayou Sauvage project areas will become an extension of Lake Pontchartrain. Areas further inland will experience increased turbidity and salinities as the site will be exposed to greater wind fetch and tidal conditions. Submerged aquatic vegetation will likely respond negatively to this increase in turbidity and salinity. Aquatic organism ingress and egress will likely increase as shoreline breaches occur. The Turtle Bayou North project will likely continue to exist as an open water pond within the flood protection system. Water depths may increase due to subsidence. Overall, there will be less non-tidal and estuarine marsh and bottomland hardwood habitat further limiting fish and wildlife habitat, water quality, and storm reduction benefits.

### Future-with Mitigation

#### General

The goal of the mitigation plans is to provide for equal replacement of habitat units lost due to re-construction of the hurricane/flood protection projects. 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, maintain and protect emergent and forested wetland habitats as a species diverse, sustainable habitat by restoring/maintaining unique functions, values, and services. The objectives of the marsh mitigation measures would be to establish marsh elevations and, in the case of the flood-side marshes, natural tidal regimes so that a diversity of native marsh vegetation and intertidal marsh functions would be supported for a time period no less than that of a natural marsh. It would also be to restore a functional bottomland hardwood habitat at an elevation that would support healthy sustainable hardwood forest.

The mitigation plan consists of acquisition (easement or fee-title) and management of a minimum of 129 acres of intermediate protected-side/non-tidal marsh and 342 acres of brackish flood-side marsh currently on private lands and on Bayou Sauvage NWR. Approximately 159 acres of bottomland hardwood habitat and 160 acres of tidally-influenced estuarine marsh would be created and managed on Big Branch Marsh NWR. The mitigation plan addresses marsh loss due to subsidence and historical land loss and the conversion of bottomland hardwood habitat to urban uses and agricultural development.

### Success Criteria, Monitoring, and Adaptive Management

“General Mitigation Guidelines” for monitoring, success criteria, and reporting requirements were developed by the Corps in coordination with the Interagency Team, including the Non-Federal Sponsor. While mitigation guidelines for the referenced mitigation projects have been drafted, the Interagency Team including the Non-Federal Sponsor will need to review and agree upon those plans.

According to the “General Mitigation Guidelines”, 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. The Corps will monitor completed mitigation to determine whether additional actions are required to achieve mitigation success and will implement those actions in accordance with cost sharing responsibilities applicable to the project and subject to the availability of funds. Once the Corps determines that the mitigation has achieved initial success criteria, monitoring will be performed by the Non-Federal Sponsor. If the mitigation fails to meet the intermediate and/or long term ecological success criteria approved by the Interagency Team the Non-Federal Sponsor is responsible for performing the corrective actions and additional monitoring, at their expense, to ensure success criteria are met.

Development of the detailed mitigation plans should continue to be conducted in coordination with the Interagency team. Future changes to those plans should be evaluated against the accrued and anticipated benefits and the effect of implementing the proposal on achievement of the mitigation plan goals. Any changes that would prevent the mitigation goals from being achieved would not be recommended for implementation. Furthermore, the following activities are not permitted within the mitigation area:

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 right-of-ways.
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 plans 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 wetlands.

National Wildlife Refuge

The National Wildlife Refuge System Improvement Act of 1997 authorized that no new or expanded use of a refuge may be allowed unless it is first determined to be compatible. A compatibility determination is a written determination signed and dated by the Refuge Manager and Regional Refuge Chief, signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. A compatible use is defined as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the NWR. A compatibility determination is only required when the Service has jurisdiction over the use.

The Corps should continue to work closely with the Refuge to determine if the proposed project constitutes a "refuge use" subject to a compatibility determination. If the proposed project requires a compatibility determination, a concise description of the project (refuge use) including who, what, where, when, how and why will be needed to prepare the compatibility determination. In order to determine the anticipated impacts of use, the project proponent may be required to provide sufficient data and information sources to document any short-term, long-term, direct, indirect or cumulative impacts on refuge resources. Compatibility determinations will include a public review and comment before issuing a final determination.

All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a NWR will require the Corps to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Project Leader for the Service's Southeast NWR, (985) 822-2000, for further information on compatibility of restoration features, and for assistance in obtaining a Special Use Permit. Close coordination by the Corps, Local Sponsor, and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

The Service continues to recommend and support the mitigation for impacts to public lands on public lands within the managing agencies jurisdiction. If mitigation lands are purchased for inclusion within a NWR, those lands must meet certain requirements; a summary of some of those requirements is provided in Appendix D. Coordination with the Service's Southeast Louisiana Refuge Complex should continue.

#### Coastal Wetlands Planning, Protection, and Restoration Act

As you are aware, several restoration projects (Table 2), which are authorized by the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) (104 Stat. 4779; 16 U.S.C. 3951 et seq.) are located within and near the proposed LPV mitigation features. Should the proposed mitigation projects directly and/or indirectly affect any of the CWPPRA project features (e.g., canal plugs, rock dikes, levees, water control structures, diversion channels, etc.) associated with those CWPPRA projects, the Corps should coordinate with the respective Federal agency. The exact locations of the proposed and existing specific CWPPRA project features may be obtained at <http://lacoast.gov/new/Projects/List.aspx>, and we recommend that the Corps coordinate directly with the appropriate CWPPRA agency sponsors of the project in developing their

proposed project. Please be aware that Section 303(d) of the CWPPRA requires that all Federal activities be consistent with the purposes of that Act. Since those activities would also include permits issued by any Federal, State, and/or local agencies, we recommend that the design and features of the proposed project are consistent with the need to protect the public investment in those CWPPRA projects.

Table 2. CWPPRA Projects within the LPV Mitigation Project Boundaries

#	Project Title	Federal Agency Sponsor	Project Type	Associated LPV Mitigation Project
PO-06	Fritchie Marsh Restoration	Natural Resource Conservation Service	Hydrologic Restoration	New Zydeco Marsh Restoration and BLH Creation
PO-18	Bayou Sauvage NWR Hydrologic Restoration, Phase 2	Fish and Wildlife Service	Hydrologic Restoration	Turtle Bayou North Marsh Restoration
PO-22	Bayou Chevee Shoreline Protection	U.S. Army Corps of Engineers	Shoreline Protection	Bayou Sauvage Marsh Restoration

With regards to the Bayou Sauvage NWR Hydrologic Restoration, Phase 2 project (PO-18), as the Federal Sponsor, the Service believes restoration of marsh within that hydrologic unit would complement the PO-18 restoration efforts. As mitigation plans develop further please continue to coordinate with the Service in regards to project effects on that CWPPRA project.

#### ANTICIPATED BENEFITS FROM THE MITIGATION PLANS

Implementation of the proposed mitigation plans is predicted to restore at a minimum 44.7 AAHUs of intermediate marsh, 129.5 AAHUs of brackish marsh habitat, 92.8 AAHUs of bottomland hardwood habitat, and 21.2 AAHUs of estuarine habitat (estuarine marsh for SAV habitat impacts). Mitigation-area habitat values would increase due to the increased quantity and quality of estuarine emergent wetlands and bottomland hardwood habitat.

For marsh restoration areas, very little emergent vegetation would be present immediately after construction as most of the project area would be un-vegetated dredged material. Planting of the marsh platform is proposed and will reduce the time to achieve a functional marsh community. Under the future-with project conditions, marsh loss would continue in the project areas. For the Bayou Sauvage Brackish Marsh Restoration Project the WVA assumes that land loss would continue in the project area at a reduced rate of -0.09 acres per year for the 49 acre area (BSFS4) and -0.36 acres/year for the 193.4-acre area (BSFS5). Under the No Action Alternative, historic land loss has been documented at approximately -0.38% /year, or -0.18 acres/year for the 49-acre area and -0.72 acres/year for the 193.4-acre area. Within the Bayou Sauvage Flood-side Marsh Restoration Project area (BSFS4 and BSFS5), approximately 78% of marsh would remain at the end of the 50-year project life compared to approximately 2% under the No Action Alternative, and a significant amount of acreage of marsh would remain within the project area after the project life.

The Turtle Bayou North Protected-side/Non-tidal Intermediate Marsh Restoration project area is located within the flood protection system and is under water level management to reestablish marsh vegetation. Introducing dredged material into this system will benefit the immediate

project area and possibly influence surrounding areas that may re-vegetate under water level management should water depths become shallower. As a worse-case-scenario it is anticipated that historic subsidence rates (3 mm/year) will continue within the project area under future-with-project conditions, however the project area should not be influenced by predicted eustatic sea level rise. Approximately 85% of the created marsh would remain at the end of the 50-year project life compared to 0% under the No Action Alternative, and a significant amount of acreage of marsh would remain within the project area after the project life.

The proposed project area intertidal marshes would continue to support a diverse assemblage of fishes and shellfishes including increased habitat for estuarine dependent organisms including brown shrimp, white shrimp, and red drum, and will provide nursery and foraging habitat for economically important marine fishery species such as spotted seatrout, sand seatrout, southern flounder, Atlantic croaker, spot, gulf menhaden, striped mullet, white mullet, and blue crab. The creation and nourishment of intertidal marsh would ensure that the project area continues to provide important nursery functions throughout the project life offsetting those impacts that occurred as a result of the levee improvements.

Improved habitat conditions would support several species of wildlife including migratory and resident waterfowl, shorebirds, wading birds, and furbearers. Migratory waterfowl utilizing the project areas would benefit from a greater food supply resulting from the increased abundance and diversity of emergent and submerged species. Habitat for the resident mottled duck would also improve considerably as the marsh platform would provide more desirable nesting habitat. Lake Pontchartrain supports a large number of wintering waterfowl, including horned grebe and common loon. Lesser Scaup populations have rebounded in recent years with more than 1 million birds observed wintering after Hurricane Katrina. Various gulls, terns, herons, egrets, and rails can be found using habitats associated with Lake Pontchartrain, which has been designated as an Important Bird Area by the American Bird Conservancy. Restoring the marshes within the Pontchartrain Basin will help to protect fish and wildlife trust resources dependent on marsh habitats, particularly at-risk species such as the diamondback terrapin, black rail, reddish egret, seaside sparrow, brown pelican and the Louisiana-eyed silkworm.

The New Zydeco Bottomland Hardwood Habitat Creation Project will require elevations of 2.5 to 3 feet North American Vertical Datum 1988 (NAVD88) at a minimum. To ensure success, achieving a higher target elevation of 3.0 to 3.5 feet NAVD would reduce potential salinity concerns. Soil consolidation and incorporation of organic material (planting grasses) should be considered during the site preparation prior to planting hardwoods. The WVA estimates that the forest canopy would mature by target year 20, and at that time provide hard mast production. Approximately 159 acres of forested habitat will be replaced in an area that was greatly impacted by Hurricane Katrina. Replacing forested habitat in this region will benefit trans-Gulf migratory songbirds such as wood thrush, yellow-billed cuckoo, and Chuck-Will's-widow, and migratory raptors such as the bald eagle and osprey. Mammals such as raccoon, opossum, swamp rabbit, gray squirrel, fox squirrel, and white-tailed deer would also benefit. The mitigation project will also support several species of reptiles and amphibians including possibly the eastern glass lizard and oak toad, listed by the State as a species of conservation concern.

As a result of the New Zydeco BLH Habitat Creation Project, 159 acres of SAV habitat will be converted to non-tidal bottomland hardwood habitat. Estuarine dependent organisms will be

displaced to adjacent habitats. To offset those losses the Corps is considering creating additional marsh habitat adjacent to the project area. This restoration project will provide increased habitat value for those estuarine dependent organisms and will complement the BLH habitat creation project by providing a diversity of habitats, improving water quality functions, and improving salinity and storm reduction benefits.

Predicted habitat conditions under future-with and without-restoration scenarios are provided in the WVAs (Appendix B). Net Change in Habitat Units is provided in Tables 3-6, and acres evaluated refers to the acres assessed in the WVA not necessarily the acres proposed by the Corps to be restored. The net benefit value of the restoration action expected to result from the above-described mitigation scenarios does not factor in the AAHU values lost as a result of the HSDRRS levee impacts. The end result is expected to be a no-net loss as opposed to the net benefit presented.

Conditions under the future-with mitigation scenario (i.e., restoration of emergent marsh and BLH habitat) proposed were input into the habitat model to calculate the AAHU value of the area over the life of the project. The AAHU value was then used to determine the per acre AAHU value.

Table 3. Net Change in Habitat Units for the Proposed Bayou Sauvage Flood-side (BSFS) Brackish Marsh Restoration (refuge and non-refuge impacts)

	BSFS4		BSFS5		Total Net
	Marsh	Water	Marsh	Water	
Future With Out Project (AAHUs)	0.00	40.93	33.05	172.22	
Future With Project (AAHUs)	37.59	9.42	200.52	39.92	
Total	37.59	-31.51	167.47	-132.30	
*Net Benefit	18.40		84.20		102.6
Acres Evaluated	59		201		

\*Net Benefits = (2.6x emergent marsh AAHUs + open water AAHUs)/3.6

Table 4. Net Change in Habitat Units for the Proposed New Zydeco BLH Habitat (wet) Creation Project (refuge impacts)

	BLH Creation	*Estuarine Habitat Impacts (SAV Habitat)	
		Marsh	Water
Future With Out Project (AAHUs)	0.08	0.21	65.65
Future With Project (AAHUs)	95.14	0.00	0.53
Total		-0.21	-65.12
Net Benefit/Impact	<b>95.05</b>	<b>-21.15</b>	

Acres Evaluated	159	159
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\*See Table 5 for mitigation to offset estuarine habitat impacts.

Table 5. Net Change in Habitat Units for the Proposed New Zydeco Marsh Restoration Project (refuge impacts: combined shortfall of 26.4 AAHUs from Bayou Sauvage project and 21.2 AAHUs of SAV impacts)

	Marsh Restoration	
	Marsh	Water
Future With Out Project (AAHUs)	0.29	66.23
Future With Project (AAHUs)	94.55	13.36
Total	94.25	-52.87
Net Benefit	46.79	
Acres Evaluated	55.5	

Table 6. Net Change in Habitat Units for the Proposed Turtle Bayou North Protected-side/Non-tidal Intermediate Marsh Restoration (refuge impacts)

	Marsh	Water
Future With Out Project (AAHUs)	0.90	24.45
Future With Project (AAHUs)	78.09	2.60
Total	77.19	-21.85
Net Benefit	45.24	
Acres Evaluated	118	

Access to the mitigation sites would also result in temporary and permanent impacts to estuarine brackish marsh and non-tidal intermediate marsh (Table 7). To avoid and minimize impacts to emergent marsh habitats, proposed access corridor widths have been reduced and access routes have been realigned. The proposed mitigation features have been resized to offset unavoidable impacts associated with accessing the mitigation areas during construction.

Table 7. Access Route Impacts Associated with Mitigation Features.

Mitigation Feature Component	Levee Side	AAHUs Impacted	Acres Impacted	Habitat Impacted
Turtle Bayou - Access ROW	PS	3.4	10.1	Intermediate Marsh
Turtle Bayou - Access ROW	FS	0.8	2.1	Brackish Marsh
Bayou Sauvage - Access ROW	FS	0.4	0.5	Brackish Marsh
New Zydeco - Access ROW	FS	1.5	3.8	Brackish Marsh

## DISCUSSION

While we are generally in support of the proposed mitigation plan, we are concerned that during mitigation plan formulation meetings the Corps presented a mitigation concept that would rely on bank/credits from mitigation banks that are currently not approved (or even potentially developed) by the Interagency Review Team. Because this concept does rely on banks that are not approved and functioning and could result in further delays in mitigation implementation the Service cannot support any alternative that would rely on this concept. Further, should the State's In-Lieu-Fee program be used there is a concern that mitigation will not be in-kind and within the same hydrologic basin. Although not preferred, provided that the State can confirm that credits are available, and that the funds will be used to create in-kind habitat and within the Lake Pontchartrain Basin, the Service would not oppose that option.

Under the current mitigation plan, brackish marsh impacts not addressed at the Bayou Sauvage Flood Side Project area are currently proposed to be mitigated at the New Zydeco Marsh Restoration project area. The Service supports this alternative feature, and recommends that the New Zydeco Marsh Restoration project area be considered for expansion should brackish marsh mitigation currently proposed at the Bayou Sauvage Flood Side Project area not be feasible.

Constructing BLH habitat within open water areas comes with an inherent risk. Salinities range from 2 to 4 parts-per-thousand during the growing season at existing monitoring stations near the New Zydeco proposed project area. As sea level rise increases salinity intrusion will likely be more prevalent. To reduce risk and construction shortfalls, elevations should be designed to achieve the highest target elevations within the range, and planted hardwood species should be chosen that have tolerance for low salinity water.

The dredging of borrow sites in Lake Pontchartrain could lead to anoxic conditions. Monitoring of dissolved oxygen (DO) levels in a dredged hole along the south shore of Lake Pontchartrain was reviewed during the design of the CWPPRA Goose Point Restoration Project. Monitoring of the south shore borrow areas indicated that chronic, low (<2 parts per million) dissolved oxygen conditions only occurred at depths of 40 feet and greater and infrequently occurred at shallower depths (Flocks and Franze 2001). Data indicated that at a depth of 40 to 50-feet below the lake bottom, anoxic conditions could persist for most of a year; while at depth of 30 feet, anoxic conditions occurred 27 percent of the year. Depths in the 20-foot range rarely dropped below the critical threshold of 2 parts per million, and during certain times of the year much of the lake experiences low oxygen conditions. Overall, wind-driven water currents would have greater velocities along the north shore as compared to the south shore dredge hole areas. Modeled tidal currents along the north shore and within the Goose Point project area would often be approximately twice the magnitude of those occurring at the south shore borrow sites (List and Signell 2002). Therefore, the Service determined that a bottom depth of the proposed Goose Point Marsh Restoration CWPPRA Project borrow sites would be designed no deeper than 25 feet below the water surface.

Tentative monitoring data from the Goose Point borrow area has been provide by the State. Based on data collected during the 2013 observation period, hypoxia was likely caused by the

dredging in the borrow area (-23 feet NAVD88), but recovery did occur relatively quickly to levels similar to the control area (-14 feet NAVD88). Low DO events appeared to correlate with similar events at the control area; however, low DO levels at the borrow area appeared to occur for an extended period compared to the control area.

Based on the available information and without project specific wind and tidal circulation modeling, the Service recommends that borrow area depths be limited to a depth no greater than 20 feet below the water surface. To further understand borrow area effects on water quality for future mitigation and restoration projects, it is recommended that water quality monitoring be conducted within the borrow areas.

### SERVICE POSITION AND RECOMMENDATIONS

The Service supports the Corps' proposed mitigation plan to mitigate impacts to fish and wildlife resources associated with HSDRRS, specifically the Bayou Sauvage Flood-side Brackish Marsh Restoration, the New Zydeco BLH Habitat Creation and Marsh Mitigation feature, and the Turtle Bayou North Protected-side/Non-tidal Intermediate Marsh Restoration projects, and believes that the recommendations provided in our October 28, 2013, FWCA Report addressing PIER 36 remain valid and should be incorporated into future project planning and implementation. Those recommendations have been provided in Appendix E for reference. The following recommendations are provided specific to the projects referenced in this report:

- 1) Constructing bottomland hardwood habitat within estuarine open water areas comes with an inherent risk. Salt water intrusion and storm induced salinity impacts will likely be more prevalent in the future. To reduce risk and construction shortfalls, we recommend considering higher target elevations (e.g. +3.0 to +3.5 feet NAVD88) and planting vegetation that has tolerance for low salinity water.
- 2) While "General Mitigation Guidelines" for monitoring, success criteria, and reporting requirements were developed by the Corps in coordination with the Interagency Team, project-specific mitigation guidelines will also need to be reviewed and agreed upon by the Interagency Team including the Non-Federal Sponsor. Please provide project specific monitoring plans and success criteria for agency review and continue to coordinate with the agencies to finalize those plans.
- 3) Comments provided by the Service and NMFS on the "General Mitigation Guidelines" provided in the PIER 36 and in the Milton Island Marsh Restoration TIER 1 are applicable and should be incorporated in the General Mitigation Guidelines addressed in SIER 1. Specific Service comments will be provided in response to the draft SIER 1 NEPA document.
- 4) Newly developed mitigation guidelines are being approved by the Corps' Regulatory Division and the Interagency Review Team. Mitigation guidelines, including monitoring and survey requirements, for this project, as well as future LPV mitigation features, should coincide with those Regulatory guidelines as much as possible and

should continue to be conducted in coordination with the Interagency team. Once the Corps revises the project specific mitigation guidelines based on comments received on the SIER, please provide the revised plan to the agencies for review.

- 5) Areas of marsh outside of the mitigation sites are expected to be nourished by dredge effluent during construction. Should the Corps decide to include those areas in the mitigation plan, pre-construction surveys, as-build surveys, and additional monitoring requirements will be necessary.
- 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) Water quality monitoring within the borrow areas is recommended, and should be conducted at least during March through November for a minimum of three years post dredging to verify the conductance, temperature, dissolved oxygen, and pH from the bottom to surface in five feet profiles. Samples should be collected at least monthly during March, April, September, October, November. During the hotter months of May, June, July and August, sampling should be conducted once every two weeks. Benthos should be sampled immediately prior to construction and thereafter annually for three years post-dredging to evaluate potential recovery or changes in the community structure.