APPENDIX N
Fish and Wildlife Coordination Act Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
February 17, 2009

Colonel Alvin B. Lee
District Engineer
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

Please reference our February 10, 2007, Fish and Wildlife Coordination Act Report for the Inner Harbor Navigation Canal Lock Replacement Project, Orleans Parish, Louisiana. Subsequent to our submittal of that report to the U.S. Army Corps of Engineers, New Orleans (Corps) we were contact by Corps personnel requesting modification of our description of the proposed alternative. We have complied with that request and have modified our report accordingly. This report supplements our March 1997 FWCAR and replaces our February 2009 FWCAR. This report contains a description of the existing fish and wildlife resources of the project area, discusses future with- and without-project habitat conditions, identifies fish and wildlife-related impacts of the proposed project, and provides recommendations for the Recommended Plan including mitigation requirements for adverse impacts to those resources. This report constitutes the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act. This report has been provided to the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service; their comments are incorporated into our final report.

Changes to our report include the removal of the word "capped" from the description of material used to cover any contaminated material placed in a confined disposal facility. The word "capped" was used in Recommendation Number 8 in our Executive Summary and report and in the second paragraph on page 20 of Appendix A, but has been removed. Use of the term apparently implies specific requirements regarding the type of material used to cover contaminated materials. The contaminated material being covered does not meet the levels required for such capping.

To help distinguish this report from our previous report we have included the full date on our cover pages. We appreciate the cooperation of your staff on this study. Should your

staff have any questions regarding the enclosed report, please have them contact Ms. Catherine Breaux (504/862-2689) of this office.

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

Attachment

cc: EPA, Dallas, TX
National Marine Fisheries Service, Baton Rouge, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD/CRD), Baton Rouge, LA

INNER HARBOR NAVIGATION CANAL LOCK REPLACEMENT PROJECT, ORLEANS PARISH, LOUISIANA

FISH AND WILDLIFE COORDINATION ACT REPORT

U.S. FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES

LAFAYETTE, LOUISIANA

FEBRUARY 17, 2009

INNER HARBOR NAVIGATION CANAL LOCK REPLACEMENT PROJECT, ORLEANS PARISH, LOUISIANA

FISH AND WILDLIFE COORDINATION ACT REPORT

SUBMITTED TO

NEW ORLEANS DISTRICT

U.S. ARMY CORPS OF ENGINEERS

NEW ORLEANS, LOUISIANA

PREPARED BY

CATHERINE BREAUX, FISH AND WILDLIFE BIOLOGIST

U.S. FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES

LAFAYETTE, LOUISIANA

FEBRUARY 17, 2009

EXECUTIVE SUMMARY

The Inner Harbor Navigation Canal (IHNC) and Lock, located in metropolitan New Orleans, provides a link between the Mississippi River, the Gulf Intracoastal Waterway (GIWW), and Lake Pontchartrain. Constructed in 1923 by the Board of Commissioners of the Port of New Orleans, the antiquated lock is currently operated beyond its design capacity. Because of an anticipated increase in barge and ship traffic, the lock replacement project was authorized), to be implemented by the U.S. Army Corps of Engineers, New Orleans (Corps), in Chapter 112 of the Rivers and Harbors and Flood Control Acts of 1956. The previous Final Environmental Impact Statement (EIS) and Main Report for the Inner Harbor Navigation Canal Lock Replacement Project (also referred to as the IHNC new lock project and previously called the Mississippi River Gulf Outlet, New Lock and Connecting Channels), Orleans Parish, Louisiana, issued in March 1998, focused on the potential impacts of new lock construction, including impacts to the local community and supporting infrastructure. In concert with that effort, the Service prepared a March 1997 Fish and Wildlife Coordination Act Report (FWCAR) addressing the impacts on fish and wildlife resources from implementation of the Recommended Plan (RP), and also providing recommendations to mitigate adverse impacts on those resources (herein incorporated by reference). The RP identifies construction of a new deep-draft lock north of the existing IHNC lock that will be 110 feet wide by 1,200 feet long and having a depth (i.e., draft) of -36 feet.

The Corps issued a Record of Decision (ROD) on December 18, 1998, but the decision was challenged in the United States District Court and the Court's Order on Motions for Summary Judgment was issued on October 3, 2006, as part of Case No. 2:03-cv-00370-EEF-KWR, United States District Court Eastern District of Louisiana. The Court's decision enjoined the Corps from continuing with the project until additional compliance with the National Environmental Policy Act (NEPA) is completed. The Corps revised Supplemental EIS will update and supplement the 1998 Final EIS by providing better evaluation of the analysis and handling of dredged material generated during the construction phase, the engineering design of confined disposal areas, and several aspects of the project which may have changed since the original EIS in 1998, including any significant new circumstances relevant to environmental concerns that have arisen since Hurricane Katrina.

This report, which compliments the updated SEIS, incorporates and supplements our March 1997 FWCAR. This report contains description of the existing fish and wildlife resources of the project area, discusses future with- and without-project habitat conditions, identifies fish and wildlife-related impacts of the proposed project, and provides recommendations for the RP including mitigation requirements for adverse impacts to those resources. This document constitutes the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report has been provided to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF) and their comments have been incorporated into the final report.

While lock replacement will have minimal impacts to fish and wildlife resources, various project features could potentially result in significant habitat losses. Construction of the graving and stockpile site and the confined disposal facility (CDF) will temporarily eliminate moderate-value fish and wildlife habitat at those sites. Disposal of uncontaminated spoil to create emergent marsh is, however, expected to significantly benefit fish and wildlife resources in the disposal area. Furthermore, those benefits could potentially offset unavoidable project-related habitat losses at the CDF, graving, and stockpile sites.

Construction of the IHNC new lock would result in the loss of up to 242.82 acres of moderate quality scrub/shrub and early successional bottomland hardwood habitat for a total loss of up to -36.28 AAHU's (See Appendix A for WVAs and Assumptions). The Service does not oppose replacement of the IHNC lock, provided the following fish and wildlife conservation recommendations are implemented concurrently with project implementation:

1. The Corps and local sponsor shall obtain 36.28 AAHU's by either creating at least 85 acres of marsh in the area south of Bayou Bienvenue, as proposed, or by mitigating elsewhere or by a combination of the two to compensate for the unavoidable, project-related loss of the early successional forested wetlands. See Appendix B for the Corps draft mitigation plan. This draft plan should be incorporate into the final mitigation plan. The Service, NMFS, LDWF, and Louisiana Department of Natural Resources should be consulted regarding the adequacy of any proposed alternative mitigation sites.

2. The Service strongly supports using all clean dredged material to create brackish marsh that will improve fish and wildlife habitat in the project area. Furthermore, such marsh creation could provide fish and wildlife habitat benefits to offset unavoidable habitat losses at the proposed CDF, graving and stockpile sites.

3. All containment features should be breached or degraded, if necessary to restore tidal connectivity, once the marsh creation/nourishment areas have at least 80% coverage of emergent vegetation.

4. The created wetlands should be monitored over the project life to help evaluate the effectiveness of these features and to document both the elevation and acreage of wetland areas created as mitigation.

5. The monitoring plan and reports should be provided to the Service, NMFS, and LDWF. Please add language to sections 5.0, 5.2.2, and 5.2.3 stating these agencies will receive copies of the monitoring reports for review.

6. The Service recommends the use of silt curtains while dredging and disposal of dredged material whether at the IHNC, CDF, graving and stockpile site, or marsh creation site to minimize siltation and the spread of contaminated materials.

7. The suggested graving and associated stockpile site designated in the RP is not the mandatory site to be used for those purposes. The contractor who is awarded the work on those sites may choose an alternate site. If an alternative graving and stockpile site are used the impacts analysis will need to be re-evaluated for the site specific impacts.

8. If contaminated material placed in the CDF is used for backfill at the new lock, that material must be contained so that it is not open to or redistributed in the IHNC.

9. The Service and NMFS shall be provided an opportunity to review and submit recommendations on future detailed planning reports (e.g., Design Document Report, Engineering Document Report, etc.) and the draft plans and specifications on the Inner Harbor Navigation Canal Lock Replacement Project addressed in this report.

10. Part of Bayou Bienvenue is a Louisiana designated Natural and Scenic River. The Corps should consult with the LDWF, Scenic Rivers Program prior to initiating any of the proposed activities within or adjacent to the banks of that bayou. Scenic Rivers Coordinator Keith Cascio can be contacted at (318) 343-4045.

11. Coordination should continue with the Service and NMFS on detailed contract specifications to avoid and minimize potential impacts to manatees, Gulf sturgeon, and pallid sturgeon.

12. If the proposed project has not been constructed within 1 year or if changes are made to the proposed project, the Corps should re-initiate Endangered Species Act consultation with the Service.

13. The proposed mitigation area is reported to have been previously subdivided into lots for urban development. The multiple land-ownerships created by this subdivision could adversely affect the ability to implement the proposed mitigation. Therefore, to ensure mitigation is implementable and occurs concurrently with construction the Service and NMFS recommend that prior to completion of the IHNC engineering and design efforts the Corps should begin addressing this potential real estate problem. If this issue prohibits implementation of mitigation at the proposed site the Corps should immediately notify all natural resource agencies to begin reformulation of mitigation alternatives.

Provided that the above recommendations are included in the feasibility report and related authorizing documents, the Service will support further planning and implementation of the RP.

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INTRODUCTION

The Inner Harbor Navigation Canal (IHNC) and Lock, located in metropolitan New Orleans, provides a link between the Mississippi River, the Gulf Intracoastal Waterway (GIWW), and Lake Pontchartrain. Constructed in 1923 by the Board of Commissioners of the Port of New Orleans, the antiquated lock is currently operated beyond its design capacity. Because of an anticipated increase in barge and ship traffic, the lock replacement project was authorized, to be implemented by the U.S. Army Corps of Engineers, New Orleans (Corps), in Chapter 112 of the Rivers and Harbors and Flood Control Acts of 1956. The previous Final Environmental Impact Statement (EIS) and Main Report for the Inner Harbor Navigation Canal Lock Replacement Project (also referred to as the IHNC new lock project and previously called the Mississippi River Gulf Outlet, New Lock and Connecting Channels), Orleans Parish, Louisiana, issued in March 1998, focused on the potential impacts of new lock construction, including impacts to the local community and supporting infrastructure. In concert with that effort, the Service prepared a March 1997 Fish and Wildlife Coordination Act Report (FWCAR) addressing the impacts on fish and wildlife resources from implementation of the Recommended Plan (RP), and also providing recommendations to mitigate adverse impacts on those resources (herein incorporated by reference). The RP identifies construction of a new deep-draft lock north of the existing IHNC lock that will be 110 feet wide by 1,200 feet long and having a depth (i.e., draft) of -36 feet.

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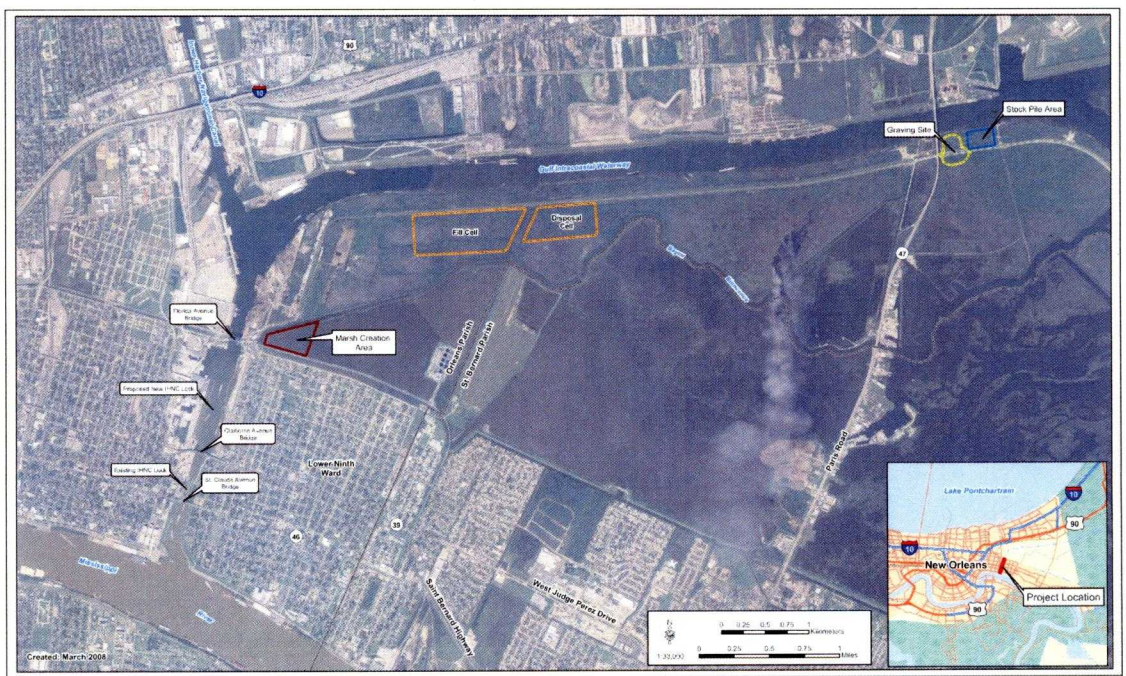
DESCRIPTION OF STUDY AREA

The study area is located in southeastern Louisiana within St. Bernard and Orleans Parish (Figure 1). The IHNC lock, one of the busiest locks in the Nation, is located in Orleans Parish. It connects the Mississippi River (fresh water) with the GIWW (salt water at this location). The area surrounding the lock is highly urbanized. Both the IHNC and adjacent residential and industrial lands have negligible value to fish and wildlife.

Northeast of the IHNC, there is a large expanse of early successional bottomland hardwood and scrub/shrub habitat, deteriorating brackish marsh, and open water between the GIWW and the back protection levee (local flood protection levee). The Corps proposes to place a portion of the spoil from project construction in an upland disposal site for contaminated sediments (contained disposal facility or CDF), a marsh creation site, and into the Mississippi River (Figure 1). In addition, the RP includes the construction of a graving site with associated stockpile site located on the south bank of the GIWW just east of Paris Road. The marsh creation site is in an openwater area that is bounded on the south by the back protection levee, on the east by a sewage treatment plant, on the north and west by an operating landfill, Bayou Bienvenue, and a strip of land composed of scrub/shrub and early succesional bottomland hardwood. The CDF is located in the strip of early successional bottomland hardwood and scrub/shrub habitat north of the marsh creation site and is bound on the south by Bayou Bienvenue.

Figure 1. The Project Area and Feature Locations for the Inner Harbor Navigation Canal, New Orleans, Louisiana Project.



Project Location Map

FISH AND WILDLIFE RESOURCES

Description of Habitats

Fish and wildlife habitats found in the study area include developed lands, scrub/shrub and early succcessional bottomland hardwood, brackish marsh, and open water. Developed habitats in the study area include residential and commercial areas, as well as roads and existing levees. Those habitats do not support significant wildlife use. Some of the development is located on higher elevations of the Mississippi River natural levees and former distributary channels; however, vast acreages of swamp and marsh have been placed under forced drainage systems and developed. Part of Bayou Bienvenue is a designated Louisiana Scenic River.

The proposed CDF and graving and adjacent stockpile sites consist of both scrub/shrub and early successional stage bottomland hardwood habitats. Scrub/shrub communities support woody vegetation less than 20 feet tall and typically occur on disturbed sites (e.g., spoil banks) along the edges of forests, streams, and canals. Scrub/shrub communities are typically vegetated with black willow (*Salix nigra*), eastern baccharis (*Baccharis halimifia*), and wax myrtle (*Myrica cerifera*). Based on the January 23, 2008, and April 8, 2008, site visits the early succesional bottomland hardwood habitat was dominated by Chinese tallow (*Triadica sebifera*) and also included black willow, dogwood (*Cornus* spp.), red maple (*Acer rubrum*), box elder (*Acer negundo*) and hackberry (*Celtis laevigata*). Some other vegetation seen includes elderberry (*Sambucus canadensis*), goldenrod (*Solidago* sp.), *Galium* sp., *Geranium* sp., thistle (*Carduus* spp.), arrowhead (*Sagittaria latifolia)*, frogfruit (*Phyla nodiflora*), spikerush (*Eleocharis spp.*), pennywort (*Hydrocotyle* spp.), cattail (*Typha* spp.), smartweed (*Polygonum* spp.), *Verbena* spp., rubus (*Rubus* spp.), white mulberry (*Morus* alba), yaupon (*Ilex vomitoria*), lizard's tail (*Saururus cernuus*), buttercup (*Ranunculus spp.*), frogbit (*Limnobium spongia)*, cutgrass (*Zizanipsis miiacea*), trumpet creeper (*Campsis radicans*), vetch (*Vicia* spp.), rattlebox *(Sesbania drummondii)*, corn salad (*Valerianela* spp.), waterhyssop (*Bacopa)*, poisn ivy (*Rhus radicans*), common ragweed (*Ambrosia* sp.), sedge (*Cyperus* spp.), and peppervine (*Ampelopsis arborea*).

Historically, the wetlands in and around the proposed marsh creation site were fresher and consisted of bottomland hardwood forest, cypress-tupelo swamp, and fresh marsh. Many tree stumps and several dead standing trees from the forested wetlands that previously occupied the area remain in the proposed marsh creation site. Construction of the MRGO and subsequent saltwater intrusion, in addition to drainage and subsidence, has converted those habitats to brackish marsh and open water. Predominant vegetation found in brackish marsh is smooth cordgrass (*Spartina alterniflora*), marshhay cordgrass *(Spartina patens)*, and leafy three-square (*Scirpus maritimus*). The openwater in the marsh creation site area is fairly turbid with highly organic bottom sediments. Major openwater areas in and around the project area include Lake Pontchartrain, the IHNC, the Mississippi River, the GIWW, and the MRGO.

Coastal wetlands and associated shallow open waters, such as those found in the study area, are very important to fish and wildlife resources. In addition to providing valuable habitat, wetlands and submerged aquatic vegetation produce vast amounts of organic detritus which are transported to adjacent estuarine waters. Organic detritus is a key component of the estuarine food web which supports a high level of finfish and shellfish productivity. Those habitats also help to improve water quality by acting as a sink for inorganic nutrients and suspended sediments. Because of subsidence, saltwater intrusion, and development, those habitats are significantly decreasing in the study area.

The current marsh habitat types are expected to remain, for the most part, as they currently are. Wetland loss in the study area will continue because of subsidence, erosion, and development. Although increased salinities prevent the re-establishment of cypress swamp, existing forested areas will continue to provide important fish and wildlife habitat. Wetland restoration efforts by State and Federal agencies may help reduce marsh loss in the project area. Restoration activities in the project area include Coastal Wetlands Planning, Protection and Restoration Act projects, and beneficial use of dredged material during Corps maintenance of Federal navigation channels.

Fisheries Resources

The IHNC has minimal fishery value in the project area. The proposed marsh creation site, however, has significant value to finfishes and shellfishes. Recreationally and commercially important finfish and shellfish species commonly found in the study-area marshes and open water include Gulf menhaden, Atlantic croaker, spotted seatrout, sand seatrout, red drum, black drum, spot, sheepshead, southern flounder, white shrimp, brown shrimp, and blue crab. Representative freshwater fishes found in the adjacent Mississippi River include channel catfish, blue catfish, freshwater drum, yellow bass, largemouth bass, and white crappie.

Fishery abundance and distribution should remain similar to the current status though it is expected to decline dramatically at some point in the future as Louisiana's coastal wetland loss continues. Future impacts to fisheries resources would be related primarily to a substantial decrease in the quality and diversity of habitat that would reduce the area's ability to support the resource. As wetlands continue to decline throughout coastal Louisiana so continues the degradation and eventual loss of important fisheries habitat used for spawning, nursery, foraging, shelter, and other life requirements.

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 NOAA'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 Habitat (EFH) provisions of the Magnuson-Stevens Act support one of the nation's overall marine resource management goals-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 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 emergent wetlands; mud, sand and shell substrates; and estuarine water column. EFH has been designated in the project area for Gulf stone crab, brown shrimp, white shrimp, and red drum. These wetlands produce nutrients and detritus, important components of the aquatic food web, which contribute to the overall productivity of the Pontchartrain basin estuary and nearshore Gulf of Mexico. Under future without project (FWOP) conditions, EFH is not expected to change much in this area in the future.

Wildlife Resources

Historically, wintering waterfowl such as mallard, green-winged teal, and gadwall were common in the study area where fresher wetlands provided excellent habitat. In spite of the conversion from fresher wetlands to brackish marsh and open water, study-area wetlands still provide habitat, albeit of reduced value, for certain waterfowl such as mottled duck and lesser scaup. Other game birds, such as American coots, common snipe, Virginia rails, and sora rails, may occasionally occur in the study area in winter. Clapper rails are year-round residents of coastal Louisiana that also are expected to be found in the study area marshes.

Numerous species of wading birds, seabirds, shorebirds, and songbirds use the wetlands and scrub/shrub habitats in the study area. Common wading birds include the little blue heron, great blue heron, great egret, snowy egret, cattle egret, white-faced ibis, white ibis, green-backed heron, and yellow-crowned night heron. Seabirds using the openwater areas include white pelican, black skimmer, herring gull, laughing gull, and several species of terns. Common shorebirds include killdeer, American avocet, black-necked stilt, and numerous sandpipers. Other nongame birds in the project area include marsh wren, boat-tailed grackle, belted kingfisher, re-winged blackbird, seaside sparrow, yellow-rumped warbler, and several raptors.

Furbearers, found in large numbers in this area, included muskrat, mink, nutria, river otter, and raccoons which were staples of the Louisiana fur industry. The most productive muskrat marshes, based on harvest records (USFWS 1960, Wicker et al. 1982), were in the marshes south of Bayou Bienvenue, near Proctor Point, between Lake Borgne and the Bayou St. Malo ridge and east of the Violet Canal. Mink catches were good in the marshes south of Bayou Bienvenue; while nutria harvests were average in the Bayou Bienvenue marshes. Furbearer populations in the area have decreased due to saltwater intrusion and a corresponding decrease in the carrying capacity of brackish marshes. Also, canals and dredged material not only physically destroyed the wetlands and disrupted natural drainage patterns, but they also provided access to the vast marshes

for hunting, trapping, and fishing. Game mammals of these marshes and few remaining forested wetlands in the inland area include wild boar, swamp rabbit, raccoon, and fox/gray squirrels. Nongame mammals that occur in the study area include Virginia opossum, nine-banded armadillo, and several species of bats, rodents and insectivores.

Reptiles and amphibians are fairly common in the low-salinity brackish marshes found within the project area. Reptiles include the American alligator, western cottonmouth, water snakes, speckled kingsnake, rat snake, and eastern mud turtle. Amphibians expected to occur in the area include the bullfrog, southern leopard frog, and Gulf coast toad.

Wildlife populations are directly related to the amount of wetlands present. As the wetlands of coastal Louisiana continues to decline over time, it is expected that wildlife populations would decrease, but some may remain steady. Populations of wading birds, woodland resident birds, shorebirds, raptors, and marsh resident and migrant birds are expected to remain steady through 2050 (LCWCR and WCRA, 1999). Seabird populations are expected to decline in the future while brown pelican populations are expected to increase through 2050 (LCWCR and WCRA, 1999). Furbearer populations are expected to continue to decrease in the future (LCWCR and WCRA, 1999). Alligator in the area have decreased in the past and are expected to continue to do so in the future (LCWCR and WCRA, 1999).

Threatened and Endangered Species

Federally listed threatened and endangered species and/or their designated critical habitat occurring in the study area include the endangered West Indian manatees (*Trichechus manatus*), the threatened Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), and the endangered pallid sturgeon (*Scaphirhynchus albus*).

Federally listed as endangered, West Indian manatees occasionally enter Lakes Pontchartrain, which is hydrologically connected to the IHNC, and adjacent coastal waters and streams during the summer months (i.e., June through September). There have been sightings of manatee in the outfall slip of the New Orleans Power Plant, approximately one mile east of the proposed graving site. Manatees have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals.

The following are conditions that should be used to avoid impacts to manatee. All contract personnel associated with the project shall be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the

presence of manatee(s). Temporary signs should 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., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels shall operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821).

The Gulf sturgeon, federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwanee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Sturgeon less than two years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

The following are conditions that would be used to avoid impacts to sturgeon. The Corps should induce Gulf sturgeon to leave the immediate work area prior to bucket dredging regardless of water depth or time of year. At the commencement of dredging, the bucket should be dropped into the water and retrieved empty one time. After the bucket has been dropped and retrieved, a one-minute no dredging period must be observed. If, at any time, more than fifteen minutes elapses with no dredging, then the empty bucket drop/retrieval process shall be performed again prior to initiating dredging. If a hydraulic/cutter head dredge is utilized, the suction/cutterhead shall remain completely buried in the bottom material during dredging operations. If pumping water through the suction/cutterhead is necessary to dislodge material, or to clean the pumps or suction/cutterhead, etc., the pumping rate shall be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increased. During dredging, the pumping rates shall be reduced to the slowest speed feasible while the suction/cutterhead is descending to or ascending from the channel bottom.

The pallid sturgeon is an endangered fish found in Louisiana, in both the Mississippi (which is hydrologically connected to the IHNC and will be used for disposal of dredged material) and Atchafalaya Rivers (with known concentrations in the vicinity of the Old

River Control Structure Complex). The pallid sturgeon is adapted to large, free-flowing, turbid rivers with a diverse assemblage of physical characteristics that are in a constant state of change. Detailed habitat requirements of this fish are not known, but it is believed to spawn in Louisiana. Habitat loss through river channelization and dams has adversely affected this species throughout its range. Should the proposed project directly or indirectly affect the pallid sturgeon or its habitat, further consultation with this office will be necessary.

EVALUATION METHODOLOGY

Evaluation of project-related impacts on fish and wildlife resources for the Mississippi River – Gulf Outlet New Lock and Connecting Channels project was conducted using the Wetland Value Assessment (WVA) methodology developed for the evaluation of proposed coastal wetland projects. The WVA is similar to the Service's Habitat Evaluation Procedures (HEP), in that habitat quality and quantity are measured for baseline conditions and predicted for future without project (FWOP) and future with project (FWP) conditions. Instead of the species-based approach of HEP, each WVA model utilizes an assemblage of variables considered important to the suitability of that habitat type for supporting a diversity of fish and wildlife species. The WVA models operate under the assumption that optimal conditions for fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to optimum conditions to provide an index of habitat quality. Habitat quality is estimated and expressed through the use of a mathematical model developed specifically for each wetland type. Separate models were used for brackish marsh and bottomland hardwood habitats in this studies evaluation. 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. As with HEP, the WVA allows a numeric comparison of each future condition and provides a quantitative estimate of project-related impacts to fish and wildlife resources. Results are annualized over the project life to determine the Average Annual Habitat Units (AAHUs) available for each habitat type.

The change (increase or decrease) in AAHUs for each FWP scenario, compared to FWOP conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the habitat being evaluated; a net loss of AAHUs indicates that the project is damaging to that habitat type.

Using the WVA methodology, impact assessments were conducted by the Service based on wetland loss data, knowledge of the area, and experience with similar projects. Appendix A contains the WVAs and their assumptions. Further explanation of how impacts/benefits were assessed is available by contacting the Service's Lafayette, Louisiana, Field Office.

DESCRIPTION OF RECOMMENDED PLAN

Three plans are considered in detail in this Supplemental EIS; the No-build/Deauthorization Plan, the 1997 EIS Plan, and the Revised Lock Replacement Plan. The No-build/Deauthorization Alternative would preclude the construction of a new lock, as well as any future expenditure by the Federal government to maintain the existing lock. The existing IHNC Lock would be deauthorized by Congress and any future maintenance or replacement would be the responsibility of the local government (e.g., Port of New Orleans). This alternative assumes that the existing lock would be maintained by a local government agency and would neither be replaced nor closed. Delay times would be similar to existing conditions as lock repairs and maintenance would be a continuous concern.

The 1997 EIS Plan or New Lock – North of Claiborne Avenue Plan was described in detail in that document. In summary, that plan included the replacement of the existing lock with a new lock to be constructed in the IHNC, north of Claiborne Avenue. The New Lock recommended in the 1997 EIS would have the dimensions of 110 feet wide by 1,200 feet long by 36 feet deep.

The Recommended Plan (RP) is the Revised Lock Replacement Plan and is described in the following paragraphs. Since the preparation of the 1997 EIS, portions of the originally proposed project and additional studies, design and analyses have been completed that require a revision to the original lock replacement plan. Most of these changes involve details associated with dredged material reuse and disposal. However, in addition to the originally proposed float-in-place (FIP) construction method evaluated in the 1997 EIS, a second plan that would allow for cast-in-place (CIP) construction has been evaluated. The FIP construction method would prefabricate lock modules that would be constructed at a graving site (see below) and floated into place in sections. With the CIP the modules would be constructed on site at the new lock location. The RP is to use the FIP construction method as in the 1997 EIS with the additional modifications involving dredge material reuse and disposal. It is anticipated the entire construction process would take 11 years to complete.

In the RP, dredged material removed during construction of the new lock, temporary bypass channels, and after demolition of the existing lock is completed would be disposed of in one of three ways. Dredged material determined to be contaminated would be disposed of along the south bank of the GIWW in a CDF (Figure 1). The CDF would be comprised of a disposal cell (71 acres of contaminated dredged material would permanently remain in the CDF) and a fill cell (138 acres of dredged material would be temporarily stockpiled in the CDF for reuse, such as backfilling the bypass channel after lock construction). To accommodate this volume of material, the CDF would be approximately 209 acres in size, including the disposal and fill cells and containment dike. Dredged material deemed suitable for use in wetland restoration would be disposed of south of Bayou Bienvenue and west of the City of New Orleans' Wastewater Treatment Plant to create wetlands as mitigation for impacts to wetlands from some project components (e.g., CDF, graving and stockpile site construction). Finally, material

determined to be suitable for disposal in aquatic environments but not needed or not suitable for esturine wetland creation would be discharged into the Mississippi River. Approximately 1.4 million cubic yards (cy) of dredged material has been determined suitable for freshwater disposal and is expected to be discharged to the Mississippi River.

Another option the Corps is considering with the RP would be to place dredged material unsuitable for open water disposal in a landfill, which would reduce permanent impacts to wetlands. If the landfill disposal option was chosen, the impacts to wetlands from the CDF construction would be 138 acres.

Areas to be dredged during each construction phase were separated into individual Dredge Material Management Units (DMMU). The determination for the handling of material in each DMMU was based on benthic toxicity testing and water column impacts. Material demonstrating no toxicity to freshwater organisms was considered suitable for open water disposal subject to evaluation of associated water column impacts. Water column impacts were determined by comparing elutriate concentrations from the standard elutriate test to state and Federal freshwater criteria. Suitability for construction fill was based on the results of benthic toxicity testing. Material not demonstrating marine or freshwater toxicity was assumed suitable for construction fill.

Dredged material pumped into the CDF would contain a large volume of water, called effluent. Both effluent and water collecting from precipitation would be managed at the CDF. Effluent and runoff from precipitation would be pumped from the CDF over the flood protection levee and into the GIWW where dilution capacity would be adequate. Main discharge weirs would be located at the northeast corner of each of the CDF cells and would be connected to the pumps and pipes that discharge to the GIWW. Active dewatering of the CDF would occur to encourage rapid consolidation and desiccation of dredged material. Active dewatering would include regular surface trenching and weir management. Vegetation management on the CDF during dewatering activities would occur through both active tilling and the application of herbicides approved for aquatic environments.

In the RP a graving site will be used to construct the lock module base section. The proposed site is located in New Orleans East, approximately six miles from the existing lock, where the Paris Road Bridge (Interstate 510/Louisiana Highway 47) crosses the GIWW (Figure 1). The graving site will be excavated to -31 feet after all the vegetation is removed. The material excavated (664,000 cy) will be stockpiled adjacent to the graving site with part being used for a berm to separate the GIWW from the graving site. The flood protection levee will be relocated and a small drainage canal will be rerouted around the graving and stockpile sites. Suitable material may be brought in to relocate the hurricane protection levee while the berms will be built using material excavated from the graving site. Following the construction of the lock modules, the stockpiled material would be used to fill the graving site and return around half of the graving site to the preconstruction elevation, and the flood protection levee will be reconstructed and returned to its current alignment and authorized elevation. It is likely that the stockpiled and berm material would no longer refill the entire graving site to its previous elevation

as that volume would likely be reduced due to dewatering and loss of organic material and 7 years of weathering.

PROJECT IMPACTS

The contaminant levels documented in the IHNC sediments and soils could pose a significant threat to those species using areas affected by contaminated spoil disposal. Exposure through direct contact or ingestion could result in injury, and in some cases, mortality. In addition, the potential for many of the contaminants to bioconcentrate and bioaccumulate poses further long-term risk to trust resources through direct and indirect exposure. The RP plans to place contaminated dredged material into the CDF thus significantly reduce the potential for adverse fish and wildlife impacts from contaminants in that material. In addition impacts are further minimized by designing spoil containment structures to ensure effluent is disposed of appropriately.

The Service has reviewed the results of the contaminant sampling plan and the proposed disposal plan for contaminated sediments. Based upon the information provided, the Service has no objections to the Corps environmental contaminants assessment and dredged sediment disposal plans as they are proposed.

Approximately 1,897,064 cy of material dredged from the IHNC and its banks will be placed in the CDF along the south bank of the GIWW. That material could impact up to 209 acres of early succesional bottomland hardwood and scrub/shrub habitat (Table 1). Of those, 71 acres (600,944 cy) would permanently remain at the CDF due to the higher levels of contaminates. If the landfill disposal option is chosen, those contaminated soil would be brought to a landfill and the impacts to wetlands from the CDF construction would be 138 acres (Table 1). The remaining 138 acres (1,296,120 cy) would be stockpiled in the CDF for future use, such as backfilling the by-pass channel after construction is complete. In addition, 34 acres at the graving and stockpile site would be directly impacted by the proposed project (Table 1). As indicated in Table 1, our WVA analyses (See Appendix A for WVAs and their Assumptions) determined that project implementation would result in the direct loss of 36.28 AAHUs (or 26.41 AAHUs with the landfill option) in moderate quality early successional bottomland hardwood and scrub/shrub wetlands. If the Corps created 85 acres of brackish marsh in the area south of Bayou Bienvenue (Figure 1) that would provide a benefit of 36.56 AAHUs.

Table 1: Impacts to Mississippi River – Gulf Outlet New Lock and Connecting Channels, New Orleans, Louisiana Project

WVAs	Acres	AAHUs
Contaminated Disposal Site	209	-29.06
Graving and Stockpile Site	33.82	-7.22
Total	**242.82**	**-36.28**
Contaminated Disposal Site with Landfill option	138	-19.19
Graving and Stockpile Site	33.82	-7.22
Total	**171.82**	**-26.41**
Marsh Creation Site	85	36.56

Wildlife Resources

During implementation of the RP, construction activities at the lock location may disrupt or displace wildlife resources. However, this temporary impact (11 years) would be localized to an area that has little wildlife value and most wildlife species would move to an area with more favorable conditions and return after construction is completed. After completion of the new lock wildlife conditions would be similar to current conditions.

Activity at the CDF, graving, and stockpile sites would directly eliminate wildlife habitat at those sites. It is expected that for 7 years while construction and continued dredging activities are on going that these sites would remain without vegetation. In our analysis we assumed a temporary loss that allowed re-vegetation to start in year 8 and beyond. Once the proposed action is complete, the adjacent wetlands would stabilize. As with the FWOP, wildlife and their habitats, in the future with project scenario, are expected to remain relatively stable with some decline from development, subsidence, and erosion.

The creation of wetlands resulting from the potential marsh creation site will be a benefit to wildlife resources. An increase in wetland acreage would provide increased nesting, brood-rearing, and foraging habitat for resident and migrant avian species and wintering habitat for waterfowl. The approximately 68 additional acres of brackish marsh habitat that would be available in 50 years compared to the FWOP would also be beneficial to furbearers, game mammals, reptiles, and amphibians. However, the long-term sustainability of wildlife resources is not expected to change as a result of this feature.

Fisheries Resources

Impacts to fisheries at the new lock site would generally be associated with construction activities and would be temporary (11 years) and include injury or mortality to sessile and sow-moving aquatic organisms due to burial or increased turbidity. More mobile fisheries would be temporarily displaced to other suitable locations. After construction activities cease, displaced fishery species would return to the proposed action area.

The CDF would have no effect on fisheries. The graving and stockpile site, as with wildlife, would eliminate fisheries habitat for the duration of construction. The majority of the graving and stockpile sites are hydrologically connected to the GIWW. Once construction is complete and those sites are restored, the site would be similar to existing conditions.

The containment needed for the marsh creation site will block fisheries access to the newly created wetlands until the containment dike is breached or degraded to allow fisheries ingress and egress. The Service proposes breaching the containment dikes when 80% of the area is covered with emergent vegetation; which is anticipated to occur 3 to 5 years after construction. These wetlands would provide a habitat for foraging, breeding, spawning, and cover for a variety of larval, juvenile and adult fishes. More nutrients and detritus would be added to the food web, thereby increasing fish productivity and providing a benefit to local fisheries. However, the long-tem sustainability of local fisheries is not expected to change as a result of this project.

Essential Fish Habitat

Impacts to EFH resulting from construction activities would be localized and temporary. There would be increases in turbidity as a result of construction in the IHNC as well as the graving, stockpile, and marsh creation sites. Once construction is complete at all sites affecting EFH, it is expected EFH would return to similar to existing conditions.

The creation of wetlands would improve the quality of some categories of EFH by re-establishing marsh communities from the less productive EFH categories of open water. Additionally, essential vegetated habitats used by fish for spawning, nursery, forage, cover, and other life requirements would be improved.

Threatened and Endangered species

Manatee and Gulf sturgeon could possibly occur at the graving and stockpile site due to hydrologic connectivity with the GIWW and the marsh creation site's connectivity with the MRGO through Bayou Bienvenue. However, the Service does not expect the manatee or Gulf sturgeon to be at the CDF. The Service does not expect pallid sturgeon to be in the graving and stockpile sites, the CDF, or the marsh creation site though they may happen into the IHNC. In the unlikely event that these species are observed in any part of the project area during construction or operation, the Corps should contact Ms. Deborah Fuller of the Service's Lafayette, Louisiana, Office at (337) 291-3124.

The Corps is responsible for determining whether the selected alternative is likely (or not likely) to adversely affect any listed species and/or critical habitat, and for requesting the Service's concurrence with that determination. If the Corps determines, and the Service concurs, that the selected alternative is likely to adversely affect listed species and/or critical habitat, a request for formal consultation in accordance with Section 7 of the

Endangered Species Act should be submitted to the Service. That request should also include the Corps rationale supporting their determination.

FISH AND WILDLIFE CONSERVATION MEASURES

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include:

(a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

The Service supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process. Based on current and expected future without-project conditions, the planning goal of the Service is to develop a balanced project, i.e., one that is responsive to the IHNC New Lock project needs while addressing the co-equal need for fish and wildlife resource conservation.

The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) 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 involved. Considering the high value of marsh for fish and wildlife and the relative scarcity of that habitat type, those wetlands are designated as Resource Category 2 habitats, the mitigation goal for which is no net loss of in-kind habitat value. The shrub/scrub and early successional bottomland hardwood habitats are of lesser habitat quality and value but are also designated as Resource Category 2. Service Policy (cited above) for Resource Category 2 habitats allows an exception for mitigation of in-kind habitat if different habitats and species available for replacement are determined to be of greater value than those lost. Project impacts to fish and wildlife resources will be minimized to some extent by placing contaminated material into the CDF, though impacts to that site could not be avoided. The graving and stockpile site impacts have been reduced by selecting an alternate site that has minimal fish and wildlife habitat value compared to the 1997 site. Because the project is already authorized, avoiding the project impacts altogether (i.e., the "no action" alternative) is not feasible. Therefore, project impacts should be mitigated via compensatory replacement of the habitat values lost.

It should be noted that with the authorization of the IHNC new lock project in 1998 and with the Service's evaluation of the existing habitat at that time, the CDF and graving site habitats were predominately scrub/shrub wetlands. Today the habitat has become scrub/shrub and early successional bottomland hardwood that is dominated by Chinese tallow. The habitat is not considered to carry the same value or act as a fully functional

bottomland hardwood habitat. In addition the long-term use of the CDF carries the potential for that site to be reused as a disposal site for dredging the GIWW, thus not allowing the habitat to ever become a fully functional bottomland hardwood. Considering the above information, the existing mitigation plan (Appendix B), and that mitigation is not typically available for scrub/shrub wetlands, the Service has determined that mitigation via marsh creation would be acceptable. Appendix B is the Corps proposed draft mitigation plan. This draft plan should be incorporate into the final mitigation plan.

As indicated in Table 1, our WVA analyses (Appendix A) determined that project implementation would result in the direct loss of 36.28 AAHUs (or 26.41 AAHUs with the landfill option) in moderate quality scrub/shrub and early successional bottomland hardwood wetlands. The Corps is proposing to create between 37 and 148 acres of marsh creation in the area south of Bayou Bienvenue (Figure 1). As seen in Table 1, if 85 acres (36.56 AAHUs) of marsh is created, that should be sufficient to satisfy the required mitigation needs. The potential of up to 63 additional acres above the mitigation requirement will be considered beneficial use of dredged material. Coastal marshes are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries). The Service encourages the use of all suitable dredged material for marsh creation. However if not enough material or no material is determined to be suitable for creating marsh then the remaining or the full mitigation needs (-36.28 AAHUs) to compensate for the unavoidable, project-related loss of forested wetlands would need to be addressed. The Service, National Marine Fisheries Service (NMFS), Louisiana Department of Wildlife and Fisheries (LDWF), and Louisiana Department of Natural Resources (LDNR) should be consulted regarding the adequacy of any proposed alternative mitigation sites. The mitigation plan developed to offset project related impacts should be consistent with mitigation requirements of the Clean Water Act regulatory program, and include monitoring, success criteria, and financial assurance components.

SERVICE POSITION AND RECOMMENDATIONS

While lock replacement will have minimal impacts to fish and wildlife resources, various project features could potentially result in significant habitat losses. Construction of the graving and stockpile site and the CDF will temporarily eliminate moderate-value fish and wildlife habitat at those sites. Disposal of uncontaminated spoil to create emergent marsh is, however, expected to significantly benefit fish and wildlife resources in the disposal area. Furthermore, those benefits could potentially offset unavoidable project-related habitat losses at the CDF, graving, and stockpile sites.

Construction of the IHNC new lock would result in the loss of up to 242.82 acres of moderate quality scrub/shrub and early successional bottomland hardwood habitat for a total loss of up to -36.28 AAHU's (See Appendix A for WVAs and Assumptions). The

Service does not oppose replacement of the IHNC lock, provided the following fish and wildlife conservation recommendations are implemented concurrently with project implementation:

1. The Corps and local sponsor shall obtain 36.28 AAHU's by either creating at least 85 acres of marsh in the area south of Bayou Bienvenue, as proposed, or by mitigating elsewhere or by a combination of the two to compensate for the unavoidable, project-related loss of the early successional forested wetlands. See Appendix B for the Corps draft mitigation plan. This draft plan should be incorporate into the final mitigation plan. The Service, NMFS, LDWF, and Louisiana Department of Natural Resources should be consulted regarding the adequacy of any proposed alternative mitigation sites.

2. The Service strongly supports using all clean dredged material to create brackish marsh that will improve fish and wildlife habitat in the project area. Furthermore, such marsh creation could provide fish and wildlife habitat benefits to offset unavoidable habitat losses at the proposed CDF, graving and stockpile sites.

3. All containment features should be breached or degraded, if necessary to restore tidal connectivity, once the marsh creation/nourishment areas have at least 80% coverage of emergent vegetation.

4. The created wetlands should be monitored over the project life to help evaluate the effectiveness of these features and to document both the elevation and acreage of wetland areas created as mitigation.

5. The monitoring plan and reports should be provided to the Service, NMFS, and LDWF. Please add language to sections 5.0, 5.2.2, and 5.2.3 stating these agencies will receive copies of the monitoring reports for review.

6. The Service recommends the use of silt curtains while dredging and disposal of dredged material whether at the IHNC, CDF, graving and stockpile site, or marsh creation site to minimize siltation and the spread of contaminated materials.

7. The suggested graving and associated stockpile site designated in the RP is not the mandatory site to be used for those purposes. The contractor who is awarded the work on those sites may choose an alternate site. If an alternative graving and stockpile site are used the impacts analysis will need to be re-evaluated for the site specific impacts.

8. If contaminated material placed in the CDF is used for backfill at the new lock, that material must be contained so that it is not open to or redistributed in the IHNC.

9. The Service and NMFS shall be provided an opportunity to review and submit recommendations on future detailed planning reports (e.g., Design Document

Report, Engineering Document Report, etc.) and the draft plans and specifications on the Inner Harbor Navigation Canal Lock Replacement Project addressed in this report.

10. Part of Bayou Bienvenue is a Louisiana designated Natural and Scenic River. The Corps should consult with the LDWF, Scenic Rivers Program prior to initiating any of the proposed activities within or adjacent to the banks of that bayou. Scenic Rivers Coordinator Keith Cascio can be contacted at (318) 343-4045.

11. Coordination should continue with the Service and NMFS on detailed contract specifications to avoid and minimize potential impacts to manatees, Gulf sturgeon, and pallid sturgeon.

12. If the proposed project has not been constructed within 1 year or if changes are made to the proposed project, the Corps should re-initiate Endangered Species Act consultation with the Service.

13. The proposed mitigation area is reported to have been previously subdivided into lots for urban development. The multiple land-ownerships created by this subdivision could adversely affect the ability to implement the proposed mitigation. Therefore, to ensure mitigation is implementable and occurs concurrently with construction the Service and NMFS recommend that prior to completion of the IHNC engineering and design efforts the Corps should begin addressing this potential real estate problem. If this issue prohibits implementation of mitigation at the proposed site the Corps should immediately notify all natural resource agencies to begin reformulation of mitigation alternatives.

Provided that the above recommendations are included in the feasibility report and related authorizing documents, the Service will support further planning and implementation of the RP.

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APPENDIX A

WETLAND VALUE ASSESSMENTS AND ASSUMPTIONS FOR THE INNER HARBOR NAVIGATION CANAL LOCK REPLACEMENT PROJECT

IHNC New Lock WVA Assumptions for Contaminated Disposal Facility (CDF)

General Assumptions

Project Area acres – The project area acres were determined by the Corps based on the area needed for disposal of contaminated material. Development rate was not applied to this area. No other loss is shown for 50 years. The only other loss would be due to subsidence which wont show in the assessed time. All areas are assumed to continue supporting existing flood tolerant trees even with some subsidence within the time period evaluated.

Target Year (TY)1-TY7 there will be various years of disposal of contaminated sediments. TY1-TY7 some material will be used for backfill behind the lock to fill in the created by-pass channel to land elevation. After the final lift the disposal site will be covered with clean material and then seeded for dust control. It is most likely the area after construction will revert to a scrub/shrub habitat dominated by tallow.

Bottomland Hardwood Assumptions

V1 – Tree Species Association
FWOP – class 1, Less than 25% of overstory consists of mast or other edible-seed producing trees. The CDS is dominated by Chinese tallow-tree (tallow) which provides low- to no- quality mast. The mid- and understory regeneration was also dominated by tallow but had some dogwoods regenerating (see V2 below). Thus this variable remained class 1 for all TYs.
FWP –class 1 for TY1-50 assume tallow will naturally recruit and dominate the new site as seen in FWOP.

V2 – Stand maturity of dominant and codominant trees
FWOP – field data collected and spreadsheets were used to determine baseline and all TY diameter-breast-height (dbh). Topped trees were assumed dead and removed from the spreadsheets at TY5. Tallow typically are not seen in nature greater than 20" dbh, thus it was assumed their maximum dbh maxed would be 20". Therefore, 12 trees at TY50 where listed at 20" and remained in the analysis. Dogwoods were grown in and lived to TY20, but most were removed by TY30 with only a few remaining. This is representative of the dogwood lifecycle. They typically have a life span of 20-30 years. However, a few dogwoods were retained in the analysis to represent the few trees that made it into the overstory, though most would eventually be overtopped by other species.

FWP – TY1-TY7 ground would have been cleared and seeded with grass but trees will not be allowed to grow. TY8 to TY50 grow scrub/shrub and tallow from natural recruitment.

V3 – Understory/midstory
FWOP – Baseline taken from data sheets and remained the same for TY1. TY5 thru TY50 adjusted to reflect a reduction in understory and a slighter increase in midstory

over time. The understory is expected to decrease as the forest grows and blocks out light.

FWP – TY1-TY7 there is no understory/midstory through the construction years. TY8 to TY50 adjusted to show a high amount of understory/midstory in the beginning and reduced over time as the forest grows.

V4 – Hydrology

FWOP - Storm-water discharge from the nearby urban area is pumped into the origin of Bayou Bienvenue. The north bank of Bayou Bienvenue forms the southern border of the confined disposal site (CDS). Rainwater runoff from the CDS flows through cuts in the bank into Bayou Bienvenue though at times, depending on rainfall and tidal stage, the exchange can be reversed. Bayou Bienvenue is tidally influenced, with a connection to the Mississippi River Gulf Outlet through a floodgate. The CDS is higher in elevation than the open water area to the south, though elevations in the CDS vary and there is a series of containment dikes and associated borrow-ditches within the CDS which retain rainwater. The CDS contains some standing water, some moist soil, and a few dry areas.

The class choices in the BLH model for this variable aren't reflective what is actually occurring. The hydrology is altered but not to the extent that class 2 describes, either extensively dry or extensively inundated/impounded. A more appropriate suitability index for the hydrology of this community is used in the WVA swamp models variable 3 for water regime. The project area has a flood duration that is temporarily flooded with a low flow/exchange (0.65 HSI).

FWP – TY1-TY7 assume no hydrology through the construction years (0.1 HSI). TY8 - TY50 assume the portion (66%) that will be used temporarily (material stockpiled for backfill) will return to the previous 0.65 HSI. The portion that will be permanently filled (34%) is expected to have no flow/exchange and permanently dry 0.01 HSI. The weighted average is (0.66*0.65 + 0.34*0.1) = 0.46 HSI.

V5 – Size of contiguous forested area

FWOP - The project area plus the adjacent forested wetlands accounts for around 1,200 acres of contiguous forested wetlands. This is a class 5 (>500 acres) for all TYs. The forested wetland area is not expected to change.

FWP – Same as FWOP.

V6 – Suitability and traversability of surrounding land use

FWOP - We based this variable on site visits and delineating an aerial map (see attached map) of the area separating the acres for each category type. Based on the map the following area was calculated:

	Acres	FWOP TY0 %	FWP Acers	FWP TY1 %
Total Area	2326.3			
Development	198.4	9%	198.4	9%
Water	1122.6	48%	1122.6	48%

Pasture	287.6	12%	287.6	12%
Forest/marsh	717.7	31%	717.7	31%

The forested wetlands of the project area are surrounded by an already extensively developed area. This area is not expected to develop much further. We assumed minor development over 50 years in some of the forested wetlands (near the dump and on the north shore of the GIWW). Therefore by TY50 this variable shifted to about 10 less forested wetlands which were evenly distributed between development and pastures.

FWP – Same as FWOP (see table above).

V7 – Disturbance

FWP – Greater than 500 feet from the perimeter of the project area there is the GIWW and the active dump site. Both are to be in the category constant/major (major highways, industrial, commercial, major navigation) disturbance. We assumed no change thru TY50 because we assumed no new development within the 500 foot buffer zone (see attached map). Or this variable could be considered to have class 4 (insignificant/lightly used roads or levees) between 50.1 to 500 feet from the perimeter of the project area. Either way the SI value (1) is the same.

FWP – same as FWOP.

IHNC New Lock Graving and Stockpile Sites WVA Assumptions

General Assumptions

Project Area acres – The project area acres were determined by the Corps based on the area needed for the graving site and stockpile area. The only loss applied was due to the potential of some development occurring in the surrounding area over 50 years. The only other loss would be due to subsidence which wont show in the assessed time. All areas are assumed to continue supporting trees even with some subsidence with in the time period evaluated.

The graving site will be excavated to -31feet. The material excavated (664,000 cy) will be stockpiled adjacent to the graving site. Suitable material may be brought in to relocate the hurricane protection levee. After project completion the hurricane protection levee will be replaced to its original location and the material used to create the berms that protect the graving and stockpile site from the GIWW will be used along with the stockpiled material to restore the graving site to its previous grade. It is likely the stockpiled and berm material would not be enough to refill the entire graving site to its previous elevation as that volume would likely be reduced due to dewatering and loss of organic material and 7 years of weathering. We assume forested wetlands will begin to be supported on a portion (half) of the graving site and the entire stockpile site after TY7. In addition the hydrology is assumed to return to FWOP conditions for the portions that return to existing elevation after TY7.

Project footprint for the graving site is 19.26 acres and for the stockpile site is 14.56 acres. Of the graving site acres, 10.76 acres is on the protected side of the levee and 8.54 acres on the flood-side of the existing hurricane protection levee.

Bottomland Hardwood Assumptions

<u>V1 – Tree Species Association</u>
FWOP – class 1, Less than 25% of overstory consists of mast or other edible-seed producing trees. The Graving and stockpile sites are dominated by Chinese tallow which provides low- to no- quality mast. The mid- and understory regeneration was also dominated by tallow but had some (very little) dogwoods, red maple, hackberry and willow regenerating (see V2 below). Thus this variable remained class 1 for all TYs.
FWP –class 1 for TY1-50 assume no mast while graving and stockpile site are being used. After construction the graving and stockpile sites are expected to revert back to tallow dominated BLH.

<u>V2 – Stand maturity of dominant and codominant trees</u>
FWOP – field data collected and spreadsheets were used to determine baseline and all TY dbh. Topped trees were assumed dead and not used. Tallow typically does not grow larger than 20" dbh in the wild; therefore, it was assumed the maximum dbh of tallow would be 20"dbh. Therefore 13 trees at TY50 where listed as 20" and remained in the data set. Twelve Red Maple, 4 boxelder, 4 dogwoods, 1 willow, and 4 hackberry were

grown in from TY10 to TY50. Seven hackberry were combined with the predominantly tallow site at TY0.

FWP – Construction at the graving site is expected to take 8.75 years. From TY1 to TY10 the ground would have been cleared for use during construction. After completion of construction the graving and stockpile sites would grow in predominately tallow from natural recruitment from TY10 to TY50.

V3 – Understory/midstory

FWOP – Baseline taken from data sheets and remained the same for TY1. TY5 thru TY50 adjusted to reflect a reduction in understory and a slighter increase in midstory over time. The understory is expected to decrease as the forest grows and blocks out light.

FWP – TY1 thru TY10 there is no understory/midstory as the area would have been cleared for disposal. At the graving and stockpile sites TY10 to TY50 adjusted to show a high amount of understory/midstory in the beginning and reduced over time as the forest grows.

V4 – Hydrology

FWOP – Majority of the graving and stockpile sites are on the flood-side of the levee open to the GIWW but some of the graving site is on the protected-side of the levee. These sites contain some areas of standing water, some moist soil, and some dry areas based on the site visit.

The class choices in the BLH model for this variable aren't reflective what is actually occurring. On the protected side the hydrology is altered but not to the extent that class 2 describes, either extensively dry or extensively inundated/impounded. A more appropriate suitability index for the hydrology of this community is used in the WVA swamp models variable 3 for water regime. Assuming the flood-side (10.76 acres graving site plus 14.56 acres stockpile site, total 25.32 acres) would be seasonally flooded and the protected-side (8.54 acres graving site) is temporarily flooded. The flood-side would have high water flow/exchange being open to the GIWW and the protected-side would have a low or limited water exchange. The project area has a flood duration that is about 75% (open to GIWW) seasonally flooded with a high flow/exchange (1.00 HSI) and 25% is temporarily flooded with a low flow/exchange (0.65 HSI), giving a weighted average of (0.75*1 + 0.25*.65) = 0.91 HSI for the project area.

FWP –The graving and stockpile sites are expected to be behind a 7 foot berm/sheetpile system during construction (TY1-TY7 = 0.1HSI). After construction part of the sites is assumed to revert back to its existing hydrology. It is most likely the material available (664,000 cy of stockpile and berm material after 7 years of weathering and compaction) to refill the graving site would not be enough to refill the site completely back to existing elevations. We assumed what material is available will be concentrated at the levee location to ensure the levee is at appropriate elevation, result in a portion of the graving site remaining below existing elevation. We assumed half of the graving site (19.26ac/2

= 9.63ac) is expected to be inundated. We assumed half of the 9.63 (1/4 of the area – 4.82 acres) inundated acres are taken from in protected side (8.54 acres) of the levee and half taken from floodside (25.28 acres), leaving 3.72 (11%) that is temporarily flooded with a low flow/exchange (0.65 HSI) and 20.46 (60.5%) acres that is seasonally flooded with a high flow/exchange (1.00 HSI), respectively, and 28.5% that is inundated (0.01 HIS). Therefore the weighted average is (0.605*1+0.11*0.65+0.285*0.01) = 0.68 HSI.

V5 – Size of contiguous forested area

FWOP - The project area plus the adjacent forested wetlands accounts for between 20.1 and 100 acres of continuous forested wetlands. This is a class 3 for all TYs. The forested wetland area is not expected to change.

FWP – TY0-TY10 Once the forested wetlands are removed from the graving and stockpile sites there will be less than 5 acres (class 1) of contiguous forested wetlands. TY20 – TY50 after the graving and stockpile sites reestablish forested wetlands there will again be over 20 acres of contiguous forested wetlands (class 3).

V6 – Suitability and traversability of surrounding land use

FWOP - We based this variable on site visits and delineating an aerial map (see attached map) of the area separating the acres for each category type. Based on the map the following area was calculated:

	Acres	FWOP TY0 %
Total Area	849.3	
Development	27.4	3%
Water	221.4	26%
Pasture	77.0	9%
Forest/marsh	523.5	62%

The forested wetlands of the project area are predominately surrounded by wetlands. This area may develop further with Paris road adjacent to those areas. We assumed development over 50 years in some of the wetlands (primarily south of the GIWW and south of the levee near Paris road and some on the north shore of the GIWW). Therefore by TY50 this variable shifted to about 30 less wetlands which were distributed between development and pastures.

FWP – Same as FWOP.

V7 – Disturbance

FWP – For the Distance Class between 50 and 500 feet (Class 2) from the perimeter of the project area there is the GIWW and Paris road. The category type of the waterway and road is a Class 1 constant/major (major highways, industrial, commercial, major navigation) disturbance. We assumed no change thru TY50 because we assumed no new development less than 50 feet of the perimeter of the project area and the type class is already the most it can be.
FWP – same as FWOP.

IHNC Lock Replacement
Wetland Value Assessment – Marsh Creation Area

The marsh creation area is 439 acres in area; however it is assumed that there is only an adequate volume of sediments dredged during lock construction to create between 80 and 104 acres of marsh. Of that acreage, the 85 acres are to be used for dredged material disposal for marsh creation to achieve mitigation requirements and if the remaining acres are filled (to 104 acres) the additional 19 acres will be considered beneficial use. Currently in the 85 acre area 0 acres are vegetated wetlands and 85 acres are open water.

Variable V1 – Emergent Marsh
Assumption: At TY0 there is 0 percent of the marsh creation area is classified as marsh and is entirely shallow open water with dead cypress trees and stumps. Marsh loss rates were supplied by USGS, and those rates (0.92%/year) used in the model. A 50% reduction in the land loss rate (0.46%/year) was applied to FWP for the marsh creation area. It is assumed that the marsh creation area will be planted but planting can not occur until the disposed dredged material has sufficiently dewatered.

Future Without Project
TY0 – 0 acres (0 percent)
TY1 – 0 acres (0 percent)
TY5 – 0 acres (0 percent)
TY50 – 0 acres (0 percent)

Future With Project
TY0 – 0 acres (0 percent)
TY1 – 9 acres (10 percent)
TY3 – 25 acres (30 percent)
TY5 – 83 acres (98 percent)
TY50 – 68 acres (80 percent)

Variable V2 – Submerged Aquatic Vegetation (SAV)

SAV coverage for TY0 is estimated to be 5 percent of the open water. Based upon surveys conducted by NMFS, much of the marsh creation area is too shallow to support SAV (less than 1 foot deep based upon 2001 spot elevation survey) and water clarity is also likely not adequate to support SAV. Under the FWOP it is assumed that the project area will deepen due to continued subsidence and the area supporting SAV will gradually increase. However with the continued urban runoff exposed to the area it is not expected that the SAVs will increase much. TY50 is 10%. Under the FWP it is assumed that the placement of dredged material will initially make the entire project area unsuitable for SAV.

Future Without Project
TY0 – 5 percent
TY1 – 5 percent

TY5 – 6 percent
TY50 – 10 percent

Future With Project
TY0 – 5 percent
TY1 – 0 percent
TY3 – 0 percent
TY5 – 0 percent
TY50 – 5 percent

Variable V3 – Interspersion
For TY0 it is assumed that the entire project area is interspersion Class 5 because the marsh area is less than 5 percent. Furthermore under the FWOP, the interspersion would remain entire Class 5 through TY50. For the FWP, most of the interspersion would be Class 1 following the placement of dredged material and would remain with very few open water bodies until TY5. By TY50, the interspersion is assumed to be 65 percent Class 2 and 35 percent Class 3.

Variable V4 – Water Depth

Based upon 2001 spot elevation survey information most of the open water in the project area is less than 1.5 feet deep (85 percent). It is assumed that under FWOP, water depth increases over time. Furthermore it is assumed that after the placement of dredged material under FWP, all of the open water in the project area would be less than 1.5 deep and that water depth would increase over time.

Future Without Project
TY0 – 85 percent
TY1 – 80 percent
TY5 – 75 percent
TY50 – 50 percent

Future With Project
TY0 – 85 percent
TY1 – 0 percent
TY3 – 100 percent
TY5 – 90 percent
TY50 – 80 percent

Variable V5 – Salinity

Based upon salinity data from 2001, emergent vegetation in the project area and salinity data from continuous recorders located near Bayou Bienvenue and the MRGO, the average salinity in the project area is 12 parts per thousand (ppt). Under both FWOP and FWP it is assumed that salinities would remain the same in the future through TY50.

Variable V6 – Fishery Access

Fishery access is currently open and would remain so under FWP, except for TY1 when containment dikes would limit fisheries access. Therefore fishery access is 0.0001 in TY1 and then 1.0 in TY3 – 50 after the containment dikes are breached.

APPENDIX B

DRAFT CONCEPTUAL WETLAND RESTORATION PLAN FOR THE INNER HARBOR NAVIGATION CANAL LOCK REPLACEMENT PROJECT

DRAFT

CONCEPTUAL WETLAND RESTORATION PLAN FOR THE MITIGATION OF IMPACTS AT THE INNER HARBOR NAVIGATION CANAL LOCK REPLACEMENT PROJECT

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New Orleans District
P.O. Box 60267
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February 2009

1.0 DESCRIPTION

1.1 SUMMARY

This conceptual wetland restoration plan was developed by CEMVN with the intent to restore 85 acres of intertidal marsh near Bayou Bienvenue in New Orleans, Orleans Parish, Louisiana. The objective of the wetland restoration is to mitigate impacts associated with the replacement of the Inner Harbor Navigation Canal (IHNC; *i.e.*, Industrial Canal) Lock, located between the St. Claude Avenue and North Claiborne Avenue Bridges in New Orleans, Louisiana (Figure 1). The IHNC Lock allows for navigation between the higher water surface elevations of the Mississippi River and the lower water surface elevations of the IHNC, the eastern portion of the Gulf Intracoastal Waterway (GIWW) and the Mississippi River-Gulf Outlet (MRGO)**.** The recommended lock replacement plan would construct a new 110-foot wide, 1,200-foot long and 36-foot deep lock in the IHNC north of the Claiborne Avenue Bridge and extend Mississippi River floodwalls and levees from the existing lock to the new lock location. The recommended plan includes the replacement of the existing St. Claude Avenue Bridge with a low-level double-bascule bridge, modifications to the Claiborne Avenue Bridge to make it compatible with a new lock and demolition of the existing lock. The recommended plan also includes the construction of lock monoliths at an offsite construction area and the disposal of material dredged during lock construction. Wetland impacts occur from the construction activities at the offsite construction area, which is located on the south bank of the GIWW/MRGO east of the Paris Road Bridge, and from the disposal of dredged material in a confined disposal facility (CDF), which is located between the GIWW/MRGO and Bayou Bienvenue northeast of the IHNC Lock construction site. The proposed mitigation site is located south of Bayou Bienvenue, across the Bayou from the CDF location.

1.2 BASELINE CONDITIONS OF IMPACTED SITE

At the proposed offsite construction area on the south bank of the GIWW/MRGO and the CDF, wooded lands are present, and the dominant plant species are Chinese tallow (*Sapium sebiferum*), elderberry (*Sambucus canadensis*), red maple (*Acer rubrum*), box elder (*Acer negundo*), roughleaf dogwood (*Cornus drummondii*) and black willow (*Salix nigra*). Much of these wooded lands were heavily damaged by Hurricane Katrina and woody vegetation was blown down by the winds and high water from the storm. Very little mature vegetation remains in these areas and much of the recruitment is Chinese tallow.

Mid-story and understory vegetation present within the proposed offsite construction area and CDF include elderberry, poison ivy (*Toxicodendron radicans*), blackberry (*Rubus* sp.), rattlebox (*Sesbania* sp.), yaupon (*Ilex vomitoria*), wax myrtle (*Morella cerifera*), groundseltree (*Baccharis halimifolia*), smartweed (*Polygonum punctatum*) and dog fennel (*Eupatorium capillifolium*).

The majority of the wooded areas in the proposed CDF are periodically flooded, primarily from rainfall. These areas are at an elevation that is high enough to restrict tidal flows but are often saturated from rain events and close proximity to ground water. The majority of the proposed offsite construction area is located on the flood side of the GIWW/MRGO levee and is subject to tidal influence. Most of the time, the CDF and a small portion of the offsite construction area are not connected to nearby water bodies (*i.e.*, GIWW and Bayou Bienvenue); however, during major rain events and high tides, the area is hydraulically connected to exterior surface waters through eroded retention dikes. Most of the time, fish access is restricted.

The dredging of the MRGO/GIWW, which was conducted in the 1950s and 1960s, substantially altered the wetlands at the offsite construction area and CDF. The wooded areas where the offsite construction area and CDF would be located were historically utilized for dredged material disposal, which raised the elevation of both sites. With the construction of a flood protection levee along the MRGO/GIWW the proposed location for the CDF and a small portion of the proposed offsite construction area were isolated from tidal influence.

1.3 SELECTION OF MITIGATION SITE

The proposed mitigation site was selected because of its proximity to the location of dredging activities associated with the IHNC Lock Replacement project which will provide the material for restoration and because of the combined Federal, state and local interest in restoring wetlands at the proposed mitigation location. Furthermore, the proposed mitigation site is located adjacent to the impact site (*i.e.*, the CDF) allowing restored wetland functions to be as close to those impacted functions as physically possible.

1.4 BASELINE CONDITIONS OF MITIGATION SITE

The proposed restoration area is almost entirely unvegetated, and consists of open water and mud flats with dead cypress trees and stumps scattered throughout. The land use in the area is currently open space and historically was cypress swamp that has degraded due to subsidence and saltwater intrusion. The area is tidally influenced through a flood gate located at the confluence of Bayou Bienvenue and the GIWW. The estimate of the tidal range within the restoration area is approximately 6 inches, as measured by CEMVN and University of Wisconsin personnel during site visits in 2007 and 2008. The triangular-shaped area totals approximately 440 acres and is highly subsided with little freshwater input. Surface elevation in the proposed restoration area ranges from approximately -0.5 feet to -1.5 feet NAVD 88 (Hartman Engineering, Inc 2001). Currently the system experiences brackish water conditions (between 5 [winter/spring] and 15 [summer] parts per thousand), and even after the placement of dredged material and the increase in elevation relative to sea level, brackish conditions are expected to persist due to the lack of freshwater influence. Therefore, brackish marsh habitats are anticipated to be restored as a result of the mitigation effort.

1.5 CREDIT DETERMINATION METHODOLOGY

Impacts on wetlands from construction of the CDF and offsite construction area were analyzed using WVA methodology. The WVA methodology is a quantitative habitat-based assessment tool developed for use in determining wetland benefits of proposed projects submitted for funding under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA); however, the methodology is widely used to evaluate the impacts of coastal projects on wetland values. The results of the WVA, measured in Average Annual Habitat Units (AAHUs), provide an estimate of the positive or negative environmental effects of a potential project. Typically, for a CEMVN civil works project, the WVA analysis is applied to the habitats that will be impacted by the project, and if net negative impacts are determined, the WVA is applied to potential mitigation plans to develop appropriate compensatory mitigation.

The WVA has been developed for application to several habitat types along the Louisiana coast, and community models have been developed for fresh marsh, intermediate marsh, brackish marsh, salt marsh, fresh swamp, barrier islands, and barrier headlands. A WVA Procedural Manual has also been prepared to provide guidance to project planners in the use of the various community models (Environmental Working Group 2006). Two other habitat assessment models for bottomland hardwoods and coastal chenier/ridge habitat were developed for use outside of CWPPRA.

Habitat quality is estimated through the use of community models developed specifically for each habitat type. Each model consists of 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index (SI) graph for each variable, which defines the assumed relationship between habitat quality and different variable values, and 3) a mathematical formula that combines the SI for each variable into a single value for habitat quality; that single value is referred to as the Habitat Suitability Index (HSI).

An SI graph is a graphical representation of how fish and wildlife habitat quality or "suitability" of a given habitat type is predicted to change as values of the given variable change, and allows the model user to numerically describe, through the SI, the habitat quality of a wetland area for any variable value. Each SI ranges from 0.1 to 1.0, with 1.0 representing the optimal condition for the variable in question. SI graphs are constructed for each variable (Environmental Working Group 2006).

The final step in model development (Environmental Working Group 2006) is to construct a mathematical formula that combines all SIs into a single HSI value. Because the SIs range from 0.1 to 1.0, the HSI also ranges from 0.1 to 1.0, and is a numerical representation of the overall or "composite" habitat quality of the particular wetland area being evaluated. The HSI formula defines the aggregation of SIs in a manner unique to each wetland type depending on how the formula is constructed (Environmental Working Group 2006).

The net impacts of a proposed project are estimated by predicting future habitat conditions under two scenarios: future without-project and future with-project. Specifically, predictions are made as to how the model variables would change through time under the scenarios. Through that process, HSIs are established for baseline (pre-project) conditions and for future without- and future with-project scenarios for selected target years (TY) throughout the expected life of the project. Those HSIs are then multiplied by the project area acreage at each TY to arrive at Habitat Units (HUs). HUs represent a numerical combination of quality (HSI) and quantity (acres) existing at any given point in time. The HUs resulting from the future without- and future with-project scenarios are annualized, averaged over the project life, to determine AAHUs. The impact of a project can be quantified by comparing AAHUs between the future without- and future with-project scenarios. The difference in AAHUs between the two scenarios represents the net impact attributable to the project in terms of habitat quantity and quality (Environmental Working Group 2006). The same type of analysis is applied to proposed mitigation plans to develop appropriate compensatory mitigation for unavoidable project impacts.

WVA analysis for the 209-acre CDF determined that there would be a loss of 29.06 AAHUs as a result of its construction. This includes the temporary impacts from the fill cell and the permanent impacts from the disposal cell. Additionally, WVA analysis for the temporary impacts of the offsite construction area determined that there would be a loss of 7.22 AAHUs. Therefore, a total loss of 36.28 AAHUs would be the net impact of the IHNC Lock Replacement project. WVA analysis for the proposed restoration in the triangular-shaped area south of Bayou Bienvenue indicates that 36.56 AAHUs would be created by restoration of brackish marsh habitat and would fully mitigate for the project’s wetland impacts.

1.6 RESPONSIBLE PARTIES

CEMVN is responsible for wetland restoration funding and design. CEMVN will also be responsible for maintenance and monitoring of the wetland restoration project. Annual monitoring reports during the maintenance and monitoring period will be prepared by CEMVN and provided to Federal and state regulatory agencies for review. The mitigation site is located on parcels owned by various entities including private and commercial landowners, and the City

of New Orleans. The parcels comprising the mitigation site will be acquired in fee by CEMVN and will be held in perpetuity.

1.7 MITIGATION IMPLEMENTATION SCHEDULE

It is anticipated that approximately 253,450 cubic yards (cy) of material would be placed in the wetland mitigation area. Dredged material removed from Dredged Material Management Unites (DMMU) 3 Fill (F), 4/5 Native (N), 7 N (area underlying east bank fill), and 9 Non-native (NN; area north of the existing lock) would be placed into the triangular-shaped area for wetland creation, as shown in Table 1-1. The dredged material would be placed at the mitigation site the year in which it is dredged.

Table 1-1. Dredged Material Volumes for Wetland Restoration and Year of Placement

DMMU/Location	Material Type	Volume (cubic yards)	Approximate Year Dredged
DMMU 7	N	83,500	1
DMMU 3	F	62,850	2-3
DMMU 4/5	N	64,900	2-3
DMMU 9	NN	42,200	7
Total		**253,450**	

2.0 WETLAND RESTORATION OBJECTIVES

2.1 INTRODUCTION

The objective of wetland restoration is to mitigate for the functions and values of the wetland habitats lost due to the construction of an offsite construction area and CDF. The proposed wetland restoration area comprises 85 acres located in the western-most corner of the triangular-shaped area south of Bayou Bienvenue (see Figure 1).

The components of the wetland restoration implementation will be:

- Construction of a dredged material containment system;
- Dewatering of dredged material;
- Vegetation plantings following dewatering;
- Breaching of containment system and degradation of containment system; and
- Monitoring and maintenance for 20 years to ensure wetland mitigation success.

2.2 TYPES, FUNCTIONS, AND VALUES OF HABITAT TO BE RESTORED

The loss of 36.28 AAHUs would be mitigated by creating wetlands in the triangular area south of Bayou Bienvenue. WVA analysis determined that by creating 85 acres of wetlands in the triangular mitigation area, the net benefits would total 36.56 AAHUs, which would fully mitigate the impacts from the CDF and offsite construction area. The objective of the mitigation would be to create emergent marsh in an area which now contains shallow brackish water. The site would be built adjacent to the perimeter of the large triangular area, just south of Bayou Bienvenue, so that the existing land would act as a corridor for animals and plants to colonize the mitigation site. The dredged material would be placed so that after settling, consolidation and initial subsidence, the elevation would be suitable for the colonization of tidal marsh plant species. One of several methods to achieve marsh creation would be used. Low-level dikes constructed to contain the dredged material during placement could be constructed. The dikes would be breached at several locations after effluent discharge so that tidal exchange between the mitigation site and Bayou Bienvenue would occur. However, due to the condition of the foundation soils throughout the mitigation site, construction of some type of temporary structure, such as geo-textile tubes or hay bales, may be used instead to minimize flow of solids away from the intended placement area. Unrestricted open water disposal at the mitigation site is yet another possibility for placement of material in the mitigation site. For all of the possible construction methods it is anticipated that diluted effluent would ultimately discharge from the triangular area to Bayou Bienvenue, and discharge would be from weirs that allow for fish egress during dredged material placement.

2.3 COMPATIBILITY WITH PAST PROJECTS PROPOSED IN THE VICINITY

Two other projects have been proposed for wetland restoration/creation in the Bayou Bienvenue triangular-shaped restoration area. However, due in part to the instability of the soils, neither of the proposed projects has been implemented. In 2001, the State of Louisiana Department of Natural Resources (LDNR), Coastal Restoration Division and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) proposed a plan to divert freshwater discharge from Pumping Station Number 5 into the restoration area. Cordgrass (*Spartina* sp.) was to be planted along the channel banks and along terraces

constructed within the open water of the restoration area. The proposed terraces were to be constructed from soil material (muck) from the project site. The project was eventually abandoned due to the expense of constructing the terraces over low-strength (unstable) organic clays and peat (Hartman Engineering 2001).

Following Hurricane Katrina in 2005, the New Orleans Sewerage and Water Board proposed a plan for wetland assimilation and restoration in the Bayou Bienvenue area. The plan called for restoration of the wetlands utilizing nutrient-rich effluent while also providing tertiary treatment for sewerage. In August 2007, the New Orleans Sewerage and Water Board, in conjunction with Saint Bernard Parish, contracted an environmental firm to execute a feasibility study for using portions of the 29,000 acre Bayou Bienvenue Central Wetland Unit (which includes the triangular-shaped area) as wetland assimilation discharge sites for tertiary treatment of its effluent. A portion of the assimilation area would also be restored to a cypress (*Taxodium distichum*) swamp.

The Holy Cross Neighborhood Association (HCNA) would also like the area to be restored to a cypress swamp. The University of Wisconsin has been studying methods for implementing a restoration plan in this location for the HCNA. Those recommendations also include the use of dredged material, diversion of freshwater from pump stations and revegetation.

CEMVN's 85-acre wetland restoration project would complement, and could become integrated into any of the ongoing proposals for restoration of the larger triangular-shaped area.

3.0 IMPLEMENTATION PLAN

3.1 IMPLEMENTATION OVERVIEW

Implementation of the restoration of the project site would be accomplished through a series of steps including preparation of plans and specifications followed by: site preparation, plant preparation, installation (*i.e.*, structures and other features of the project and plants), maintenance and adaptive management, and monitoring. Activities included in site preparation are construction of dredged material containment structures and preparation of the site for dredged material placement. Plant preparation will include collecting and propagating plants or securing locally-adapted seeds, cuttings, and plugs. Structures and major features of the project would be then be constructed, followed by the installation of locally grown plants. Maintenance of the mitigation site will include ensuring the containment structures are in tact until dewatering is complete, ensuring the marsh surface elevation is at the desired height, removing and/or managing invasive species at the site (see Chapter 4), and allowing for adaptive management techniques. Adaptive management will allow for mid-course corrections during the 20-year monitoring of the project.

3.2 IMPLEMENTING PARTIES

CEMVN is responsible for implementation and construction of the wetland restoration project, as well as the maintenance and monitoring until specific performance criteria for success are met. CEMVN is also responsible for reporting activities. CEMVN will be the contracting entity, to provide contract oversight for implementation and monitoring.

3.3 WETLAND RESTORATION DESIGN

The wetland restoration design for the site employs several techniques to restore intertidal marsh. These are construction of a dredged material containment system, placement of dredged material to raise the elevation of the site relative to sea level, dewatering of the dredged material to allow for sediment consolidation, seeding of the dredged material for short-term sediment stability, breaching of containment system and planting wetland vegetation.

3.3.1 Site Design

Containment methods

Two containment methods for the dredged material could be considered – earthen berms and geo-textile cells. The earthen berms would be created with dredge material and the geo-textile cells would be filled with the dredge material. Both containment methods could be utilized on the instable soils. Hard structure containment is not an option for the mitigation area due to the instability of the substrate and difficulty in placing the hard structures.

Earthen containment berms would be designed to provide for complete containment of the applicable DMMU's in the year they are dredged. There would be at least three containment cells separated by earthen dikes (Figure 2). Material dredged in year 1 would be placed into the first cell and dewatered through the second and third areas. The water and any suspended sediments remaining after the settling time would pass through a weir to cell 2, and eventually to cell 3. The effluent leaving cell 3 would be passed through a silt curtain, if necessary, before

discharging into Bayou Bienvenue. Each of the subsequent DMMU episodes (in years 2-3 and year 7) would be similarly designed and the same dewatering and sediment settlement methods would be utilized. Laboratory sedimentation tests would provide data for design of the containment area to meet effluent suspended soils criteria and to provide adequate storage capacity for the dredged solids.

The dredged material could also be contained in geo-textile cells. The cells would be staked in place and filled to provide the same level of containment for the three individual containment cells. Dredged material would be placed as described for the earthen containment berms. Due to site inaccessibility and the instability of the soils at the 85-acre mitigation site, geo-textile cells would likely be the preferred alternative for containment. Further engineering analysis would be completed before project implementation to ensure the appropriate containment method was chosen.

Full build-out designs would analyze and address the placement of the dredged material on the instable soils at the restoration site and the final elevation of material placement. At this time, it is unknown how much the sediment will settle or at what rate the material might settle. If the material does not settle to the desired elevation, the dike can be breached to allow the sediment to spill into an adjacent cell. Similarly, if the sediment settles too much, additional soil can be placed in the cell in subsequent years. Although it is recognized that some loss of aquatic species will occur from suffocation or burial during dredged material placement, full build-out designs will include weir designs that provide for fish egress, where possible.

All dikes or containment berms would be breached immediately following material containment and dewatering to insure adequate tidal exchange and fish access. Breaches would be placed at natural connections with waterways and provide as much exchange with Bayou Bienvenue as possible. Areas along dikes or berms that are at elevations greater than the marsh surface would be degraded so that no upland areas would remain within the mitigation site.

Dredged material volume

IHNC dredged material proposed for deposition in the mitigation area would be primarily native soil material from DMMUs 3, 4/5, 7 and 9. The native material found in the core tests for these DMMUs consisted of between 84 and 96 percent fine sediment (silt and clay), with sand fractions somewhat higher in DMMUs 3 and 4/5. The predominant fine grain size of the material will result in extended holding times for the material to allow for sediment settling prior to discharging of the decanted effluent into Bayou Bienvenue.

A total of 253,450 cubic yards of dredge material will be placed in the mitigation area over a period of 7 years. The scheduled delay of between 1 and 4 years between the placement of material from individual DMMUs will allow for sediment settling and material compaction in the mitigation area, such that a stable substrate can be established for planting vegetation in each disposal cell.

The amount of effluent resulting from dewatering of the dredged material from each DMMU cannot be estimated with accuracy. Over the length of the dewatering period, approximately two thirds of the initial volume of dredge material slurry entering the containment cell for each

DMMU will be discharged as effluent. Precipitation over the life of the containment cells will also be discharged with the effluent.

Short term water management and effluent

Under either containment system (*e.g.*, earthen berms or geo-textile cells), there would be at least three cells with weirs that would allow the water to flow over the top and the sediment to settle in each cell. If there is still suspended sediment at the discharge point, a silt curtain would be placed over the discharge pipe to catch any finely suspended sediments remaining before the effluent is discharged into Bayou Bienvenue.

Initial fill elevation

Dredged material would be placed hydraulically in the mitigation site. The target initial fill elevation would be +4.5 feet NAVD 88 allowing for a minimum of 2 feet of consolidation for a target final elevation of +2.5 feet NAVD 88. The target final elevation of +2.5 feet NAVD88 would be at an elevation that is high enough to allow for an additional 0.5 to 1.0 foot of subsidence and compaction over the next 50 years and still remain intertidal and supportive of wetland vegetation. Calculations were made for the conceptual design assuming existing ground elevations varied from -1.5 feet to -0.5 feet NAVD 88 based upon previous surveys. Using the initial target and final target elevations along with existing ground elevations, it was determined that there is more than sufficient excess dredged material from the IHNC Lock Replacement project to create 85 acres of wetlands (253,450 cubic yards). Full build design plans and specifications for the mitigation site will further refine target initial and final elevations and dredged material volumes.

Wetland vegetation planting

The proposed wetland restoration site is sparsely vegetated with smooth cordgrass (*Spartina alterniflora*). Additional smooth cordgrass would be planted on 5 foot centers in the intertidal areas of the project site after the target elevation is reached. Natural recruitment from plants in the project area and the planted plugs would ensure successful colonization of this species. Marsh hay cordgrass (*Spartina patens*) would be also planted on 5 foot centers. Three-square bulrush (*Scirpus americanus*) would also be planted at 10 foot centers on higher elevation areas.

Most of the material to be placed at the site is native clay and silt soil. Because the soil would be lacking nutrients, fertilizer and organic material (such as straw mulch) would be added to the dredged material after placement. Plants could be fertilized with Osmocote or Mag Amp. In a fertilizer study on *S. alterniflora* transplants in North Carolina, tests showed that transplanted plants fertilized with Osmocote survived significantly better than the others and grew fastest (Broome et al. 1983). Plants fertilized with Mag Amp were slower to get started, but were showed greater long-term rates of growth.

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4.0 MAINTENANCE PLAN

The maintenance phase may be revised based on the results of annual monitoring by CEMVN provided that the revisions improve the chances of the final success criteria being met or exceeded (see Section 5.2.1, Final Success Criteria).

4.1 MAINTENANCE OF DREDGED MATERIAL

The final elevation of the material in each containment cell will be controlled by the height of the weir in the containment dike for each cell. If the elevation of a cell is measured to be below target height, subsequent dredge events will be managed to provide additional material to bring the elevation to the desired height. Likewise, if during a fill event, it becomes obvious that too much material is being placed in the cell, then the weir can be lowered to allow more fill to enter the next cell. Final compacted cell heights can also be manipulated by mechanical equipment, if necessary, to bring the cell height to the desired elevation. Following dewatering of the containment cells, dikes would be breached in multiple locations to allow for increased tidal influence and fish passage, and degraded in areas where the ground surface elevation is too high to allow for colonization of wetland species.

Surveyed staff gages will be placed in each fill cell prior to dredged material placement. Monitoring of fill heights and rates of material compaction will occur throughout the dredging activities.

4.2 MAINTENANCE OF PLANTINGS

Monitoring of vegetation species, distribution, and percent cover (see Chapter 5 regarding monitoring requirements) will be used to evaluate the success of the plantings. Information from this monitoring program will direct maintenance activities and adjustments to planting areas or techniques to ensure the success of the mitigation.

One of the critical steps of installation is maintenance and monitoring of the site. Maintenance of the site will ensure the final success criteria will be met and that the marsh creation proceeds accordingly. Maintenance could include (Interagency Working Group 2008):

- Controlling non-native and invasive species;
- Controlling herbivores;
- Replacing plants;
- Maintaining breaches to allow for fish passage
- Reducing or preventing human intrusion; and
- Controlling local pollutants.

Non-native and invasive species would be monitored and controlled throughout the 20-year monitoring period. This involves suppressing non-native or invasive plants with herbicides, cutting them repeatedly during key times in the growing season, manually removing individual plants, and re-planting native species to eventually help shade out invasive plants.

Chinese tallow (*Sapium sebiferum*), an invasive, non-native tree, could colonize the mitigation area if uncontrolled. Although it produces seeds after 3 years of growth, it can also reproduce vegetatively. Seedlings found on the site could be manually removed, treated with a low-volume foliar herbicide, or the foliage and stem could be burned with a backpack burner. Herbicide selection would depend on the presence of standing water on the site and the size of the plants.

Herbivory would be monitored and if herbivory is determined to be a problem with meeting success criteria, structures would be constructed to keep the animals (*e.g.*, nutria) out of the restoration area. Warning signs would be erected to discourage human intrusion into the restoration area.

5.0 MONITORING PLAN

The goal of the monitoring plan is to provide feedback to the maintenance program and determine the success of the wetland restoration. The final success criteria are based on establishing brackish marsh habitat. Modifications or adjustments to the final success criteria for habitat restoration will be done by CEMVN, if necessary, in coordination with U.S. Environmental Protection Agency (EPA), LDEQ, U.S. Fish and Wildlife Service (USFWS) and NOAA Fisheries.

5.1 INTRODUCTION

Monitoring of the marsh surface elevation, water levels and vegetation will determine if the wetland habitat restoration requirements have been met. Attainment of the performance criteria outlined below will indicate that the wetland restoration is on the proper trajectory to meet the long-term habitat goals.

Restoration will be monitored over a 20 year period, starting after the plantings are in place, to calculate trend characteristics and provide feedback to the maintenance program. Trend characteristics will be used to assess growth rates toward the final success criteria. The results of the final year of monitoring will be compared to the final success criteria (*i.e.*, 65 percent plant cover) to determine if the restoration goals have been met. If the final success criteria have not been met (as described in Section 5.2.1 below), then monitoring results will be evaluated, additional maintenance will be accomplished, the monitoring plan revised accordingly, and the monitoring will continue until the final success criteria are achieved.

5.2 MONITORING

Monitoring completed over the 20 year period will include monitoring the marsh surface elevation annually, collecting aerial photography, determining plant cover by species across the site, and measuring water levels. Water levels and marsh surface elevation data will be used to calculate the frequency, depth and duration of flooding over the marsh surface

A surveyed (NAVD 88) staff gage will be placed in each of the three cells prior to the placement of dredged material. Monitoring of marsh surface elevation will be done by taking 20 random elevation measurements in each of the three cells and then tying those elevations into the datum of the surveyed staff gage. These 60 random elevation measurements will be collected annually for the first 5 years and then once every 5 years (years 10, 15 and 20) until monitoring is completed.

One continuous water recorder will be installed and surveyed to NAVD 88 within the restoration area immediately following planting. Water surface elevations and salinity measurements will be recorded hourly for 5 years, and then hourly for one year each in monitoring years 10, 15 and 20. Water surface elevations from the continuous recorder data will be tied to the marsh surface elevation data to determine the duration and depth of flooding across the marsh surface.

Color infrared aerial photography of the mitigation site will be collected in years 1, 3, 5, 10 and 20. The aerial photography will be georectified, photointerpreted, ground-truthed and mapped in

GIS. The aerial photography will be used to document vegetated and non-vegetated areas within the mitigation site.

Ocular estimates of percent plant cover by species will be collected annually for the first 5 years, and in years 10, 15 and 20, in randomly placed 1 square meter quadrats. Quadrats would continue to be randomly sampled until no new plant species were found in five consecutive quadrats.

During year 5, sampling for fish use would occur on a quarterly basis using cast nets or seines to sample in open water within the mitigation area. Observation of wildlife use would also be recorded.

5.2.1 Success Criteria

Monitoring will be conducted for 20 years. When all final success criteria have been met or exceeded, all habitat restoration obligations will be considered complete. If all final success criteria have not been met at the end of the 20 year monitoring period, CEMVN shall undertake the necessary actions to correct the problem(s) and continue the monitoring for 2 additional years.

CEMVN shall consider the wetland restoration successful when sampling data demonstrate that all of the following success criteria have been met or exceeded:

1) Functional marsh elevation is achieved over 75 percent of the mitigation acreage.
2) Minimum 85 percent plant cover of marsh surface with facultative wetland or wetter species;
3) Demonstrated use of mitigation area by fish and wildlife species.

The following interim criteria will be used by CEMVN for adaptive management purposes and allow for an early resolution of any problems with the restoration:

Functional marsh surface elevation within the mitigation acreage:

Year 1: 80 percent	Year 10: 85 percent
Year 3: 90 percent	Year 15: 80 percent
Year 5: 90 percent	Year 20: 75 percent

Cover of marsh surface with facultative wetland or wetter species:

Year 1: 70 percent	Year 10: 90 percent
Year 3: 95 percent	Year 15: 85 percent
Year 5: 90 percent	Year 20: 85 percent

Additional Five-year Success Criteria would include:

1) Demonstrated use of bank area by estuarine-dependent marine fishery species
2) Observed use of created marsh by wildlife species typically found in natural marsh habitats of similar regime.

5.2.2 Monitoring Reports

A monitoring report will be prepared annually for the first 5 years and in years 10, 15 and 20 describing the monitoring results. Each monitoring report will contain a description of the conditions of the mitigation area, a comparison of collected data with interim success criteria, and progress towards final success criteria. In addition to success criteria, the health of the plantings and other vegetation, the presence of invasive plants, and other general observations will be collected and reported. Photo-documentation of restoration progress will be collected at the same locations at each monitoring event. Management recommendations to assure that final success criteria are met will be included in each monitoring report. The monitoring report will also include information and recommendations concerning revegetation site changes, such as acts of vandalism, lack of tidal influence, or any condition that may inhibit restoration efforts. The as-built plans for the mitigation area will be provided and annual monitoring reports submitted to EPA, LDEQ, USFWS and NOAA Fisheries by December 31st of each year during the monitoring period.

5.2.3 Adaptive Management

If monitoring reports indicate a failure to meet interim success criteria or sufficient progress towards final success criteria, CEMVN would take measures to achieve those criteria and initiate annual monitoring for two consecutive years or until all criteria are achieved. CEMVN would either deposit additional material or redistribute existing material as necessary to achieve functional marsh elevations over the target percentage of the mitigation acreage. If vegetative planting survival is not adequate to achieve target percentage of marsh surface coverage, CEMVN would address the causes of mortality and replace dead plantings. If adaptive management does not result in achievement of success criteria within two years, remedial actions would be developed in coordination with EPA, LDEQ, USFWS, and NOAA Fishers.

5.2.4 Completion of Monitoring Requirements

When final success criteria have been met, CEMVN will submit a final report to the EPA, LDEQ, USFWS and NOAA Fisheries. The final monitoring report will demonstrate that the wetland restoration is successful and include a summary of data trends from previous monitoring reports, as well as photo-documentation of representative sample plots. If, at the end of 20 years, the final success criteria have not been met, replacement plants will be installed, EPA, LDEQ, USFWS and NOAA Fisheries consulted, and monitoring continued for 2 additional years.

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6.0 LITERATURE CITED

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