**APPENDIX F**
**MITIGATION AND WETLAND VALUE ASSESSMENT REPORT**

# MITIGATION PLAN
# FOR THE NEW ORLEANS TO VENICE (NOV) FEDERAL LEVEE SYSTEM, PLAQUEMINES PARISH, LOUISIANA

US Army Corps of Engineers
Vicksburg District

Prepared for:
U.S. Army Corps of Engineers
Vicksburg District
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June 2011

**FINAL**

# MITIGATION PLAN
# FOR THE NEW ORLEANS TO VENICE (NOV)
# FEDERAL LEVEE SYSTEM,
# PLAQUEMINES PARISH, LOUISIANA

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# PROJECT DESCRIPTION

# 1.0 PROJECT DESCRIPTION

## 1.1 SUMMARY

The U.S. Army Corps of Engineers (USACE), Vicksburg District (CEMVK) is preparing a Supplemental Environmental Impact Statement (SEIS) to evaluate the potential impacts associated with the proposed construction on the New Orleans to Venice (NOV) Federal Levee System in Plaquemines Parish, Louisiana (Figure 1-1). The project includes restoring, armoring, and accelerating completion of the existing NOV Federal levees on the east bank from Phoenix to Bohemia and on the west bank from St. Jude to Venice to provide the authorized design grade for storm risk reduction (Figures 1-2, 1-3, 1-4, and 1-5). The elevations of the existing floodwalls and levees are below the authorized NOV design elevation. The NOV Federal levee project would restore the elevation of the levees on the east bank from Phoenix to Bohemia and the levees on the west bank from St. Jude to Venice to meet the authorized 2% design grade. A total of 2 miles of the Mississippi River Levee (MRL) between river mile (RM) 46.5 to RM 44 have an average deficiency of 0.4 foot. The 2 miles of the MRL that are deficient need to be raised to meet MRL authorized grade prior to the NOV Federal levee project; however, the schedule for execution of this MRL work is subject to congressional appropriation. The project to address deficiencies in the MRL levee would be constructed and funded through the Mississippi River and Tributaries (MR&T) program prior to construction of the NOV Federal levee project, and a separate NEPA analysis will document the impacts on the environment.

A full range of alternatives and the estimated borrow for consideration were developed and evaluated for improving the flood risk management capability of the Federal levee system. A no-action alternative was also considered. Alternatives were evaluated against criteria such as engineering effectiveness, economic efficiency, and environmental and social acceptability. The proposed alternatives, which represent the least environmentally damaging alternative to provide the authorized design grade for risk reduction, were chosen.

During alternative analysis, three separate construction alternatives were developed, and all follow the existing NOV alignment but vary in width and length. The no-action alternative would not restore, armor, and accelerate completion of the NOV Federal levee system for the purpose of providing the authorized flood risk reduction from storm surge and protection of evacuation routes. Alternative 2, the Tentatively Selected Plan (TSP), would restore, armor, and accelerate completion of the existing hurricane risk reduction system to provide a 50-year (2%) level of risk reduction, and Alternative 3 would restore, armor, or accelerate construction of the existing hurricane risk reduction system to provide the authorized pre-Katrina General Design Memorandum (GDM) level of risk reduction.


Figure 1-1: Vicinity Map

December 2010

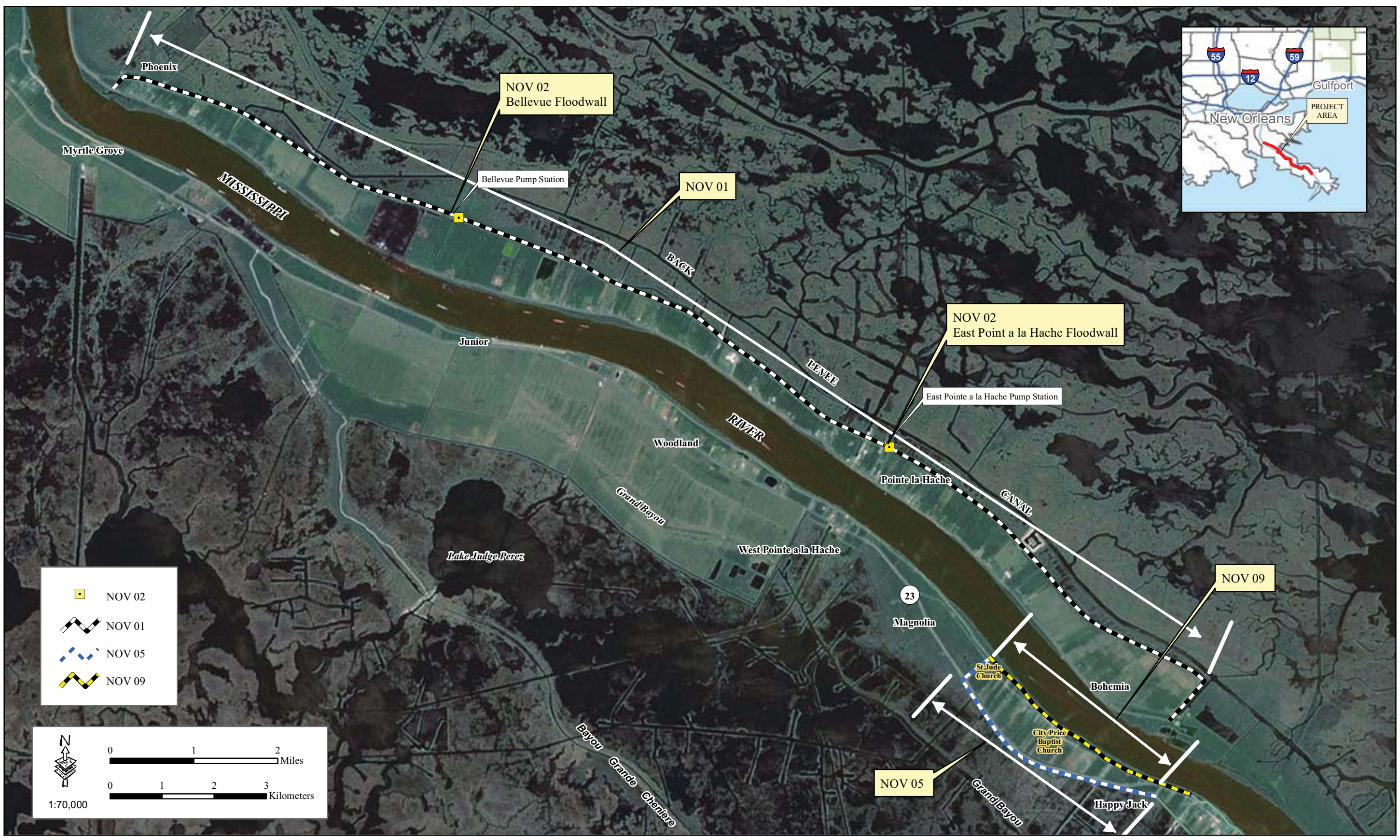


Figure 1-2: Project Area for NOV 01, NOV 02, NOV 05, and NOV 09

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Figure 1-3: Project Area for NOV 06, NOV 10, and NOV 15

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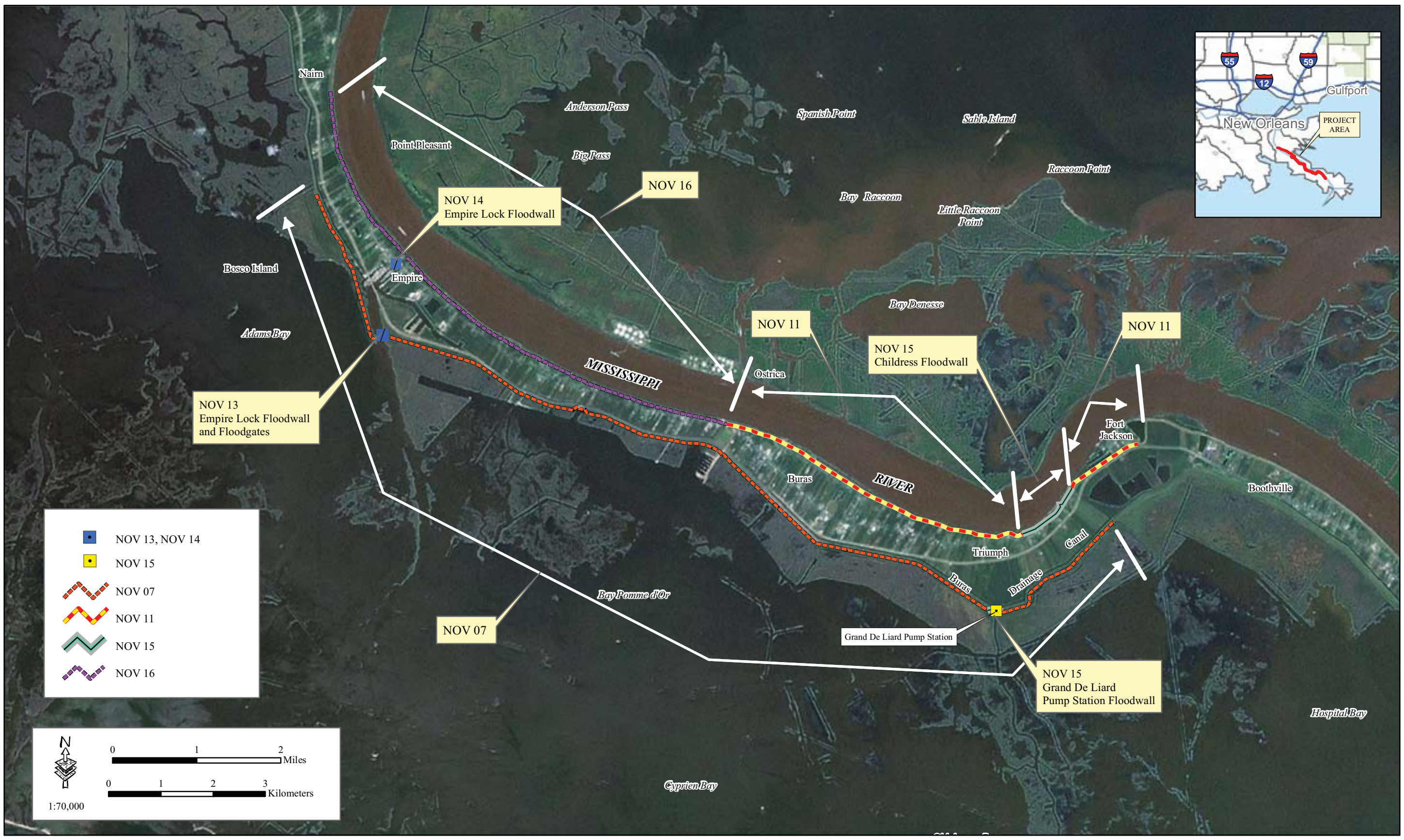


Figure 1-4: Project Area for NOV 07, NOV 11, NOV 13, NOV 14, NOV 15, and NOV 16

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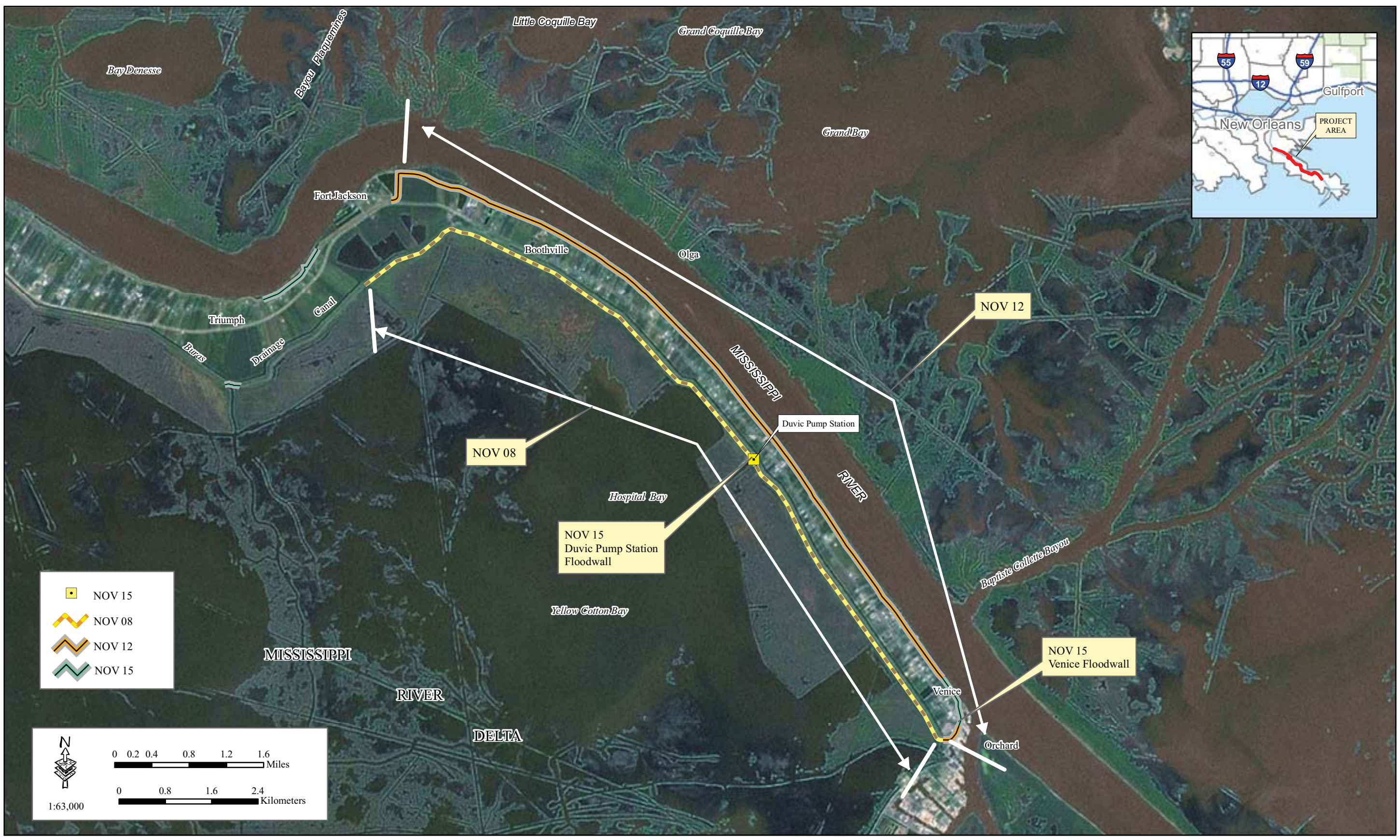


Figure 1-5: Project Area for NOV 08, NOV 12, and NOV 15

December 2010

## 1.2 OBJECTIVES

The objectives of the mitigation plan are to fully offset the impacts on bottomland hardwoods, wet pasture, scrub shrub, and freshwater, intermediate, brackish, and saline marsh habitats located in Plaquemines Parish related to the construction of the NOV Federal levee system under the TSP.

Included in this mitigation plan are the impacts associated with the government-furnished (GF) borrow areas that will possibly be used during construction of the project. The availability of the borrow resources at time of project construction are not known, but for analysis purposes the assumption is made that all of the GF borrow areas will be used and the mitigation responsibilities will be included with the levee alternatives. The contractor-furnished (CF) borrow impacts are not included in this mitigation plan since it is not known, at this time, whether the project contractor will acquire borrow from a CF borrow source. Should the project contractor ultimately acquire borrow from an as yet known borrow source, environmental impacts and compensatory mitigation for unavoidable impacts arising from such borrow acquisition will be evaluated and addressed prior to earth-disturbing activities.

## 1.3 BASELINE CONDITIONS

### 1.3.1 Conditions of Project Site

During the environmental analysis of the project area, eight different habitats were identified, and the anticipated impacts on these habitats for each alternative were documented during the Wetland Value Assessment (WVA) that was coordinated with the U.S. Fish and Wildlife (USFWS), U.S. Environmental Protection Agency (USEPA), National Marine Fisheries Service (NMFS), Louisiana Department of Natural Resources (LDNR), and Louisiana Department of Wildlife and Fisheries (LDWF).

The NOV Federal levee project corridor is bisected by the Mississippi River. The east bank levee system (Phoenix to Bohemia, Louisiana) is located within the Breton Sound Basin, and the west bank levee system (Magnolia to Venice, Louisiana) is within the Barataria Basin (see Figure 1-1). Land use within the NOV Federal levee system includes developed and undeveloped land. Natural levees and low-lying wetlands within the levee system have been drained or altered to provide suitable land for residential, commercial, and agricultural development. Undeveloped land on the protected side of the levee includes bottomland hardwood forests, abandoned or unproductive agriculture fields, and scrub-shrub habitat.

The wetlands observed throughout the project corridor consist of freshwater marshes, backwater riverine wetlands (batture), intermediate, brackish, and saline marsh communities, and bottomland hardwood forests. Wetland community types observed on-site were relatively similar in vegetative structure and composition.

The batture community is a strip of land between the Mississippi River and the MRL and consists of freshwater marsh and bottomland hardwoods communities. The soils and soil moisture are influenced by elevation gradients and the spring floods of the Mississippi River. In addition, there are several small ponds and canals located on the protected side of the levees that are considered freshwater marsh habitat. Intermediate marshes are located on the flood side of the levees on the east bank of the Mississippi River, north of brackish marsh communities. Saline marshes are located on the flood side of the levees on the west bank of the Mississippi River.

The batture communities are dominated by Chinese tallow (*Triadica sebifera*), black willow (*Salix nigra*), and hackberry (*Celtis laevigata*). Shrub species found within freshwater marsh and batture communities consist of baccharis (*Baccharis halimifolia*), giant reed (*Phragmites australis*), silky dogwood (*Cornus amomum*), and purple rattle bush (*Sesbania punicea*). Herbaceous species include torpedo grass (*Panicum repens*), taro (*Colocasia antiquorum*), elephant ear (*Colocasia esculenta*), giant reed, Vasey's grass (*Paspalum urvillei*), foxtail (*Setaria geniculata*), swamp dock (*Rumex verticillatus*), jaborosa (*Jaborosa integrifolia*), California bulrush (*Schoenoplectus californicus*), and southern beakrush (*Rhynchospora microcarpa*).

Intermediate, brackish, and saline marsh communities consist of black willow species in the tree stratum, while baccharis, marsh-elder (*Iva frutescens*), purple rattle bush, black willow, and giant reed dominate the shrub stratum. Herbaceous species include saltmeadow cordgrass (*Spartina patens*), smooth cordgrass (*Spartina alterniflora*), black needlerush (*Juncus roemerianus*), California bulrush, southern beakrush, and foxtail.

Bottomland hardwood forests in the project area are dominated by Chinese tallow, silky dogwood, hackberry, bitter pecan (*Carya aquatica*), persimmon (*Diospyros virginiana*), bald cypress (*Taxodium distichum*), live oak (*Quercus virginiana*), water oak (*Quercus nigra*), baccharis, and black willow in the tree and shrub stratums, and alligator weed (*Alternanthera philoxeroides*), smart weed (*Polygonum hydropiper*), and southern beakrush in the herbaceous stratum. A variety of birds utilize these forests for nesting, breeding, brooding, and perching. Hard mast (nuts) and soft mast (e.g., samaras, berries) provide a valuable food source for birds, mammals, and other wildlife species.

### 1.3.2 Conditions of Proposed Mitigation Site

Desirable wetland mitigation sites include areas of severely degraded marsh, shallow open water that was historically marsh, or areas of marsh with high land loss rates. Bottomland hardwood reforestation sites may include damaged highly disturbed scrub-shrub habitat or forested areas taken over by Chinese tallow. At the time of this document, the sites for mitigation construction projects have not been selected. An Environmental Assessment will be prepared to address the site-specific baseline conditions at the time of mitigation site(s) selection.

## 1.4 SELECTION OF MITIGATION SITE

### 1.4.1 Site Selection

The site selection process for all habitat types will follow Civil Works procedures should compensatory mitigation be achieved with USACE-constructed mitigation, rather than the purchase of mitigation bank credits. Lands will be acquired from sellers in accordance with USACE acquisition procedures, and the mitigation location will consider standard USACE priority criteria of within project area and within watershed or basin. In addition, hydrological conditions, soil characteristics, and other physical and chemical characteristic variables will be considered in each habitat restoration area. Site(s) selected for USACE-constructed compensatory mitigation will be purchased in fee title by the USACE on behalf of the non-

Federal sponsor (NFS). The NFS will be responsible for protecting lands constituting the mitigation site(s) in perpetuity.

Included in the USFWS Coordination Act Report, which is hereby incorporated as a reference, are priority areas USACE will be focusing on to implement restoration alternatives as mitigation for impacts on wetlands from the NOV Federal levee system modifications (USFWS 2011). If selected, these areas will fully mitigate the impacts related to the selected alternative. Mitigation sites have not been determined at this time, but the following mitigation priority areas may be considered:

- Homeplace Marsh Creation: Barataria Basin, Plaquemines Parish
- Bayou Grand Cheniere Marsh Creation: Barataria Basin, Plaquemines Parish
- Plaquemines Parish Coastal Restoration Project: Plaquemines Parish
- Breton Marsh Restoration Project: Breton Sound Basin, Plaquemines Parish
- Dedicated Sediment Delivery and Water Conveyance for Marsh Creation near Big Mar: Breton Sound Basin, Plaquemines Parish
- Bottomland Hardwoods/Swamp Restoration sites
    - Jesuit Bend: Barataria Basin, Plaquemines Parish
    - Phoenix Site: Breton Sound Basin, Plaquemines Parish
    - Horsepower Canal Site: Breton Sound Basin, Plaquemines Parish
    - Belair Site: Breton Sound Basin, Plaquemines Parish (Figure 1-6)

Ideally, the fresh/intermediate marsh and brackish marsh mitigation sites will occur on the east bank of the Mississippi River, and the saline marsh mitigation sites will be located on the west bank of the Mississippi River. Bottomland hardwood mitigation sites will likely occur within the same watershed as the impacted habitat.

### 1.4.2 Mitigation Bank

Following guidelines established in the Water Resource Development Act 2007 Section 2036(c), in carrying out a water resources project involving wetlands mitigation and impacts that occur within the service area of a mitigation bank, USACE, where appropriate, will consider the use of the mitigation bank if the bank contains sufficient available credits to offset the impact and the bank is approved in accordance with the Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks.

## 1.5 CREDIT DETERMINATION METHODOLOGY

Impacts to habitats from construction of the NOV Federal levee system 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 provide a quantitative estimate of the positive or negative environmental effects of a potential project. Typically, for a USACE civil works project, the WVA is applied to the habitats that will be impacted by the project. The WVA is then applied to potential mitigation plans to develop appropriate compensatory mitigation if net negative impacts are determined.


Figure 1-6: Location of Priority Mitigation Sites

January 2011

The WVA has been developed for application to several habitat types along the Louisiana coast including fresh/intermediate marsh, brackish marsh, saline 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) (Environmental Working Group 2006).

An SI function describes the relationship between a measurable condition and fish and wildlife habitat quality or 'suitability' and can be used to predict habitat quality based on the value of the measured condition. This allows the model user to evaluate, through the SI, the quality of a habitat 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 developed for each variable based on empirical data and observed relationships (Environmental Working Group 2006, Environmental Working Group 2009, LDNR 1994). The final step in model development is to construct a mathematical formula that combines all SIs into a single HSI value. The HSI values are a numerical representation of the overall or "composite" habitat quality of the particular habitat being evaluated. The HSI formula defines the aggregation of SIs in a manner unique to each habitat 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 (FWOP) and future with-project (FWP). Specifically, predictions are made as to how the model variables would change through time under the two scenarios. Through that process, HSIs are established for baseline (pre-project) conditions and for FWOP and FWP scenarios for selected target years (TY) throughout the expected life of the project. 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 are then averaged over the project life, to determine Average Annual Habitat Units (AAHUs). The impact of a project can be quantified by comparing AAHUs between the FWOP and FWP 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.

CEMVK has conducted a habitat analysis, in coordination with USFWS and NMFS, to determine unavoidable impacts on fish and wildlife habitats as a result of the proposed levee enlargement. WVAs identified impacts on seven different habitat types. Table 1-1 displays the impacted habitats acres, resulting AAHU loss, and the required mitigation acres to compensate for the losses for the two action alternatives and borrow areas utilized for the project.

**Table 1-1. Habitat Impacts (Acres/AAHUs) and Mitigation Acres by Alternative**

| Habitats | Alternative 2 (TSP) | | | Alternative 3 | | | Borrow | | |
|---|---|---|---|---|---|---|---|---|---|
| | Impacted Acres | AAHUs | Mitigation Acres* | Impacted Acres | AAHUs | Mitigation Acres* | Impacted Acres | AAHUs | Mitigation Acres* |
| **Bottomland Hardwoods-Wet** | 110.49 | 67.63 | 125.24 | 454.49 | 278.19 | 515.17 | 0.00 | 0.00 | 0.00 |
| **Bottomland Hardwoods-Dry** | 1.86 | 1.18 | 2.15 | 45.01 | 28.53 | 52.94 | 1,658.90 | 608.80 | 1,127.50 |
| **Scrub Shrub** | 2.96 | 1.33 | 3.48 | 57.65 | 25.93 | 48.02 | 0.00 | 0.00 | 0.00 |
| **Intermediate Marsh** | 75.26 | 37.37 | 138.41 | 128.62 | 40.86 | 151.33 | 0.00 | 0.00 | 0.00 |
| **Freshwater Marsh** | 82.96 | 18.95 | 70.19** | 315.15 | 79.57 | 292.52** | 0.00 | 0.00 | 0.00 |
| **Brackish Marsh** | 30.00 | 20.67 | 76.56 | 40.01 | 27.57 | 102.11 | 0.00 | 0.00 | 0.00 |
| **Saline Marsh** | 105.99 | 76.21 | 282.22 | 503.07 | 310.42 | 1149.67 | 0.00 | 0.00 | 0.00 |
| **Total All Habitats** | **409.52** | **223.34** | **698.24** | **1,544.00** | **791.07** | **2,311.76** | **1,658.90** | **608.80** | **1,127.50** |

*Estimated mitigation acres were calculated based on habitat-specific conversion formulas. Final mitigation acreage calculations will be determined through a WVA analysis of the selected restoration site(s).
** Freshwater marsh habitat includes wet pasture which has a poor quality habitat value; thus, the mitigation acres for freshwater marsh are less than the impacted acres.

## 1.6 RESPONSIBLE PARTIES

CEMVK is responsible for mitigation funding and design. CEMVK will also be responsible for mitigation construction and meeting the success criteria established in this plan. Once the mitigation projects achieve the initial success criteria, non-Federal sponsors will be responsible for the long-term maintenance and monitoring of the mitigation projects. In addition, annual monitoring reports during the maintenance and monitoring period will be prepared by the non-Federal Sponsor and provided to Federal and state regulatory agencies for review.

## 1.7 FINANCIAL ASSURANCES

Funding for compensatory mitigation for project impacts is in place and appropriated for use for mitigation activities. The goal of the mitigation program is that mitigation construction be concurrent with other project construction. Construction for the NOV Federal levees within available funding for the NOV project are based on development of a back levee line of defense for the project area on the west bank of the river, along with fronting protection for all the pump stations including those on the east bank, then addressing deficiencies on the Mississippi River side of the project area on the west bank, and the back levees on the east bank. There is $30 million budgeted for mitigation for Phase 1 of the NOV Federal levee construction. Phase 2 would be budgeted as work progresses. The funds will be available on time for mitigation construction to begin concurrently with other project construction.

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# SECTION 2.0
# MITIGATION WORK PLAN OBJECTIVES

# 2.0 MITIGATION WORK PLAN OBJECTIVES

## 2.1 INTRODUCTION

The objective of wetland and bottomland hardwoods restoration is to mitigate for the functions and values of the habitats lost due to the projects associated with restoring, armoring, and accelerating completion of the NOV Federal levee system and the associated borrow areas.

The components of the wetland restoration implementation will be:

- Construction of a dredged material containment system;
- Placement of dredged material to the designed elevation;
- Dewatering of dredged material;
- Vegetation plantings following dewatering;
- Breaching of containment system and degradation of containment system; and,
- Monitoring and maintenance for 50 years to ensure wetland mitigation success.

The components of bottomland hardwoods restoration implementation will be:

- Herbicide application (aerial or ground spraying) to eradicate Chinese tallow and other noxious and exotic species;
- Vegetative plantings of hard and soft mast-producing species; and,
- Monitoring and maintenance for 50 years to ensure bottomland hardwood mitigation success.

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

Under the TSP, the loss of 56.32 AAHUs of fresh/intermediate marsh, 20.67 AAHUs of brackish marsh, and 76.21 AAHUs of saline marsh will be mitigated by creating wetlands within a shallow open water environment. The objective of the mitigation would be to create emergent marsh in an area which now contains open water but which formerly was emergent marsh that has since degraded due to coastal land loss processes. The loss of 70.14 AAHUs, associated with the TSP, of wet and non-wet bottomland hardwoods and scrub-shrub habitat (see Table 1-1) will be mitigated for by bottomland hardwoods reforestation projects. In addition, if fully utilized, dry bottomland hardwood impacts (608.6 AAHU) associated with the GF borrow areas will be mitigated for by bottomland hardwoods reforestation projects.

## 2.3 COMPATIBILITY WITH PROJECTS PROPOSED IN THE VICINITY

There are several proposed wetland creation, barrier island restoration, outfall management, hydrologic restoration, and freshwater, water, and sediment diversion projects located in southeast Louisiana, including Plaquemines Parish (CWPRRA 2011) (Table 2-1). Agencies sponsoring restoration projects include NMFS, USFWS, USEPA, National Resources Conservation Service (NRCS), and USACE. The restoration of 567.38 acres of emergent marsh and 130.87 acres of bottomland hardwood restoration would be compatible with these other restoration projects.

**Table 2-1. CWPPRA Projects in Plaquemines Parish**

| Number | Project Name | Agency | Project Type | Net Acres Benefited |
|---|---|---|---|---|
| BA-76 | Cheniere Ronquille Barrier Island Restoration | NMFS | Barrier Island Restoration | 234 |
| BA-68 | Grand Liard Marsh and Ridge Restoration | NMFS | Marsh Creation | 286 |
| BS-18 | Bertrandville Siphon | USEPA | Freshwater Diversion | 1,613 |
| BA-47 | West Pointe a la Hache Outfall Management | NRCS | Marsh Creation | 203 |
| BS-15 | Bohemia Mississippi River Reintroduction | USEPA | Freshwater Diversion | 637 |
| BA-42 | Lake Hermitage Marsh Creation | USFWS | Marsh Creation | 447 |
| BS-13 | Bayou Lamoque Freshwater Diversion | USACE | Freshwater Diversion | 620 |
| MR-15 | Venice Ponds Marsh Creation and Crevasses | USEPA | Marsh Creation, Water Diversion | 511 |
| BA-40 | Riverine Sand Mining/Scofield Island Restoration | NMFS | Barrier Island Restoration | 234 |
| BS-12 | White Ditch Diversion Restoration and Outfall Management | NRCS | Water Diversion, Outfall Management | 189 |
| MR-14 | Spanish Pass Diversion | USACE | Water Diversion | 433 |
| BA-39 | Mississippi River Sediment Delivery System - Bayou Dupont | USEPA | Marsh Creation, Dredged Material | 326 |
| MR-12 | Mississippi River Sediment Trap | USACE | Marsh Creation | 1,190 |
| BA-35 | Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration | NMFS | Barrier Island Restoration | 263 |
| BA-38 | Barataria Barrier Island Complex Project: Pelican Island and Pass La Mer to Chaland Pass Restoration | NMFS | Barrier Island Restoration | 334 |
| BA-33 | Delta Building Diversion at Myrtle Grove | USACE | Water Diversion | 8,891 |
| BS-10 | Delta Building Diversion North of Fort St. Philip | USACE | Water Diversion | 501 |
| BS-11 | Delta Management at Fort St. Philip | USFWS | Sediment and Nutrient Trapping, Outfall Management | 267 |
| MR-13 | Benneys Bay Diversion | USACE | Water Diversion | 5,706 |
| PO-27 | Chandeleur Islands Marsh Restoration | NMFS | Barrier Island Restoration | 220 |
| MR-09 | Delta Wide Crevasses | NMFS | Water Diversion | 2,386 |
| BA-03c | Naomi Outfall Management | NRCS | Outfall Management | 633 |
| BA-24 | Myrtle Grove Siphon | NMFS | Freshwater Diversion | 1,119 |
| BA-04c | West Pointe a la Hache Outfall Management | NRCS | Hydrologic Restoration, Outfall Management | 646 |
| MR-06 | Channel Armor Gap Crevasse | USACE | Sediment Diversion | 936 |
| BS-03a | Caernarvon Diversion Outfall Management | NRCS | Outfall Management | 802 |
| MR-03 | West Bay Sediment Diversion | USACE | Water Diversion | 9,831 |

Source: CWPPRA 2011

# SECTION 3.0
# MITIGATION WORK PLAN

# 3.0 MITIGATION WORK PLAN

## 3.1 OVERVIEW

Implementation of the restoration will be accomplished through a series of steps including preparation of plans and specifications, site preparation, plant preparation, installation (i.e., structures and other features of the project and plants), maintenance and adaptive management, and monitoring.

### 3.1.1 Wetland Restoration

Activities included in site preparation for marsh restoration 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 will then be constructed, followed by the installation of locally grown plants. Maintenance of the mitigation site will include ensuring that the containment structures are intact until dewatering is complete, ensuring that 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 50-year monitoring of the project.

### 3.1.2 Bottomland Hardwoods Restoration

Activities included in site preparation for bottomland hardwood reforestation include herbicide application by aerial or ground equipment to remove Chinese tallow and other invasive and exotic species. Plant preparation will include collecting and propagating plants or securing locally adapted seeds, cuttings, and plugs, and the installation of locally grown plants. Maintenance of the mitigation site will include replanting of seedlings, exotic/noxious species control and timber thinning, if necessary. Adaptive management will allow for mid-course corrections during the 50-year monitoring of the project.

## 3.2 IMPLEMENTING PARTIES

CEMVK is responsible for implementation and construction of the wetland restoration project(s), as well as implementing adaptive management techniques, if necessary, until specific performance criteria for success are met. Once the initial success criteria has been established, the annual monitoring reports during the maintenance and monitoring period will be prepared by the NFS and provided to Federal and state regulatory agencies for review.

## 3.3 WETLAND RESTORATION DESIGN

The wetland restoration design 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

#### *3.3.1.1 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 unstable soils. Hard structure containment is not an option 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 dredged material management units (DMMU) in the year they are dredged. There would be at least three containment cells separated by earthen dikes to restore the entire area needed for mitigation. 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. 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. Further engineering analysis would be completed before project implementation to ensure that the appropriate containment method was chosen.

Full build-out designs will analyze and address the placement of the dredged material on the unstable soils at the restoration site and the final elevation of material placement. At this time, it is unknown how much underlying consolidation would occur, 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 material 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 will be breached immediately following material containment and dewatering to ensure adequate tidal exchange and fish access. Breaches will be placed at natural connections with waterways and provide as much exchange as possible. Areas along dikes or berms that are at elevations greater than the marsh surface will be degraded so that no upland areas will remain within the mitigation site.

#### *3.3.1.2 Dredged Material Volume*

The amount of dredged material to be used for mitigation site(s) is unknown, since exact locations have not been determined. 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.

##### *3.3.1.3 Short Term Water Management and Effluent*

Under either containment system (e.g., earthen berms or geo-textile cells), there will be at least three cells with weirs that will 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 will be placed over the discharge pipe to catch any finely suspended sediments remaining before the effluent is discharged into the adjacent water bodies.

##### *3.3.1.4 Initial Fill Elevation*

Dredged material will be placed hydraulically in the mitigation site. The target for the initial fill elevation will vary depending on selected mitigation sites, will be 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. Full build design plans and specifications for the mitigation site will further refine target initial and final elevations and dredged material volumes.

##### *3.3.1.5 Wetland Vegetation Planting*

Marsh plants (e.g., saltmeadow cordgrass, California bulrush, smooth cordgrass) suited to the restored marsh type will be planted on 5-foot centers in the intertidal areas of the project site after the target elevation is reached. Planted plugs will be grown from propagules collected within the project basin to ensure successful colonization of the species, along with natural recruitment from plants in the project area. Fertilizer or mulch would not be used to encourage marsh plant growth because of the extended growing season in Louisiana. In addition, because marshes are regularly inundated a portion of each day depending on tidal cycles, any attempts to fertilize or mulch a marsh restoration site would be affected by tidal events. Past experience regarding marsh restoration in Louisiana has shown that many sites begin naturally revegetating prior to or in conjunction with implementation of vegetative planting.

## 3.4 BOTTOMLAND HARDWOODS RESTORATION DESIGN

Bottomland hardwoods would be restored using existing agricultural lands or property acceptable for mitigating wetland impacts. The site vegetation, soils, and hydrology shall be selected such that the site meets wetland criteria as described in the USACEs 1987 Wetlands Delineation Manual.

### 3.4.1 Site Design

##### *3.4.1.1 Herbicide Application*

Prior to any restoration (year 0), the entire mitigation site will be treated with herbicide by aerial or ground spraying to eradicate any Chinese tallow and other noxious/exotic species on-site. Clearcast® herbicide is one that specifically attacks noxious and invasive species, including

Chinese tallow, while allowing other desirable hardwood species to survive. Clearcast® has been approved in aquatic and semi-aquatic ecosystems. In the summer of year 1, the entire site will again be treated with herbicide using ground equipment. The second spraying will kill any seedlings that germinated after the application of the initial herbicide application or any individuals that had been missed.

#### *3.4.1.2 Bottomland Hardwoods Vegetation Plantings*

In the fall or winter of year 1 (if it is determined that invasive species removal was successful), monitoring plots will be established, and tree seedlings and midstory species (e.g., persimmon, mayhaw (*Crataegus aestivalis*), etc.) will be planted. A mixture of both hard (60 to 70%) and soft mast (30 to 40%) species will be planted to achieve bottomland hardwood restoration. Hard mast species could include water hickory, willow oak (*Quercus phellos*), water oak, live oak, overcup oak (*Quercus lyrata)*, and Nuttall oak *(Quercus nutalli)*. Soft mast species could include Drummond red maple (*Acer rubrum* var. *drummondii*), green ash (*Fraxinus pennsylvanica*), bald cypress, American elm (*Ulmus americana*), sweet gum (*Liquidambar styraciflua*), hackberry, sycamore (*Platanus occidentalis*), and common persimmon. Seedling planting densities will be approximately 538 seedlings per acre (9-foot center planting spacing) while shrub densities will be 109 shrubs per acre (20-foot center planting spacing) to quickly establish a canopy and minimize herbivory (USFWS 2011).

### 3.4.2 Reforestation Site Development

The following assumptions are based on worst case scenario of selecting a site within the project area that is dominated by Chinese tallow. Previously cleared agricultural lands will be priority and HSI values will be recalculated if a cleared site is selected. The HSI values are derived from an evaluation of the ability of habitat components to supply the life requisites for selected species of fish and wildlife. Evaluation involves using the habitat components to compare existing habitat conditions and optimum habitat conditions. The HSI value obtained from this comparison thus becomes an index to carrying capacity for that species.

a. <u>Area dominated by Chinese tallow-tree</u>**.** In the summer of Target Year (TY) 0, the entire site would be treated with herbicide by aerial or ground spraying. In the following year (TY 1), the entire site would again be treated with herbicide, but using ground equipment. In the fall/winter of TY 1, tree seedlings and midstory shrub/scrub (hawthorn, mayhaw, persimmon, etc.) species would be planted and monitoring plots (MP) established. Management activities would include replanting of seedlings which is anticipated to occur in TY 2, 3, 5, 7, and 10 and extensive herbicide application for Chinese tallow-tree in TY 2, 3, 5, 7 and 10 if deemed necessary by resource agencies. Replanting and herbicide application is estimated at 80% of the site after the initial planting and at 10% of the site in the subsequent target years.

b. The entire acreage would be planted with mast-producing species suited to the soil(s) and site conditions. Midstory species (i.e., shrub species) could include mayhaw, hawthorn, and persimmon. Planting of mast-producing species would be on 9- by 9-foot centers (538/acre) and midstory species on 20- by 20-foot centers (109/acre) in order to quickly establish a dense canopy and minimize the reestablishment and growth of Chinese tallow-trees. In areas where Chinese tallow is not prevalent or because of local conditions may not colonize, all planting densities can be on 10- by 10-foot centers (436/acre). Hard- to soft-mast tree species ratio should range from 60 and 70% hard-mast species to 30 and 40% soft-mast species.

c. Implementation of the proposed management plan would restore native bottomland hardwood species and shrub/scrub species and improve the habitat value of this area. Habitat values would increase due to the increased quantity and quality of native bottomland hardwood species, especially mast-producing trees and midstory species. Changes by target year in the HSI values (Table 3-1) reflect predicted habitat conditions under future-with-management scenarios for a Chinese tallow-dominated site.

**Table 3-1. Habitat Suitability Index Values for Chinese Tallow-Tree Dominated Area (WVA Bottomland Hardwoods)**

| Target Year | Future with Management |
|---|---|
| 0 | 0.10 |
| 1 | 0.04 |
| 20 | 0.58 |
| 50 | 0.80 |

d. The HSI values under future-with-management conditions for Chinese tallow-dominated areas were projected based on the following assumptions:

(1) Year 0 – Existing conditions. If vegetation in the mitigation area consists primarily of Chinese tallow-tree and very few native bottomland hardwood species, mast trees are almost nonexistent and very little midstory exists. Initial herbicide application is conducted during the summer.

(2) Years 0 to 1. Property has been surveyed and posted. Monitoring plots are established. Over- and midstory cover has been significantly reduced by summer time herbicide application in TY 0 and 1. Areas have been planted in the fall/winter with hard-mast and bottomland hardwood species (e.g., American elm, green ash, and hackberry) native to the area and suited to the site. Some shrub/scrub species (e.g., mayhaw, hawthorn, and persimmon) have also been planted to ensure diversity within the forest.

(3) Years 2 to 3. Herbaceous vegetation has increased in those areas subjected to herbicide application and seedling planting in TY 1. Portions of the area may undergo selective herbicide application where needed to maintain control Chinese tallow-tree and other species that threaten survival of planted seedlings. Seedling survival rates are determined and replanting is conducted, as necessary. Monitoring plots are resurveyed, and necessary alterations to the mitigation plan are proposed and reported in the mitigation monitoring report.

(4) Years 4 to 10. Seedling survival rates are determined, and replanting continues where necessary to increase the future density of hard-mast producers and other bottomland hardwood vegetation. A limited amount of the area may undergo selective herbicide application where needed to maintain control of Chinese tallow-tree and other exotic and/or noxious species. Herbaceous and shrub cover has increased due to previous herbicide applications to Chinese tallow-tree overstory and planting of shrub/scrub midstory species. Monitoring plots are

resurveyed and necessary modifications to achieve the mitigation goals are proposed and reported in the mitigation monitoring reports.

(5) Years 11 to 25. Habitat development practices (e.g., control of Chinese tallow-tree) continue as necessary. Some saplings and young trees begin to die in areas maintained with a dense canopy closure (i.e., high basal area) creating snags. Mast-producing tree species become increasingly dominant as the overstory canopy develops and some mast is produced at the end of this time period. Mid- and understory vegetation begins to decrease in response to canopy development. Plots are monitored, and reports documenting mitigation implemented and necessary modifications are produced. If mitigation effectiveness is proceeding as anticipated, the number of monitoring plots can be reduced by 50% after TY 20.

(6) Years 26 to 50. Bottomland hardwood management practices continue as necessary. Most oak and other hard-mast seedlings planted during earlier years begin producing mast. The number of mast-producing species has increased and is reaching optimum levels. Monitoring continues and the plan is adaptively modified as necessary to achieve projected mitigation benefits. Reports summarizing mitigation implemented, results of monitoring, and proposed and implemented mitigation changes are produced.

e. The intensive habitat development activities described previously for this area were input into the habitat model to calculate the AAHU value of the site over the life of the project. This AAHU value was then used to determine the per acre AAHU value (0.13).

# SECTION 4.0
# MAINTENANCE PLAN

## 4.0 MAINTENANCE PLAN

The maintenance phase may be revised based on the results of annual monitoring by USACE provided that the revisions improve the chances of the final success criteria being met or exceeded.

### 4.1 BOTTOMLAND HARDWOODS

In the event that monitoring reveals that initial success criteria have not been met, measures shall be taken to achieve those criteria in accordance with the following plan:

a. If survival is less than 50% per acre as determined by sampling or by observing high mortality at any location within the planted areas or target species ratios are not met, replanting, monitoring, and reporting, as previously described, shall occur as needed to achieve and document the required 1-year survival rate.

b. If the survival criterion is not met after three unsuccessful attempts, USACE, USFWS, USEPA, LDNR, and LDWF will reassess the mitigation to determine whether the use of the mitigation area should be discontinued or if a new management potential should be calculated incorporating the new conditions.

c. Year 5 monitoring shall verify seedling composition and survivorship goals established in the above section. Remedial action, as deemed necessary to ensure attainment of year 5 survivorship and composition criteria, shall be implemented.

### 4.2 MARSH

In the event monitoring reveals that initial success criteria have not been met, measures shall be taken to achieve those criteria in accordance with the following plan:

a. Should the initial placement of dredged material not meet the 80% target construction elevation or areal coverage, the USACE/NFS shall either deposit additional dredged material or redistribute existing material, as necessary, to achieve the target percentage and areal coverage.

b. At year 5, if less than 75% of the marsh creation area contains emergent vegetation (at least 50% of which have a Facultative (FAC) or wetter designation), then additional dredged material may be required. Should the USACE and resource agencies decide that such measures are necessary, the location and extent of fill placement and vegetative plantings will be determined in consultation with appropriate resource agencies.

c. From years 6 through 20, if less than 50% of the marsh creation area contains emergent vegetation (at least 50% of which have a FAC or wetter designation), then additional dredged material may be required and planting in these areas to the extent that marsh coverage is at a minimum of 50% at year 20. Should the USACE and resource agencies decide that such measures are necessary, the location and extent of fill placement and vegetative plantings will be determined in consultation with appropriate resource agencies.

d. If vegetative plantings survival is less than 50% per acre as determined by sampling or by observing high mortality at any location within the planted tract, the USACE/NFS shall take appropriate actions, as recommended by the natural resource agencies, to address the causes of mortality and shall replace all dead plantings during the following planting season. Replanting, monitoring, and reporting shall occur, as needed, to achieve and document the required 1-year survival rate. If the survival criterion is not met after a second unsuccessful attempt, the USACE/NFS will convene a meeting to decide if replanting should continue. Should the USACE and natural resource agencies determine that achieving the required survival rate would not be likely, the USACE/NFS shall have the option to provide replacement mitigation for the increment of value that did not accrue within the unsuccessful tracts within 1 year of this decision. In addition, the USACE and natural resource agencies will reassess the created marsh to determine if a new management potential should be calculated incorporating the new conditions.

e. Year 5 monitoring shall verify vegetation composition and survivorship goals. The USACE/NFS shall implement remedial action, as deemed necessary by the USACE and natural resource agencies, to ensure attainment of year 5 survivorship and composition criteria.

# SECTION 5.0
# PERFORMANCE STANDARDS

# 5.0 PERFORMANCE STANDARDS

## 5.1 BOTTOMLAND HARDWOODS

Once a site has been selected, the performance standards will be reevaluated to reflect the best interest of the specific location and mitigation technique.

### 5.1.1 Initial Success Criteria (within 1 year)

a. Hydrology. Ground surface elevations must be conducive to the establishment and support of hydrophytic vegetation, and reestablishment and maintenance of hydric soil characteristics. To that end, all alterations of the natural topography (ditching, spoil banks, land leveling, bedding, fire breaks, etc.) that have affected the duration and extent of surface water have been removed or otherwise rendered ineffective in accordance with project-specific plans and specifications.

b. Vegetation. For the bottomland hardwood areas, a minimum of 250 planted seedlings per acre must survive through the end of the second spring following the planting (i.e., Year 1). Those surviving seedlings must be representative both in species composition and percentage identified in project-specific plans and specifications. This criterion will apply to initial plantings as well as any subsequent replanting that may be needed to meet this requirement.

### 5.1.2 Interim Success Criteria

a. Hydrology. Approximately 2 years following attainment of the initial success criteria, site hydrology will be restored such that the site meets the wetland criterion as described in the 1987 Manual.

b. Vegetation and Vegetative Plantings (by Year 5).

(1) For a given planting, a minimum of 250 seedlings/saplings per acre must be present at the end of the fourth year following successful attainment of the 1-year survivorship criteria. Trees established through natural recruitment may be included in this tally; however, no less than 125 hard-mast-producing seedlings per acre must be present. Surviving hard-mast seedlings must be representative of the species composition and percentage identified in project-specific plans and specifications. Exotic/invasive species may not be included in this tally.

(2) Approximately 4 years following successful attainment of the 1-year survivorship criteria, the acreage and the perimeter will be virtually free (approximately 5% stems of seedlings/saplings or less on an acre-by-acre basis) of exotic/invasive vegetation.

(3) Developing plant community must exhibit characteristics and diversity indicative of a viable native forested wetland community commensurate with stand age and site conditions. Achievement of wetland vegetation dominance is defined as a vegetation community where more than 50% of all dominant species are FAC or wetter, excluding FAC-plants, using “routine delineation methods” as described in the 1987 Manual.

### 5.1.3 Long-term Success Criteria (by Year 10)

a. Forest canopy coverage exceeds 80% of forested land mass as measured by an approved method. Forest canopy species abundance and composition are consistent with the restoration goals identified in the restoration plan and credit assessment methodologies.

b. When forest canopy coverage exceeds 80%, the site will be within all reasonable efforts, essentially void of exotic/invasive vegetation (approximately 1% or less of the overstory vegetation on an acre-by-acre basis). An active treatment program will continue as part of the long-term maintenance program.

c. If thinning to maintain or enhance the ecological value of the site is determined necessary by the USACE in cooperation with the resource agencies at this time, the USACE/NFS will develop a thinning plan in coordination with the USACE and resource agencies. Measures to control the encroachment of noxious/exotic vegetation after the thinning operation shall be included in the timber management plan and implemented.

## 5.2 MARSH

Once a site has been selected, the performance standards will be reevaluated to reflect the best interest of the specific location and mitigation technique.

### 5.2.1 Initial Success Criteria (within Year 1)

Initial placement of dredged material is completed and at least 80% of the site is within "as-built" or initial construction elevation. Resource agencies will review the USACE proposed initial construction elevation, but it will be the responsibility of the USACE to select the initial construction elevation based on the desired post-compaction, functional marsh elevation identified by the natural resource agencies.

### 5.2.2 Interim Success Criteria (by Year 3)

a. After at least 2 full years following construction, no less than 90% of the marsh creation site is within the functional marsh elevation range to be determined by the natural resource agencies on a project-specific basis (e.g., +1.0 feet, North American Vertical Datum (NAVD)88, to + 1.5 feet, NAVD88).

b. At least 80% of the dredged material disposal area should be vegetated.

c. Containment dikes breached and tidal creeks constructed and functioned as determined by the USACE and natural resource agencies.

d. At least 80% of the vegetative cover is composed of species classified as FAC or wetter, as verified by monitoring reports and verified by the USACE and natural resource agencies, if necessary.

### 5.2.3 Long-Term Success Criteria (by Year 5 and Beyond)

a. Approximately 5 years after construction, at least 75% of the created marsh remains within the functional marsh target elevation range.

b. Demonstrated use of the created marsh area by estuarine-dependent marine fishery species typical of that marsh type as shown by sampling on a quarterly basis during years 4 and 5 using cast nets and/or seines in open water within the project area.

c. Observed use of created marsh by wildlife species typically found in natural marsh habitats of similar salinity regime.

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# SECTION 6.0
# MONITORING REQUIREMENTS

# 6.0 MONITORING REQUIREMENTS

## 6.1 BOTTOMLAND HARDWOODS

As a part of the development activities, MPs will be established. Plots are 10- by 10-foot sites established systematically over the mitigation area (one per 10 acres). Following the initial MP establishment, the WVA evaluation parameter will be measured and recorded for each MP at a minimum during years 1, 2, 5, 7, and 10 during the development period in order to monitor the success of the mitigation implementation plan.

Plots shall be established to monitor the mitigation and demonstrate compliance with the success criteria established above and achievement of WVA benefits. Monitoring reports will be submitted to USEPA, USFWS, NFMS, LDNR, and LDWF by 31 December of each monitoring year. The monitoring program shall follow the guidelines established below:

a. Visual Description. Visual descriptions shall be provided with each monitoring report. Digital images recorded on compact disc shall be submitted from each survey plot at each monitoring period. Permanent photo-documentation points will be established.

b. Initial and Interim Success Criteria.

(1) One plot per 10 acres shall be established. Plots are 1/50-acre plots (0.2 acre) and should be established prior to or immediately following the initial planting. Plots should be identified with a permanent marker (e.g., 8-foot polyvinyl chloride pipe anchored with a metal T-post) and global positioning system (GPS) coordinates shall be recorded. A map depicting the location of the survey plots and a listing of the geographic coordinates shall be provided. The survey plots should be representative of the plantings. The species (including the number of individuals), height (until long-term success criteria are met; i.e., year 15 criteria), and diameters of each tree should be recorded.

(2) A survey of living and dead seedlings near the end of the planting season when new growth can be identified shall be undertaken. In addition, a visual examination of the entire planted acreage to determine if the survey results are indicative of overall survival rates shall be undertaken. A written report indicating the number and species of surviving seedlings in each survey plot should be produced.

(3) The report also shall describe the condition of applicable hydrology altering features (culverts), the general condition of the seedlings, and discuss likely causes for observed mortality (e.g., herbivory, drought, etc.) within those plots that did not exhibit a seedling survival rate as indicated by the success criteria.

(4) The report shall identify the generalized degree and location of exotic/noxious species colonization and identify measures that will be implemented to eradicate them.

c. Continuous Monitoring Reports.

(1) The plots established will be utilized for continuous monitoring. All trees falling within the plot should be permanently tagged and numbered and the number, species, and diameter of trees within each plot shall be recorded.

(2) The report shall identify seedling survivorship and colonization by volunteer mid- and overstory species. Also included in the report would be the results of the vegetation survey including visual estimates of percentage of canopy, mid- and overstory closure, percent of canopy cover comprised of soft- and hard-mast species (differentiated), percent of canopy cover comprised by bald cypress, percent exotic vegetation in each vegetation layer, survival rate of planted vegetation, and an estimate of natural regeneration in mid- and understory by species shall be included in the report.

(3) The report must include a discussion of the general health or vigor of the planted trees.

(4) The report must include a description of the overall condition of the entire mitigation area.

(5) The report must include a description of observed wildlife usage.

(6) The report must summarize the overall condition of the mitigation relative to the goals and success criteria.

(7) The report must identify maintenance activities performed on mitigation lands.

(8) The report must include a discussion of the measures used to control noxious/exotic species colonization/establishment.

d. Schedule.

(1) Vegetative monitoring and reports shall be completed in the spring (when new growth makes identification practicable) of years 1, 2, 5, 7, 10, and 15 and prior to and following any thinning operation. Following the more intensive surveying of the first 10-year period, monitoring should be continued on a 5-year basis as previously described. For monitoring activities after year 20, the number of MPs may be reduced to 50% of the original number of plots if the mitigation success is proceeding as anticipated.

(2) If the year 1 vegetative success criterion is obtained, but all performance standards have not been met in the 3$^{rd}$ and 5$^{th}$ year, a monitoring report shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (i.e., that corrective actions were successful).

(3) Reports discussing measures to control exotic/noxious species shall be provided annually until such time as all initial success criteria and interim success criteria identified in the

above sections have been met and documented in reports and thereafter according to the schedule identified in paragraph above. The annual reports should document items such as noxious/exotic species, method of treatment/control, machinery and/or chemical treatments utilized, timing of treatments/work, effectiveness of previous treatments/work, etc.

(4) Monitoring reports shall be provided to the USACE, USFWS, USEPA, LDNR, and LDWF.

### 6.2 MARSH

The USACE/NFS will submit an As-Built Report to LDWF, NMFS, USEPA, LDNR, and USFWS for each cell of the marsh creation feature within 1 year following completion of the work. The As-Built Report shall contain a survey providing the areal extent of the filled area and the settled grade of the dredged material and adjacent marsh areas.

The USACE/NFS will perform all necessary work to monitor the mitigation remediation project to demonstrate compliance with the success criteria established in the monitoring plan. The monitoring program shall follow the guidelines established below:

a. Visual Description. Visual descriptions shall be provided with each monitoring report by one of the following means.

(1) Photographs of each vegetation plot and hydrology monitoring station (permanent markers shall be established to ensure that the same locations are monitored in each monitoring period); or

(2) One color aerial photograph (8 x 10 inches or larger) depicting the entire site. An aerial photograph should be taken once the site has been constructed, stabilized and planted (preferably in the 3$^{rd}$ or 5$^{th}$ year following completion of initial work).

b. Hydrology.

(1) Tidal influence shall be discussed using indicators of high and low tides referenced to a known datum.

(2) The condition of the constructed tidal channels and ponds noting general flow characteristics, noting excessive scouring and/or silting in of channels.

c. Vegetation.

(1) The USACE/NFS shall establish, as applicable, survey plots along systematically spaced linear transects (approximately 20 transects for each marsh cell; perpendicular to the rock dike) at the time of construction and shall conduct a survey of each tract at or near the end of the first growing season. Surveys shall be conducted in accordance with an accepted academic or industrial sampling methodology. The USACE/NFS shall establish 0.01-acre permanent continuous monitoring plots that account for at least 2% of the total created marsh area, as

applicable.  The USACE/NFS shall document the species and percentage coverage by species within each plot.

(2) The USACE/NFS shall provide a written report to LDWF, NMFS, USEPA, and USFWS that describes the developing vegetative communities developing within the marsh creation cells by determining:

(a) Dominant vegetation species.

(b) A coverage assessment.

(c) The number and species rated FAC or wetter (excluding FAC-) growing in wetlands (total and number/acre).

(d) The percentage of dominant species FAC or wetter (excluding FAC-).

(e) An invasive/noxious species assessment.

(3) The report shall describe the general condition of the vegetation and discuss likely causes for any observed mortality.

b. Site Elevation.  The USACE/NFS shall provide a topographic survey with elevations shot along the transect lines established for determining vegetation cover and species composition.  Surveys should be included in monitoring reports for years 1, 3, 5, 10, 20, 30, 40, and 50.

c. Timing.

(1) Monitoring shall be conducted during the growing season following years 1, 3, 5, and 10 and every 10 years thereafter for 50 years.

(2) Monitoring for the first year or any year following construction shall take place between August and October.

d. Monitoring Reports.

(1) Upon achievement of the initial success criteria, the USACE/NFS shall document the results of monitoring in a report.  Additional reports will be submitted following years 3, 5, 10, 20, 30, 40, and 50.

(2) The reports shall contain a description of the conditions of the mitigation project relating those conditions to the success criteria and shall contain the following:

(a) An aerial photograph (only in report submitted after the 3rd or 5th year) taken during the growing season depicting a completed tract of the mitigation project with the photograph, date, and approximate scale noted.

(b) Ground-level photographs taken at permanently established photo-documentation points in the same ordinal.

(c) A detailed narrative summarizing the condition of the mitigation project and all regular maintenance activities.

(d) A drawing based upon the site plan that depicts topography, sampling plots, and permanent photograph stations.

(e) Results of tidal monitoring, including mean high- and low-water elevations.

(f) Results of vegetation survey including visual estimates of percentage overall cover and percent cover by each species, percent exotic vegetation, total percent "facultative" and total percent "upland" species in each vegetation layer, survival rate of planted vegetation (if planted), an estimate of natural revegetation, and a qualitative estimate of plant vigor as measured by evidence of reproduction.

(g) If year 1 success criteria are obtained but all performance criteria have not been met in the third year, a monitoring report shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (i.e., that corrective actions were successful).

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# SECTION 7.0
# MANAGEMENT PLANS

# 7.0 MANAGEMENT PLANS

## 7.1 LONG-TERM MANAGEMENT PLAN

The USACE is responsible for this mitigation project for the duration of the mitigation project construction phase to verify mitigation success and complete project features, if necessary. Typical mitigation construction phase, depending on habitat being restored, will be 1 to 2 years for bottomland hardwood restoration and 1 to 3 years for marsh restoration activities. The NFS shall be responsible for operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) once the USACE deems the construction phase to be complete and all initial success criteria have been attained. The NFS shall be responsible for maintaining the mitigation site in perpetuity. In the event that the NFS fails to perform, the USACE has the right to complete, operate, maintain, repair, rehabilitate, or replace any project feature, including mitigation features, but such action would not relieve NFS of its responsibility to meet its obligations and would not preclude the USACE from pursuing any remedy at law or equity to ensure the NFS's performance.

## 7.2 ADAPTIVE MANAGEMENT PLAN

In the event reports in the monitoring plan submitted to USACE reveal that any success criteria have not been met during OMRR&R phase, NFS, or its assigns after consultation with the USACE and other appropriate agencies, will take all necessary measures to modify management practices in order to achieve these criteria in the future.

If the results of the monitoring program support the need for physical modifications to the project, the USACE will determine and implement the appropriate corrections in accordance with current authority, budgetary, and other guidance, including the potential to consider implementing corrective measures under separate authority.

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# SECTION 8.0
# LITERATURE CITED

## 8.0 LITERATURE CITED


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# WETLAND VALUE ASSESSMENT FOR SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

# NEW ORLEANS TO VENICE LEVEE SYSTEM, PLAQUEMINES PARISH, LOUISIANA

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May 2011

**FINAL**

# WETLAND VALUE ASSESSMENT FOR SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT NEW ORLEANS TO VENICE LEVEE SYSTEM, PLAQUEMINES PARISH, LOUISIANA

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**May 2011**

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## ATTACHMENTS

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# SECTION 1.0
# INTRODUCTION

# 1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Vicksburg District (CEMVK) is preparing a Supplemental Environmental Impact Statement (SEIS) to evaluate the potential impacts associated with the proposed construction to the New Orleans to Venice (NOV) Federal Levee System in Plaquemines Parish, Louisiana (Figure 1-1). The project includes restoring, armoring and accelerating completion of the existing NOV Federal levees on the east bank from Phoenix to Bohemia and on the west bank from St. Jude to Venice to provide the authorized design grade for storm risk reduction (Figures 1-2, 1-3, 1-4, 1-5). The elevations of the existing floodwalls and levees are below the authorized NOV design elevation. The NOV Federal levee project would restore the elevation of the levees on the east bank from Phoenix to Bohemia and the levees on the west bank from St. Jude to Venice to meet the authorized 2% design grade. A total of two miles of the Mississippi River Levee (MRL) between river mile (RM) 46.5 to RM 44 have an average deficiency of 0.4 feet. The two miles of the MRL that are deficient need to be raised to meet MRL authorized grade prior to the NOV Federal levee project; however, the schedule for execution of this MRL work is subject to congressional appropriation. The project to address deficiencies in the MRL levee would be constructed and funded through the Mississippi River and Tributaries (MR&T) program prior to construction of the NOV Federal levee project and a separate NEPA analysis will document the impacts to the environment

A full range of alternatives and the estimated borrow for consideration were developed and evaluated for improving the flood risk management capability of the Federal levee system. A no-action alternative was also considered. Alternatives were evaluated against criteria such as engineering effectiveness, economic efficiency, and environmental and social acceptability. The proposed alternatives, which represent the least environmentally damaging alternative to provide the authorized design grade for risk reduction, were chosen.

During alternative analysis, three separate construction alternatives were developed, and all follow the existing NOV alignment, but vary in width and length. The no-action alternative would not restore, armor, and accelerate completion of the NOV Federal levee system for the purpose of providing the authorized flood risk reduction from storm surge and protection of evacuation routes. Alternative 2, the Tentatively Selected Plan (TSP), would restore, armor, and accelerate completion of the existing hurricane risk reduction system to provide a 50-year (2 percent) level of risk reduction, and Alternative 3 would restore, armor, or accelerate construction of the existing hurricane risk reduction system to provide the authorized pre-Katrina (GDM) level of risk reduction.


Figure 1-1: Vicinity Map

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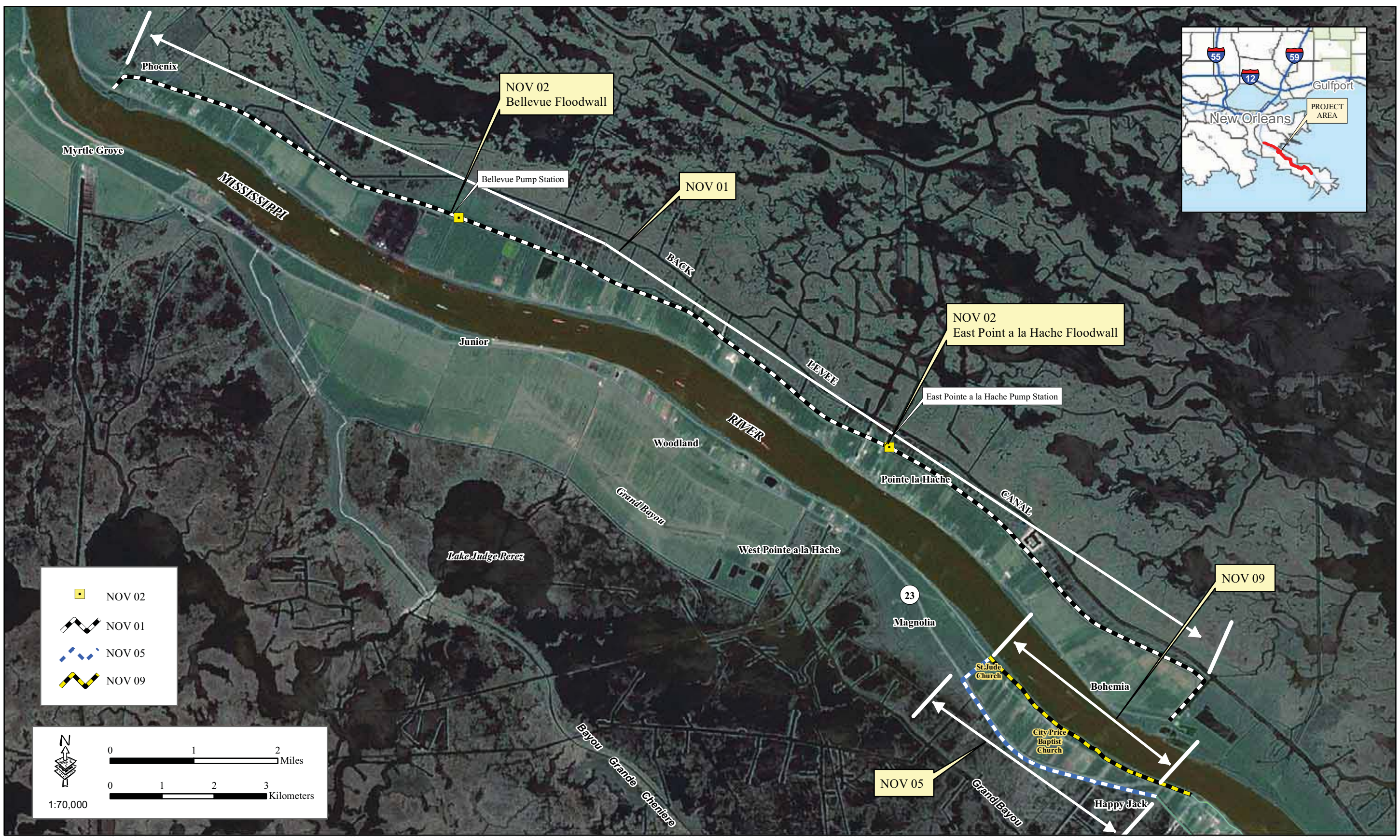


Figure 1-2: Project Area for NOV 01, NOV 02, NOV 05, and NOV 09

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Figure 1-3: Project Area for NOV 06, NOV 10, and NOV 15

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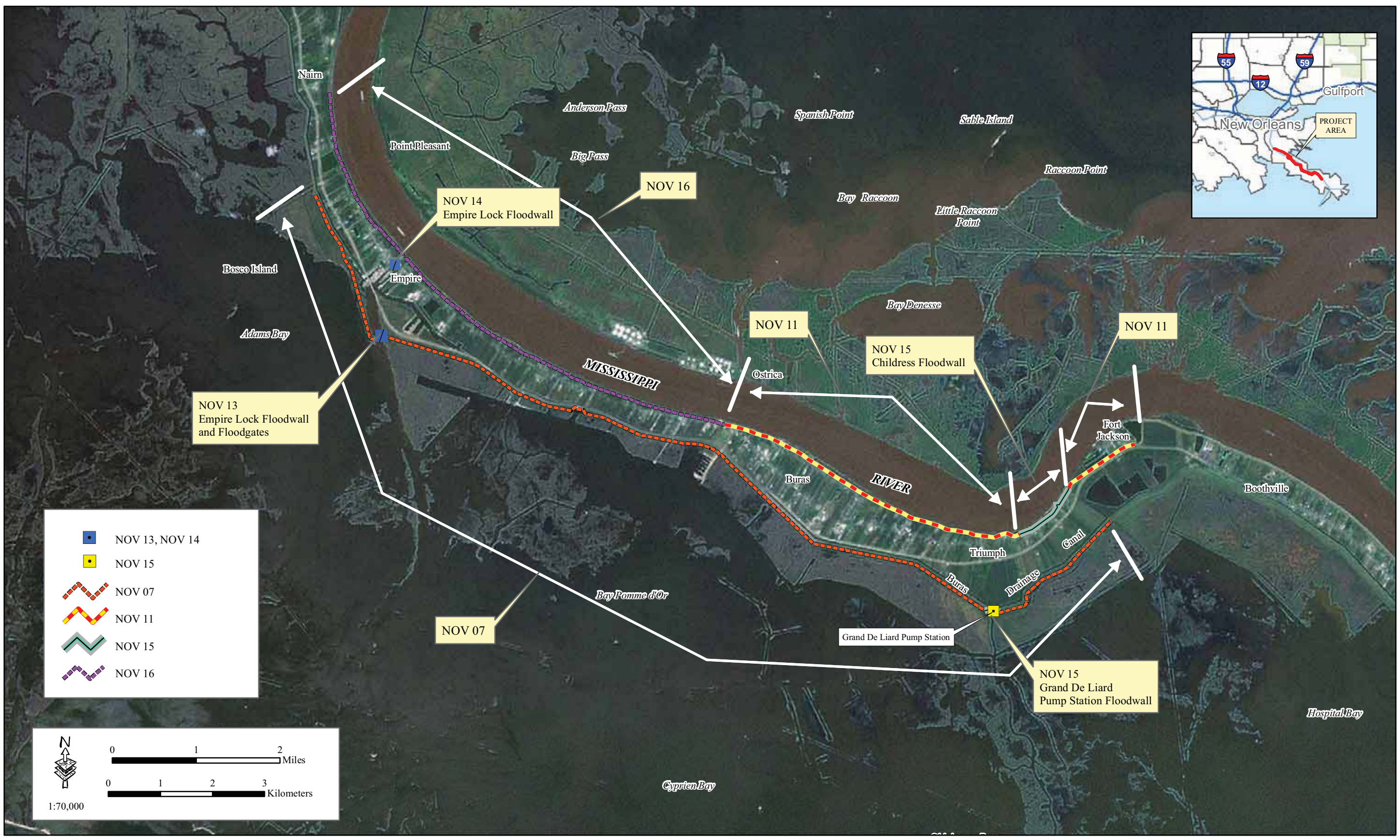


Figure 1-4: Project Area for NOV 07, NOV 11, NOV 13, NOV 14, NOV 15, and NOV 16

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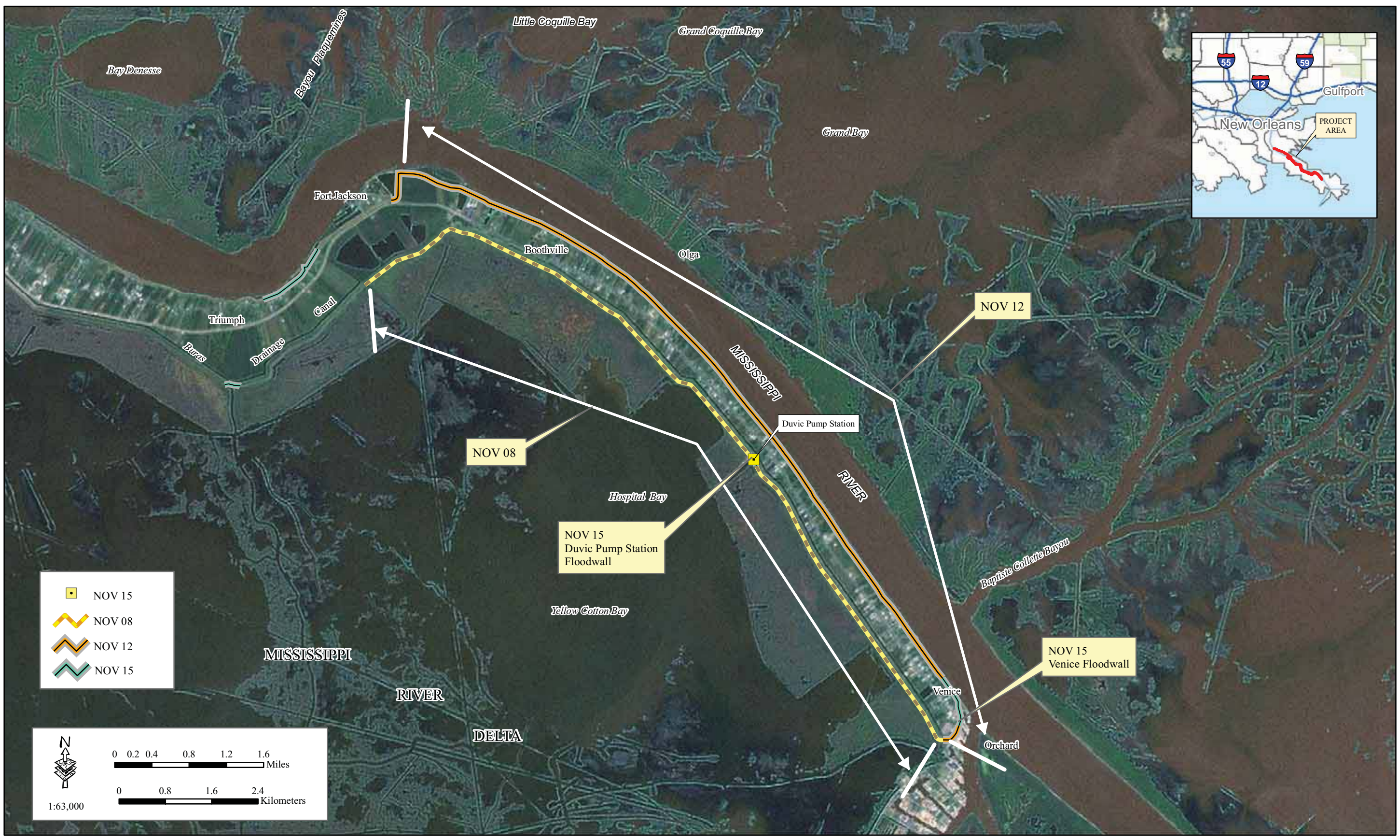


Figure 1-5: Project Area for NOV 08, NOV 12, and NOV 15

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# SECTION 2.0
# WETLAND VALUE ASSESSMENT (WVA) METHODOLOGY

## 2.0 WETLAND VALUE ASSESSMENT (WVA) METHODOLOGY

Impacts to habitats from construction of the Plaquemines Parish NOV Levee System were analyzed using Wetland Value Assessment (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 provide a quantitative estimate of the positive or negative environmental effects of a potential project. Typically, for a USACE civil works project, the WVA is applied to the habitats that will be impacted by the project. The WVA is applied to potential mitigation plans to develop appropriate compensatory mitigation if net negative impacts are determined.

The WVA has been developed for application to several habitat types along the Louisiana coast including fresh/intermediate marsh, brackish marsh, saline 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 (BLH) 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) (Environmental Working Group 2006).

An SI function describes the relationship between a measurable condition and fish and wildlife habitat quality or 'suitability,' and can be used to predict habitat quality based on the value of the measured condition. This allows the model user to evaluate, through the SI, the quality of a habitat 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 developed for each variable based on empirical data and observed relationships (Environmental Working Group 2006, Environmental Working Group 2009, Louisiana Department of Natural Resources [LADNR] 1994). The final step in model development is to construct a mathematical formula that combines all SIs into a single HSI value. The HSI values are a numerical representation of the overall or "composite" habitat quality of the particular habitat being evaluated. The HSI formula defines the aggregation of SIs in a manner unique to each habitat 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 (FWOP) and future with-project (FWP). Specifically, predictions are made as to how the model variables would change through time under the two scenarios. Through that process, HSIs are established for baseline (pre-project) conditions and for FWOP and FWP scenarios for selected target years (TY) throughout the expected life of the project. 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 are then averaged over the project life, to determine Average Annual Habitat Units (AAHUs). The impact of a project can be quantified by comparing AAHUs between the FWOP and FWP 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.

GSRC conducted WVAs to analyze the following habitat types by levee section: hydrologically altered BLH, scrub-shrub, batture (wet BLH and fresh marsh) along the Mississippi River, wet pasture, fresh/intermediate marsh, brackish marsh, and saline marsh. GSRC coordinated with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) throughout the WVA process. Habitat boundaries were identified by field investigations, Geographic Information System (GIS) software, 2007 U.S. Geological Survey (USGS) vegetation data, 2007 National Wetland Inventory (NWI) data, and 2008 digital orthophoto quarter quads (DOQQ) imagery. The variables for hydrologically altered BLH and scrub-shrub habitat were estimated from habitat conditions observed along the Non-Federal hurricane levee system in Plaquemines Parish. Detailed information on these variables can be found in the Wetland Value Assessments for non-Federal Levee Hurricane Protection System, Plaquemines Parish, Louisiana (USACE 2010), which is herein incorporated by reference. The batture wet BLH habitat variables were estimated by averaging variables from nine previous WVAs along the Mississippi River (USFWS 2010). The marsh habitat variables (batture fresh marsh, wet pasture, fresh-intermediate marsh, brackish marsh, and saline marsh) were developed using USGS land loss data, aerial photography, CWPPRA's Coastal Resource Monitoring System (CRMS) salinity data, Mississippi River Hydrographic Surveys (USACE 2007), and CWPPRA's Wetland Value Assessment Methodology Handbook (Environmental Working Group 2009).

FWOP and FWP conditions were measured or estimated as described below for all habitat types. Variables for FWOP TY 0 and FWP TY 0 were the same. FWP TY 1 is assumed to result in a complete loss of the original habitat due to the construction of levees, floodwalls, floodgates, and staging areas, and the conversion of habitat into levee. Therefore, the variables that result in the lowest HSI values were used for TY 1 through TY 50 FWP conditions of for all habitat types.

## 2.1 HYDROLOGICALLY ALTERED BLH HABITAT ASSESSMENT

### 2.1.1 Variable $V_1$ – Tree Species Association

The composition of tree species is important because wildlife species utilize BLH for mast, edible seeds, and tree buds as sources of food. Hard mast is considered more important than soft mast because of its availability in the fall and winter and its high energy content. Higher production of both hard and soft mast and edible seeds is more beneficial than low production. Two sites were considered to be at the Class 5 stage because the canopy consists of greater than 50 percent of mast or other edible seed-producing trees, and hard mast producers constitute more than 20 percent of the canopy (Table 2-1). Three sites were considered to be at the Class 2 stage because mast or other edible seed-producing trees constitute between 25 percent and 50 percent of the canopy, but hard mast producers constitute less than 10 percent of the canopy. Two sites were considered to be at the Class 1 stage because less than 25 percent of the canopy consists of mast or other edible seed-producing trees or because the canopy consists of more than 50 percent soft mast but no hard mast. Values were averaged for an overall BLH stage of Class 4 for all FWOP TYs and FWP TY 1. Details are provided in the Combined Field Site Data Spreadsheet (Attachment 4).

**Table 2-1. Tree Species Composition ($V_1$) Descriptions in BLH Habitat Analysis**

| Class | Description | SI |
|---|---|---|
| Class 1 | Less than 25 percent of canopy consists of mast or other edible seed-producing trees | 0.2 |
| Class 2 | 25 to 50 percent of overstory canopy consists of mast or edible seed-producing trees, but hard mast producers are less than 10 percent of the canopy | 0.4 |
| Class 3 | 25 to 50 percent of overstory canopy consists of mast or edible seed-producing trees, but hard mast producers are more than 10 percent of the canopy | 0.6 |
| Class 4 | Greater than 50 percent of overstory canopy consist of mast or other edible seed-producing trees, but hard mast producers are less than 20 percent of the canopy | 0.8 |
| Class 5 | Greater than 50 percent of overstory canopy consist of mast or other edible seed-producing trees, but hard mast producers are less than 20 percent of the canopy | 1.0 |

### 2.1.2 Variable $V_2$ – Stand Maturity

Stand maturity is based upon the average age of canopy-dominant and canopy co-dominant trees. If the age is unknown, the average diameter at breast height (DBH) is recorded. Optimal conditions (i.e., SI=1) occur when the stand is approximately 50 years old or if the average DBH of stand is greater than 20 inches (LADNR 1994). In this case, the DBH recorded at each sample site was averaged across all sites because the age of the stand was unknown (Table 2-2). Details are provided in the DBH spreadsheets (Attachment 3) and Combined Field Site Data Spreadsheet (Attachment 4).

**Table 2-2. Stand Maturity ($V_2$) Projections for Hydrologically Altered BLH Habitat Analysis**

| Condition | TY | Average DBH (inches) |
|---|---|---|
| FWOP | 0 | 13.30 |
| | 1 | 13.57 |
| | 20 | 10.09 |
| | 50 | 18.50 |
| FWP | 0 | 13.30 |
| | 1 | 0.00 |
| | 20 | 0.00 |
| | 50 | 0.00 |

### 2.1.3 Variable $V_3$ – Understory/Midstory Cover

The amount of understory and midstory coverage is important because it provides habitat for resting, foraging, and nesting for wildlife (LADNR 1994). Optimal conditions occur when the understory cover is between 30 and 60 percent, and when the midstory cover is between 20 and 50 percent (LADNR 1994). Percentages of understory and midstory were also averaged across sites (Table 2-3). Details are provided in the Combined Field Site Data Spreadsheet (Attachment 4). The understory and midstory consist of a mixture of hard and soft mast species, plus a large amount of Chinese tallow (*Triadica sebifera*); therefore, the understory should decrease over time as seedlings mature and shade out the ground cover. The midstory is expected to decrease as the mid-size trees grow into the canopy, but then is expected to remain consistent as seedlings grow into the midstory.

**Table 2-3. Understory/Midstory Cover ($V_3$) Projections for Hydrologically Altered BLH Habitat Analysis**

| Condition | TY | Understory Cover (Percent) | Midstory Cover (Percent) |
|---|---|---|---|
| FWOP | 0 | 42.9 | 53.6 |
| | 1 | 42.9 | 53.6 |
| | 20 | 35.7 | 43.6 |
| | 50 | 28.6 | 35.0 |
| FWP | 0 | 42.9 | 53.6 |
| | 1 | 0.00 | 0.00 |
| | 20 | 0.00 | 0.00 |
| | 50 | 0.00 | 0.00 |

### 2.1.4 Variable $V_4$ – Hydrology

There are three hydrology classes in BLH WVA analysis (Table 2-4). BLH habitats assessed here are within the existing flood protection system, but are not under a forced drainage system. Rather, they have drainage ditches and are no longer exposed to natural flooding events, and/or they experience reduced periods of inundation. As a result, hydrology was evaluated as Class 2 for all FWOP TYs and FWP TY 0.

**Table 2-4. Description of Hydrology ($V_4$) Classes for BLH Habitat Analysis**

| Hydrology Class | Description | SI |
|---|---|---|
| 1 | Forced drainage system that removes water from surface year-round | 0.1 |
| 2 | Level of water table either significantly reduces or extends periods of inundation | 0.5 |
| 3 | Hydrology essentially unaltered | 1.0 |

### 2.1.5 Variable $V_5$ – Size of Contiguous Forested Area

The BLH habitat analysis also takes forest patch size into consideration (Table 2-5). Larger forested areas provide higher quality habitat than smaller areas. Corridors less than 75 feet wide do not constitute a break in the forested area contiguity. The impacted BLH is located within a tract of approximately 600 acres in NOV 01, and therefore is evaluated as a Class 5.

**Table 2-5. Description of Size of Contiguous Forest Area ($V_5$) for BLH Habitat Analysis**

| Class | Description | SI |
|---|---|---|
| 1 | 0 to 5 acres | 0.2 |
| 2 | 5.1 to 20 acres | 0.4 |
| 3 | 20.1 to 100 acres | 0.6 |
| 4 | 100.1 to 500 acres | 0.8 |
| 5 | > 500 acres | 1.0 |

### 2.1.6 Variable $V_6$ – Suitability and Traversability of Surrounding Land Uses

Land uses surrounding BLH habitat are important because they may encourage, allow, or discourage the movement of wildlife species between desirable habitats. The land uses that allow movement increase the amount of habitat available to local wildlife (LADNR 1994). Open water was included with pasture/hayfields because it provides similar habitat benefits (e.g., drinking source, aquatic invertebrates, attracts/produces flying insects, etc.). The existing right-of-way width for the anticipated TSP alignment was used as the baseline for determining the 0.5-mile buffer (Table 2-6). Any future modifications to that alignment right-of-way buffer distance should not result in significant changes in percentages of land use to the degree that they would change the weight of this variable in the WVA analysis. Details can be found in the Land Use Calculation Spreadsheets in Attachment 5.

**Table 2-6. Land Use within 0.5-mile Buffer of Project Area for Hydrologically Altered BLH Analysis**

| Land Use | Percent of 0.5-mile wide buffer |
|---|---|
| BLH, other forested areas, marsh habitat, etc. | 41.79 |
| Abandoned agriculture, overgrown fields, dense cover, etc. | 4.60 |
| Pasture, hayfields, etc. | 40.84 |
| Active agriculture, etc. | 1.03 |
| Non-habitat: linear, residential, commercial, industrial development, etc. | 11.74 |

### 2.1.7 Variable $V_7$ – Disturbance

The effect of disturbance depends on the distance to the disturbance and the type of disturbance near the project area (Table 2-7). Optimal conditions occur when any type of disturbance is greater than 500 feet away or when the type of disturbance is 0 to greater than 500 feet away but insignificant (LADNR 1994).

**Table 2-7. Description of Disturbance ($V_7$) Distance and Type Classes**

| Distance Class | Description | Type Class | Description |
|---|---|---|---|
| 1 | 0 to 50 feet away | 1 | Constant/major disturbance (e.g. highways, industrial) |
| 2 | 50.1 to 500 feet away | 2 | Frequent/moderate disturbance (e.g. residential, moderately used waterways and roadways) |
| 3 | >500 feet away | 3 | Seasonal/intermittent disturbance (e.g. agriculture) |
| | | 4 | Insignificant disturbance (e.g. individual homes, lightly used roads and waterways) |

The BLH habitat in the project area is exposed to various disturbance type classes less than 500 feet away; therefore, the type/distance combination that resulted in the lowest SI value was used. Disturbance was evaluated at a Class 2 distance and a Class 3 type. These values were used for all FWOP TYs and FWP TY 0. Again, the existing right-of-way width for the anticipated TSP was used as the baseline for determining disturbance distances. Any future modifications to that buffer distance should not result in significant changes in the distance class portion of this variable to the degree that they would change the weight of this variable in the WVA analysis. The hydrologically altered BLH WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

## 2.2 SCRUB-SHRUB HABITAT

Scrub-shrub habitat occurs in Alternatives 2 and 3 of levee section NOV 05. The sites are dominated by Chinese tallow and in the early successional stage of BLH. Other species in the understory and midstory include persimmon (*Diospyros virginiana)*, box elder (*Acer negundo*), buttonbush (*Cephalanthus occidentalis*), baccharis (*Baccharis halimifolia*), sugarberry (*Celtis laevigata*), and red maple (*Acer rubrum*).

### 2.2.1 Variable $V_1$ – Tree Species Association

The scrub-shrub habitat was evaluated at a Class 1 because less than 25 percent of the overstory canopy consists of mast or other edible seed-producing trees (see Table 2-1). Details are provided in the Combined Field Site Data Spreadsheet (Attachment 4).

### 2.2.2 Variable $V_2$ – Stand Maturity

Stand maturity is based upon the average age or DBH of canopy-dominant and canopy co-dominant trees (Table 2-8). Optimal conditions (i.e., SI=1) occur when the stand is approximately 50 years old or if the average DBH of stand is greater than 20 inches (LADNR 1994). Details are provided in the DBH spreadsheets (Attachment 3) and Combined Field Site Data Spreadsheet (Attachment 4).

**Table 2-8. Stand Maturity ($V_2$) Projections for Scrub-Shrub Habitat Analysis**

| Condition | TY | Average DBH (inches) |
|---|---|---|
| FWOP | 0 | 6.49 |
| | 1 | 6.75 |
| | 20 | 10.41 |
| | 50 | 16.01 |
| FWP | 0 | 6.49 |
| | 1 | 0 |
| | 20 | 0 |
| | 50 | 0 |

### 2.2.3 Variable $V_3$ – Understory/Midstory

The amount of understory and midstory coverage is important because they provide habitat for resting, foraging, and nesting for wildlife (LADNR 1994). Optimal conditions occur when the understory cover is between 30 and 60 percent, and when the midstory cover is between 20 and

50 percent (LADNR 1994). The understory will likely decrease over time, as the young tallow trees mature and shade out ground cover (Table 2-9). The midstory will likely decrease initially as the current midstory grows into the canopy, but will then remain stable as young understory trees grow into the midstory.

**Table 2-9. Understory/Midstory Cover ($V_3$) Projections for Scrub-Shrub Habitat Analysis**

| Condition | TY | Understory Percent | Midstory Percent |
|---|---|---|---|
| FWOP | 0 | 48.3 | 23.3 |
| | 1 | 48.3 | 23.3 |
| | 20 | 20 | 20 |
| | 50 | 5 | 20 |
| FWP | 0 | 48.3 | 23.3 |
| | 1 | 0 | 0 |
| | 20 | 0 | 0 |
| | 50 | 0 | 0 |

### 2.2.4 Variable $V_4$ – Hydrology

There are three hydrology classes in BLH WVA analysis (see Table 2-4). The scrub-shrub habitats are within the existing flood protection system, but are not under a forced drainage system. Rather, they have drainage ditches and are no longer exposed to natural flooding events, and/or they experience reduced periods of inundation. As a result, hydrology was evaluated as Class 2 for all FWOP TYs and FWP TY 0.

### 2.2.5 Variable $V_5$ – Size of Contiguous Forested Area

The BLH habitat analysis also takes forest patch size into consideration (see Table 2-5). Corridors less than 75 feet wide do not constitute a break in the forested area contiguity. Larger forested areas provide higher quality habitat than smaller areas. There are three forest patches that include Chinese tallow. The sizes of those forest patches are 573.41 acres, 167.80 acres, and 13.58 acres. The average forest patch size is 251.6 acres. Thus, the averaged size of the contiguous forested area is a Class 4 for all FWOP TYs and FWP TY 0.

### 2.2.6 Variable $V_6$ – Suitability and Traversability of Surrounding Land Uses

Open water was included with pasture/hayfields because it provides similar habitat benefits (e.g., drinking source, aquatic invertebrates, attracts/produces flying insects, etc.). The existing right-of-way width for the anticipated TSP alignment was used as the baseline for determining the 0.5-mile buffer (Table 2-10). Any future modifications to that alignment right-of-way buffer distance should not result in significant changes in percentages of land use to the degree that they would change the weight of this variable in the WVA analysis. Details can be found in the Land Use Calculation Spreadsheets in Attachment 5.

**Table 2-10. Land Use within 0.5-mile Buffer of Project Area for Scrub-Shrub Habitat Analysis**

| Land Use | Percent of 0.5-mile wide buffer |
|---|---|
| BLH, other forested areas, marsh habitat, etc. | 42.00 |
| Abandoned agriculture, overgrown fields, dense cover, etc. | 6.00 |
| Pasture, hayfields, etc. | 39.00 |
| Active agriculture, etc. | 2.00 |
| Non-habitat: linear, residential, commercial, industrial development, etc. | 11.00 |

### 2.2.7 Variable $V_7$ – Disturbance

The effect of disturbance depends on the distance to the disturbance and the type of disturbance near the project area. Descriptions of distance and type classes associated $V_7$ disturbance for BLH habitat analysis are described in Table 2-7. Optimal conditions occur when any type of disturbance is greater than 500 feet away or when the type of disturbance is 0 to greater than 500 feet away but insignificant (LADNR 1994).

The BLH habitat in the project area is exposed to various disturbance type classes less than 500 feet away; therefore, the type/distance combination that resulted in the lowest SI value was used. Due to the size of the project area and its linear nature, the classes were averaged by disturbance areas (Table 2-11). These values were used for all FWOP TYs and FWP TY 0. Again, the existing right-of-way width for the anticipated TSP was used as the baseline for determining disturbance distances. Any future modifications to that buffer distance should not result in significant changes in the distance class portion of this variable to the degree that they would change the weight of this variable in the WVA analysis. The scrub-shrub WVA model worksheets and the resulting AAHUs can be found in Attachment 1.

**Table 2-11. Determination of Variable Disturbance ($V_7$) for Scrub-Shrub Habitat Analysis**

| | Distance Class | Type Class |
|---|---|---|
| Section 1 | 2 | 4 |
| Section 2 | 2 | 3 |
| Section 5 | 2 | 1 |
| **AVERAGE** | **2** | **3** |

## 2.3 BATTURE HABITAT

Batture refers to the alluvial land between a river at low water stage and a levee. Levee sections NOV 09, NOV 10, NOV 11, NOV 12, NOV 13, NOV 14, NOV 15, and NOV 16 would impact batture habitat on the Mississippi River side of the levee. The BLH WVA model was used to analyze the wooded habitat within the batture area because the model evaluates habitat-related variables that are most appropriate for the area. High water prevented biologists from accessing the batture area during a field visit to Plaquemines Parish on November 3, 2010, so data from previous WVAs with similar habitats from the project area were used and averaged to determine variables. Percentages of wet BLH, fresh marsh, and open water were estimated using aerial photography, and then applied to impacted acres. Levee sections NOV 09 and NOV 10 were predominately wet BLH, so these sections contained little or no fresh marsh or open water habitat. For the rest of the NOV levee sections, the following percentages were used to calculate impacted habitat acres: 32.42 percent BLH, 25.39 percent fresh marsh, and 42.19 percent open water. The open water and fresh marsh acres were combined into a single WVA.

### 2.3.1 Wet BLH Batture Habitat

Previous WVAs located within the project area with a dominance of black willow (*Salix nigra*) and Chinese tallow trees were used to determine the values for the wet BLH batture habitat. These WVAs include borrow sites and Mississippi River Levee WVAs.

#### *2.3.1.1 Variable $V_1$ – Tree Species Association*

Nine sites were averaged to determine $V_1$ variables for wet BLH batture habitat (Table 2-12). FWOP TY 0 through TY 20 and FWP TY 0, $V_1$ was evaluated at a Class 2. FWOP TY 50 was evaluated as a Class 4. All trees would be cleared as a result of the project, so FWP conditions were evaluated as a Class 1.

**Table 2-12. Tree Species Association ($V_1$) Projections for Wet BLH Batture Habitat**

| Condition | Previous WVA | Class TY 0 | Class TY 1 | Class TY 20 | Class TY 50 |
|---|---|---|---|---|---|
| FWOP | MRL 01- IER 33 and 34 | 1 | 1 | 1 | 2 |
| | MRL 03- IER 33 and 34 | 1 | 1 | 1 | 2 |
| | MRL 04- IER 33 and 34 | 1 | 1 | 1 | 2 |
| | MRL 05- IER 33 and 34 | 3 | 3 | 5 | 5 |
| | MRL 08- IER 33 and 34 | 4 | 4 | 4 | 5 |
| | Q4 borrow site | 1 | 1 | 1 | 1 |
| | Q2 borrow site | 2 | 2 | 2 | 2 |
| | Q7(b) borrow site | 1 | 1 | 1 | 2 |
| | Q6 (a) borrow site | 1 | 1 | 1 | 3 |
| | **AVERAGE** | **CLASS 2** | **CLASS 2** | **CLASS 2** | **CLASS 4** |
| FWP | MRL 01- IER 33 and 34 | 1 | 1 | 1 | 1 |
| | MRL 03- IER 33 and 34 | 1 | 1 | 1 | 1 |
| | MRL 04- IER 33 and 34 | 1 | 1 | 1 | 1 |
| | MRL 05- IER 33 and 34 | 1 | 1 | 1 | 1 |
| | MRL 08- IER 33 and 34 | 3 | 1 | 1 | 1 |
| | Q4 borrow site | 4 | 1 | 1 | 1 |
| | Q2 borrow site | 1 | 1 | 1 | 1 |
| | Q7(b) borrow site | 2 | 1 | 1 | 1 |
| | Q6 (a) borrow site | 1 | 1 | 1 | 1 |
| | **AVERAGE** | **CLASS 2** | **CLASS 1** | **CLASS 1** | **CLASS 1** |

#### *2.3.1.2 Variable $V_2$ – Stand Maturity*

Stand maturity is based upon the average age or DBH of canopy-dominant and canopy co-dominant trees. Optimal conditions (i.e., SI=1) occur when the stand is approximately 50 years old or if the average DBH of stand is greater than 20 inches (LADNR 1994). In this case, average DBH was determined across all sites because the age of the stand was unknown (Table 2-13). Details are provided in the DBH spreadsheets (Attachment 3).

**Table 2-13. Stand Maturity ($V_2$) Projections for Wet BLH Batture Habitat Analysis**

| Condition | TY | Average DBH (inches) |
|---|---|---|
| FWOP | 0 | 8.1 |
| | 1 | 8.4 |
| | 20 | 13.2 |
| | 50 | 21.7 |
| FWP | 0 | 8.1 |
| | 1 | 0.0 |
| | 20 | 0.0 |
| | 50 | 0.0 |

### *2.3.1.3 Variable $V_3$ – Understory/Midstory Cover*

The amount of understory and midstory coverage are important because they provide habitat for resting, foraging, and nesting for wildlife (LADNR 1994). Optimal conditions occur when the understory cover is between 30 and 60 percent, and when the midstory cover is between 20 and 50 percent (LADNR 1994). Percentages of understory and midstory were also averaged across sites (Table 2-14). Details are provided in the Combined Field Site Data Spreadsheet (Attachment 4).

**Table 2-14. Understory/Midstory Cover ($V_3$) Projections for Batture Habitat Analysis**

| Condition | TY | Understory Percent | Midstory Percent |
|---|---|---|---|
| FWOP | 0 | 55 | 33 |
| | 1 | 55 | 33 |
| | 20 | 45 | 28 |
| | 50 | 37 | 30 |
| FWP | 0 | 55 | 33 |
| | 1 | 0 | 0 |
| | 20 | 0 | 0 |
| | 50 | 0 | 0 |

### *2.3.1.4 Variable $V_4$ – Hydrology*

There are three hydrology classes in BLH WVA analysis (see Table 2-4). Hydrology is evaluated as a Class 3 for all FWOP and FWP TYs because the natural hydrology of the area has remained essentially unchanged. In addition, the proposed project would involve modifications to an already existing levee, so no significant changes to the current hydrologic regime are expected.

### *2.3.1.5 Variable $V_5$ – Size of Contiguous Forested Area*

The BLH habitat analysis also takes forest patch size into consideration (see Table 2-5). Corridors less than 75 feet wide do not constitute a break in the forested area contiguity. Larger forested areas provide higher quality habitat than smaller areas. Due to the linear nature of the project area, it was assumed that the impacted batture habitat (approximately 137 acres) comprised the contiguous forested area. All FWOP TYs and FWP TY 0 was evaluated as a

Class 4, and FWP TY 1 through TY 50 was evaluated as a Class 1 as a result of batture being converted to levee as a result of the project.

#### *2.3.1.6 Variable $V_6$ – Suitability and Traversability of Surrounding Land Uses*

Open water was included with pasture/hayfields because it provides similar habitat benefits (e.g., drinking source, aquatic invertebrates, attracts/produces flying insects, etc.). The footprint for the TSP alignment was used as the baseline for determining the 0.5-mile buffer (Table 2-15). Any future modifications to that alignment right-of-way buffer distance should not result in significant changes in percentages of land use to the degree that they would change the weight of this variable in the WVA analysis. Details can be found in the Land Use Calculation Spreadsheets in Attachment 5.

**Table 2-15. Land Use within 0.5-mile of the Project Area for Batture Habitat Analysis**

| Land Use | Percent of 0.5-mile wide buffer |
|---|---|
| BLH, other forested areas, marsh habitat, etc. | 10.08 |
| Abandoned agriculture, overgrown fields, dense cover, etc. | 0.31 |
| Pasture, hayfields, open water, etc. | 66.63 |
| Active agriculture, etc. | 0.02 |
| Non-habitat: linear, residential, commercial, industrial development, etc. | 22.96 |

#### *2.3.1.7 Variable $V_7$ – Disturbance*

The effect of disturbance depends on the distance to the disturbance and the type of disturbance near the project area (see Table 2-7). Optimal conditions occur when any type of disturbance is greater than 500 feet away or when the type of disturbance is 0 to greater than 500 feet away but insignificant (LADNR 1994).

The BLH habitat in the project area is exposed to various disturbance type classes less than 500 feet away; therefore, the type/distance combination that yielded the most appropriate SI was utilized. The closest disturbances include the Mississippi River and Louisiana Highway 11. The Mississippi River is considered a constant and major type of disturbance, but most vessels are over 500 feet away. Highway 11 is 50.1 to 500 feet from the project area and is considered a frequent and moderate disturbance. These were averaged so that all FWOP and FWP TYs were evaluated at a distance Class 2 and a disturbance type Class 2. These disturbances are not expected to change over the project life. Again, the footprint of the TSP alignment was used as the baseline for determining disturbance distances. Any future modifications to that buffer distance should not result in significant changes in the distance class portion of this variable to the degree that they would change the weight of this variable in the WVA analysis.

The Wet BLH Batture WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

### 2.3.2 Fresh Marsh Batture Habitat

The fresh marsh associated with the batture habitat is all the marsh habitat on the floodside of the Mississippi River levees and open water potentially impacted by the TSP. Open water habitat was included with marsh acres for evaluation.

#### *2.3.2.1 Variable $V_1$ – Percent of Wetland Area Covered by Emergent Marsh*

A high suitability index (i.e., SI=1) occurs when vegetative cover is near 100 percent and decreases in value with smaller emergent marsh percentages. Emergent marsh provides important resting, foraging, and breeding habitat for fish and wildlife species (Environmental Working Group 2009). For the batture wetlands, a 0 percent loss rate was assumed. For all sections, the fresh marsh was comprised of approximately 62 percent open water and 38 percent emergent marsh. For FWP conditions TY 1 through TY 50, it was assumed 0 percent emergent marsh as a result of all habitat being converted into levee as a result of the project.

#### *2.3.2.2 Variable $V_2$ – Percent of Open Water Area Covered by Aquatic Vegetation*

A high suitability index (i.e., SI=1) for fresh/intermediate marshes occurs when 100 percent of the open water is dominated by aquatic vegetation and decreases with lower aquatic vegetation percentage. It was estimated that submerged aquatic vegetation (SAV) covered 10 percent of the open water area, and increased to 12 percent over 50 years. For FWP conditions TY 1 through TY 50, it was assumed 0 percent SAV as a result of all habitat being converted into levee as a result of the project.

#### *2.3.2.3 Variable $V_3$ – Marsh Edge and Interspersion*

Interspersion was calculated by consulting aerial photography within the project footprints and comparing to sample illustrations provided in the CWPPRA Wetland Value Assessment Methodology handbook (Environmental Working Group 2009). Descriptions of the different interspersion classes can be seen in Table 2-16.

**Table 2-16. Description of Interspersion ($V_3$) Classes for Marsh Habitat Analysis**

| Class | Description | SI |
|---|---|---|
| 1 | High degree of interspersion in the form of tidal channels and small ponds | 1.0 |
| 2 | Numerous small ponds, but can be indicative of marsh break-up | 0.6 |
| 3 | Large ponds and open water areas; or carpet marsh containing no significant tidal channels, creeks, or ponds | 0.4 |
| 4 | Large ponds and open water areas with little surrounding marsh | 0.2 |
| 5 | Very small marsh islands (less than 5% emergent marsh), areas of almost entirely open water | 0.1 |

The fresh marsh along the Mississippi River levees was estimated to be approximately 40 percent Class 1 and 60 percent Class 4 (Table 2-17). Old borrow pits in the project area create large ponds and open water areas with little surrounding marsh. For FWP conditions TY 1 through TY 50, all interspersion values were evaluated as Class 5 in order to provide a sub-optimal value as a result of all marsh habitat being converted into levee.

**Table 2-17. Interspersion ($V_3$) Variables for NOV Fresh Marsh Batture Habitat Analysis**

| Levee Section | TY | Interspersion Variable |
|---|---|---|
| All Sections (FWOP) | TY 0 | 40%-C1, 60%-C4 |
| | TY 1 | 40%-C1, 60%-C4 |
| | TY 50 | 30%-C1, 35%-C3, 35%-C4 |
| All Sections (FWP) | TY 0 | 40%-C1, 60%-C4 |
| | TY 1 | 100%- C5 |
| | TY 50 | 100%-C5 |

#### *2.3.2.4 Variable $V_4$ – Percent Open Water Less than 1.5 Feet Deep*

Optimal $V_4$ conditions occur at 80 to 90 percent open water less than 1.5 feet deep in fresh/intermediate marshes. $V_4$ was estimated using the USACE's 2007 Mississippi River Hydrographic Surveys. Approximately 50 percent of the borrow areas were less than 1.5 feet deep (USACE 2007). For FWP conditions TY 1 through TY 50, it was assumed that 0 percent of open water less than 1.5 feet deep would be present as a result of conversion of this habitat into levee.

#### *2.3.2.5 Variable $V_5$ – Salinity*

Mean salinity during the growing season (March through November) is used for the fresh/intermediate marsh model because that is when high salinity is most detrimental to these marshes. Optimal conditions for fresh marsh under these conditions is less than 0.5 parts per thousand (ppt) for fresh marsh and 2.5 ppt or less for intermediate marsh. Salinity was assumed to be 0 ppt. For FWP conditions TY 1 through TY 50, a salinity of 5 ppt was used to provide a low quality SI as a result of all marsh habitat being converted into levee.

#### *2.3.2.6 Variable $V_6$ – Aquatic Organism Access*

Because the impacted marsh is located on the floodside of the levee, there were no obstacles that would prevent fish or other aquatic organisms from accessing the impacted marshes. Small ponds, channels, and canals provide access to the project area. Optimal conditions for $V_6$ occur when there are no obstructions or barriers to the project area and it is completely accessible (i.e., SI=1).

The fresh marsh WVAs for all levee sections and the resulting AAHUs can be found in Attachment 1.

## 2.4 FRESH –INTERMEDIATE MARSH ASSESSMENT

Open water habitat was included with marsh acres for habitat evaluation. In the situations where a NOV levee section had two marsh types, the open water was grouped with the most dominant marsh type. Only levee section NOV 01 contained areas of fresh/intermediate marsh, and all open water acres were included in the evaluation of this habitat type.

### 2.4.1 Variable $V_1$ – Percent of Wetland Area Covered by Emergent Marsh

A high suitability index (i.e., SI=1) occurs when vegetative cover is near 100 percent and decreases in value with smaller emergent marsh percentages. Emergent marsh provides important resting, foraging, and breeding habitat for fish and wildlife species (Environmental Working Group 2009). In order to calculate percent emergent marsh, land loss rates from 1985 to 2009 for an expanded project boundary for each alternative were provided by USGS. TY 0 was estimated at 2010 conditions and the loss rate (-0.0068) was applied through TY 50 to calculate percent emergent marsh (Attachment 6). It was assumed that TY 1 through TY 50 is 0 percent emergent marsh as a result of all habitat being filled and converted into levee.

### 2.4.2 Variable $V_2$ – Percent of Open Water Area Covered by Aquatic Vegetation

There was little (5 percent) to no SAV observed in the field (Attachment 2). It was assumed that FWOP conditions may result in a small increase in SAV growth over 50 years (8 percent). However, SAV growth will be impacted by decrease of shallow water habitat due to relative sea level rise (RSLR) and subsidence. For FWP conditions TY 1 through TY 50, percent SAV was assumed to be 0 as a result of all marsh and open water habitat being filled and converted into levee as a result of the project.

### 2.4.3 Variable $V_3$ – Marsh Edge and Interspersion

The intermediate marsh in NOV 01 is dense, although there are small ponds and some areas of open water (Table 2-18). The majority is considered Class 1, with a small percent being considered Class 2 as a result of increased open water areas and presence of small ponds. For FWP conditions TY 1 through TY 50, all interspersion values were evaluated as Class 5 in order to provide a sub-optimal value as a result of all marsh habitat being converted into levee.

**Table 2-18. Interspersion ($V_3$) Variables for Fresh/Intermediate Marsh Habitat Analysis**

| Levee Section | TY | Interspersion Variable | Comment |
|---|---|---|---|
| NOV 01 (FWOP) | TY 0 | 90%-C1, 10%-C2 | Over 50 years, the marsh would degrade, and more open water habitat would result from subsidence and RSLR |
| | TY 1 | 90%-C1, 10%-C2 | |
| | TY 50 | 70%-C1, 20%-C2, 10%-C3 | |
| NOV 01 (FWP) | TY 0 | 90%-C1, 10%-C2 | The project would result in all marsh and open water habitat being converted into levee |
| | TY 1 | 100%- C5 | |
| | TY 50 | 100%-C5 | |

### 2.4.4 Variable $V_4$ – Percent Open Water Less than 1.5 Feet Deep

Percent open water less than 1.5 feet deep was evaluated at 25 percent. For FWP conditions TY 1 through TY 50, it was assumed 0 percent of open water less than 1.5 feet deep would be present as a result of conversion of this habitat into levee.

### 2.4.5 Variable $V_5$ – Salinity

Mean salinity during the growing season (March through November) is used for fresh/intermediate marsh model because that is when high salinity is most detrimental to these marshes. Optimal conditions for fresh marsh is less than 0.5 ppt for fresh marsh and 2.5 ppt or less for intermediate marsh. Salinity was collected from CWPRRA's CRMS website for Station 0136. Salinity ranged from 1.16 ppt to a maximum of 11.83 ppt during the growing season (CRMS 2010). However, the average of mean salinities through the growing season was used to evaluate $V_5$. The average of mean salinities at CRMS Station 0136 was 3 ppt for all FWOP TYs and FWP TY 0. For FWP conditions TY 1 through TY 50, a salinity of 7 ppt was used to provide a low quality SI as a result of all marsh habitat being converted into levee.

#### 2.4.6 Variable $V_6$ – Aquatic Organism Access

Because the impacted marsh is located on the floodside of the levee, there were no obstacles that would prevent fish or other aquatic organisms from accessing the impacted marshes. Small ponds, channels, and canals provide access to the project area. Optimal conditions for $V_6$ occur when there are no obstructions or barriers to the project area and it is completely accessible (i.e., SI=1).

The intermediate marsh WVAs for levee section NOV 01 and the resulting AAHUs can be found in Attachment 1.

### 2.5 WET PASTURE

In this scenario, wet pasture refers to fresh marsh located on the protected side of the levee system. Wet pasture occurs in levee section NOV 07 with the larger Alternative 3 footprint. The fresh/intermediate marsh model was used to evaluate the wet pasture habitat. Open water habitat on the protected side of the levee was included in the wet pasture evaluation.

#### 2.5.1 Variable $V_1$ – Percent of Wetland Area Covered by Emergent Marsh

A high suitability index (i.e., SI=1) occurs when vegetative cover is near 100 percent and decreases in value with smaller emergent marsh percentages. Emergent marsh provides important resting, foraging, and breeding habitat for fish and wildlife species (Environmental Working Group 2009). Since this marsh is located on the protected side of the levee, a 0 percent loss rate was assumed for this habitat.

#### 2.5.2 Variable $V_2$ – Percent of Open Water Area Covered by Aquatic Vegetation

There was little (10 percent) to no SAV observed in the field (Attachment 2). For FWP conditions TY 1 through TY 50, percent SAV was assumed to be 0 as a result of all marsh and open water habitat being filled and converted into levee as a result of the project.

#### 2.5.3 Variable $V_3$ – Marsh Edge and Interspersion

Approximately 33 percent of the total project area is open water habitat. The wet pasture is dense, although there are areas with streams and ponds. For FWP conditions TY 1 through TY 50, all interspersion values were evaluated as Class 5 in order to provide a sub-optimal value as a result of all marsh habitat being converted into levee (Table 2-19).

**Table 2-19. Interspersion ($V_3$) Variables for Wet Pasture Habitat Analysis**

| Levee Section | TY | Interspersion Variable | Comment |
|---|---|---|---|
| NOV 07 (FWOP) | TY 0 | 50%-C1, 20%-C2, 30%-C3 | Marsh interspersion would remain the same over 50 years since it was assumed that there will be a 0 percent loss rate |
| | TY 1 | 50%-C1, 20%-C2, 30%-C3 | |
| | TY 50 | 50%-C1, 20%-C2, 30%-C3 | |
| NOV 07 (FWP) | TY 0 | 50%-C1, 20%-C2, 30%-C3 | The project would result in all marsh and open water habitat being converted into levee |
| | TY 1 | 100%- C5 | |
| | TY 50 | 100%-C5 | |

### 2.5.4 Variable $V_4$ – Percent Open Water Less than 1.5 Feet Deep

Percent open water less than 1.5 feet deep was evaluated at 25 percent. For FWP conditions TY 1 through TY 50, it was assumed that 0 percent of open water less than 1.5 feet deep would be present as a result of conversion of this habitat into levee.

### 2.5.5 Variable $V_5$ – Salinity

The salinity was evaluated at 0 ppt because all habitat is located on the protected side of the levee.

### 2.5.6 Variable $V_6$ – Aquatic Organism Access

Because the impacted marsh is located on the protected side of the levee, access to this area is extremely limited, so a value of 0.0001 was assigned to the wet pasture $V_6$ variable.

The wet pasture WVAs for levee section NOV 07 and the resulting AAHUs can be found in Attachment 1.

## 2.6 BRACKISH MARSH ASSESSMENT

Open water habitat for NOV 01 was included with fresh/intermediate marsh WVA. Brackish marsh was not associated with any open water habitat.

### 2.6.1 Variable $V_1$ – Percent of Wetland Area Covered by Emergent Marsh

In order to calculate percent emergent marsh, land loss rates from 1985 to 2009 for an expanded project boundary for each alternative were provided by USGS. TY 0 was estimated at 2010 conditions and the loss rate (-0.0010) was applied through TY 50 to calculate percent emergent marsh (Attachment 6). Total project areas were provided by the USACE based on 2007 NWI habitat classification data. For FWP conditions, TY 1 through TY 50 was assumed to be 0 percent emergent marsh as a result of all habitat being converted into levee due to the construction of the project.

### 2.6.2 Variable $V_2$ – Percent of Open Water Area Covered by Aquatic Vegetation

Like the fresh/intermediate marsh WVA model, a high suitability index (i.e., SI=1) for brackish marshes occur when 100 percent of the open water is dominated with aquatic vegetation and decreases with lower aquatic vegetation percentages. Data from field trips in Plaquemines Parish were used to calculate $V_2$. There was little (5 percent) SAV observed in the field (Attachment 2). It was assumed that FWOP conditions may result in a small increase in SAV growth over 50 years (8 percent). For FWP conditions TY 1 through TY 50, percent SAV was assumed to be 0 as a result of all marsh and open water habitat being filled and converted into levee.

### 2.6.3 Variable $V_3$ – Marsh Edge and Interspersion

The brackish marsh in NOV 01 is dense, although there are small ponds and some areas of open water. The majority is considered Class 1, with a small percent being considered Class 2 as a result of increased open water areas and presence of small ponds (Table 2-20). For FWP conditions TY 1 through TY 50, all interspersion values were evaluated as Class 5 in order to provide a sub-optimal value as a result of all marsh habitat being converted into levee.

**Table 2-20. Interspersion ($V_3$) Variables for NOV Levee Sections Brackish Marsh Habitat Analysis**

| Levee Section | TY | Interspersion Variable | Comment |
|---|---|---|---|
| NOV 01 (FWOP) | TY 0 | 90%-C1, 30%-C2 | Over 50 years, the marsh would degrade, and more open water habitat would result from subsidence and RSLR |
| | TY 1 | 90%-C1, 30%-C2 | |
| | TY 50 | 80%-C1, 20%-C2 | |
| NOV 01 (FWP) | TY 0 | 90%-C1, 10%-C2 | The project would result in all marsh and open water habitat being converted into levee |
| | TY 1 | 100%-C5 | |
| | TY 50 | 100%-C5 | |

### 2.6.4 Variable $V_4$ – Percent Open Water less than 1.5 Feet Deep

In brackish marshes, optimal $V_4$ conditions occur when there is 70 to 80 percent shallow water. Percent open water less than 1.5 feet deep was observed to be low (5 percent) in the brackish marshes visited in the field. It was assumed that some shallow water habitat would be lost over 50 years due to RSLR and subsidence (8 percent). For FWP conditions TY 1 through TY 50, it was assumed that 0 percent of open water less than 1.5 feet deep would be present as a result of conversion of this habitat into levee.

### 2.6.5 Variable $V_5$ – Salinity

Average annual salinity is used as the salinity parameter in the brackish marsh model. Optimal salinities occur between 0 and 10 ppt. Data were collected from CWPPRA’s CRMS website from CRMS Station 0148. Salinities ranged from 0.21 ppt to 21.07 ppt; however, the averaged mean salinity was 5.0 ppt. An estimate of 5.0 ppt for all FWOP TYs and FWP TY 0 was used to evaluate salinity for levee section NOV 01. For FWP conditions TY 1 through TY 50, a sub-optimal salinity of 16 ppt was used in order to reflect the conversion of habitat in levee.

### 2.6.6 Variable $V_6$ – Aquatic Organism Access

Because the impacted marsh is located on the floodside of the levee, there were no obstacles that would prevent fish or other aquatic organisms from accessing the impacted marshes. Small ponds, channels, and canals provide access to the project area. Optimal conditions for $V_6$ occur when there are no obstructions or barriers to the project area and it is completely accessible. The brackish marsh WVA model worksheets and the resulting AAHUs can be found in Attachment 1.

## 2.7 SALINE MARSH

Levee sections NOV 05, NOV 06, NOV 07, and NOV 08 levee section contain saline marsh within the potential area of impact for Alternative 2 and Alternative 3. Open water habitat was combined with saline marsh habitat for evaluation. In addition, NOV 06 contained 0.65 acre of fresh marsh that was included with the saline marsh and open water due to the small amount of land.

### 2.7.1 Variable $V_1$ – Percent of Wetland Area Covered by Emergent Marsh

In order to calculate percent emergent marsh, land loss rates from 1985 to 2009 for an expanded project boundary for each alternative were provided by USGS. TY 0 was estimated at 2010 conditions, and the loss rate was applied through TY 50 to calculate percent emergent marsh. The loss rate for levee sections NOV 05 and 06 was -0.0043, and the loss rate for levee sections NOV 07 and NOV 08 was -0.0009 (Attachment 6). For FWP conditions, TY 1 through TY 50 was assumed to be 0 percent emergent marsh as a result of all habitat being converted into levee due to the construction of the project.

### 2.7.2 Variable $V_2$ – Percent of Open Water Area Covered by Aquatic Vegetation

There was little (10 percent) SAV observed in the field (see Attachment 2). It was assumed that FWOP conditions may result in a small increase in SAV growth over 50 years (12 percent). FWP conditions TY 1 through TY 50, percent SAV was assumed to be 0 as a result of all marsh and open water habitat being filled and converted into levee.

### 2.7.3 Variable $V_3$ – Marsh Edge and Interspersion

The saline marsh along the levees is dense, although there are small ponds and some areas of open water (Table 2-21). The majority is considered Class 1, with a small percent being considered Class 2 as a result of increased open water areas and presence of small ponds. For FWP conditions TY 1 through TY 50, all interspersion values were evaluated as 100 percent Class 5 in order to provide a sub-optimal value as a result of all marsh habitat being converted into levee.

**Table 2-21. Interspersion ($V_3$) Variables for Saline Marsh Habitat Analysis**

| Levee Section | TY | Interspersion Variable | Comment |
|---|---|---|---|
| NOV 05 (FWOP) | TY 0 | 90%-C1, 30%-C2 | Over 50 years, the marsh would degrade, and more open water habitat would result from subsidence and RSLR |
| | TY 1 | 90%-C1, 30%-C2 | |
| | TY 50 | 80%-C1, 20%-C2 | |
| NOV 06 (FWOP) | TY 0 | 90%-C1, 30%-C2 | NOV 06 has more open water habitat; therefore, more open water habitat will be created as the marsh degrades |
| | TY 1 | 90%-C1, 30%-C2 | |
| | TY 50 | 70%-C1, 20%-C2, 10%-C3 | |
| NOV 07 (FWOP) | TY 0 | 90%-C1, 30%-C2 | Over 50 years, the marsh would degrade, and more open water habitat would result from subsidence and RSLR |
| | TY 1 | 90%-C1, 30%-C2 | |
| | TY 50 | 80%-C1, 20%-C2 | |
| NOV 08 (FWOP) | TY 0 | 90%-C1, 30%-C2 | Over 50 years, the marsh would degrade, and more open water habitat would result from subsidence and RSLR |
| | TY 1 | 90%-C1, 30%-C2 | |
| | TY 50 | 80%-C1, 20%-C2 | |
| NOV 05, 06, 07, 08 (FWP) | TY 0 | 90%-C1, 10%-C2 | The project would result in all marsh and open water habitat being converted into levee |
| | TY 1 | 100%-C5 | |
| | TY 50 | 100%-C5 | |

### 2.7.4 Variable $V_4$ – Percent Open Water less than 1.5 Feet Deep

Optimal $V_4$ conditions in saline marshes occur when there is 70 to 80 percent shallow water. Percent open water less than 1.5 feet deep was observed to be low (5 percent) in the saline marshes visited in the field. For FWP conditions TY 1 through TY 50, it was assumed that 0 percent of open water less than 1.5 feet deep would be present as a result of conversion of this habitat into levee.

### 2.7.5 Variable $V_5$ – Salinity

Average annual salinity is used as the salinity parameter in the saline marsh model. Optimal salinities occur between 0 and 21 ppt. Anything higher than 21 ppt is assumed to stress saline marsh vegetation. A salinity of 11 ppt was used to evaluate levee section NOV 05 based on mean salinities from 1992 to 2002 at Station (BA) 4-55 (Table 2-22). A salinity of 13 ppt was used to evaluate levee section NOV 06 because CRMS Station 0272 mean salinity ranged from 10.64 to 15.2 ppt, so the median value was used. Levee section NOV 07 and Grand Liard exhibit similar habitat conditions, so 17 ppt was used to evaluate salinity for levee section NOV 07. A salinity of 10 ppt was chosen for NOV 08 because the WVA model requires salinity above 9 ppt to function, and the salinity at CMRS Stations 2608 and 0163 never got high enough to become sub-optimal (i.e., greater than 21 ppt). A sub-optimal salinity of 24 ppt was used for all FWP conditions TY 1 through TY 50.

**Table 2-22. Salinity References for Saline Marsh**

| Levee Section | Salinity (ppt) | Reference |
|---|---|---|
| NOV 05 | 11.0 | Station (BA) 4-55: mean salinities from 1992 to 2002. |
| NOV 06 | 13.0 | CRMS0272 |
| NOV 07 | 17.0 | Grand Liard salinity data (NMFS) |
| NOV 08 | 10.0 | CRMS 2608 and CRMS 0163 |

### 2.7.6 Variable $V_6$ – Aquatic Organism Access

Because the impacted marsh is located on the floodside of the levee, there were no obstacles that would prevent fish or other aquatic organisms from accessing the impacted marshes. Small ponds, channels, and canals provide access to the project area. Optimal conditions for $V_6$ occur when there are no obstructions or barriers to the project area and it is completely accessible. The brackish marsh WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

# SECTION 3.0
# RESULTS

## 3.0 RESULTS

WVAs were analyzed by alternative and by each levee section within the Plaquemines Parish NOV levee system. The following habitats were analyzed: hydrologically altered BLH, scrub-shrub, wet BLH (batture), fresh marsh (batture), wet pasture, fresh/intermediate marsh, brackish marsh, and saline marsh. Not all habitats were present in all sections of levee. The results of the WVA analysis can be found in Table 3-1.

Alternative 2 would result in a loss of 223.34 AAHUs, including: 1.16 AAHUs of altered BLH, 1.33 AAHUs of scrub-shrub habitat; 86.58 AAHUs of batture (67.63 AAHUs of wet BLH and 18.95 AAHUs fresh marsh); and 134.25 AAHUs of marsh (37.37 AAHUs of intermediate marsh, 20.67 AAHUs of brackish marsh, 76.21 AAHUs saline marsh).

Alternative 3 would result in a loss of 791.07 AAHUs, including: 28.53 of altered BLH; 25.93 AAHUs of scrub-shrub habitat; 324.53 AAHUs of batture (278.19 AAHUs of wet BLH and 46.34 AAHUs fresh marsh); 33.23 AAHUs of wet pasture; and 378.85 AAHUs of marsh (40.86 AAHUs of intermediate marsh, 27.57 AAHUs of brackish marsh, 310.42 AAHUs saline marsh).

**Table 3-1. Summary of Change in AAHUs (FWOP-FWP) by Levee Section and Habitat**

| Alternative | NOV Levee Section | BLH (altered) | Scrub-Shrub | Batture | | Interme diate Marsh | Wet Pasture | Brackish Marsh | Saline Marsh | TOTALS BY LEVEE SECTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Wet BLH | Fresh Marsh | | | | | |
| Alternative 2 (TSP): 50-year level of risk reduction | NOV 01 | -1.18 | - | - | - | -37.37 | - | -20.67 | - | **-59.22** |
| | NOV 05 | - | -1.33 | - | - | | - | - | -14.51 | **-15.84** |
| | NOV 06 | - | - | - | - | - | - | - | -13.58 | **-13.58** |
| | NOV 07 | - | - | - | - | - | - | - | -14.70 | **-14.70** |
| | NOV 08 | - | - | - | - | - | - | - | -33.42 | **-33.42** |
| | NOV 09 | - | - | -24.85 | - | - | - | - | - | **-24.85** |
| | NOV 10 | - | - | -18.41 | - | - | - | - | - | **-18.41** |
| | NOV 11 | - | - | -5.99 | -5.24 | - | - | - | - | **-11.23** |
| | NOV 12 | - | - | -9.21 | -6.87 | - | - | - | - | **-16.08** |
| | NOV 15 | - | - | -3.53 | -2.63 | - | - | - | - | **-6.16** |
| | NOV 16 | - | - | -5.64 | -4.21 | - | - | - | - | **-9.85** |
| | | | | | | | | | | |
| Alternative 3: Authorized pre-Katrina (GDM) level of risk reduction | NOV 01 | -14.01 | - | - | - | -40.86 | - | -27.57 | - | **-27.30** |
| | NOV 05 | - | -3.36 | - | - | - | - | - | -32.74 | **-36.10** |
| | NOV 06 | - | - | - | - | - | - | - | -44.77 | **-44.77** |
| | NOV 07 | -14.52 | - | | - | - | -33.23 | - | -87.72 | **-135.47** |
| | NOV 08 | - | -22.57 | - | - | - | - | - | -145.19 | **-167.76** |
| | NOV 09 | - | - | -46.68 | - | - | - | - | - | **-46.68** |
| | NOV 10 | - | - | -169.38 | - | - | - | - | - | **-169.38** |
| | NOV 11 | - | - | -20.36 | -15.19 | - | - | - | - | **-35.55** |
| | NOV 12 | - | - | -22.67 | -16.90 | - | - | - | - | **-39.57** |
| | NOV 15 | - | - | -3.47 | -2.59 | - | - | - | - | **-6.06** |
| | NOV 16 | - | - | -15.63 | -11.66 | - | - | - | - | **-27.29** |
| **TOTALS** | | | | | | | | | | **TOTALS BY ALTERNATIVE** |
| **Alternative 2** | | -1.18 | -1.33 | -67.63 | -18.95 | -37.37 | 0 | -20.67 | -76.21 | **-223.34** |
| **Alternative 3** | | -28.53 | -25.93 | -278.19 | -46.34 | -40.86 | -33.23 | -27.57 | -310.42 | **-791.07** |

# SECTION 4.0
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## 4.0 REFERENCES


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# APPENDIX A
# WETLAND VALUE ASSESSMENT WORKSHEETS

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 1 DRY/ALTERED BLH Acres: 1.83

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 4 | 0.80 | 1 | | 1 | | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 13.3 | 0.53 | 0 | 0.00 | 0 | 0.00 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 42.9 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 53.6 | 0.98 | 0 | | 0 | | 0.96 | 0.10 | 0.10 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 2 | 0.50 | 1 | 0.10 | 1 | 0.10 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 5 | 1.00 | 1 | | 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.61 | 42 | 0.61 | 42 | 0.61 | | | |
| | Abandoned Ag | 5 | | 5 | | 5 | | | | |
| | Pasture / Hay | 41 | | 41 | | 41 | | | | |
| | Active Ag | 1 | | 1 | | 1 | | | | |
| | Development | 11.74 | | 11.74 | | 11.74 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 3 | 0.65 | 3 | 0.65 | 3 | 0.65 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.68 | HSI = | | HSI = | | | | |

Project: Alt 2: NOV SECTION 1 DRY/ALTERED BLH

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 1 | | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 0 | | | | | | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 1 | 0.10 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 1 | | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.61 | | | | | |
| | Abandoned Ag | 5 | | | | | | |
| | Pasture / Hay | 41 | | | | | | |
| | Active Ag | 1 | | | | | | |
| | Development | 11.74 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 3 | 0.65 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 1 DRY/ALTERED BLH Acres: 1.83

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 13.3 | 0.53 | 13.57 | 0.56 | 10.09 | 0.24 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 42.9 | | 42.9 | | 35.7 | | 1.00 | 1.00 | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 53.6 | 0.98 | 53.6 | 0.98 | 43.6 | 1.00 | 0.96 | 0.96 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 5 | 1.00 | 5 | 1.00 | 5 | 1.00 | | | |
| | Surrounding | Values % | | Values % | | Values % | | | | |
| V6 | Land Use | | | | | | | | | |
| | Forest / marsh | 42 | 0.61 | 42 | 0.61 | 42 | 0.61 | | | |
| | Abandoned Ag | 5 | | 5 | | 5 | | | | |
| | Pasture / Hay | 41 | | 41 | | 41 | | | | |
| | Active Ag | 1 | | 1 | | 1 | | | | |
| | Development | 11.74 | | 11.74 | | 11.74 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 3 | 0.65 | 3 | 0.65 | 3 | 0.65 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.68 | HSI = | 0.69 | HSI = | 0.55 | | | |

Project.......
FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 18.5 | 0.90 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 28.6 | | | | | | 0.96 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 35 | 0.98 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 5 | 1.00 | | | | | |
| | Surrounding | Values % | | Values % | | Values % | | |
| V6 | Land Use | | | | | | | |
| | Forest / marsh | 42 | 0.61 | | | | | |
| | Abandoned Ag | 5 | | | | | | |
| | Pasture / Hay | 41 | | | | | | |
| | Active Ag | 1 | | | | | | |
| | Development | 11.74 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 3 | 0.65 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | 0.78 | HSI = | | HSI = | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:** Alt 2: NOV SECTION 1 DRY/ALTERED BLH

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 1.83 | 0.68 | 1.24 | |
| 1 | 1.83 | 0.00 | 0.00 | 0.62 |
| 20 | 1.83 | 0.00 | 0.00 | 0.00 |
| 50 | 1.83 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 0.62 |
| | | | AAHUs = | 0.01 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 1.83 | 0.68 | 1.24 | |
| 1 | 1.83 | 0.69 | 1.26 | 1.25 |
| 20 | 1.83 | 0.55 | 1.01 | 21.58 |
| 50 | 1.83 | 0.78 | 1.43 | 36.66 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 59.50 |
| | | | AAHUs = | 1.19 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 0.62 |
| B. Future Without Project CHUs = | 59.50 |
| Net Change (FWP - FWOP) = | -58.88 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.01 |
| B. Future Without Project AAHUs = | 1.19 |
| **Net Change (FWP - FWOP) =** | **-1.18** |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Brackish Marsh

Project: Alternative 2: NOV SECTION 1

Project Area: 30.00

brackish marsh 30

open water 0

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 100 | 1.00 | 99.9 | 1.00 | 95.24 | 0.96 | | | |
| V2 | % Aquatic | 5 | 0.15 | 5 | 0.15 | 8 | 0.17 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 8 | 0.20 | 8 | 0.20 | 5 | 0.16 | | | |
| V5 | Salinity (ppt) | 5 | 1.00 | 5 | 1.00 | 5 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | Emergent Marsh HSI = | | 1.00 | EM HSI = | 1.00 | EM HSI = | 0.97 | | | |
| | Open Water HSI = | | 0.40 | OW HSI = | 0.40 | OW HSI = | 0.42 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Brackish Marsh

Project: Alternative 2: NOV SECTION 1

Project Area: 30.00

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 100 | 1.00 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 5 | 0.15 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 8 | 0.20 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 5 | 1.00 | 16 | 0.10 | 16 | 0.10 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | Emergent Marsh HSI = | | 1.00 | EM HSI = | 0.10 | EM HSI = | 0.10 | | | |
| | Open Water HSI = | | 0.40 | OW HSI = | 0.10 | OW HSI = | 0.10 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alternative 2: NOV SECTION 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 30.00 | 1.00 | 29.87 | |
| 1 | 29.97 | 1.00 | 29.82 | 29.84 |
| 50 | 28.57 | 0.97 | 27.58 | 1405.98 |
| | | | AAHUs = | 28.72 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 30.00 | 1.00 | 29.87 | |
| 1 | 0.00 | 0.10 | 0.00 | 10.46 |
| 50 | 0.00 | 0.10 | 0.00 | 0.00 |
| | | | AAHUs | 0.21 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.21 |
| B. Future Without Project Emergent Marsh AAHUs = | 28.72 |
| Net Change (FWP - FWOP) = | -28.51 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alternative 2: NOV SECTION 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.00 | 0.40 | 0.00 | |
| 1 | 0.03 | 0.40 | 0.01 | 0.01 |
| 50 | 1.43 | 0.42 | 0.61 | 14.95 |
| | | | AAHUs = | 0.30 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.00 | 0.40 | 0.00 | |
| 1 | 0.00 | 0.10 | 0.00 | 0.00 |
| 50 | 0.00 | 0.10 | 0.00 | 0.00 |
| | | | AAHUs | 0.00 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.00 |
| B. Future Without Project Open Water AAHUs = | 0.30 |
| Net Change (FWP - FWOP) = | -0.30 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -28.51 |
| B. Open Water Habitat Net AAHUs = | -0.30 |
| Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6 | -20.67 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alternative 2 NOV Section 1

**Project Area:** **75.26**
Int 70.86
Open Water 4.40

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 94.15 | 0.95 | 93.51 | 0.94 | 66.78 | 0.70 | | | |
| V2 | % Aquatic | 5 | 0.15 | 5 | 0.15 | 8 | 0.17 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 70 | 0.86 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | 10 | | 0 | 0 | 0.4 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 25 | 0.38 | 25 | 0.38 | 25 | 0.38 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 0.99 | 0 | 0.99 | 0 | 0.99 | 1.00 | 1.00 | 1.00 |
| | intermediate | 3 | | 3 | | 3 | | 0.90 | 0.90 | 0.90 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 1.00 | | 1.00 | | 1.00 | | 1.00 | 1.00 | 1.00 |
| | **Emergent Marsh HSI =** | | **0.96** | **EM HSI =** | **0.96** | **EM HSI =** | **0.78** | | | |
| | **Open Water HSI =** | | **0.36** | **OW HSI =** | **0.36** | **OW HSI =** | **0.37** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alternative 2 NOV Section 1

Project Area: 75.26
Int 70.86
Open Water 4.40

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 94.15 | 0.95 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 5 | 0.15 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 25 | 0.38 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 0.99 | 0 | 0.95 | 0 | 0.95 | 1.00 | 1.00 | 1.00 |
| | intermediate | 3 | | 7 | | 7 | | 0.90 | 0.10 | 0.10 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.29 | 0.00 | 0.29 | 1.00 | 0.30 | 0.30 |
| | intermediate | 1.00 | | 0.00 | | 0.00 | | 1.00 | 0.20 | 0.20 |
| | **Emergent Marsh HSI =** | | **0.96** | **EM HSI =** | **0.21** | **EM HSI =** | **0.21** | | | |
| | **Open Water HSI =** | | **0.36** | **OW HSI =** | **0.19** | **OW HSI =** | **0.19** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alternative 2 NOV Section 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 70.86 | 0.96 | 68.07 | |
| 1 | 70.37 | 0.96 | 67.33 | 67.70 |
| 50 | 50.26 | 0.78 | 39.43 | 2587.40 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs = | 53.10 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 70.86 | 0.96 | 68.07 | |
| 1 | 0.00 | 0.21 | 0.00 | 25.16 |
| 50 | 0.00 | 0.21 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs | 0.50 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.50 |
| B. Future Without Project Emergent Marsh AAHUs = | 53.10 |
| Net Change (FWP - FWOP) = | **-52.60** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alternative 2 NOV Section 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 4.40 | 0.36 | 1.57 | |
| 1 | 4.89 | 0.36 | 1.74 | 1.65 |
| 50 | 25.00 | 0.37 | 9.33 | 268.39 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs = | 5.40 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 4.40 | 0.36 | 1.57 | |
| 1 | 0.00 | 0.19 | 0.00 | 0.66 |
| 50 | 0.00 | 0.19 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs | 0.01 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.01 |
| B. Future Without Project Open Water AAHUs = | 5.40 |
| Net Change (FWP - FWOP) = | **-5.39** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -52.60 |
| B. Open Water Habitat Net AAHUs = | -5.39 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | **-37.37** |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 5

Project Area: 21.89
Saline Marsh 21.60
Open Water 0.29

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 98.68 | 0.99 | 98.26 | 0.98 | 79.74 | 0.82 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 12 | 0.38 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 11 | 1.00 | 11 | 1.00 | 11 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | **Emergent Marsh HSI =** | | **0.99** | **EM HSI =** | **0.99** | **EM HSI =** | **0.88** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.75** | **OW HSI =** | **0.75** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 5

Project Area: 21.89
Saline Marsh 21.60
Open Water 0.29

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 99 | 0.99 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 11 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | **Emergent Marsh HSI =** | | **0.99** | **EM HSI =** | **0.18** | **EM HSI =** | **0.18** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.75** | **OW HSI =** | **0.18** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 2: NOV Section 5

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 21.60 | 0.99 | 21.35 | |
| 1 | 21.51 | 0.99 | 21.22 | 21.29 |
| 50 | 17.46 | 0.88 | 15.40 | 893.72 |
| | | | AAHUs = | 18.30 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 21.60 | 0.99 | 21.35 | |
| 1 | 0.00 | 0.18 | 0.00 | 7.75 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.16 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.16 |
| B. Future Without Project Emergent Marsh AAHUs = | 18.30 |
| Net Change (FWP - FWOP) = | -18.15 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 2: NOV Section 5

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.29 | 0.75 | 0.22 | |
| 1 | 0.38 | 0.75 | 0.28 | 0.25 |
| 50 | 4.43 | 0.75 | 3.33 | 88.34 |
| | | | AAHUs = | 1.77 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.29 | 0.75 | 0.22 | |
| 1 | 0.00 | 0.18 | 0.00 | 0.08 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.00 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.00 |
| B. Future Without Project Open Water AAHUs = | 1.77 |
| Net Change (FWP - FWOP) = | -1.77 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -18.15 |
| B. Open Water Habitat Net AAHUs = | -1.77 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | -14.51 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 5 S/S    Acres: 2.96

Condition: Future With Project

| Variable | | TY 0 Class/Value | SI | TY 1 Class/Value | SI | TY 20 Class/Value | SI |
|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 1 | 0.20 | Class 1 | | Class 1 | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 6.49 | 0.08 | Age<br>dbh 0 | 0.00 | Age<br>dbh 0 | 0.00 |
| V3 | Understory / Midstory | Understory % 48.3<br>Midstory % 23.3 | 1.00 | Understory % 0<br>Midstory % 0 | | Understory % 0<br>Midstory % 0 | |
| V4 | Hydrology | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | |
| | Forest / marsh | 42 | 0.62 | 42 | 0.62 | 42 | 0.62 |
| | Abandoned Ag | 6 | | 6 | | 6 | |
| | Pasture / Hay | 39 | | 39 | | 39 | |
| | Active Ag | 2 | | 2 | | 2 | |
| | Development | 11 | | 11 | | 11 | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class 3 | 0.65 | Class 3 | 0.65 |
| | Distance | Class 2 | | Class 2 | | Class 2 | |
| | | HSI = | 0.28 | HSI = | | HSI = | |

1.00 0.10 0.10

1.00 0.10 0.10

Project: Alt 2: NOV SECTION 5 S/S

FWP

| Variable | | TY 50 Class/Value | SI | TY Class/Value | SI | TY Class/Value | SI |
|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 1 | | Class | | Class | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 0 | 0.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 |
| V3 | Understory / Midstory | Understory % 0<br>Midstory % 0 | | Understory %<br>Midstory % | | Understory %<br>Midstory % | |
| V4 | Hydrology | Class 2 | 0.50 | Class | | Class | |
| V5 | Forest Size | Class 1 | | Class | | Class | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | |
| | Forest / marsh | 42 | 0.62 | | | | |
| | Abandoned Ag | 6 | | | | | |
| | Pasture / Hay | 39 | | | | | |
| | Active Ag | 2 | | | | | |
| | Development | 11 | | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class | | Class | |
| | Distance | Class 2 | | Class | | Class | |
| | | HSI = | | HSI = | | HSI = | |

0.10

0.10

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 5 S/S — Acres: 2.96

Condition: Future Without Project

| Variable | | TY 0 Class/Value | SI | TY 1 Class/Value | SI | TY 20 Class/Value | SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 1 | 0.20 | 1 | 0.20 | 2 | 0.40 | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity (input age or dbh, not both) | dbh 6.49 | 0.08 | dbh 6.75 | 0.08 | dbh 10.41 | 0.26 | | | |
| V3 | Understory / Midstory | Understory % 48.3 | | Understory % 48.3 | | Understory % 20 | | 1.00 | 1.00 | 0.70 |
| | | Midstory % 23.3 | 1.00 | Midstory % 23.3 | 1.00 | Midstory % 20 | 0.85 | 1.00 | 1.00 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.62 | 42 | 0.62 | 42 | 0.62 | | | |
| | Abandoned Ag | 6 | | 6 | | 6 | | | | |
| | Pasture / Hay | 39 | | 39 | | 39 | | | | |
| | Active Ag | 2 | | 2 | | 2 | | | | |
| | Development | 11 | | 11 | | 11 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | Type | Class 3 | 0.65 | Class 3 | 0.65 | Class 3 | 0.65 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.28 | HSI = | 0.28 | HSI = | 0.45 | | | |

Project.......
FWOP

| Variable | | TY 50 Class/Value | SI | TY Class/Value | SI | TY Class/Value | SI | |
|---|---|---|---|---|---|---|---|---|
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 2 | 0.40 | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity (input age or dbh, not both) | dbh 16.01 | 0.73 | dbh | 0.00 | dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 5 | | Understory % | | Understory % | | 0.25 |
| | | Midstory % 20 | 0.63 | Midstory % | | Midstory % | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.62 | | | | | |
| | Abandoned Ag | 6 | | | | | | |
| | Pasture / Hay | 39 | | | | | | |
| | Active Ag | 2 | | | | | | |
| | Development | 11 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | Type | Class 3 | 0.65 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | 0.57 | HSI = | | HSI = | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:** Alt 2: NOV SECTION 5 S/S

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 2.96 | 0.28 | 0.82 | |
| 1 | 2.96 | 0.00 | 0.00 | 0.41 |
| 20 | 2.96 | 0.00 | 0.00 | 0.00 |
| 50 | 2.96 | 0.00 | 0.00 | 0.00 |
| | | | Total CHUs = | 0.41 |
| | | | AAHUs = | 0.01 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 2.96 | 0.28 | 0.82 | |
| 1 | 2.96 | 0.28 | 0.83 | 0.82 |
| 20 | 2.96 | 0.45 | 1.34 | 20.62 |
| 50 | 2.96 | 0.57 | 1.69 | 45.53 |
| | | | Total CHUs = | 66.98 |
| | | | AAHUs = | 1.34 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 0.41 |
| B. Future Without Project CHUs = | 66.98 |
| Net Change (FWP - FWOP) = | -66.57 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.01 |
| B. Future Without Project AAHUs = | 1.34 |
| Net Change (FWP - FWOP) = | -1.33 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 6

Condition: Future Without Project

| Project Area: | 25.04 |
|---|---|
| Saline Marsh | 20.34 |
| fresh marsh | 0.65 |
| open water | 4.05 |

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 83.83 | 0.85 | 83.47 | 0.85 | 67.74 | 0.71 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 70 | 0.86 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | 10 | | 0 | 0 | 0.4 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 13 | 1.00 | 13 | 1.00 | 13 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | **Emergent Marsh HSI =** | | **0.91** | **EM HSI =** | **0.91** | **EM HSI =** | **0.81** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.75** | **OW HSI =** | **0.74** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 6

Condition: Future With Project

| Project Area: | 25.04 |
|---|---|
| Saline Marsh | 20.34 |
| fresh marsh | 0.65 |
| open water | 4.05 |

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 84 | 0.85 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 13 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | **Emergent Marsh HSI =** | | **0.91** | **EM HSI =** | **0.18** | **EM HSI =** | **0.18** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.18** | **OW HSI =** | **0.18** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 2: NOV Section 6

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 20.99 | 0.91 | 19.08 | |
| 1 | 20.90 | 0.91 | 18.96 | 19.02 |
| 50 | 16.96 | 0.81 | 13.70 | 797.03 |
| | | | AAHUs = | 16.32 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 20.99 | 0.91 | 19.08 | |
| 1 | 0.00 | 0.18 | 0.00 | 6.98 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.14 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.14 |
| B. Future Without Project Emergent Marsh AAHUs = | 16.32 |
| Net Change (FWP - FWOP) = | -16.18 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 2: NOV Section 6

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 4.05 | 0.75 | 3.03 | |
| 1 | 4.14 | 0.75 | 3.09 | 3.06 |
| 50 | 8.08 | 0.74 | 5.98 | 222.58 |
| | | | AAHUs = | 4.51 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 4.05 | 0.75 | 3.03 | |
| 1 | 0.00 | 0.18 | 0.00 | 1.13 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.02 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.02 |
| B. Future Without Project Open Water AAHUs = | 4.51 |
| Net Change (FWP - FWOP) = | -4.49 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -16.18 |
| B. Open Water Habitat Net AAHUs = | -4.49 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | -13.58 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 7

Project Area: 22.14
Saline Marsh 20.24
Open Water 1.90

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 91.42 | 0.92 | 91.33 | 0.92 | 87.29 | 0.89 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 17 | 1.00 | 17 | 1.00 | 17 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | Emergent Marsh HSI = | | 0.95 | EM HSI = | 0.95 | EM HSI = | 0.92 | | | |
| | Open Water HSI = | | 0.75 | OW HSI = | 0.75 | OW HSI = | 0.74 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 7

Project Area: 22

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 91 | 0.92 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 17 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | Emergent Marsh HSI = | | 0.95 | EM HSI = | 0.18 | EM HSI = | 0.18 | | | |
| | Open Water HSI = | | 0.75 | OW HSI = | 0.18 | OW HSI = | 0.18 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 2: NOV Section 7

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 20.24 | 0.95 | 19.23 | |
| 1 | 20.22 | 0.95 | 19.20 | 19.21 |
| 50 | 19.33 | 0.92 | 17.85 | 907.52 |
| | | | AAHUs = | 18.53 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 20.24 | 0.95 | 19.23 | |
| 1 | 0.00 | 0.18 | 0.00 | 7.01 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.14 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.14 |
| B. Future Without Project Emergent Marsh AAHUs = | 18.53 |
| Net Change (FWP - FWOP) = | **-18.39** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 2: NOV Section 7

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 1.90 | 0.75 | 1.42 | |
| 1 | 1.92 | 0.75 | 1.44 | 1.43 |
| 50 | 2.81 | 0.74 | 2.09 | 86.45 |
| | | | AAHUs = | 1.76 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 1.90 | 0.75 | 1.42 | |
| 1 | 0.00 | 0.18 | 0.00 | 0.53 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.01 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.01 |
| B. Future Without Project Open Water AAHUs = | 1.76 |
| Net Change (FWP - FWOP) = | **-1.75** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -18.39 |
| B. Open Water Habitat Net AAHUs = | -1.75 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | **-14.70** |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 8

Project Area: 36.92
Saline Marsh 36.66
Open Water 0.22

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 99.38 | 99.29 | 91.33 | 0.92 | 94.89 | 0.95 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 10 | 1.00 | 10 | 1.00 | 10 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | **Emergent Marsh HSI =** | | **24.68** | **EM HSI =** | **0.95** | **EM HSI =** | **0.96** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.75** | **OW HSI =** | **0.74** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 2: NOV Section 8

Project Area: 36.92
36.66
0.22

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 99 | 0.99 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 100 | 1.00 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 10 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | **Emergent Marsh HSI =** | | **1.00** | **EM HSI =** | **0.18** | **EM HSI =** | **0.18** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.18** | **OW HSI =** | **0.18** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 2: NOV Section 8

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 36.69 | 24.68 | 905.59 | |
| 1 | 36.66 | 0.95 | 34.81 | 470.08 |
| 50 | 35.03 | 0.96 | 33.77 | 1680.52 |
| | | | AAHUs = | 43.01 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 36.69 | 1.00 | 36.57 | |
| 1 | 0.00 | 0.18 | 0.00 | 13.27 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.27 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.27 |
| B. Future Without Project Emergent Marsh AAHUs = | 43.01 |
| Net Change (FWP - FWOP) = | -42.75 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 2: NOV Section 8

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.23 | 0.75 | 0.17 | |
| 1 | 0.26 | 0.75 | 0.19 | 0.18 |
| 50 | 1.89 | 0.74 | 1.41 | 39.28 |
| | | | AAHUs = | 0.79 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.23 | 0.75 | 0.17 | |
| 1 | 0.00 | 0.18 | 0.00 | 0.06 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.00 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.00 |
| B. Future Without Project Open Water AAHUs = | 0.79 |
| Net Change (FWP - FWOP) = | -0.79 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -42.75 |
| B. Open Water Habitat Net AAHUs = | -0.79 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | -33.42 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 9- batture | Acres: 40.60

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 8.1 | 0.11 | Age<br>dbh 0 | 0.00 | Age<br>dbh 0 | 0.00 | | | |
| V3 | Understory / Midstory | Understory % 55<br>Midstory % 33 | 1.00 | Understory % 0<br>Midstory % 0 | | Understory % 0<br>Midstory % 0 | | 1.00<br>1.00 | 0.10<br>0.10 | 0.10<br>0.10 |
| V4 | Hydrology | Class 3 | 1.00 | Class 1 | 0.10 | Class 1 | 0.10 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | 0.37 | Values % | 0.37 | Values % | 0.37 | | | |
| | Forest / marsh | 10 | | 10 | | 10 | | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 0 | 0.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 0<br>Midstory % 0 | | Understory %<br>Midstory % | | Understory %<br>Midstory % | | 0.10<br>0.10 |
| V4 | Hydrology | Class 1 | 0.10 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | 0.37 | Values % | | Values % | | |
| | Forest / marsh | 10 | | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 9 Acres: 40.60

Condition: Future Without Project

| Variable | | TY 0 Class/Value | TY 0 SI | TY 1 Class/Value | TY 1 SI | TY 20 Class/Value | TY 20 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 2 | 0.40 | Class 2 | 0.40 | Class 2 | 0.40 | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 8.1 | 0.11 | Age<br>dbh 8.4 | 0.13 | Age<br>dbh 13.2 | 0.52 | | | |
| V3 | Understory / Midstory | Understory % 55<br>Midstory % 33 | 1.00 | Understory % 55<br>Midstory % 33 | 1.00 | Understory % 45<br>Midstory % 28 | 1.00 | 1.00<br>1.00 | 1.00<br>1.00 | 1.00<br>1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class 3 | 1.00 | Class 3 | 1.00 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 4 | 0.80 | Class 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 Class/Value | TY 50 SI | TY Class/Value | TY SI | TY Class/Value | TY SI | |
|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 4 | 0.80 | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 21.7 | 1.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 37<br>Midstory % 30 | 1.00 | Understory %<br>Midstory % | | Understory %<br>Midstory % | | 1.00<br>1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class | | Class | | |
| V5 | Forest Size | Class 4 | 0.80 | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

# AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 9**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 40.60 | 0.38 | 15.41 | |
| 1 | 40.60 | 0.00 | 0.00 | 7.71 |
| 20 | 40.60 | 0.00 | 0.00 | 0.00 |
| 50 | 40.60 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 7.71 |
| | | | AAHUs = | 0.15 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 40.60 | 0.38 | 15.41 | |
| 1 | 40.60 | 0.40 | 16.14 | 15.78 |
| 20 | 40.60 | 0.58 | 23.51 | 376.68 |
| 50 | 40.60 | 0.83 | 33.67 | 857.81 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 1250.27 |
| | | | AAHUs = | 25.01 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 7.71 |
| B. Future Without Project CHUs = | 1250.27 |
| Net Change (FWP - FWOP) = | -1242.57 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.15 |
| B. Future Without Project AAHUs = | 25.01 |
| Net Change (FWP - FWOP) = | -24.85 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 10- batture | Acres: 30.08

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 1 | | 1 | | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 0 | 0.00 | 0 | 0.00 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 1 | 0.10 | 1 | 0.10 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 1 | | 1 | | | | |
| | Surrounding | Values % | | Values % | | Values % | | | | |
| V6 | Land Use | | | | | | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 1 | | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 0 | | | | | | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 1 | 0.10 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 1 | | | | | | |
| | Surrounding | Values % | | Values % | | Values % | | |
| V6 | Land Use | | | | | | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 9 Acres: 30.08

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 2 | 0.40 | Class 2 | 0.40 | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 8.1 | 0.11 | Age<br>dbh 8.4 | 0.13 | Age<br>dbh 13.2 | 0.52 | | | |
| V3 | Understory / Midstory | Understory % 55<br>Midstory % 33 | 1.00 | Understory % 55<br>Midstory % 33 | 1.00 | Understory % 45<br>Midstory % 28 | 1.00 | 1.00<br>1.00 | 1.00<br>1.00 | 1.00<br>1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class 3 | 1.00 | Class 3 | 1.00 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 4 | 0.80 | Class 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 4 | 0.80 | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 21.7 | 1.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 37<br>Midstory % 30 | 1.00 | Understory %<br>Midstory % | | Understory %<br>Midstory % | | 1.00<br>1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class | | Class | | |
| V5 | Forest Size | Class 4 | 0.80 | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

# AAHU CALCULATION, Bottomland Hardwoods

## Project:NOV SECTION 10

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 30.08 | 0.38 | 11.42 | |
| 1 | 30.08 | 0.00 | 0.00 | 5.71 |
| 20 | 30.08 | 0.00 | 0.00 | 0.00 |
| 50 | 30.08 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 5.71 |
| | | | AAHUs = | 0.11 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 30.08 | 0.38 | 11.42 | |
| 1 | 30.08 | 0.40 | 11.96 | 11.69 |
| 20 | 30.08 | 0.58 | 17.42 | 279.08 |
| 50 | 30.08 | 0.83 | 24.95 | 635.54 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 926.31 |
| | | | AAHUs = | 18.53 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 5.71 |
| B. Future Without Project CHUs = | 926.31 |
| Net Change (FWP - FWOP) = | -920.60 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.11 |
| B. Future Without Project AAHUs = | 18.53 |
| Net Change (FWP - FWOP) = | -18.41 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 11- batture    Acres: 9.79

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 1 | | 1 | | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 0 | 0.00 | 0 | 0.00 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 1 | 0.10 | 1 | 0.10 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 1 | | 1 | | | | |
| | Surrounding | Values % | | Values % | | Values % | | | | |
| V6 | Land Use | | | | | | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 1 | | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 0 | | | | | | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 1 | 0.10 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 1 | | | | | | |
| | Surrounding | Values % | | Values % | | Values % | | |
| V6 | Land Use | | | | | | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 11 Acres: 9.79

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | |
|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 2 | 0.40 | Class 2 | 0.40 |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 8.1 | 0.11 | Age<br>dbh 8.4 | 0.13 | Age<br>dbh 13.2 | 0.52 |
| V3 | Understory / Midstory | Understory % 55<br>Midstory % 33 | 1.00 | Understory % 55<br>Midstory % 33 | 1.00 | Understory % 45<br>Midstory % 28 | 1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class 3 | 1.00 | Class 3 | 1.00 |
| V5 | Forest Size | Class 4 | 0.80 | Class 4 | 0.80 | Class 4 | 0.80 |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 |
| | Abandoned Ag | 0 | | 0 | | 0 | |
| | Pasture / Hay | 67 | | 67 | | 67 | |
| | Active Ag | 0 | | 0 | | 0 | |
| | Development | 23 | | 23 | | 23 | |
| V7 | Disturbance<br>Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 |
| | Distance | Class 2 | | Class 2 | | Class 2 | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 |

1.00 1.00 1.00

1.00 1.00 1.00

FWOP

| Variable | | TY 50 | | TY | | TY | |
|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI |
| V1 | Species Assoc. | Class 4 | 0.80 | Class | | Class | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 21.7 | 1.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 |
| V3 | Understory / Midstory | Understory % 37<br>Midstory % 30 | 1.00 | Understory %<br>Midstory % | | Understory %<br>Midstory % | |
| V4 | Hydrology | Class 3 | 1.00 | Class | | Class | |
| V5 | Forest Size | Class 4 | 0.80 | Class | | Class | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | |
| | Forest / marsh | 10 | 0.37 | | | | |
| | Abandoned Ag | 0 | | | | | |
| | Pasture / Hay | 67 | | | | | |
| | Active Ag | 0 | | | | | |
| | Development | 23 | | | | | |
| V7 | Disturbance<br>Type | Class 2 | 0.50 | Class | | Class | |
| | Distance | Class 2 | | Class | | Class | |
| | | HSI = | 0.83 | HSI = | | HSI = | |

1.00

1.00

## AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 11**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 9.79 | 0.38 | 3.72 | |
| 1 | 9.79 | 0.00 | 0.00 | 1.86 |
| **20** | 9.79 | 0.00 | 0.00 | 0.00 |
| **50** | 9.79 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 1.86 |
| | | | AAHUs = | 0.04 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 9.79 | 0.38 | 3.72 | |
| 1 | 9.79 | 0.40 | 3.89 | 3.80 |
| **20** | 9.79 | 0.58 | 5.67 | 90.83 |
| **50** | 9.79 | 0.83 | 8.12 | 206.85 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 301.48 |
| | | | AAHUs = | 6.03 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 1.86 |
| B. Future Without Project CHUs = | 301.48 |
| Net Change (FWP - FWOP) = | -299.62 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.04 |
| B. Future Without Project AAHUs = | 6.03 |
| Net Change (FWP - FWOP) = | -5.99 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: NOV 11- fresh marsh (batture)

Project Area: 20.40
Fresh............ 20.40
Intermediate..

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.6 | 0.44 | 37.6 | 0.44 | 37.6 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.56 | EM HSI = | 0.56 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.39 | OW HSI = | 0.39 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: NOV 11- fresh marsh (batture)

Project Area:
Fresh............ 20
Intermediate..

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.6 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.12 | EM HSI = | 0.12 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.12 | OW HSI = | 0.12 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** NOV 11- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 9.79 | 0.56 | 5.48 | |
| 1 | 9.79 | 0.56 | 5.48 | 5.48 |
| 50 | 9.79 | 0.56 | 5.47 | 268.42 |
| | | | AAHUs = | 5.48 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 9.79 | 0.56 | 5.48 | |
| 1 | 0 | 0.12 | 0.00 | 2.02 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.04 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.04 |
| B. Future Without Project Emergent Marsh AAHUs = | 5.48 |
| Net Change (FWP - FWOP) = | -5.44 |

## AAHU CALCULATION - OPEN WATER

**Project:** NOV 11- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 12.47 | 0.39 | 4.81 | |
| 1 | 12.47 | 0.39 | 4.81 | 4.81 |
| 50 | 12.47 | 0.39 | 4.89 | 237.58 |
| | | | AAHUs = | 4.85 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 12.47 | 0.39 | 4.81 | |
| 1 | 0 | 0.12 | 0.00 | 1.86 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.04 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.04 |
| B. Future Without Project Open Water AAHUs = | 4.85 |
| Net Change (FWP - FWOP) = | -4.81 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -5.44 |
| B. Open Water Habitat Net AAHUs = | -4.81 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | -5.24 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 12- batture    Acres: 15.04

Condition: Future With Project

| Variable | | TY 0 Class/Value | TY 0 SI | TY 1 Class/Value | TY 1 SI | TY 20 Class/Value | TY 20 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 2 | 0.40 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 8.1 | 0.11 | Age<br>dbh 0 | 0.00 | Age<br>dbh 0 | 0.00 | | | |
| V3 | Understory / | Understory % 55 | | Understory % 0 | | Understory % 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % 33 | 1.00 | Midstory % 0 | | Midstory % 0 | | 1.00 | 0.10 | 0.10 |
| V4 | Hydrology | Class 3 | 1.00 | Class 1 | 0.10 | Class 1 | 0.10 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 Class/Value | TY 50 SI | TY Class/Value | TY SI | TY Class/Value | TY SI | |
|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 0 | 0.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / | Understory % 0 | | Understory % | | Understory % | | 0.10 |
| | Midstory | Midstory % 0 | | Midstory % | | Midstory % | | 0.10 |
| V4 | Hydrology | Class 1 | 0.10 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 12      Acres: 15.04

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Class/Value** | **SI** | **Class/Value** | **SI** | **Class/Value** | **SI** | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 2 | 0.40 | 2 | 0.40 | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 8.4 | 0.13 | 13.2 | 0.52 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 55 | | 45 | | 1.00 | 1.00 | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 33 | 1.00 | 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 3 | 1.00 | 3 | 1.00 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | **HSI =** | **0.38** | **HSI =** | **0.40** | **HSI =** | **0.58** | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 21.7 | 1.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 37 | | | | | | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 30 | 1.00 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 3 | 1.00 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | **HSI =** | **0.83** | **HSI =** | | **HSI =** | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 12**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 15.04 | 0.38 | 5.71 | |
| 1 | 15.04 | 0.00 | 0.00 | 2.85 |
| 20 | 15.04 | 0.00 | 0.00 | 0.00 |
| 50 | 15.04 | 0.00 | 0.00 | 0.00 |
| | | | Total CHUs = | 2.85 |
| | | | AAHUs = | 0.06 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 15.04 | 0.38 | 5.71 | |
| 1 | 15.04 | 0.40 | 5.98 | 5.84 |
| 20 | 15.04 | 0.58 | 8.71 | 139.54 |
| 50 | 15.04 | 0.83 | 12.47 | 317.77 |
| | | | Total CHUs = | 463.15 |
| | | | AAHUs = | 9.26 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 2.85 |
| B. Future Without Project CHUs = | 463.15 |
| Net Change (FWP - FWOP) = | -460.30 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.06 |
| B. Future Without Project AAHUs = | 9.26 |
| Net Change (FWP - FWOP) = | -9.21 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 2: NOV 12- fresh marsh (batture)

Condition: Future Without Project

Project Area: 31.35
Fresh............ 31.35
Intermediate..

| Variable | | TY 0 | | TY 1 | | TY 50 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | SI | Value | SI | Value | SI | | | |
| V1 | % Emergent | 37.58 | 0.44 | 37.58 | 0.44 | 37.58 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | **Emergent Marsh HSI** | **=** | **0.56** | **EM HSI =** | **0.56** | **EM HSI =** | **0.56** | | | |
| | **Open Water HSI** | **=** | **0.39** | **OW HSI =** | **0.39** | **OW HSI =** | **0.39** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 2: NOV 12- fresh marsh (batture)

Condition: Future With Project

Project Area:
Fresh............ 31
Intermediate..

| Variable | | TY 0 | | TY 1 | | TY 50 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | SI | Value | SI | Value | SI | | | |
| V1 | % Emergent | 37.58 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | **Emergent Marsh HSI** | **=** | **0.56** | **EM HSI =** | **0.12** | **EM HSI =** | **0.12** | | | |
| | **Open Water HSI** | **=** | **0.39** | **OW HSI =** | **0.12** | **OW HSI =** | **0.12** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 2: NOV 12- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 11.78 | 0.56 | 6.60 | |
| 1 | 11.78 | 0.56 | 6.60 | 6.60 |
| 50 | 11.78 | 0.56 | 6.58 | 322.90 |
| | | | AAHUs = | 6.59 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 11.78 | 0.56 | 6.60 | |
| 1 | 0 | 0.12 | 0.00 | 2.43 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.05 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.05 |
| B. Future Without Project Emergent Marsh AAHUs = | 6.59 |
| Net Change (FWP - FWOP) = | **-6.54** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 2: NOV 12- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 19.57 | 0.39 | 7.54 | |
| 1 | 19.57 | 0.39 | 7.54 | 7.54 |
| 50 | 19.57 | 0.39 | 7.67 | 372.85 |
| | | | AAHUs = | 7.61 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 19.57 | 0.39 | 7.54 | |
| 1 | 0 | 0.12 | 0.00 | 2.92 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.06 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.06 |
| B. Future Without Project Open Water AAHUs = | 7.61 |
| Net Change (FWP - FWOP) = | **-7.55** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -6.54 |
| B. Open Water Habitat Net AAHUs = | -7.55 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | **-6.87** |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 15- batture    Acres: 5.76

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | | | |
| | | dbh 8.1 | 0.11 | dbh 0 | 0.00 | dbh 0 | 0.00 | | | |
| V3 | Understory / | Understory % 55 | | Understory % 0 | | Understory % 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % 33 | 1.00 | Midstory % 0 | | Midstory % 0 | | 1.00 | 0.10 | 0.10 |
| V4 | Hydrology | Class 3 | 1.00 | Class 1 | 0.10 | Class 1 | 0.10 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | |
| | | dbh 0 | 0.00 | dbh | 0.00 | dbh | 0.00 | |
| V3 | Understory / | Understory % 0 | | Understory % | | Understory % | | 0.10 |
| | Midstory | Midstory % 0 | | Midstory % | | Midstory % | | 0.10 |
| V4 | Hydrology | Class 1 | 0.10 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 15- batture  Acres: 5.76

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Class/Value** | **SI** | **Class/Value** | **SI** | **Class/Value** | **SI** | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 2 | 0.40 | 2 | 0.40 | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 8.4 | 0.13 | 13.2 | 0.52 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 55 | | 45 | | 1.00 | 1.00 | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 33 | 1.00 | 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 3 | 1.00 | 3 | 1.00 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | **HSI =** | **0.38** | **HSI =** | **0.40** | **HSI =** | **0.58** | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 21.7 | 1.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 37 | | | | | | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 30 | 1.00 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 3 | 1.00 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | **HSI =** | **0.83** | **HSI =** | | **HSI =** | | |

# AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 15**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 5.76 | 0.38 | 2.19 | |
| 1 | 5.76 | 0.00 | 0.00 | 1.09 |
| **20** | 5.76 | 0.00 | 0.00 | 0.00 |
| **50** | 5.76 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | **1.09** |
| | | | AAHUs = | **0.02** |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 5.76 | 0.38 | 2.19 | |
| 1 | 5.76 | 0.40 | 2.29 | 2.24 |
| **20** | 5.76 | 0.58 | 3.34 | 53.44 |
| **50** | 5.76 | 0.83 | 4.78 | 121.70 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 177.38 |
| | | | AAHUs = | **3.55** |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 1.09 |
| B. Future Without Project CHUs = | 177.38 |
| Net Change (FWP - FWOP) = | -176.29 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.02 |
| B. Future Without Project AAHUs = | 3.55 |
| Net Change (FWP - FWOP) = | -3.53 |

## WETLAND VALUE ASSESSMENT COMMUNITY MODEL
### Fresh/Intermediate Marsh

Project: Alt 2: NOV 15- fresh marsh (batture)

Project Are: 12.00
Fresh........... 12.00
Intermediate..

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.58 | 0.44 | 37.58 | 0.44 | 37.58 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI = | | 0.56 | EM HSI = | 0.56 | EM HSI = | 0.56 | | | |
| | Open Water HSI = | | 0.39 | OW HSI = | 0.39 | OW HSI = | 0.39 | | | |

## WETLAND VALUE ASSESSMENT COMMUNITY MODEL
### Fresh/Intermediate Marsh

Project: Alt 2: NOV 15- fresh marsh (batture)

Project Area:
Fresh......... 12
Intermediat

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.58 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI = | | 0.56 | EM HSI = | 0.12 | EM HSI = | 0.12 | | | |
| | Open Water HSI = | | 0.39 | OW HSI = | 0.12 | OW HSI = | 0.12 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 2: NOV 15- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 4.51 | 0.56 | 2.53 | |
| 1 | 4.51 | 0.56 | 2.53 | 2.53 |
| 50 | 4.51 | 0.56 | 2.52 | 123.62 |
| | | | AAHUs = | 2.52 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 4.51 | 0.56 | 2.53 | |
| 1 | 0 | 0.12 | 0.00 | 0.93 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.02 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.02 |
| B. Future Without Project Emergent Marsh AAHUs = | 2.52 |
| Net Change (FWP - FWOP) = | **-2.50** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 2: NOV 15- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 7.49 | 0.39 | 2.89 | |
| 1 | 7.49 | 0.39 | 2.89 | 2.89 |
| 50 | 7.49 | 0.39 | 2.94 | 142.70 |
| | | | AAHUs = | 2.91 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 7.49 | 0.39 | 2.89 | |
| 1 | 0 | 0.12 | 0.00 | 1.12 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.02 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.02 |
| B. Future Without Project Open Water AAHUs = | 2.91 |
| Net Change (FWP - FWOP) = | **-2.89** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -2.50 |
| B. Open Water Habitat Net AAHUs = | -2.89 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | **-2.63** |

# COMMUNITY HABITAT SUITABILITY MODEL

## Bottomland Hardwoods

Project: Alt 2: NOV SECTION 16- batture  Acres: 9.22

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 1 | | 1 | | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 0 | 0.00 | 0 | 0.00 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 1 | 0.10 | 1 | 0.10 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 1 | | 1 | | | | |
| | Surrounding | Values % | | Values % | | Values % | | | | |
| V6 | Land Use | | | | | | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 1 | | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 0 | | | | | | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 1 | 0.10 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 1 | | | | | | |
| | Surrounding | Values % | | Values % | | Values % | | |
| V6 | Land Use | | | | | | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 16 Acres: 9.22

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 2 | 0.40 | 2 | 0.40 | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 8.4 | 0.13 | 13.2 | 0.52 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 55 | | 45 | | 1.00 | 1.00 | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 33 | 1.00 | 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 3 | 1.00 | 3 | 1.00 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 21.7 | 1.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 37 | | | | | | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 30 | 1.00 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 3 | 1.00 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

# AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 16**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 9.22 | 0.38 | 3.50 | |
| 1 | 9.22 | 0.00 | 0.00 | 1.75 |
| 20 | 9.22 | 0.00 | 0.00 | 0.00 |
| 50 | 9.22 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 1.75 |
| | | | AAHUs = | 0.04 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 9.22 | 0.38 | 3.50 | |
| 1 | 9.22 | 0.40 | 3.66 | 3.58 |
| 20 | 9.22 | 0.58 | 5.34 | 85.54 |
| 50 | 9.22 | 0.83 | 7.65 | 194.80 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 283.93 |
| | | | AAHUs = | 5.68 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 1.75 |
| B. Future Without Project CHUs = | 283.93 |
| Net Change (FWP - FWOP) = | -282.18 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.04 |
| B. Future Without Project AAHUs = | 5.68 |
| Net Change (FWP - FWOP) = | -5.64 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 2: NOV 16- fresh marsh (batture)

Project Area: 19.21
Fresh............ 19.21
Intermediate..

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.58 | 0.44 | 37.58 | 0.44 | 37.58 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI = | | 0.56 | EM HSI = | 0.56 | EM HSI = | 0.56 | | | |
| | Open Water HSI = | | 0.39 | OW HSI = | 0.39 | OW HSI = | 0.39 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 2: NOV 16- fresh marsh (batture)

Project Area:
Fresh............. 19
Intermediate...

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.58 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI = | | 0.56 | EM HSI = | 0.12 | EM HSI = | 0.12 | | | |
| | Open Water HSI = | | 0.39 | OW HSI = | 0.12 | OW HSI = | 0.12 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 2: NOV 16- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 7.22 | 0.56 | 4.04 | |
| 1 | 7.22 | 0.56 | 4.04 | 4.04 |
| 50 | 7.22 | 0.56 | 4.03 | 197.91 |
| | | | AAHUs = | 4.04 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 7.22 | 0.56 | 4.04 | |
| 1 | 0 | 0.12 | 0.00 | 1.49 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.03 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.03 |
| B. Future Without Project Emergent Marsh AAHUs = | 4.04 |
| Net Change (FWP - FWOP) = | **-4.01** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 2: NOV 16- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 11.99 | 0.39 | 4.62 | |
| 1 | 11.99 | 0.39 | 4.62 | 4.62 |
| 50 | 11.99 | 0.39 | 4.70 | 228.44 |
| | | | AAHUs = | 4.66 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 11.99 | 0.39 | 4.62 | |
| 1 | 0 | 0.12 | 0.00 | 1.79 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.04 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.04 |
| B. Future Without Project Open Water AAHUs = | 4.66 |
| Net Change (FWP - FWOP) = | **-4.63** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -4.01 |
| B. Open Water Habitat Net AAHUs = | -4.63 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | **-4.21** |

# COMMUNITY HABITAT SUITABILITY MODEL

## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 1 DRY/ALTERED BLH Acres: 22.10

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class | | Class | | Class | | | | |
| | | 4 | 0.80 | 1 | | 1 | | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 13.3 | 0.53 | | 0.00 | 0 | 0.00 | | | |
| V3 | Understory / | Understory % | | Understory % | | Understory % | | | | |
| | Midstory | 42.9 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 53.6 | 0.98 | 0 | | 0 | | 0.96 | 0.10 | 0.10 |
| V4 | Hydrology | Class | | Class | | Class | | | | |
| | | 2 | 0.50 | 1 | 0.10 | 1 | 0.10 | | | |
| V5 | Forest Size | Class | | Class | | Class | | | | |
| | | 4 | 0.80 | 1 | | 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.61 | 42 | 0.61 | 42 | 0.61 | | | |
| | Abandoned Ag | 5 | | 5 | | 5 | | | | |
| | Pasture / Hay | 41 | | 41 | | 41 | | | | |
| | Active Ag | 1 | | 1 | | 1 | | | | |
| | Development | 11.74 | | 11.74 | | 11.74 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | Type | Class | | Class | | Class | | | | |
| | | 3 | 0.65 | 3 | 0.65 | 3 | 0.65 | | | |
| | Distance | Class | | Class | | Class | | | | |
| | | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.67 | HSI = | | HSI = | | | | |

Project: Alt 3: NOV SECTION 1 DRY/ALTERED BLH

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class | | Class | | Class | | |
| | | 1 | | | | | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| V3 | Understory / | Understory % | | Understory % | | Understory % | | |
| | Midstory | 0 | | | | | | 0.10 |
| | | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| V4 | Hydrology | Class | | Class | | Class | | |
| | | 1 | 0.10 | | | | | |
| V5 | Forest Size | Class | | Class | | Class | | |
| | | 1 | | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.61 | | | | | |
| | Abandoned Ag | 5 | | | | | | |
| | Pasture / Hay | 41 | | | | | | |
| | Active Ag | 1 | | | | | | |
| | Development | 11.74 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | Type | Class | | Class | | Class | | |
| | | 3 | 0.65 | | | | | |
| | Distance | Class | | Class | | Class | | |
| | | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

Project….. Alt 3: NOV SECTION 1 DRY/ALTERED BLH

# COMMUNITY HABITAT SUITABILITY MODEL

## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 1 DRY/ALTERED BLH     Acres: 22.10

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V2 | | Age | | Age | | Age | | | | |
| | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 13.3 | 0.53 | 13.57 | 0.56 | 10.09 | 0.24 | | | |
| V3 | | Understory % | | Understory % | | Understory % | | | | |
| | Understory / | 42.9 | | 42.9 | | 35.7 | | 1.00 | 1.00 | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 53.6 | 0.98 | 53.6 | 0.98 | 43.6 | 1.00 | 0.96 | 0.96 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.61 | 42 | 0.61 | 42 | 0.61 | | | |
| | Abandoned Ag | 5 | | 5 | | 5 | | | | |
| | Pasture / Hay | 41 | | 41 | | 41 | | | | |
| | Active Ag | 1 | | 1 | | 1 | | | | |
| | Development | 11.74 | | 11.74 | | 11.74 | | | | |
| V7 | Disturbance | Class | | Class | | Class | | | | |
| | Type | 3 | 0.65 | 3 | 0.65 | 3 | 0.65 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.67 | HSI = | 0.68 | HSI = | 0.54 | | | |

Project.......
FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| V2 | | Age | | Age | | Age | | |
| | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 18.5 | 0.90 | | 0.00 | | 0.00 | |
| V3 | | Understory % | | Understory % | | Understory % | | |
| | Understory / | 28.6 | | | | | | 0.96 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 35 | 0.98 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.61 | | | | | |
| | Abandoned Ag | 5 | | | | | | |
| | Pasture / Hay | 41 | | | | | | |
| | Active Ag | 1 | | | | | | |
| | Development | 11.74 | | | | | | |
| V7 | Disturbance | Class | | Class | | Class | | |
| | Type | 3 | 0.65 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | 0.77 | HSI = | | HSI = | | |

# AAHU CALCULATION, Bottomland Hardwoods

**Project:** Alt 3: NOV SECTION 1 DRY/ALTERED BLH

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 22.10 | 0.67 | 14.81 | |
| 1 | 22.10 | 0.00 | 0.00 | 7.41 |
| 20 | 22.10 | 0.00 | 0.00 | 0.00 |
| 50 | 22.10 | 0.00 | 0.00 | 0.00 |
| | | | Total CHUs = | 7.41 |
| | | | AAHUs = | 0.15 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 22.10 | 0.67 | 14.81 | |
| 1 | 22.10 | 0.68 | 15.01 | 14.91 |
| 20 | 22.10 | 0.54 | 12.02 | 256.80 |
| 50 | 22.10 | 0.77 | 17.06 | 436.22 |
| | | | Total CHUs = | 707.93 |
| | | | AAHUs = | 14.16 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 7.41 |
| B. Future Without Project CHUs = | 707.93 |
| Net Change (FWP - FWOP) = | -700.52 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.15 |
| B. Future Without Project AAHUs = | 14.16 |
| **Net Change (FWP - FWOP) =** | **-14.01** |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Brackish Marsh

Project: Alt 3: NOV SECTION 1

Project Area: 40.01
brackish marsh 40.01
open water 0

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 100 | 1.00 | 99.9 | 1.00 | 95.24 | 0.96 | | | |
| V2 | % Aquatic | 5 | 0.15 | 5 | 0.15 | 8 | 0.17 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 8 | 0.20 | 8 | 0.20 | 5 | 0.16 | | | |
| V5 | Salinity (ppt) | 5 | 1.00 | 5 | 1.00 | 5 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | Emergent Marsh HSI = | | 1.00 | EM HSI = | 1.00 | EM HSI = | 0.97 | | | |
| | Open Water HSI = | | 0.40 | OW HSI = | 0.40 | OW HSI = | 0.42 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Brackish Marsh

Project: Alt 3: NOV SECTION 1

Project Area: 40.01

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 100 | 1.00 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 5 | 0.15 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 8 | 0.20 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 5 | 1.00 | 16 | 0.10 | 16 | 0.10 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | Emergent Marsh HSI = | | 1.00 | EM HSI = | 0.10 | EM HSI = | 0.10 | | | |
| | Open Water HSI = | | 0.40 | OW HSI = | 0.10 | OW HSI = | 0.10 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV SECTION 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 40.01 | 1.00 | 39.83 | |
| 1 | 39.97 | 1.00 | 39.77 | 39.80 |
| 50 | 38.1 | 0.97 | 36.78 | 1875.04 |
| | | | AAHUs = | 38.30 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 40.01 | 1.00 | 39.83 | |
| 1 | 0.00 | 0.10 | 0.00 | 13.94 |
| 50 | 0.00 | 0.10 | 0.00 | 0.00 |
| | | | AAHUs | 0.28 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.28 |
| B. Future Without Project Emergent Marsh AAHUs = | 38.30 |
| Net Change (FWP - FWOP) = | -38.02 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV SECTION 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.00 | 0.40 | 0.00 | |
| 1 | 0.04 | 0.40 | 0.02 | 0.01 |
| 50 | 1.91 | 0.42 | 0.81 | 19.97 |
| | | | AAHUs = | 0.40 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 0.00 | 0.40 | 0.00 | |
| 1 | 0.00 | 0.10 | 0.00 | 0.00 |
| 50 | 0.00 | 0.10 | 0.00 | 0.00 |
| | | | AAHUs | 0.00 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.00 |
| B. Future Without Project Open Water AAHUs = | 0.40 |
| Net Change (FWP - FWOP) = | -0.40 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -38.02 |
| B. Open Water Habitat Net AAHUs = | -0.40 |
| Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6 | -27.57 |

## WETLAND VALUE ASSESSMENT COMMUNITY MODEL
### Fresh/Intermediate Marsh

Project: Alt 3: NOV Section 1

Condition: Future Without Project

| | |
|---|---|
| **Project Area:** | **128.68** |
| Int | 83.11 |
| Open Water | 45.57 |

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 64.59 | 0.68 | 64.14 | 0.68 | 45.81 | 0.51 | | | |
| V2 | % Aquatic | 5 | 0.15 | 5 | 0.15 | 8 | 0.17 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 70 | 0.86 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | 10 | | 0 | 0 | 0.4 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 25 | 0.38 | 25 | 0.38 | 25 | 0.38 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 0.96 | 0 | 0.96 | 0 | 0.96 | 1.00 | 1.00 | 1.00 |
| | intermediate | 3 | | 3 | | 3 | | 0.90 | 0.90 | 0.90 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 1.00 | | 1.00 | | 1.00 | | 1.00 | 1.00 | 1.00 |
| | Emergent Marsh HSI | = | 0.78 | EM HSI = | 0.78 | EM HSI = | 0.65 | | | |
| | Open Water HSI | = | 0.35 | OW HSI = | 0.35 | OW HSI = | 0.37 | | | |

## WETLAND VALUE ASSESSMENT COMMUNITY MODEL
### Fresh/Intermediate Marsh

Project: Alt 3: NOV Section 1

Condition: Future With Project

| | |
|---|---|
| **Project Area:** | **128.68** |
| Int | 83.11 |
| Open Water | 45.57 |

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 64.59 | 0.68 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 5 | 0.15 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 25 | 0.38 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 0.96 | 0 | 0.79 | 0 | 0.79 | 1.00 | 1.00 | 1.00 |
| | intermediate | 3 | | 5.5 | | 5.5 | | 0.90 | 0.40 | 0.40 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.26 | 0.00 | 0.26 | 1.00 | 0.30 | 0.30 |
| | intermediate | 1.00 | | 0.00 | | 0.00 | | 1.00 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.78 | EM HSI = | 0.19 | EM HSI = | 0.19 | | | |
| | Open Water HSI | = | 0.35 | OW HSI = | 0.17 | OW HSI = | 0.17 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV Section 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 83.11 | 0.78 | 64.72 | |
| 1 | 82.54 | 0.78 | 64.05 | 64.38 |
| 50 | 58.95 | 0.65 | 38.21 | 2480.66 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs = | 50.90 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 83.11 | 0.78 | 64.72 | |
| 1 | 0.00 | 0.19 | 0.00 | 24.21 |
| 50 | 0.00 | 0.19 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs | 0.48 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.48 |
| B. Future Without Project Emergent Marsh AAHUs = | 50.90 |
| Net Change (FWP - FWOP) = | -50.42 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV Section 1

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 45.57 | 0.35 | 16.11 | |
| 1 | 46.14 | 0.35 | 16.31 | 16.21 |
| 50 | 69.73 | 0.37 | 25.88 | 1030.32 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs = | 20.93 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 45.57 | 0.35 | 16.11 | |
| 1 | 0.00 | 0.17 | 0.00 | 6.68 |
| 50 | 0.00 | 0.17 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs | 0.13 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.13 |
| B. Future Without Project Open Water AAHUs = | 20.93 |
| Net Change (FWP - FWOP) = | -20.80 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -50.42 |
| B. Open Water Habitat Net AAHUs = | -20.80 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | -40.86 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 3: NOV Section 5

Project Area: 56.22
Saline Marsh 49.90
Open Water 6.32

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 88.76 | 0.90 | 88.38 | 0.90 | 71.73 | 0.75 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 12 | 0.38 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 11 | 1.00 | 11 | 1.00 | 11 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | Emergent Marsh HSI = | | 0.94 | EM HSI = | 0.93 | EM HSI = | 0.84 | | | |
| | Open Water HSI = | | 0.75 | OW HSI = | 0.75 | OW HSI = | 0.75 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 3: NOV Section 5

Project Area: 56.22
Saline Marsh 49.90
Open Water 6.32

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 89 | 0.90 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 11 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | Emergent Marsh HSI = | | 0.94 | EM HSI = | 0.18 | EM HSI = | 0.18 | | | |
| | Open Water HSI = | | 0.75 | OW HSI = | 0.18 | OW HSI = | 0.18 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV Section 5

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 49.90 | 0.94 | 46.69 | |
| 1 | 49.69 | 0.93 | 46.40 | 46.55 |
| 50 | 40.33 | 0.84 | 33.77 | 1956.76 |
| | | | AAHUs = | 40.07 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 49.90 | 0.94 | 46.69 | |
| 1 | 0.00 | 0.18 | 0.00 | 17.04 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.34 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.34 |
| B. Future Without Project Emergent Marsh AAHUs = | 40.07 |
| Net Change (FWP - FWOP) = | -39.73 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV Section 5

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 6.32 | 0.75 | 4.72 | |
| 1 | 6.53 | 0.75 | 4.88 | 4.80 |
| 50 | 15.89 | 0.75 | 11.93 | 411.66 |
| | | | AAHUs = | 8.33 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 6.32 | 0.75 | 4.72 | |
| 1 | 0.00 | 0.18 | 0.00 | 1.76 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.04 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.04 |
| B. Future Without Project Open Water AAHUs = | 8.33 |
| Net Change (FWP - FWOP) = | -8.29 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -39.73 |
| B. Open Water Habitat Net AAHUs = | -8.29 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | -32.74 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 5 S/S | Acres: 7.46

Condition: Future With Project

| Variable | | TY 0 Class/Value | TY 0 SI | TY 1 Class/Value | TY 1 SI | TY 20 Class/Value | TY 20 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 1 | 0.20 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 6.49 | 0.08 | Age<br>dbh 0 | 0.00 | Age<br>dbh 0 | 0.00 | | | |
| V3 | Understory / Midstory | Understory % 48.3<br>Midstory % 23.3 | 1.00 | Understory % 0<br>Midstory % 0 | | Understory % 0<br>Midstory % 0 | | 1.00<br>1.00 | 0.10<br>0.10 | 0.10<br>0.10 |
| V4 | Hydrology | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.62 | 42 | 0.62 | 42 | 0.62 | | | |
| | Abandoned Ag | 6 | | 6 | | 6 | | | | |
| | Pasture / Hay | 39 | | 39 | | 39 | | | | |
| | Active Ag | 2 | | 2 | | 2 | | | | |
| | Development | 11 | | 11 | | 11 | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class 3 | 0.65 | Class 3 | 0.65 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.28 | HSI = | | HSI = | | | | |

Project: Alt 3: NOV SECTION 5 S/S

FWP

| Variable | | TY 50 Class/Value | TY 50 SI | TY Class/Value | TY SI | TY Class/Value | TY SI | |
|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 0 | 0.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 0<br>Midstory % 0 | | Understory %<br>Midstory % | | Understory %<br>Midstory % | | 0.10<br>0.10 |
| V4 | Hydrology | Class 2 | 0.50 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.62 | | | | | |
| | Abandoned Ag | 6 | | | | | | |
| | Pasture / Hay | 39 | | | | | | |
| | Active Ag | 2 | | | | | | |
| | Development | 11 | | | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL

## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 5 S/S Acres: 7.46

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 1 | 0.20 | 1 | 0.20 | 2 | 0.40 | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or dbh, not both) | dbh | | dbh | | dbh | | | | |
| | | 6.49 | 0.08 | 6.75 | 0.08 | 10.41 | 0.26 | | | |
| V3 | Understory / Midstory | Understory % | | Understory % | | Understory % | | | | |
| | | 48.3 | | 48.3 | | 20 | | 1.00 | 1.00 | 0.70 |
| | | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 23.3 | 1.00 | 23.3 | 1.00 | 20 | 0.85 | 1.00 | 1.00 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.62 | 42 | 0.62 | 42 | 0.62 | | | |
| | Abandoned Ag | 6 | | 6 | | 6 | | | | |
| | Pasture / Hay | 39 | | 39 | | 39 | | | | |
| | Active Ag | 2 | | 2 | | 2 | | | | |
| | Development | 11 | | 11 | | 11 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | | Class | | Class | | Class | | | | |
| | Type | 3 | 0.65 | 3 | 0.65 | 3 | 0.65 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.28 | HSI = | 0.28 | HSI = | 0.45 | | | |

Project.......
FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 2 | 0.40 | | | | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or dbh, not both) | dbh | | dbh | | dbh | | |
| | | 16.01 | 0.73 | | 0.00 | | 0.00 | |
| V3 | Understory / Midstory | Understory % | | Understory % | | Understory % | | |
| | | 5 | | | | | | 0.25 |
| | | Midstory % | | Midstory % | | Midstory % | | |
| | | 20 | 0.63 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.62 | | | | | |
| | Abandoned Ag | 6 | | | | | | |
| | Pasture / Hay | 39 | | | | | | |
| | Active Ag | 2 | | | | | | |
| | Development | 11 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | | Class | | Class | | Class | | |
| | Type | 3 | 0.65 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | 0.57 | HSI = | | HSI = | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:** Alt 3: NOV SECTION 5 S/S

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 7.46 | 0.28 | 2.06 | |
| 1 | 7.46 | 0.00 | 0.00 | 1.03 |
| 20 | 7.46 | 0.00 | 0.00 | 0.00 |
| 50 | 7.46 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 1.03 |
| | | | AAHUs = | 0.02 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 7.46 | 0.28 | 2.06 | |
| 1 | 7.46 | 0.28 | 2.09 | 2.08 |
| 20 | 7.46 | 0.45 | 3.38 | 51.96 |
| 50 | 7.46 | 0.57 | 4.27 | 114.76 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 168.80 |
| | | | AAHUs = | 3.38 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 1.03 |
| B. Future Without Project CHUs = | 168.80 |
| Net Change (FWP - FWOP) = | -167.77 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.02 |
| B. Future Without Project AAHUs = | 3.38 |
| Net Change (FWP - FWOP) = | -3.36 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 3: NOV Section 6

Condition: Future Without Project

Project Area: 109.61
Saline Marsh 69.75
fresh marsh 0.65
open water 39.2

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 64.24 | 0.68 | 63.96 | 0.68 | 51.91 | 0.57 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 70 | 0.86 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | 10 | | 0 | 0 | 0.4 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 13 | 1.00 | 13 | 1.00 | 13 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | **Emergent Marsh HSI =** | | **0.80** | **EM HSI =** | **0.80** | **EM HSI =** | **0.72** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.75** | **OW HSI =** | **0.74** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 3: NOV Section 6

Condition: Future With Project

Project Area: 109.61
Saline Marsh 69.75
fresh marsh 0.65
open water 39.2

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 64 | 0.68 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 13 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | **Emergent Marsh HSI =** | | **0.80** | **EM HSI =** | **0.18** | **EM HSI =** | **0.18** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.18** | **OW HSI =** | **0.18** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV Section 6

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 70.41 | 0.80 | 56.26 | |
| 1 | 70.11 | 0.80 | 55.91 | 56.08 |
| 50 | 56.90 | 0.72 | 40.68 | 2357.55 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs = | 48.27 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 70.41 | 0.80 | 56.26 | |
| 1 | 0.00 | 0.18 | 0.00 | 20.83 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs | 0.42 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.42 |
| B. Future Without Project Emergent Marsh AAHUs = | 48.27 |
| Net Change (FWP - FWOP) = | -47.86 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV Section 6

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 39.20 | 0.75 | 29.30 | |
| 1 | 39.50 | 0.75 | 29.53 | 29.42 |
| 50 | 52.71 | 0.74 | 39.01 | 1680.08 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs = | 34.19 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 39.20 | 0.75 | 29.30 | |
| 1 | 0.00 | 0.18 | 0.00 | 10.94 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | AAHUs | 0.22 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.22 |
| B. Future Without Project Open Water AAHUs = | 34.19 |
| Net Change (FWP - FWOP) = | -33.97 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -47.86 |
| B. Open Water Habitat Net AAHUs = | -33.97 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | -44.77 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 7 DRY/ALTERED BLH (PS) Acres: 22.91

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 13.3 | 0.53 | Age<br>dbh | 0.00 | Age<br>dbh 0 | 0.00 | | | |
| V3 | Understory / Midstory | Understory % 42.9<br>Midstory % 53.6 | 0.98 | Understory % 0<br>Midstory % 0 | | Understory % 0<br>Midstory % 0 | | 1.00<br>0.96 | 0.10<br>0.10 | 0.10<br>0.10 |
| V4 | Hydrology | Class 2 | 0.50 | Class 1 | 0.10 | Class 1 | 0.10 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.61 | 42 | 0.61 | 42 | 0.61 | | | |
| | Abandoned Ag | 5 | | 5 | | 5 | | | | |
| | Pasture / Hay | 41 | | 41 | | 41 | | | | |
| | Active Ag | 1 | | 1 | | 1 | | | | |
| | Development | 11.74 | | 11.74 | | 11.74 | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class 3 | 0.65 | Class 3 | 0.65 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.67 | HSI = | | HSI = | | | | |

Project: Alt 3: NOV SECTION 7 DRY/ALTERED BLH (PS)

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 0 | 0.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 0<br>Midstory % 0 | | Understory %<br>Midstory % | | Understory %<br>Midstory % | | 0.10<br>0.10 |
| V4 | Hydrology | Class 1 | 0.10 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.61 | | | | | |
| | Abandoned Ag | 5 | | | | | | |
| | Pasture / Hay | 41 | | | | | | |
| | Active Ag | 1 | | | | | | |
| | Development | 11.74 | | | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 7 DRY/ALTERED BLH (PS) Acres: 22.91

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 13.3 | 0.53 | 13.57 | 0.56 | 10.09 | 0.24 | | | |
| V3 | Understory / | Understory % 42.9 | | Understory % 42.9 | | Understory % 35.7 | | 1.00 | 1.00 | 1.00 |
| | Midstory | Midstory % 53.6 | 0.98 | Midstory % 53.6 | 0.98 | Midstory % 43.6 | 1.00 | 0.96 | 0.96 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.61 | 42 | 0.61 | 42 | 0.61 | | | |
| | Abandoned Ag | 5 | | 5 | | 5 | | | | |
| | Pasture / Hay | 41 | | 41 | | 41 | | | | |
| | Active Ag | 1 | | 1 | | 1 | | | | |
| | Development | 11.74 | | 11.74 | | 11.74 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | | Class | | Class | | Class | | | | |
| | Type | 3 | 0.65 | 3 | 0.65 | 3 | 0.65 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | **HSI =** | **0.67** | **HSI =** | **0.68** | **HSI =** | **0.54** | | | |

Project.......
FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 18.5 | 0.90 | | 0.00 | | 0.00 | |
| V3 | Understory / | Understory % 28.6 | | Understory % | | Understory % | | 0.96 |
| | Midstory | Midstory % 35 | 0.98 | Midstory % | | Midstory % | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.61 | | | | | |
| | Abandoned Ag | 5 | | | | | | |
| | Pasture / Hay | 41 | | | | | | |
| | Active Ag | 1 | | | | | | |
| | Development | 11.74 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | | Class | | Class | | Class | | |
| | Type | 3 | 0.65 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | **HSI =** | **0.77** | **HSI =** | | **HSI =** | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:** Alt 3: NOV SECTION 7 DRY/ALTERED BLH (PS)

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 22.91 | 0.67 | 15.36 | |
| 1 | 22.91 | 0.00 | 0.00 | 7.68 |
| **20** | 22.91 | 0.00 | 0.00 | 0.00 |
| **50** | 22.91 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | **Total CHUs =** | **7.68** |
| | | | **AAHUs =** | **0.15** |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 22.91 | 0.67 | 15.36 | |
| 1 | 22.91 | 0.68 | 15.56 | 15.46 |
| **20** | 22.91 | 0.54 | 12.46 | 266.21 |
| **50** | 22.91 | 0.77 | 17.69 | 452.20 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | **Total CHUs =** | 733.87 |
| | | | **AAHUs =** | **14.68** |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 7.68 |
| B. Future Without Project CHUs = | 733.87 |
| Net Change (FWP - FWOP) = | -726.19 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.15 |
| B. Future Without Project AAHUs = | 14.68 |
| **Net Change (FWP - FWOP) =** | **-14.52** |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 3: NOV Section 7

Project Area: 128.76
Saline Marsh 120.17
Open Water 8.60

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 93.33 | 0.94 | 93.24 | 0.94 | 89.12 | 0.90 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 17 | 1.00 | 17 | 1.00 | 17 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | **Emergent Marsh HSI =** | | **0.96** | **EM HSI =** | **0.96** | **EM HSI =** | **0.93** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.75** | **OW HSI =** | **0.74** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alt 3: NOV Section 7

Project Area: 128.76
Saline Marsh 120.17
Open Water 8.60

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 93 | 0.94 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 17 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | **Emergent Marsh HSI =** | | **0.96** | **EM HSI =** | **0.18** | **EM HSI =** | **0.18** | | | |
| | **Open Water HSI =** | | **0.75** | **OW HSI =** | **0.18** | **OW HSI =** | **0.18** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV Section 7

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 120.17 | 0.96 | 115.40 | |
| 1 | 120.06 | 0.96 | 115.23 | 115.31 |
| 50 | 114.75 | 0.93 | 107.09 | 5445.79 |
| | | | AAHUs = | 111.22 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 120.17 | 0.96 | 115.40 | |
| 1 | 0.00 | 0.18 | 0.00 | 42.01 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.84 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.84 |
| B. Future Without Project Emergent Marsh AAHUs = | 111.22 |
| Net Change (FWP - FWOP) = | **-110.38** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV Section 7

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 8.59 | 0.75 | 6.42 | |
| 1 | 8.70 | 0.75 | 6.50 | 6.46 |
| 50 | 14.01 | 0.74 | 10.43 | 415.05 |
| | | | AAHUs = | 8.43 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 8.59 | 0.75 | 6.42 | |
| 1 | 0.00 | 0.18 | 0.00 | 2.40 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.05 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.05 |
| B. Future Without Project Open Water AAHUs = | 8.43 |
| Net Change (FWP - FWOP) = | **-8.38** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -110.38 |
| B. Open Water Habitat Net AAHUs = | -8.38 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | **-87.72** |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 3: NOV SECTION 7 (wet pasture)

Project Area: 104
Fresh............ 68
Intermediate.. 0

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 65.83 | 0.69 | 65.83 | 0.69 | 63.85 | 0.67 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 10 | 0.19 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 50 | 0.65 | 50 | 0.65 | 50 | 0.65 | 1 | 1 | 1 |
| | Class 2 | 20 | | 20 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | 30 | | 30 | | 30 | | 0.1 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 25 | 0.38 | 25 | 0.38 | 25 | 0.38 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 0.00 | 0.30 | 0.00 | 0.30 | 0.00 | 0.30 | 0.30 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.65 | EM HSI = | 0.65 | EM HSI = | 0.64 | | | |
| | Open Water HSI | = | 0.32 | OW HSI = | 0.32 | OW HSI = | 0.32 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 3: NOV SECTION 7 (wet pasture)

Project Area:
Fresh............ 68
Intermediate.. 0

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 20 Value | TY 20 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 65.83 | 0.69 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 50 | 0.65 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 20 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | 30 | | 100 | | 100 | | 0.1 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 25 | 0.38 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 0.00 | 0.30 | 0.00 | 0.30 | 0.00 | 0.30 | 0.30 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.65 | EM HSI = | 0.22 | EM HSI = | 0.22 | | | |
| | Open Water HSI | = | 0.32 | OW HSI = | 0.19 | OW HSI = | 0.19 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV SECTION 7 (wet pasture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 68.19 | 0.65 | 44.45 | |
| 1 | 68.19 | 0.65 | 44.45 | 44.45 |
| 50 | 68.19 | 0.64 | 43.76 | 2161.22 |
| | | | AAHUs = | 44.11 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 68.19 | 0.65 | 44.45 | |
| 1 | 0.00 | 0.22 | 0.00 | 17.27 |
| 50 | 0.00 | 0.22 | 0.00 | 0.00 |
| | | | AAHUs | 0.35 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.35 |
| B. Future Without Project Emergent Marsh AAHUs = | 44.11 |
| Net Change (FWP - FWOP) = | -43.77 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV SECTION 7 (wet pasture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 35.40 | 0.32 | 11.19 | |
| 1 | 35.40 | 0.32 | 11.19 | 11.19 |
| 50 | 35.40 | 0.32 | 11.19 | 548.35 |
| | | | AAHUs = | 11.19 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 35.40 | 0.32 | 11.19 | |
| 1 | 0.00 | 0.19 | 0.00 | 4.86 |
| 50 | 0.00 | 0.19 | 0.00 | 0.00 |
| | | | AAHUs | 0.10 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.10 |
| B. Future Without Project Open Water AAHUs = | 11.19 |
| Net Change (FWP - FWOP) = | -11.09 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -43.77 |
| B. Open Water Habitat Net AAHUs = | -11.09 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | -33.23 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alternative 3: NOV Section 8

Project Area: 206.48
Saline Marsh 197.57
Open Water 8.91

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 95.68 | 0.96 | 95.6 | 0.96 | 91.37 | 0.92 | | | |
| V2 | % Aquatic | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | 90 | 0.96 | 80 | 0.92 | 1 | 1 | 1 |
| | Class 2 | 10 | | 10 | | 20 | | 0.6 | 0.6 | 0.6 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 10 | 0.23 | 10 | 0.23 | | | |
| V5 | Salinity (ppt) | 10 | 1.00 | 10 | 1.00 | 10 | 1.00 | | | |
| V6 | Access Value | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | |
| | Emergent Marsh HSI = | | 0.97 | EM HSI = | 0.97 | EM HSI = | 0.95 | | | |
| | Open Water HSI = | | 0.75 | OW HSI = | 0.75 | OW HSI = | 0.74 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Saline Marsh

Project: Alternative 3: NOV Section 8

Project Area: 206.48
Saline Marsh 197.57
Open Water 8.91

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 96 | 0.96 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.37 | 0 | 0.30 | 0 | 0.30 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 90 | 0.96 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | 10 | | | | | | 0.6 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | | | | | | | 0 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 10 | 0.23 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | 10 | 1.00 | 24 | 0.79 | 24 | 0.79 | | | |
| V6 | Access Value | 1.00 | 1.00 | 0.00 | 0.10 | 0.00 | 0.10 | | | |
| | Emergent Marsh HSI = | | 0.97 | EM HSI = | 0.18 | EM HSI = | 0.18 | | | |
| | Open Water HSI = | | 0.75 | OW HSI = | 0.18 | OW HSI = | 0.18 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alternative 3: NOV Section 8

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 197.57 | 0.97 | 192.19 | |
| 1 | 197.39 | 0.97 | 191.93 | 192.06 |
| 50 | 188.66 | 0.95 | 178.35 | 9069.93 |
| | | | AAHUs = | 185.24 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 197.57 | 0.97 | 192.19 | |
| 1 | 0.00 | 0.18 | 0.00 | 69.89 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 1.40 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 1.40 |
| B. Future Without Project Emergent Marsh AAHUs = | 185.24 |
| Net Change (FWP - FWOP) = | **-183.84** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alternative 3: NOV Section 8

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 8.91 | 0.75 | 6.66 | |
| 1 | 9.09 | 0.75 | 6.80 | 6.73 |
| 50 | 17.82 | 0.74 | 13.27 | 491.78 |
| | | | AAHUs = | 9.97 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 8.91 | 0.75 | 6.66 | |
| 1 | 0.00 | 0.18 | 0.00 | 2.49 |
| 50 | 0.00 | 0.18 | 0.00 | 0.00 |
| | | | AAHUs | 0.05 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.05 |
| B. Future Without Project Open Water AAHUs = | 9.97 |
| Net Change (FWP - FWOP) = | **-9.92** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -183.84 |
| B. Open Water Habitat Net AAHUs = | -9.92 |
| Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5 | **-145.19** |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 9 Scrub-Shrub    Acres: 50.19

Condition: Future With Project

| Variable | | TY 0 Class/Value | TY 0 SI | TY 1 Class/Value | TY 1 SI | TY 20 Class/Value | TY 20 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 1 | 0.20 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 6.49 | 0.08 | Age<br>dbh 0 | 0.00 | Age<br>dbh 0 | 0.00 | | | |
| V3 | Understory / Midstory | Understory % 48.3<br>Midstory % 23.3 | 1.00 | Understory % 0<br>Midstory % 0 | | Understory % 0<br>Midstory % 0 | | 1.00<br>1.00 | 0.10<br>0.10 | 0.10<br>0.10 |
| V4 | Hydrology | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.62 | 42 | 0.62 | 42 | 0.62 | | | |
| | Abandoned Ag | 6 | | 6 | | 6 | | | | |
| | Pasture / Hay | 39 | | 39 | | 39 | | | | |
| | Active Ag | 2 | | 2 | | 2 | | | | |
| | Development | 11 | | 11 | | 11 | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class 3 | 0.65 | Class 3 | 0.65 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.28 | HSI = | | HSI = | | | | |

Project: Alt 3: NOV SECTION 9 Scrub-Shrub

FWP

| Variable | | TY 50 Class/Value | TY 50 SI | TY Class/Value | TY SI | TY Class/Value | TY SI | |
|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 0 | 0.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 0<br>Midstory % 0 | | Understory %<br>Midstory % | | Understory %<br>Midstory % | | 0.10<br>0.10 |
| V4 | Hydrology | Class 2 | 0.50 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.62 | | | | | |
| | Abandoned Ag | 6 | | | | | | |
| | Pasture / Hay | 39 | | | | | | |
| | Active Ag | 2 | | | | | | |
| | Development | 11 | | | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 9 Scrub-Shrub Acres: 50.19

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 1 | 0.20 | Class 1 | 0.20 | Class 2 | 0.40 | | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | | | |
| | | dbh 6.49 | 0.08 | dbh 6.75 | 0.08 | dbh 10.41 | 0.26 | | | |
| V3 | Understory / Midstory | Understory % 48.3 | | Understory % 48.3 | | Understory % 20 | | 1.00 | 1.00 | 0.70 |
| | | Midstory % 23.3 | 1.00 | Midstory % 23.3 | 1.00 | Midstory % 20 | 0.85 | 1.00 | 1.00 | 1.00 |
| V4 | Hydrology | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 4 | 0.80 | Class 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 42 | 0.62 | 42 | 0.62 | 42 | 0.62 | | | |
| | Abandoned Ag | 6 | | 6 | | 6 | | | | |
| | Pasture / Hay | 39 | | 39 | | 39 | | | | |
| | Active Ag | 2 | | 2 | | 2 | | | | |
| | Development | 11 | | 11 | | 11 | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class 3 | 0.65 | Class 3 | 0.65 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.28 | HSI = | 0.28 | HSI = | 0.45 | | | |

Project.......
FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | |
| | | dbh 16.01 | 0.73 | dbh | 0.00 | dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 5 | | Understory % | | Understory % | | 0.25 |
| | | Midstory % 20 | 0.63 | Midstory % | | Midstory % | | 1.00 |
| V4 | Hydrology | Class 2 | 0.50 | Class | | Class | | |
| V5 | Forest Size | Class 4 | 0.80 | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 42 | 0.62 | | | | | |
| | Abandoned Ag | 6 | | | | | | |
| | Pasture / Hay | 39 | | | | | | |
| | Active Ag | 2 | | | | | | |
| | Development | 11 | | | | | | |
| V7 | Disturbance Type | Class 3 | 0.65 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | 0.57 | HSI = | | HSI = | | |

# AAHU CALCULATION, Bottomland Hardwoods

**Project:** Alt 3: NOV SECTION 9 Scrub-Shrub

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 50.19 | 0.28 | 13.86 | |
| 1 | 50.19 | 0.00 | 0.00 | 6.93 |
| 20 | 50.19 | 0.00 | 0.00 | 0.00 |
| 50 | 50.19 | 0.00 | 0.00 | 0.00 |
| | | | Total CHUs = | 6.93 |
| | | | AAHUs = | 0.14 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 50.19 | 0.28 | 13.86 | |
| 1 | 50.19 | 0.28 | 14.07 | 13.96 |
| 20 | 50.19 | 0.45 | 22.73 | 349.61 |
| 50 | 50.19 | 0.57 | 28.74 | 772.07 |
| | | | Total CHUs = | 1135.64 |
| | | | AAHUs = | 22.71 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 6.93 |
| B. Future Without Project CHUs = | 1135.64 |
| Net Change (FWP - FWOP) = | -1128.71 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.14 |
| B. Future Without Project AAHUs = | 22.71 |
| Net Change (FWP - FWOP) = | -22.57 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 9- batture  Acres: 76.27

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | | | |
| | | dbh 8.1 | 0.11 | dbh 0 | 0.00 | dbh 0 | 0.00 | | | |
| V3 | Understory / Midstory | Understory % 55 | | Understory % 0 | | Understory % 0 | | 1.00 | 0.10 | 0.10 |
| | | Midstory % 33 | 1.00 | Midstory % 0 | | Midstory % 0 | | 1.00 | 0.10 | 0.10 |
| V4 | Hydrology | Class 3 | 1.00 | Class 1 | 0.10 | Class 1 | 0.10 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | |
| | | dbh 0 | 0.00 | dbh | 0.00 | dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 0 | | Understory % | | Understory % | | 0.10 |
| | | Midstory % 0 | | Midstory % | | Midstory % | | 0.10 |
| V4 | Hydrology | Class 1 | 0.10 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL

## Bottomland Hardwoods

Project: NOV SECTION 9 Acres: 76.27

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 2 | 0.40 | Class 2 | 0.40 | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or dbh, not both) | dbh 8.1 | 0.11 | dbh 8.4 | 0.13 | dbh 13.2 | 0.52 | | | |
| V3 | Understory / Midstory | Understory % 55 | | Understory % 55 | | Understory % 45 | | 1.00 | 1.00 | 1.00 |
| | | Midstory % 33 | 1.00 | Midstory % 33 | 1.00 | Midstory % 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class 3 | 1.00 | Class 3 | 1.00 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 4 | 0.80 | Class 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 4 | 0.80 | Class | | Class | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or dbh, not both) | dbh 21.7 | 1.00 | dbh | 0.00 | dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 37 | | Understory % | | Understory % | | 1.00 |
| | | Midstory % 30 | 1.00 | Midstory % | | Midstory % | | 1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class | | Class | | |
| V5 | Forest Size | Class 4 | 0.80 | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

# AAHU CALCULATION, Bottomland Hardwoods

## Project:NOV SECTION 9

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 76.27 | 0.38 | 28.95 | |
| 1 | 76.27 | 0.00 | 0.00 | 14.48 |
| 20 | 76.27 | 0.00 | 0.00 | 0.00 |
| 50 | 76.27 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 14.48 |
| | | | AAHUs = | 0.29 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 76.27 | 0.38 | 28.95 | |
| 1 | 76.27 | 0.40 | 30.32 | 29.64 |
| 20 | 76.27 | 0.58 | 44.17 | 707.63 |
| 50 | 76.27 | 0.83 | 63.26 | 1611.46 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 2348.72 |
| | | | AAHUs = | 46.97 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 14.48 |
| B. Future Without Project CHUs = | 2348.72 |
| Net Change (FWP - FWOP) = | -2334.25 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.29 |
| B. Future Without Project AAHUs = | 46.97 |
| Net Change (FWP - FWOP) = | -46.68 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 10- batture    Acres: 276.72

Condition: Future With Project

| Variable | | TY 0 Class/Value | TY 0 SI | TY 1 Class/Value | TY 1 SI | TY 20 Class/Value | TY 20 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class<br>2 | 0.40 | Class<br>1 | | Class<br>1 | | | | |
| V2 | Maturity<br>(input age or dbh, not both) | Age<br>dbh<br>8.1 | 0.11 | Age<br>dbh<br>0 | 0.00 | Age<br>dbh<br>0 | 0.00 | | | |
| V3 | Understory / Midstory | Understory %<br>55 | | Understory %<br>0 | | Understory %<br>0 | | 1.00 | 0.10 | 0.10 |
| | | Midstory %<br>33 | 1.00 | Midstory %<br>0 | | Midstory %<br>0 | | 1.00 | 0.10 | 0.10 |
| V4 | Hydrology | Class<br>3 | 1.00 | Class<br>1 | 0.10 | Class<br>1 | 0.10 | | | |
| V5 | Forest Size | Class<br>4 | 0.80 | Class<br>1 | | Class<br>1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance<br>Type | Class<br>2 | 0.50 | Class<br>2 | 0.50 | Class<br>2 | 0.50 | | | |
| | Distance | Class<br>2 | | Class<br>2 | | Class<br>2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 Class/Value | TY 50 SI | TY Class/Value | TY SI | TY Class/Value | TY SI | |
|---|---|---|---|---|---|---|---|---|
| V1 | Species Assoc. | Class<br>1 | | Class | | Class | | |
| V2 | Maturity<br>(input age or dbh, not both) | Age<br>dbh<br>0 | 0.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory %<br>0 | | Understory % | | Understory % | | 0.10 |
| | | Midstory %<br>0 | | Midstory % | | Midstory % | | 0.10 |
| V4 | Hydrology | Class<br>1 | 0.10 | Class | | Class | | |
| V5 | Forest Size | Class<br>1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance<br>Type | Class<br>2 | 0.50 | Class | | Class | | |
| | Distance | Class<br>2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 9 Acres: 276.72

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 2 | 0.40 | Class 2 | 0.40 | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 8.1 | 0.11 | Age<br>dbh 8.4 | 0.13 | Age<br>dbh 13.2 | 0.52 | | | |
| V3 | Understory / Midstory | Understory % 55 | | Understory % 55 | | Understory % 45 | | 1.00 | 1.00 | 1.00 |
| | | Midstory % 33 | 1.00 | Midstory % 33 | 1.00 | Midstory % 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class 3 | 1.00 | Class 3 | 1.00 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 4 | 0.80 | Class 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 4 | 0.80 | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 21.7 | 1.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 37 | | Understory % | | Understory % | | 1.00 |
| | | Midstory % 30 | 1.00 | Midstory % | | Midstory % | | 1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class | | Class | | |
| V5 | Forest Size | Class 4 | 0.80 | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

# AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 10**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 276.72 | 0.38 | 105.05 | |
| 1 | 276.72 | 0.00 | 0.00 | 52.52 |
| 20 | 276.72 | 0.00 | 0.00 | 0.00 |
| 50 | 276.72 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 52.52 |
| | | | AAHUs = | 1.05 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 276.72 | 0.38 | 105.05 | |
| 1 | 276.72 | 0.40 | 110.00 | 107.52 |
| 20 | 276.72 | 0.58 | 160.26 | 2567.39 |
| 50 | 276.72 | 0.83 | 229.52 | 5846.64 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 8521.56 |
| | | | AAHUs = | 170.43 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 52.52 |
| B. Future Without Project CHUs = | 8521.56 |
| Net Change (FWP - FWOP) = | -8469.03 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 1.05 |
| B. Future Without Project AAHUs = | 170.43 |
| Net Change (FWP - FWOP) = | -169.38 |

# COMMUNITY HABITAT SUITABILITY MODEL

## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 11- batture　　　　Acres: 33.26

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 1 | | Class 1 | | | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | | | |
| | | dbh 8.1 | 0.11 | dbh 0 | 0.00 | dbh 0 | 0.00 | | | |
| V3 | Understory / | Understory % 55 | | Understory % 0 | | Understory % 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % 33 | 1.00 | Midstory % 0 | | Midstory % 0 | | 1.00 | 0.10 | 0.10 |
| V4 | Hydrology | Class 3 | 1.00 | Class 1 | 0.10 | Class 1 | 0.10 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 1 | | Class 1 | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 1 | | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age | | Age | | Age | | |
| | | dbh 0 | 0.00 | dbh | 0.00 | dbh | 0.00 | |
| V3 | Understory / | Understory % 0 | | Understory % | | Understory % | | 0.10 |
| | Midstory | Midstory % 0 | | Midstory % | | Midstory % | | 0.10 |
| V4 | Hydrology | Class 1 | 0.10 | Class | | Class | | |
| V5 | Forest Size | Class 1 | | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 11 Acres: 33.26

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class | | Class | | Class | | | | |
| | | 2 | 0.40 | 2 | 0.40 | 2 | 0.40 | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 8.4 | 0.13 | 13.2 | 0.52 | | | |
| V3 | Understory / Midstory | Understory % | | Understory % | | Understory % | | | | |
| | | 55 | | 55 | | 45 | | 1.00 | 1.00 | 1.00 |
| | | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 33 | 1.00 | 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| V4 | Hydrology | Class | | Class | | Class | | | | |
| | | 3 | 1.00 | 3 | 1.00 | 3 | 1.00 | | | |
| V5 | Forest Size | Class | | Class | | Class | | | | |
| | | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class | | Class | | Class | | |
| | | 4 | 0.80 | | | | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 21.7 | 1.00 | | 0.00 | | 0.00 | |
| V3 | Understory / Midstory | Understory % | | Understory % | | Understory % | | |
| | | 37 | | | | | | 1.00 |
| | | Midstory % | | Midstory % | | Midstory % | | |
| | | 30 | 1.00 | | | | | 1.00 |
| V4 | Hydrology | Class | | Class | | Class | | |
| | | 3 | 1.00 | | | | | |
| V5 | Forest Size | Class | | Class | | Class | | |
| | | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 11**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 33.26 | 0.38 | 12.63 | |
| 1 | 33.26 | 0.00 | 0.00 | 6.31 |
| 20 | 33.26 | 0.00 | 0.00 | 0.00 |
| 50 | 33.26 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 6.31 |
| | | | AAHUs = | 0.13 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 33.26 | 0.38 | 12.63 | |
| 1 | 33.26 | 0.40 | 13.22 | 12.92 |
| 20 | 33.26 | 0.58 | 19.26 | 308.58 |
| 50 | 33.26 | 0.83 | 27.59 | 702.73 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 1024.24 |
| | | | AAHUs = | 20.48 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 6.31 |
| B. Future Without Project CHUs = | 1024.24 |
| Net Change (FWP - FWOP) = | -1017.92 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.13 |
| B. Future Without Project AAHUs = | 20.48 |
| Net Change (FWP - FWOP) = | -20.36 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 3: NOV 11- fresh marsh (batture)

Project Area: 69.32
Fresh............ 69.32
Intermediate..

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.58 | 0.44 | 37.58 | 0.44 | 37.58 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.56 | EM HSI = | 0.56 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.39 | OW HSI = | 0.39 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 3: NOV 11- fresh marsh (batture)

Project Area:
Fresh............ 69
Intermediate..

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.58 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.12 | EM HSI = | 0.12 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.12 | OW HSI = | 0.12 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV 11- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 26.05 | 0.56 | 14.59 | |
| 1 | 26.05 | 0.56 | 14.59 | 14.59 |
| 50 | 26.05 | 0.56 | 14.56 | 714.06 |
| | | | AAHUs = | 14.57 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 26.05 | 0.56 | 14.59 | |
| 1 | 0 | 0.12 | 0.00 | 5.36 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.11 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.11 |
| B. Future Without Project Emergent Marsh AAHUs = | 14.57 |
| Net Change (FWP - FWOP) = | -14.47 |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV 11- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 43.28 | 0.39 | 16.68 | |
| 1 | 43.28 | 0.39 | 16.68 | 16.68 |
| 50 | 43.28 | 0.39 | 16.97 | 824.58 |
| | | | AAHUs = | 16.83 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 43.28 | 0.39 | 16.68 | |
| 1 | 0 | 0.12 | 0.00 | 6.46 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.13 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.13 |
| B. Future Without Project Open Water AAHUs = | 16.83 |
| Net Change (FWP - FWOP) = | -16.70 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -14.47 |
| B. Open Water Habitat Net AAHUs = | -16.70 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | -15.19 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3- NOV SECTION 12- batture    Acres: 37.03

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 1 | | 1 | | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 0 | 0.00 | 0 | 0.00 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 1 | 0.10 | 1 | 0.10 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 1 | | 1 | | | | |
| | Surrounding | Values % | | Values % | | Values % | | | | |
| V6 | Land Use | | | | | | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 1 | | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 0 | | | | | | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 1 | 0.10 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 1 | | | | | | |
| | Surrounding | Values % | | Values % | | Values % | | |
| V6 | Land Use | | | | | | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 12 Acres: 37.03

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 2 | 0.40 | 2 | 0.40 | | | |
| V2 | Maturity | Age | | Age | | Age | | | | |
| | (input age or dbh, not both) | dbh | | dbh | | dbh | | | | |
| | | 8.1 | 0.11 | 8.4 | 0.13 | 13.2 | 0.52 | | | |
| V3 | Understory / Midstory | Understory % | | Understory % | | Understory % | | | | |
| | | 55 | | 55 | | 45 | | 1.00 | 1.00 | 1.00 |
| | | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 33 | 1.00 | 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 3 | 1.00 | 3 | 1.00 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| V2 | Maturity | Age | | Age | | Age | | |
| | (input age or dbh, not both) | dbh | | dbh | | dbh | | |
| | | 21.7 | 1.00 | | 0.00 | | 0.00 | |
| V3 | Understory / Midstory | Understory % | | Understory % | | Understory % | | |
| | | 37 | | | | | | 1.00 |
| | | Midstory % | | Midstory % | | Midstory % | | |
| | | 30 | 1.00 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 3 | 1.00 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 12**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 37.03 | 0.38 | 14.06 | |
| 1 | 37.03 | 0.00 | 0.00 | 7.03 |
| 20 | 37.03 | 0.00 | 0.00 | 0.00 |
| 50 | 37.03 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 7.03 |
| | | | AAHUs = | 0.14 |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 37.03 | 0.38 | 14.06 | |
| 1 | 37.03 | 0.40 | 14.72 | 14.39 |
| 20 | 37.03 | 0.58 | 21.45 | 343.56 |
| 50 | 37.03 | 0.83 | 30.71 | 782.38 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Total CHUs = | 1140.33 |
| | | | AAHUs = | 22.81 |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 7.03 |
| B. Future Without Project CHUs = | 1140.33 |
| Net Change (FWP - FWOP) = | -1133.31 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.14 |
| B. Future Without Project AAHUs = | 22.81 |
| Net Change (FWP - FWOP) = | -22.67 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: NOV 12- fresh marsh (batture)

Project Area: 31.35
Fresh............ 31.35
Intermediate..

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.56 | 0.44 | 37.56 | 0.44 | 37.56 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | **Emergent Marsh HSI =** | | **0.56** | **EM HSI =** | **0.56** | **EM HSI =** | **0.56** | | | |
| | **Open Water HSI =** | | **0.39** | **OW HSI =** | **0.39** | **OW HSI =** | **0.39** | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: NOV 12- fresh marsh (batture)

Project Area:
Fresh............ 31
Intermediate...

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.56 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | **Emergent Marsh HSI =** | | **0.56** | **EM HSI =** | **0.12** | **EM HSI =** | **0.12** | | | |
| | **Open Water HSI =** | | **0.39** | **OW HSI =** | **0.39** | **OW HSI =** | **0.12** | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** NOV 12- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 29.00 | 0.56 | 16.24 | |
| 1 | 29.00 | 0.56 | 16.24 | 16.24 |
| 50 | 29.00 | 0.56 | 16.20 | 794.74 |
| | | | AAHUs = | 16.22 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 29.00 | 0.56 | 16.24 | |
| 1 | 0.00 | 0.12 | 0.00 | 5.97 |
| 50 | 0.00 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.12 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.12 |
| B. Future Without Project Emergent Marsh AAHUs = | 16.22 |
| Net Change (FWP - FWOP) = | -16.10 |

## AAHU CALCULATION - OPEN WATER

**Project:** NOV 12- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 48.20 | 0.39 | 18.58 | |
| 1 | 48.20 | 0.39 | 18.58 | 18.58 |
| 50 | 48.20 | 0.39 | 18.90 | 918.32 |
| | | | AAHUs = | 18.74 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 48.20 | 0.39 | 18.58 | |
| 1 | 0.00 | 0.12 | 0.00 | 7.19 |
| 50 | 0.00 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.14 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.14 |
| B. Future Without Project Open Water AAHUs = | 18.74 |
| Net Change (FWP - FWOP) = | -18.59 |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -16.10 |
| B. Open Water Habitat Net AAHUs = | -18.59 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | -16.90 |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 15- batture    Acres: 5.67

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 1 | | 1 | | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 0 | 0.00 | 0 | 0.00 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 1 | 0.10 | 1 | 0.10 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 1 | | 1 | | | | |
| | Surrounding | Values % | | Values % | | Values % | | | | |
| V6 | Land Use | | | | | | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 1 | | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 0 | | | | | | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 1 | 0.10 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 1 | | | | | | |
| | Surrounding | Values % | | Values % | | Values % | | |
| V6 | Land Use | | | | | | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 15- batture Acres: 5.67

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| V1 | Species Assoc. | Class 2 | 0.40 | Class 2 | 0.40 | Class 2 | 0.40 | | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 8.1 | 0.11 | Age<br>dbh 8.4 | 0.13 | Age<br>dbh 13.2 | 0.52 | | | |
| V3 | Understory / Midstory | Understory % 55 | | Understory % 55 | | Understory % 45 | | 1.00 | 1.00 | 1.00 |
| | | Midstory % 33 | 1.00 | Midstory % 33 | 1.00 | Midstory % 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class 3 | 1.00 | Class 3 | 1.00 | | | |
| V5 | Forest Size | Class 4 | 0.80 | Class 4 | 0.80 | Class 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | Type | Class 2 | 0.50 | Class 2 | 0.50 | Class 2 | 0.50 | | | |
| | Distance | Class 2 | | Class 2 | | Class 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| V1 | Species Assoc. | Class 4 | 0.80 | Class | | Class | | |
| V2 | Maturity (input age or dbh, not both) | Age<br>dbh 21.7 | 1.00 | Age<br>dbh | 0.00 | Age<br>dbh | 0.00 | |
| V3 | Understory / Midstory | Understory % 37 | | Understory % | | Understory % | | 1.00 |
| | | Midstory % 30 | 1.00 | Midstory % | | Midstory % | | 1.00 |
| V4 | Hydrology | Class 3 | 1.00 | Class | | Class | | |
| V5 | Forest Size | Class 4 | 0.80 | Class | | Class | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | Type | Class 2 | 0.50 | Class | | Class | | |
| | Distance | Class 2 | | Class | | Class | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

## AAHU CALCULATION, Bottomland Hardwoods

### Project:NOV SECTION 15

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| **TY** | **Acres** | **x HSI** | **HUs** | **HUs** |
| 0 | 5.67 | 0.38 | 2.15 | |
| 1 | 5.67 | 0.00 | 0.00 | 1.08 |
| **20** | 5.67 | 0.00 | 0.00 | 0.00 |
| **50** | 5.67 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | **Total CHUs =** | **1.08** |
| | | | **AAHUs =** | **0.02** |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| **TY** | **Acres** | **x HSI** | **HUs** | **HUs** |
| 0 | 5.67 | 0.38 | 2.15 | |
| 1 | 5.67 | 0.40 | 2.25 | 2.20 |
| **20** | 5.67 | 0.58 | 3.28 | 52.61 |
| **50** | 5.67 | 0.83 | 4.70 | 119.80 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | **Total CHUs =** | 174.61 |
| | | | **AAHUs =** | **3.49** |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 1.08 |
| B. Future Without Project CHUs = | 174.61 |
| Net Change (FWP - FWOP) = | -173.53 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.02 |
| B. Future Without Project AAHUs = | 3.49 |
| Net Change (FWP - FWOP) = | -3.47 |

## WETLAND VALUE ASSESSMENT COMMUNITY MODEL
### Fresh/Intermediate Marsh

Project: Alt 3: NOV 15- fresh marsh (batture)

Project Area: 11.81
Fresh............ 11.81
Intermediate..

Condition: Future Without Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.6 | 0.44 | 37.6 | 0.44 | 37.6 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.56 | EM HSI = | 0.56 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.39 | OW HSI = | 0.39 | | | |

## WETLAND VALUE ASSESSMENT COMMUNITY MODEL
### Fresh/Intermediate Marsh

Project: Alt 3: NOV 15- fresh marsh (batture)

Project Area:
Fresh............ 12
Intermediate...

Condition: Future With Project

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.6 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.12 | EM HSI = | 0.12 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.12 | OW HSI = | 0.12 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV 15- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 4.44 | 0.56 | 2.49 | |
| 1 | 4.44 | 0.56 | 2.49 | 2.49 |
| 50 | 4.44 | 0.56 | 2.48 | 121.74 |
| | | | AAHUs = | 2.48 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 4.44 | 0.56 | 2.49 | |
| 1 | 0 | 0.12 | 0.00 | 0.91 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.02 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.02 |
| B. Future Without Project Emergent Marsh AAHUs = | 2.48 |
| Net Change (FWP - FWOP) = | **-2.47** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV 15- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 7.38 | 0.39 | 2.84 | |
| 1 | 7.38 | 0.39 | 2.84 | 2.84 |
| 50 | 7.38 | 0.39 | 2.89 | 140.61 |
| | | | AAHUs = | 2.87 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 7.38 | 0.39 | 2.84 | |
| 1 | 0 | 0.12 | 0.00 | 1.10 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.02 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.02 |
| B. Future Without Project Open Water AAHUs = | 2.87 |
| Net Change (FWP - FWOP) = | **-2.85** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -2.47 |
| B. Open Water Habitat Net AAHUs = | -2.85 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | **-2.59** |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: Alt 3: NOV SECTION 16- batture  Acres: 25.54

Condition: Future With Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 1 | | 1 | | | | |
| | | Age | | Age | | Age | | | | |
| V2 | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 0 | 0.00 | 0 | 0.00 | | | |
| | | Understory % | | Understory % | | Understory % | | | | |
| V3 | Understory / | 55 | | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 0 | | 0 | | 1.00 | 0.10 | 0.10 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 1 | 0.10 | 1 | 0.10 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 1 | | 1 | | | | |
| | Surrounding | Values % | | Values % | | Values % | | | | |
| V6 | Land Use | | | | | | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| | Disturbance | | | | | | | | | |
| V7 | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | | HSI = | | | | |

FWP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 1 | | | | | | |
| | | Age | | Age | | Age | | |
| V2 | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 0 | 0.00 | | 0.00 | | 0.00 | |
| | | Understory % | | Understory % | | Understory % | | |
| V3 | Understory / | 0 | | | | | | 0.10 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 0 | | | | | | 0.10 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 1 | 0.10 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 1 | | | | | | |
| | Surrounding | Values % | | Values % | | Values % | | |
| V6 | Land Use | | | | | | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| | Disturbance | | | | | | | |
| V7 | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | | HSI = | | HSI = | | |

# COMMUNITY HABITAT SUITABILITY MODEL
## Bottomland Hardwoods

Project: NOV SECTION 16 Acres: 25.54

Condition: Future Without Project

| Variable | | TY 0 | | TY 1 | | TY 20 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Class/Value** | **SI** | **Class/Value** | **SI** | **Class/Value** | **SI** | | | |
| | | Class | | Class | | Class | | | | |
| V1 | Species Assoc. | 2 | 0.40 | 2 | 0.40 | 2 | 0.40 | | | |
| V2 | | Age | | Age | | Age | | | | |
| | Maturity | | | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | | | |
| | dbh, not both) | 8.1 | 0.11 | 8.4 | 0.13 | 13.2 | 0.52 | | | |
| V3 | | Understory % | | Understory % | | Understory % | | | | |
| | Understory / | 55 | | 55 | | 45 | | 1.00 | 1.00 | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | | | |
| | | 33 | 1.00 | 33 | 1.00 | 28 | 1.00 | 1.00 | 1.00 | 1.00 |
| | | Class | | Class | | Class | | | | |
| V4 | Hydrology | 3 | 1.00 | 3 | 1.00 | 3 | 1.00 | | | |
| | | Class | | Class | | Class | | | | |
| V5 | Forest Size | 4 | 0.80 | 4 | 0.80 | 4 | 0.80 | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | | | |
| | Forest / marsh | 10 | 0.37 | 10 | 0.37 | 10 | 0.37 | | | |
| | Abandoned Ag | 0 | | 0 | | 0 | | | | |
| | Pasture / Hay | 67 | | 67 | | 67 | | | | |
| | Active Ag | 0 | | 0 | | 0 | | | | |
| | Development | 23 | | 23 | | 23 | | | | |
| V7 | Disturbance | | | | | | | | | |
| | | Class | | Class | | Class | | | | |
| | Type | 2 | 0.50 | 2 | 0.50 | 2 | 0.50 | | | |
| | | Class | | Class | | Class | | | | |
| | Distance | 2 | | 2 | | 2 | | | | |
| | | HSI = | 0.38 | HSI = | 0.40 | HSI = | 0.58 | | | |

FWOP

| Variable | | TY 50 | | TY | | TY | | |
|---|---|---|---|---|---|---|---|---|
| | | Class/Value | SI | Class/Value | SI | Class/Value | SI | |
| | | Class | | Class | | Class | | |
| V1 | Species Assoc. | 4 | 0.80 | | | | | |
| V2 | | Age | | Age | | Age | | |
| | Maturity | | | | | | | |
| | (input age or | dbh | | dbh | | dbh | | |
| | dbh, not both) | 21.7 | 1.00 | | 0.00 | | 0.00 | |
| V3 | | Understory % | | Understory % | | Understory % | | |
| | Understory / | 37 | | | | | | 1.00 |
| | Midstory | Midstory % | | Midstory % | | Midstory % | | |
| | | 30 | 1.00 | | | | | 1.00 |
| | | Class | | Class | | Class | | |
| V4 | Hydrology | 3 | 1.00 | | | | | |
| | | Class | | Class | | Class | | |
| V5 | Forest Size | 4 | 0.80 | | | | | |
| V6 | Surrounding Land Use | Values % | | Values % | | Values % | | |
| | Forest / marsh | 10 | 0.37 | | | | | |
| | Abandoned Ag | 0 | | | | | | |
| | Pasture / Hay | 67 | | | | | | |
| | Active Ag | 0 | | | | | | |
| | Development | 23 | | | | | | |
| V7 | Disturbance | | | | | | | |
| | | Class | | Class | | Class | | |
| | Type | 2 | 0.50 | | | | | |
| | | Class | | Class | | Class | | |
| | Distance | 2 | | | | | | |
| | | HSI = | 0.83 | HSI = | | HSI = | | |

## AAHU CALCULATION, Bottomland Hardwoods

**Project:NOV SECTION 16**

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 25.54 | 0.38 | 9.70 | |
| 1 | 25.54 | 0.00 | 0.00 | 4.85 |
| **20** | 25.54 | 0.00 | 0.00 | 0.00 |
| **50** | 25.54 | 0.00 | 0.00 | 0.00 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | **Total CHUs =** | **4.85** |
| | | | **AAHUs =** | **0.10** |

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Acres | x HSI | HUs | HUs |
| 0 | 25.54 | 0.38 | 9.70 | |
| 1 | 25.54 | 0.40 | 10.15 | 9.92 |
| **20** | 25.54 | 0.58 | 14.79 | 236.96 |
| **50** | 25.54 | 0.83 | 21.18 | 539.62 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | **Total CHUs =** | 786.50 |
| | | | **AAHUs =** | **15.73** |

| NET CHANGE IN CHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project CHUs = | 4.85 |
| B. Future Without Project CHUs = | 786.50 |
| Net Change (FWP - FWOP) = | -781.65 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project AAHUs = | 0.10 |
| B. Future Without Project AAHUs = | 15.73 |
| Net Change (FWP - FWOP) = | -15.63 |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 3: NOV 16- fresh marsh (batture)

Condition: Future Without Project

Project Area: 53.23
Fresh............ 53.23
Intermediate..

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.57 | 0.44 | 37.57 | 0.44 | 37.57 | 0.44 | | | |
| V2 | % Aquatic | 10 | 0.19 | 10 | 0.19 | 12 | 0.21 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | 40 | 0.52 | 30 | 0.51 | 1 | 1 | 1 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | 35 | | 0 | 0 | 0.4 |
| | Class 4 | 60 | | 60 | | 35 | | 0.2 | 0.2 | 0.2 |
| | Class 5 | | | | | | | 0 | 0 | 0 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 50 | 0.66 | 40 | 0.55 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 0 | 1.00 | 0 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.56 | EM HSI = | 0.56 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.39 | OW HSI = | 0.39 | | | |

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL
## Fresh/Intermediate Marsh

Project: Alt 3: NOV 16- fresh marsh (batture)

Condition: Future With Project

Project Area:
Fresh............ 53
Intermediate...

| Variable | | TY 0 Value | TY 0 SI | TY 1 Value | TY 1 SI | TY 50 Value | TY 50 SI | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V1 | % Emergent | 37.57 | 0.44 | 0 | 0.10 | 0 | 0.10 | | | |
| V2 | % Aquatic | 10 | 0.19 | 0 | 0.10 | 0 | 0.10 | | | |
| V3 | Interspersion | % | | % | | % | | | | |
| | Class 1 | 40 | 0.52 | | 0.10 | | 0.10 | 1 | 0 | 0 |
| | Class 2 | | | | | | | 0 | 0 | 0 |
| | Class 3 | | | | | | | 0 | 0 | 0 |
| | Class 4 | 60 | | | | | | 0.2 | 0 | 0 |
| | Class 5 | | | 100 | | 100 | | 0 | 0.1 | 0.1 |
| V4 | %OW <= 1.5ft | 50 | 0.66 | 0 | 0.10 | 0 | 0.10 | | | |
| V5 | Salinity (ppt) | | | | | | | | | |
| | fresh | 0 | 1.00 | 5 | 0.10 | 5 | 0.10 | 1.00 | 0.10 | 0.10 |
| | intermediate | 0 | | 0 | | 0 | | 1.00 | 1.00 | 1.00 |
| V6 | Access Value | | | | | | | | | |
| | fresh | 1.00 | 1.00 | 0.00 | 0.30 | 0.00 | 0.30 | 1.00 | 0.30 | 0.30 |
| | intermediate | 0.00 | | 0.00 | | 0.00 | | 0.20 | 0.20 | 0.20 |
| | Emergent Marsh HSI | = | 0.56 | EM HSI = | 0.12 | EM HSI = | 0.12 | | | |
| | Open Water HSI | = | 0.39 | OW HSI = | 0.12 | OW HSI = | 0.12 | | | |

## AAHU CALCULATION - EMERGENT MARSH

**Project:** Alt 3: NOV 16- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 20.00 | 0.56 | 11.20 | |
| 1 | 20.00 | 0.56 | 11.20 | 11.20 |
| 50 | 20.00 | 0.56 | 11.18 | 548.16 |
| | | | AAHUs = | 11.19 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Marsh Acres | x HSI | HUs | HUs |
| 0 | 20.00 | 0.56 | 11.20 | |
| 1 | 0.00 | 0.12 | 0.00 | 4.12 |
| 50 | 0.00 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.08 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Emergent Marsh AAHUs = | 0.08 |
| B. Future Without Project Emergent Marsh AAHUs = | 11.19 |
| Net Change (FWP - FWOP) = | **-11.10** |

## AAHU CALCULATION - OPEN WATER

**Project:** Alt 3: NOV 16- fresh marsh (batture)

| Future Without Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 33.23 | 0.39 | 12.81 | |
| 1 | 33.23 | 0.39 | 12.81 | 12.81 |
| 50 | 33.23 | 0.39 | 13.03 | 633.11 |
| | | | AAHUs = | 12.92 |

| Future With Project | | | Total | Cummulative |
|---|---|---|---|---|
| TY | Water Acres | x HSI | HUs | HUs |
| 0 | 33.23 | 0.39 | 12.81 | |
| 1 | 0 | 0.12 | 0.00 | 4.96 |
| 50 | 0 | 0.12 | 0.00 | 0.00 |
| | | | AAHUs | 0.10 |

| NET CHANGE IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Future With Project Open Water AAHUs = | 0.10 |
| B. Future Without Project Open Water AAHUs = | 12.92 |
| Net Change (FWP - FWOP) = | **-12.82** |

| TOTAL BENEFITS IN AAHUs DUE TO PROJECT | |
|---|---|
| A. Emergent Marsh Habitat Net AAHUs = | -11.10 |
| B. Open Water Habitat Net AAHUs = | -12.82 |
| Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1 | **-11.66** |

# APPENDIX B
# FIELD DATA SHEETS

M_Sect1

#1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 9/3/09 Time:________ Project: Plaquemines non-fed

Site #/lat-lon: 29°46'58.8" 90° 2' 40.2" Name: 6 total 3on leve 3 al site

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: 80

Percent overstory canopy softmast/edible seed producers: 100

Percent overstory canopy closure 50

**UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):**

Percent understory : 95 /species lizard tail, smartweed, fern, palmetto rubus, pennywort, alligator weed, button bush, Bomeria cylindrica

Tree Species in Understory (include height/indicate abundance)

ash, redmaple

Percent midstory : 40 /species muscadine

Tree Species in Midstory (include height/indicate abundance)

am. elm, red maple, sugar berry, sweetgum, cypress ash, muscadine, tupelo

**STAND MATURITY (VARIABLE 2):**

**(Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: ________ or TREE SPECIES – with D.B.H.

| pumpkin ash | red maple | | cypress | amer. elm |
|---|---|---|---|---|
| 1.25 | 1.9 | 19.3 | 40.1 | 7.1 |
| 7.7 | 8.5 | .5 | 15.2 | same base |
| 12.3 Topped ("Died" at TY30) | 3.0 | 1.0 | 14.7 | |
| 8.9 | 3.1 | 1.0 inj. | 22.1 | |
| | 5.8 | 5.0 bent | 21.6 | |
| | 2.7 | 11.7 inj. "died" @ TY 30 | | |
| | 7.0 | 2.6 | | |
| | 4.9 | Snag | | |
| | 6.0 | | | |
| | 3.6 | | | |
| | 1.3 | | | |
| | 3.8 | | | |
| | 11.6 | | | |
| | 2.1 | | | |

**HYDROLOGY (VARIABLE 4) (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class3 (minor alteration) – **(Swamp)** Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) **(Percent of flooding)** Percent of area flooded during growing season (indicate approximate end of flooding: July Aug-Sept)________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):# 1 /#total snags ________ /#future snags____

Sweetgum downed but living

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps 300 feet______

N_Sect1

#1 a

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 19 Aug 09 Time:________ Project: Plaq. Non-Fed (West)

Site #/lat-lon: 4 pictures Name:________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

90° 0 16.388" W
29°43' 12.641" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: 100

Percent overstory canopy softmast/edible seed producers: Ø

Percent overstory canopy closure: 30

**UNDERSTORY/MIDSTORY:**

Percent understory: 95 /species Duck potato, cattail, alligator weed, pickerel weed, polygonum, marsh mallow

Tree Species in Understory (include height/indicate abundance)
none

Percent midstory: 10 /species wax myrtle, baccharis

Tree Species in Midstory (include height/indicate abundance)
red maple, cypress, tallow

**STAND MATURITY:**

(**Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

"died" @T430 due to prolonged inundation

AGE:______ or TREE SPECIES – with D.B.H.

| B. Cypress | Maple | Sugarberry | Tallow |
|---|---|---|---|
| plot 1 { 4.1 | plot 1 { 3X .25 | plot { 3.8 | plot 1 { 3X 1.7 |
| 27.3 | .5 | | 4X 1.2 |
| ~~10.3~~ | 10.2 } same base | | 2.2 |
| 6.6 | 7.8 | | |
| 25.2 | 8.75 | | |
| 16.4 | .5 | | |
| | 5.1 | | |
| | 3.9 | | |
| | 3.4 | | |
| | 34.5 | | |

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#_____ /#total snags _____ /#future snags_____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____ feet____

0_Sect1

#1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 19 Aug 09 Time:________ Project: Plaq. Non-Fed (West)

Site #/lat-lon: 4 pictures Name:________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

90° 0' 16.388" W
29°43' 12.641" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)
Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: 100
Percent overstory canopy softmast/edible seed producers: ∅
Percent overstory canopy closure: 30

**UNDERSTORY/MIDSTORY:**

Percent understory: 95 /species Duck potato, cattail, alligator weed, pickerel weed, polygonum, marsh mallow

Tree Species in Understory (include height/indicate abundance) none

Percent midstory: 10 /species wax myrtle, baccharis

Tree Species in Midstory (include height/indicate abundance) red maple, cypress, tallow

**STAND MATURITY:**

**(Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) Comments-(stand conditions, etc):

AGE:________ or TREE SPECIES – with D.B.H.

| B. Cypress | | Maple | | Sugarberry | Tallow |
|---|---|---|---|---|---|
| plot 1 | | plot 1 | | plot | plot 1 |
| 4.1" | | 3x .85 | | 3.8 | 3x 1.7" |
| 27.3 | | .5 | | | 4x 1" |
| ~~?~~ | "dead" @ T430 due to storm damage | 10.2 | same base | | 2.2 |
| 6.6 | | 7.8 | same base | | |
| 25.2 | | 8.75 | | | |
| 16.4 | | .5 | | | |
| | | 5.1 | | | |
| | | 3.9 | | | |
| | | 3.4 | | | |
| | | 34.5 | | | |

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – **(Swamp)** Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) **(Percent of flooding)**
Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#________/#total snags________/#future snags________

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____ feet________

R;R

#008

P_Sect 1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/13/09 Time:________ Project: Plaq. Non-Fed (west)

Site #/lat-lon: 29'42'44.5" 89'59'57.6 Name:________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: Ø Percent overstory canopy cypress: 10

Percent overstory canopy softmast/edible seed producers: 100

Percent overstory canopy closure: 30

**UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):**

Percent understory : 100 /species pennywort, delta duck potatoe, cattail, polygonum, fragrant flatsedge, button bush, tall eleocharus, walters millet (short hairs), alligatorweed, biden, frogfruit, goldenrod

Tree Species in Understory (include height/indicate abundance) red maple, cypress

Percent midstory : < 5 /species buttonbush, elder berry

Tree Species in Midstory (include height/indicate abundance) willow, red maple,

**STAND MATURITY (VARIABLE 2):**

(**Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE:________ or TREE SPECIES – with D.B.H.

| tupelo | cypress | maple | willow |
|---|---|---|---|
| 10.5 | 12.3 | 1.5 | 1 |
| 21.7 | | 1 | .5 |
| 12 | 9.4 | | .5 |
| 5.25 | 16 | | .1 |
| 16 | | | 1 |
| 11.8 | | | |
| 7 | | | |
| 14.1 | | | |
| 10.4 | | | |
| 8.4 | | | |
| 15.4 | | | |
| 10.25 | | | |
| 13.25 | | | |
| 12.5 | | | |

**HYDROLOGY (VARIABLE 4) (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – **(Swamp)** Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#______/#total snags 2 /#future snags____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____ feet none

Q - Sect 1

ID #1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/13/01 Time: ________ Project: ________

Site #/lat-lon: 29°42'4.1" 89°59'32.8" Name: Plaquemines Non Fed (west)

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: 45

Percent overstory canopy softmast/edible seed producers: 80

Percent overstory canopy closure: 80

**UNDERSTORY/MIDSTORY:**

Percent understory: 80 /species trumpet creeper, elephant ear, elderberry, spiderwort, lizard tail, false nettle

Tree Species in Understory (include height/indicate abundance) ________

Percent midstory: 55 /species elderberry, privet, trumpet creeper

Tree Species in Midstory (include height/indicate abundance) maple, tallow, cypress

**STAND MATURITY:**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: ________ or TREE SPECIES – with D.B.H.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1.5 | maple | | B. cypress | willow | privet | Tallow |
| 3x1" | 10" | | 21 | 11.9 | 1" | 3' |
| 1.5" | 5" | | 10.2 | 5.5 | | |
| 4.4 | 3.5 | | 11.9 | 10.4 | | |
| 2.3 | 5.5. | | 14 | 6.5 | | |
| 3.1 | 7" | | 10 | 8" | | |
| 2.8 | 5.3" | | 10.7 | | | |
| 2.5x3 | 10.5" | | 24.5 | | | |
| 2.25 | 6.8" | 2.5 | 14.5 | | | |
| .5 | 2" | 2.5 | 2"* | | | |
| 1" | 5.6" | 2.5 | 14.75 | | | |
| 6.1 | 6" | 3' | | | | |
| 1.5 | 3 | 5.35 | | | | |
| .5 | | 4.5 (45° angle) | "died" @ TY30 due to storm damage | | | |
| .5 | 10.6 | 10.5 | | | | |

**HYDROLOGY** (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept) ________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):# ______ /#total snags 2 /#future snags ______

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps ____ feet ____ none

Z1 — sect 4

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11-18-2009 Time: 11:30-ish Project Name: Plaq Parish NFL - Sect. 4 Subsided Ridge

Field Trip Participants: B. Firmin, L. Behrens, L. Marcy, F. Cole, Albertine

Site # / Name: Subsided Ridge - (1A)

Lat/Long: N 29.59201 W 089.89863 3 pictures

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Lots of downed trees, Hydrology altered Dry when we came

## Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees 30 %

Percent of overstory canopy that consists of soft-mast producing trees 70 %

Percent of overstory canopy that consists of non-mast producing trees 0 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

30% canopy closure

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

| | | | |
|---|---|---|---|
| box elder | 10.6, 13", 6.5", 12.4 | Tallow 2×1" | |
| water oak | 20", 27", 15.6" | " 4×1" | |
| Sweetgum | 11", 12.5", 18.25", 7.8" | 17.5" " 1×2" | |
| sugarberry | 5", 7" | " 2×2" | |
| | | " 2" | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | 3 snag |
| | | | 1 future snag |

## Variable V3 - Understory / Midstory

Percent midstory canopy closure: 25 % Midstory tree species:

Midstory non-tree species: persimmon, Tallow, boxelder, palmetto, nuttall oak
muscadine

Percent understory canopy closure: 75 % Understory tree species:

Understory non-tree species: black berry, palmetto, tallow

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*****
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

## Variable V4 - Hydrology

Check one:

| | | | |
|---|---|---|---|
| ____ | Class 1 | *Highly Altered* | Forced drainage system which efficiently removes water from the surface year round. |
| ____ | Class 2 | *Moderately Altered* | Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment |
| ____ | Class 3 | *Little to No Alterations* | Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.) |

## Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

| | | |
|---|---|---|
| ____ | Class 1 | 0 to 5.0 acres |
| ____ | Class 2 | 5.1 to 20.0 acres |
| ____ | Class 3 | 20.1 to 100.0 acres |
| ____ | Class 4 | 100.1 to 500.0 acres |
| ____ | Class 5 | > 500 acres |

## Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

| LAND USE | Weighting Factor | PERCENT OF THE TOTAL AREA |
|---|---|---|
| Bottomland hardwoods, other forested areas, marsh habitat, etc. | (1.0) | ____ |
| Abandoned agriculture, overgrown fields, dense cover, etc. | (0.6) | ____ |
| Pasture, hayfields, open water, etc. | (0.4) | ____ |
| Active agriculture | (0.2) | ____ |
| Nonhabitat: linear, residential, commercial, industrial development, etc. | (0.0) | ____ |

## Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

**Type Classes**

| | | |
|---|---|---|
| ____ | Class 1 | Constant / Major (Major highways, industrial, commercial, major navigation.) |
| ____ | Class 2 | Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats.) |
| ____ | Class 3 | Seasonal / Intermittent (Agriculture, aquaculture.) |
| ____ | Class 4 | Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.) |

Check one:

**Distance Classes**

| | | |
|---|---|---|
| ____ | Class 1 | 0 to 50 feet |
| ____ | Class 2 | 50.1 to 500 feet |
| ____ | Class 3 | > 500 feet |

Z2 _ Sect4

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11/18/09 Time: ______ Project Name: Plaq Parish NFL - Sect. 4

Field Trip Participants: Same as 1a

Site # / Name: Subsided Ridge - 1B 3 pictures

Lat/Long: N 29.59242 W 89.89980

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.):
More live oaks than 1a, Baccharis, Trees in poor condition due to hurricane

## Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees 50 %

Percent of overstory canopy that consists of soft-mast producing trees 50 % Must add to equal 100%

Percent of overstory canopy that consists of non-mast producing trees 0 %

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

40% canopy closure

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

| | | | |
|---|---|---|---|
| Water Hickory | tallow | maple | live oak |
| 20.3 | 6 x 1" | 8.3 | 8.5 |
| | 1 x 2" | 6.1 | 16.2 |
| | 5 x 1" | 6.7 | |
| nuttall oak | 6 x 1" | | |
| 21 | 3.2 | | |
| | 6 x 1" | | |
| | 4 x 1" | Amer. Elm | |
| | | 8" | |
| | | 4.3" | |
| Sugarberry | | 13 | |
| 8.5 | | | |
| | | | Deciduous Holley |
| green Ash | | | 4.3 topped |
| 7.1 | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## Variable V3 - Understory / Midstory

Percent midstory canopy closure: 25 % Midstory tree species:

Midstory non-tree species: tallow, palmetto, deciduous holley, red maple, baccharis

Percent understory canopy closure: 65 % Understory tree species:

Understory non-tree species: muscadine, tallow, palmetto,

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*****
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

## Variable V4 - Hydrology

Check one:

| | | | |
|---|---|---|---|
| ______ | Class 1 | *Highly Altered* | Forced drainage system which efficiently removes water from the surface year round. |
| ______ | Class 2 | *Moderately Altered* | Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment |
| ______ | Class 3 | *Little to No Alterations* | Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.) |

## Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

| | | |
|---|---|---|
| ______ | Class 1 | 0 to 5.0 acres |
| ______ | Class 2 | 5.1 to 20.0 acres |
| ______ | Class 3 | 20.1 to 100.0 acres |
| ______ | Class 4 | 100.1 to 500.0 acres |
| ______ | Class 5 | > 500 acres |

## Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

| LAND USE | Weighting Factor | PERCENT OF THE TOTAL AREA |
|---|---|---|
| Bottomland hardwoods, other forested areas, marsh habitat, etc. | (1.0) | ______ |
| Abandoned agriculture, overgrown fields, dense cover, etc. | (0.6) | ______ |
| Pasture, hayfields, open water, etc. | (0.4) | ______ |
| Active agriculture | (0.2) | ______ |
| Nonhabitat: linear, residential, commercial, industrial development, etc. | (0.0) | ______ |

## Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

**Type Classes**

| | | |
|---|---|---|
| ______ | Class 1 | Constant / Major (Major highways, industrial, commercial, major navigation.) |
| ______ | Class 2 | Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats.) |
| ______ | Class 3 | Seasonal / Intermittent (Agriculture, aquaculture.) |
| ______ | Class 4 | Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.) |

Check one:

**Distance Classes**

| | | |
|---|---|---|
| ______ | Class 1 | 0 to 50 feet |
| ______ | Class 2 | 50.1 to 500 feet |
| ______ | Class 3 | >500 feet |

Z3_ sect4

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11/18/09 Time: ______ Project Name: Plaq. Parish NFF- Sect.4

Field Trip Participants: Same as 1a&b

Site # / Name: Subsided Ridge - 2A

Lat/Long: N29.59514 W89.90453

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Larger trees in better condition than 18; no tallow - one in understory only

## Variable V1 - Tree Species Association

3 pictures

Percent of overstory canopy that consists of hard-mast producing trees 35 %

Percent of overstory canopy that consists of soft-mast producing trees 65 %

Percent of overstory canopy that consists of non-mast producing trees 0 %

Must add to equal 100%

- Class 1: < 25% of canopy consists of mast producing trees
- Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
- Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
- Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
- Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

55% canopy closure

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

| | | | |
|---|---|---|---|
| water Hickory | Hackberry | Am. Elm | Red Maple |
| 12.25 | 7.1 | 12.4 | 7.3 |
| 12 | 6.6 | 11.3 | 2 |
| 15.3 | 12.5 | 9.25 | 3.8 |
| 20 | 7.2 | 12.3 | 1 |
| | 13.8 | 8.25 | 3 |
| | | 10 | 2.25 |
| live Oak | Sweetgum | 7.5 | 4.5 |
| 11 | 5.5 | | 2.5 |
| 13.6 | 3 | | |
| | 3 | Deciduous | |
| | 11.1 | 4.7 | |
| | 13.7 | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## Variable V3 - Understory / Midstory

Percent midstory canopy closure: 15 % Midstory tree species:

Midstory non-tree species: Jap. Holly, palmett, red maple, Sweetgum, Am. elm

Percent understory canopy closure: 50 % Understory tree species:

Understory non-tree species: Tallow, palmetto

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*******
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

## Variable V4 - Hydrology

Check one:

| | | | |
|---|---|---|---|
| ________ | Class 1 | *Highly Altered* | Forced drainage system which efficiently removes water from the surface year round. |
| ________ | Class 2 | *Moderately Altered* | Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment |
| ________ | Class 3 | *Little to No Alterations* | Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.) |

## Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

| | | |
|---|---|---|
| ________ | Class 1 | 0 to 5.0 acres |
| ________ | Class 2 | 5.1 to 20.0 acres |
| ________ | Class 3 | 20.1 to 100.0 acres |
| ________ | Class 4 | 100.1 to 500.0 acres |
| ________ | Class 5 | > 500 acres |

## Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

| LAND USE | Weighting Factor | PERCENT OF THE TOTAL AREA |
|---|---|---|
| Bottomland hardwoods, other forested areas, marsh habitat, etc. | (1.0) | ________ |
| Abandoned agriculture, overgrown fields, dense cover, etc. | (0.6) | ________ |
| Pasture, hayfields, open water, etc. | (0.4) | ________ |
| Active agriculture | (0.2) | ________ |
| Nonhabitat: linear, residential, commercial, industrial development, etc. | (0.0) | ________ |

## Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

**Type Classes**

| | | |
|---|---|---|
| ________ | Class 1 | Constant / Major (Major highways, industrial, commercial, major navigation) |
| ________ | Class 2 | Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats) |
| ________ | Class 3 | Seasonal / Intermittent (Agriculture, aquaculture) |
| ________ | Class 4 | Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.) |

Check one:

**Distance Classes**

| | | |
|---|---|---|
| ________ | Class 1 | 0 to 50 feet |
| ________ | Class 2 | 50.1 to 500 feet |
| ________ | Class 3 | > 500 feet |

Z4_sect 4

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11/18/09 Time: ______ Project Name: Plaq. Parish NFL - sect. 4

Field Trip Participants: same as 1a & b

Site # / Name: Subsided Ridge - 2B

Lat/Long: N 29.59413 W 89.90325

3 pictures

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Trees in decent condition; more tallow than 2A

## Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees 60 %

Percent of overstory canopy that consists of soft-mast producing trees 40 %

Percent of overstory canopy that consists of non-mast producing trees 0 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

65% canopy closure

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

| | | | |
|---|---|---|---|
| green ash | Tallow | Am Elm | Sweet gum |
| 12" | 12x .5 | 2" | 13.7 |
| 11.5" | 2 x 1" | 12.5 | |
| | 20 x .5" | | |
| | | | |
| | | | |
| | | | |
| Red Maple | Water oak | Hackberry | |
| 3" | 7" | 12.6 | |
| 12" | 24" | 12.5 | |
| | | 21 | |
| | | | |
| | | | |
| | | | |
| | | | 1 snag |
| | | | |

## Variable V3 - Understory / Midstory

Percent midstory canopy closure: 25 % Midstory tree species: Sweet gum,

Midstory non-tree species: palmetto, red maple, tallow, am. elm, water oak

Percent understory canopy closure: 50 % Understory tree species: ______

Understory non-tree species: tallow, palmetto

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*****
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

## Variable V4 - Hydrology

Check one:

| | | | |
|---|---|---|---|
| ______ | Class 1 | ***Highly Altered*** | Forced drainage system which efficiently removes water from the surface year round. |
| ______ | Class 2 | ***Moderately Altered*** | Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment |
| ______ | Class 3 | ***Little to No Alterations*** | Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.) |

## Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

| | | |
|---|---|---|
| ______ | Class 1 | 0 to 5.0 acres |
| ______ | Class 2 | 5.1 to 20.0 acres |
| ______ | Class 3 | 20.1 to 100.0 acres |
| ______ | Class 4 | 100.1 to 500.0 acres |
| ______ | Class 5 | > 500 acres |

## Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

| LAND USE | Weighting Factor | PERCENT OF THE TOTAL AREA |
|---|---|---|
| Bottomland hardwoods, other forested areas, marsh habitat, etc. | (1.0) | ______ |
| Abandoned agriculture, overgrown fields, dense cover, etc. | (0.6) | ______ |
| Pasture, hayfields, open water, etc. | (0.4) | ______ |
| Active agriculture | (0.2) | ______ |
| Nonhabitat: linear, residential, commercial, industrial development, etc. | (0.0) | ______ |

## Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

**Type Classes**

| | | |
|---|---|---|
| ______ | Class 1 | Constant / Major (Major highways, industrial, commercial, major navigation) |
| ______ | Class 2 | Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats.) |
| ______ | Class 3 | Seasonal / Intermittent (Agriculture, aquaculture.) |
| ______ | Class 4 | Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.) |

Check one:

**Distance Classes**

| | | |
|---|---|---|
| ______ | Class 1 | 0 to 50 feet |
| ______ | Class 2 | 50.1 to 500 feet |
| ______ | Class 3 | > 500 feet |

V_Sect 2

Plaq. Non-Fed (west)

\#005
N 29°37'16.1"
W 089°57'13.0"

# Coastal Wetlands Planning, Protection and Restoration Act
## Wetland Value Assessment Worksheet

Project:

Date: Thurs., Aug. 13, 2009 | Marsh Acreage:

Section 2 Myrtle Grove pump station

Wetland Type: floodside marsh | Water Acreage:

Land Loss Rate: | Total Acreage:

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | None | | | | |
| FWOP | 1 | | | | | | |
| | | | | | | | |
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| FWP | 1 | | | | | | |
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| | | | | | | | |

Saline? (Brackish)

D: dominant

D Distichlis spicata
D: Spartina patens
SD: " alterniflora
Bacopa cabena
D: Scirpus (robustus)
Iva frutescens
Baccharis

no SAV seen

#2

$90^\circ\ 0'\ 33.831''$ W
$29^\circ\ 43'\ 28.795''$ N

W_Sect1

## Coastal Wetlands Planning, Protection and Restoration Act
## Wetland Value Assessment Worksheet

2 pictures

Project: Plaqu. Non Fed

Date: 8/19/09

Marsh Acreage:

Wetland Type:

Water Acreage:

Land Loss Rate:

Total Acreage:

Fresh marsh

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | none | | 100% | | |
| FWOP | 1 | | | | | | |
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| FWP | 1 | | | | | | |
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| | | | | | | | |

walter's millet
cypress - alligator weed
coffeeweed - cyperus
duckweed - amaranth
ragweed - buttonbush
hibiscus - cattail
*salvinia*

90° 1' 5.826" W
29° 44' 0.665" N

X-Sect 1

5 pictures - 1 of pickeral weed

#3

maple

**Coastal Wetlands Planning, Protection and Restoration Act**
**Wetland Value Assessment Worksheet**

Project: Plaquemines Non Fed

Ash 2.2

Date: 8/19/09

Marsh Acreage:

25% forested

Wetland Type:

Water Acreage:

Land Loss Rate:

Total Acreage:

1.5 3.4 5 > same base
1.75 3
1 2 > same base
1 3
.5 2 > same base
Same base 1.7 1.7

| Target Year | | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | None | | 100% | | |
| FWOP | 1 | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| FWP | 1 | | | | | | |
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elephant ear
pickeral weed
poligonum
fresh rush
duck potatoe
dear pea
Salt bush
Coffee weed
alligator weed
Penny wort
marsh mallow
button bush
Salvinia
lizard tail
duckweed
beaked rush

A_Sect5

Class 5 Flood side

pt. #31

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/11/09 Time:__________ Project: Plaquemines (West bank) Non fed

Site #/lat-lon: 29°23'5.1" 89°47'10.2" Name:__________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 100% Percent overstory canopy cypress: 0

Percent overstory canopy softmast/edible seed producers: 0

Percent overstory canopy closure: 30% (estimated by DOQQ imagery & live oak tree sizes)

**UNDERSTORY/MIDSTORY:**

Percent understory : 5% /species goldenrod, smartweed, baccharis bacoppa

Tree Species in Understory (include height/indicate abundance) none

Percent midstory : 99 /species Baccharis, Wax Myrtle, tallow palmetto

Tree Species in Midstory (include height/indicate abundance) tallow, oak

**STAND MATURITY:**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: or TREE SPECIES – with D.B.H.

| | | |
|---|---|---|
| live oak | ✓11" | 1 base |
| " | ✓14" | |
| " | ✓14" | |
| " | ✓7.8" | |
| " | 2" ✓ | |
| Tallow | 3.1" ✓ | yaupon 2.3 — Not used in dbh calculations; shrub species |
| " | 2" ✓ | |
| " | 4.3 ✓ | |
| " | 2" ✓ | |
| " | 2" ✓ | |
| " | 1.8" ✓ | |
| " | 3 ✓ | |
| " | 4.8" ✓ | |
| " | 3" ✓ | |

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)__________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#________/#total snags __________/#future snags_____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____feet_______

#32

B-Sect5

Class 5 Floodside

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 11 Aug 09 Time:__________ Project: Plaquemine Non-Fed (Westbank)

Site #/lat-lon: 29°33'56.7" 89°47'19.4" Name:__________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 95% Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: Ø

Percent overstory canopy closure: 15

**UNDERSTORY/MIDSTORY:**

Percent understory : 5 /species poison ivy, Smartweed, polygonum

Tree Species in Understory (include height/indicate abundance)
Tallow, oak

Percent midstory : 60 /species Baccharis, tallow, wax myrtle, palmetto

Tree Species in Midstory (include height/indicate abundance)
Tallow, oak

**STAND MATURITY:**

(**Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) Comments-(stand conditions, etc):

AGE:__________ or TREE SPECIES – with D.B.H.

| | | | |
|---|---|---|---|
| Live oak | 13" ✓ | Tallow | 3.5 ✓ |
| Tallow | 2" ✓ | " | 4.5 ✓ |
| Live oak | 18" ✓ | | |
| Tallow | 2" ✓ | | |
| Live Oak | 13" ✓ | | |
| " | 9.5" ✓ | | |
| " | 9" ✓ | | |
| " | ✓ 21.2" | same base | |
| " | ✓ 8" | | |
| " | ✓ 8.5" | | |
| " | 4.5" ✓ | | |
| " | ✓ 6.8" | | |
| Tallow | 1.2" ✓ | | |
| " | 2.2" ✓ | | |

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)__________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#________/#total snags ________/#future snags_____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____ feet______ pt. #30 | D-Sect5 | Class5 Floodside

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/11/09 Time:________ Project: Plaquemines Non-Fed (Westbank)

NAD83

Site #/lat-lon: N 29°32'55.2" W89°41'.2" Name:________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 100% Percent overstory canopy cypress: 0

Percent overstory canopy softmast/edible seed producers: 0

Percent overstory canopy closure: 5%

**UNDERSTORY/MIDSTORY:**

Percent understory : 15 /species Bacharus & Golden Rod, waterhyacinth

Tree Species in Understory (include height/indicate abundance)________

Percent midstory : 90 /species Baccharus

Tree Species in Midstory (include height/indicate abundance) Ø

**STAND MATURITY:**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: ________ or TREE SPECIES – with D.B.H.

√25.3" live oak edge of plot

* Anticipate Chinese tallow encroachment from nearby areas by TY20 & TY50.

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#______/#total snags ______/#future snags____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____ feet____

E_Sect3

Class 5 Floodside

Section 3

#35

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/11/09 Time:________ Project: Plaq. Non Fed (Westonk)

Site #/lat-lon: 29°37'32" 89°55'46" Name:________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

measured on the 1/2 plot

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 20 Percent overstory canopy cypress: 0

Percent overstory canopy softmast/edible seed producers: 30

Percent overstory canopy closure: 55

**UNDERSTORY/MIDSTORY:**

Percent understory : 40 /species poison ivy, peppervine, sedge, button bush, greenbriar, baccharus, goldenrod, marsh mallow

Tree Species in Understory (include height/indicate abundance) water oak, red maple, tallow, elm

Percent midstory : 75 /species buttonbush, baccharus

Tree Species in Midstory (include height/indicate abundance) Tallow, red maple, live oak, water oak,

**STAND MATURITY:**

(**Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) Comments-(stand conditions, etc):

AGE:________ or TREE SPECIES – with D.B.H.

Tallow: 2" ✓, 1.5 ✓, 1.5 ✓, 1.5 ✓, 2.5" ✓, 1.8" ✓, 1.6" ✓, 5 ✓, 5 ✓, 5 ✓, 3.3 ✓, 1.6 ✓

loss of 4 tallow trees @TY20 due to overcrowding

water oak: 9" ✓, 3" ✓

"lost" to storm damage @TY20.

Sugarberry: 3, 3 same base; 7.8

Live oak: 4.5

Red Maple: 4" ✓, 4" ✓, 6" ✓ same base, 4.9 ✓

P. Ash 18"

yaupon: 3", 2", 2"

Not used in dbh calculations; shrub species

american elm in 1/2 not measured

**HYDROLOGY** (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#________/#total snags________/#future snags________

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____feet________

I_Sect1

Flood side class 2

#4

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP
Date: 9.3.09 Time: ______ Project: 3 pictures
Site #/lat-lon: 29° 46' 18.1" 90° 2' 57.4" Name: Plaquemines Un. Fed
DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:
(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)
Percent overstory canopy hardmast: 5 Percent overstory canopy cypress: Ø
Percent overstory canopy softmast/edible seed producers: 95
Percent overstory canopy closure: 40
UNDERSTORY/MIDSTORY:
Percent understory: 95 /species heartleaf peppervine, buttonbush, smartweed, alligatorweed, hydrocotile
lizard tail, rubus, palmetto, goldenrod, Lilarum, spider ... +
Tree Species in Understory (include height/indicate abundance)
green ash, tallow, elm, red maple
Percent midstory: 45 /species poison ivy, button bush 2x.5
abundant baccharus, privet
Tree Species in Midstory (include height/indicate abundance)
tallow, red maple, green ash, elm, willow

STAND MATURITY:
(Age or d.b.h. can be used. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) Comments-(stand conditions, etc):

AGE: or TREE SPECIES – with D.B.H.

9r Ash | B. willow | | Am elm | | maple
---|---|---|---|---|---
6" | 1.9 | | .5 | | 4.7
1 | 3.7 | | 1.7 | | 5.5
.5 | topped | | .5 | | 3.8
8.5 | 4.1 | | .5 | | 2.5
7 | 10.6 | | .5 | | 3.2
.5 | 7.5 | Tallow | .25 | | 5.2
8 | 7.4 | 3.1 | 1 | | .5
10 | 6.9 | | | | 7.4
9.7 | | | | 2.3 | 5.9
5.4 | | | | 4.1 | 1.6
| | 2.25 | | 1.25 | .5
Live oak | | 2.25 | | 3x.5 | 2.8
9.4 | .5 | 2x.5 | | 1.25 | 1.5
| .25 | .5 | | 2 | 7.6
| 2x.5 | 3.2 | 2 | | 7

laying down in ... "died" by TY20

"died" by TY20

"died" by TY20

in/...

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (Swamp) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#________ /#total snags ________ /#future snags 5

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____ feet____

#34 C_Sect5 class5

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 11Aug09 Time: ________ Project: Plaquemine Non-Fed (West)

Site #/lat-lon: 29°34'56" 89°48'58" Name: ________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 35 Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 20

Percent overstory canopy closure: 60

**UNDERSTORY/MIDSTORY:**

Percent understory : 10 /species heartleaf peppervine, rubus, dewberry, millweed, sedge

Tree Species in Understory (include height/indicate abundance)

live oak, tallow, sugarberry

Percent midstory : 30 /species rubus, baccharis

Tree Species in Midstory (include height/indicate abundance)

tallow, live oak

**STAND MATURITY:**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: ________ or TREE SPECIES – with D.B.H.

| | | |
|---|---|---|
| Sugarberry | Live oak | Tallow |
| ✓17.5 | ✓ 17" | ✓4.8 |
| | ✓ 18" | ✓ 6" |
| | ✓ 3.75" | ✓ 3.6 |
| | ✓ 14.5" | ✓ 3.4 |
| | ✓ 9" | |
| | ✓ 17" | all |
| water oak | ✓ 6" | same tree |
| ✓1.3 | ✓ 2.1 | |
| | ✓ 8.25" | |
| | ✓ 2.75" | |

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept) ________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):# ________ /#total snags ________ /#future snags ____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps ____ feet ______

F_Sect1

Class 5

Section 1

1 picture

#6

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/19/09 Time: ____ Project: ____

Site #/lat-lon: ____ Name: Plaquemines Non Fed

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

90° 2' 33.681" W
29° 45' 59.18" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 35 Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 65

Percent overstory canopy closure: 70

**UNDERSTORY/MIDSTORY:**

Percent understory : 25 /species rubus, pepper vine, fern, Virginia creeper, privet, ladies dewdrops

Tree Species in Understory (include height/indicate abundance) yellow, red maple, persimmon, elm, boxelder, am elm

Percent midstory : 75 /species Virginia creeper, poison ivy, privet, rubus

Tree Species in Midstory (include height/indicate abundance) persimmon, red maple, yellow, water oak, live oak, box elder, am. elm

**STAND MATURITY:**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: ____ or TREE SPECIES – with D.B.H.

| persimmon | hawthorn | live oak | | water oak | Boxelder | |
|---|---|---|---|---|---|---|
| .5 ✓ | ✓ 2 | ✓ 3.4 | | ✓ 7.5 | ✓ 4 | 7 ✓ |
| | ✓ 2x.5 | ✓ .5 | | ✓ 5.75 | ✓ 1.4 | |
| | ✓ 1.5 | ✓ 1.5 | ✓ 2.5 | ✓ 2.75 | ✓ 5.7 | 8.3 ✓ |
| Tallow | | ✓ 6.8 | ✓ 10 | ✓ .5 | ✓ 2 | 3.5 ✓ |
| .5 ✓ | | | | ✓ 11.5 | ✓ 5.5 | |
| | | | ✓ 3.5 | ✓ 2.25 | ✓ 4.2 | |
| | | | | ✓ 2.75 | ✓ 3.3 | |
| | | | | | ✓ 2.25 | |
| | | green ash | | | | |
| | dogwood | ✓ 2 | | | red maple | |
| Sugar berry | ✓ .5 | ✓ 22 | | | ✓ 21" Injured ← "dead" @ TY20 | |
| 3" ✓ | ✓ 2" | | | | ✓ 2" | |
| 1" ✓ | | | | | | |

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept) ____

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):# ____ /#total snags ____ /#future snags ____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps ____ feet ____

G_ Sect1

Class 2

#2

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 9/3/09 Time: ________ Project: Ages Non Fed

Site #/lat-lon: 29°47'0.8" 90°2'32.6" Name: 3 pictures

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

whole plot

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 % cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 10 Percent overstory canopy cypress: 5

Percent overstory canopy softmast/edible seed producers: 90

Percent overstory canopy closure 70

**UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):**

Percent understory: 50/species rubus, palmetto, virginia creeper, bromerius cylindrica, pepper vine, smart weed, poison ivy, daphon weed, spiderwort

Tree Species in Understory (include height/indicate abundance)

Sweet gum, ash, red maple, am. elm, tallow

Percent midstory: 50 /species

Tree Species in Midstory (include height/indicate abundance)

redmaple, Sweetgum, box elder, persimmon, ash, american elm

**STAND MATURITY (VARIABLE 2):**

**(Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: ________ or TREE SPECIES – with D.B.H.

| | | | | |
|---|---|---|---|---|
| water oak | red maple | Sweet gum | | box elder |
| 14.3 | 11.7 | 2x1' | | 1.8 |
| | 4.5 | .5 | 13.8 | 1.75 |
| | 2.8 | 5x.5 | 2 | 1" |
| Cypress | 2.7 | 1.25 | 3x1" | .5 |
| 33.2 | 3.1 | 1.9 | 4x.75" | 1.5 |
| | 3.3 | 2.6 | 32.6 | 1 |
| persimmon | 3.2 | 2x.5 | 3x1" | 1' |
| 2x.5 | | 25.2 | 1.5" | 7.4 |
| | | .5 | 2" | 4.8 |
| american elm | | 1.25 | 1.5" | 1.5 |
| 14.7 | | 1.5 | 2x.25 | 5.1 |
| | | .5 | | 3.3 |
| gr. Ash | | 2x.75 | | 5.7 |
| 15.7 | | 3x1 | | |
| | | 26.4 | "died" @TY20 - storm loss | |

**HYDROLOGY (VARIABLE 4) (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – **(Swamp)** Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) **(Percent of flooding)** Percent of area flooded during growing season (indicate approximate end of flooding: July Aug-Sept) ________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):# 1 /#total snags ________ /#future snags 2

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps ____ feet ______

H_Sect2

class 2

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/13/09 Time:__________ Project: Plaquemines Non Federal

#002 Site #/lat-lon: 29°40'46.2" 89°59'15.2" Name:__________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 5 Percent overstory canopy cypress: 10

Percent overstory canopy softmast/edible seed producers: 80

Percent overstory canopy closure 40

**UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):**

Percent understory: 20 /species ironweed, poliganum, ladys eardrops
lizard tail, rubus

Tree Species in Understory (include height/indicate abundance)
elm tallow, maple (≈12), persimmon

Percent midstory: 40 /species

Tree Species in Midstory (include height/indicate abundance)
tallow, persimmon, sugarberry, maple

**STAND MATURITY (VARIABLE 2):**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: __________ or TREE SPECIES – with D.B.H.

American Elm
✓5.7

bitter pecan
9.5

tallow
5" ✓
.5"

maple
✓3.5" 3.5✓
✓3.25" 20.4✓
✓7.5 6.1✓
✓7.2 8"✓
✓2.7 14.5✓

✓2x1.25
✓1"
✓6x.75"
✓2x3/4"
6x.75"✓ 1.5"✓
✓5x1"
✓2x.5"
5x.75✓ 2"✓
✓3x.5"
✓1"
1"✓ 3"✓
✓6x.5"
✓1.75"
✓1.25' .75
✓2.2
✓2x.75"
.75 2x.5

B. Cypress
✓30.1
✓85 ✓26.5

Sugarberry
✓.5"
✓1"
✓1" 2x2.25✓

pumpkin Ash
13.6✓

✓5
died @1920 ✓5.6 > same base
2x 1.5"✓
✓3.5" 1.25✓
✓7.1
✓12x.75
.5"✓
✓1.5' 1"✓
✓3.5
2x1.25✓ ✓7x.5"
8x.5"✓
4x.75" 1"✓
✓3.3
4x.5✓ ✓9"
2x1.25"✓
✓2x 1" 1.75✓
✓8.5
✓6x1.5"
3x 1"✓
6x.75" 1.25✓
✓7.6
✓2"
5x.5"✓
✓2"
✓.5"
3x.5"✓

Persimmon
.5" .5"

Sweetgum
15.5✓

**HYDROLOGY (VARIABLE 4) (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July Aug-Sept)__________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#________ /#total snags __________ /#future snags_____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____ feet_______

J_Sect1

Section I

N of Ollie Pump

#4

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/19 Time: 1500 Project: Plaq NFL

Site #/lat-lon: 2 pictures Name:

Class 2

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

90° 2' 28.812" W
29° 46' 2.216" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 5 Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 95

Percent overstory canopy closure: 50

**UNDERSTORY/MIDSTORY:**

Percent understory: 80 /species pepper vine, spiderwort, rubus, poison ivy, trumpet creeper, elderberry

Tree Species in Understory (include height/indicate abundance)

Sugarberry, green ash

Percent midstory: 60 /species privet, elderberry

Tree Species in Midstory (include height/indicate abundance) water tupelo

persimmon, american elm, box elder, oak & red maple
Sugar berry, roughleaf dogwood

**STAND MATURITY:**

(Age or d.b.h. can be used. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) Comments-(stand conditions, etc): "died" to storm damage @ TY20

AGE: ______ or TREE SPECIES – with D.B.H. "died" @TY20

Box Elder 7, 5.5, 12.5 (Damaged) 3, 8.7, 2, (3), 1, 2, 1, 1.2, 1.5, 3, 5, 3.2 D: Damaged
Sugar berry 6.7
Red Oak 3, 3, 8, 4, 20
Dogwood 1, 1, 1, 1.9, 1
Persimmon 2, 2, 1.5
Red Maple 10, .5, 1.3, 19.2, 7.5, 1, (1.5 + .5)
~~Tupelo 17.7~~
Green Ash 17.2, 17.7
China Berry 1.5
Water Oak 1.8
Am. Elm 3.1

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (Swamp) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (Percent of flooding) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)________

NUMBER OF SNAGS (≥8' and ≥6" dbh):#________/#total snags ________/#future snags________

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____ feet________

K_Sect1

class 1

#5

2 pictures

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/19/09 Time: ______ Project: Plaq non fed

Site #/lat-lon: ______ Name: ______

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

90° 2'32.338" W
29° 45' 59.291" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: Ø Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 100

Percent overstory canopy closure: 60

**UNDERSTORY/MIDSTORY:**

Percent understory: 75 /species peppervine, lake's eardrops, tie vine lizard tail, poligonum, poison ivy, spiderwort

Tree Species in Understory (include height/indicate abundance) tallow, elm, red maple

Percent midstory: 60 /species french mulberry

Tree Species in Midstory (include height/indicate abundance) tallow redmaple, Am elm

**STAND MATURITY:**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) Comments-(stand conditions, etc):

"died" to storm damage @TY20

AGE: ______ or TREE SPECIES – with D.B.H.

| tallow | | maple | green ash | Am. elm | Red oak |
|---|---|---|---|---|---|
| 2x.5 | 1 | 6.25 | 15" | 2" | 5.7 bent over |
| 1" | .75 | 10.5 | 21 | 2.5 | |
| 1.5" | .5 | 2x 1 | 8 | | |
| 1 | 2.5 | 1.2 loss @TY20 overcrowding | 10 | | box elder |
| 4.75 | .5 | 1.5 same | 12 | | 1" |
| 13 | 2.5 | 2 base | 22 | | 2x1" |
| 3 same (loss to overcrowding @TY20) | | 4.1 same | 10.6 | | |
| 3 base | | 1.5 base | 17 | | |
| 1 | .3 | 4.1 loss @TY20 overcrowding | 20 topped & debranched | | |
| 4x.5 | 1.5 | 8.3 | | | |
| 5.25 | .5 | 7.3 | | | |
| 1 | .3 | 14.6 (topped) "died" to storm damage @ TY20 | | | |
| 3 | .3 | | | | |
| 1.75 | 4.5 | 8.5 | 2.25 | | |
| 3.25 | 1.5 | 5.1 | 4.5 | | |

**HYDROLOGY (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept) ______

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):# ______ /#total snags ______ /#future snags ______

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps ____ feet ______

L_Sect2

class 1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

#004 Date: 8/12/09 Time: ____ Project: Plaquemines Non-Fed (west)

Site #/lat-lon: 29°40'44.1" 89°58'55.2" Name: ____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)
Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: ∅
Percent overstory canopy softmast/edible seed producers: 100
Percent overstory canopy closure 60

**UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):**

Percent understory : 40 /species privet, poison Ivy, peppervine muscadine, rubus, virginia creeper

Tree Species in Understory (include height/indicate abundance) boxelder, dogwood, hickory, sweetgum, red maple

Percent midstory : 60 /species privet, muscadine, wax myrtle, ~~dogwood~~, ~~sweetgum~~, ~~water oak~~, ~~? oak~~

Tree Species in Midstory(include height/indicate abundance) dogwood, sweetgum, water oak, ? oak, boxelder

**STAND MATURITY (VARIABLE 2):**

**(Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments-**(stand conditions, etc):

AGE: ____ or TREE SPECIES – with D.B.H. decid. Holly 5.1

17.5 8.2 .5 .5 10x.5

Sweetgum — ✓13" ✓14 ✓14.75 ✓12.5 ✓1.8 ✓16.7 ✓17 .5⊗

privet — .75 .5 .5 1.5 .5 1 .5

dogwood — .5'⊗ .25✓ ⊗.75 ✓1" ✓1' 1.5✓ ✓3" ✓.25 .75⊗ ⊗.5 ✓1.5' ✓1 ✓.75 ✓1 .5⊗ ✓2" .5⊗ ✓.5 ✓1" ⊗.5 .5✓ ✓2.5 ✓1.8" ⊗.5 1.5✓ ✓2 ✓3.3 ✓2.25 2✓ ✓2 ✓3.7 ✓.5 1.5✓

boxelder — .5⊗ ⊗.5 1✓ ⊗.5 8.5✓ ✓13 4✓ ✓3.5 ✓3.5 14.1✓

water oak — ✓1.25 .5⊗ ✓1 .5⊗ .5⊗ .5⊗ ✓1.5 .5⊗ ✓.25 .75⊗ ✓1.4

wax myrtle — ✓5' .5⊗ .5⊗ ⊗.5 .5⊗ ✓2 2x .75⊗ ⊗.5 1✓ 3x .5⊗ ⊗.5 .25✓ ⊗2x.5 1✓ ✓1' ✓3x1" 3✓ ✓1' 2'✓ ✓3 3✓ ✓14 .5⊗ ⊗2x.5

? Oak 1"✓

Privet not used be shrub species only

Cherry bark

**HYDROLOGY (VARIABLE 4) (BLH)**— Class: 1(Forced/Highly altered) Class 2 (Altered) Class3 (minor alteration) – **(Swamp)** Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) **(Percent of flooding)** Percent of area flooded during growing season (indicate approximate end of flooding: July Aug-Sept) ____

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):# ____ /#total snags ____ /#future snags ____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps ____ feet ____

## Coastal Wetlands Planning, Protection and Restoration Act
## Wetland Value Assessment Worksheet

Project: Plaquemine Non Fed (west)

2 sample sites

Date: 11 Aug 09

Marsh Acreage:

Wetland Type:

Water Acreage:

Land Loss Rate:

Total Acreage:

(T_Sect4)
89°51'27.47
29°34'49.83

Reach 4 Sand [illegible] [illegible]

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | 90 | 0 | | 100 | 0 | 0 |
| FWOP | 1 | 99 | 0 | | 100 | 0 | 0 |
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| FWP | 1 | | | | | | |
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Same but other [illegible]

89°51'21.19
29°34'47.73
(S_Sect4)

R_Sect2

Wet pasture w/swale

Plaq. Non-Fed (West)

29° 41' 45.8"
89° 59' 54.5"

#003

## Coastal Wetlands Planning, Protection and Restoration Act
## Wetland Value Assessment Worksheet

Cocklebur
~~hybiscus~~
bermuda grass
poligonum
Camphor weed
Marsh mallow
eleocharis
Soft rush
rubus
water primrose
alligator weed

Project:

Date: 8/13/09

Marsh Acreage:

Wetland Type:

Water Acreage:

Land Loss Rate:

Total Acreage:

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | 95 | | | Ø | | |
| FWOP | 1 | | | | | | |
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Trimble Pt #1

Flood side

Phragmites
Spartina paten
Sesbania (rattlebo
Camphorata
Bulltongue
Cattail
Three-square
Baccharis
Spartina alterniflo
Scirpus

## Coastal Wetlands Planning, Protection and Restoration Act
## Wetland Value Assessment Worksheet

Project: NOV Fed – St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - intermediate

Water Acreage:

Land Loss Rate:

Total Acreage:

Manmade channel along W edge

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | 0 | class 1 | 15% | 1.8 | 1 |
| FWOP | 1 | | | | | | |
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| FWP | 1 | | | | | | |
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Trimble Pt #2

Protected side

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 5-17-10 Time: ______ Project Name: NOV Fed - St. Jude to Venice

Field Trip Participants: ______

Site # / Name: ______

Lat/Long: ______

[Scrub-Shrub]

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Tallest trees ~8ft; no real overstory canopy; trees currently midstory

## Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees 0 %

Percent of overstory canopy that consists of soft-mast producing trees 20 %

Percent of overstory canopy that consists of non-mast producing trees 80 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees

Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy

Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy

Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy

Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

| | | | |
|---|---|---|---|
| Tallow | | | |
| Sugarberry | | | |
| Dogwood | | | |
| Elderberry | | | |
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## Variable V3 - Understory / Midstory

Percent midstory canopy closure: 40 %

Midstory tree species: tallow, Sugarberry, Dogwood, elderberry; Brazilian berband

Midstory non-tree species: ______

Percent understory canopy closure: 100 %

Understory tree species: Goldenrod; Curly Dock; Blackberry

Understory non-tree species: frogbit; trifolium

Irvmvae Pt #3

Flood side

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 5-17-10 Time: ______ Project Name: NOV Fed - St. Jude to Venice

Field Trip Participants: ______

Site # / Name: ______

Lat/Long: ______

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Spoil Bank on edge of Impact shapefile; floodside; Hardwood species

## Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees 0 %

Percent of overstory canopy that consists of soft-mast producing trees 75 %

Percent of overstory canopy that consists of non-mast producing trees 25 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

| | | | | |
|---|---|---|---|---|
| | Persimmon 2.0x3 | Tallow 5.3 same | Sugarberry 2.5 | Mulberry 1.2 |
| .1 | 1.9x2 1.4x2 | 2.8 base | 2.4 | 0.8 same |
| .0 | 2.2x2 1.9 | 8.7 2.8 | 2.8 | 2.2 base |
| .8 | 1.0x2 0.9 | 2.4 1.0 same | 1.0 | 0.9 |
| .5 | 1.2x3 same 0.8 | 6.2 0.9 base | 2.1 | |
| .5 | 0.7x2 base 2.5 | 8.1 1.1 | 1.1x2 | |
| .6 | 1.1x2 0.9 | 7.6 2.6 same | 1.8 | |
| .7 | 1.6x3 1.7x2 | 2.5 from Tallow 1.1 base | 2.8 same | |
| .2 | 1.0x3 1.7 same 1.9 | 2.6 tree 7.7 | 1.7 base | |
| .5 | 2.6x2 0.8 base 1.0x3 | 6.5 5.6 | 2.2 | |
| .2 | 1.4 1.2x3 | 1.7 3.7 | 1.7 | |
| | 1.2x3 1.3x2 | 2.8 same | leaning - 10.8 | |
| | 1.0x2 2.4 | 1.9 base | 1.5 same | |
| | 0.8x3 1.7x3 | 3.9 | 1.5 base | |
| | 1.8 1.1x2 | 3.5 same base | 0.7 | |
| | 1.1x2 1.3x2 | 2.7 | | |
| | 0.9x3 1.3 | 1.8 | | |
| | 0.9x2 same 1.0 | 7.6 | | |
| | 1.5x2 base 1.1 | | | |

## Variable V3 - Understory / Midstory

Percent midstory canopy closure: 30 % Midstory tree species: Persimmon, Sugarberry

Midstory non-tree species:

Percent understory canopy closure: 85 % Understory tree species: Persimmon; blackberry; Salidago; poison ivy

Understory non-tree species:

Trimble
Pt #4

Flood side

Three-square
Distichlis
Spartina patens
Spartina alterniflora

Solid
thick
marsh

Rails calling
in background

## Coastal Wetlands Planning, Protection and Restoration Act
## Wetland Value Assessment Worksheet

Project: NOV Fed - St. Jude to Venice

Date: 5-17-10

Wetland Type: Marsh – Intermediate

Land Loss Rate:

Marsh Acreage:

Water Acreage:

Total Acreage:

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | 0 | class 1 | 100% | 2.4 ↓ 4.3 | None |
| FWOP | 1 | | | | | | |
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| FWP | 1 | | | | | | |
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Trimble
Pt #5

Floodside

check tides for today
at Noon-time

# Coastal Wetlands Planning, Protection and Restoration Act
## Wetland Value Assessment Worksheet

Baccharis
Distichlis
Sp. patens
Sp. alterniflora
Eliocharis
Foxtail on
edge

Project: NOV Fed - St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - intermediate

Water Acreage:

Land Loss Rate:

Total Acreage:

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | 0 | class 2 | 100 % | 3.1 | 1 |
| FWOP | 1 | | | | | | |
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| FWP | 1 | | | | | | |
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Pigweed
Soft Rush

Trimble
Pt #6

Floodside

Sp. alterniflora
Iva frutens
Sp. patens
Tallow (edge)
Goldenrod (edge)

**Coastal Wetlands Planning, Protection and Restoration Act**
**Wetland Value Assessment Worksheet**

Project: NOV Fed Levee - St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - Brackish

Water Acreage:

Land Loss Rate:

Total Acreage:

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | 0 | 2 | 10% | 6.2<br>6.0 | 1 |
| FWOP | 1 | | | | | | |
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| FWP | 1 | | | | | | |
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Trimble
Pt #7

Flood Side

Sp. alterniflora
Sp. patens
Iva frutescens

**Coastal Wetlands Planning, Protection and Restoration Act**
**Wetland Value Assessment Worksheet**

Project: NOV Fed levee - St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - Brackish

Water Acreage:

Land Loss Rate:

Total Acreage:

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | 5% | 4 | 5% | 7.5 | 1 |
| FWOP | 1 | | | | | | |
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| FWP | 1 | | | | | | |
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Trimble
Pt #8

Flood side

Scirpus maritima
Sp. patens
Sp. alterniflora
Distichlis
Frog bit
Baccharis
Goldenrod
Johnson grass

**Coastal Wetlands Planning, Protection and Restoration Act**
**Wetland Value Assessment Worksheet**

Project: NOV Fed levee - St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - Brackish

Water Acreage:

Land Loss Rate:

Total Acreage:

| | Target Year | V1 % Marsh | V2 % SAV | V3 Marsh Edge | V4 Water<=1.5 ft | V5 Salinity | V6 Fish Access |
|---|---|---|---|---|---|---|---|
| | 0 | | 5% | 4 | 10% | 8.3 | 1 |
| **FWOP** | 1 | | | | | | |
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| **FWP** | 1 | | | | | | |
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Transect Pt #9

East Bank
Protected Side

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 5-18-10 Time: 11:00 AM Project Name: NOV Phoenix to Bohemia - Reach C

Field Trip Participants:

Site # / Name: The cross-levee

Lat/Long:

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Large patch of BLH on S side of cross levee

## Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees 60 %

Percent of overstory canopy that consists of soft-mast producing trees 35 %

Percent of overstory canopy that consists of non-mast producing trees 5 %

Must add to equal 100%

- Class 1: < 25% of canopy consists of mast producing trees
- Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
- Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
- Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
- Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

| Sugarberry | Black willow | Dogwood | Bitter pecan |
|---|---|---|---|
| 13.4 4.50 | 14.4 (topped) | 2.2 | 1.7 |
| 5.8 2.8 | 12.5 (topped) | 1.4 | 5.6 |
| 9.0 2.2 | 11.3 (topped) | 1.7 | 4.8 |
| 3.5 5.3 | | 2.4 | |
| 10.4 12.1 | | 2.4 | |
| 5.0 3.3 | Water oak | 2.5 | |
| 6.0 5.5 | 16.2 | 1.4 | |
| 5.1 1.5 | 11.8 | 2.0 | |
| 2.2 1.7 | 20.9 | | |
| 4.2 4.0 | | | |
| 3.2 11.2 | | | |
| 10.4 4.8 | | | |
| 7.2 12.0 | | | |
| 4.2 6.4 | | | |
| 3.7 6.1 | | | |
| 7.8 16.1 | | | |
| 9.9 5.1 | | | |

## Variable V3 - Understory / Midstory

Percent midstory canopy closure: 20 %

Midstory tree species: Decid. holly, Artimesia, dogwood

Midstory non-tree species: Sugarberry, tallow

Percent understory canopy closure: 80 %

Understory tree species: poison ivy, peppervine

Understory non-tree species: cherbyl, Carex

# WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: ________________ Time: ________________ Project Name: ________________________

Field Trip Participants: ____________________________________________

Site # / Name: ________________________________

Lat/Long: ________________________________

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): ________________

______________________________________________________________________

## Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees ________%

Percent of overstory canopy that consists of soft-mast producing trees ________% Must add to equal 100%

Percent of overstory canopy that consists of non-mast producing trees ________%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections)

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## Variable V3 - Understory / Midstory

Percent midstory canopy closure: ________% Midstory tree species: ________________________

Midstory non-tree species: ____________________________________________

Percent understory canopy closure: ________% Understory tree species ________________________

Understory non-tree species: ____________________________________________

# WVA Data Sheet for SWAMP

To be classified as swamp, the area must have ≥ 33% canopy coverage, and ≥ 60% of the canopy must be comprised of baldcypress, water tupelo, button-bush, planer-tree (water elm), swamp privet, and/or Drummond red maple.

Date: ________________ Time: ________________ Project Name: ________________________

Field Trip Participants: ________________________________________________

Site # / Name: ________________________________________

Lat/Long: ________________________________________

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): ________________

________________________________________________________________________

## Variable V1 - Stand Structure

Each component of stand structure should be viewed independently to determine the percent closure or coverage.

Percent overstory canopy closure: ________ % Overstory species: ________________________

Overstory species: ________________________________________________

Percent midstory canopy closure: ________ % Midstory tree species: ________________________

Midstory non-tree species: ________________________________________________

Percent understory canopy closure: ________ % Understory tree species: ________________________

Understory non-tree species: ________________________________________________

## Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory. When both baldcypress and tupelogum (and other species) are present in the overstory, the average age should be weighted according to the percent canopy coverage for each species group. For trees with buttress swell, DBH is the diameter measured at 12" above the swell. In baldcypress and tupelogum, this can sometimes be as high as 10 to 12 feet above the ground.

Percent of overstory closure attributed to baldcypress: ________ %

Average DBH of baldcypress: ________

Must add to equal 100%

Percent of overstory closure attributed to water tupelo and other species: ________ %

Average DBH of water tupelo and other species: ________

**Record tree species and DBHs** (for current average DBH calculations, and future DBH/tree-growth projections):

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WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date:________________ Time:____________ Project:______________________________

Site #/lat-lon:____________________________Name:__________________________________

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast:______ Percent overstory canopy cypress:______

Percent overstory canopy softmast/edible seed producers:______

Percent overstory canopy closure ______

**UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):**

Percent understory :_____/species______________________________________________

______________________________________________________________________________

Tree Species in Understory (include height/indicate abundance)______________________

______________________________________________________________________________

Percent midstory :______/species_______________________________________________

______________________________________________________________________________

Tree Species in Midstory(include height/indicate abundance)_________________________

______________________________________________________________________________

______________________________________________________________________________

**STAND MATURITY (VARIABLE 2):**

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):_______________________

______________________________________________________________________________

AGE: ___________ or TREE SPECIES – with D.B.H.

______________________________________________________________________________

______________________________________________________________________________

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**HYDROLOGY (VARIABLE 4) (BLH)**—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration)– (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered, stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_________________________________________

**NUMBER OF SNAGS** (≥8' and ≥6" dbh):#________/#total snags __________/#future snags_____

**HARDMAST PROXIMITY** from site (# of species of oak/pecan & distance) #sps____feet_______

# APPENDIX C
# DBH SPREADSHEETS

**Site: Plaq Parish NFL - all BLH, protected side only**

YOUNG TREE INGROWTH DBH 0- 5.9 INCHES

| TARGET YEAR: | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 20 | 25 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DBH -Range | | # of trees | Measured DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH |
| 1 | 1.4 | 79 | 1.06 | 1.3 | 1.6 | 1.8 | 2.1 | 2.3 | 2.6 | 2.8 | 3.1 | 3.4 | 3.6 | 3.9 | 4.1 | 4.4 | 4.6 | 4.9 | 6.2 | 7.4 | 8.7 |
| 1.5 | 1.9 | 44 | 1.59 | 1.8 | 2.1 | 2.4 | 2.6 | 2.9 | 3.1 | 3.4 | 3.6 | 3.9 | 4.1 | 4.4 | 4.7 | 4.9 | 5.2 | 5.4 | 6.7 | 8.0 | 9.2 |
| 2 | 2.4 | 32 | 2.08 | 2.3 | 2.6 | 2.8 | 3.1 | 3.4 | 3.6 | 3.9 | 4.1 | 4.4 | 4.6 | 4.9 | 5.1 | 5.4 | 5.7 | 5.9 | 7.2 | 8.5 | 9.7 |
| 2.5 | 2.9 | 15 | 2.63 | 2.9 | 3.1 | 3.4 | 3.7 | 3.9 | 4.2 | 4.4 | 4.7 | 4.9 | 5.2 | 5.4 | 5.7 | 5.9 | 6.2 | 6.5 | 7.7 | 9.0 | 10.3 |
| 3 | 3.4 | 25 | 3.14 | 3.4 | 3.7 | 3.9 | 4.2 | 4.4 | 4.7 | 4.9 | 5.2 | 5.4 | 5.7 | 5.9 | 6.2 | 6.5 | 6.7 | 7.0 | 8.2 | 9.5 | 10.8 |
| 3.5 | 3.9 | 13 | 3.55 | 3.8 | 4.1 | 4.3 | 4.6 | 4.8 | 5.1 | 5.3 | 5.6 | 5.8 | 6.1 | 6.4 | 6.6 | 6.9 | 7.1 | 7.4 | 8.7 | 9.9 | 11.2 |
| 4 | 4.4 | 6 | 4.05 | 4.3 | 4.6 | 4.8 | 5.1 | 5.3 | 5.6 | 5.8 | 6.1 | 6.3 | 6.6 | 6.9 | 7.1 | 7.4 | 7.6 | 7.9 | 9.2 | 10.4 | 11.7 |
| 4.5 | 4.9 | 7 | 4.64 | 4.9 | 5.2 | 5.4 | 5.7 | 5.9 | 6.2 | 6.4 | 6.7 | 6.9 | 7.2 | 7.4 | 7.7 | 8.0 | 8.2 | 8.5 | 9.7 | 11.0 | 12.3 |
| 5 | 5.4 | 5 | 5.02 | 5.3 | 5.5 | 5.8 | 6.0 | 6.3 | 6.6 | 6.8 | 7.1 | 7.3 | 7.6 | 7.8 | 8.1 | 8.3 | 8.6 | 8.8 | 10.1 | 11.4 | 12.7 |
| 5.5 | 5.9 | 8 | 5.64 | 5.9 | 6.2 | 6.4 | 6.7 | 6.9 | 7.2 | 7.4 | 7.7 | 7.9 | 8.2 | 8.4 | 8.7 | 9.0 | 9.2 | 9.5 | 10.7 | 12.0 | 13.3 |

| DBH | Range | | | | | | | | | | | | | | | | | | | | | | | | | | | # of trees | Avg dbh |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.4 | | 0.3 | 0.25 | 0.3 | 0.3 | 0.25 | 0.25 | 0.25 | 0.25 | | | | | | | | | | | | | | | | | | 8 | 0.26 |
| 0.5 | 0.9 | * | | | | | | | | | | | | | | | | | | | | | | | | | | 101 | 0.60 |
| 1 | 1.4 | * | | | | | | | | | | | | | | | | | | | | | | | | | | 79 | 1.06 |
| 1.5 | 1.9 | * | | | | | | | | | | | | | | | | | | | | | | | | | | 44 | 1.59 |
| 2 | 2.4 | * | | | | | | | | | | | | | | | | | | | | | | | | | | 32 | 2.08 |
| 2.5 | 2.9 | | 2.8 | 2.6 | 2.5 | 2.75 | 2.75 | 2.7 | 2.8 | 2.6 | 2.7 | 2.5 | 2.5 | 2.5 | 2.5 | 2.75 | 2.5 | | | | | | | | | | | 15 | 2.63 |
| 3 | 3.4 | | 3.4 | 3 | 3.4 | 3.3 | 3.1 | 3.3 | 3.2 | 3.3 | 3.25 | 3 | 3 | 3 | 3.2 | 3.3 | 3.1 | 3 | 3 | 3 | 3.25 | 3 | 3 | 3 | 3.3 | 3 | 3 | 25 | 3.14 |
| 3.5 | 3.9 | | 3.8 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.7 | 3.5 | 3.5 | 3.5 | | | | | | | | | | | | | 13 | 3.55 |
| 4 | 4.4 | | 4.0 | 4.2 | 4 | 4.1 | 4 | 4 | | | | | | | | | | | | | | | | | | | | 6 | 4.05 |
| 4.5 | 4.9 | | 4.8 | 4.5 | 4.8 | 4.75 | 4.5 | 4.6 | 4.5 | | | | | | | | | | | | | | | | | | | 7 | 4.64 |
| 5 | 5.4 | | 5.1 | 5 | 5 | 5 | 5 | | | | | | | | | | | | | | | | | | | | | 5 | 5.02 |
| 5.5 | 5.9 | | 5.8 | 5.5 | 5.7 | 5.7 | 5.6 | 5.5 | 5.7 | 5.7 | | | | | | | | | | | | | | | | | | 8 | 5.64 |

* Because of the large # of trees in these DBH ranges, these classes had to be calculated separately. The summary is located here, and worksheets can be provided upon request.

**Name: Plaq Parish NFL -- all class BLH - protected side only**

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites
Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

**Correction Factor (see below):** for : species

| | | #of Trees | TY 20 | | TY 1 | 5.0 | | 10.0 | | TY 20 | | 30.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DBH | Range | Measured DE | | BA | DBH | DBH | BA | DBH | BA | DBH | BA | DBH |
| 6 | 6.4 | 5 | 6.1 | 1.00 | 6.4 | 7.5 | 1.52 | 9.1 | 2.24 | 12.1 | 3.97 | 15.1 |
| 6.5 | 6.9 | 2 | 6.8 | 0.50 | 7.0 | 8.2 | 0.72 | 9.8 | 1.04 | 12.8 | 1.77 | 15.8 |
| 7 | 7.4 | 7 | 7.1 | 1.95 | 7.4 | 8.5 | 2.79 | 10.1 | 3.93 | 13.1 | 6.59 | 16.1 |
| 7.5 | 7.9 | 4 | 7.5 | 1.24 | 7.8 | 8.9 | 1.74 | 10.5 | 2.42 | 13.5 | 3.99 | 16.5 |
| 8 | 8.4 | 6 | 8.2 | 2.19 | 8.5 | 9.6 | 3.00 | 11.2 | 4.09 | 14.2 | 6.58 | 17.2 |
| 8.5 | 8.9 | 4 | 8.6 | 1.59 | 8.8 | 10.0 | 2.16 | 11.6 | 2.91 | 14.6 | 4.62 | 17.6 |
| 9 | 9.4 | 2 | 9.0 | 0.88 | 9.3 | 10.4 | 1.18 | 12.0 | 1.57 | 15.0 | 2.45 | 18.0 |
| 9.5 | 9.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 10 | 10.4 | 3 | 10.0 | 1.64 | 10.3 | 11.4 | 2.13 | 13.0 | 2.77 | 16.0 | 4.19 | 19.0 |
| 10.5 | 10.9 | 2 | 10.6 | 1.21 | 10.8 | 12.0 | 1.56 | 13.6 | 2.00 | 16.6 | 2.99 | 19.6 |
| 11 | 11.4 | 1 | 11.0 | 0.66 | 11.3 | 12.4 | 0.84 | 14.0 | 1.07 | 17.0 | 1.58 | 20.0 |
| 11.5 | 11.9 | 2 | 11.6 | 1.47 | 11.9 | 13.0 | 1.84 | 14.6 | 2.33 | 17.6 | 3.38 | 20.6 |
| 12 | 12.4 | 2 | 12.0 | 1.57 | 12.3 | 13.4 | 1.96 | 15.0 | 2.45 | 18.0 | 3.53 | 21.0 |
| 12.5 | 12.9 | 1 | 12.5 | 0.85 | 12.8 | 13.9 | 1.05 | 15.5 | 1.31 | 18.5 | 1.87 | 21.5 |
| 13 | 13.4 | 1 | 13.0 | 0.92 | 13.3 | 14.4 | 1.13 | 16.0 | 1.40 | 19.0 | 1.97 | 22.0 |
| 13.5 | 13.9 | 2 | 13.7 | 2.05 | 14.0 | 15.1 | 2.49 | 16.7 | 3.04 | 19.7 | 4.23 | 22.7 |
| 14 | 14.4 | 3 | 14.1 | 3.27 | 14.4 | 15.5 | 3.95 | 17.1 | 4.80 | 20.1 | 6.63 | 23.1 |
| 14.5 | 14.9 | 4 | 14.6 | 4.66 | 14.9 | 16.0 | 5.59 | 17.6 | 6.77 | 20.6 | 9.27 | 23.6 |
| 15 | 15.4 | 1 | 15.0 | 1.23 | 15.3 | 16.4 | 1.47 | 18.0 | 1.77 | 21.0 | 2.41 | 24.0 |
| 15.5 | 15.9 | 2 | 15.6 | 2.65 | 15.9 | 17.0 | 3.15 | 18.6 | 3.77 | 21.6 | 5.09 | 24.6 |
| 16 | 16.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 16.5 | 16.9 | 1 | 16.7 | 1.52 | 17.0 | 18.1 | 1.79 | 19.7 | 2.12 | 22.7 | 2.81 | 25.7 |
| 17 | 17.4 | 5 | 17.0 | 7.92 | 17.3 | 18.4 | 9.27 | 20.0 | 10.95 | 23.0 | 14.48 | 26.0 |
| 17.5 | 17.9 | 3 | 17.6 | 5.05 | 17.8 | 19.0 | 5.89 | 20.6 | 6.92 | 23.6 | 9.09 | 26.6 |
| 18 | 18.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 18.5 | 18.9 | 1 | 18.5 | 1.87 | 18.8 | 19.9 | 2.16 | 21.5 | 2.52 | 24.5 | 3.27 | 27.5 |
| 19 | 19.4 | 1 | 19.2 | 2.01 | 19.5 | 20.6 | 2.31 | 22.2 | 2.69 | 25.2 | 3.46 | 28.2 |
| 19.5 | 19.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 20 | 20.4 | 4 | 20.1 | 8.84 | 20.4 | 21.5 | 10.11 | 23.1 | 11.67 | 26.1 | 14.89 | 29.1 |
| 20.5 | 20.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 21 | 21.4 | 2 | 21.0 | 4.81 | 21.3 | 22.4 | 5.47 | 24.0 | 6.28 | 27.0 | 7.95 | 30.0 |
| 21.5 | 21.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 22 | 22.4 | 2 | 22.0 | 5.28 | 22.3 | 23.4 | 5.97 | 25.0 | 6.82 | 28.0 | 8.55 | 31.0 |
| 22.5 | 22.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 23 | 23.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 23.5 | 23.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 24 | 24.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 24.5 | 24.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 25 | 25.4 | 1 | 25.2 | 3.46 | 25.5 | 26.6 | 3.86 | 28.2 | 4.34 | 31.2 | 5.31 | 34.2 |
| 25.5 | 25.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 26 | 26.4 | 1 | 26.4 | 3.80 | 26.7 | 27.8 | 4.22 | 29.4 | 4.71 | 32.4 | 5.73 | 35.4 |
| 26.5 | 26.9 | 1 | 26.5 | 3.83 | 26.8 | 27.9 | 4.25 | 29.5 | 4.75 | 32.5 | 5.76 | 35.5 |
| 27 | 27.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 27.5 | 27.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 28 | 28.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 28.5 | 28.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 29 | 29.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 29.5 | 29.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 30 | 30.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 30.5 | 30.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 31 | 31.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 31.5 | 31.9 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 32 | 32.4 | 0 | 0.0 | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 32.5 | 32.9 | 1 | 32.6 | 5.80 | 32.9 | 34.0 | 6.30 | 35.6 | 6.91 | 38.6 | 8.13 | 41.6 |
| 33 | 33.4 | 1 | 33.2 | 6.01 | 33.5 | 34.6 | 6.53 | 36.2 | 7.15 | 39.2 | 8.38 | 42.2 |
| 33.5 | 33.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 34 | 34.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 34.5 | 34.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 35 | 35.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 35.5 | 35.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 36 | 36.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 36.5 | 36.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 37 | 37.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 37.5 | 37.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 38 | 38.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |

| DBH | Range | | Measured DE | BA | DBH | DBH | BA | DBH | BA | DBH | BA | DBH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38.5 | 38.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 39 | 39.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 39.5 | 39.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 40 | 40.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 40.5 | 40.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 41 | 41.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 41.5 | 41.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 42 | 42.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 42.5 | 42.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 43 | 43.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 43.5 | 43.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 44 | 44.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 44.5 | 44.9 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| 45 | 45.4 | | | 0.00 | WRONG | 1.4 | 0.00 | 3.0 | 0.00 | 6.0 | 0.00 | 9.0 |
| | | **# of Trees** | **DBH** | **BA** | **DBH** | **DBH** | **BA** | **DBH** | **BA** | **DBH** | **BA** | **DBH** |
| | | **78** | **13.30** | **91.72** | **13.57** | **14.70** | **108.39** | **16.30** | **129.49** | **19.30** | **174.92** | **22.30** |

Between tree spacing (feet): 23.63179

Note: The

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Basal Area | | | | | | | |
| 457.92 | | | 541.16 | | 646.48 | | 873.27 |

## Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3

Water hickory enter -0.6
Baldcypress enter -0.1

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

| | | | | | | |
|---|---|---|---|---|---|---|
| 52.0 | 503.3 | 516.8 | 576.1 | 659.3 | 815.3 | 971.3 |
| 21.0 | 390.0 | 396.1 | 419.4 | 453.0 | 516.0 | 579.0 |
| 5.0 | 143.9 | 145.4 | 150.9 | 158.9 | 173.9 | 188.9 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 78.0 | 1037.2 | 1058.2 | 1146.4 | 1271.2 | 1505.2 | 1739.2 |

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

**Name: Pla**

**Correction Factor (see below):** for : species

| | | #of Trees | TY 20 | | TY21 | TY21 | TY25 | | TY30 | | TY40 | | TY50 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DBH | Range | | Measured DBH | BA | DBH | DBH | DBH | BA | DBH | BA | DBH | BA | DBH | BA |
| 6 | 6.4 | 79 | 6.2 | 16.56 | 6.5 | 6.5 | 7.5 | 24.07 | 9.0 | 34.90 | 11.8 | 59.99 | 14.6 | 91.84 |
| 6.5 | 6.9 | 41 | 6.7 | 10.04 | 7.0 | 7.0 | 8.0 | 14.22 | 9.5 | 20.18 | 12.3 | 33.83 | 15.1 | 50.99 |
| 7 | 7.4 | 32 | 7.2 | 9.05 | 7.5 | 7.5 | 8.5 | 12.54 | 10.0 | 17.45 | 12.8 | 28.59 | 15.6 | 42.47 |
| 7.5 | 7.9 | 15 | 7.7 | 4.85 | 8.0 | 8.0 | 9.0 | 6.59 | 10.5 | 9.02 | 13.3 | 14.47 | 16.0 | 20.89 |
| 8 | 8.4 | 23 | 8.2 | 8.43 | 8.5 | 8.5 | 9.5 | 11.26 | 11.0 | 15.18 | 13.8 | 23.89 | 16.5 | 34.07 |
| 8.5 | 8.9 | 13 | 8.7 | 5.37 | 9.0 | 9.0 | 10.0 | 7.05 | 11.5 | 9.38 | 14.3 | 14.50 | 17.1 | 20.73 |
| 9 | 9.4 | 6 | 9.2 | 2.77 | 9.5 | 9.5 | 10.5 | 3.59 | 12.0 | 4.71 | 14.8 | 7.17 | 17.6 | 10.14 |
| 9.5 | 9.9 | 6 | 9.7 | 3.08 | 10.0 | 10.0 | 11.0 | 3.94 | 12.5 | 5.11 | 15.3 | 7.66 | 18.1 | 10.72 |
| 10 | 10.4 | 5 | 10.1 | 2.78 | 10.4 | 10.4 | 11.4 | 3.53 | 12.9 | 4.54 | 15.7 | 6.72 | 18.5 | 9.33 |
| 10.5 | 10.9 | 6 | 10.7 | 3.75 | 11.0 | 11.0 | 12.0 | 4.69 | 13.5 | 5.96 | 16.3 | 8.69 | 19.1 | 11.94 |
| 11 | 11.4 | | | 0.00 | WRONG | 0.3 | 1.3 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 11.5 | 11.9 | | | 0.00 | WRONG | 0.3 | 1.3 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.6 | 0.00 |
| 12 | 12.4 | 5 | 12.1 | 3.99 | 12.4 | 12.4 | 13.4 | 4.93 | 14.9 | 6.05 | 17.7 | 8.54 | 20.6 | 11.57 |
| 12.5 | 12.9 | 2 | 12.8 | 1.79 | 13.1 | 13.1 | 14.1 | 2.18 | 15.6 | 2.65 | 18.4 | 3.69 | 21.3 | 4.95 |
| 13 | 13.4 | 7 | 13.1 | 6.55 | 13.4 | 13.4 | 14.4 | 7.96 | 15.9 | 9.65 | 18.7 | 13.35 | 21.7 | 17.98 |
| 13.5 | 13.9 | 4 | 13.5 | 3.98 | 13.8 | 13.8 | 14.8 | 4.80 | 16.3 | 5.80 | 19.1 | 7.96 | 22.1 | 10.66 |
| 14 | 14.4 | 6 | 14.2 | 6.60 | 14.5 | 14.5 | 15.6 | 7.96 | 17.0 | 9.46 | 19.8 | 12.83 | 22.8 | 17.01 |
| 14.5 | 14.9 | 4 | 14.6 | 4.65 | 14.9 | 14.9 | 16.0 | 5.58 | 17.4 | 6.61 | 20.2 | 8.90 | 23.2 | 11.74 |
| 15 | 15.4 | 2 | 15.0 | 2.45 | 15.3 | 15.3 | 16.4 | 2.93 | 17.8 | 3.46 | 20.6 | 4.63 | 23.6 | 6.08 |
| 15.5 | 15.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.6 | 0.00 |
| 16 | 16.4 | 3 | 16.0 | 4.19 | 16.3 | 16.3 | 17.4 | 4.95 | 18.8 | 5.78 | 21.6 | 7.63 | 24.6 | 9.90 |
| 16.5 | 16.9 | 2 | 16.6 | 3.01 | 16.9 | 16.9 | 18.0 | 3.53 | 19.4 | 4.11 | 22.2 | 5.38 | 25.2 | 6.93 |
| 17 | 17.4 | 1 | 17.0 | 1.58 | 17.3 | 17.3 | 18.4 | 1.85 | 19.8 | 2.14 | 22.6 | 2.79 | 25.6 | 3.57 |
| 17.5 | 17.9 | 2 | 17.6 | 3.38 | 17.9 | 17.9 | 19.0 | 3.94 | 20.4 | 4.54 | 23.2 | 5.87 | 26.2 | 7.49 |
| 18 | 18.4 | 1 | 18.0 | 1.77 | 18.3 | 18.3 | 19.5 | 2.06 | 20.8 | 2.36 | 23.6 | 3.04 | 26.6 | 3.86 |
| 18.5 | 18.9 | 1 | 18.5 | 1.87 | 18.8 | 18.8 | 20.0 | 2.17 | 21.3 | 2.47 | 24.1 | 3.17 | 27.1 | 4.01 |
| 19 | 19.4 | 1 | 19.0 | 1.97 | 19.3 | 19.3 | 20.5 | 2.28 | 21.8 | 2.59 | 24.6 | 3.30 | 27.6 | 4.15 |
| 19.5 | 19.9 | 2 | 19.7 | 4.23 | 20.0 | 20.0 | 21.2 | 4.88 | 22.5 | 5.52 | 25.3 | 6.98 | 28.3 | 8.74 |
| 20 | 20.4 | 3 | 20.1 | 6.61 | 20.4 | 20.4 | 21.6 | 7.63 | 22.9 | 8.58 | 25.7 | 10.81 | 28.7 | 13.48 |
| 20.5 | 20.9 | 4 | 20.6 | 9.26 | 20.9 | 20.9 | 22.1 | 10.66 | 23.4 | 11.95 | 26.2 | 14.98 | 29.1 | 18.47 |
| 21 | 21.4 | 1 | 21.0 | 2.41 | 21.3 | 21.3 | 22.5 | 2.76 | 23.8 | 3.09 | 26.6 | 3.86 | 29.5 | 4.75 |
| 21.5 | 21.9 | 2 | 21.6 | 5.09 | 21.9 | 21.9 | 23.1 | 5.82 | 24.4 | 6.49 | 27.2 | 8.07 | 30.1 | 9.88 |
| 22 | 22.4 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.5 | 0.00 |
| 22.5 | 22.9 | 1 | 22.7 | 2.81 | 23.0 | 23.0 | 24.2 | 3.19 | 25.5 | 3.55 | 28.3 | 4.37 | 31.1 | 5.28 |
| 23 | 23.4 | 5 | 23.0 | 14.43 | 23.3 | 23.3 | 24.5 | 16.37 | 25.8 | 18.15 | 28.6 | 22.31 | 31.4 | 26.89 |
| 23.5 | 23.9 | 3 | 23.6 | 9.11 | 23.9 | 23.9 | 25.1 | 10.31 | 26.4 | 11.40 | 29.2 | 13.95 | 32.0 | 16.75 |
| 24 | 24.4 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 24.5 | 24.9 | 1 | 24.5 | 3.27 | 24.8 | 24.8 | 26.0 | 3.69 | 27.3 | 4.06 | 30.1 | 4.94 | 32.9 | 5.90 |
| 25 | 25.4 | 1 | 25.2 | 3.46 | 25.5 | 25.5 | 26.7 | 3.89 | 28.0 | 4.28 | 30.8 | 5.17 | 33.6 | 6.16 |
| 25.5 | 25.9 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 26 | 26.4 | 3 | 26.1 | 11.15 | 26.4 | 26.4 | 27.6 | 12.46 | 28.9 | 13.67 | 31.7 | 16.44 | 34.5 | 19.47 |
| 26.5 | 26.9 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |

| DBH | Range | #of Trees | TY 20 Measured DBH | BA | TY21 DBH | TY21 DBH | TY25 DBH | BA | TY30 DBH | BA | TY40 DBH | BA | TY50 DBH | BA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 | 27.4 | 1 | 27.0 | 3.98 | 27.3 | 27.3 | 28.5 | 4.43 | 29.8 | 4.84 | 32.6 | 5.80 | 35.4 | 6.83 |
| 27.5 | 27.9 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 28 | 28.4 | 2 | 28.0 | 8.55 | 28.3 | 28.3 | 29.5 | 9.46 | 30.8 | 10.35 | 33.6 | 12.31 | 36.4 | 14.45 |
| 28.5 | 28.9 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 29 | 29.4 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 29.5 | 29.9 | | | 0.00 | WRONG | 0.3 | 1.5 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 30 | 30.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 30.5 | 30.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 31 | 31.4 | 1 | 31.2 | 5.31 | 31.5 | 31.5 | 32.6 | 5.80 | 34.0 | 6.30 | 36.8 | 7.39 | 39.6 | 8.55 |
| 31.5 | 31.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 32 | 32.4 | 1 | 32.4 | 5.73 | 32.7 | 32.7 | 33.8 | 6.23 | 35.2 | 6.76 | 38.0 | 7.88 | 40.8 | 9.08 |
| 32.5 | 32.9 | 1 | 32.5 | 5.76 | 32.8 | 32.8 | 33.9 | 6.27 | 35.3 | 6.80 | 38.1 | 7.92 | 40.9 | 9.12 |
| 33 | 33.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 33.5 | 33.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 34 | 34.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 34.5 | 34.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 35 | 35.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 35.5 | 35.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 36 | 36.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 36.5 | 36.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 37 | 37.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 37.5 | 37.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 38 | 38.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 38.5 | 38.9 | 1 | 0.0 | 0.00 | WRONG | 0.3 | 1.4 | 0.01 | 2.8 | 0.04 | 5.6 | 0.17 | 8.4 | 0.38 |
| 39 | 39.4 | 1 | 39.2 | 8.38 | 39.5 | 39.5 | 40.6 | 8.99 | 42.0 | 9.62 | 44.8 | 10.95 | 47.6 | 12.36 |
| 39.5 | 39.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 40 | 40.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 40.5 | 40.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 41 | 41.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 41.5 | 41.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 42 | 42.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 42.5 | 42.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 43 | 43.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 43.5 | 43.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 44 | 44.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 44.5 | 44.9 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| 45 | 45.4 | | | 0.00 | WRONG | 0.3 | 1.4 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 | 8.4 | 0.00 |
| | | **# of Trees** | **DBH** | **BA** | **DBH** | | **DBH** | **BA** | **DBH** | **BA** | **DBH** | **BA** | **DBH** | **BA** |
| | | **301** | **10.09** | **223.97** | **10.35** | **#DIV/0!** | **11.40** | **271.48** | **12.89** | **329.56** | **15.69** | **460.88** | **18.50** | **619.57** |

Between tree spacing (feet): 12.02986317

Note: The

| | | | | | |
|---|---|---|---|---|---|
| Basal Area | | | | | |
| 1118.18 | | 1355.36 | 1645.31 | 2300.95 | 3093.19 |

| DBH | Range | #of Trees | TY 20 Measured DBH | BA | TY21 DBH | TY21 DBH | TY25 DBH | BA | TY30 DBH | BA | TY40 DBH | BA | TY50 DBH | BA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3

Tupelos en
Pecan ente
Cottonwoo
Willow ente

Water hickory enter -0.6
Baldcypress enter -0.1

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

| | | | | | | |
|---|---|---|---|---|---|---|
| 256.0 | 2045.6 | 2111.5 | 2374.7 | 2762.4 | 3479.2 | 4196.7 |
| 33.0 | 668.2 | 677.9 | 716.7 | 760.6 | 853.0 | 949.3 |
| 10.0 | 282.6 | 285.5 | 297.2 | 310.6 | 338.6 | 366.6 |
| 2.0 | 39.2 | 39.8 | 42.0 | 44.8 | 50.4 | 56.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 301.0 | 3035.6 | 3114.6 | 3430.5 | 3878.4 | 4721.2 | 5568.6 |

Plaq Parish NFL -all class BLH - protected side of existing levee

| DBH | Range | | | | | | | | # of trees | Avg DBH |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 6.4 | 6.0 | 6 | 6.1 | 6 | 6.25 | | | 5 | 6.07 |
| 6.5 | 6.9 | 6.8 | 6.7 | | | | | | 2 | 6.75 |
| 7 | 7.4 | 7.0 | 7.4 | 7.1 | 7.2 | 7 | 7 | 7.3 | 7 | 7.14 |
| 7.5 | 7.9 | 7.5 | 7.6 | 7.5 | 7.5 | | | | 4 | 7.53 |
| 8 | 8.4 | 8.3 | 8.3 | 8 | 8.3 | 8 | 8.2 | | 6 | 8.18 |
| 8.5 | 8.9 | 8.5 | 8.7 | 8.5 | 8.5 | | | | 4 | 8.55 |
| 9 | 9.4 | 9.0 | 9 | | | | | | 2 | 9.00 |
| 9.5 | 9.9 | | | | | | | | 0 | 0.00 |
| 10 | 10.4 | 10.0 | 10 | 10 | | | | | 3 | 10.00 |
| 10.5 | 10.9 | 10.5 | 10.6 | | | | | | 2 | 10.55 |
| 11 | 11.4 | 11.0 | | | | | | | 1 | 11.00 |
| 11.5 | 11.9 | 11.5 | 11.7 | | | | | | 2 | 11.60 |
| 12 | 12.4 | 12.0 | 12 | | | | | | 2 | 12.00 |
| 12.5 | 12.9 | 12.5 | | | | | | | 1 | 12.50 |
| 13 | 13.4 | 13.0 | | | | | | | 1 | 13.00 |
| 13.5 | 13.9 | 13.8 | 13.6 | | | | | | 2 | 13.70 |
| 14 | 14.4 | 14.3 | 14 | 14.1 | | | | | 3 | 14.13 |
| 14.5 | 14.9 | 14.5 | 14.7 | 14.5 | 14.75 | | | | 4 | 14.61 |
| 15 | 15.4 | 15.0 | | | | | | | 1 | 15.00 |
| 15.5 | 15.9 | 15.7 | 15.5 | | | | | | 2 | 15.60 |
| 16 | 16.4 | | | | | | | | 0 | 0.00 |
| 16.5 | 16.9 | 16.7 | | | | | | | 1 | 16.70 |
| 17 | 17.4 | 17.0 | 17 | 17.2 | 17 | 17 | | | 5 | 17.04 |
| 17.5 | 17.9 | 17.5 | 17.7 | 17.5 | | | | | 3 | 17.57 |
| 18 | 18.4 | | | | | | | | 0 | 0.00 |
| 18.5 | 18.9 | 18.5 | | | | | | | 1 | 18.50 |
| 19 | 19.4 | 19.2 | | | | | | | 1 | 19.20 |
| 19.5 | 19.9 | | | | | | | | 0 | 0.00 |
| 20 | 20.4 | 20.1 | 20.4 | 20 | 20 | | | | 4 | 20.13 |
| 20.5 | 20.9 | | | | | | | | 0 | 0.00 |
| 21 | 21.4 | 21.0 | 21 | | | | | | 2 | 21.00 |
| 21.5 | 21.9 | | | | | | | | 0 | 0.00 |
| 22 | 22.4 | 22.0 | 22 | | | | | | 2 | 22.00 |
| 22.5 | 22.9 | | | | | | | | 0 | 0.00 |
| 23 | 23.4 | | | | | | | | 0 | 0.00 |
| 23.5 | 23.9 | | | | | | | | 0 | 0.00 |
| 24 | 24.4 | | | | | | | | 0 | 0.00 |
| 24.5 | 24.9 | | | | | | | | 0 | 0.00 |
| 25 | 25.4 | 25.2 | | | | | | | 1 | 25.20 |
| 25.5 | 25.9 | | | | | | | | 0 | 0.00 |
| 26 | 26.4 | 26.4 | | | | | | | 1 | 26.40 |
| 26.5 | 26.9 | 26.5 | | | | | | | 1 | 26.50 |
| 27 | 27.4 | | | | | | | | 0 | 0.00 |
| 27.5 | 27.9 | | | | | | | | 0 | 0.00 |
| 28 | 28.4 | | | | | | | | 0 | 0.00 |
| 28.5 | 28.9 | | | | | | | | 0 | 0.00 |
| 29 | 29.4 | | | | | | | | 0 | 0.00 |
| 29.5 | 29.9 | | | | | | | | 0 | 0.00 |

| DBH | Range | | | | | | | | # of trees | Avg DBH |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 30.4 | | | | | | | | 0 | 0.00 |
| 30.5 | 30.9 | | | | | | | | 0 | 0.00 |
| 31 | 31.4 | | | | | | | | 0 | 0.00 |
| 31.5 | 31.9 | | | | | | | | 0 | 0.00 |
| 32 | 32.4 | | | | | | | | 0 | 0.00 |
| 32.5 | 32.9 | 32.6 | | | | | | | 1 | 32.60 |
| 33 | 33.4 | 33.2 | | | | | | | 1 | 33.20 |
| 33.5 | 33.9 | | | | | | | | 0 | 0.00 |
| 34 | 34.4 | | | | | | | | 0 | 0.00 |
| 34.5 | 34.9 | | | | | | | | 0 | 0.00 |
| 35 | 35.4 | | | | | | | | 0 | 0.00 |
| 35.5 | 35.9 | | | | | | | | 0 | 0.00 |
| 36 | 36.4 | | | | | | | | 0 | 0.00 |
| 36.5 | 36.9 | | | | | | | | 0 | 0.00 |
| 37 | 37.4 | | | | | | | | 0 | 0.00 |
| 37.5 | 37.9 | | | | | | | | 0 | 0.00 |
| 38 | 38.4 | | | | | | | | 0 | 0.00 |
| 38.5 | 38.9 | | | | | | | | 0 | 0.00 |
| 39 | 39.4 | | | | | | | | 0 | 0.00 |
| 39.5 | 39.9 | | | | | | | | 0 | 0.00 |
| 40 | 40.4 | | | | | | | | 0 | 0.00 |
| 40.5 | 40.9 | | | | | | | | 0 | 0.00 |
| 41 | 41.4 | | | | | | | | 0 | 0.00 |
| 41.5 | 41.9 | | | | | | | | 0 | 0.00 |
| 42 | 42.4 | | | | | | | | 0 | 0.00 |
| 42.5 | 42.9 | | | | | | | | 0 | 0.00 |
| 43 | 43.4 | | | | | | | | 0 | 0.00 |
| 43.5 | 43.9 | | | | | | | | 0 | 0.00 |
| 44 | 44.4 | | | | | | | | 0 | 0.00 |
| 44.5 | 44.9 | | | | | | | | 0 | 0.00 |
| 45 | 45.4 | | | | | | | | 0 | 0.00 |

**Site: Scrub Shrub** **YOUNG TREE INGROWTH**

| ***TARGET YEAR:*** | | | ***0*** | ***1*** | ***2*** | ***3*** | ***10*** | ***15*** | ***20*** | ***25*** | ***30*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **DBH** | **-Range** | **# of trees** | **Measured DBH** | **DBH** | **DBH** | **DBH** | **DBH** | **DBH** | **DBH** | **DBH** | **DBH** |
| **1** | **1.4** | 71 | 1.1 | 1.4 | 1.6 | 1.9 | 3.7 | 4.9 | 6.2 | 7.5 | 8.8 |
| **1.5** | **1.9** | 68 | 1.61 | 1.9 | 2.1 | 2.4 | 4.2 | 5.4 | 6.7 | 8.0 | 9.3 |
| **2** | **2.4** | 55 | 2.21 | 2.5 | 2.7 | 3.0 | 4.8 | 6.0 | 7.3 | 8.6 | 9.9 |
| **2.5** | **2.9** | 45 | 2.64 | 2.9 | 3.2 | 3.4 | 5.2 | 6.5 | 7.7 | 9.0 | 10.3 |
| **3** | **3.4** | 29 | 3.21 | 3.5 | 3.7 | 4.0 | 5.8 | 7.0 | 8.3 | 9.6 | 10.9 |
| **3.5** | **3.9** | 50 | 3.62 | 3.9 | 4.1 | 4.4 | 6.2 | 7.4 | 8.7 | 10.0 | 11.3 |
| **4** | **4.4** | 22 | 4.27 | 4.5 | 4.8 | 5.0 | 6.8 | 8.1 | 9.4 | 10.6 | 11.9 |
| **4.5** | **4.9** | 1 | 4.8 | 5.1 | 5.3 | 5.6 | 7.4 | 8.6 | 9.9 | 11.2 | 12.5 |
| **5** | **5.4** | 8 | 5.23 | 5.5 | 5.7 | 6.0 | 7.8 | 9.1 | 10.3 | 11.6 | 12.9 |
| **5.5** | **5.9** | 8 | 5.63 | 5.9 | 6.1 | 6.4 | 8.2 | 9.5 | 10.7 | 12.0 | 13.3 |

**YOUNG TREE AVERAGE DBH**

| **DBH** | **Range** | | | | | | | | | | | | | | **# of trees** | **Avg dbh** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.4 | | | | | | | | | | | | | | 0.0 | 0.0 |
| 0.5 | 0.9 | | | | | | | | | | | | | | 0.0 | 0.0 |
| 1.0 | 1.4 | * | | | | | | | | | | | | | 0.0 | 0.0 |
| 1.5 | 1.9 | * | | | | | | | | | | | | | 0.0 | 0.0 |
| 2.0 | 2.4 | * | | | | | | | | | | | | | 0.0 | 0.0 |
| 2.5 | 2.9 | * | | | | | | | | | | | | | 0.0 | 0.0 |
| 3.0 | 3.4 | * | | | | | | | | | | | | | 0.0 | 0.0 |
| 3.5 | 3.9 | * | | | | | | | | | | | | | 0.0 | 0.0 |
| 4.0 | 4.4 | | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.2 | 4.4 | 4.1 | 4.2 | 4.0 | 4.0 | 4.4 | 22.0 | 4.3 |
| 4.5 | 4.9 | | 4.8 | | | | | | | | | | | | 1.0 | 4.8 |
| 5.0 | 5.4 | | 5.2 | 5.2 | 5.2 | 5.2 | | | | | | | | | 8.0 | 5.2 |
| 5.5 | 5.9 | | 5.5 | 5.5 | 5.5 | 5.5 | | | | | | | | | 8.0 | 5.6 |
| | | | | | | | | | | | | | | | | |

SCRUB-SHRUB

Date: 11/23/2009 Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

**Correction Factor (see below):** for : species

| | | | Target Year: | | Target Year: | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | #of Trees | 0.0 | | 1.0 | 5.0 | | 10.0 | | 20.0 | |
| DBH | Range | | Measured DBH | BA | DBH | DBH | BA | DBH | BA | DBH | BA |
| 6 | 6.4 | 9 | 6.0 | 1.77 | 6.3 | 7.4 | 2.70 | 9.0 | 3.98 | 12.0 | 7.08 |
| 6.5 | 6.9 | 4 | 6.5 | 0.92 | 6.8 | 7.9 | 1.36 | 9.5 | 1.97 | 12.5 | 3.41 |
| 7 | 7.4 | 5 | 7.4 | 1.48 | 7.6 | 8.8 | 2.09 | 10.4 | 2.93 | 13.4 | 4.87 |
| | | **# of Trees** | **DBH** | **BA** | **DBH** | **DBH** | **BA** | **DBH** | **BA** | **DBH** | **BA** |
| | | **18** | **6.49** | **4.17** | **6.75** | **7.89** | **6.15** | **9.49** | **8.88** | **12.49** | **15.36** |

Between tree spacing (feet): 49.1934955

Note: The f

| | | | | |
|---|---|---|---|---|
| Basal Area | | | | |
| 20.83 | | 30.70 | 44.34 | 76.67 |

**Correction Factors:**

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

| | |
|---|---|
| Overcup oak enter -0.7 | Tupelos enter · |
| Red oaks enter +1.1 | Pecan enter +( |
| White oaks enter -0.2 | Cottonwood er |
| Ashes enter -0.3 | Willow enter +: |

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3

For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

| | | | | | |
|---|---|---|---|---|---|
| 18.0 | 116.9 | 121.5 | 142.1 | 170.9 | 224.9 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 18.0 | 116.9 | 121.5 | 142.1 | 170.9 | 224.9 |

SCRUB-SHRUB

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

**Correction Factor (see below):** for : species

| DBH | Range | #of Trees | TY3O Measured DBH | BA | TY31 DBH | TY35 DBH | BA | TY40 DBH | BA | TY50 DBH | BA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8.5 | 8.9 | 65 | 8.8 | 27.14 | 9.0 | 10.0 | 35.63 | 11.6 | 47.29 | 14.4 | 73.00 |
| 9 | 9.4 | 62 | 9.3 | 29.00 | 9.5 | 10.5 | 37.53 | 12.1 | 49.18 | 14.9 | 74.67 |
| 9.5 | 9.9 | 49 | 9.9 | 25.98 | 10.1 | 11.1 | 33.14 | 12.7 | 42.83 | 15.5 | 63.87 |
| 10 | 10.4 | 41 | 10.3 | 23.68 | 10.5 | 11.6 | 29.91 | 13.1 | 38.32 | 15.9 | 56.46 |
| 10.5 | 10.9 | 24 | 10.9 | 15.44 | 11.1 | 12.1 | 19.28 | 13.7 | 24.42 | 16.5 | 35.46 |
| 11 | 11.4 | 45 | 11.3 | 31.17 | 11.5 | 12.5 | 38.63 | 14.1 | 48.59 | 16.9 | 69.85 |
| 11.5 | 11.9 | 17 | 11.9 | 13.13 | 12.2 | 13.2 | 16.09 | 14.7 | 20.04 | 17.5 | 28.39 |
| 12 | 12.4 | | | 0.00 | WRONG | 1.3 | 0.00 | 2.8 | 0.00 | 5.6 | 0.00 |
| 12.5 | 12.9 | 9 | 12.9 | 8.14 | 13.2 | 14.2 | 9.93 | 15.7 | 12.07 | 18.5 | 16.76 |
| 13 | 13.4 | 8 | 13.3 | 7.69 | 13.6 | 14.6 | 9.33 | 16.1 | 11.28 | 18.9 | 15.55 |
| 15 | 15.4 | 9 | 15.0 | 11.04 | 15.3 | 16.4 | 13.20 | 17.8 | 15.55 | 20.6 | 20.83 |
| 15.5 | 15.9 | 4 | 15.5 | 5.24 | 15.8 | 16.9 | 6.23 | 18.3 | 7.31 | 21.1 | 9.71 |
| 16 | 16.4 | 5 | 16.4 | 7.33 | 16.7 | 17.8 | 8.64 | 19.2 | 10.05 | 22.0 | 13.20 |
| | | **# of Trees** | **DBH** | **BA** | **DBH** | **DBH** | **BA** | **DBH** | **BA** | **DBH** | **BA** |
| | | **338** | **10.41** | **204.99** | **10.67** | **11.70** | **257.52** | **13.21** | **326.93** | **16.01** | **477.77** |

Between tree spacing (feet): 11.35234512

Note: The f

| | | | | | |
|---|---|---|---|---|---|
| | Basal Area | | | | |
| | 1023.43 | | 1285.67 | 1632.20 | 2385.27 |

**Correction Factors:**

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3

Tupelos enter -
Pecan enter +(
Cottonwood en
Willow enter +2

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3

For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

| | | | | | |
|---|---|---|---|---|---|
| 329.0 | 3375.2 | 3459.5 | 3796.9 | 4296.4 | 5217.6 |
| 9.0 | 144.0 | 146.5 | 156.6 | 169.2 | 194.4 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 338.0 | 3519.2 | 3606.0 | 3953.5 | 4465.6 | 5412.0 |

**BATTURE-wet BLH**
**Correction Factor (see below):**

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites
Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

| ***TARGET YEAR:*** | | *0* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *11* | *12* | *13* | *14* | *15* | *20* | *25* | *30* | *35* | *40* | *45* | *50* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DBH | -Range | Measured DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH | DBH |
| 6 | 6.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 6.5 | 6.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 7 | 7.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 7.5 | 7.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 8 | 8.4 | 8.1 | 8.4 | 8.6 | 8.9 | 9.1 | 9.4 | 9.6 | 9.9 | 10.1 | 10.4 | 10.7 | 10.9 | 11.2 | 11.4 | 11.7 | 11.9 | 13.2 | 14.5 | 15.9 | 17.3 | 18.7 | 20.2 | 21.7 |
| 8.5 | 8.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 9 | 9.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 9.5 | 9.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 10 | 10.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 10.5 | 10.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 11 | 11.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 11.5 | 11.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 12 | 12.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 12.5 | 12.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 13 | 13.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 13.5 | 13.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 14 | 14.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 14.5 | 14.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 15 | 15.4 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |
| 15.5 | 15.9 | | WRONG | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### | ####### |

# APPENDIX D
# COMBINED FIELD SITE DATA WORKSHEETS

Project: Plaq Parish NFL

**TY0**

Habitat Type: BLH, protected side only

| Sites: | C_Sect5 | F_Sect1 | G_Sect1 | H_Sect2 | J_Sect1 | MEAN | STDV |
|---|---|---|---|---|---|---|---|
| mean dbh | | | | | | | |
| % Overstory hardmast | 35 | 35 | 10 | 5 | 5 | 12.9 | 15.5 |
| % overstory softmast | 20 | 65 | 90 | 80 | 95 | 78.6 | 28.7 |
| % canopy closure | 60 | 70 | 70 | 40 | 50 | 58.6 | 10.7 |
| % understory | 10 | 25 | 50 | 20 | 80 | 42.9 | 27.1 |
| % mid story | 30 | 75 | 50 | 40 | 60 | 53.6 | 14.9 |
| # tree sps in mid story | 2 | 7 | 6 | 4 | 8 | 5.0 | 2.2 |
| # tree sps in understory | 3 | 6 | 5 | 4 | 2 | 4.0 | 1.4 |
| # snags > or = 6" | 0 | 0 | 1 | 0 | 0 | 0.1 | 0.4 |
| # snags > or = 8" | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 |
| distance (from sample) to nearest hardmast (feet) | | | | | | | |
| | class 5 | class 5 | class 2 | class 2 | class 2 | AVG = class 4 | |

**TY20**

Habitat Type: BLH, protected side only

| Sites: | C_Sect5 | F_Sect1 | G_Sect1 | H_Sect2 | J_Sect1 | MEAN | STDV |
|---|---|---|---|---|---|---|---|
| mean dbh | | | | | | | |
| % Overstory hardmast | 45 | 45 | 5 | 5 | 10 | 16.4 | 19.7 |
| % overstory softmast | 10 | 55 | 95 | 70 | 90 | 73.6 | 32.4 |
| % canopy closure | | | | | | | |
| % understory | 10 | 15 | 45 | 15 | 70 | 35.7 | 24.7 |
| % mid story | 20 | 65 | 40 | 30 | 50 | 43.6 | 14.9 |
| # tree sps in mid story | | | | | | | |
| # tree sps in understory | | | | | | | |
| # snags > or = 6" | | | | | | | |
| # snags > or = 8" | | | | | | | |
| distance (from sample) to nearest hardmast (feet) | | | | | | | |

AVG= class 4

**TY50**

Habitat Type: BLH, protected side only

| Sites: | C_Sect5 | F_Sect1 | G_Sect1 | H_Sect2 | J_Sect1 | MEAN | STDV |
|---|---|---|---|---|---|---|---|
| mean dbh | | | | | | | |
| % Overstory hardmast | 50 | 50 | 5 | 5 | 15 | 19.3 | 21.5 |
| % overstory softmast | 5 | 50 | 95 | 60 | 85 | 69.3 | 33.8 |
| % canopy closure | | | | | | | |
| % understory | 5 | 10 | 40 | 10 | 60 | 28.6 | 22.9 |
| % mid story | 20 | 55 | 30 | 20 | 40 | 35.0 | 12.6 |
| # tree sps in mid story | | | | | | | |
| # tree sps in understory | | | | | | | |
| # snags > or = 6" | | | | | | | |
| # snags > or = 8" | | | | | | | |
| distance (from sample) to nearest hardmast (feet) | | | | | | | |

AVG= class 4

Project: Plaq Parish NFL

**Habitat Type: Class 1 Scrub-Shrub**

| | Sites: | V_Sect1 | W_Sect2 | Y_Sect5 | | MEAN | STDV |
|---|---|---|---|---|---|---|---|
| **mean dbh** | | | | | | | |
| **% Overstory hardmast** | | 0 | 0 | 10 | | 3.3 | 5.8 |
| **% overstory softmast** | | 10 | 0 | 0 | | 3.3 | 5.8 |
| **% canopy closure** | | 90 | 95 | 65 | | 83.3 | 16.1 |
| **% understory** | | 60 | 80 | 5 | | 48.3 | 38.8 |
| **% mid story** | | 5 | 25 | 40 | | 23.3 | 17.6 |
| **# tree sps in mid story** | | | | | | | |
| **# tree sps in understory** | | | | | | | |
| **# snags > or = 6"** | | | | | | | |
| **# snags > or = 8"** | | | | | | | |
| **distance (from sample) to nearest hardmast (feet)** | | 500 | | | | 500.0 | |

Combined Data-
Batture: Wet BLH

| Previous WVAs | V1-Tree Species Assc | | V2- stand maturity | | V3- Understory/midstory | | V4-Hydrology | | V5- Size of Contiguous Forest | V6- Land Use | V7- Disturbance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FWOP | FWP | FWOP | FWP | FWOP | FWP | FWOP | FWP | | | |
| **MRL 01-IER 33/34** | C1 (all) except TY50 (C2) | C1 (all) | TY 0 avg- 9.7, TY 1+ avg- 9.5 | TY 0 avg- 9.7, TY 1+ avg- 9.5 | 5%U, 90%M (TY 0), then 0% | 5%U, 90%M (TY 0), then 0% | C3-all | C3-all | | See Attachment 5 | Mississippi River (1/3 for all) |
| **MRL 03-IER 33/34** | C1 (all) except TY 35 and 50 (C2) | C1 (all) | Avg 9.2 | 0.01 after TY 0 | 65%U, 30%M then 0 | 65%U, 30%M then 0 | C3-all | C3-all | | See Attachment 5 | Mississippi River (1/3 for all) |
| **MRL 04-IER 33/34** | C1 (all) except TY50 (C2) | C1 (all) | Avg. 11.1 | 0.01 after TY 0 | 40%U, 15%M, then 0 | 40%U, 15%M, then 0 | C3-all | C3-all | | See Attachment 5 | Mississippi River (1/3 for all) |
| **MRL 05- IER 33/34** | C3, then C5 (TY 25/50) | C3 (TY0), then C1 | avg 8.4 | 0.01 after TY 0 | 25%U, 50%M | 25%U, 50%M | C3-all | C3-all | | See Attachment 5 | Mississippi River (1/3 for all) |
| **MRL 08- IER 33/34** | C4, then C5 | C4 (TY 0), then C1 | TY 0 avg-10.8, TY 1+ avg 9.2 | 0.01 after TY 0 | 80%U, 15%M | 80%U, 15%M | C3-all | C3-all | | See Attachment 5 | Mississippi River (1/3 for all) |
| **Q4-borrow site** | C1 (all) | C1 (all) | Avg 4.4 | 0.01 after TY 0 | 40%U, 30%M | 40%U, 30%M | C3-all | C3, then C2 | | See Attachment 5 | Road 2.2 |
| **Q2-borrow site** | C2 all | C2, then C1 | TY 0 avg- 3.2, TY 1+ avg 3.8 | 0.01 after TY 0 | 75%U, 30%M | 75%U, 30%M | C3-all | C3, then C2 | | See Attachment 5 | Road 2.2 |
| **Q7(b)-borrow site** | C1 all except TY 50 (c2) | C1 (all) | Ty 0 avg 3.1, TY 1+ avg 3.6 | 0.01 after TY 0 | 90%U, 35%M | 90%U, 35%M | C3-all | C3, then C2 | | See Attachment 5 | Road 2.2 |
| **Q6(a)- borrow site** | Class 1 all except TY 50 (C3) | C1 (all) | avg 13 (only 1 tree) | 0.01 after TY 0 | 80%U, 2%M | 80%U, 2%M | C3-all | C3, then C2 | | See Attachment 5 | Road 2.2 |
| | | | | | | | | | | | |
| **AVERAGE** | **TY 0- 1.6 (C2), TY 50- 3.6 (C4)** | **C1 (all)** | **avg 8.1 TY 0, then project out** | **8.1 then 0.01 after TY 0, see Attachment 3** | **TY 0-55%U, 33%M** | **TY 0:55%U, 33%M** | **C3-all** | **C3-all** | **136 total impacts=C4** | **See Attachment 5** | **total: 2/2** |
| | | | | | **TY 1-55%U, 33%M** | | | | | | |
| | | | | | **TY 20-45%U, 42%M** | | | | | | |
| | | | | | **TY 50-37%U, 34%M** | | | | | | |

# APPENDIX E
# LAND USE SPREADSHEETS

**Land Use for BLH**

| Levee Section | Forest/Marsh | Abandoned AG, etc. | Pasture | Water | Active AG | Development | TOTAL w/in 0.5-mile Radius |
|---|---|---|---|---|---|---|---|
| | *(acres)* | *(acres)* | *(acres)* | *(acres)* | *(acres)* | *(acres)* | *(acres)* |
| **Section 1 (BLH)** | 2589.61 | 98.35 | 517.27 | 931.86 | 232.98 | 990.95 | 5361.02 |
| **Section 2** | 846.42 | 128.93 | 683.43 | 318.65 | 16.51 | 110.09 | 2104.02 |
| **Section 3** | 412.98 | 54.06 | 53.77 | 286.46 | 0.00 | 197.61 | 1004.89 |
| **Section 4** | 1036.86 | 0.00 | 923.71 | 343.57 | 0.00 | 117.72 | 2421.86 |
| **Section 5** | 841.01 | 222.83 | 188.99 | 808.71 | 0.00 | 240.85 | 2302.40 |
| | | | | | | | |
| **TOTALS** | **5726.88** | **504.18** | **2367.18** | **2689.25** | **249.49** | **1657.21** | **13194.19** |
| | | | | | | | |
| **PERCENTAGES** | | | | | | | |
| **Levee Section** | **Forest/Marsh** | **Abandoned AG, etc.** | **Pasture** | **Water** | **Active AG** | **Development** | |
| **Section 1 (BLH)** | 48.30% | 1.83% | 9.65% | 17.38% | 4.35% | 18.48% | 99.99% |
| **Section 2** | 40.23% | 6.13% | 32.48% | 15.14% | 0.78% | 5.23% | 99.99% |
| **Section 3** | 41.10% | 5.38% | 5.35% | 28.51% | 0.00% | 19.66% | 100.00% |
| **Section 4** | 42.81% | 0.00% | 38.14% | 14.19% | 0.00% | 4.86% | 100.00% |
| **Section 5** | 36.53% | 9.68% | 8.21% | 35.12% | 0.00% | 10.46% | 100.00% |
| | | | | | | | |
| ***AVERAGES*** | **41.79%** | **4.60%** | **18.77%** | **22.07%** | **1.03%** | **11.74%** | **100.00%** |

**Land Use for S/S**

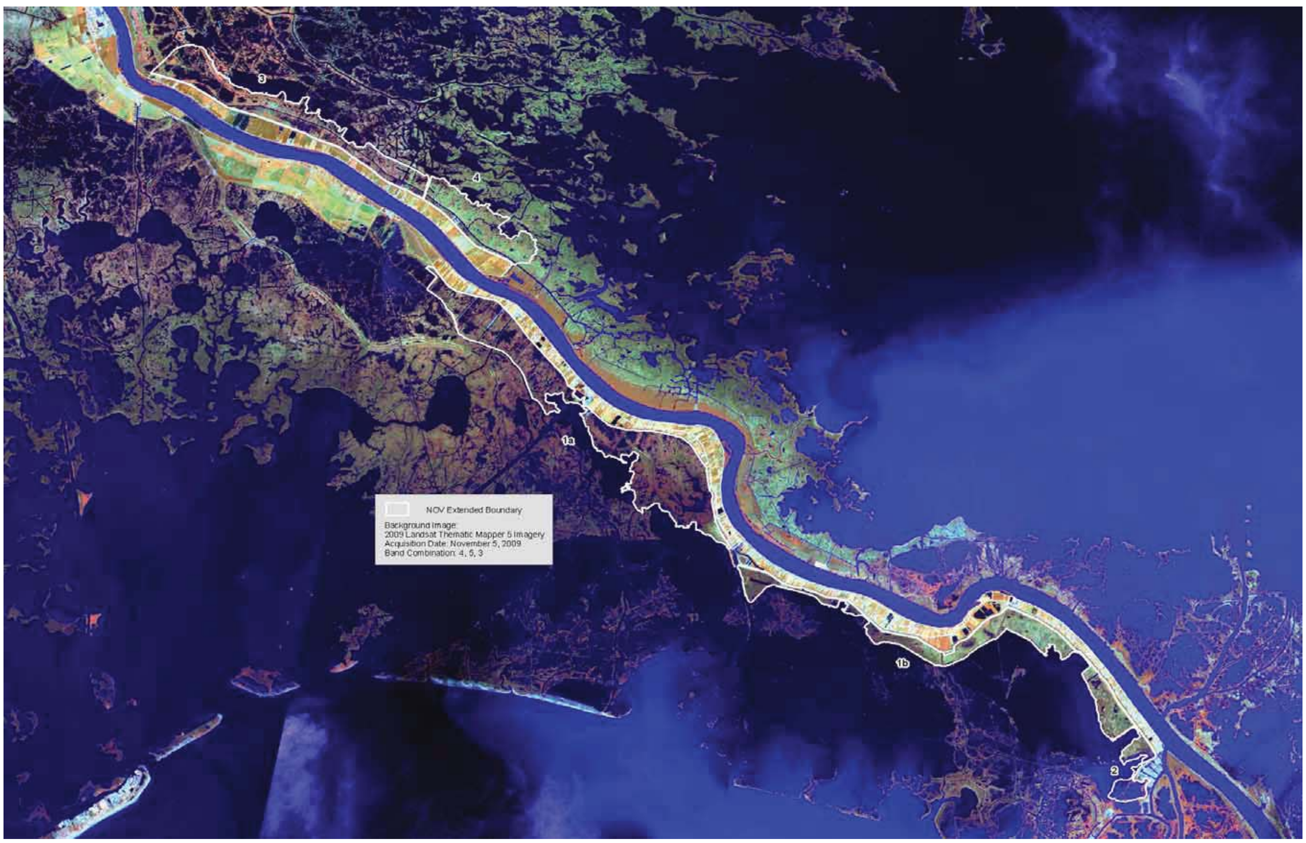
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **section 1 (ac)** | 2589.61 | 98.35 | 517.27 | 931.86 | 232.98 | 990.95 | 5361.02 |
| **section 2 (ac)** | 846.42 | 128.93 | 683.43 | 318.65 | 16.51 | 110.09 | 2104.02 |
| **section 5 (ac)** | 841.01 | 222.83 | 188.99 | 808.71 | 0.00 | 240.85 | 2302.40 |
| | | | | | | | |
| **section 1** | 0.48 | 0.02 | 0.10 | 0.17 | 0.04 | 0.19 | 1.00 |
| **section 2** | 0.40 | 0.06 | 0.32 | 0.15 | 0.01 | 0.05 | 1.00 |
| **section 5** | 0.37 | 0.10 | 0.08 | 0.35 | 0.00 | 0.10 | 1.00 |

**Batture**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***AVERAGES*** | ***41.69%*** | ***5.87%*** | ***16.76%*** | ***22.55%*** | ***1.69%*** | ***11.40%*** | ***99.96%*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 3042 | 94 | 6556 | 7 | 6928 | 13552 | |
| | 3136 | 3136 | 3136 | 3136 | 3136 | 3136 | |
| | 9539712 | 294784 | 20559616 | 21952 | 21726208 | 42499072 | |
| | 0.000247105 | 0.000247105 | 0.00024711 | 0.00024711 | 0.000247105 | 0.000247105 | |
| **Acres** | **2,357** | **73** | **5,080** | **5** | **5,369** | **10,502** | **23,386** |
| **Percent** | **10.08%** | **0.31%** | **21.72%** | **0.02%** | **22.96%** | **44.91%** | **100.00%** |

# APPENDIX F
# LAND LOSS SPREADSHEETS


3
4
1a
NOV Extended Boundary
Background Image:
2009 Landsat Thematic Mapper 5 Imagery
Acquisition Date: November 5, 2009
Band Combination: 4, 5, 3
1b
2

**Plaquemines Parish New Orleans to Venice Levee (NOV) Project Extended Boundaries**

| Data Source | Acquisition Date | Water Level Meters | Class | Area 1a | Area 1b | Area 2 | Area 3 | Area 4 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Area Units = Acres | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **1/19/1985** | 1.77 | TM Land | 8,899 | 5,373 | 962 | 5,332 | 2,986 | 23,552 |
| **Provisional Data** | | | TM Water | 2,668 | 308 | 194 | 650 | 216 | 4,036 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **1/28/1988** | 1.53 | TM Land | 9,556 | 5,439 | 899 | 5,378 | 3,006 | 24,278 |
| **Provisional Data** | | | TM Water | 2,011 | 242 | 257 | 604 | 196 | 3,310 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **11/1/1990** | 2.00 | TM Land | 8,555 | 5,400 | 794 | 5,049 | 2,915 | 22,713 |
| **Provisional Data** | | | TM Water | 3,012 | 281 | 362 | 933 | 287 | 4,875 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **9/28/1995** | 2.09 | TM Land | 8,729 | 5,343 | 851 | 5,224 | 2,924 | 23,071 |
| **Provisional Data** | | | TM Water | 2,838 | 338 | 305 | 758 | 278 | 4,517 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **2/24/1998** | 1.72 | TM Land | 7,017 | 5,204 | 609 | 5,217 | 2,968 | 21,015 |
| **Provisional Data** | | | TM Water | 4,550 | 477 | 547 | 765 | 234 | 6,573 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **11/18/1999** | 1.97 | TM Land | 9,181 | 5,274 | 595 | 5,004 | 2,877 | 22,931 |
| **Provisional Data** | | | TM Water | 2,386 | 407 | 561 | 978 | 325 | 4,657 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **10/30/2001** | 1.97 | TM Land | 8,476 | 5,391 | 581 | 5,013 | 2,896 | 22,357 |
| **Provisional Data** | | | TM Water | 3,091 | 290 | 575 | 969 | 306 | 5,231 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **2/27/2002** | 1.66 | TM Land | 8,638 | 5,379 | 580 | 5,176 | 2,941 | 22,714 |
| **Provisional Data** | | | TM Water | 2,929 | 302 | 576 | 806 | 261 | 4,874 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **11/7/2004** | 1.97 | TM Land | 8,729 | 5,315 | 649 | 5,064 | 2,901 | 22,658 |
| **Provisional Data** | | | TM Water | 2,838 | 366 | 507 | 918 | 301 | 4,930 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **10/25/2005** | 1.86 | TM Land | 8,516 | 5,048 | 507 | 4,400 | 2,835 | 21,306 |
| **Provisional Data** | | | TM Water | 3,051 | 633 | 649 | 1,582 | 367 | 6,282 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **10/28/2006** | 1.99 | TM Land | 8,461 | 5,158 | 478 | 4,465 | 2,862 | 21,424 |
| **Provisional Data** | | | TM Water | 3,106 | 523 | 678 | 1,517 | 340 | 6,164 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| | | | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **TM** | **10/1/2008** | 2.10 | TM Land | 8,375 | 5,211 | 527 | 4,389 | 2,903 | 21,405 |
| **Provisional Data** | | | TM Water | 3,192 | 470 | 629 | 1,593 | 299 | 6,183 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |
| **TM + 2007 Marsh Types** | **11/5/2009** | 2.04 | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| **Provisional Data** | | | Fresh Marsh | 0 | 0 | 0 | 0 | 0 | 0 |
| **NOTE: this assumes same marsh types** | | | Intermediate Marsh | 0 | 1 | 477 | 4,454 | 0 | 4,932 |
| **are present in 2009.** | | | Brackish Marsh | 0 | 0 | 0 | 0 | 2,918 | 2,918 |
| | | | Saline Marsh | 7,974 | 5,238 | 2 | 0 | 0 | 13,214 |
| | | | Swamp | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Developed Ag Other | 17 | 15 | 1 | 2 | 1 | 36 |
| | | | Fresh Marsh Water | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Intermediate Marsh Water | 0 | 0 | 672 | 1,526 | 0 | 2,198 |
| | | | Brackish Marsh Water | 0 | 0 | 0 | 0 | 283 | 283 |
| | | | Saline Marsh Water | 3,575 | 427 | 4 | 0 | 0 | 4,006 |
| | | | Swamp Water | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Developed Ag Other Water | 1 | 0 | 0 | 0 | 0 | 1 |
| | | | | **11,567** | **5,681** | **1,156** | **5,982** | **3,202** | **27,588** |

Analysis completed 09/23/2010.

Produced for Plaquemines Parish New Orleans to Venice Levee (NOV) Project Extended Boundaries

**NOTE: Land/Water data are provisional, have not gone through a reveiw process, and can change pending the review process.**

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| | Total Area | Land | Water | Out | Total |
|---|---|---|---|---|---|
| | 1/19/1985 | 23,552 | 4,036 | 0 | 27,588 |
| | 1/28/1988 | 24,278 | 3,310 | 0 | 27,588 |
| | 11/1/1990 | 22,713 | 4,875 | 0 | 27,588 |
| | 9/28/1995 | 23,071 | 4,517 | 0 | 27,588 |
| | 2/24/1998 | 21,015 | 6,573 | 0 | 27,588 |
| | 11/18/1999 | 22,931 | 4,657 | 0 | 27,588 |
| | 10/30/2001 | 22,357 | 5,231 | 0 | 27,588 |
| | 2/27/2002 | 22,714 | 4,874 | 0 | 27,588 |
| | 11/7/2004 | 22,658 | 4,930 | 0 | 27,588 |
| Post Hurricane | 10/25/2005 | 21,306 | 6,282 | 0 | 27,588 |
| | 10/28/2006 | 21,424 | 6,164 | 0 | 27,588 |
| Post Hurricane | 10/1/2008 | 21,405 | 6,183 | 0 | 27,588 |
| | 11/5/2009 | 21,100 | 6,488 | 0 | 27,588 |

| | Area 1a | Land | Water | Out | Total |
|---|---|---|---|---|---|
| | 1/19/1985 | 8,899 | 2,668 | 0 | 11,567 |
| | 1/28/1988 | 9,556 | 2,011 | 0 | 11,567 |
| | 11/1/1990 | 8,555 | 3,012 | 0 | 11,567 |
| | 9/28/1995 | 8,729 | 2,838 | 0 | 11,567 |
| | 2/24/1998 | 7,017 | 4,550 | 0 | 11,567 |
| | 11/18/1999 | 9,181 | 2,386 | 0 | 11,567 |
| | 10/30/2001 | 8,476 | 3,091 | 0 | 11,567 |
| | 2/27/2002 | 8,638 | 2,929 | 0 | 11,567 |
| | 11/7/2004 | 8,729 | 2,838 | 0 | 11,567 |
| Post Hurricane | 10/25/2005 | 8,516 | 3,051 | 0 | 11,567 |
| | 10/28/2006 | 8,461 | 3,106 | 0 | 11,567 |
| Post Hurricane | 10/1/2008 | 8,375 | 3,192 | 0 | 11,567 |
| | 11/5/2009 | 7,991 | 3,576 | 0 | 11,567 |

| | Area 1b | Land | Water | Out | Total |
|---|---|---|---|---|---|
| | 1/19/1985 | 5,373 | 308 | 0 | 5,681 |
| | 1/28/1988 | 5,439 | 242 | 0 | 5,681 |
| | 11/1/1990 | 5,400 | 281 | 0 | 5,681 |
| | 9/28/1995 | 5,343 | 338 | 0 | 5,681 |
| | 2/24/1998 | 5,204 | 477 | 0 | 5,681 |
| | 11/18/1999 | 5,274 | 407 | 0 | 5,681 |
| | 10/30/2001 | 5,391 | 290 | 0 | 5,681 |
| | 2/27/2002 | 5,379 | 302 | 0 | 5,681 |
| | 11/7/2004 | 5,315 | 366 | 0 | 5,681 |
| Post Hurricane | 10/25/2005 | 5,048 | 633 | 0 | 5,681 |
| | 10/28/2006 | 5,158 | 523 | 0 | 5,681 |
| Post Hurricane | 10/1/2008 | 5,211 | 470 | 0 | 5,681 |
| | 11/5/2009 | 5,254 | 427 | 0 | 5,681 |

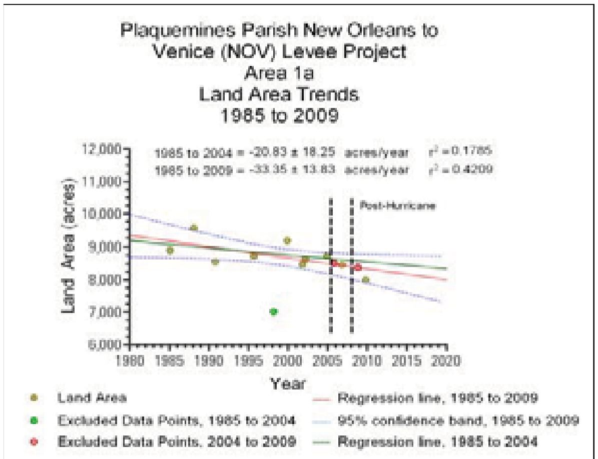
| | Area 2 | Land | Water | Out | Total |
|---|---|---|---|---|---|
| | 1/19/1985 | 962 | 194 | 0 | 1,156 |
| | 1/28/1988 | 899 | 257 | 0 | 1,156 |
| | 11/1/1990 | 794 | 362 | 0 | 1,156 |
| | 9/28/1995 | 851 | 305 | 0 | 1,156 |
| | 2/24/1998 | 609 | 547 | 0 | 1,156 |
| | 11/18/1999 | 595 | 561 | 0 | 1,156 |
| | 10/30/2001 | 581 | 575 | 0 | 1,156 |
| | 2/27/2002 | 580 | 576 | 0 | 1,156 |
| | 11/7/2004 | 649 | 507 | 0 | 1,156 |
| Post Hurricane | 10/25/2005 | 507 | 649 | 0 | 1,156 |
| | 10/28/2006 | 478 | 678 | 0 | 1,156 |
| Post Hurricane | 10/1/2008 | 527 | 629 | 0 | 1,156 |
| | 11/5/2009 | 480 | 676 | 0 | 1,156 |

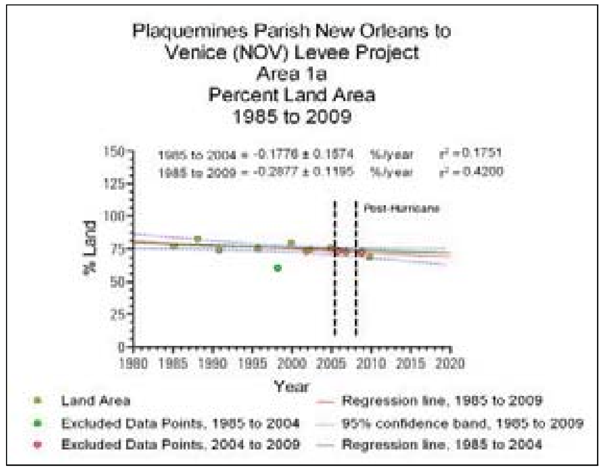
| | Area 3 | Land | Water | Out | Total |
|---|---|---|---|---|---|
| | 1/19/1985 | 5,332 | 650 | 0 | 5,982 |
| | 1/28/1988 | 5,378 | 604 | 0 | 5,982 |
| | 11/1/1990 | 5,049 | 933 | 0 | 5,982 |
| | 9/28/1995 | 5,224 | 758 | 0 | 5,982 |
| | 2/24/1998 | 5,217 | 765 | 0 | 5,982 |
| | 11/18/1999 | 5,004 | 978 | 0 | 5,982 |
| | 10/30/2001 | 5,013 | 969 | 0 | 5,982 |
| | 2/27/2002 | 5,176 | 806 | 0 | 5,982 |
| | 11/7/2004 | 5,064 | 918 | 0 | 5,982 |
| Post Hurricane | 10/25/2005 | 4,400 | 1,582 | 0 | 5,982 |
| | 10/28/2006 | 4,465 | 1,517 | 0 | 5,982 |
| Post Hurricane | 10/1/2008 | 4,389 | 1,593 | 0 | 5,982 |
| | 11/5/2009 | 4,456 | 1,526 | 0 | 5,982 |

| | Area 4 | Land | Water | Out | Total |
|---|---|---|---|---|---|
| | 1/19/1985 | 2,986 | 216 | 0 | 3,202 |
| | 1/28/1988 | 3,006 | 196 | 0 | 3,202 |
| | 11/1/1990 | 2,915 | 287 | 0 | 3,202 |
| | 9/28/1995 | 2,924 | 278 | 0 | 3,202 |
| | 2/24/1998 | 2,968 | 234 | 0 | 3,202 |
| | 11/18/1999 | 2,877 | 325 | 0 | 3,202 |
| | 10/30/2001 | 2,896 | 306 | 0 | 3,202 |
| | 2/27/2002 | 2,941 | 261 | 0 | 3,202 |
| | 11/7/2004 | 2,901 | 301 | 0 | 3,202 |
| Post Hurricane | 10/25/2005 | 2,835 | 367 | 0 | 3,202 |
| | 10/28/2006 | 2,862 | 340 | 0 | 3,202 |
| Post Hurricane | 10/1/2008 | 2,903 | 299 | 0 | 3,202 |
| | 11/5/2009 | 2,919 | 283 | 0 | 3,202 |

**Area 1a**

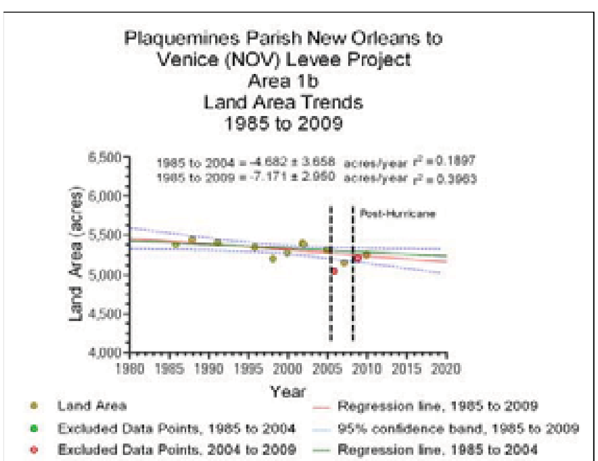
| Date | Decimal Date | Data | Land Area (acres) | Water (acres) | Total (acres) | Land Area (mi2) | Water (mi2) | Total (mi2) | % Land | % Water | Daily Average, NOS #8761724 (m STND)* | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/19/1985 | 1985.1 | TM | 8899 | 2,668 | 11,567 | 13.9 | 4.2 | 18.1 | 76.9% | 23.1% | 1.77 | |
| 1/28/1988 | 1988.1 | TM | 9556 | 2,011 | 11,567 | 14.9 | 3.1 | 18.1 | 82.6% | 17.4% | 1.53 | Low Water Levels |
| 11/1/1990 | 1990.8 | TM | 8555 | 3,012 | 11,567 | 13.4 | 4.7 | 18.1 | 74.0% | 26.0% | 2.00 | |
| 9/28/1995 | 1995.7 | TM | 8729 | 2,838 | 11,567 | 13.6 | 4.4 | 18.1 | 75.5% | 24.5% | 2.09 | High water levels, Excluded: Outlier |
| 2/24/1998 | 1998.2 | TM | 7017 | 4,550 | 11,567 | 11.0 | 7.1 | 18.1 | 60.7% | 39.3% | 1.72 | Low Water Levels |
| 11/18/1999 | 1999.9 | TM | 9181 | 2,386 | 11,567 | 14.3 | 3.7 | 18.1 | 79.4% | 20.6% | 1.97 | |
| 10/30/2001 | 2001.8 | TM | 8476 | 3,091 | 11,567 | 13.2 | 4.8 | 18.1 | 73.3% | 26.7% | 1.97 | |
| 2/27/2002 | 2002.2 | TM | 8638 | 2,929 | 11,567 | 13.5 | 4.6 | 18.1 | 74.7% | 25.3% | 1.66 | Low Water Levels |
| 11/7/2004 | 2004.9 | TM | 8729 | 2,838 | 11,567 | 13.6 | 4.4 | 18.1 | 75.5% | 24.5% | 1.97 | |
| 10/25/2005 | 2005.8 | TM | 8516 | 3,051 | 11,567 | 13.3 | 4.8 | 18.1 | 73.6% | 26.4% | 1.86 | |
| 10/28/2006 | 2006.8 | TM | 8461 | 3,106 | 11,567 | 13.2 | 4.9 | 18.1 | 73.1% | 26.9% | 1.99 | > 10kt winds N near time of image acquisition |
| 10/1/2008 | 2008.8 | TM | 8375 | 3,192 | 11,567 | 13.1 | 5.0 | 18.1 | 72.4% | 27.6% | 2.10 | High water levels |
| 11/5/2009 | 2009.8 | TM | 7991 | 3,576 | 11,567 | 12.5 | 5.6 | 18.1 | 69.1% | 30.9% | 2.04 | High water levels |

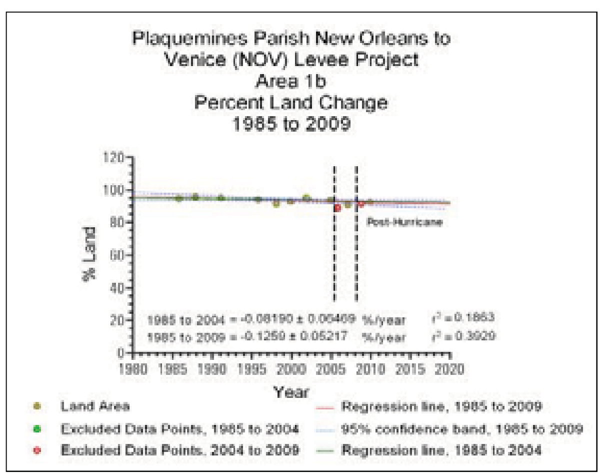



**Area 1b**

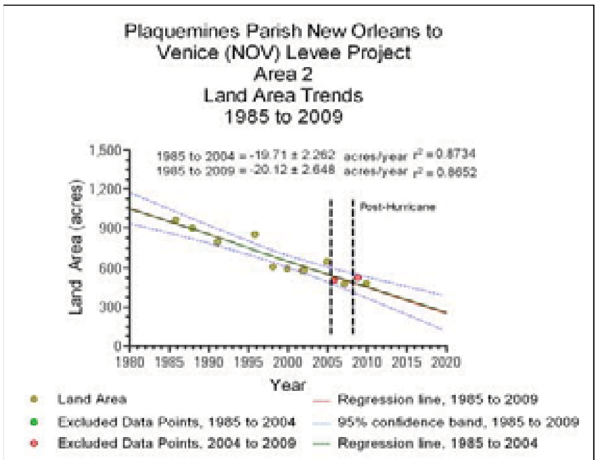
| Date | Decimal Date | Data | Land Area (acres) | Water (acres) | Total (acres) | Land Area (mi2) | Water (mi2) | Total (mi2) | % Land | % Water | Daily Average, NOS #8761724 (m STND)* | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/11/1985 | 1985.8 | TM | 5373 | 308 | 5,681 | 8.4 | 0.5 | 8.9 | 94.6% | 5.4% | 2.07 | High water levels |
| 12/4/1987 | 1987.9 | TM | 5439 | 242 | 5,681 | 8.5 | 0.4 | 8.9 | 95.7% | 4.3% | 1.97 | |
| 2/14/1991 | 1991.1 | TM | 5400 | 281 | 5,681 | 8.4 | 0.4 | 8.9 | 95.1% | 4.9% | 1.82 | |
| 10/7/1995 | 1995.8 | TM | 5343 | 338 | 5,681 | 8.3 | 0.5 | 8.9 | 94.1% | 5.9% | 2.10 | High water levels |
| 2/17/1998 | 1998.1 | TM | 5204 | 477 | 5,681 | 8.1 | 0.7 | 8.9 | 91.6% | 8.4% | 1.84 | |
| 11/27/1999 | 1999.9 | TM | 5274 | 407 | 5,681 | 8.2 | 0.6 | 8.9 | 92.8% | 7.2% | 1.94 | |
| 10/7/2001 | 2001.8 | TM | 5391 | 290 | 5,681 | 8.4 | 0.5 | 8.9 | 94.9% | 5.1% | 2.06 | High water levels |
| 1/3/2002 | 2002.0 | TM | 5379 | 302 | 5,681 | 8.4 | 0.5 | 8.9 | 94.7% | 5.3% | 1.83 | |
| 10/9/2004 | 2004.9 | TM | 5315 | 366 | 5,681 | 8.3 | 0.6 | 8.9 | 93.6% | 6.4% | 2.06 | High water levels |
| 10/18/2005 | 2005.8 | TM | 5048 | 633 | 5,681 | 7.9 | 1.0 | 8.9 | 88.9% | 11.1% | 2.05 | High water levels |
| 1/25/2007 | 2007.1 | TM | 5158 | 523 | 5,681 | 8.1 | 0.8 | 8.9 | 90.8% | 9.2% | 1.82 | |
| 10/26/2008 | 2008.8 | TM | 5211 | 470 | 5,681 | 8.1 | 0.7 | 8.9 | 91.7% | 8.3% | 2.08 | High water levels |
| 11/14/2009 | 2009.9 | TM | 5254 | 427 | 5,681 | 8.2 | 0.7 | 8.9 | 92.5% | 7.5% | 2.03 | High water levels |

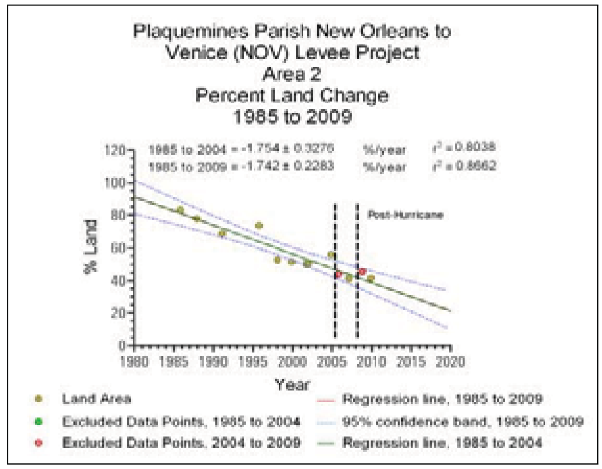


**Area 2**

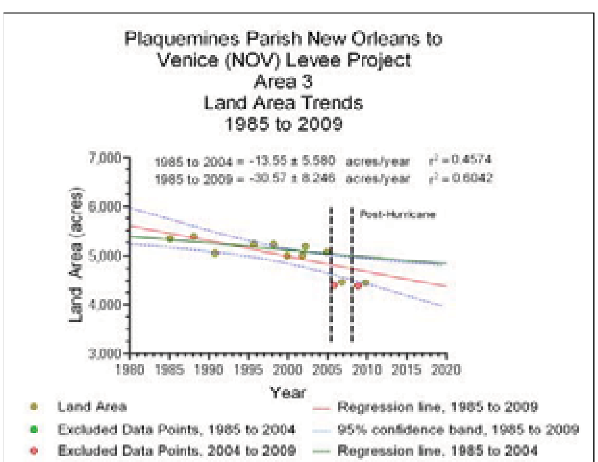
| Date | Decimal Date | Data | Land Area (acres) | Water (acres) | Total (acres) | Land Area (mi2) | Water (mi2) | Total (mi2) | % Land | % Water | Daily Average, NOS #8761724 (m STND)* | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/11/1985 | 1985.8 | TM | 962 | 194 | 1,156 | 1.5 | 0.3 | 1.8 | 83.2% | 16.8% | 2.07 | High water levels |
| 12/4/1987 | 1987.9 | TM | 899 | 257 | 1,156 | 1.4 | 0.4 | 1.8 | 77.8% | 22.2% | 1.97 | |
| 2/14/1991 | 1991.1 | TM | 794 | 362 | 1,156 | 1.2 | 0.6 | 1.8 | 68.7% | 31.3% | 1.82 | |
| 10/7/1995 | 1995.8 | TM | 851 | 305 | 1,156 | 1.3 | 0.5 | 1.8 | 73.6% | 26.4% | 2.10 | High water levels |
| 2/17/1998 | 1998.1 | TM | 609 | 547 | 1,156 | 1.0 | 0.9 | 1.8 | 52.7% | 47.3% | 1.84 | |
| 11/27/1999 | 1999.9 | TM | 595 | 561 | 1,156 | 0.9 | 0.9 | 1.8 | 51.5% | 48.5% | 1.94 | |
| 10/7/2001 | 2001.8 | TM | 581 | 575 | 1,156 | 0.9 | 0.9 | 1.8 | 50.3% | 49.7% | 2.06 | High water levels |
| 1/3/2002 | 2002.0 | TM | 580 | 576 | 1,156 | 0.9 | 0.9 | 1.8 | 50.2% | 49.8% | 1.83 | |
| 10/9/2004 | 2004.9 | TM | 649 | 507 | 1,156 | 1.0 | 0.8 | 1.8 | 56.1% | 43.9% | 2.06 | High water levels |
| 10/18/2005 | 2005.8 | TM | 507 | 649 | 1,156 | 0.8 | 1.0 | 1.8 | 43.9% | 56.1% | 2.05 | High water levels |
| 1/25/2007 | 2007.1 | TM | 478 | 678 | 1,156 | 0.7 | 1.1 | 1.8 | 41.3% | 58.7% | 1.82 | |
| 10/26/2008 | 2008.8 | TM | 527 | 629 | 1,156 | 0.8 | 1.0 | 1.8 | 45.6% | 54.4% | 2.08 | High water levels |
| 11/14/2009 | 2009.9 | TM | 480 | 676 | 1,156 | 0.8 | 1.1 | 1.8 | 41.5% | 58.5% | 2.03 | High water levels |

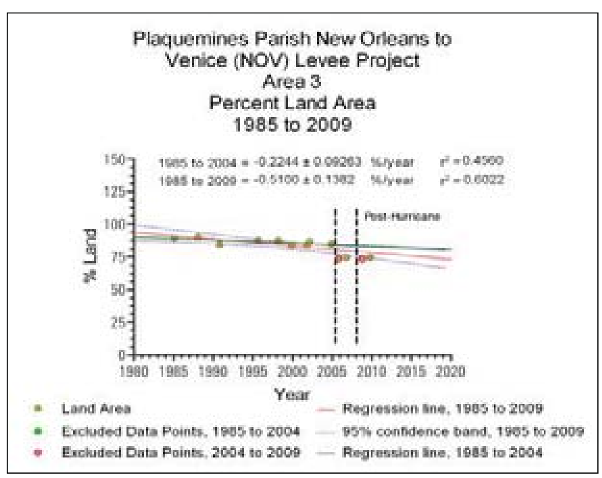



**Area 3**

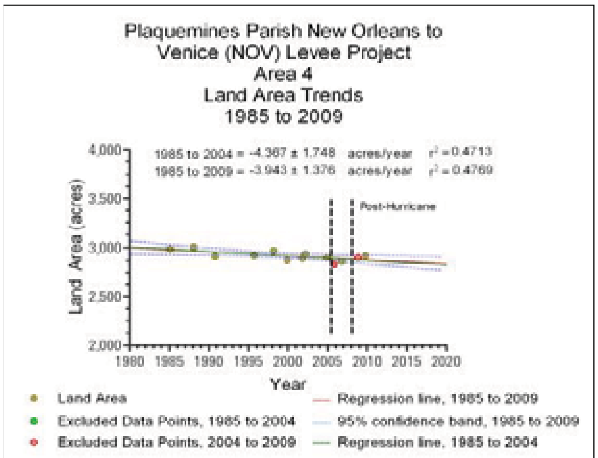
| Date | Decimal Date | Data | Land Area (acres) | Water (acres) | Total (acres) | Land Area (mi2) | Water (mi2) | Total (mi2) | % Land | % Water | Daily Average, NOS #8761724 (m STND)* | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/19/1985 | 1985.1 | TM | 5332 | 650 | 5,982 | 8.3 | 1.0 | 9.3 | 89.1% | 10.9% | 1.77 | |
| 1/28/1988 | 1988.1 | TM | 5378 | 604 | 5,982 | 8.4 | 0.9 | 9.3 | 89.9% | 10.1% | 1.53 | Low Water Levels |
| 11/1/1990 | 1990.8 | TM | 5049 | 933 | 5,982 | 7.9 | 1.5 | 9.3 | 84.4% | 15.6% | 2.00 | |
| 9/28/1995 | 1995.7 | TM | 5224 | 758 | 5,982 | 8.2 | 1.2 | 9.3 | 87.3% | 12.7% | 2.09 | High water levels, Excluded: Outlier |
| 2/24/1998 | 1998.2 | TM | 5217 | 765 | 5,982 | 8.2 | 1.2 | 9.3 | 87.2% | 12.8% | 1.72 | Low Water Levels |
| 11/18/1999 | 1999.9 | TM | 5004 | 978 | 5,982 | 7.8 | 1.5 | 9.3 | 83.7% | 16.3% | 1.97 | |
| 10/30/2001 | 2001.8 | TM | 5013 | 969 | 5,982 | 7.8 | 1.5 | 9.3 | 83.8% | 16.2% | 1.97 | |
| 2/27/2002 | 2002.2 | TM | 5176 | 806 | 5,982 | 8.1 | 1.3 | 9.3 | 86.5% | 13.5% | 1.66 | Low Water Levels |
| 11/7/2004 | 2004.9 | TM | 5064 | 918 | 5,982 | 7.9 | 1.4 | 9.3 | 84.7% | 15.3% | 1.97 | |
| 10/25/2005 | 2005.8 | TM | 4400 | 1,582 | 5,982 | 6.9 | 2.5 | 9.3 | 73.6% | 26.4% | 1.86 | |
| 10/28/2006 | 2006.8 | TM | 4465 | 1,517 | 5,982 | 7.0 | 2.4 | 9.3 | 74.6% | 25.4% | 1.99 | > 10kt winds N near time of image acquisition |
| 10/1/2008 | 2008.8 | TM | 4389 | 1,593 | 5,982 | 6.9 | 2.5 | 9.3 | 73.4% | 26.6% | 2.10 | High water levels |
| 11/5/2009 | 2009.8 | TM | 4456 | 1,526 | 5,982 | 7.0 | 2.4 | 9.3 | 74.5% | 25.5% | 2.04 | High water levels |

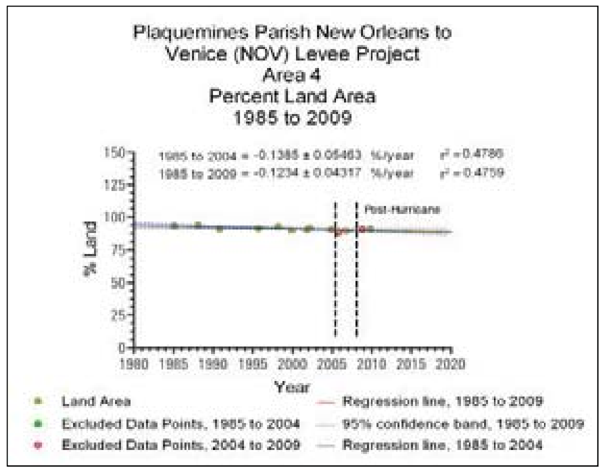


**Area 4**

| Date | Decimal Date | Data | Land Area (acres) | Water (acres) | Total (acres) | Land Area (mi2) | Water (mi2) | Total (mi2) | % Land | % Water | Daily Average, NOS #8761724 (m STND)* | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/19/1985 | 1985.1 | TM | 2986 | 216 | 3,202 | 4.7 | 0.3 | 5.0 | 93.3% | 6.7% | 1.77 | |
| 1/28/1988 | 1988.1 | TM | 3006 | 196 | 3,202 | 4.7 | 0.3 | 5.0 | 93.9% | 6.1% | 1.53 | Low Water Levels |
| 11/1/1990 | 1990.8 | TM | 2915 | 287 | 3,202 | 4.6 | 0.4 | 5.0 | 91.0% | 9.0% | 2.00 | |
| 9/28/1995 | 1995.7 | TM | 2924 | 278 | 3,202 | 4.6 | 0.4 | 5.0 | 91.3% | 8.7% | 2.09 | High water levels |
| 2/24/1998 | 1998.2 | TM | 2968 | 234 | 3,202 | 4.6 | 0.4 | 5.0 | 92.7% | 7.3% | 1.72 | Low Water Levels |
| 11/18/1999 | 1999.9 | TM | 2877 | 325 | 3,202 | 4.5 | 0.5 | 5.0 | 89.9% | 10.1% | 1.97 | |
| 10/30/2001 | 2001.8 | TM | 2896 | 306 | 3,202 | 4.5 | 0.5 | 5.0 | 90.4% | 9.6% | 1.97 | |
| 2/27/2002 | 2002.2 | TM | 2941 | 261 | 3,202 | 4.6 | 0.4 | 5.0 | 91.8% | 8.2% | 1.66 | Low Water Levels |
| 11/7/2004 | 2004.9 | TM | 2901 | 301 | 3,202 | 4.5 | 0.5 | 5.0 | 90.6% | 9.4% | 1.97 | |
| 10/25/2005 | 2005.8 | TM | 2835 | 367 | 3,202 | 4.4 | 0.6 | 5.0 | 88.5% | 11.5% | 1.86 | |
| 10/28/2006 | 2006.8 | TM | 2862 | 340 | 3,202 | 4.5 | 0.5 | 5.0 | 89.4% | 10.6% | 1.99 | > 10kt winds N near time of image acquisition |
| 10/1/2008 | 2008.8 | TM | 2903 | 299 | 3,202 | 4.5 | 0.5 | 5.0 | 90.7% | 9.3% | 2.10 | High water levels |
| 11/5/2009 | 2009.8 | TM | 2919 | 283 | 3,202 | 4.6 | 0.4 | 5.0 | 91.2% | 8.8% | 2.04 | High water levels |




*Grand Isle Estimated Water Level Ranges for SE Deltaic Plain Used in TM Classification
Low = < 1.8
Moderate = 1.8 to 2.00
High = > 2.0

The water level estimates constitute a sliding range that varies with time as sea-level rise and subsidence increase water levels. The water level population is defined by the available classified TM data points.

Ex. Land-water classifications based on a "high water" Landsat TM satellite scene from 1983/84 will generally be based on a lower "high water" elevation than "high water" measurements for current scenes.

citation:


Barras, J.A., Bernier, J.C., and Morton, R.A., 2008, Land area change in coastal Louisiana--A multidecadal perspective (from 1956 to 2006): U.S. Geological Survey Scientific Investigations Map 3019, scale 1:250,000, 14 p. pamphlet, http://pubs.usgs.gov/sim/3019/


Source: John Barras

# Land Loss Spreadsheet

| *used data from polygon 3 (USGS) | | | | | Loss Rate Calculation | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Project:** | NOV S1: Intermediate Marsh | | | | **Beginning Year** | **Ending Year** | **Beginning Year Acreage** | **Ending Year Acreage** | **Loss Rate** |
| **Total Acres** | | **TY0 Marsh Acres** | | **TY0 Water Acres** | 1985 | 2009 | 5,332 | 4,456 | -0.0068 |
| 75 | | 71 | | 4 | FWP Land Loss Reduction | | | 0.75 | |

| FWOP | | | | | FWP | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | Net Acres of Marsh |
| 0 | | 70.86 | 94.15% | 4 | 0 | | 71 | 94% | 4 | 0 |
| **1** | -0.00685 | **70.37** | **93.51%** | 5 | **1** | -0.00171 | **71** | **94%** | 5 | 0 |
| 2 | -0.00685 | 70 | 93% | 5 | 2 | -0.00171 | 71 | 94% | 5 | 1 |
| 3 | -0.00685 | 69 | 92% | 6 | 3 | -0.00171 | 70 | 94% | 5 | 1 |
| 4 | -0.00685 | 69 | 92% | 6 | 4 | -0.00171 | 70 | 94% | 5 | 1 |
| 5 | -0.00685 | 68 | 91% | 7 | 5 | -0.00171 | 70 | 93% | 5 | 2 |
| 6 | -0.00685 | 68 | 90% | 7 | 6 | -0.00171 | 70 | 93% | 5 | 2 |
| 7 | -0.00685 | 68 | 90% | 8 | 7 | -0.00171 | 70 | 93% | 5 | 2 |
| 8 | -0.00685 | 67 | 89% | 8 | 8 | -0.00171 | 70 | 93% | 5 | 3 |
| 9 | -0.00685 | 67 | 89% | 9 | 9 | -0.00171 | 70 | 93% | 5 | 3 |
| 10 | -0.00685 | 66 | 88% | 9 | 10 | -0.00171 | 70 | 93% | 6 | 4 |
| 11 | -0.00685 | 66 | 87% | 10 | 11 | -0.00171 | 70 | 92% | 6 | 4 |
| 12 | -0.00685 | 65 | 87% | 10 | 12 | -0.00171 | 69 | 92% | 6 | 4 |
| 13 | -0.00685 | 65 | 86% | 10 | 13 | -0.00171 | 69 | 92% | 6 | 4 |
| 14 | -0.00685 | 64 | 86% | 11 | 14 | -0.00171 | 69 | 92% | 6 | 5 |
| 15 | -0.00685 | 64 | 85% | 11 | 15 | -0.00171 | 69 | 92% | 6 | 5 |
| 16 | -0.00685 | 63 | 84% | 12 | 16 | -0.00171 | 69 | 92% | 6 | 5 |
| 17 | -0.00685 | 63 | 84% | 12 | 17 | -0.00171 | 69 | 91% | 6 | 6 |
| 18 | -0.00685 | 63 | 83% | 13 | 18 | -0.00171 | 69 | 91% | 7 | 6 |
| 19 | -0.00685 | 62 | 83% | 13 | 19 | -0.00171 | 69 | 91% | 7 | 6 |
| **20** | -0.00685 | **62** | **82%** | 13 | **20** | -0.00171 | **68** | **91%** | 7 | **7** |
| 21 | -0.00685 | 61 | 82% | 14 | 21 | -0.00171 | 68 | 91% | 7 | 7 |
| 22 | -0.00685 | 61 | 81% | 14 | 22 | -0.00171 | 68 | 91% | 7 | 7 |
| 23 | -0.00685 | 61 | 80% | 15 | 23 | -0.00171 | 68 | 91% | 7 | 8 |
| 24 | -0.00685 | 60 | 80% | 15 | 24 | -0.00171 | 68 | 90% | 7 | 8 |
| 25 | -0.00685 | 60 | 79% | 16 | 25 | -0.00171 | 68 | 90% | 7 | 8 |
| 26 | -0.00685 | 59 | 79% | 16 | 26 | -0.00171 | 68 | 90% | 7 | 9 |
| 27 | -0.00685 | 59 | 78% | 16 | 27 | -0.00171 | 68 | 90% | 8 | 9 |
| 28 | -0.00685 | 58 | 78% | 17 | 28 | -0.00171 | 68 | 90% | 8 | 9 |
| 29 | -0.00685 | 58 | 77% | 17 | 29 | -0.00171 | 67 | 90% | 8 | 9 |
| 30 | -0.00685 | 58 | 77% | 18 | 30 | -0.00171 | 67 | 89% | 8 | 10 |
| 31 | -0.00685 | 57 | 76% | 18 | 31 | -0.00171 | 67 | 89% | 8 | 10 |
| 32 | -0.00685 | 57 | 76% | 18 | 32 | -0.00171 | 67 | 89% | 8 | 10 |
| 33 | -0.00685 | 56 | 75% | 19 | 33 | -0.00171 | 67 | 89% | 8 | 10 |
| 34 | -0.00685 | 56 | 75% | 19 | 34 | -0.00171 | 67 | 89% | 8 | 11 |
| 35 | -0.00685 | 56 | 74% | 20 | 35 | -0.00171 | 67 | 89% | 9 | 11 |
| 36 | -0.00685 | 55 | 74% | 20 | 36 | -0.00171 | 67 | 89% | 9 | 11 |
| 37 | -0.00685 | 55 | 73% | 20 | 37 | -0.00171 | 67 | 88% | 9 | 12 |
| 38 | -0.00685 | 55 | 73% | 21 | 38 | -0.00171 | 66 | 88% | 9 | 12 |
| 39 | -0.00685 | 54 | 72% | 21 | 39 | -0.00171 | 66 | 88% | 9 | 12 |
| 40 | -0.00685 | 54 | 72% | 21 | 40 | -0.00171 | 66 | 88% | 9 | 12 |
| 41 | -0.00685 | 53 | 71% | 22 | 41 | -0.00171 | 66 | 88% | 9 | 13 |
| 42 | -0.00685 | 53 | 71% | 22 | 42 | -0.00171 | 66 | 88% | 9 | 13 |
| 43 | -0.00685 | 53 | 70% | 23 | 43 | -0.00171 | 66 | 87% | 9 | 13 |
| 44 | -0.00685 | 52 | 70% | 23 | 44 | -0.00171 | 66 | 87% | 10 | 13 |
| 45 | -0.00685 | 52 | 69% | 23 | 45 | -0.00171 | 66 | 87% | 10 | 14 |
| 46 | -0.00685 | 52 | 69% | 24 | 46 | -0.00171 | 65 | 87% | 10 | 14 |
| 47 | -0.00685 | 51 | 68% | 24 | 47 | -0.00171 | 65 | 87% | 10 | 14 |
| 48 | -0.00685 | 51 | 68% | 24 | 48 | -0.00171 | 65 | 87% | 10 | 14 |
| 49 | -0.00685 | 51 | 67% | 25 | 49 | -0.00171 | 65 | 87% | 10 | 15 |
| 50 | -0.00685 | 50.26 | 66.78% | 25 | 50 | -0.00171 | 65 | 86% | 10 | 15 |

# Land Loss Spreadsheet

***used data from polygon 4 (USGS)**

**Project:** NOV 01: Brackish Marsh

| **Total Acres** | | **TY0 Marsh Acres** | | **TY0 Water Acres** |
|---|---|---|---|---|
| 30 | | 30 | | 0 |

**Loss Rate Calculation**

| **Beginning Year** | **Ending Year** | **Beginning Year Acreage** | **Ending Year Acreage** | **Loss Rate** |
|---|---|---|---|---|
| 1985 | 2009 | 2,989 | 2,919 | -0.0010 |

FWP Land Loss Reduction: 0.75

| FWOP | | | | | FWP | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | Net Acres of Marsh |
| 0 | | 30.00 | 100.00% | 0 | 0 | | 30 | 100% | 0 | 0 |
| **1** | -0.000976 | **29.97** | **99.90%** | 0 | **1** | -0.000244 | **30** | **100%** | 0 | 0 |
| 2 | -0.000976 | 30 | 100% | 0 | 2 | -0.000244 | 30 | 100% | 0 | 0 |
| 3 | -0.000976 | 30 | 100% | 0 | 3 | -0.000244 | 30 | 100% | 0 | 0 |
| 4 | -0.000976 | 30 | 100% | 0 | 4 | -0.000244 | 30 | 100% | 0 | 0 |
| 5 | -0.000976 | 30 | 100% | 0 | 5 | -0.000244 | 30 | 100% | 0 | 0 |
| 6 | -0.000976 | 30 | 99% | 0 | 6 | -0.000244 | 30 | 100% | 0 | 0 |
| 7 | -0.000976 | 30 | 99% | 0 | 7 | -0.000244 | 30 | 100% | 0 | 0 |
| 8 | -0.000976 | 30 | 99% | 0 | 8 | -0.000244 | 30 | 100% | 0 | 0 |
| 9 | -0.000976 | 30 | 99% | 0 | 9 | -0.000244 | 30 | 100% | 0 | 0 |
| 10 | -0.000976 | 30 | 99% | 0 | 10 | -0.000244 | 30 | 100% | 0 | 0 |
| 11 | -0.000976 | 30 | 99% | 0 | 11 | -0.000244 | 30 | 100% | 0 | 0 |
| 12 | -0.000976 | 30 | 99% | 0 | 12 | -0.000244 | 30 | 100% | 0 | 0 |
| 13 | -0.000976 | 30 | 99% | 0 | 13 | -0.000244 | 30 | 100% | 0 | 0 |
| 14 | -0.000976 | 30 | 99% | 0 | 14 | -0.000244 | 30 | 100% | 0 | 0 |
| 15 | -0.000976 | 30 | 99% | 0 | 15 | -0.000244 | 30 | 100% | 0 | 0 |
| 16 | -0.000976 | 30 | 98% | 0 | 16 | -0.000244 | 30 | 100% | 0 | 0 |
| 17 | -0.000976 | 30 | 98% | 0 | 17 | -0.000244 | 30 | 100% | 0 | 0 |
| 18 | -0.000976 | 29 | 98% | 1 | 18 | -0.000244 | 30 | 100% | 0 | 0 |
| 19 | -0.000976 | 29 | 98% | 1 | 19 | -0.000244 | 30 | 100% | 0 | 0 |
| **20** | -0.000976 | **29** | **98%** | 1 | **20** | -0.000244 | **30** | **100%** | 0 | **0** |
| 21 | -0.000976 | 29 | 98% | 1 | 21 | -0.000244 | 30 | 99% | 0 | 0 |
| 22 | -0.000976 | 29 | 98% | 1 | 22 | -0.000244 | 30 | 99% | 0 | 0 |
| 23 | -0.000976 | 29 | 98% | 1 | 23 | -0.000244 | 30 | 99% | 0 | 0 |
| 24 | -0.000976 | 29 | 98% | 1 | 24 | -0.000244 | 30 | 99% | 0 | 1 |
| 25 | -0.000976 | 29 | 98% | 1 | 25 | -0.000244 | 30 | 99% | 0 | 1 |
| 26 | -0.000976 | 29 | 97% | 1 | 26 | -0.000244 | 30 | 99% | 0 | 1 |
| 27 | -0.000976 | 29 | 97% | 1 | 27 | -0.000244 | 30 | 99% | 0 | 1 |
| 28 | -0.000976 | 29 | 97% | 1 | 28 | -0.000244 | 30 | 99% | 0 | 1 |
| 29 | -0.000976 | 29 | 97% | 1 | 29 | -0.000244 | 30 | 99% | 0 | 1 |
| 30 | -0.000976 | 29 | 97% | 1 | 30 | -0.000244 | 30 | 99% | 0 | 1 |
| 31 | -0.000976 | 29 | 97% | 1 | 31 | -0.000244 | 30 | 99% | 0 | 1 |
| 32 | -0.000976 | 29 | 97% | 1 | 32 | -0.000244 | 30 | 99% | 0 | 1 |
| 33 | -0.000976 | 29 | 97% | 1 | 33 | -0.000244 | 30 | 99% | 0 | 1 |
| 34 | -0.000976 | 29 | 97% | 1 | 34 | -0.000244 | 30 | 99% | 0 | 1 |
| 35 | -0.000976 | 29 | 97% | 1 | 35 | -0.000244 | 30 | 99% | 0 | 1 |
| 36 | -0.000976 | 29 | 97% | 1 | 36 | -0.000244 | 30 | 99% | 0 | 1 |
| 37 | -0.000976 | 29 | 96% | 1 | 37 | -0.000244 | 30 | 99% | 0 | 1 |
| 38 | -0.000976 | 29 | 96% | 1 | 38 | -0.000244 | 30 | 99% | 0 | 1 |
| 39 | -0.000976 | 29 | 96% | 1 | 39 | -0.000244 | 30 | 99% | 0 | 1 |
| 40 | -0.000976 | 29 | 96% | 1 | 40 | -0.000244 | 30 | 99% | 0 | 1 |
| 41 | -0.000976 | 29 | 96% | 1 | 41 | -0.000244 | 30 | 99% | 0 | 1 |
| 42 | -0.000976 | 29 | 96% | 1 | 42 | -0.000244 | 30 | 99% | 0 | 1 |
| 43 | -0.000976 | 29 | 96% | 1 | 43 | -0.000244 | 30 | 99% | 0 | 1 |
| 44 | -0.000976 | 29 | 96% | 1 | 44 | -0.000244 | 30 | 99% | 0 | 1 |
| 45 | -0.000976 | 29 | 96% | 1 | 45 | -0.000244 | 30 | 99% | 0 | 1 |
| 46 | -0.000976 | 29 | 96% | 1 | 46 | -0.000244 | 30 | 99% | 0 | 1 |
| 47 | -0.000976 | 29 | 96% | 1 | 47 | -0.000244 | 30 | 99% | 0 | 1 |
| 48 | -0.000976 | 29 | 95% | 1 | 48 | -0.000244 | 30 | 99% | 0 | 1 |
| 49 | -0.000976 | 29 | 95% | 1 | 49 | -0.000244 | 30 | 99% | 0 | 1 |
| 50 | -0.000976 | 28.57 | 95.24% | 1 | 50 | -0.000244 | 30 | 99% | 0 | 1 |

# Land Loss Spreadsheet

| *used NOV polygon 1a provided by USGS | | | | | Loss Rate Calculation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Project:** NOV 05/06: Saline Marsh | | | | | **Beginning Year** | **Ending Year** | **Beginning Year Acreage** | **Ending Year Acreage** | **Loss Rate** | |
| **Total Acres** | | **TY0 Marsh Acres** | | **TY0 Water Acres** | 1985 | 2009 | 8,899 | 7,991 | -0.0043 | |
| 22 | | 22 | | 0 | FWP Land Loss Reduction | | | 0.75 | | |
| **FWOP** | | | | | **FWP** | | | | | |
| TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | Net Acres of Marsh |
| 0 | | 21.60 | 98.68% | 0 | 0 | | 22 | 99% | 0 | 0 |
| **1** | -0.004251 | **21.51** | **98.26%** | 0 | **1** | -0.001063 | **22** | **99%** | 0 | 0 |
| 2 | -0.004251 | 21 | 98% | 0 | 2 | -0.001063 | 22 | 98% | 0 | 0 |
| 3 | -0.004251 | 21 | 97% | 1 | 3 | -0.001063 | 22 | 98% | 0 | 0 |
| 4 | -0.004251 | 21 | 97% | 1 | 4 | -0.001063 | 22 | 98% | 0 | 0 |
| 5 | -0.004251 | 21 | 97% | 1 | 5 | -0.001063 | 21 | 98% | 0 | 0 |
| 6 | -0.004251 | 21 | 96% | 1 | 6 | -0.001063 | 21 | 98% | 0 | 0 |
| 7 | -0.004251 | 21 | 96% | 1 | 7 | -0.001063 | 21 | 98% | 0 | 0 |
| 8 | -0.004251 | 21 | 95% | 1 | 8 | -0.001063 | 21 | 98% | 0 | 1 |
| 9 | -0.004251 | 21 | 95% | 1 | 9 | -0.001063 | 21 | 98% | 0 | 1 |
| 10 | -0.004251 | 21 | 95% | 1 | 10 | -0.001063 | 21 | 98% | 1 | 1 |
| 11 | -0.004251 | 21 | 94% | 1 | 11 | -0.001063 | 21 | 98% | 1 | 1 |
| 12 | -0.004251 | 21 | 94% | 1 | 12 | -0.001063 | 21 | 97% | 1 | 1 |
| 13 | -0.004251 | 20 | 93% | 1 | 13 | -0.001063 | 21 | 97% | 1 | 1 |
| 14 | -0.004251 | 20 | 93% | 2 | 14 | -0.001063 | 21 | 97% | 1 | 1 |
| 15 | -0.004251 | 20 | 93% | 2 | 15 | -0.001063 | 21 | 97% | 1 | 1 |
| 16 | -0.004251 | 20 | 92% | 2 | 16 | -0.001063 | 21 | 97% | 1 | 1 |
| 17 | -0.004251 | 20 | 92% | 2 | 17 | -0.001063 | 21 | 97% | 1 | 1 |
| 18 | -0.004251 | 20 | 91% | 2 | 18 | -0.001063 | 21 | 97% | 1 | 1 |
| 19 | -0.004251 | 20 | 91% | 2 | 19 | -0.001063 | 21 | 97% | 1 | 1 |
| **20** | -0.004251 | **20** | **91%** | 2 | **20** | -0.001063 | **21** | **97%** | 1 | **1** |
| 21 | -0.004251 | 20 | 90% | 2 | 21 | -0.001063 | 21 | 96% | 1 | 1 |
| 22 | -0.004251 | 20 | 90% | 2 | 22 | -0.001063 | 21 | 96% | 1 | 1 |
| 23 | -0.004251 | 20 | 89% | 2 | 23 | -0.001063 | 21 | 96% | 1 | 1 |
| 24 | -0.004251 | 20 | 89% | 2 | 24 | -0.001063 | 21 | 96% | 1 | 2 |
| 25 | -0.004251 | 19 | 89% | 2 | 25 | -0.001063 | 21 | 96% | 1 | 2 |
| 26 | -0.004251 | 19 | 88% | 3 | 26 | -0.001063 | 21 | 96% | 1 | 2 |
| 27 | -0.004251 | 19 | 88% | 3 | 27 | -0.001063 | 21 | 96% | 1 | 2 |
| 28 | -0.004251 | 19 | 88% | 3 | 28 | -0.001063 | 21 | 96% | 1 | 2 |
| 29 | -0.004251 | 19 | 87% | 3 | 29 | -0.001063 | 21 | 96% | 1 | 2 |
| 30 | -0.004251 | 19 | 87% | 3 | 30 | -0.001063 | 21 | 96% | 1 | 2 |
| 31 | -0.004251 | 19 | 86% | 3 | 31 | -0.001063 | 21 | 95% | 1 | 2 |
| 32 | -0.004251 | 19 | 86% | 3 | 32 | -0.001063 | 21 | 95% | 1 | 2 |
| 33 | -0.004251 | 19 | 86% | 3 | 33 | -0.001063 | 21 | 95% | 1 | 2 |
| 34 | -0.004251 | 19 | 85% | 3 | 34 | -0.001063 | 21 | 95% | 1 | 2 |
| 35 | -0.004251 | 19 | 85% | 3 | 35 | -0.001063 | 21 | 95% | 1 | 2 |
| 36 | -0.004251 | 19 | 85% | 3 | 36 | -0.001063 | 21 | 95% | 1 | 2 |
| 37 | -0.004251 | 18 | 84% | 3 | 37 | -0.001063 | 21 | 95% | 1 | 2 |
| 38 | -0.004251 | 18 | 84% | 4 | 38 | -0.001063 | 21 | 95% | 1 | 2 |
| 39 | -0.004251 | 18 | 84% | 4 | 39 | -0.001063 | 21 | 95% | 1 | 2 |
| 40 | -0.004251 | 18 | 83% | 4 | 40 | -0.001063 | 21 | 95% | 1 | 2 |
| 41 | -0.004251 | 18 | 83% | 4 | 41 | -0.001063 | 21 | 94% | 1 | 3 |
| 42 | -0.004251 | 18 | 83% | 4 | 42 | -0.001063 | 21 | 94% | 1 | 3 |
| 43 | -0.004251 | 18 | 82% | 4 | 43 | -0.001063 | 21 | 94% | 1 | 3 |
| 44 | -0.004251 | 18 | 82% | 4 | 44 | -0.001063 | 21 | 94% | 1 | 3 |
| 45 | -0.004251 | 18 | 81% | 4 | 45 | -0.001063 | 21 | 94% | 1 | 3 |
| 46 | -0.004251 | 18 | 81% | 4 | 46 | -0.001063 | 21 | 94% | 1 | 3 |
| 47 | -0.004251 | 18 | 81% | 4 | 47 | -0.001063 | 21 | 94% | 1 | 3 |
| 48 | -0.004251 | 18 | 80% | 4 | 48 | -0.001063 | 21 | 94% | 1 | 3 |
| 49 | -0.004251 | 18 | 80% | 4 | 49 | -0.001063 | 21 | 94% | 1 | 3 |
| 50 | -0.004251 | 17.46 | 79.74% | 4 | 50 | -0.001063 | 20 | 94% | 1 | 3 |

# Land Loss Spreadsheet

| *used NOV polygon 1b provided by USGS | | | | | Loss Rate Calculation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Project:** | NOV 07/08: Saline Marsh | | | | **Beginning Year** | **Ending Year** | **Beginning Year Acreage** | **Ending Year Acreage** | **Loss Rate** | |
| **Total Acres** | | **TY0 Marsh Acres** | | **TY0 Water Acres** | 1985 | 2009 | 5,373 | 5,254 | -0.0009 | |
| 22 | | 20 | | 2 | FWP Land Loss Reduction | | | 0.75 | | |
| **FWOP** | | | | | **FWP** | | | | | |
| TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | TY | Loss Rate | Marsh (acres) | % Marsh (V1) | Water (acres) | Net Acres of Marsh |
| 0 | | 20.24 | 91.42% | 2 | 0 | | 20 | 91% | 2 | 0 |
| **1** | -0.000923 | **20.22** | **91.33%** | 2 | **1** | -0.000231 | **20** | **91%** | 2 | 0 |
| 2 | -0.000923 | 20 | 91% | 2 | 2 | -0.000231 | 20 | 91% | 2 | 0 |
| 3 | -0.000923 | 20 | 91% | 2 | 3 | -0.000231 | 20 | 91% | 2 | 0 |
| 4 | -0.000923 | 20 | 91% | 2 | 4 | -0.000231 | 20 | 91% | 2 | 0 |
| 5 | -0.000923 | 20 | 91% | 2 | 5 | -0.000231 | 20 | 91% | 2 | 0 |
| 6 | -0.000923 | 20 | 91% | 2 | 6 | -0.000231 | 20 | 91% | 2 | 0 |
| 7 | -0.000923 | 20 | 91% | 2 | 7 | -0.000231 | 20 | 91% | 2 | 0 |
| 8 | -0.000923 | 20 | 91% | 2 | 8 | -0.000231 | 20 | 91% | 2 | 0 |
| 9 | -0.000923 | 20 | 91% | 2 | 9 | -0.000231 | 20 | 91% | 2 | 0 |
| 10 | -0.000923 | 20 | 91% | 2 | 10 | -0.000231 | 20 | 91% | 2 | 0 |
| 11 | -0.000923 | 20 | 90% | 2 | 11 | -0.000231 | 20 | 91% | 2 | 0 |
| 12 | -0.000923 | 20 | 90% | 2 | 12 | -0.000231 | 20 | 91% | 2 | 0 |
| 13 | -0.000923 | 20 | 90% | 2 | 13 | -0.000231 | 20 | 91% | 2 | 0 |
| 14 | -0.000923 | 20 | 90% | 2 | 14 | -0.000231 | 20 | 91% | 2 | 0 |
| 15 | -0.000923 | 20 | 90% | 2 | 15 | -0.000231 | 20 | 91% | 2 | 0 |
| 16 | -0.000923 | 20 | 90% | 2 | 16 | -0.000231 | 20 | 91% | 2 | 0 |
| 17 | -0.000923 | 20 | 90% | 2 | 17 | -0.000231 | 20 | 91% | 2 | 0 |
| 18 | -0.000923 | 20 | 90% | 2 | 18 | -0.000231 | 20 | 91% | 2 | 0 |
| 19 | -0.000923 | 20 | 90% | 2 | 19 | -0.000231 | 20 | 91% | 2 | 0 |
| **20** | -0.000923 | **20** | **90%** | 2 | **20** | -0.000231 | **20** | **91%** | 2 | **0** |
| 21 | -0.000923 | 20 | 90% | 2 | 21 | -0.000231 | 20 | 91% | 2 | 0 |
| 22 | -0.000923 | 20 | 90% | 2 | 22 | -0.000231 | 20 | 91% | 2 | 0 |
| 23 | -0.000923 | 20 | 89% | 2 | 23 | -0.000231 | 20 | 91% | 2 | 0 |
| 24 | -0.000923 | 20 | 89% | 2 | 24 | -0.000231 | 20 | 91% | 2 | 0 |
| 25 | -0.000923 | 20 | 89% | 2 | 25 | -0.000231 | 20 | 91% | 2 | 0 |
| 26 | -0.000923 | 20 | 89% | 2 | 26 | -0.000231 | 20 | 91% | 2 | 0 |
| 27 | -0.000923 | 20 | 89% | 2 | 27 | -0.000231 | 20 | 91% | 2 | 0 |
| 28 | -0.000923 | 20 | 89% | 2 | 28 | -0.000231 | 20 | 91% | 2 | 0 |
| 29 | -0.000923 | 20 | 89% | 2 | 29 | -0.000231 | 20 | 91% | 2 | 0 |
| 30 | -0.000923 | 20 | 89% | 2 | 30 | -0.000231 | 20 | 91% | 2 | 0 |
| 31 | -0.000923 | 20 | 89% | 2 | 31 | -0.000231 | 20 | 91% | 2 | 0 |
| 32 | -0.000923 | 20 | 89% | 2 | 32 | -0.000231 | 20 | 91% | 2 | 0 |
| 33 | -0.000923 | 20 | 89% | 3 | 33 | -0.000231 | 20 | 91% | 2 | 0 |
| 34 | -0.000923 | 20 | 89% | 3 | 34 | -0.000231 | 20 | 91% | 2 | 0 |
| 35 | -0.000923 | 20 | 89% | 3 | 35 | -0.000231 | 20 | 91% | 2 | 0 |
| 36 | -0.000923 | 20 | 88% | 3 | 36 | -0.000231 | 20 | 91% | 2 | 0 |
| 37 | -0.000923 | 20 | 88% | 3 | 37 | -0.000231 | 20 | 91% | 2 | 1 |
| 38 | -0.000923 | 20 | 88% | 3 | 38 | -0.000231 | 20 | 91% | 2 | 1 |
| 39 | -0.000923 | 20 | 88% | 3 | 39 | -0.000231 | 20 | 91% | 2 | 1 |
| 40 | -0.000923 | 20 | 88% | 3 | 40 | -0.000231 | 20 | 91% | 2 | 1 |
| 41 | -0.000923 | 19 | 88% | 3 | 41 | -0.000231 | 20 | 91% | 2 | 1 |
| 42 | -0.000923 | 19 | 88% | 3 | 42 | -0.000231 | 20 | 91% | 2 | 1 |
| 43 | -0.000923 | 19 | 88% | 3 | 43 | -0.000231 | 20 | 91% | 2 | 1 |
| 44 | -0.000923 | 19 | 88% | 3 | 44 | -0.000231 | 20 | 90% | 2 | 1 |
| 45 | -0.000923 | 19 | 88% | 3 | 45 | -0.000231 | 20 | 90% | 2 | 1 |
| 46 | -0.000923 | 19 | 88% | 3 | 46 | -0.000231 | 20 | 90% | 2 | 1 |
| 47 | -0.000923 | 19 | 88% | 3 | 47 | -0.000231 | 20 | 90% | 2 | 1 |
| 48 | -0.000923 | 19 | 87% | 3 | 48 | -0.000231 | 20 | 90% | 2 | 1 |
| 49 | -0.000923 | 19 | 87% | 3 | 49 | -0.000231 | 20 | 90% | 2 | 1 |
| 50 | -0.000923 | 19.33 | 87.29% | 3 | 50 | -0.000231 | 20 | 90% | 2 | 1 |

# APPENDIX G
# FISH AND WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

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

May 13, 2011

Colonel Jeffrey R. Eckstein
District Engineer
U.S. Army Corps of Engineers
4155 Clay Street
Vicksburg, Mississippi 39183-3435

Dear Colonel Eckstein:

Enclosed is the final Fish and Wildlife Coordination Act Report for the proposed New Orleans to Venice Federal Hurricane Protection Levee (NOV) Project, Plaquemines Parish, Louisiana. This final report is transmitted under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). The National Marine Fisheries Service's comments have been incorporated. No comments have been received from the Louisiana Department of Wildlife and Fisheries to date. A copy of this report is also being sent to the District Engineer in New Orleans, Louisiana.

Should your staff have any questions regarding the enclosed report, please have them contact Ms. Brigette Firmin of this office at 337/291-3108.

Sincerely,

Carrie Thompson
Acting Supervisor
Louisiana Field Office

Enclosures

cc: EPA, Dallas, TX
NMFS, Baton Rouge, LA
LDWF, Baton Rouge, LA
LDNR, CMD, Baton Rouge, LA
OCPR, Baton Rouge, LA

# FINAL
# Fish and Wildlife Coordination Act Report

## New Orleans to Venice, LA, Federal Hurricane Levee Protection System
## Plaquemines Parish, Louisiana

Provided to:
U.S. Army Corps of Engineers
Vicksburg, Mississippi, and New Orleans, Louisiana

Prepared by:
Brigette D. Firmin
Fish and Wildlife Biologist
Ecological Services
Lafayette, Louisiana

U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia

**May 2011**

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## EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (Service) has prepared this final Fish and Wildlife Coordination Act Report for the proposed upgrades to the New Orleans to Venice, Louisiana, Hurricane Levee Protection System (NOV) in Plaquemines Parish, Louisiana, under the authority of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). The U.S. Army Corps of Engineers, Vicksburg District (Corps) has prepared a Supplemental Environmental Impact Statement (SEIS) to fulfill the Corps' compliance with the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.). Work proposed in that SEIS would be conducted under the authority of Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4). That law authorized the Corps to upgrade the existing NOV levee system in Plaquemines Parish, Louisiana.

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 proposed project. This final report incorporates and supplements the November 26, 2007, Draft Programmatic FWCA Report that addresses the hurricane protection improvements authorized in Supplemental 4 and our May 1982 and November 1987 FWCA Reports that address impacts of the originally authorized project. Impacts and mitigation needs resulting from government and contractor provided borrow areas have been addressed in the October 25, 2007, and November 1, 2007, FWCA Reports, respectively; therefore, this report will not address those project features. This final document constitutes the report of the Secretary of the Interior as required by Section 2(b) of the FWCA. The January 19, 2011, draft of this final report was provided to the Louisiana Department of Wildlife and Fisheries (LDWF) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). The NMFS' comments on the draft FWCA report have been incorporated into this final report. No comments were received from the LDWF regarding the draft FWCA report.

The NOV study area spans the Mississippi River and is located within two basins in the Mississippi River Deltaic Plain of the Lower Mississippi River Ecosystem. The east bank levee system is located in the Breton Sound Basin; it consists of the back levee which begins near the town of Phoenix, Louisiana, and ends near Bohemia, Louisiana. The east bank portion of the study area is defined by emergent wetlands to the north, east, and south, and to the west by residential, commercial, and forested areas, Louisiana State Highway 39, Parish Highway 15, and the Mississippi River. The west bank levee system is located in the Barataria Basin; it consists of both the back levee and the Mississippi River levee. The west bank levee system begins near the town of Magnolia, Louisiana, and ends at Venice, Louisiana. The west bank portion of the study area is defined by forested and emergent wetlands, the town of Magnolia, and the Plaquemines Parish nonfederal levee system to the north; emergent wetlands to the west; the town of Venice and Grand Pass to the south; and to the east by residential, commercial, and forested areas, Louisiana State Highway 23, and the Mississippi River. Within the NOV hurricane protection system, natural levees and lower lying wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development; however, some of the land remains undeveloped. Undeveloped lands generally consist of fallow fields, bottomland hardwood forests, and/or scrub-shrub habitat.

Study area wetlands support nationally important fish and wildlife resources including fresh, intermediate, brackish, and saline marsh. Factors that will strongly influence future fish and wildlife resource conditions outside of the protection levees include freshwater and sediment input and loss of coastal wetlands. Regardless of which of the above factors ultimately has the greatest influence, emergent wetlands within and adjacent to the project area will likely experience losses due to subsidence, erosion, and relative sea-level rise.

During the alternatives analysis, the no-action alternative and the alternative to accelerate improvement of the existing hurricane protection levee system to the pre-Katrina General Design Memorandum (GDM) level of risk reduction were considered. The no-action alternative would not be implemented because it fails to provide the authorized level of protection from St. Jude to Venice, Louisiana. The alternative to improve the existing levee system to the pre-Katrina GDM level of risk reduction would not be implemented because it exceeds the Corps' allocated cost for construction; however, the local sponsor has the option to implement Alternative 3 by funding the excess costs beyond the Corps' preferred alternative.

The Corps' preferred alternative would include raising the existing hurricane protection levee system to provide a 50-year level of protection. The proposed levee improvements would be incorporated into 95.4 miles of existing levee system. Levee heights would be raised to elevations varying from 13.0 feet up to 20.5 feet North American Vertical Datum (NAVD) along different sections of the existing system.

Implementation of the preferred alternative would directly impact 1.86 acres of hydrologically altered (i.e., non-wet) bottomland hardwood habitat, 110.49 acres of wet bottomland hardwood habitat (in the batture of the Mississippi River), 2.96 acres of scrub-shrub habitat, 82.96 acres of fresh marsh habitat (in the batture of the Mississippi River), 75.26 acres of intermediate marsh habitat, 30.0 acres of brackish marsh habitat, and 105.99 acres of saline marsh habitat. According to the Gulf South Research Corporation's (GSRC) Habitat Assessment Methodology (HAM) and Wetland Value Assessment (WVA) analyses the preferred alternative would result in the direct loss of 1.18 average annual habitat units (AAHUs) of hydrologically altered bottomland hardwood forest, 67.63 AAHUs of wet bottomland hardwood forest, 1.33 AAHUs of scrub-shrub habitat, 18.95 AAHUs of fresh marsh, 37.37 AAHUs of intermediate marsh, 20.67 AAHUs of brackish marsh, and 76.21 AAHUs of saline marsh. Mitigation for unavoidable losses of those habitats caused by project features should be implemented concurrent with project construction.

The Service does not object to improving the existing NOV hurricane protection in Plaquemines Parish, provided the following fish and wildlife conservation recommendations are incorporated into future project planning and implementation.

1. To the greatest extent possible, design (e.g., implementation of "T"-walls, sheet-pile, and/or cement floodwall in levee designs) and position flood protection features so that destruction of forested and emergent wetlands and non-wet bottomland hardwoods are avoided or minimized.

2. Minimize enclosure of wetlands with new levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.

3. The Corps shall fully compensate for any unavoidable losses to wet and non-wet bottomland hardwood habitat (-68.81 AAHUs), scrub-shrub habitat (-1.33 AAHUs), fresh marsh (-18.95

AAHUs), intermediate marsh (-37.37 AAHUs), brackish marsh (-20.67 AAHUs), and saline marsh (-76.21 AAHUs) caused by project features. Specific guidance and recommendations regarding details for mitigation planning, as well as potential locations of mitigation priority areas, are enclosed in Appendix A. All aspects of mitigation planning should be coordinated with the Service, NMFS, the Environmental Protection Agency (EPA), the Louisiana Department of Natural Resources (LDNR), and LDWF.

4. Funds for full compensatory mitigation for the entire project should be set aside up-front to ensure that the Federal and local sponsors will have the capability of offsetting unavoidable losses to the wetland habitats as listed in item #3 above, regardless of whether construction funding is procured by each levee reach.

5. Full compensation for marsh should be defined to be no less than 0.27 AAHUs per mitigation acre; however, that replacement rate may require redefining based on design of a specific proposed mitigation project to ensure full functional replacement.

6. The Service recommends that mitigation alternatives include locating the mitigation within the Basin where impacts occurred.

7. If a proposed project feature is changed significantly or is not implemented within one year of the February 11, 2011, Endangered Species Act consultation update, we recommend that the Corps reinitiate coordination with the Service to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their critical habitat.

8. Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. A qualified biologist should inspect the proposed work site for the presence of undocumented wading bird nesting colonies and bald eagle nests during the nesting seasons (i.e., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles).

9. To minimize disturbance to colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

10. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to this office.

11. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

12. Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest. All costs (i.e., performance compliance and monitoring) until year five success criteria are attained shall be at the sole expense of the Federal sponsor.

13. Construction of or purchasing credit from an approved mitigation bank for all compensatory mitigation should be conducted concurrent with construction of the NOV project (and concurrent with the NFL project if mitigation is combined), to ensure that mitigation obligations are met on behalf of the public interest.

14. If mitigation lands are purchased for inclusion within Federal or State managed lands, those lands must meet certain requirements; therefore, the land manager of that management area should be contacted early in the planning phase regarding such requirements.

15. Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the Service, NMFS, EPA, LDNR, and LDWF, and the Corps shall provide them with an opportunity to review and submit recommendations on all work addressed in those reports.

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

17. A report documenting the status of mitigation implementation and maintenance should be prepared by the managing agency and provided to the Corps, the Service, NMFS, EPA, LDNR, and LDWF. That report should also describe future management activities and identify any proposed changes to the existing management plan.

18. The Service recommends that the mitigation plan be finalized prior to finalization of the Feasibility Study Report.

# INTRODUCTION

The New Orleans to Venice Hurricane Protection (NOV) Project provides hurricane protection to developed areas of Plaquemines Parish, Louisiana, along the Mississippi River below New Orleans. It was originally authorized by the Flood Control Act of 1962. In coordination with the U.S. Army Corps of Engineers' (Corps) New Orleans District and the Louisiana Office of Coastal Planning and Restoration (OCPR, the nonfederal sponsor), the Corps' Vicksburg District is preparing a Supplemental Environmental Impact Statement (SEIS) for the proposed upgrade of the existing federal levee system from St. Jude to Venice, in Plaquemines Parish, Louisiana. The federal levees would be improved to provide a 50-year level of protection in accordance with Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery 2006 (Supplemental 4).

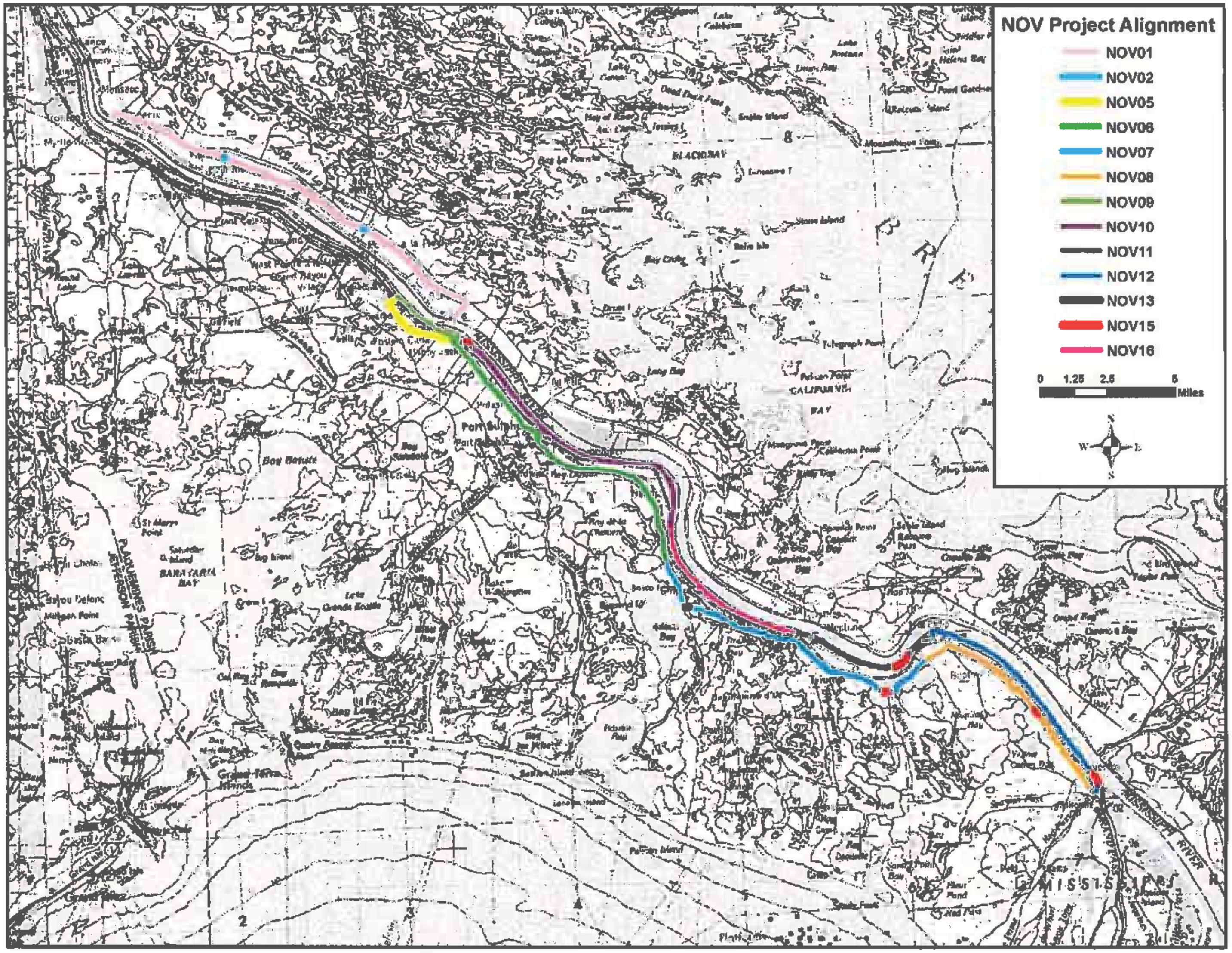
The U.S. Fish and Wildlife Service (Service) has prepared this final FWCA report in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). This final FWCA report contains a description of the existing fish and wildlife resources in the project area and a discussion of the future with- and without-project conditions. This report also identifies fish and wildlife-related impacts and provides recommendations for the proposed project. This report incorporates and supplements our November 26, 2007, draft programmatic FWCA report that addresses the hurricane protection improvements authorized in Supplemental 4. This final report constitutes the report of the Secretary of the Interior as required by Section 2(b) of the FWCA. The draft of this final report was provided to the Louisiana Department of Wildlife and Fisheries (LDWF) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). The NMFS' comments on the draft FWCA report have been incorporated into this final report. No comments were received from the LDWF regarding the draft FWCA report.

## Project Description

The goal of the proposed action is to improve the storm damage reduction capability of the NOV system in Plaquemines Parish, Louisiana (Figure 1). The proposed action would involve upgrading the elevation and/or the stability of the NOV protection system, as well as rehabilitating existing floodwalls, along approximately 95.4 miles of earthen levees. Elevation upgrades vary from 13.0 feet up to 20.5 feet North American Vertical Datum 1988 (NAVD) for the preferred alternative. The proposed action would result in wider levee footprints along the existing alignments of the Mississippi River levee on the west bank and the back levees on both the east and west banks.

*[This area intentionally left blank.]*

Figure 1. New Orleans to Venice (NOV), Plaquemines Parish, Louisiana, Study Area.



## DESCRIPTION OF THE STUDY AREA

The NOV study area spans the Mississippi River and is located within two basins in the Mississippi River Deltaic Plain of the Lower Mississippi River Ecosystem. The east bank levee system is located in the Breton Sound Basin; it consists of the back levee which begins near the town of Phoenix, Louisiana, and ends near Bohemia, Louisiana. The east bank portion of the study area is defined by emergent wetlands to the north, east, and south, and to the west by residential, commercial, and forested areas, Louisiana State Highway 39, Parish Highway 15, and the Mississippi River. The west bank levee system is located in the Barataria Basin; it consists of both the back levee and the Mississippi River levee. The west bank levee system begins near the town of Magnolia, Louisiana, and ends at Venice, Louisiana. The west bank portion of the study area is defined by forested and emergent wetlands, the town of Magnolia, and the Plaquemines Parish nonfederal levee system to the north; emergent wetlands to the west; the town of Venice and Grand Pass to the south; and to the east by residential, commercial, and forested areas, Louisiana State Highway 23, and the Mississippi River. Within the NOV hurricane protection system, natural levees and lower lying wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development; however, some of the land remains undeveloped. Undeveloped lands generally consist of fallow fields, bottomland hardwood forests, and/or scrub-shrub habitat.

### Description of Habitats

The major habitat types in the study area can be classified as riverine and estuarine emergent marsh, palustrine scrub-shrub wetlands, riverine and palustrine forested wetlands, wetland pasture, open water, and developed upland. Due to development and a forced-drainage system, the hydrology of the palustrine forest, scrub-shrub, and wetland pasture habitats within the NOV hurricane protection system has been altered. The forced-drainage system has been in operation for many years, and subsidence is evident throughout the areas enclosed by levees.

The coastal wetlands within the study area provide plant detritus to adjacent coastal waters and thereby contribute to the production of commercially and recreationally important fishes and shellfishes. Wetlands in the project area also provide valuable water quality functions such as reduction of excessive dissolved nutrient levels, filtering of waterborne contaminants, and removal of suspended sediment. In addition, coastal wetlands buffer storm surges reducing their damaging effect to man-made infrastructure within the coastal area.

Factors that will strongly influence future fish and wildlife resource conditions outside of the protection levees include freshwater input and loss of coastal wetlands. Depending upon the deterioration rate of marshes, the frequency of occasional short-term saltwater events may increase. Under that scenario, tidal action in the project area may increase gradually as the buffering effect of marshes is lost, and use of that area by estuarine-dependent fishes and shellfish tolerant of saltwater conditions would likely increase. Regardless of which of the above factors ultimately has the greatest influence, emergent wetlands within and adjacent to the project area will probably experience losses due to development, subsidence, and erosion.

The ongoing loss of coastal Louisiana wetlands (approximately 1,149 square miles between 1956 and 2004; average loss rate of 24 square miles per year) was recently exacerbated by Hurricanes Katrina and Rita in 2005. Those hurricanes caused an initial loss of wetlands equivalent to 9 years (approximately 217 square miles) of mean annual losses. Louisiana wetlands provide 26 percent of the seafood landed in the conterminous United States and over 5 million migratory waterfowl utilize those wetlands every year. In addition, those wetlands provide protection to coastal towns, cities and their infrastructure, as well as important infrastructure for the nation's oil and gas industry.

Non-wet bottomland hardwoods within the project area also provide habitat for wildlife resources. Between 1932 and 1984, the acreage of bottomland hardwoods in Louisiana declined by 45 percent (Rudis and Birdsey 1986). A large percentage of the original bottomland hardwoods within the Mississippi River floodplain in the Deltaic Plain are located within levees. However, losses of that habitat type are not regulated or mitigated with the exception of impacts resulting from Corps projects as required by Section 906(b) of the Water Resources Development Act of 1986.

Forested Habitats

Forested habitats in the study area consist of bottomland hardwood forests. Bottomland hardwood forests found in the study area occur primarily on the natural levees of the Mississippi River, on former distributary channels, or between the river and its levees (i.e., the batture). Dominant vegetation may include sugarberry, water oak, live oak, bitter pecan, black willow, American elm, Drummond red maple, Chinese tallow-tree, box elder, green ash and elderberry. Most bottomland hardwoods that are located within the constructed hurricane protection project have been degraded by forced drainage and resultant subsidence. Those areas are also often fragmented by development. Conversely, those bottomland hardwoods located outside the protection levees or in areas where structures through the levees maintain a hydrologic connection, still retain many wetland functions and values.

Marshes

Marsh types within the study area include fresh, intermediate, brackish, and saline. Fresh marshes occur within the hurricane protection system, along the batture, near sediment diversion projects, or closer to the mouth of the Mississippi River; they are often characterized by floating or semi-floating organic soils and minimal daily tidal action. Vegetation may include maidencane, bulltongue, cattail, California bulrush, pennywort, giant cutgrass, American cupscale, spikerushes, bacopa, and alligatorweed. Associated open water habitats may often support extensive beds of floating-leafed and submerged aquatic vegetation including water hyacinth, *Salvinia*, duckweeds, American lotus, white water lily, water lettuce, coontail, Eurasian milfoil, hydrilla, pondweeds, naiads, fanwort, wild celery, water stargrass, elodea, and others.

Intermediate marshes are a transitional zone between fresh and brackish marshes and are often characterized by organic, semi-floating soils. Typically, intermediate marshes experience low levels of daily tidal action. Salinities are negligible or low throughout much of the year, with salinity peaks occurring during late summer and fall. Vegetation includes saltmeadow cordgrass, deer pea, three-cornered grass, cattail, bulltongue, seashore paspalum, wild millet, fall panicum, and bacopa. Ponds and lakes within the intermediate marsh zone often support extensive submerged aquatic vegetation including southern naiad, Eurasian milfoil, and wigeongrass.

Brackish marshes are characterized by low to moderate daily tidal energy and by soils ranging from firm mineral soils to organic semi-floating soils. Freshwater conditions may prevail for several months during early spring; however, low to moderate salinities occur during much of the year, with peak salinities in the late summer or fall. Vegetation is usually dominated by saltmeadow cordgrass, but also includes saltgrass, three-cornered grass, leafy three-square, and deer pea. Shallow brackish marsh ponds occasionally support abundant beds of wigeongrass.

Saline marshes occur along the fringe of the coastal wetlands. Those marshes usually exhibit fairly firm mineral soils and experience moderate to high daily tidal energy. Vegetation is dominated by saltmarsh cordgrass but may also include saltgrass, saltmeadow cordgrass, black needlerush, and leafy three-square. Submerged aquatic vegetation is rare. Within the study area, intertidal mud flats are most common in saline marshes.

Scrub-Shrub Habitats

Scrub-shrub habitat is often found along the flanks of distributary ridges and in marshes altered by spoil deposition, drainage projects, or agriculture. Typically it is bordered by marsh at lower elevations and by developed areas or bottomland hardwoods at higher elevations. Typical scrub-shrub vegetation includes elderberry, wax myrtle, buttonbush, black willow, Drummond red maple, Chinese tallow-tree, and groundselbush. Some scrub-shrub habitat is an early successional stage of bottomland hardwood forests. Within the project area, scrub-shrub habitat occurs within abandoned agricultural fields, cattle pastures, at sites disturbed by hurricanes, or at sites experiencing subsidence.

Wetland Pasture

Wetland pasture is often found between the distributary ridges and in marshes altered by spoil deposition, drainage projects, or agriculture. Typically it is bordered by marsh at lower elevations and by active agriculture lands, scrub-shrub habitat, or residential development at higher elevations. Typical wetland pasture vegetation includes *Panicum sp.*, *Paspalum sp.*, Bermuda grass, camphorweed, marshmallow, spikerush, soft rush, dewberry, waterprimrose, smartweed, and alligator weed. Some wetland pasture consists of marsh that is used for grazing cattle. Within the project area, wetland pasture occurs along the development/marsh interface or adjacent to the existing hurricane protection system.

Open-Water Habitats

Open-water habitat within the project area consists of ponds, lakes, canals, bays, and bayous. Natural marsh ponds and lakes are typically shallow, ranging in depth from 6 inches to over 2 feet. Typically, the smaller ponds are shallow and the larger lakes and bays are deeper. In fresh and low-salinity areas, ponds and lakes may support varying amounts of submerged and/or floating-leaved aquatic vegetation. Brackish and, much less frequently, saline marsh ponds and lakes may support wigeongrass beds.

Canals and larger bayous typically range in depth from 4 or 5 feet, to over 15 feet. Strong tidal flows may occur at times through those waterways, especially where they provide hydrologic connections to other large waterbodies. Such canals and bayous may have mud or clay bottoms that range from soft to firm. Dead-end canals and small bayous are typically shallow and their bottoms may be filled in to varying degrees with semi-fluid organic material. Erosion due to wave action and boat wakes, together with shading from overhanging woody vegetation, tends to retard the amount of intertidal marsh vegetation growing along the edges of those waterways.

Drainage canals enclosed within the hurricane protection project are stagnant except when pumps are operating to remove water. Runoff from developed areas has likely reduced the habitat value of that aquatic habitat by introducing various urban pollutants, such as oil, grease, and excessive nutrients. Clearing and development has eliminated much of the riparian habitat that would normally provide shade and structure for many aquatic species.

Developed Areas

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. Most of the development is located on higher elevations of the Mississippi River natural levees and former distributary channels. Large amounts of agricultural lands occur throughout the area; agriculture includes citrus farming, cattle production, and hay production.

**Fishery/Aquatic Resources**

Drainage canals in the study area do not support significant fishery resources because of dense vegetation, poor water quality, and inadequate depth. Freshwater sport fishes present in the project area, but outside of the levees, include largemouth bass, crappie, bluegill, redear sunfish, warmouth, channel catfish, and blue catfish. Other fishes likely to be present include yellow bullhead, freshwater drum, bowfin, carp, buffalo, and gar. Estuarine-dependent fishes and shellfishes such as Atlantic croaker, red drum, spot, sand seatrout, spotted seatrout, southern flounder, Gulf menhaden, striped mullet, brown shrimp, white shrimp, and blue crab are found in the intermediate to saline marshes.

Some of the waterbodies in the project area meet criteria for primary and secondary contact recreation and partially meets criteria for fish and wildlife propagation, while others do not meet the criteria for fish and wildlife propagation. Causes for not fully meeting fish and wildlife propagation criteria include excessive nutrients, organic enrichment, low dissolved oxygen levels, flow and habitat alteration, pathogens and noxious aquatic plants. Indicated sources of those problems include hydrologic modification, habitat modification, recreational activities, and unspecified upstream sources. Municipal point sources, urban runoff, storm sewers, and onsite wastewater treatment systems are also known contributors to poor water quality in the area.

Deteriorating water quality in the Breton Sound and Barataria Basins, at least partially correlated to wetlands loss and a commensurate reduction in the area's waste assimilation capacity, is a major problem affecting fish and wildlife in that portion of the study area. According to Bahr et al. (1983), factors that currently adversely affect water quality in the Barataria Basin are those generally related to urban development and associated urban pollution, altered land-use patterns, and hydrologic modifications (drainage, etc.) within the watershed. Two major human-related causes of water quality degradation include eutrophication and increased levels of toxic substances.

Essential Fish Habitat

Estuarine wetlands and associated intertidal and sub-tidal areas within the study area have been identified as Essential Fish Habitat (EFH) for post-larval, juvenile and sub-adult stages of brown shrimp, white shrimp, red drum, and Gulf stone crab, as well as the adult stages of those species in near-shore and offshore waters. EFH requirements vary depending upon species and life stage. Categories of EFH in the project area include estuarine emergent wetlands, estuarine water column, substrates (i.e., mud, sand, shell, rock, and associated biological communities), submerged aquatic vegetation, and estuarine water bottoms (i.e., shallow open water with non-vegetated water bottoms).

Detailed information on federally managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the Gulf of Mexico Fishery Management Council. The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; Public Law 104-297).

In addition to being designated as EFH for various federally managed species, wetlands and water bottoms in the project area provide nursery and foraging habitats for a variety of economically important marine fishery species such as blue crab, gulf menhaden, spotted seatrout, sand seatrout, southern flounder, and striped mullet. Species such as the striped mullet, Atlantic croaker, sand sea trout, pinfish, spot, anchovies, and killifish, as well as various shellfish species and benthic organisms that occur in the study area also serve as prey for other fish species managed under the Magnuson-Stevens Act by the Gulf of Mexico Fishery Management Council (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks). Wetlands in the project area also produce nutrients and detritus, important components of the aquatic food web, which contribute to the overall productivity of the Barataria Bay and Breton Sound estuaries.

**Wildlife Resources**

Mammals known to occur in the study-area bottomland hardwoods and marshes include white-tailed deer, mink, raccoon, swamp rabbit, nutria, river otter, and muskrat. Those habitats also support a variety of birds including herons, egrets, ibises, least bittern, rails, gallinules, olivaceous cormorant, anhinga, white pelicans, pied-billed grebe, black-necked stilt, sandpipers, gulls, and terns. Forested and scrub-shrub habitats within the study area also provide habitat for many resident passerine birds and essential resting areas for many migratory songbirds including warblers, orioles, thrushes, vireos, tanagers, grosbeaks, buntings, flycatchers, and cuckoos. Many of these and other passerine birds have undergone a decline in population primarily due to habitat loss.

Given the extent of development and drainage, waterfowl use within the hurricane protection system is likely minimal, except in the adjacent wetlands outside the levees. Swamps and fresh and intermediate marshes usually receive greater waterfowl utilization than brackish and saline marshes because they generally provide more waterfowl food. Migratory species expected to occur in the project area include gadwall, green-winged teal, blue-winged teal, fulvous whistling duck, northern shoveler, mallard, pintail, American widgeon, lesser scaup, ring-necked duck, redhead, and canvasback. Resident species expected to occur in that area include mottled duck and wood duck.

The study area also supports resident hawks and owls including the red-shouldered hawk, barn owl, common screech owl, great horned owl, and barred owl. The red-tailed hawk, marsh hawk, and American kestrel are seasonal residents which utilize habitats within the study area.

Amphibians such as the pig frog, bullfrog, leopard frog, cricket frog, and Gulf coast toad are expected to occur in the fresh and low salinity wetlands of the project area. Reptiles such as the American alligator, snapping turtle, soft-shell turtle, red-eared turtle, diamond-backed terrapin, speckled king snake, Gulf salt marsh snake, western cottonmouth, and various water snakes are also expected to occur in the project-area wetlands and waterbodies.

## Endangered and Threatened Species

To aid the Corps in complying with their proactive consultation responsibilities under the Endangered Species Act (ESA), the Service provided a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District in an August 7, 2006, letter to the Corps regarding construction of and improvements to Federal and nonfederal hurricane/flood protection levees throughout southern Louisiana. The Service recommended that the Corps conduct ESA consultation as soon as project-specific plans were developed and impact locations were identified. In correspondence dated February 11, 2011, the Service indicated that the proposed project would have no effect on federally listed species located in the vicinity of the proposed project area. However, should plans be changed significantly, or if work is not implemented within 1 year following that coordination, we recommend that the Corps conduct annual re-initiation of ESA coordination with this office to ensure that the proposed project (or any future changes or modifications) would not adversely affect any federally listed threatened or endangered species or their habitat.

## Migratory Birds

The Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.) and the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) offer additional protection to many bird species within the project area including colonial nesting birds and the bald eagle (*Haliaeetus leucocephalus*).

The project area is located where colonial nesting waterbirds may be present. LDWF currently maintains a database of these colonies locations. That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work sites for the presence of undocumented nesting colonies during the nesting season (e.g. February through September depending on the species). If colonies exist work should not be conducted within 1,000 feet of the colony during the nesting season.

The study-area forested wetlands provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species on August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. Bald eagles generally nest in large trees located near coastlines, rivers, or lakes that support adequate food supplies. In the southeastern Parishes, eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water. Eagles may also nest in mature pine trees near large lakes in central and northern Louisiana. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

Breeding bald eagles defend "territories" that may be reoccupied annually. In addition to the active nest, a territory may include one or more alternate nests that are built and maintained by the eagles, but which are not used for nesting in a given year. Potential nest trees within a territory may, therefore, provide important alternative bald eagle nest sites. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during these periods may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree, thus reducing their chance of survival.

Although the bald eagle has been removed from the List of Endangered and Threatened Species, bald eagles and their nests continue to be protected under the MBTA and the BGEPA. The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. Results of that determination should be provided to this office. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting such consultations. If after consulting those guidelines you need further assistance in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, please contact this office.

**Future Fish and Wildlife Resources**

The combination of subsidence and sea level rise is called submergence or land sinking. As the land sinks the wetlands become inundated with higher water levels, stressing most non-fresh marsh plants, bottomland hardwood plants and even cypress-tupelo swamps leading to plant death and conversion to open water. Other major causes of wetland losses within the study area include altered hydrology, storms, saltwater intrusion (caused by marine processes invading fresher wetlands), shoreline erosion, herbivory, and development activities including the direct and indirect impacts of dredge and fill (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998). The continued conversion of wetlands and forested habitat to open water or developed land represent the most serious fish and wildlife-related problems in the study area. Those losses could be expected to cause significant declines in coastal fish and shellfish production and in the study area's carrying capacity for numerous migratory waterfowl, wading birds, other migratory birds, alligators, furbearers, and game mammals. Wetland losses will also reduce storm surge protection of developed lands, and will likely contribute to water quality degradation associated with excessive nutrient inputs.

## ALTERNATIVES UNDER CONSIDERATION

The Corps is evaluating three construction alternatives:

Alternative 1 – No Action: This alternative would involve no construction and would have no impacts, but it does not meet the objective of the proposed action to reduce storm damage capability of the existing NOV system.

Alternative 2 – 50-year Level of Risk Reduction: This is the Corps' preferred alternative for which they have authorization to fund and construct. The proposed work and authorized design elevation varies by reach as follows (Figure 1).

- Section NOV 01 consists of 15.8 miles of back levee from Phoenix to Bohemia, Louisiana, on the east bank of the Mississippi River. That section would be upgraded to an elevation ranging from 19.5 to 20.5 feet NAVD using earthen fill.
- Section NOV 02 consists of installing floodwalls at two pump stations along the east bank back levee. Approximately 0.08-mile of floodwall would be constructed at the Bellevue pump station and 0.05-mile of floodwall would be constructed at the East Pointe a la Hache pump station.
- Section NOV 05 consists of 3.2 miles of back levee near City Price on the west bank of the Mississippi River. That section would be upgraded to an elevation of 13.0 feet NAVD using earthen fill.
- Section NOV 06 consists of 12.2 miles of back levee, including 0.07-mile of floodwall, between Happy Jack and Empire on the west bank of the Mississippi River. That section would be upgraded to an elevation of 13.0 feet NAVD using earthen fill and would upgrade the existing floodwall portions by incorporating them into the earthen levee.
- Section NOV 07consists of 12.6 miles of back levee from Port Sulphur to Fort Jackson on the west bank of the Mississippi River. That section would be upgraded to an elevation of 13.5 feet NAVD using earthen fill.
- Section NOV 08 consists of 8.9 miles of back levee from Fort Jackson to Venice on the west bank of the Mississippi River. That section would be widened with stability berms (if needed) to meet the Corps' stability criteria for design standards.
- Section NOV 09 consists of 2.5 miles of Mississippi River levee from St. Jude Church to City Price Church. That section would be upgraded to an elevation of 18.5 feet NAVD using earthen fill.
- Section NOV 10 consists of 13 miles of Mississippi River levee from Happy Jack to Port Sulphur. That section would be upgraded to an elevation of 18 feet NAVD using earthen fill.
- Section NOV 11 consists of 11.6 miles of Mississippi River levee from Port Sulphur to Jackson. That section would be upgraded to an elevation of 17.5 feet NAVD using earthen fill.
- Section NOV 12 consists of 8.8 miles of Mississippi River levee from Fort Jackson to Venice. That section would be widened with stability berms (if needed) to meet the Corps' stability criteria for design standards.
- Section NOV 13 consists of conducting upgrades and repairs to the Empire floodgate and flood walls on the west bank back levee. The Corps would construct a new sector gate and new floodwalls to tie into the upgraded levee constructed for section NOV 07.
- Section NOV 14 consists of upgrades to the Empire Lock floodwalls on the Mississippi River levee. The Corps would construct a new sector gate in front of the existing lock and new floodwalls to tie into the existing levee.
- Section NOV 15 consists of restoring and armoring the existing floodwalls on the Mississippi River levee at Childress and Venice using earthen levee to meet the Corps' stability criteria for design standards.
- Section NOV 16 consists of 6.6 miles of Mississippi River levee from Port Sulphur to Buras. That section would be upgraded to an elevation of 18 feet NAVD using earthen fill.

Alternative 3 – Authorized Pre-Katrina General Design Memorandum (GDM) Level of Risk Reduction: This alternative refers to the authorized pre-Hurricane Katrina level of risk reduction based on the GDM design that was completed before the 2005 hurricane season. This alternative differs from Alternative 2 by reach as follows.

- Section NOV 01 would be upgraded to the authorized design grade of 17.5 feet NAVD using earthen fill.
- Section NOV 02 is the same as Alternative 2.
- Section NOV 05 would be upgraded to the authorized design grade of 13.0 feet NAVD using earthen fill.
- Section NOV 06 would be upgraded to the authorized design grade ranging from 13.1 to 15.1 feet NAVD using earthen fill.
- Section NOV 07 would be upgraded to the authorized design grade of 15.6 feet NAVD using earthen fill.
- Section NOV 08 would be either widened or raised (if needed) using earthen fill to meet the Corps' stability criteria.
- Section NOV 09 would be upgraded to the authorized design grade of 17.5 feet NAVD using earthen fill.
- Section NOV 10 would be upgraded to the authorized design grade of 17.5 feet NAVD using earthen fill.
- Section NOV 11 would be upgraded to the authorized design grade of 17.5 feet NAVD using earthen fill.
- Section NOV 12 would be either widened or raised (if needed) using earthen fill to meet the Corps' stability criteria.
- Section NOV 13 is the same as Alternative 2.
- Section NOV 14 is the same as Alternative 2.
- Section NOV 15 is the same as Alternative 2.
- Section NOV 16 would be upgraded to the authorized design grade of 17.5 feet NAVD using earthen fill.

## PROJECT IMPACTS

Proposed project impacts associated with the preferred alternative would result primarily from the expansion of existing levees, expansion of the levee rights-of-way, and associated features (e.g., temporary workspaces, access roads). Although some of the construction will occur in cleared areas and on existing levees, project implementation will directly impact wet and non-wet bottomland hardwoods, scrub-shrub, and marsh habitats that provide a variable degree of low to high quality habitat value for diverse fish and wildlife resources (e.g., refugia, food resources, and nesting habitat) depending on the area of influence. Construction staging and processing areas would be sited primarily in cleared areas and on existing levees minimizing impacts to forested habitats. Implementation of the preferred alternative would not result in impacts to wetland pasture.

Direct impacts to bottomland hardwood, scrub-shrub, and marsh habitats were quantified by acreage and habitat quality (i.e., average annual habitat units or AAHUs) by Gulf South Research Corporation (GSRC) in coordination with the Service and NMFS. Those impacts are presented in Table 1. The Louisiana Department of Natural Resources (LDNR) Habitat Assessment Methodology (HAM) was used to quantify the impacts of proposed project features on non-wet and wet bottomland hardwood habitats. The habitat assessment models for bottomland hardwoods within the Louisiana coastal zone utilized in this evaluation were modified from those developed in the Service's Habitat Evaluation Procedures (HEP). For each habitat type, those models define an assemblage of variables considered important to the suitability of an area to support a diversity of fish and wildlife species. For bottomland hardwoods and scrub-shrub habitats, existing data from the Plaquemines Parish Nonfederal Levees Project (NFL) and Individual Environmental Reports (IERs) were used to derive the appropriate variable values for the HAM because: (1) those habitat types were consistent in species composition and forest age class throughout the study areas of the NOV, NFL, and portions of the IER projects, and (2) there was limited time to collect additional field data due to workload and project schedules.

GSRC used the Wetland Value Assessment (WVA) methodology to quantify impacts to fresh, intermediate, brackish, and saline marsh habitats. The WVA is used to evaluate proposed projects under the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA), and is similar to the Service's HEP, in that habitat quality and quantity (acreage) are measured for baseline conditions and predicted for future without-project and future with-project conditions. As with HEP, the WVA provides a quantitative estimate of project-related impacts to fish and wildlife resources; however, the WVA is based on separate models for fresh-intermediate marsh, brackish marsh, and saline marsh. Further explanation of the assumptions affecting habitat suitability (i.e., quality) index (HSI) values for each target year for impacts to bottomland hardwood, swamp, and marsh habitats are available for review at the Service's Lafayette, Louisiana, Field Office.

Because scrub-shrub habitat can occur naturally in marsh areas or may be early successional bottomland hardwood forest, impacts to that habitat type were assessed according to nearby habitat characteristics and future predictions of habitat change within the area. For the preferred alternative, scrub-shrub habitat was indicative of early successional forest habitat and impacts were assessed using the nearest bottomland hardwood forest type (i.e., wet or dry).

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Table 1: Potential Estimated Impacts for the Preferred Alternative of the NOV Hurricane Protection System Project

| LEVEE REACH | HABITAT TYPES | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Altered BLH[a] (PFO1Ad)[b] | | Seasonally Flooded BLH[a] (R2FO1C) | | Scrub-shrub (PSS1D) | | Fresh Marsh (R2EM1P0) | | Intermediate Marsh (E2EM1P6) | | Brackish Marsh (E2EM1P5) | | Saline Marsh (E2EM1N4) | | TOTALS by levee reach | |
| | Acres | AAHUs | Acres | AAHUs | Acres | AAHUs | Acres | AAHUs | Acres | AAHUs | Acres | AAHUs | Acres | AAHUs | Acres | AAHUs |
| NOV 01 | 1.86 | -1.18 | 0 | N/A[c] | 0 | N/A | 0 | N/A | 75.26 | -37.37 | 30.00 | -20.67 | 0 | N/A | 107.12 | -59.22 |
| NOV 02 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A |
| NOV 05 | 0 | N/A | 0 | N/A | 2.96 | -1.33 | 0 | N/A | 0 | N/A | 0 | N/A | 21.89 | -14.51 | 24.85 | -15.84 |
| NOV 06 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 25.04 | -13.58 | 25.04 | -13.58 |
| NOV 07 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 22.14 | -14.70 | 22.14 | -14.70 |
| NOV 08 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 36.92 | -33.42 | 36.92 | -33.42 |
| NOV 09 | 0 | N/A | 40.60 | -24.85 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 40.60 | -24.85 |
| NOV 10 | 0 | N/A | 30.08 | -18.41 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 30.08 | -18.41 |
| NOV 11 | 0 | N/A | 9.79 | -5.99 | 0 | N/A | 20.40 | -5.24 | 0 | N/A | 0 | N/A | 0 | N/A | 30.19 | -11.23 |
| NOV 12 | 0 | N/A | 15.04 | -9.21 | 0 | N/A | 31.35 | -6.87 | 0 | N/A | 0 | N/A | 0 | N/A | 46.39 | -16.08 |
| NOV 13 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A |
| NOV 14 | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 | N/A |
| NOV 15 | 0 | N/A | 5.76 | -3.53 | 0 | N/A | 12.00 | -2.63 | 0 | N/A | 0 | N/A | 0 | N/A | 17.76 | -6.16 |
| NOV 16 | 0 | N/A | 9.22 | -5.64 | 0 | N/A | 19.21 | -4.21 | 0 | N/A | 0 | N/A | 0 | N/A | 28.43 | -9.85 |
| TOTALS by habitat type | 1.86 | -1.18 | 110.49 | -67.63 | 2.96 | -1.33 | 82.96 | -18.95 | 75.26 | -37.37 | 30.00 | -20.67 | 105.99 | -76.21 | 409.52 | -223.33 |

[a] BLH = Bottomland Hardwoods
[b] (xxx) = National Wetlands Inventory (NWI) Classification
[c] N/A = Not Applicable

Direct impacts to 1.86 acres of hydrologically altered (i.e., non-wet) bottomland hardwood habitat would occur as a result of implementing the preferred alternative. These impacts are associated with a forested tract along the northernmost reach of the protected side of the east bank back levee (Reach NOV 01). Direct impacts to 110.49 acres of seasonally flooded bottomland hardwood habitat would occur as a result of implementing the preferred alternative. These impacts are associated with the riparian corridor along the batture (flood-side) of the existing Mississippi River levee on the west bank (Reaches NOV 09, 10, 11, 12, 15, and 16). Impacts to the above-listed forested habitats would result from expansion of the existing levee and right-of-way and associated features. Project design goals intended to minimize direct impacts to forested wetlands by expanding the existing alignment to the protected side to the maximum extent practicable; however, increased post-Hurricane Katrina design standards and the Corps' authorization limitations have resulted in an increased flood protection easement and increased impacts. Forested wetlands impacted by all sections of the preferred alignment provide a high degree of habitat value as well as storm buffering and water quality benefits.

Direct impacts to 2.96 acres of scrub-shrub habitat would occur as a result of implementing the proposed alternative. Impacts would result from expansion of the existing levee and right-of-way and associated features. These impacts are primarily associated with a previously disturbed wetland tract located between Louisiana Highway 23 and the Mississippi River levee along the outside of the existing tie-in levee of Reach NOV 05. Project design goals intended to minimize direct impacts to wetlands by remaining on the existing alignment with a slight shift to the protected side; however, increased post-Hurricane Katrina design standards and the Corps' authorization limitations have resulted in an increased flood protection easement and increased impacts.

Direct impacts to 82.96 acres of fresh marsh (of which 51.78 acres is open water less than 1.5 feet deep), 75.26 acres of intermediate marsh (of which 4.4 acres is shallow open water less than 1.5 feet deep), 30.0 acres of brackish marsh (none of which is open water), and 105.99 acres of saline marsh (of which 6.46 acres is shallow open water less than 1.5 feet deep) would occur as a result of implementing the preferred alternative. The impacts to fresh marsh are associated with emergent wetlands within the batture (flood-side) along the existing Mississippi River levee on the west bank (Reaches NOV 11, 12, 15, and 16). In some areas, old borrow pits within the batture are filling in with sediment during seasonal floods, and marsh is emerging along the shallow edges of those borrow pits. In other areas, there is marsh along the toe of the existing levee. The impacts to intermediate and brackish marsh are primarily associated with large areas of solid or broken marsh along the flood-side of the existing east bank back levee (Reach NOV 01). The impacts to saline marsh are primarily associated with large areas of solid or broken marsh along the flood-side of the existing west bank back levee (Reaches NOV 05, 06, 07, and 08). Impacts to the above-listed marsh types would result from expansion of the existing levee and right-of-way and associated project features. Project design goals intended to minimize direct impacts to emergent wetlands by expanding the existing alignment to the protected side to the maximum extent practicable; however, increased post-Hurricane Katrina design standards and the Corps' authorization limitations have resulted in an increased flood protection easement and increased impacts. Emergent wetlands impacted by the preferred alternative alignment provide a high degree of habitat value as well as storm buffering and water quality benefits.

## FISH AND WILDLIFE CONSERVATION AND MITIGATION MEASURES

The President's Council on Environmental Quality (CEQ) defined the term "mitigation" in the NEPA regulations to include:

1. avoiding the impact altogether by not taking a certain action or parts of an action;
2. minimizing impacts by limiting the degree or magnitude of the action and its implementation;
3. rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
4. reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
5. 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 demonstrated hurricane protection needs while addressing the co-equal need for fish and wildlife resource conservation).

Direct and indirect impacts have been minimized by using the existing levee alignment and expanding to the protected side of the levee to the maximum extent practicable. However, the preferred alignment continues to impact wet and dry bottomland hardwoods, scrub-shrub habitat, and fresh, intermediate, brackish, and saline marsh. To further minimize impacts to those wetland habitats the footprint could be reduced by implementing sheet-pile or cement floodwall into the design rather than increasing the earthen levee footprint. The Service recommends that these alternatives be evaluated further.

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 forested and emergent wetlands and the relative scarcity of those habitat types, those wetlands are usually designated as Resource Category 2 habitats, the mitigation for which is no net loss of in-kind habitat value. Remaining direct and indirect project impacts to forested wetlands should be mitigated via in-kind compensatory replacement of the habitat values lost. Degraded (i.e., non-wet) bottomland hardwood forest and any scrub-shrub habitat that may be impacted, however, are placed in Resource Category 3 due to their reduced value to wildlife, fisheries, and lost/degraded wetland functions. Project impacts to wetlands will be minimized to some extent by hauling in material for the levee rather than using adjacent borrow. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value.

On April 10, 2008, the U.S. Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) issued regulations governing compensatory mitigation for activities authorized by Department of the Army permits (Federal Register, Vol. 73, No. 70). Those regulations identified a 12-step process for developing a mitigation plan. That 12-step process and the Service's specific guidance and recommendations regarding mitigation planning can be found in Appendix A. The Service has also identified potential mitigation priority areas for the preferred alternative. Locations of those areas are provided in Appendix B. Those mitigation priority areas are the same as provided in our draft FWCA report dated December 20, 2010, regarding the incorporation of certain nonfederal levees in Plaquemines Parish (NFL project) into the NOV system. The Service is willing to consider combining mitigation for both the NOV and NFL projects provided that the subsequent mitigation plan would result in the maximum compensation of habitat value benefits for fish and wildlife resources and that the plan would be implemented in conjunction with construction of both projects. The Corps' selection of specific mitigation sites and all aspects of mitigation planning, including an alternatives analysis for techniques, locations, design, and means to comply with the 12-step planning process, should be coordinated with the Service and all interested Federal and State natural resource agencies.

## SERVICE POSITION AND RECOMMENDATIONS

Construction of the NOV hurricane protection system would result in direct impacts to -1.18 AAHUs of hydrologically altered bottomland hardwood forest, -67.63 AAHUs of seasonally flooded bottomland hardwood forest, -1.33 AAHUs of scrub-shrub, -18.95 AAHUs of fresh marsh, -37.37 AAHUs of intermediate marsh, -20.67 AAHUs of brackish marsh, and -76.21 AAHUs of saline marsh. The Service does not object to improving the NOV hurricane protection system of Plaquemines Parish provided the following fish and wildlife conservation recommendations are incorporated into future project planning and implementation.

1. To the greatest extent possible, design (e.g., implementation of "T"-walls, sheet-pile, and/or cement floodwall in levee designs) and position flood protection features so that destruction of forested and emergent wetlands and non-wet bottomland hardwoods are avoided or minimized.

2. Minimize enclosure of wetlands with new levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.

3. The Corps shall fully compensate for any unavoidable losses to wet and non-wet bottomland hardwood habitat (-68.81 AAHUs), scrub-shrub habitat (-1.33 AAHUs), fresh marsh (-18.95 AAHUs), intermediate marsh (-37.37 AAHUs), brackish marsh (-20.67 AAHUs), and saline marsh (-76.21 AAHUs) caused by project features. Specific guidance and recommendations regarding details for mitigation planning, as well as potential locations of mitigation priority areas, are enclosed in Appendix A. All aspects of mitigation planning should be coordinated with the Service, NMFS, EPA, the Louisiana Department of Natural Resources (LDNR), and LDWF.

4. Funds for full compensatory mitigation for the entire project should be set aside up-front to ensure that the Federal and local sponsors will have the capability of offsetting unavoidable losses to the wetland habitats as listed in item #3 above, regardless of whether construction funding is procured by each levee reach.

5. Full compensation for marsh should be defined to be no less than 0.27 AAHUs per mitigation acre; however, that replacement rate may require redefining based on design of a specific proposed mitigation project to ensure full functional replacement.

6. The Service recommends that mitigation alternatives include locating the mitigation within the Basin where impacts occur.

7. If a proposed project feature is changed significantly or is not implemented within one year of the September 10, 2009, Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with the Service to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their critical habitat.

8. Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. A qualified biologist should inspect the proposed work site for the presence of undocumented wading bird nesting colonies and bald eagle nests during the nesting seasons (i.e., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles).

9. To minimize disturbance to colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

10. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to this office.

11. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

12. Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest. All costs (i.e., performance compliance and monitoring) until year five success criteria are attained shall be at the sole expense of the Federal sponsor.

13. Construction of or purchasing credit from an approved mitigation bank for all compensatory mitigation should be conducted concurrent with construction of the NOV project (and concurrent with the NFL project if mitigation is combined), to ensure that mitigation obligations are met on behalf of the public interest.

14. If mitigation lands are purchased for inclusion within Federal or State managed lands, those lands must meet certain requirements; therefore, the land manager of that management area should be contacted early in the planning phase regarding such requirements.

15. Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be

coordinated with the Service, NMFS, EPA, LDNR, and LDWF, and the Corps shall provide them with an opportunity to review and submit recommendations on all work addressed in those reports.

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

17. A report documenting the status of mitigation implementation and maintenance should be prepared by the managing agency and provided to the Corps, the Service, NMFS, EPA, LDNR, and LDWF. That report should also describe future management activities and identify any proposed changes to the existing management plan.

18. The Service recommends that the mitigation plan be finalized prior to finalization of the Feasibility Study Report.

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# APPENDIX A
# MITIGATION GUIDANCE AND RECOMMENDATIONS

On April 10, 2008, the U.S. Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) issued regulations governing compensatory mitigation for activities authorized by Department of the Army permits (Federal Register, Vol. 73, No. 70). According to the Federal Register, those regulations establish performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects. The following summary outline generally describes the process of developing a mitigation plan as outlined in those regulations (see the Federal Register for a detailed description of each step).

1. Objectives: a description of the resource type(s) and amount(s) that would be provided as mitigation, the method of compensation, and the manner in which the resource functions of the compensatory mitigation project would address the needs of the geographic area of interest.
2. Site Selection: a description of the factors considered during the site selection process.
3. Site Protection Instrument: a description of the legal arrangements and instrument that would be used to ensure long-term protection of the compensatory mitigation project site.
4. Baseline Information: a description of the ecological characteristics of the proposed compensatory mitigation project site.
5. Determination of Credits: a description of the number of credits to be provided, including a rationale for that determination.
6. Mitigation Work Plan: detailed written specifications and work descriptions for the compensatory mitigation project.
7. Maintenance Plan: a description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.
8. Performance Standards: ecologically based standards that will be used to determine whether the compensatory mitigation project is achieving its objective.
9. Monitoring Requirements: a description of parameters to be monitored in order to determine if the mitigation project is on track for achieving its performance standards and if adaptive management is needed.
10. Long-term Management Plan: a description of the manner in which the compensatory mitigation project will be managed after the performance standards have been achieved to ensure the long-term sustainability of the resource.
11. Adaptive Management Plan: a management strategy to address unforeseen changes in site conditions or other mitigation project components.
12. Financial Assurances: a description of the financial assurances that would be provided and how they are sufficient to ensure a high level of confidence that the mitigation project will be successfully completed in accordance with its performance standards.

Accordingly, the U.S. Fish and Wildlife Service (Service) provides the following assumptions for each habitat type that would be impacted by the proposed New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV) in Plaquemines Parish, Louisiana, as guidance and recommendations for concurrent development of mitigation for impacts resulting from implementation of that project. This guidance has been updated since our draft Fish and Wildlife Coordination Act (FWCA) reports dated December 20, 2010, and January 19, 2011, regarding the incorporation of certain non-federal levees (NFL project) in Plaquemines Parish and the proposed modifications to the existing New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV) for federal levees in Plaquemines Parish, Louisiana, respectively. The Service is willing to consider combining mitigation for both the NFL and NOV projects provided that the subsequent mitigation plan would result in the maximum compensation of habitat value benefits for fish and wildlife resources and that the plan would be implemented in conjunction with construction of both projects.

The Water Resources Development Act of 2007 also requires Civil Works projects to adhere to the mitigation regulations applied under the Corps' regulatory program. Under the regulatory program, the Corps encourages mitigating for impacts to wetlands within the same watershed, whereas the entire deltaic plain is the service area for marsh mitigation banks. However, the Service and National Marine Fisheries Service (NMFS) encourage that impacts to marsh habitat west of the Mississippi River be mitigated west of the river, and likewise for east of the river, especially for large acreages of marsh impacts (e.g., impacts to saline marsh for the NOV project located west of the river). This should be taken into consideration as mitigation planning and coordination continues for both the NOV and NFL projects, especially if mitigation for impacts resulting from those projects would be combined into one mitigation plan and/or project(s).

The goal of the mitigation plan is to provide for equal replacement of the habitat units lost due to re-construction of the hurricane/flood protection projects. The equal replacement compensation goal specifies that the gain of one habitat unit can be used to offset the loss of one habitat unit. Achieving this goal would re-establish, maintain, and protect bottomland hardwood habitats (wet and non-wet), swamp, scrub-shrub, and marsh as species diverse, sustainable habitats by restoring/maintaining unique functions, values, and services. For example, the objectives of the mitigation measures for bottomland hardwood forest and swamp would be to establish and maintain a high diversity of native mast- and fruit-producing trees and shrubs, maximize herbaceous and shrub-layer canopy cover, while maintaining a semi-mature to mature forest.

Mitigation development would always include activities not necessarily to produce habitat value but also to protect the mitigation lands and to provide features necessary for adequate management. Such activities would include but are not limited to controlling access, defining boundaries, protection of surface rights, and stewardship. Access to the mitigation site should be restricted to ensure that the development of the mitigation site is successful. In order to post the property and control access, surveying and establishing property boundaries would be required. This information would be used for the location and posting of perimeter boundary signs. Fencing along with gates could be utilized to control access. Stewardship would include surveillance to protect the area from vandalism and other disturbances by maintaining a regularly seen, physical presence by staff in the area. All of the above tasks are considered to be a single management increment. The above measures (e.g. fence/signage repair and replacement, stewardship) would also be included as operational and maintenance measures over the project life.

The following assumptions, success criteria, and monitoring guidelines are subject to change depending upon site-specific conditions and future evaluation of other ongoing mitigation projects. For all habitat types, if monitoring indicates that a project site does not meet the below success criteria, the use of operations and maintenance (O&M) duties or implementation of adaptive management is warranted.

## I. PROPOSED STANDARDIZED ASSUMPTIONS FOR BOTTOMLAND HARDWOOD FOREST

The following represents the basic assumptions utilized in doing a bottomland hardwood Wetland Value Assessment (WVA, also referred to as Habitat Assessment Methodology [HAM]) for two different mitigation scenarios. Those scenarios include what is currently referred to as enhancement and restoration. Enhancement does not fit the terminology of enhancement under the Fish and Wildlife Coordination Act and/or Water Resources Development Act, but it is used to distinguish between the two scenarios. Each scenario is explained in the paragraphs following the paragraph on general mitigation needs common to both scenarios.

<u>General</u>
All habitat scenarios would emphasize tree species diversity by restoring or increasing native species within the over-story and mid-story to increase habitat values. The wildlife habitat value of these areas would be substantially improved by removing and controlling exotic species, primarily Chinese tallow-tree and possibly other noxious species, i.e., black willow, box elder, if needed, and planting native bottomland hardwood trees (e.g., Nuttal, overcup, and water oaks, sycamore, American elm, green ash, bitter pecan, red maple, persimmon, tupelo, and bald cypress) and some shrubs (e.g., mayhaw, hawthorn and buttonbush) that are suited to the soils and hydrology of the site.

In areas that could become dominated by Chinese tallow-trees, seedling planting densities would be approximately 9- by 9-foot spacing for 538 trees per acre, while shrubs would be planted on a 20- by 20-foot spacing (109 per acre) to quickly establish a canopy and minimize competition. Predation guards would be utilized as necessary to protect the seedlings from herbivory. Replanting of seedlings would be conducted to achieve short-term, interim and long-term success criteria as defined in Section I.B of this Appendix. Natural recruitment of native tree species would be included in determining the percent survival rate. Re-application of herbicide to control Chinese tallow-trees in all areas during the initial 10-year period would also be necessary to ensure success of the mitigation-related management measures.

To achieve bottomland hardwood restoration a mixture of both hard mast and soft mast species will be planted. The hardmast species will constitute between 60 and 70 percent of the stand and can consist of: bitter pecan (*Carya lecontei*), water hickory (*Carya aquatica*), willow oak (*Quercus phellos*), water oak (*Quercus nigra*), live oak (*Quercus virginiana*), overcup oak (*Quercus lyrata*) and Nuttall oak (*Quercus nuttalli*). The softmast species (30–40 percent of the stand) can consist of: Drummond red maple (*Acer rubrum* var. *drummondii*), green ash (*Fraxinus pennsylvanica*), bald cypress (*Taxodium distichum*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), sugarberry (*Celtis laevigata*), common persimmon (*Diospyros virginiana*) and sycamore (*Platanus occidentalis*). Other native species suited to the site and local conditions may also be planted.

<u>Monitoring</u>
As a part of the development activities, Monitoring Plots (MP) will be established. Plots will be established systematically over the mitigation area (1 per ten acres). Following the initial MP establishment, the HAM evaluation parameters will be measured and recorded for each MP at minimum during years 1, 2, 5, 7, and 10 during the development period in order to monitor the success of the mitigation implementation plan.

Surveys of the MPs established in the development period will be continued over the project life. A monitoring plot report will be prepared to establish a record of the plot measurements and management recommendations for the first 10 years. During this period, copies of the resulting report from the MP surveys will be provided to the resource agencies (Service, Corps, EPA, National Marine Fisheries Service [NMFS], and Louisiana Department of Wildlife and Fisheries [LDWF]). Survey records should be used to document mitigation effectiveness or to document the need for change in the habitat development program early in the mitigation process. Prior to measurement of plots, an invitation to participate in the measurements will be provided to those agencies.

For MP activities after target year (TY) 20, the number of monitoring plots may be reduced to 50 percent of the original number of plots, if the mitigation success is proceeding as anticipated. In addition, following the first 10-year period, monitoring should be continued on a 5-year basis as described previously. Details of the monitoring program, success criteria, and reporting requirements are outlined below.

**A. Habitat Assumptions for Bottomland Hardwood Mitigation**

1. Enhancement

(a) In areas dominated by Chinese tallow-trees, seedling planting densities would be approximately 9- by 9-foot spacing for 538 trees per acre, while shrubs would be planted on a minimum spacing of 20- by 20-foot (109 per acre) to quickly establish a canopy and minimize competition. Predation guards would be utilized as necessary to protect the seedlings from herbivory. Replanting of seedlings would be conducted to achieve short-term, interim and long-term success criteria as defined in Section I.B. of this Appendix. Natural recruitment of native tree species would be included in determining the percent survival rate. Re-application of herbicide to control Chinese tallow-trees in all areas during the initial 10-year period would also be necessary to ensure success of the mitigation-related management measures.

(b) To achieve bottomland hardwood restoration a mixture of both hard mast and soft mast species will be planted that are suited to the site and local conditions. The hard-mast species will constitute between 60 and 70 percent of the stand and will consist of a combination of as diverse hard-mast species as possible. The soft-mast species (30 – 40 percent of the stand) will also consist of a diverse assemblage. Consideration will be given to reducing the planting of soft-mast species along the edge of the mitigation site when light seeded species are in adjacent forested habitats.

(c) Control of Chinese tallow-tree would be accomplished by application of herbicide on localized concentrations of exotic or noxious trees or individual trees. Under-planting with mast-bearing seedlings (e.g., elm, oaks and sugarberry) would be done in those areas where needed as determined by vegetation surveys. Subsequent seedling survival checks would be carried out the year after planting and re-plantings would be done as necessary. Management activities would include replanting of seedlings which is anticipated to occur in TY 2, 5, 7, and 10 and extensive herbicide application for Chinese tallow-tree in TY 0, 1, 2, 3, 5, 7 and 10. It is assumed that approximately 25 percent of the seedlings would need to be replanted after one year. Planting of mid-story and shrub species (i.e., hawthorn, mayhaw, and persimmon) should be planned but a less dense spacing may be used based on mid-story species found on that site.

(d) Implementation of the proposed management plan is predicted to improve and maintain the habitat value of the bottomland hardwoods for wildlife. Mitigation-area habitat values would increase due to the increased quantity and quality of mast-producing trees, and moderate increases in shrub and herbaceous cover after planting. Changes by target year in the Habitat Suitability Index (HSI) values (Table 1) reflect typically predicted habitat conditions under future-with and without-management scenarios. HSI values for HAM under future with-management conditions for sites still dominated by hurricane-damaged native tree species were projected based on the following assumptions:

*Year 0 – Existing conditions*: The mitigation site consists of a hurricane-damaged stand of mixed bottomland hardwood tree species (e.g., live oak, sugarberry) with a relatively low stocking rate and relatively open canopy. Portions of the area have varying densities of Chinese tallow-tree in both the mid- and understory; mast trees are moderately abundant.

*Year 0 through 1* – Property has been surveyed and posted and vehicle access features for management are being constructed. Monitoring plots are established in this area. Remaining Chinese tallow-trees or new sprouts in the under- and midstory area have been reduced through herbicide application. Selected areas have been under-planted with hardmast seedlings, and other bottomland hardwood species suited to the site. Some shrub/scrub species (e.g., mayhaw, hawthorn, and persimmon) have also been planted to ensure diversity within the forest and provide mid-story cover.

*Years 2 through 3* – Snags have been created from herbicide application conducted on Chinese tallow-trees in TY1. Herbaceous vegetation has increased in those areas subjected to herbicide application and planting in TY1. Seedling survival rates have been determined and replanting has been accomplished, as necessary. Monitoring plots have been re-surveyed, and necessary alterations to the mitigation plan are proposed and reported in the mitigation monitoring report.

*Years 4 through 10* – Habitat development practices continue at a level necessary to achieve an overall canopy closure between 40 and 80 percent. The average diameter of the stand is reduced where under-planting and natural regeneration are being promoted. Under-planting continues where necessary to increase the future density of native vegetation and achieve required seedling survival rate. Herbaceous and shrub cover increases slightly but begins to decline toward the end of this time period in response to canopy development. Seedling survival rates are determined and replanting is accomplished, as necessary. Control of Chinese tallow-trees and noxious species continues throughout the area, but the presence of those species has been significantly reduced (i.e., less than 5% on an acre-by-acre basis). Monitoring plots are re-surveyed and necessary modifications to achieve the mitigation goals are proposed and reported in the mitigation summary reports.

*Years 11 through 25* – Habitat development practices continue. Some native saplings and young trees begin to grow into the mid- and over-story in areas previously planted. Mast-producing tree species become increasingly dominant in the over-story canopy with mast production increasing at the end of this time period. Control of exotic and noxious species continues throughout the area. Plots are monitored and reports documenting mitigation implemented and necessary modifications are produced. If mitigation effectiveness is proceeding as anticipated, then the number of monitoring plots will be reduced by 50 percent after TY 20.

*Years 26 through 50* – Bottomland hardwood management practices continue. Oak seedlings planted during earlier years begin producing mast. The percentage of mast (hard and soft) species in the canopy reaches optimum levels. The number of native species has significantly increased with exotic and noxious species still occurring on only 5% of the area on an acre-by-acre basis. Monitoring continues, and the mitigation plan is adaptively modified as necessary to achieve and maintain mitigation. Control of exotic and noxious species continues throughout the area. Mitigation reports that summarize mitigation implemented, results of monitoring plots, and proposed and implemented adaptive mitigation changes are produced.

Table 1. Typical Habitat Suitability Index Values for an Enhanced Site

| **Habitat Suitability Index Values** *(HAM Bottomland Hardwoods)* | |
|---|---|
| Target Year | Future with management |
| 0 | 0.72 |
| 1 | 0.73 |
| 20 | 0.80 |
| 50 | 0.80 |

2. Habitat Assessment Methodology: Analysis of Compensation Needs

(a) The difference between future with-management and future without-management average annual habitat unit (AAHU) values expected to result from the above-described mitigation scenario (Table 1) reflect the expected net benefit of the management actions.

(b) The intensive habitat development activities described previously for this area were input into the habitat model to calculate the AAHU value of the area over the life of the project. This AAHU value was then used to determine the per acre AAHU value (0.19).

3. Reforestation

***Site Development***

(a) This area is dominated by Chinese tallow-tree. In the summer of TY 0 the entire site would be treated with herbicide by aerial or ground spraying. In the following year (TY 1) the entire site would again treated with herbicide but using ground equipment. In the fall/winter of TY 1, tree seedlings and mid-story shrub/scrub (hawthorn, mayhaw, persimmon, etc.) species would be planted and MPs established. Management activities would include replanting of seedlings which is anticipated to occur in TY 2, 3, 5, 7, and 10 and extensive herbicide application for Chinese tallow-tree in TY 2, 3, 5, 7 and 10. Replanting and herbicide application is estimated at 80 percent of the site after the initial planting and at 10 percent of the site in the subsequent TYs.

(b) The entire acreage would be planted with mast-producing species suited to the soil(s) and site conditions. Mid-story species (i.e., shrub species) could include mayhaw, hawthorn, and persimmon. Planting of mast-producing species would be on by 9-foot x 9-foot centers (538/acre) and mid-story species on 20-foot x 20-foot centers (109/acre) in order to quickly establish a dense canopy and to minimize the re-establishment and growth of Chinese tallow-trees. Hard to soft mast tree species ratio should range between 60 and 70 hard-mast species to 30-40 soft-mast species.

(c) Implementation of the proposed management plan would restore native bottomland hardwood species and shrub/scrub species and improve the habitat value of this area. Habitat values would increase due to the increased quantity and quality of native bottomland hardwood species, especially mast-producing trees and mid-story species. Changes by target year in the HSI values (Table 2) reflect predicted habitat conditions under future-with- management scenarios.

(d) HSI values for HAM under future-with-management conditions for Chinese tallow-tree dominated areas were projected based on the following assumptions:

*Year 0 – Existing conditions*: Vegetation in the mitigation area consists primarily of Chinese tallow-tree and very few native bottomland hardwood species. Mast trees are almost nonexistent and very little mid-story exists. Initial herbicide application is conducted during the summer.

*Year 0 through 1* – Property has been surveyed and posted. Monitoring plots are established. Over-story and mid-story cover has been significantly reduced by summer time herbicide application in TY 0 and 1. Areas have been planted in the fall/winter with hard mast and bottomland hardwood species (e.g., American elm, green ash, and sugarberry) native to the area and suited to the site. Some shrub/scrub species (e.g., mayhaw, hawthorn, and persimmon) have also been planted to ensure diversity within the forest.

*Years 2 through 3* – Herbaceous vegetation has increased in those areas subjected to herbicide application and seedling planting in TY1. Portions of the area may undergo selective herbicide application where needed to maintain control Chinese tallow-tree and other species that threaten survival of planted seedlings. Seedling survival rates are determined and replanting is conducted, as necessary. Monitoring plots are re-surveyed and necessary alterations to the mitigation plan are proposed and reported in the mitigation monitoring report.

*Years 4 through 10* – Seedling survival rates are determined and replanting continues where necessary to increase the future density of hard-mast producers and other bottomland hardwood vegetation. A limited amount of the area may undergo selective herbicide application where needed to maintain control of Chinese tallow-tree and other exotic and/or noxious species. Herbaceous and shrub cover has increased due to previous herbicide applications to Chinese tallow-tree over-story and planting of shrub/scrub mid-story species. Monitoring plots are re-surveyed and necessary modifications to achieve the mitigation goals are proposed and reported in the mitigation monitoring reports.

*Years 11 through 25* – Habitat development practices, e.g., control of Chinese tallow-tree, continue as necessary. Some saplings and young trees begin to die in areas maintained with a dense canopy closure (i.e., high basal area) creating snags. Mast-producing tree species become increasingly dominant as the over-story canopy develops and some mast is produced at the end of this time period. Mid- and under-story vegetation begins to decrease in response to canopy development. Plots are monitored, and reports documenting mitigation implemented and necessary modifications are produced. If mitigation effectiveness is proceeding as anticipated, the number of monitoring plots can be reduced by 50 percent after TY 20.

*Years 26 through 50* – Bottomland hardwood management practices continue, as necessary. Most oak and other hard-mast seedlings planted during earlier years begin producing mast. The number of mast-producing species has increased and is reaching optimum levels. Monitoring continues and the plan is adaptively modified as necessary to achieve projected mitigation benefits. Reports summarizing mitigation implemented, results of monitoring, and proposed and implemented mitigation changes are produced.

Table 2. Habitat Suitability Index Values for Chinese tallow-tree dominated areas.

| **Habitat Suitability Index Values** *(HAM Bottomland Hardwoods)* | |
|---|---|
| Target Year | Future with management |
| 0 | 0.10 |
| 1 | 0.04 |
| 20 | 0.58 |
| 50 | 0.80 |

(e) The intensive habitat development activities described previously for this area were input into the habitat model to calculate the AAHU value of the site over the life of the project. This AAHU value was then used to determine the per acre AAHU value (0.13).

## B. Mitigation Success Criteria, Monitoring Program, and Reporting Requirements

1. SUCCESS CRITERIA

***Initial Success Criteria*** (within 1 year)
(a) **Hydrology:** Ground surface elevations must be conducive to the establishment and support of hydrophytic vegetation, and re-establishment and maintenance of hydric soil characteristics. To that end, all alterations of the natural topography (ditching, spoil banks, land leveling, bedding, fire breaks, etc.) that have affected the duration and extent of surface water have been removed or otherwise rendered ineffective in accordance with project-specific plans and specifications. [Add site specific hydrology criteria.]
(b) **Vegetation:** For the bottomland hardwood areas, a minimum of 250 planted seedlings per acre must survive through the end of the second spring following the planting (i.e., Year 1). Those surviving seedlings must be representative both in species composition and percentage identified in project-specific plans and specifications. This criterion will apply to initial plantings as well as any subsequent replanting that may be needed to meet this requirement.

*Interim Success Criteria*

(a) **Hydrology**: Two years following attainment of the initial success criteria, site hydrology will be restored such that the site meets the wetland criterion as described in the 1987 Manual. Data demonstrating that wetland hydrology has been re-established is to be collected by the Non-Federal Sponsor (NFS) and submitted to the Corps in the monitoring report for the interim success criteria. [Add site specific hydrology criteria.]

(b) **Vegetation and Vegetative Plantings** (by Year 5):

i. For a given planting, a minimum of 250 seedlings/saplings per acre must be present at the end of the fourth year following successful attainment of the one-year survivorship criteria. Trees established through natural recruitment may be included in this tally; however, no less than 125 hard mast-producing seedlings per acre must be present. Surviving hard mast seedlings must be representative of the species composition and percentage identified in project specific plans and specifications. Exotic/invasive species may not be included in this tally.

ii. Four years following successful attainment of the one-year survivorship criteria, the acreage and the perimeter will be virtually free (approximately 5 percent stems of seedlings/saplings or less on an acre-by-acre basis) of exotic/invasive vegetation.

iii. Developing plant community must exhibit characteristics and diversity indicative of a viable native forested wetland community commensurate with stand age and site conditions. Achievement of wetland vegetation dominance is defined as a vegetation community where more than 50 percent of all dominant species are facultative ("FAC") or wetter, excluding FAC-plants, using "routine delineation methods" as described in the 1987 Manual.

*Long-term Success Criteria* (by Year 10):

(a) Forest canopy coverage exceeds eighty percent of forested land mass as measured by an approved method. Forest canopy species abundance and composition is consistent with the restoration goals identified in the restoration plan and credit assessment methodologies.

(b) When forest canopy coverage exceeds eighty percent, the site will be, within all reasonable efforts, essentially void of exotic/invasive vegetation (approximately 1 percent or less of the over-story vegetation on an acre-by-acre basis). An active treatment program will continue as part of the long-term maintenance program.

(c) If thinning to maintain or enhance the ecological value of the site is determined necessary by the Corps in cooperation with the Interagency Team at this time, the NFS will develop a thinning plan in coordination with the Corps and Interagency Team. Thinning operations will be performed by the NFS. Measures to control the encroachment of noxious/exotic vegetation after the thinning operation shall be included in the timber management plan and implemented.

## 2. REPORTING PROTOCOLS AND MONITORING PLAN

(a) **Monitoring and Reporting Provisions**

Plots shall be established to monitor the mitigation and demonstrate compliance with the success criteria established above and achievement of WVA benefits. Monitoring reports will be submitted by December 31 of each monitoring year. The monitoring program shall follow the guidelines established below:

i. ***Visual Description:*** Visual descriptions shall be provided with each monitoring report. Digital images recorded on compact disc shall be submitted from each survey plot at each monitoring period.

ii. ***Initial and Interim Success Criteria:***

- One plot per 10 acres shall be established. Plots are 1/50-acre plots (0.2 acre) and should be established prior to or immediately following the initial planting. Plots should be identified with a permanent marker (e.g., 8-foot PVC pipe anchored with a metal T-post) and GPS coordinates shall be recorded. A map depicting the location of the survey plots and a listing of the geographic coordinates shall be provided. The survey plots should be representative of the plantings. The species (including the number of individuals), height (until long-term success criteria is met i.e., year 15 criteria), and diameters of each tree should be recorded.
- A survey of living and dead seedlings near the end of the planting season when new growth can be identified shall be undertaken. In addition, a visual examination of the entire planted acreage to determine if the survey results are indicative of overall survival rates shall be undertaken. A written report indicating the number and species of surviving seedlings in each survey plot should be produced.
- The report also shall describe the condition of applicable hydrology altering features (culverts), the general condition of the seedlings, and discuss likely causes for observed mortality (e.g., herbivory, drought, etc.) within those plots that did not exhibit a seedling survival rate as indicated by the success criteria.
- The report shall identify the generalized degree and location of exotic/noxious species colonization and identify measures that will be implemented to eradicate them.

*iii.* ***Continuous Monitoring Reports:***

- The plots established in paragraph 2a above will be utilized for continuous monitoring. All trees falling within the plot should be permanently tagged and numbered and the number, species and diameters of trees within each plot shall be recorded.
- The report shall identify seedling survivorship and colonization by volunteer mid-story and over-story species. Also included in the report would be the results of the vegetation survey including visual estimates of percentage (%) of canopy, mid story and over story closure, % of canopy cover comprised of soft mast and hard mast species (differentiated), % canopy cover comprised by bald cypress, % exotic vegetation in each vegetation layer, survival rate of planted vegetation, and an estimate of natural regeneration in mid- and understory by species shall be included in the report.
- The report must include a discussion of the general health or vigor of the planted trees.
- The report must include a description of the overall condition of the entire mitigation area.
- The report must include a description of observed wildlife usage.
- The report must summarize the overall condition of the mitigation relative to the goals and success criteria.
- The report must identify maintenance activities performed on mitigation lands.
- The report must include a discussion of the measures used to control noxious/exotic species colonization/establishment.

*iv.* ***Schedule:***

- Vegetative monitoring and reports shall be completed in the spring (when new growth makes identification practicable) of years 1, 2, 5, 7, 10, 15, and prior to and following the any thinning operation. Following the more intensive surveying of the first 10-year period, monitoring should be continued on a 5-year basis as previously described. For monitoring activities after year 20, the number of monitoring plots may be reduced to 50 percent of the original number of plots, if the mitigation success is proceeding as anticipated.
- If the year 1 vegetative success criterion is obtained, but all performance standards have not been met in the 3rd and 5th year, a monitoring report shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (i.e., that corrective actions were successful).
- Reports discussing measure to control exotic/noxious species shall be provided annually until such time as all initial success criteria and interim success criteria identified in the above sections have been met and documented in reports, and thereafter according to the schedule identified in 4(a) above. The annual reports should document items such as noxious/exotic species, method of treatment/control, machinery and/or chemical treatments utilized, timing of treatments/work, effectiveness of previous treatments/work, etc.
- Monitoring reports will be submitted by December 31 of each monitoring year. Monitoring reports shall be provided to the Corps, the Service, EPA, and LDWF.

## C. Contingency and Remedial Actions and Responsibilities

In the event monitoring reveals that initial success criteria have not been met, measures shall be taken to achieve those criteria in accordance with the following plan:

1. If survival is less than 50 percent per acre as determined by sampling or by observing high mortality at any location within the planted areas, or target species ratios are not met, replanting, monitoring and reporting, as previously described, shall occur as needed to achieve and document the required one-year survival rate.
2. If the survival criterion is not met after three unsuccessful attempts, the Corps, the Service, EPA, and LDWF will reassess the mitigation to determine whether the use of the mitigation area should be discontinued or if a new management potential should be calculated incorporating the new conditions.
3. Year 5 monitoring shall verify seedling composition and survivorship goals established in the above section. Remedial action, as deemed necessary to ensure attainment of year 5 survivorship and composition criteria shall be implemented.

## II. PROPOSED STANDARDIZED ASSUMPTIONS FOR MARSH

### A. Performance Standards

In order for the proposed project to be considered acceptable for mitigating wetland impacts, the site vegetation, soils, and hydrology shall be restored such that the site meets wetland criteria as described in the Corps 1987 Wetlands Delineation Manual. Additionally, the following criteria are applicable:

***Initial Success Criteria*** (within Year 1):
Initial placement of dredged material is completed and at least 80 percent of site is within "as-built" or initial construction elevation. Resource agencies will review the Corps' proposed initial construction elevation, but it will be the Corps' responsibility to select the initial construction elevation based on the desired post-compaction, "functional marsh" elevation identified by the natural resource agencies.

***Interim Success Criteria*** (by Year 3):

1. After at least two full years following construction, no less than 90 percent of the marsh creation site is within the "functional marsh" elevation range to be determined by the natural resource agencies on a project-specific basis (e.g., +1.0 feet NAVD88 to + 1.5 feet NAVD88).
2. At least 80 percent of the dredge material disposal area should be vegetated.
3. Containment dikes breached and tidal creeks constructed and functioning as determined by the natural resource agencies.
4. At least 80 percent of the vegetative cover is species classified as Facultative (FAC) or wetter, as verified by monitoring reports and verified by the natural resource agencies if necessary.

***Long-term Success Criteria*** (by Year 5 and beyond):

1. Five years after construction, at least 75 percent of the created marsh remains within the "functional marsh" target elevation range.
2. Demonstrated use of the created marsh area by estuarine-dependent marine fishery species (not just forage species) typical of that marsh type as shown by sampling on a quarterly basis during years four and five using cast nets and/or seines in open water within the project area.
3. Observed use of created marsh by wildlife species typically found in natural marsh habitats of similar salinity regime.

### B. Reporting Protocols and Monitoring Plan

1. AS-BUILT REPORTS

The Corp / Local Sponsor will submit an As-Built Report to LDWF, NMFS, EPA, the Service, and the Louisiana Department of Coastal Management (CMD), and for each cell of the marsh creation feature within one year following completion of the work described in IER 20. The As-Built Report shall contain a survey providing the areal extent of the filled area and the settled grade of the dredged material and adjacent marsh areas.

2. MONITORING PROVISIONS

The Corps/Local Sponsor agrees to perform all necessary work to monitor the mitigation remediation project to demonstrate compliance with the success criteria established in the monitoring plan. The monitoring program shall follow the guidelines established below:

(a) **Visual Description:** Visual descriptions shall be provided with each monitoring report by one of the following means.
  i. Photographs of each vegetation plot and hydrology monitoring station [permanent markers shall be established to ensure that the same locations (and view directions) are monitored in each monitoring period]; or,
  ii. One color aerial photograph (8" x 10" or larger) depicting the entire site. An aerial photograph should be taken once the site has been constructed, stabilized and planted (preferably in the 3rd or 5th year following completion of initial work).

(b) **Hydrology:**
  i. Tidal influence shall be discussed using indicators of high and low tides referenced to a known datum.
  ii. The condition of the constructed tidal channels and ponds noting general flow characteristics, noting excessive scouring and/or silting in of channels.

(c) **Vegetation:**
  i. The Corps / Local Sponsor shall establish survey plots along systematically spaced linear transects (approximately 20 transects for each marsh cell; perpendicular to the rock dike) at the time of construction, and shall conduct a survey of each tract at or near the end of the first growing season. Surveys shall be conducted in accordance with an accepted academic or industrial sampling methodology (e.g. Steyer et. al. 1995). The Corps / Local Sponsor shall establish one-hundredth-acre permanent continuous monitoring plots that account for at least 2 percent of the total created marsh area The Sponsor shall document the species and percentage coverage by species within each plot. The Sponsor will begin monitoring the continuous monitoring plots and submit monitoring reports to LDWF, NMFS, EPA, the Service, and CMD at required intervals.
  ii. The Sponsor shall provide a written report to LDWF, NMFS, EPA, the Service, and CMD that describes the developing vegetative communities developing within the marsh creation cells by determining:
    - Dominant vegetation species;
    - A coverage assessment;
    - The number and species rated FAC or wetter (excluding FAC-) growing in wetlands (total and number/acre);
    - The percentage of dominant species FAC or wetter (excluding FAC-); and
    - An invasive/noxious species assessment.
  iii. The report shall describe the general condition of the vegetation, and discuss likely causes for any observed mortality.

(d) **Site Elevation:** The Corps / Local Sponsor shall provide a topographic survey with elevations shot along the transect lines established for determining vegetation cover and species composition. Surveys should be included in monitoring reports for years 1, 3, 5, 10, 20, 30, 40, and 50.

(e) **Timing:**

i. Monitoring shall be conducted during the growing season following years 1, 3, 5, 10 and every 10 years thereafter for 50 years.

ii. Monitoring for the first year or any year following construction shall take place between August and October;

3. MONITORING REPORTS

a. Upon achievement of the initial success criteria, the Corps / Local Sponsor shall document the results of his monitoring in a report submitted to LDWF, NMFS, EPA, the Service, and CMD. Additional reports will be submitted following years 3, 5, 10, 20, 30, 40 and 50.

b. The reports shall contain a description of the conditions of the mitigation project relating those conditions to the success criteria and shall contain the following:

i. An aerial photograph (only in report submitted after the 3rd or 5th year) taken during the growing season, depicting a completed tract of the mitigation project with the photo date and approximate scale noted.

ii. Ground level photographs.

iii. A detailed narrative summarizing the condition of the mitigation project and all regular maintenance activities.

iv. A drawing based upon the site plan that depicts topography, sampling plots and permanent photo stations.

v. Results of tidal monitoring, including mean high and low water elevations.

vi. Results of vegetation survey including visual estimates of percentage (%) overall cover and % cover by each species, % exotic vegetation, total % "facultative" and total % "upland" species in each vegetation layer, survival rate of planted vegetation (if planted), an estimate of natural re-vegetation, and a qualitative estimate of plant vigor as measured by evidence of reproduction.

vii. If Year 1 success criteria is obtained, but all performance criteria have not been met in the 3rd year, a monitoring report shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (i.e., that corrective actions were successful).

viii. Reports will be submitted by December 31 of each monitoring year.

ix. Monitoring reports shall be provided to LDWF, NMFS, EPA, the Service, and CMD and made available to other members of the natural resource agencies upon request.

**C. Contingency and Remedial Actions and Responsibilities**

In the event monitoring reveals that initial success criteria have not been met, the Corps / Local Sponsor shall take measures to achieve those criteria in accordance with the following plan:

1. FILL MATERIAL ELEVATIONS AND AREA

a. Should the initial placement of dredged material not meet the 80 percent target construction elevation or areal coverage, the Corps / Local Sponsor shall either deposit additional dredged material or redistribute existing material as necessary to achieve the target percentage and areal coverage.

b. At year 5, if less than 75 percent of the marsh creation area contains emergent vegetation (at least 50 percent of which have a FAC or wetter designation), then the Local Sponsor may be required, at the discretion of the natural resource agencies, to deposit and plant (according to their specifications) additional dredged material. Should the agencies decide that such measures are necessary, the location and extent of fill placement and vegetative plantings will be determined in consultation with, and with their approval.

c. From years 6 through 20, if less than 50 percent of the marsh creation area contains emergent vegetation (at least 50 percent of which have a FAC or wetter designation), then the Sponsor may be required, at the discretion of the natural resource agencies, to deposit additional dredged material and plant these areas (according to their specifications) so that the extent of marsh coverage is at minimum 50 percent at year 20. Should the agencies decide that such measures are necessary, the location and extent of fill placement and vegetative plantings will be determined in consultation with, and with their approval.

2. VEGETATIVE PLANTINGS

a. If vegetative plantings survival is less than 50 percent per acre as determined by sampling or by observing high mortality at any location within the planted tract, the Sponsor shall take appropriate actions, as recommended by the natural resource agencies, to address the causes of mortality and shall replace all dead plantings during the following planting season. Replanting and monitoring and reporting, shall occur as needed to achieve and document the required one-year survival rate. If the survival criterion is not met after a second unsuccessful attempt, the Corps / Local Sponsor will convene a meeting to decide if replanting should continue. Should the natural resource agencies determine that achieving the required survival rate would not be likely, the Sponsor shall be required to provide replacement mitigation for the increment of value that did not accrue within the unsuccessful tracts within one year of this decision. In addition, the natural resource agencies will reassess the created marsh to determine if a new management potential should be calculated incorporating the new conditions.

b. Year 5 monitoring shall verify vegetation composition and survivorship goals. The Sponsor shall implement remedial action, as deemed necessary by the natural resource agencies, to ensure attainment of Year 5 survivorship and composition criteria.

**D. Long-term Maintenance and Protection**

The Sponsor, or its heirs, assigns or purchasers shall be responsible for protecting lands contained within the mitigation project area in perpetuity, unless bank lands are transferred or sold to a state or federal resource agency or non-profit conservation organization. The conservation servitude shall incorporate this mitigation monitoring plan by reference and bind the Sponsor, its heirs, assigns, and future owners to complying with the terms of this copy of the mitigation monitoring plan. A copy of the conservation servitude to be filed in the real estate records of the Mortgage and Conveyance Office for the parish in which the site is located and shall be provided to the Corps for review and approval prior to filing. After filing, a copy of the recorded conservation servitude, clearly showing the book, page and date of filing, will be provided to LDWF, NMFS, EPA, the Service, and CMD.

# APPENDIX B
# MITIGATION PRIORITY AREAS

The U.S. Fish and Wildlife Service (Service) has identified priority areas for potential mitigation sites along the west and east sides of the Mississippi River that generally characterize potential lines of defense along the flood-side of the New Orleans to Venice (NOV) and Plaquemines Parish nonfederal levees (NFL) projects. These areas do not, however, preclude other areas and/or lines of defense for potential consideration as priority mitigation areas. Priority areas from the State's Master Plan and the U.S. Army Corps of Engineers' (Corps) Louisiana Coastal Protection and Restoration Project, Multiple Lines of Defense Report are additional options to consider as a project-specific mitigation plan is developed for the NOV and NFL projects. Thus, other potential mitigation projects should not be excluded from consideration during the mitigation planning process.

Some areas proposed below are proposed projects under the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) program that have not yet been selected for construction funding. The remaining areas are either proposed projects by other entities or contain sufficient acreage to satisfy the mitigation needs of the proposed NOV and NFL projects.

I. AREA/PROJECT NAME: Homeplace Marsh Creation

**CWPPRA PPL20 PROJECT NOMINEE FACT SHEET, March 30, 2010**
**Coast 2050 Strategy:** Coastwide Strategy: dedicated dredging for wetland creation.
**Project Location:** Region 2, Barataria Basin, Plaquemines Parish, near Homeplace, west of hurricane protection levee.
**Problem:** The marsh located between the hurricane protection levee and Bay Lanaux / Bay de la Cheniere is severely degraded. The lack of healthy marsh at this location poses a threat to the hurricane protection levee; 2008 aerial imagery confirms the deteriorated marsh west of the hurricane protection levee. The proposed marsh creation/marsh nourishment will help protect the levee.
**Goals:** Create 215 acres and nourish 35 acres of marsh between the hurricane protection levee and Bay Lanaux / Bay de la Cheniere. The proposed marsh creation and nourishment will help protect the levee.
**Proposed Solution:** 215 acres of marsh creation and 35 acres of marsh nourishment. Material for marsh creation and nourishment will be excavated from the Mississippi River.
**Preliminary Project Benefits:**

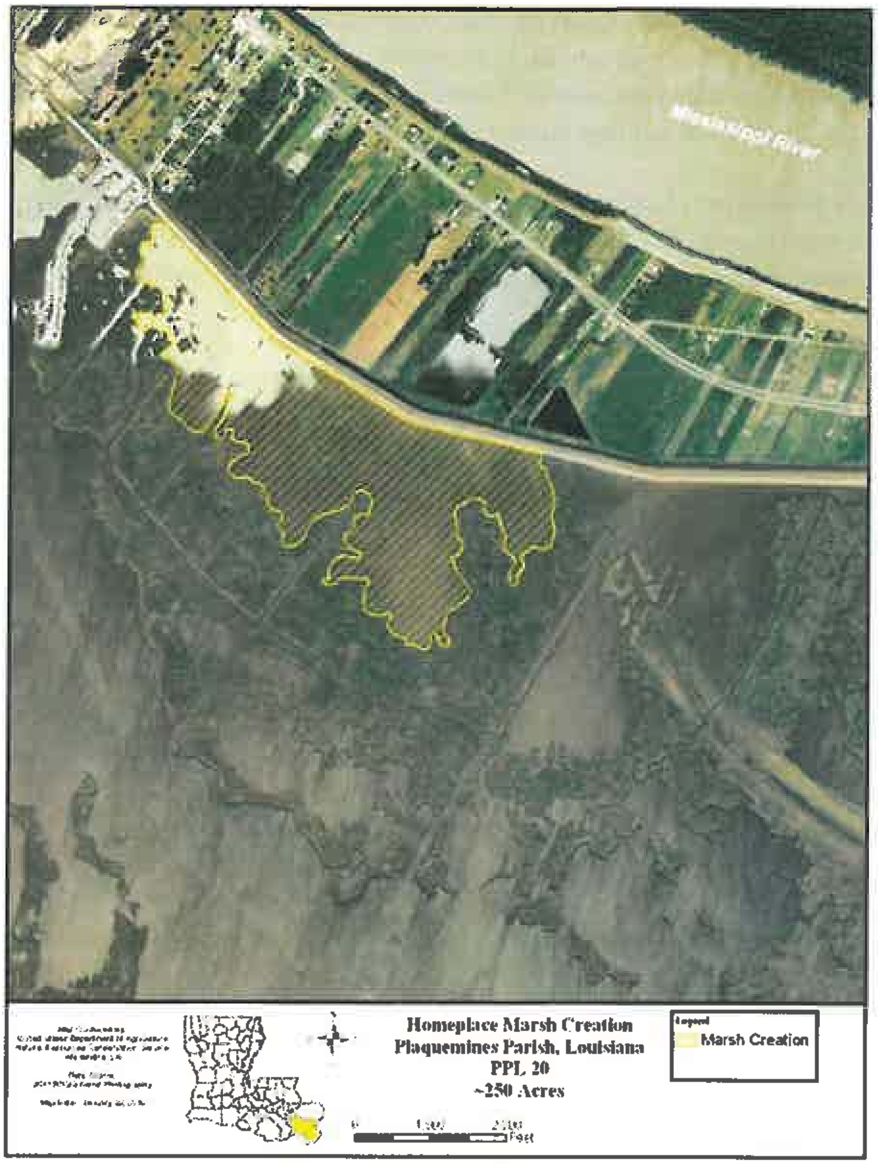
1. What is the total acreage benefited both directly and indirectly? 250 acres
2. How many acres of wetlands will be protected/created over the project life? Estimated 203 net acres at end of 20 years.
3. What is the anticipated loss rate reduction throughout the area of direct benefits over the project life (<25%, 25-49%, 50-74% and >75%). 50% reduction in land loss rate (marsh creation/nourishment).
4. Do any project features maintain or restore structural components of the coastal ecosystem such as barrier islands, natural or artificial levee ridges, beach and lake rims, cheniers, etc. The created and nourished marsh will help re-establish the hydrologic function of the former Bayou de la Cheniere ridge.
5. What is the net impact of the project on critical and non-critical infrastructure? The created/nourished marsh will reduce the fetch west of the hurricane protection levee.
6. To what extent does the project provide a synergistic effect with other approved and/or constructed restoration projects? The project will complement other efforts to establish / nourish

marshes west of the Mississippi River – Mississippi River Sediment Delivery- Bayou Dupont; West Bay Sediment Diversion, Lake Hermitage Marsh Creation, West Point a la Hache Marsh Creation.

**Identification of Potential Issues:** The proposed project has the following potential issues: no issues presently identified.

**Preliminary Construction Cost:** The estimated construction cost including 25% contingency is $22,786,140. The fully-funded cost range is $30M - $35M.

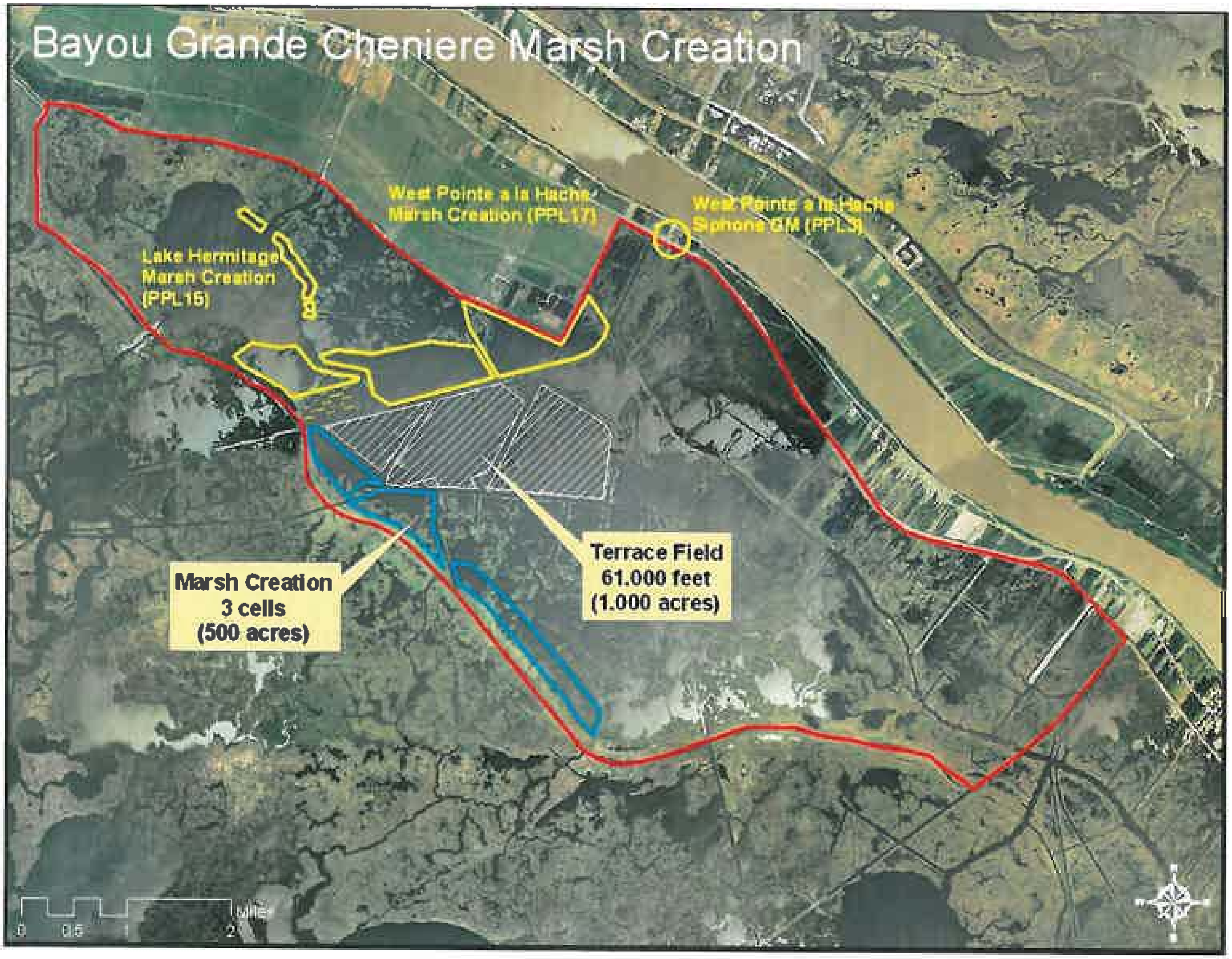
**Preparer of Fact Sheet:** Quin Kinler, USDA-NRCS, 225-382-2047, quin.kinler@la.usda.gov.



II. AREA/PROJECT NAME: Bayou Grand Cheniere Marsh Creation

**CWPPRA PPL20 PROJECT NOMINEE FACT SHEET, January 28, 2010**
**Coast 2050 Strategy:** Coastwide – dedicated dredging to create, restore, or protect wetlands; Coastwide – utilize off-shore and riverine sand and sediment resources.
**Project Location:** Region 2, Barataria Basin, Plaquemines Parish, near Lake Hermitage, along Bayou Grande Cheniere ridge.
**Problem:** From 1932 to 1990, the West Point a la Hache Mapping Unit lost 38% of its marsh. Through 2050, 28% of the 1990 marsh acreage is expected to be lost. That loss is expected to occur even with operation of the West Point a la Hache Siphons. Significant marsh loss has occurred south of Lake Hermitage with the construction of numerous oil and gas canals.
**Goals :** The primary goal is to re-create marsh habitat in the open water areas and nourish marsh along the eastern side of the Bayou Grande Cheniere ridge. Terraces are proposed to reduce fetch in large open water bodies and to capture suspended sediment delivered via the West Pointe a la Hache siphons.
**Proposed Project Features:** (1) Riverine sediments will be hydraulically dredged and pumped via pipeline to create approximately 500 acres of marsh in the project area. (2) Approximately 60,000 linear feet of terraces (50 acres) will be constructed to reduce fetch and turbidity and capture suspended sediment.
**Preliminary Project Benefits:**
1. The total acreage benefited directly would be 550 acres (500 acres of marsh creation/nourishment and 50 acres of terraces). Indirect benefits would occur to the Bayou Grand Cheniere ridge and within the 1,000-acre terrace field.
2. The total net acres protected/created over the project life would be between 400-500 acres.
3. Background loss rates would be reduced by 50% in the marsh creation and marsh nourishment areas.
4. The project would help maintain the Bayou Grande Cheniere ridge.
5. The project would not protect any significant infrastructure.
6. The project would provide a synergistic effect with the Lake Hermitage Marsh Creation Project (PPL15), the West Pointe a la Hache Marsh Creation Project (PPL17), and the West Pointe a la Hache Siphon Enhancement Project (PPL3). All of these projects would work in conjunction to restore wetlands within the Lake Hermitage Basin.

**Identification of Potential Issues:** Numerous oil and gas canals; borrow site.
**Preliminary Construction Costs:** Preliminary construction costs are estimated at $25 million, which includes 25% contingency.
**Preparer of Fact Sheet:** Kevin Roy, USFWS, (337) 291-3120, kevin_roy@fws.gov.


Bayou Grande Cheniere Marsh Creation
West Pointe a la Hache Marsh Creation (PPL17)
West Pointe a la Hache Siphons GM (PPL3)
Lake Hermitage Marsh Creation (PPL15)
Terrace Field 61.000 feet (1.000 acres)
Marsh Creation 3 cells (500 acres)
0 0.5 1 2 Miles

# III. AREA/PROJECT NAME: Plaquemines Parish Coastal Restoration Project



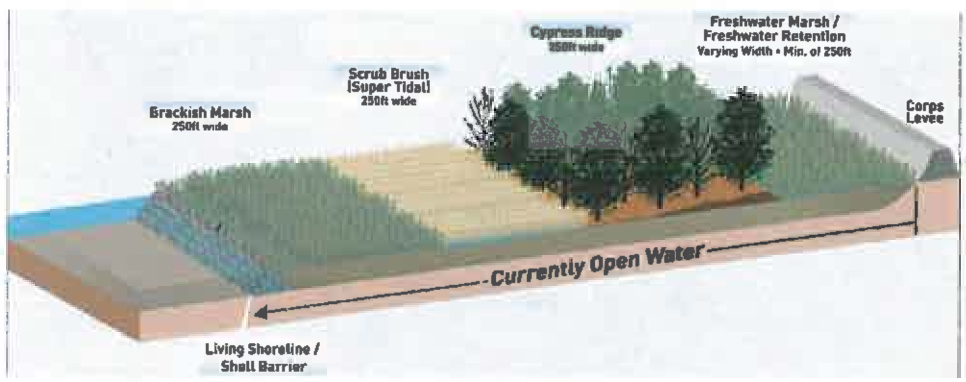
**Option A – Open Water Reduction** - Development of a stabilized shoreline and wetland vegetation (brackish marsh, Scrub Brush, and Cypress Ridge) westward of the existing brackish marsh

The major advantage of this alternative is that it minimizes any negative impact on the existing marsh. The major disadvantage is the construction cost.

In summary, Option A provides for the protection of approximately 2,800 acres of marsh through the development of a new shoreline and creation of transitional wetland vegetation (brackish marsh, Scrub Brush ridge and cypress ridge) immediately east of the "living shoreline." The new protected shoreline also encloses Areas 1, 2 and 3, providing the potential for development of mitigation land banks for development of freshwater marshes in these areas.

## Option A


**Cross-section**

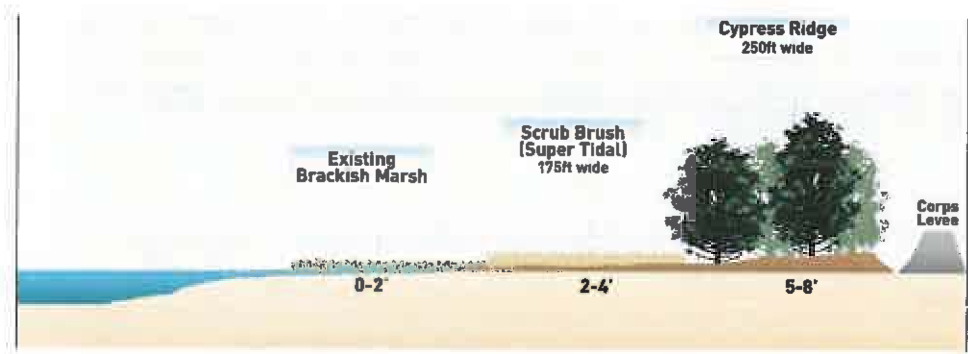



**Oblique View**

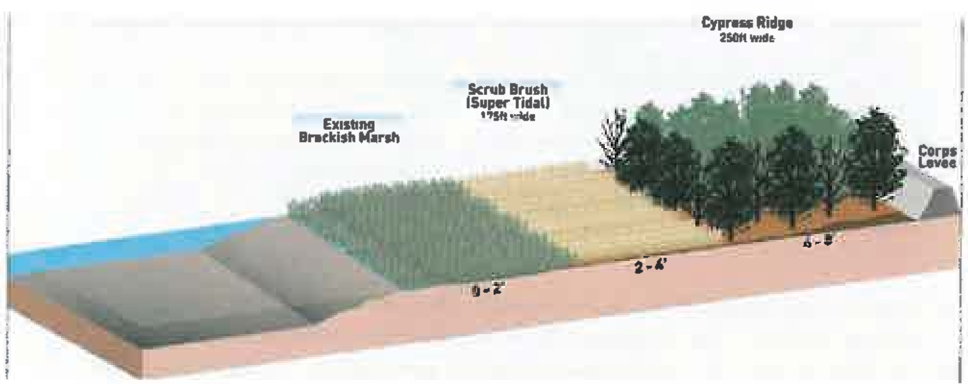
**Option B – Brackish Marsh Stabilization** - Development of two wetland vegetation ridges (Scrub Brush Ridge and Cypress Ridge) immediately adjacent to the back levee system for Reach B-2 and the enrichment of the existing brackish marsh immediately west of the these two ridges. This project provides stabilization to the existing brackish marsh through enrichment with freshwater nutrients and sediment from the Mississippi River plus infilling of the open water areas that currently penetrate the brackish marsh, and establishes transitional wetland vegetation between the brackish marsh and the Reach B-2 back levee.

While his project converts 335 acres of brackish marsh into Scrub Brush and Cypress ridges, the impact is offset by the creation of new brackish marsh through the infilling of open water, the enrichment of existing marsh, and the development of additional wetland habitat.

## Option B




**Cross-section**




**Oblique View**

**Plaquemines Parish**
**Coastal Restoration Alternatives for Reach B-2**

| | Open Water Eliminated (Acres) | Brackish Marsh Impacted (Acres) | Brackish Marsh Marsh Created (Acres) | 0 - 2 MSL Brackish Enriched (Acres) | 2 - 5 MSL Scrub Brush Ridge Created (Acres) | 5 - 8 MSL Cypress Ridge Created (Acres) | Construction Cost ($000) | Mitigation Cost ($000) |
|---|---|---|---|---|---|---|---|---|
| Option A<br>Open Water Reduction | *<br>1,380 | 0 | 240 | 0 | 240 | 240 | $ 230,000 | $ - |
| Option B<br>Brackish Marsh Stabilization | 660 | 335 | **<br>310 | 158 | 138 | 197 | $ 27,000 | $ 18,000 |

* This figure assumes the 582 Acres of open water within the new shoreline is eventually filled-in through Mitigation Land Bank; however, the cost is not in this project

** This figure assumes the in-filling of Areas 1 and 2 only

**Regulation:** The policy of the Corps of Engineers is that they can permit existing wetlands to be destroyed only if an equal, or greater, area of the same wetland type is created or restored elsewhere.

**Impact:** In Option B, we are impacting 335 acres of marsh with fill above 2 feet.

**Mitigating actions:**

1. 310 Acres of open water (Areas 1 and 2) will be filled and in-kind marsh will be created. Because this is "new" versus "established" marsh, the new, in-kind marsh is discounted by 25% ( providing .75 acre credit for each acre of new marsh created)
2. 197 Acres of existing marsh is being enriched with freshwater sediment from the river. A 10% factor is given for the enrichment of these 197 acres.
3. 138 Acres of Scrub Brush (or other appropriate vegetation) will be planted on a 175 Ft. wide ridge between 2 and 4 feet in elevation. The value of the wetland acreage developed by this ridge is assumed to be only 1/3 of the value of the existing marsh.
4. 197 Acres of Cypress will be planted on a 250 Ft. wide ridge approximately 5 Ft. in elevation. The value of this ridge is assumed to be only 1/4 of value of the existing marsh.

Assuming the discounts identified above, the project as proposed in Option B will produce 803 acres of wetland, however, when factoring in the values described above the wetland replacement value is 343 acres – still in excess of the 335 acres impacted by the improvements proposed in Option B.

## Option B Mitigation Alternatives

| Area 1 | |
|---|---|
| 100 | Acres |
| 3.8 | Ft. Deep |
| 16,552,800 | CF |
| 613,067 | CY |
| $ 5.75 | CY Cost of Fill |
| $ 3,525,133 | Fill Cost |

| | Marsh Impacted (Acres) | In-kind Marsh Created (Acres) | In-kind Marsh Enriched (Acres) | Scrub Brush Ridge Created (Acres) | Cypress Ridge Created (Acres) | Project Total Credit Value (Acres) | |
|---|---|---|---|---|---|---|---|
| | 335 | 100 | 158 | 153 | 197 | 593 | Acres of Wetland Post-Project |
| Comparative Value: | | 75% | 10% | 33% | 25% | | |
| | | 75 | 16 | 46 | 49 | 185.59 | Acres of Wetland Habitat Credits |

| Area 2 | |
|---|---|
| 210 | Acres |
| 8.5 | Ft. Deep |
| 77,754,600 | CF |
| 2,879,800 | CY |
| $ 5.75 | CY Cost of Fill |
| $ 16,558,850 | Fill Cost |

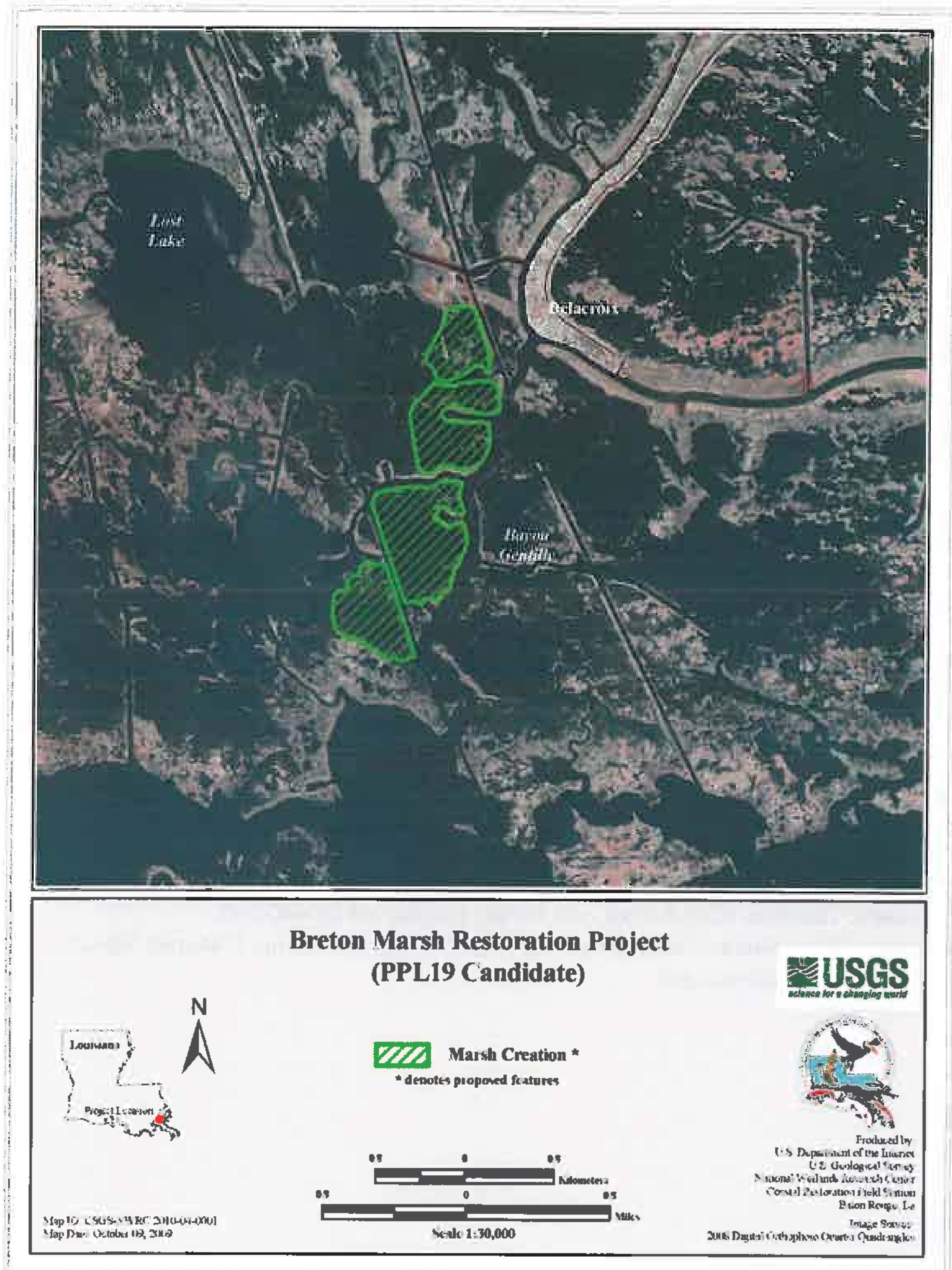
| | Marsh Impacted (Acres) | In-kind Marsh Created (Acres) | In-kind Marsh Enriched (Acres) | Scrub Brush Ridge Created (Acres) | Cypress Ridge Created (Acres) | Project Total Credit Value (Acres) | |
|---|---|---|---|---|---|---|---|
| | 335 | 310 | 158 | 153 | 197 | 803 | Acres of Wetland Post-Project |
| Comparative Value: | | 75% | 10% | 33% | 25% | | |
| | | 232.5 | 16 | 46 | 49 | 343.09 | Acres of Wetland Habitat Credits |

| Area 3 | |
|---|---|
| 272 | Acres |
| 15.5 | Ft. Deep |
| 183,648,960 | CF |
| 6,801,813 | CY |
| $ 5.75 | CY Cost of Fill |
| $ 39,110,427 | Fill Cost |

| | Marsh Impacted (Acres) | In-kind Marsh Created (Acres) | In-kind Marsh Enriched (Acres) | Scrub Brush Ridge Created (Acres) | Cypress Ridge Created (Acres) | Project Total Credit Value (Acres) | |
|---|---|---|---|---|---|---|---|
| | 335 | 582 | 158 | 153 | 197 | 1,075 | Acres of Wetland Post-Project |
| Comparative Value: | | 75% | 10% | 50% | 50% | | |
| | | 436.5 | 16 | 69 | 99 | 619.8 | Acres of Wetland Habitat Credits |

IV. AREA/PROJECT NAME: Breton Marsh Restoration Project

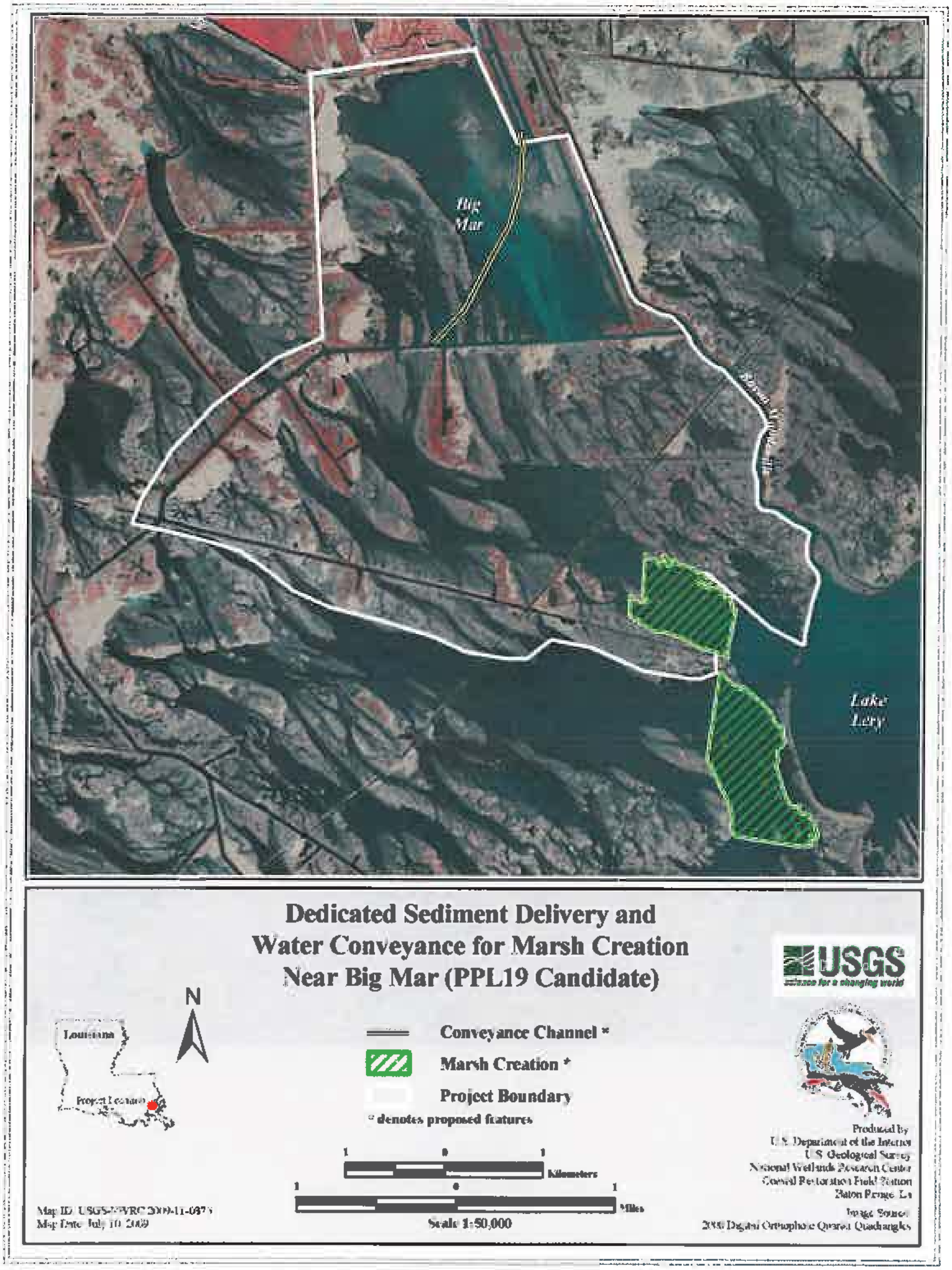
**CWPPRA PPL19 PROJECT NOMINEE FACT SHEET, November 10, 2009**
**Coast 2050 Strategy:** Coastwide Strategy: dedicated dredging, to create, restore, or protect wetlands.
**Project Location:** The project area is located in Region 2, Breton Basin, Plaquemines Parish, southeast of Delacroix, LA.
**Problem:** A major cause of loss in the Region 2, Caernarvon Mapping Unit has been storm related. Prior to Katrina the greatest land loss (6,560 acres) occurred from 1956-1974 and coincided with Hurricane Betsy and extensive canal building. It is estimated that 40.9 square miles of marsh were converted to open water in the Breton Sound Basin as a result of Hurricane Katrina in 2005. Land loss rates for this area are currently estimated at –2.5%/year based on USGS data from 1985 to 2006.
**Goals:** The goal of this project is to restore marsh that was damaged by Hurricane Katrina in 2005. Reestablishing this marsh will help to restore the western shoreline of Bayou Gentilly and moderate the effects of the brackish waters from the Black Bay system moving north into the more intermediate marshes. Initial project construction includes the creation of 337 acres and nourishment of 99 acres of brackish marsh.
**Proposed Solution:** Approximately 337 acres of marsh will be restored and 99 acres of marsh will be nourished through hydraulic dredging. It is estimated that 1.6 million cubic yards of material would be dredged hydraulically from Lake Lery and pumped via pipeline to create marsh. Dredged material would be pumped into containment dikes to achieve an average height of 1.4 feet NAVD 88. Tidal creeks will be constructed prior to placement of dredge material and retention levees would be gapped for estuarine fisheries access and to achieve a functional marsh.
**Project Benefits:** The project would benefit 436 acres of brackish marsh and open water. Approximately 275 acres of brackish marsh would be created/protected over the 20-year project life.
**Preliminary Construction Costs:** The total fully-funded cost for the project is $ 14,599,655.
**Preparer(s) of Fact Sheet:** Angela Trahan, U.S. Fish and Wildlife Service, (337) 291-3137, Angela_Trahan@fws.gov; Robert Dubois, U.S. Fish and Wildlife Service, (337) 291-3127, Robert_Dubois@fws.gov.


Lost
Lake
Delacroix
Bayou
Gentilly
Breton Marsh Restoration Project
(PPL19 Candidate)
USGS
science for a changing world
N
Louisiana
Marsh Creation *
* denotes proposed features
0
Kilometers
Miles
Scale 1:30,000
Produced by
U.S. Geological Survey
Image Source:

V. AREA/PROJECT NAME: Dedicated Sediment Delivery and Water Conveyance for Marsh Creation near Big Mar

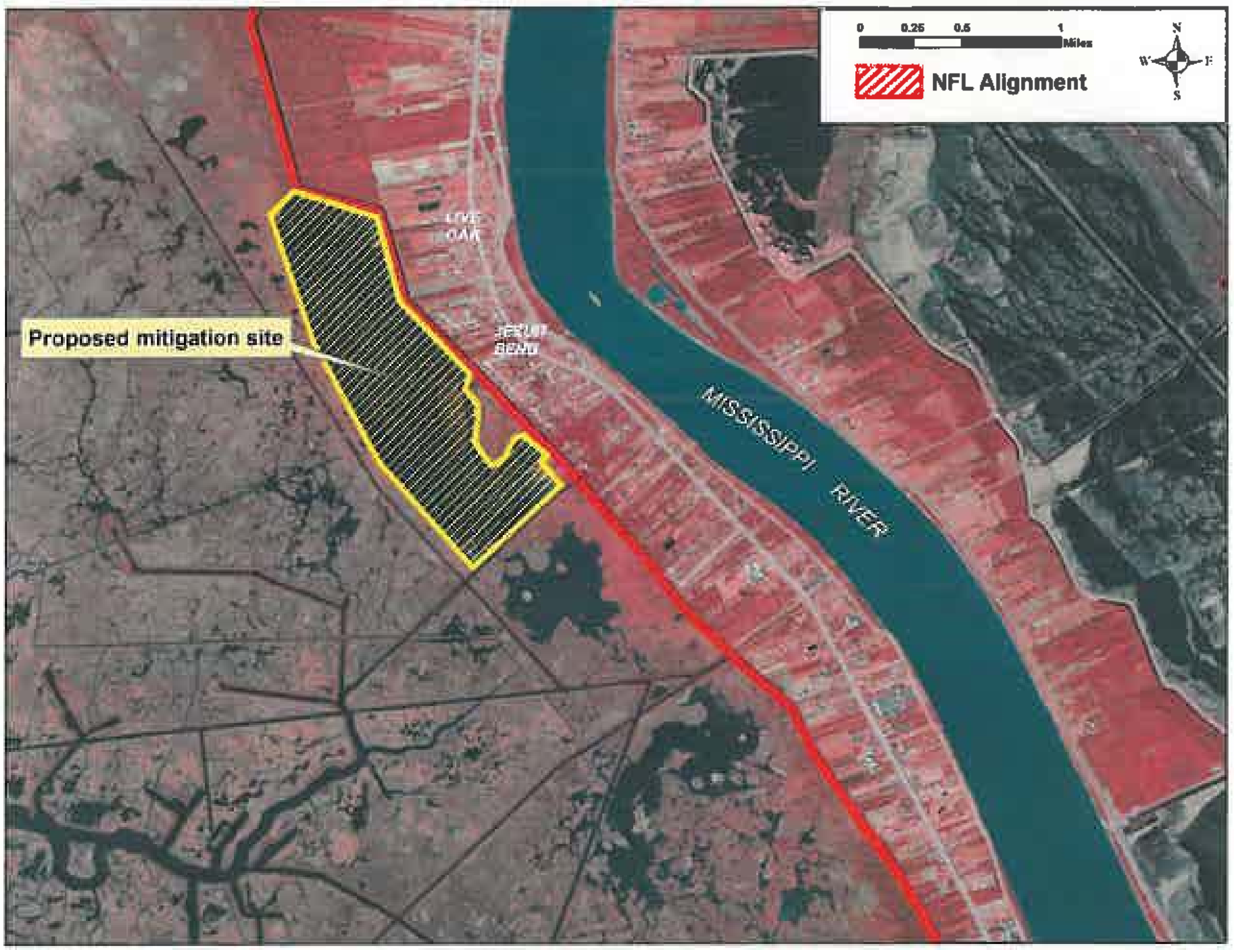
**CWPPRA PPL19 PROJECT NOMINEE FACT SHEET**

**Coast 2050 Strategy:** Coastwide Strategy: dedicated dredging to create, restore, or protect wetlands.
**Project Location:** Region 2, Breton Sound Basin, Plaquemines Parish, the marsh creation is located along the western shoreline of Lake Lery and the conveyance channel is located within Big Mar.
**Problem:** The upper Breton Sound marshes have long been subjected to subsidence, salt water intrusion, altered hydrology, and storm damage. After the passing of Hurricane Katrina in 2005, the Breton Sound marshes were devastated and land loss rates increased in the upper sound from 0.69%/yr to 1.74%/yr (USGS). The Caernarvon Freshwater Diversion Project is helping to reverse land loss in this area; however, as Big Mar fills in, flow that used to go down Delacroix Canal and into the marshes southwest of Big Mar is now mostly taking the path of least resistance into Lake Lery. Furthermore, the shoreline of Lake Lery is almost indistinguishable where the lake is coalescing with hundreds of acres of open water. Reestablishment of the Breton Sound marshes is dependent upon the direct reconstruction of lost marsh, reestablishing the lake rim, and optimizing the flow and outfall of the Caernarvon structure.
**Goals:** Project goals include: 1) creating approximately 434 acres of fresh to intermediate marsh via dredging the center of Lake Lery, 2) excavating a channel 7,850-foot-long, 75 feet bottom width, and 7 feet deep through the Big Mar to facilitate Caernarvon outfall to 6,300 acres of marshes west and southwest of Big Mar, and 3) reducing the loss rate of adjacent interior marshes.
**Proposed Solution:** Project features include approximately 434 acres of marsh creation via dredging from Lake Lery. In addition, a 7,850-foot-long conveyance channel would be dredged from the northeast confluence of Caernarvon Canal and Big Mar to near the southwest corner of Big Mar where it joins with Delacroix Canal. The excavated material will be beneficially used to build marsh in the Big Mar. Construction of this channel will help redirect flow from the Caernarvon diversion to the southwest wetlands of upper Breton Sound. The southern cell of proposed marsh creation would need to be adjusted slightly west to avoid an approved CWPPRA Project.
**Project Benefits:** The project would benefit 6,311 acres of fresh marsh and open water. Approximately 853 net acres of marsh would be created/protected over the 20-year project life.
**Project Costs:** The total fully funded cost for the project is $ 20,443,392.
**Preparer(s) of Fact Sheet:** Cheryl Brodnax, NOAA National Marine Fisheries Service, (225) 578-7923, cheryl.brodnax@noaa.gov.

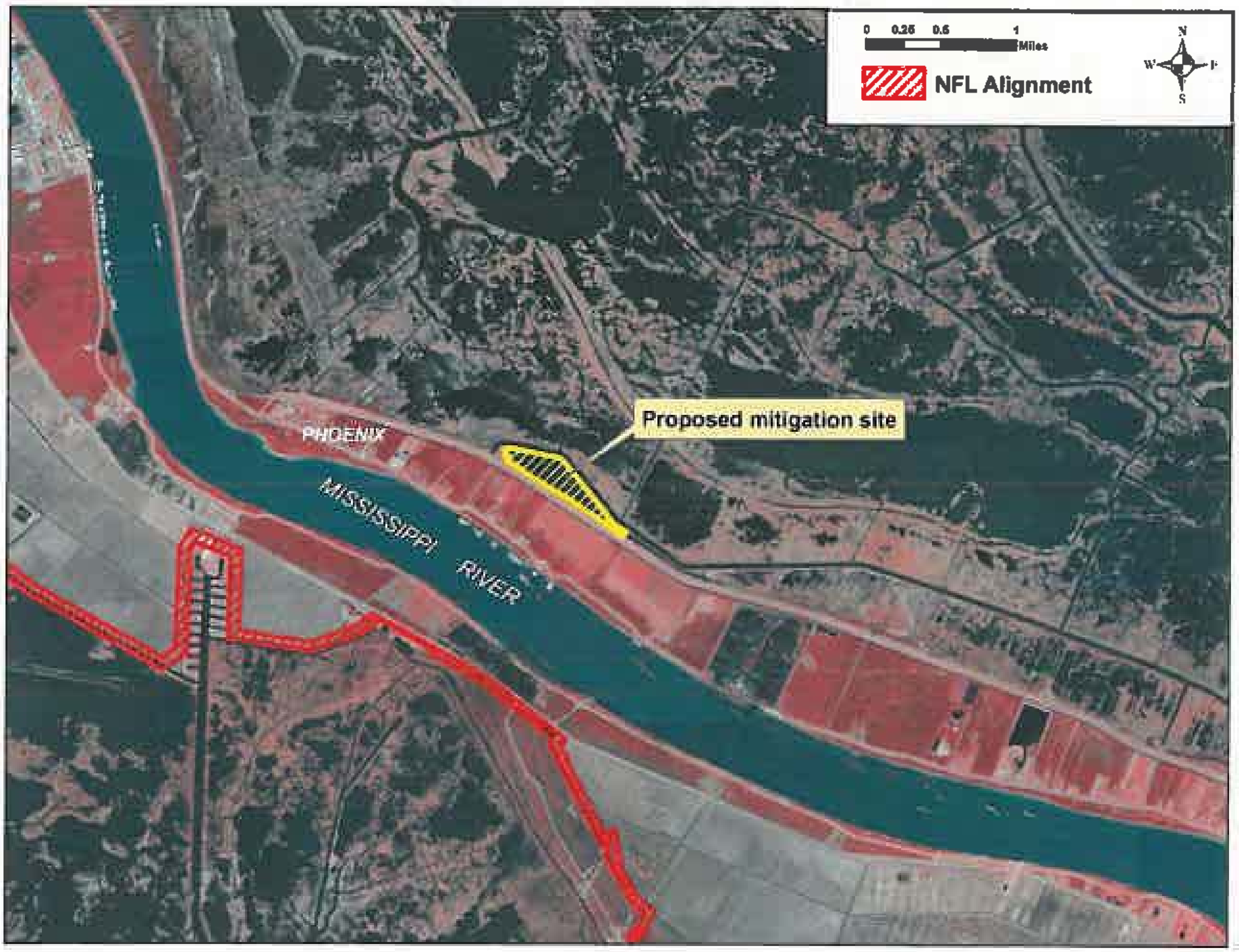

Big Mar
Lake Lery
Dedicated Sediment Delivery and
Water Conveyance for Marsh Creation
Near Big Mar (PPL19 Candidate)
USGS
N
Louisiana
Project Location
Conveyance Channel *
Marsh Creation *
Project Boundary
* denotes proposed features
Kilometers
Miles
Scale 1:50,000
Produced by
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Baton Rouge, La
Image Source:
Map Date: July 10, 2009

## VI. Other Potential Areas for Creation of Bottomland Hardwood Forest, Swamp, and/or Marsh

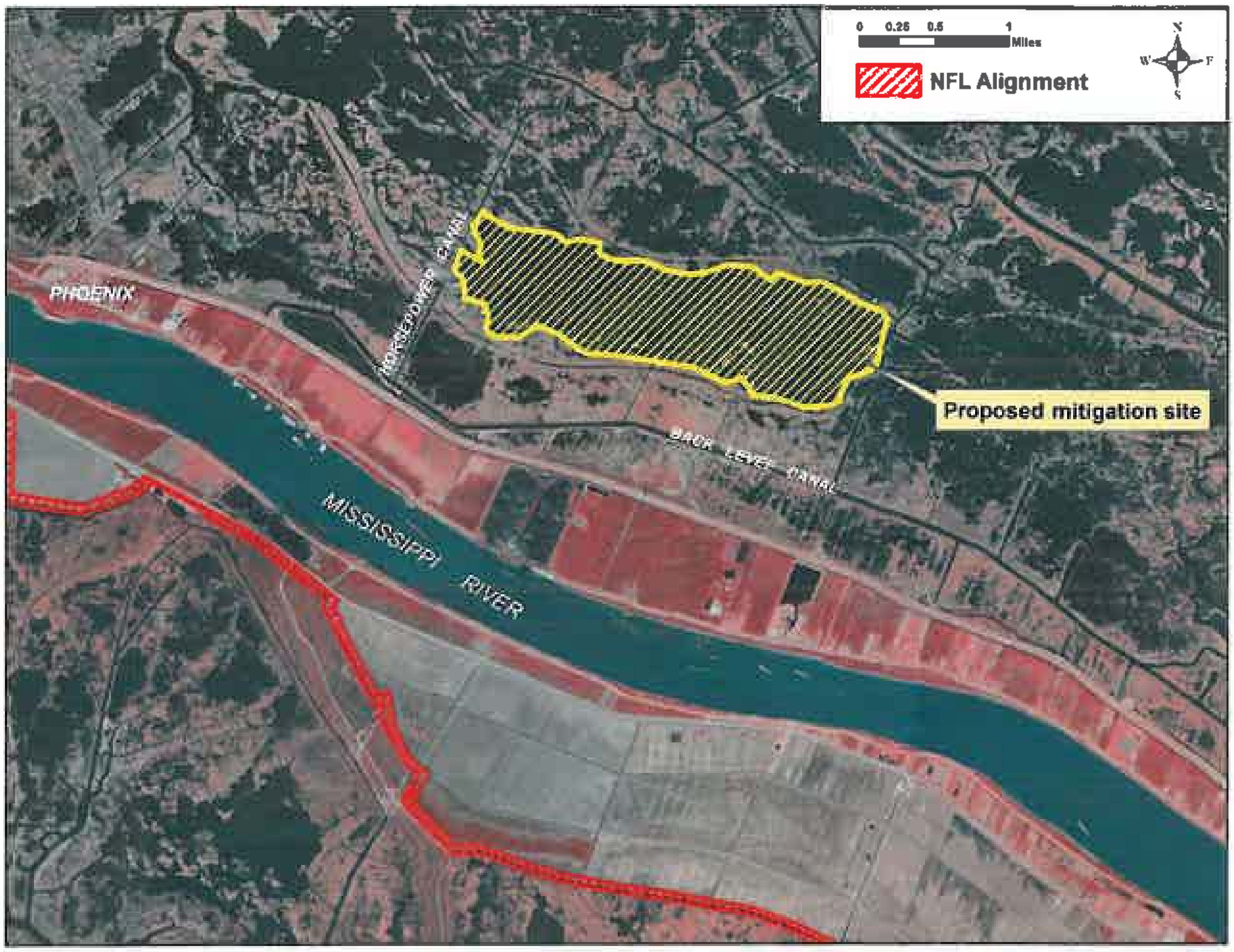
A. **Jesuit Bend Site**, approximately 667 acres:
Sediment could be pumped from the Mississippi River to create bottomland hardwood forest and/or swamp adjacent to the nonfederal system and to create marsh on the western edge of the forested habitat (similar to the project proposal listed above in Section III of this Appendix). Once vegetation is established, the levees on the west end of the open-water area could be graded down or gapped to allow water to flow naturally through the created wetland system.



B. **Phoenix Site**, approximately 74 acres:
Sediment could be pumped from the Mississippi River to create bottomland hardwood forest and/or swamp adjacent to the nonfederal system and to create marsh on the eastern edge of the forested habitat (similar to the project proposal listed above in Section III of this Appendix). Once vegetation is established, the levees on the east end of the open-water area could be graded down or gapped to allow water to flow naturally through the created wetland system.



C. **Horsepower Canal Site**, approximately 1,251 acres:
Sediment could be pumped from the Mississippi River to create marsh. The lack of levees in the area would allow water to flow naturally through the created wetland system.



D. **Belair Site**, approximately 538 acres:
Sediment could be pumped from the Mississippi River to create bottomland hardwood forest and/or swamp adjacent to the nonfederal system and to create marsh on the eastern edge of the forested habitat (similar to the project proposal listed above in Section III of this Appendix). The lack of levees in the area would allow water to flow naturally through the created wetland system.