APPENDIX F
MITIGATION AND WETLAND VALUE ASSESSMENT REPORT

DRAFT

CONCEPTUAL WETLAND AND BOTTOMLAND HARDWOOD RESTORATION PLAN FOR THE MITIGATION OF IMPACTS FOR THE NEW ORLEANS TO VENICE (NOV) FEDERAL LEVEE SYSTEM, PLAQUEMINES PARISH, LOUISIANA

Prepared For:
U.S Army Corps of Engineers
Vicksburg District
4155 East Clay Street
Vicksburg, MS 39183

Submitted By:
Gulf South Research Corporation
8081 GSRI Ave.
Baton Rouge, LA 70820

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1.0 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 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.

The goals and objectives of the mitigation plan are to fully offset the impacts to habitats located in Plaquemines Parish related to the construction of the NOV levee system, and to document the intent of the USACE to follow the Council on Environmental Quality's (CEQ) National Environmental Policy Act guidelines to: 1) avoid the impact, 2) minimize the impact, 3) rectify the impact, 4) reduce or eliminate the impact, and 5) compensate for unavoidable impacts. Further, this mitigation plan meets the recommendations provided in the U.S. Fish and Wildlife (USFWS) Coordination Act Report (CAR) for NOV.

Figure 1-1: Vicinity Map

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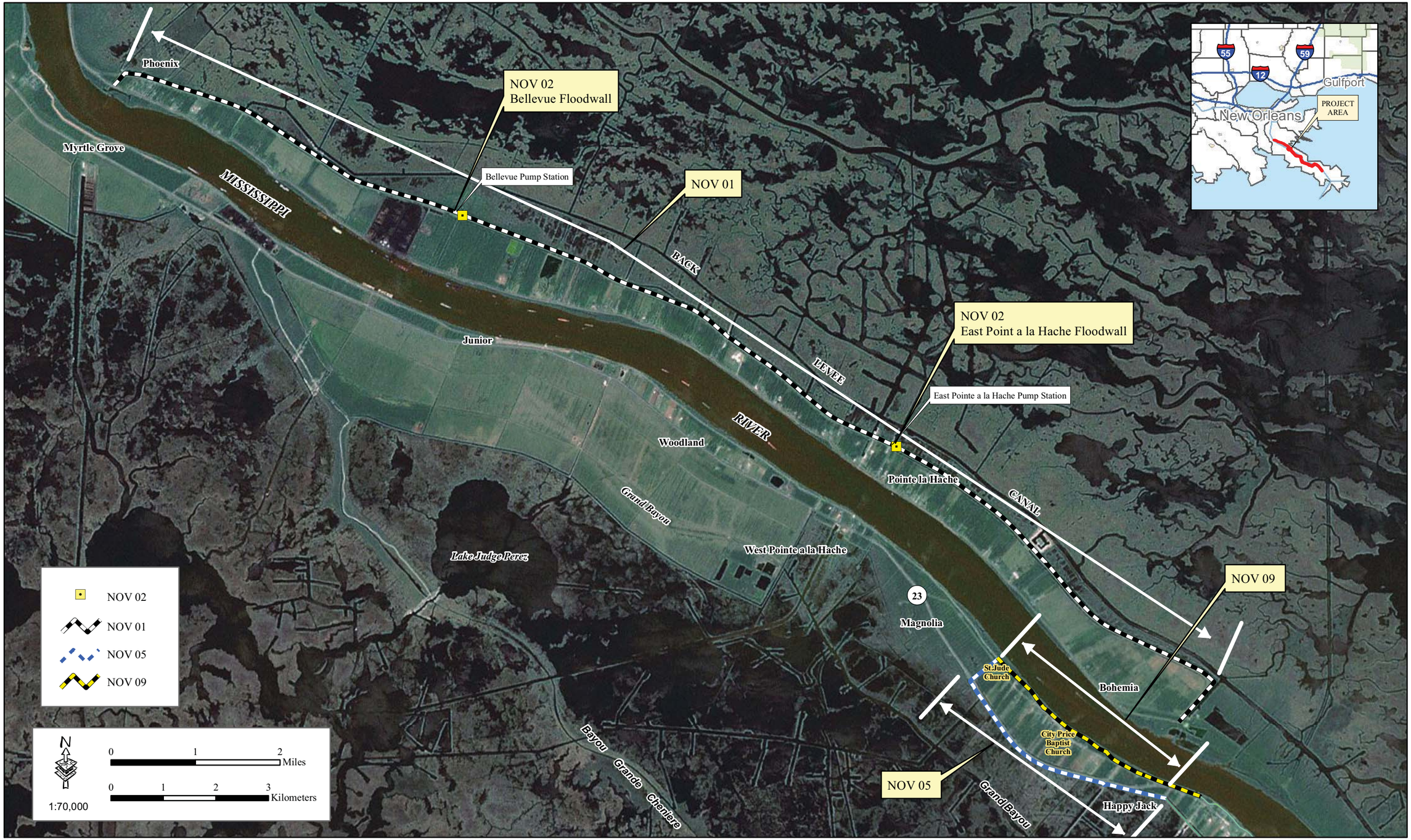

Figure 1-2: Project Area for NOV 01, NOV 02, NOV 05, and NOV 09

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

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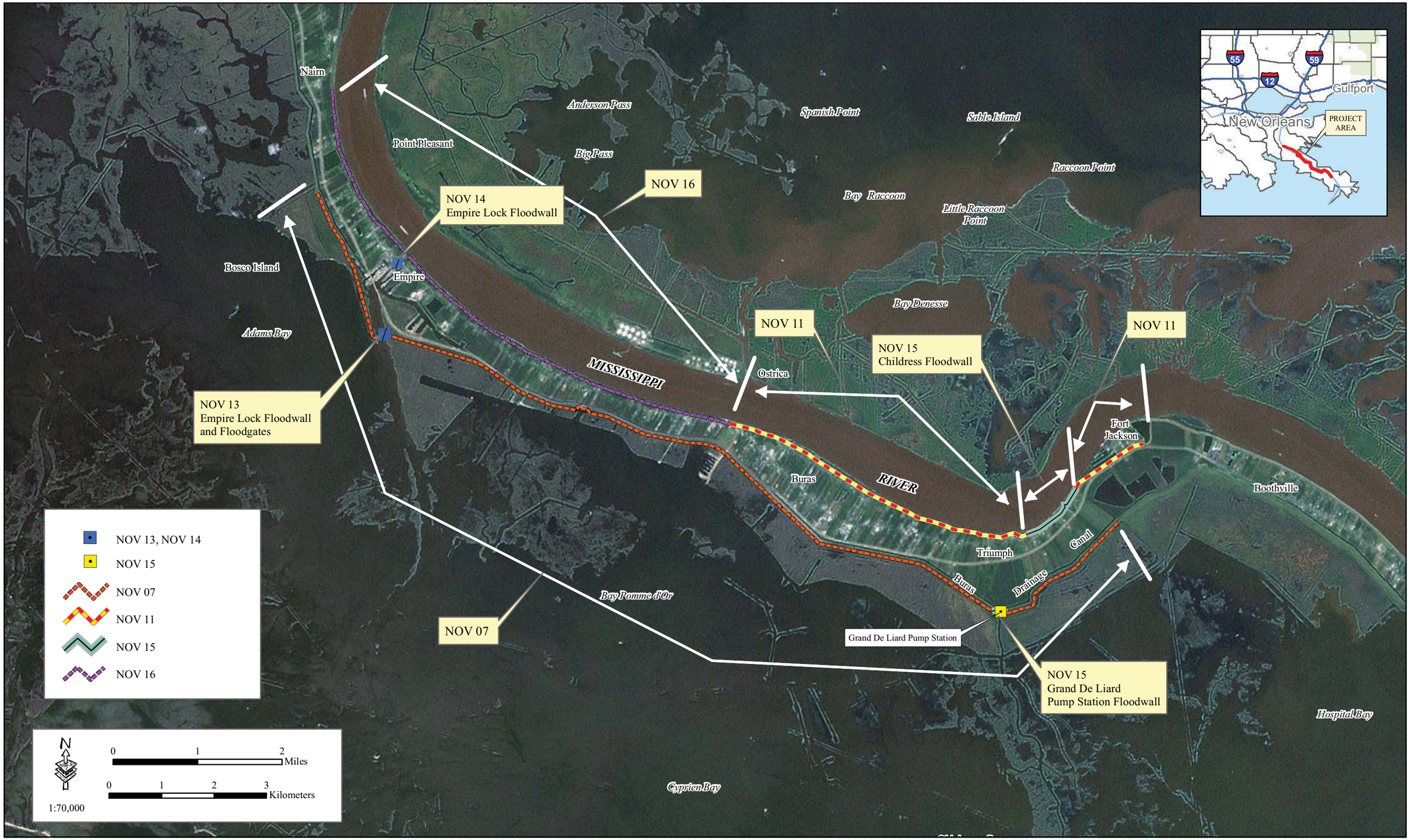

Figure 1-4: Project Area for NOV 07, NOV 11, NOV 13, NOV 14, NOV 15, and NOV 16

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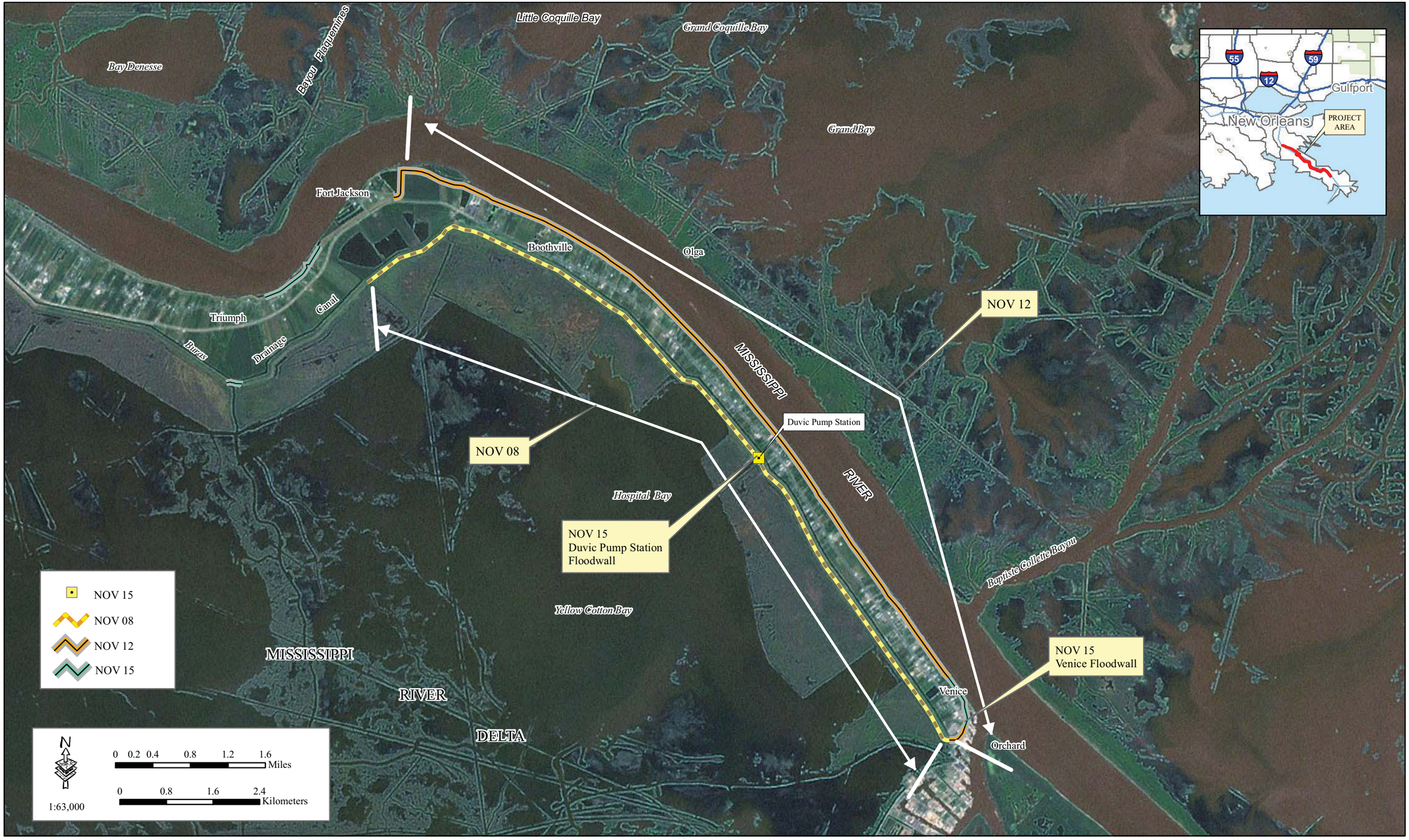

Figure 1-5: Project Area for NOV 08, NOV 12, and NOV 15

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Included in this mitigation plan are the impacts associated with the 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 in with the levee alternatives. The CF borrow impacts are not included in this mitigation plan since the responsibility of mitigating impacts from CF borrow are with the borrow area landowner.

1.2 BASELINE CONDITIONS OF IMPACTED AREA

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 freshwater marsh and batture communities are dominated by Chinese tallow (*Triadica sebifera*), black willow (*Salix nigra*), and hackberry (*Celtis laevigata*). Shrub species consist of baccharis (*Baccharis halimifolia*), giant reed (*Phragmites australis*), silky dogwood (*Cornus amomum*), and purple rattle bush (*Sesbania punicea*). Herbaceous species include Chinese tallow, torpedo grass (*Panicum repens*), taro (*Colocasia antiquorum*), elephant's 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 Chinese tallow and 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, foxtail, baccharis, and Chinese tallow.

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, etc.) provide a valuable food source for birds, mammals, and other wildlife species.

1.3 SELECTION OF MITIGATION SITE

Included in the USFWS CAR, which is hereby incorporated as a reference, are priority areas CEMVK 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 westbank of the Mississippi River. Bottomland hardwood mitigation sites will likely occur within the same watershed as the impacted habitat.

1.4 BASELINE CONDITIONS OF 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.

Figure 1-6: Location of Priority Mitigation Sites

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1.5 CREDIT DETERMINATION METHODOLOGY

Impacts to habitats from construction of the NOV Federal 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 then 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 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.

CEMVK has requested that Gulf South Research Corporation (GSRC) conduct a habitat analysis, in coordination with USFWS and NMFS, to determine unavoidable impacts to fish and wildlife habitats as a result of the proposed levee enlargement. WVAs identified impacts to 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	78.98	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	310.41	1149.67	0.00	0.00	0.00
Total All Habitats	**409.52**	**223.86**	**698.24**	**1,544.00**	**790.53**	**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).

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.

2.0 RESTORATION 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 formally 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 the National Oceanic and Atmospheric Administration (NOAA) National Marine and Fisheries Service (NMFS), U.S. Environmental Protection Agency (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	1613
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	1190
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	8891
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	5706
PO-27	Chandeleur Islands Marsh Restoration	NMFS	Barrier Island Restoration	220
MR-09	Delta Wide Crevasses	NMFS	Water Diversion	2386
BA-03c	Naomi Outfall Management	NRCS	Outfall Management	633
BA-24	Myrtle Grove Siphon	NMFS	Freshwater Diversion	1119
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	9831

3.0 IMPLEMENTATION PLAN

3.1 IMPLEMENTATION 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 the containment structures are intact until dewatering is complete, ensuring the marsh surface elevation is at the desired height, removing and/or managing invasive species at the site (see Chapter 4), and allowing for adaptive management techniques. Adaptive management will allow for mid-course corrections during the 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 (see Chapter 4). 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 non-Federal Sponsor 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 unit (DMMU)s 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 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 insure 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.

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

3.4 BOTTOMLAND HARDWOODS RESTORATION DESIGN

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. 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 percent) and soft mast (30 to 40 percent) 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).

4.0 MAINTENANCE PLAN

The maintenance phase may be revised based on the results of annual monitoring by CEMVK provided that the revisions improve the chances of the final success criteria being met or exceeded (see Section 5.3, Final Success Criteria).

4.1 MAINTENANCE OF DREDGED MATERIALS

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

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

4.2 MAINTENANCE OF VEGETATIVE PLANTINGS

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

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

- Controlling non-native and invasive species;
- Controlling herbivores;
- Replacing plants;
- Maintaining breaches to allow for fish passage;
- Reducing or preventing human intrusion;
- Controlling local pollutants; and
- Timber thinning can be performed subject to approval by CEMVK, USFWS, USEPA, and Louisiana Department of Wildlife and Fisheries (LDWF).

Non-native and invasive species will be monitored and controlled throughout the 50-year monitoring period. This involves suppressing non-native or invasive plants with herbicides, cutting them repeatedly during key times in the growing season, manually removing individual plants, and re-planting native species to eventually help shade out invasive plants.

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

Herbivory will be monitored and if herbivory is determined to be a problem with meeting success criteria, structures will be constructed to keep the animals (e.g., nutria) out of the restoration area. Warning signs will be erected to discourage human intrusion into the restoration area. Replanting will occur to achieve short term, interim, and long-term success criteria.

5.0 MONITORING PLAN

The goal of the monitoring plan is to provide feedback to the maintenance program and determine the success of the wetland restoration. The final success criteria are based on establishing brackish marsh habitat. Modifications or adjustments to the final success criteria for habitat restoration will be done by CEMVK, if necessary, in coordination with USEPA, Louisiana Department of Environmental Quality (LDEQ), USFWS, and NOAA Fisheries.

5.1 INTRODUCTION

Monitoring of the marsh surface elevation, water levels and vegetation will determine if the wetland habitat restoration requirements have been met. Bottomland hardwood mitigation sites will be monitored for seedling survivorship and presence of noxious/exotic weeds to determine if reforestation requirements have been met. Attainment of the performance criteria outlined below will indicate that the wetland restoration and bottomland hardwood reforestation is on the proper trajectory to meet the long-term habitat goals.

Restoration will be monitored over a 50-year period, starting after the plantings are in place, to calculate trend characteristics and provide feedback to the maintenance program. Trend characteristics will be used to assess growth rates toward the final success criteria. The results of the final year of monitoring will be compared to the final success criteria (i.e., 65 percent plant cover) to determine if the restoration goals have been met. If the final success criteria have not been met (as described in Section 5.2.1 below), then monitoring results will be evaluated, additional maintenance will be accomplished, the monitoring plan revised accordingly, and the monitoring will continue until the final success criteria are achieved.

5.2 MONITORING

5.2.1 Marsh Restoration Monitoring

Monitoring completed over the 50-year period will include monitoring the marsh surface elevation annually, collecting aerial photography, determining plant cover by species across the site, and measuring water levels. Systematic, linear transects (approximately 20/marsh cell or 2 percent of the total created marsh area) will be established. The following data will be recorded: dominant vegetation species, numbers and species rated facultative hydrophyte (FAC) or wetter (number/acre), percentage of dominant species FAC or wetter. In addition, a coverage assessment and invasive/noxious species assessment will be conducted. Water levels and marsh surface elevation data will be used to calculate the frequency, depth and duration of flooding over the marsh surface

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

One continuous water level recorder will be installed and surveyed to NAVD 88 within the restoration area immediately following planting. Water surface elevations and salinity measurements will be recorded hourly for 5 years and then hourly for 1 year each in monitoring years 10, 15, and 20. Water surface elevations from the continuous recorder data will be tied to the marsh surface elevation data to determine the duration and depth of flooding across the marsh surface.

Color infrared aerial photography of the mitigation site will be collected in years 1, 3, 5, 10, and 20. The aerial photography will be georectified, photointerpreted, ground-truthed and mapped in GIS. The aerial photography will be used to document vegetated and non-vegetated areas within the mitigation site.

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

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

5.2.2 Bottomland Hardwood Reforestation Monitoring

Monitoring plots 0.2-acre in size (1 per 10 acres) will be established systematically over the mitigation area, and criteria will be measured and recorded at each monitoring plot. Plots will be identified with permanent markers, and GPS coordinates will be taken. The following data will be recorded: species, height, and diameter of each individual tree, number of individuals within the plot, number of living and dead seedlings, and visual estimation of overall survival rates. In addition, the general condition of seedlings and likely causes for observed mortality, condition of hydrology altering features, and general location and degree of exotic/noxious species will be recorded. Management activities such as replanting seedlings and extensive herbicide application to control Chinese tallow is expected to occur at TY 2, 3, 5, 7, and 10.

5.3 SUCCESS CRITERIA

Monitoring will be conducted for 50 years. When all final success criteria have been met or exceeded, all habitat restoration obligations will be considered complete. If all final success criteria have not been met at the end of the 50-year monitoring period, CEMVK shall undertake the necessary actions to correct the problem(s) and continue the monitoring for 2 additional years.

5.3.1 Wetland Restoration

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

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

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

Functional marsh surface elevation within the mitigation acreage:

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

Cover of marsh surface with facultative wetland or wetter species:

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

Additional Five-year Success Criteria will include:

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

5.3.2 Bottomland Hardwood Reforestation

CEMVK shall consider the bottomland hardwoods reforestation successful when sampling data demonstrate that all of the following success criteria have been met or exceeded:

1) A healthy component of mid-story species is established (75 percent cover); and
2) Be essentially free of invasive/exotic vegetation (less than 5 percent of total plant cover);

Additional plantings to achieve mid-story abundance and diversity (75 plants/acre) and active treatment of noxious/exotic species will continue as part of the long-term maintenance plan. In addition, control of noxious/exotic species as a result of timber thinning will be included and implemented in the timber management plan.

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

Number of seedlings per acre with planted ratio of hard mast to soft mast-producing species:

Year 1: 266 seedlings
Year 5: 300 seedlings
Year 15: 75 mid-story plants/acre

Presence of woody exotic vegetation:

Year 1: 0 percent
Year 5: 0 percent
Year 15: < 5 percent

Presence of noxious vegetation:

Year 1: 0 percent
Year 5: < 5 percent
Year 15: < 5 percent

Five-Year Success Criteria also includes that the planted tracts must exhibit characteristics and diversity present in a viable native forest communities in proportion to stand age and site conditions.

5.4 MONITORING REPORTS

A monitoring report for marsh restoration will be prepared annually for the first 5 years and in years 10, 15 and 20 to describe the monitoring results. Monitoring reports for bottomland hardwood reforestation will be prepared for years 1, 2, 5, 7, 10, 15, and prior to any thinning operation. After the first 10-year period, monitoring will continue on a 5-year basis. For monitoring after 20 years, the number of monitoring plots will be reduced by half, if mitigation success is proceeding as anticipated. Each monitoring report will contain a description of the conditions of the mitigation area, a comparison of collected data with interim success criteria, and progress towards final success criteria. In addition to success criteria, the health of the plantings and other vegetation, the presence of invasive plants, and other general observations will be collected and reported. Photo-documentation of restoration progress will be collected at the same locations at each monitoring event. Management recommendations to assure that final success criteria are met will be included in each monitoring report. The monitoring report will also include information and recommendations concerning revegetation site changes, such as acts of vandalism, lack of tidal influence, or any condition that may inhibit restoration efforts. The as-built plans for the mitigation area will be provided and annual monitoring reports submitted to USEPA, USFWS, LDEQ, and NOAA Fisheries by December 31st of each year during the monitoring period.

5.4.1 Adaptive Management

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

years, remedial actions will be developed in coordination with USEPA, LDEQ, USFWS, and NOAA Fisheries.

5.5 COMPLETION OF MONITORING REQUIREMENTS

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

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US Army Corps of Engineers
Vicksburg District

WETLAND VALUE ASSESSMENT FOR SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

NEW ORLEANS TO VENICE LEVEE SYSTEM, PLAQUEMINES PARISH, LOUISIANA

Prepared for:
U.S. Army Corps of Engineers
Vicksburg District
4155 East Clay Street
Vicksburg, MS 39183

Prepared by:
Gulf South Research Corporation
8081 GSRI Avenue
Baton Rouge, Louisiana 70820

December 2010

DRAFT

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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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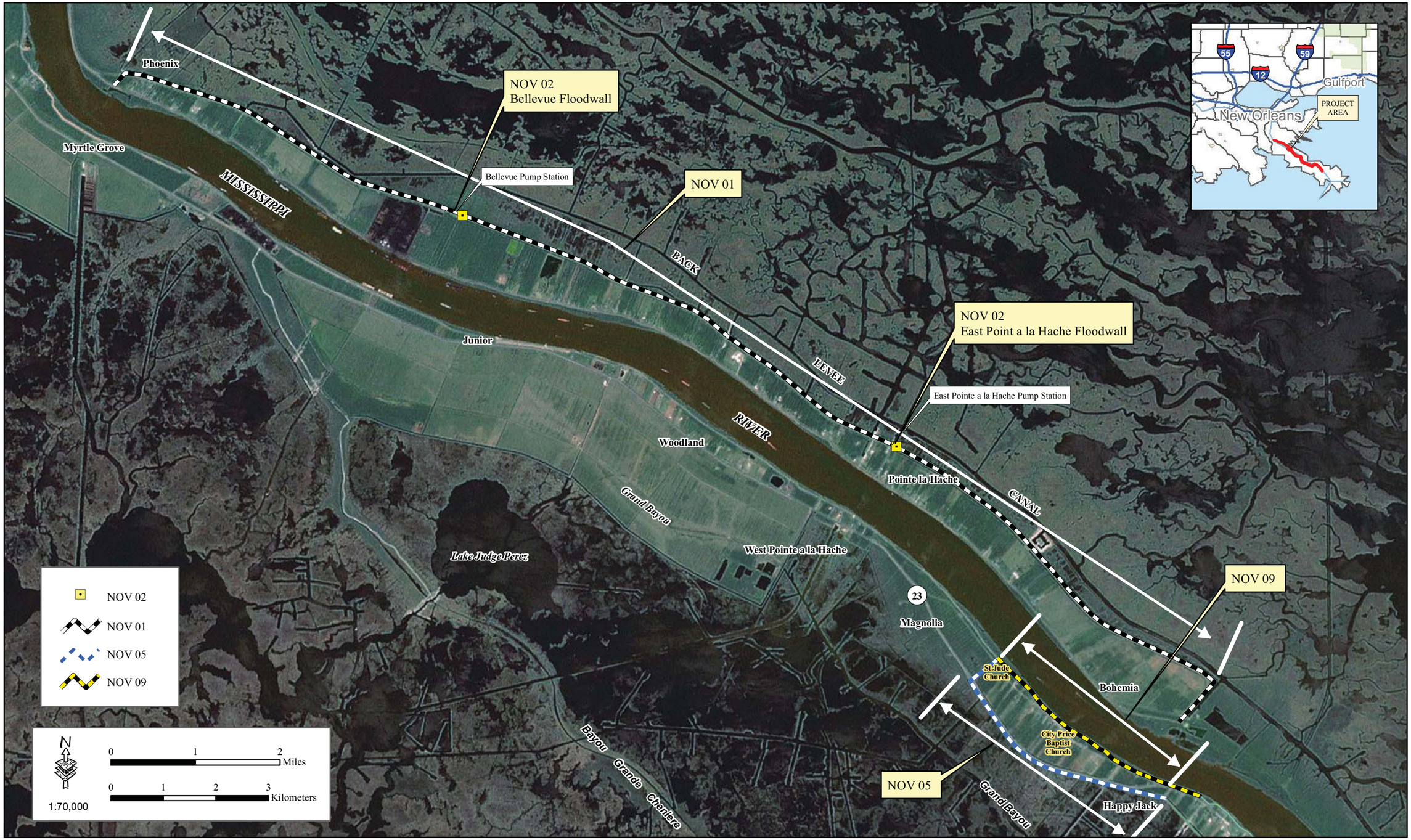

Figure 1-2: Project Area for NOV 01, NOV 02, NOV 05, and NOV 09

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

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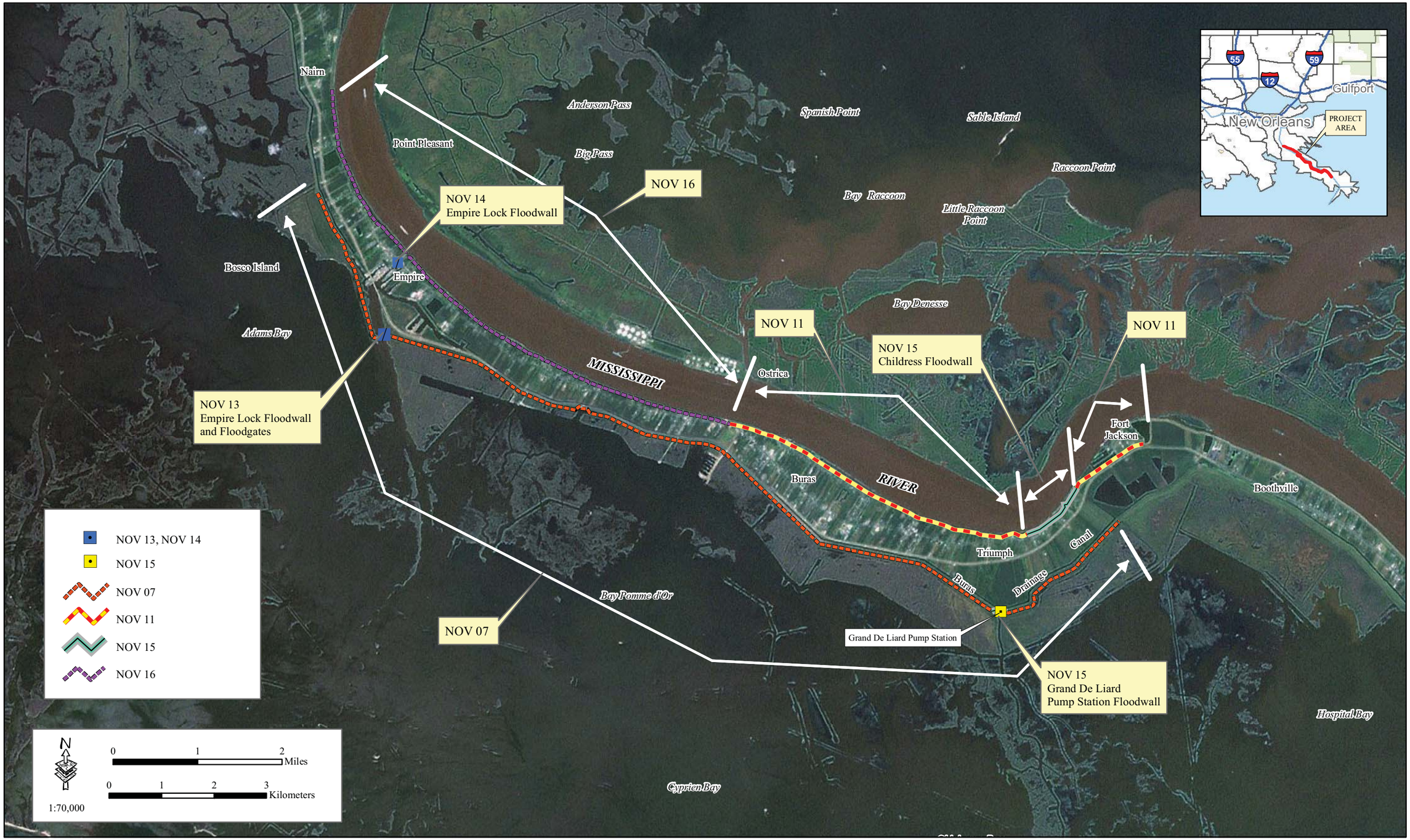

Figure 1-4: Project Area for NOV 07, NOV 11, NOV 13, NOV 14, NOV 15, and NOV 16

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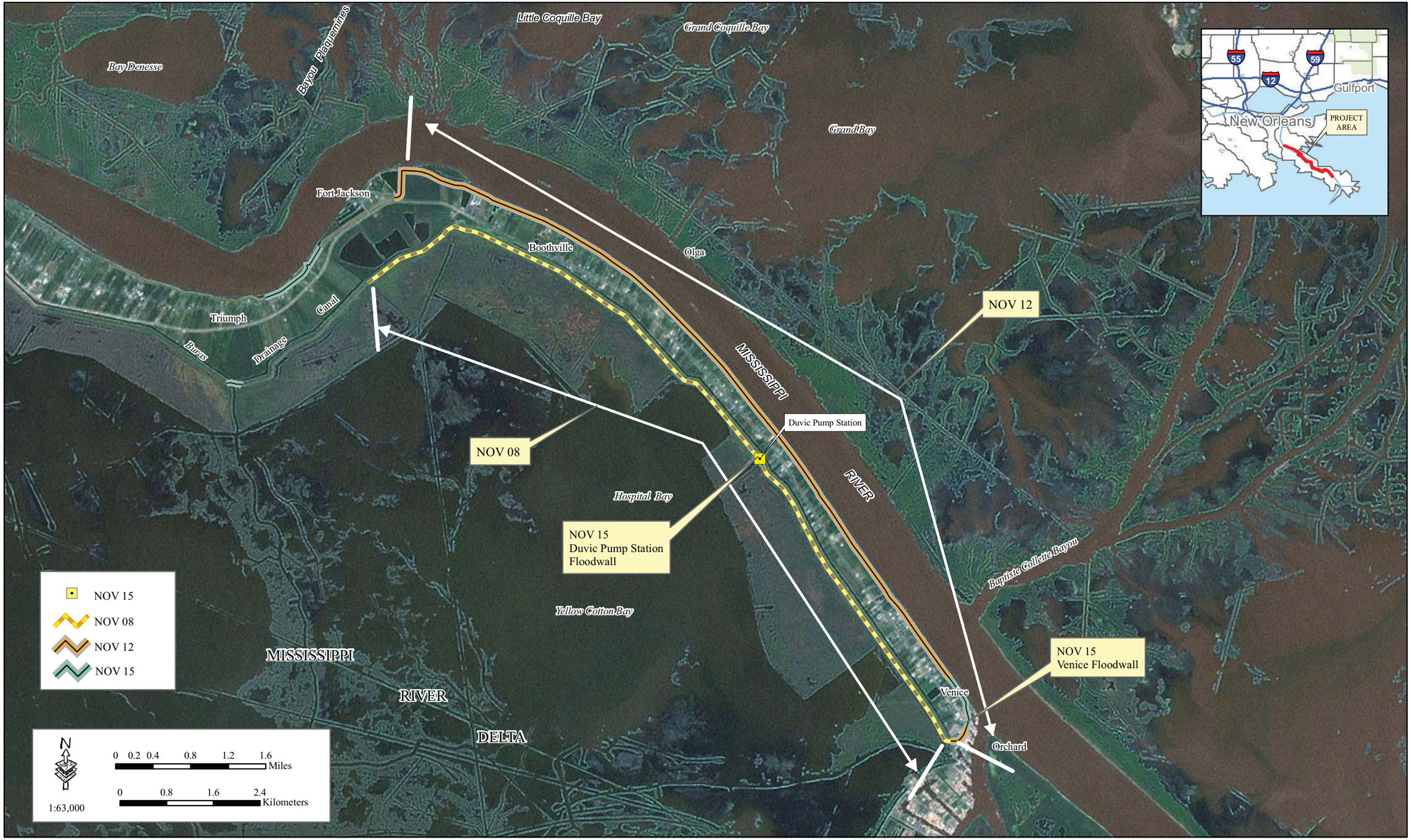

Figure 1-5: Project Area for NOV 08, NOV 12, and NOV 15

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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**

Condition	Previous WVA	Class TY 0	Class TY 1	Class TY 20	Class TY 50
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 improvements 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 735.93 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		Intermediate 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	**-223.33**
Alternative 3		-28.53	-25.93	-278.19	-46.34	-40.86	-33.23	27.57	-310.42	**-735.93**

SECTION 4.0
REFERENCES

4.0 REFERENCES

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ATTACHMENT 1
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 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	0.10
V4	Hydrology	Class 2	0.50	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 5	1.00	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 =	0.68	HSI =		HSI =				

Project: Alt 2: NOV SECTION 1 DRY/ALTERED BLH
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 / dbh 0	0.00	Age / dbh	0.00	Age / 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	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 2: NOV SECTION 1 DRY/ALTERED BLH Acres: 1.83

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 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh 13.57	0.56	Age dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9		Understory % 42.9		Understory % 35.7		1.00	1.00	1.00
		Midstory % 53.6	0.98	Midstory % 53.6	0.98	Midstory % 43.6	1.00	0.96	0.96	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50			
V5	Forest Size	Class 5	1.00	Class 5	1.00	Class 5	1.00			
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 =	0.68	HSI =	0.69	HSI =	0.55			

Project.....
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 dbh 18.5	0.90	Age dbh	0.00	Age dbh	0.00	
V3	Understory / Midstory	Understory % 28.6		Understory %		Understory %		0.96
		Midstory % 35	0.98	Midstory %		Midstory %		1.00
V4	Hydrology	Class 2	0.50	Class		Class		
V5	Forest Size	Class 5	1.00	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 =	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

Condition: Future Without Project

Project Area: 75.26
Int 70.86
Open Water 4.40

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

Condition: Future With Project

Project Area: 75.26
Int 70.86
Open Water 4.40

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

Condition: Future Without Project

Project Area: 21.89
Saline Marsh 21.60
Open Water 0.29

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

Condition: Future With Project

Project Area: 21.89
Saline Marsh 21.60
Open Water 0.29

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 =	0.18	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	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 / dbh 6.49	0.08	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 48.3		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 23.3	1.00	Midstory % 0		Midstory % 0		1.00	0.10	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 2: 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 / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		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 2: NOV SECTION 5 S/S Acres: 2.96

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 1	0.20	Class 1	0.20	Class 2	0.40			
V2	Maturity (input age or dbh, not both)	Age / dbh 6.49	0.08	Age / dbh 6.75	0.08	Age / 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 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 2	0.40	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 16.01	0.73	Age / dbh	0.00	Age / 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 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

Condition: Future Without Project

Project Area: 36.92
Saline Marsh 36.66
Open Water 0.22

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

Condition: Future With Project

Project Area: 36.92
36.66
0.22

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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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: 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 dbh 8.1	0.11	Age dbh 8.4	0.13	Age 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 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 dbh 21.7	1.00	Age dbh	0.00	Age dbh	0.00
V3	Understory / Midstory	Understory % 37		Understory %		Understory %	
		Midstory % 30	1.00	Midstory %		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 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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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: 30.08

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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / 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	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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 11 Acres: 9.79

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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / dbh	0.00
V3	Understory / Midstory	Understory % 37		Understory %		Understory %	
		Midstory % 30	1.00	Midstory %		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 Type	Class 2	0.50	Class		Class	
	Distance	Class 2		Class		Class	
		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	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)

Condition: Future Without Project

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

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)

Condition: Future With Project

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

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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 12 Acres: 15.04

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 dbh 8.1	0.11	Age dbh 8.4	0.13	Age 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 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 dbh 21.7	1.00	Age dbh	0.00	Age 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 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 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 12- fresh marsh (batture)

Condition: Future With Project

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

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 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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 15- batture Acres: 5.76

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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / dbh	0.00
V3	Understory / Midstory	Understory % 37		Understory %		Understory %	
		Midstory % 30	1.00	Midstory %		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 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	5.76	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)

Condition: Future Without Project

Project Area: 12.00
Fresh..... 12.00
Intermediate..

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)

Condition: Future With Project

Project Area:
Fresh..... 12
Intermediat

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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 16 Acres: 9.22

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 dbh 8.1	0.11	Age dbh 8.4	0.13	Age 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			

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

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 dbh 21.7	1.00	Age dbh	0.00	Age 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 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)

Condition: Future Without Project

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

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)

Condition: Future With Project

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

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 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	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 1 DRY/ALTERED BLH
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 / dbh 0	0.00	Age / dbh	0.00	Age / 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	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 =		

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 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh 13.57	0.56	Age dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9 Midstory % 53.6	0.98	Understory % 42.9 Midstory % 53.6	0.98	Understory % 35.7 Midstory % 43.6	1.00	1.00 0.96	1.00 0.96	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	0.61	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 =	0.68	HSI =	0.54			

Project…….
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 dbh 18.5	0.90	Age dbh	0.00	Age dbh	0.00	
V3	Understory / Midstory	Understory % 28.6 Midstory % 35	0.98	Understory % Midstory %		Understory % Midstory %		0.96 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	0.61					
	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 =	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

Condition: Future Without Project

Project Area: 56.22
Saline Marsh 49.90
Open Water 6.32

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

Condition: Future With Project

Project Area: 56.22
Saline Marsh 49.90
Open Water 6.32

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 / dbh 6.49	0.08	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 48.3		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 23.3	1.00	Midstory % 0		Midstory % 0		1.00	0.10	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 / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		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 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	0.20	Class 2	0.40			
V2	Maturity (input age or dbh, not both)	Age / dbh 6.49	0.08	Age / dbh 6.75	0.08	Age / 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 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 2	0.40	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 16.01	0.73	Age / dbh	0.00	Age / 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 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 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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	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 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh 13.57	0.56	Age dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9		Understory % 42.9		Understory % 35.7		1.00	1.00	1.00
		Midstory % 53.6	0.98	Midstory % 53.6	0.98	Midstory % 43.6	1.00	0.96	0.96	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	0.61	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 =	0.68	HSI =	0.54			

Project.....
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 dbh 18.5	0.90	Age dbh	0.00	Age dbh	0.00	
V3	Understory / Midstory	Understory % 28.6		Understory %		Understory %		0.96
		Midstory % 35	0.98	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	0.61					
	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 =	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

Condition: Future Without Project

Project Area: 128.76
Saline Marsh 120.17
Open Water 8.60

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

Condition: Future With Project

Project Area: 128.76
Saline Marsh 120.17
Open Water 8.60

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)

Condition: Future Without Project

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

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)

Condition: Future With Project

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

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

Condition: Future Without Project

Project Area: 206.48
Saline Marsh 197.57
Open Water 8.91

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

Condition: Future With Project

Project Area: 206.48
Saline Marsh 197.57
Open Water 8.91

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 / dbh 6.49	0.08	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 48.3		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 23.3	1.00	Midstory % 0		Midstory % 0		1.00	0.10	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 / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		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 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	0.20	Class 2	0.40			
V2	Maturity (input age or dbh, not both)	Age / dbh 6.49	0.08	Age / dbh 6.75	0.08	Age / 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 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 2	0.40	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 16.01	0.73	Age / dbh	0.00	Age / 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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / dbh	0.00
V3	Understory / Midstory	Understory % 37		Understory %		Understory %	
		Midstory % 30	1.00	Midstory %		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 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 2	0.40	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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: 276.72

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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / 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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 11 Acres: 33.26

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 dbh 8.1	0.11	Age dbh 8.4	0.13	Age 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 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 dbh 21.7	1.00	Age dbh	0.00	Age 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 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)

Condition: Future Without Project

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

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)

Condition: Future With Project

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

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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 12 Acres: 37.03

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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / 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 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)

Condition: Future Without Project

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

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)

Condition: Future With Project

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

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 =	0.12	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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 15- batture Acres: 5.67

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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / 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)

Condition: Future Without Project

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

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)

Condition: Future With Project

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

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 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 / dbh 8.1	0.11	Age / dbh 0	0.00	Age / 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 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 / dbh 0	0.00	Age / dbh	0.00	Age / 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 16 Acres: 25.54

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 / dbh 8.1	0.11	Age / dbh 8.4	0.13	Age / 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 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 / dbh 21.7	1.00	Age / dbh	0.00	Age / dbh	0.00
V3	Understory / Midstory	Understory % 37		Understory %		Understory %	
		Midstory % 30	1.00	Midstory %		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 Type	Class 2	0.50	Class		Class	
	Distance	Class 2		Class		Class	
		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

ATTACHMENT 2
FIELD DATA SHEETS

M_Sect1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

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

#1 Site #/lat-lon: 29°46'58.8" 90° 2' 40.2" Name: 6 total 3 on levee 3 at 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: Ø 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, alligatorweed, buttonbush, Boemeria cylindrica

Tree Species in Understory (include height/indicate abundance) ash, red maple

Percent midstory : 40 /species muscadine

Tree Species in Midstory(include height/indicate abundance) ash, red maple, sugarberry, 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. ismeasured 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	comm. elm
1.25	1.9	19.3	40.1	7.1
7.7	8.5	.5	15.2	
12.3 Topped	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.		
	7.0	2.6		
	4.9	Snag		
	6.0			
	3.6			
	1.3			
	3.8			
	11.6			
	2.1			

"Died" at TY30 — 12.3 Topped

cypress: 15.2, 14.7 > same base

11.7 inj. — "died" @ TY 30

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: JulyAug-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: 20

UNDERSTORY/MIDSTORY:
Percent understory : 95 /species Duck potato, cat tail, alligator weed, pickerel weed, polygonum, marsh mallow
Tree Species in Understory (include height/indicate abundance) none
Percent midstory : 10 /species wax myrtle, bacchris
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): "dried" @T+30 due to prolonged inundation

AGE: _____ or TREE SPECIES – with D.B.H.

B. Cypress
Plot 1 { 41.1, 27.3, ~~12.3~~, 6.6, 25.2, 16.4

Plot 1 { Maple 3x 1.25, .5, 10.2, 7.8, 8.75, .5, 5.1, 3.9, 3.4, 34.5 } same base

Plot { Sugarberry 3.8

Plot 1 { Tallow 3x 1.7", 4x 1", 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_____