Bayou Dularge Ridge Restoration, Marsh Creation & Hydrologic Restoration

Proposal

USDA - NRCS, LOUISIANA

11/14/2014

Appendix A: Council Member Applicant and Proposal Information Summary Sheet

Council Member: USDA	Point of Contact: Homer Wilkes Phone (601) 673-3131, ext 102 Email: Homer.Wilkes@ms.usda.gov

Project Identification

Project Title: **Bayou Dularge Ridge Restoration, Marsh Creation & Hydrologic Restoration; Phase I** | Project

State(s): **Louisiana**	County/City/Region: **Terrebonne Parish/Terrebonne Basin/SE Louisiana**

General Location: *Projects must be located within the Gulf Coast Region as defined in RESTORE Act. (attach map or photos, if applicable)*
In the Terrebonne Basin and Central Terrebonne marshes extending from S of Lake Decade through Lake Merchant S to Bayou Dularge Ridge

Project Description

RESTORE Goals: *Identify all RESTORE Act goals this project supports. Place a **P** for Primary Goal, and **S** for secondary goals.*

_P Restore and Conserve Habitat
_S Restore Water Quality
__ Restore and Revitalize the Gulf Economy
S__Replenish and Protect Living Coastal and Marine Resources
___ Enhance Community Resilience

RESTORE Objectives: *Identify all RESTORE Act objectives this project supports. Place a **P** for Primary Objective, and **S** for secondary objectives.*

_P Restore, Enhance, and Protect Habitats
_S__Restore, Improve, and Protect Water Resources
_P_ Protect and Restore Living Coastal and Marine Resources
_P__Restore and Enhance Natural Processes and Shorelines
_ Promote Community Resilience
__Promote Natural Resource Stewardship and Environmental Education
__Improve Science-Based Decision-Making Processes

RESTORE Priorities: *Identify all RESTORE Act priorities that this project supports.*

_X Priority 1: Projects that are projected to make the greatest contribution
_X Priority 2: Large-scale projects and programs that are projected to substantially contribute to restoring
_X Priority 3: Projects contained in existing Gulf Coast State comprehensive plans for the restoration ….
_X Priority 4: Projects that restore long-term resiliency of the natural resources, ecosystems, fisheries …

RESTORE Commitments: *Identify all RESTORE Comprehensive Plan commitments that this project supports.*

_X Commitment to Science-based Decision Making
_X Commitment to Regional Ecosystem-based Approach to Restoration
_X Commitment to Engagement, Inclusion, and Transparency
_X Commitment to Leverage Resources and Partnerships
_X Commitment to Delivering Results and Measuring Impacts

RESTORE Proposal Type and Phases: *Please identify which type and phase best suits this proposal.*

X__Project X Planning __ Technical Assistance __Implementation _____Program

Project Cost and Duration

Project Cost Estimate:		**Project Timing Estimate**:
Total : **$5,162,084**	**$ 5,162, 084**	Date Anticipated to Start: October 1,2015 Time to Completion: __5_ years Anticipated Project Lifespan: _5-10 yrs

II. Executive Summary

For centuries, periodic overflow of the Mississippi River helped build the Louisiana coast through sedimentation, a natural land building process that offsets erosion and subsidence. After levees were built along the Mississippi River for navigation and flood protection, Mississippi River sediment is now deposited into the deep waters of the Gulf of Mexico, rather than to the benefit of nourishing and building Louisiana's coastal wetlands.

The project components perform synergistically to provide benefits to over approximately 48,000 acres of wetlands through a combination of hydrologic restoration, marsh creation and ridge restoration. The project location provides a unique opportunity to manage salinity intrusion into a vast area where salinity was historically and naturally moderated through intact land features. By reducing the cross-section of the Grand Pass and restoring the integrity of the land bridge that separates the two large lake systems (Lake Mechant and Caillou Lake), the project will results in 233 net acres from the hydrologic restoration, 282 net acres from the marsh creation and 25 net acres of ridge for a total 540 net acres of total direct benefit over its first 20 years.

This project takes a regional ecosystem-based approach to restoration by: 1) Reestablishing historic hydrologic and salinity conditions by reducing the artificial intrusion of Gulf marine waters into the Central Terrebonne marshes via the Grand Pass while enhancing the influence of the Atchafalaya River waters into the area and 2) Creating/restoring a ridge feature and degraded marsh in the landbridge that separates Lake Mechant from Caillou Lake to insure the integrity of the ridge and its important function of sustaining optimal salinity gradients and promoting healthy marsh recovery in the region.

The integrity of the ridge is a concern due to erosion of the adjacent marshes. The position of the Bayou Dularge ridge and adjacent marshes form a significant land bridge that defines the landscape and hydrology within the lower basin. Maintaining the integrity of the land bridge is the key focal point of hydrologic influence that controls environmental conditions of vast areas of marsh to the north. Loss of this important land bridge would undermine efforts to restore the fresh and intermediate marshes to the north and eliminate an important landscape feature of critical importance to basin hydrology.

Monitoring of this project will include annual inspections of the structural features and environmental monitoring via the Coastwide Reference Monitoring System (CRMS) that has been set up and is funded through the CWPPRA program.

The project would contribute to the primary comprehensive plan goal of habitat restoration by incorporating hydrologic restoration and ridge restoration/marsh creation strategies which will restore, and conserve the health, diversity and resilience of key coastal, estuarine, and marine habitats of the lower Terrebonne Basin. The project will achieve the primary objective of enhancing and protecting critical coastal Louisiana habitats. The secondary goal of restoring and protecting water quality will be accomplished by restoring optimal salinity gradients, restoring and enhancing natural processes and shorelines, and promoting marsh primary productivity.

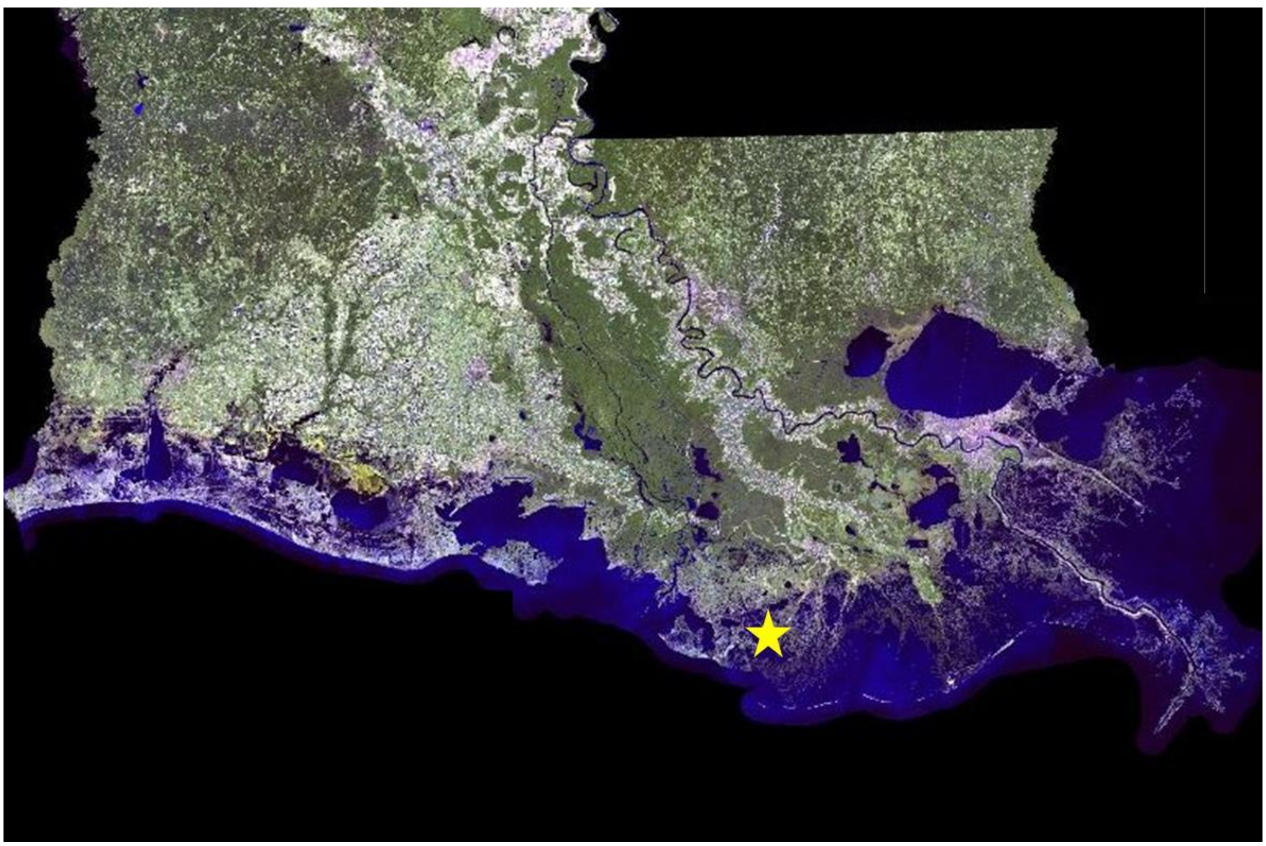
This large-scale project meets RESTORE ACT and criteria and would make a great contribution to achieve comprehensive ecosystem restoration by delivering a project that makes the greatest contribution to restoring and protecting the natural resources and ecosystems of coastal wetlands of the Gulf Coast Region. This large-scale project will substantially contribute to restoration and protection of the natural resources and coastal wetlands of the Gulf Coast ecosystem.

The United States Department of Agriculture will deliver results and measure impacts of this five-year project under the auspices of the Resources and Ecosystems Sustainability, Tourism Opportunities, and Revived Economies of the Gulf Coastal States (RESTORE) Act and other applicable statutory authorities.

III. Narrative
Introduction and Background

The Bayou Dularge Ridge, which extends from northeast to southwest, historically restricted the Gulf marine influence into Louisiana's Central Terrebonne marshes where the Atchafalaya influence is prominent (Figure 1). Grand Pass is currently a 900 ft wide artificial cut through the Bayou Dularge Ridge south of Lake Mechant. The pass is mainly used by commercial and recreational fisherman as a shortcut to the Gulf and has greatly eroded to a depth of approximately 36 feet which well exceeds the depth needed for navigation. The expansion of the pass to its current size has allowed for a substantial alteration of historic salinity and hydrology and consequently a broad area of the Central Terrebonne marshes are currently suffering some of the highest loss rates in the state.

Figure 1. Regional map of coastal Louisiana showing location of project area.

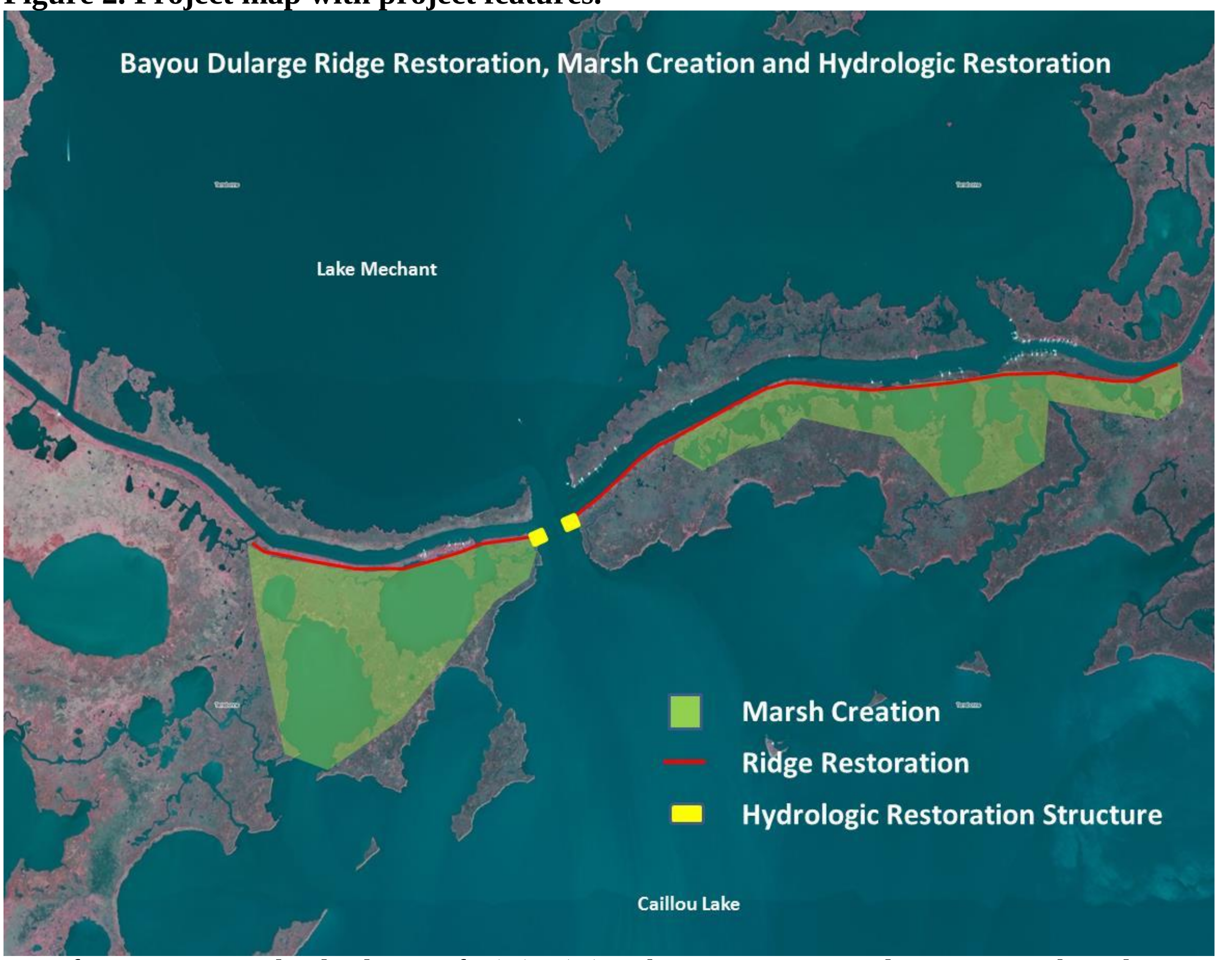


Proposed Solution (Project Location Information)

A rock structure would be constructed in Grand Pass to reduce the size of the opening by up to 90%, leaving an opening approximately 150 feet wide and 16 feet deep (Figure 2). The project would reestablish the historic function of the Bayou Dularge ridge that separated Lake Mechant from the Gulf and would moderate salinities that have greatly impacted the marshes to the north of Lake Mechant.

Secondly, lake sediments will be hydraulically dredged and pumped via pipeline to create/nourish approximately 450 acres of marsh (Figure 1). The proposed design is to place the dredged material to a fill height of +2.0 ft NAVD88. Dewatering and compaction of dredged sediments should produce marsh elevations conducive to the establishment of emergent marsh and within the intertidal range. The project will include perimeter containment of dredged material across marsh and open water areas as needed. Containment will not be constructed in areas where spoil banks currently exist or along the ridge alignment.

Figure 2. Project map with project features.



+6.0 ft NAVD88, and side slopes of 1(V):5(H). The current proposal is to create the ridge using material excavated from south of the existing ridge and backfill the borrow area with dredge material. Herbaceous plantings (e.g., seashore paspalum) will occur immediately after construction. Appropriate bottomland hardwood species (seedlings and saplings) will be planted approximately two years after material deposition is complete. Chinese tallow tree control and maintenance plantings will be included in the project.

Methods and Justification

The Wetland Value Assessment (WVA 2013) methodology (Variable 1 - Percent of Wetland Area Covered by Emergent Vegetation only) from the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) program was used to calculate the benefits of the project. Benefits are defined as the net acres of wetland area created, restored and/or protected during the life of the project. The CWPPRA program generally evaluates the projects over a 20 year period to correspond to the program obligation to operate and maintain the project. Therefore, the benefits developed in this proposal will reflect those derived for CWPPRA projects with a 20 year land loss rate adjustment to account for changes over time.

The U.S. Geological Service National Wetland Research Center (NWRC) provided an analysis of land loss for each of the project areas which includes a hypertemporal rate of loss derived from multiple images of LandSat data over a period ranging from 1984 to 2013. An analysis was performed on each of the project's three components – hydrologic restoration, marsh creation and ridge restoration. Each of these components requires a different approach to arrive at benefits, and therefore are treated individually for the purposes of analysis. The benefits of the three components can then be added together to yield total net benefits for the combined elements. All benefits are reported as acres.

This project has also utilized various forms of computer modeling to generate project effects and benefits. The hydrologic restoration component involved two models: 1) 2D finite element model RMA-2/RMA-11 – hydrodynamic simulation model to calculate salinity changes and water level changes with and without the structure and 2) STELLA – SPROD2 desktop model to calculate the benefits of salinity reductions predicted by the hydrodynamic model (Boustany 2011).

Hydrologic Restoration Component

NRCS recently contracted with FTN Associates, Ltd. (FTN) to develop, calibrate and apply a hydrodynamic model to assess the construction of a salinity control structure at Grand Pass for use in the selection of preferred project construction features (FTN Associates 2014). The study involved two phases including 1) determination and reconnaissance of the study area, a recommendation of the model to be used, a compilation of existing data, and a determination of additional data needs and 2) calibration and verification of a two-dimensional (2D) hydrodynamic model to be applied to evaluate the impacts of various proposed alternatives.

FTN calibrated the model using data acquired from project specific sondes at select locations, available USGS gauges, and CRMS gauges. Salinity, water level, and velocity data were collected continuously at 15 minute intervals during the period of January 2011 through December 2011. After the model was calibrated, the model was run for various structural alternatives for the Grand Pass structure to determine the impact of the structure on project area salinities. The following (Table 1) describes the structural alternatives used:

Table 1. Description of structural feature alternatives analyzed in hydrodynamic model.

Structure Number	Bottom Width (ft)	Boat Bay Crest Elevation (ft, NAVD88)	Side Slopes	Top of Weir Crest Elevation (ft, NAVD88)	Top Width (ft)
1	150	-16	3:1	+4	270
2	80	-10	3:1	+4	164
3	300	-16	3:1	+4	420
4	N/A	N/A	N/A	+4	N/A

- **Grand Pass Structure #1** – A rock structure which reduces the existing cross-sectional area to a trapezoidal cross-section with the following dimensions: 150-ft bottom width, -16.0 ft NAVD88 boat bay crest, 3:1 side slopes. Crest of the top of the weir and abutment will be at +4.0 ft NAVD88 with a width of 270-ft.

- **Grand Pass Structure #2** – A rock structure which reduces the existing cross-sectional area to a trapezoidal cross-section with the following dimensions: 80-ft bottom width, -10.0 ft NAVD88 boat bay crest, 3:1 side slopes. Crest of the top of the weir and abutment will be at +4.0 ft NAVD88 with a width of 164-ft.

- **Grand Pass Structure #3** – A rock structure which reduces the existing cross-sectional area to a trapezoidal cross-section with the following dimensions: 300-ft bottom width, -16.0 ft NAVD88 boat bay crest, 3:1 side slopes. Crest of the top of the weir and abutment will be at +4.0 ft NAVD88 with a width of 420-ft.

- **Grand Pass Structure #4** – A rock structure which blocks the entire pass. Crest of the top of the weir and abutment will be at +4.0 ft NAVD88.

FTN provided the model predictions on the four structure alternatives including salinity effects, water surface elevations and velocity changes at all of the modeled cross-sections where there was concern regarding potentially hazardous increases in tidal velocities and rerouting of large volumes of water to alternate locations resulting from the structural reductions in the pass. NRCS used the salinity reduction information to derive wetland benefits; the other physical hydrologic information will be incorporated into design considerations.

The following table (Table 2) includes the mean monthly salinity percent changes for each marsh type (fresh, intermediate, brackish and saline) when compared to the Future Without Project condition for the preferred alternative (06-FWGP10, which is the 150' x 16' structure). The analysis was run for the calendar year 2011 which also happened to be the year that the Mississippi and Atchafalaya River systems were experiencing a significant flooding event. When examining the average percent reduction, the total year reduction percent is somewhat dampened by the unusually low

Table 2. Average salinity reduction percents for habitat types determined by hydrodynamic model.

FWGP10 w/o Liners Canal			
Average Percent Reduction by Habitat Type	All months	w/o May, June, July	Fall ONLY - Sep, Oct, Nov, Dec
Fresh	-11.4	-14.7	-26.2
Intermediate	-8.9	-11.4	-15.3
Brackish	-7.8	-8.1	-8.7
Saline	-4.8	-5.3	-3.7
average	-8.2	-9.9	-13.5

salinity levels experienced in the months of May, June, and July when the peak flood occurred. The annual average percent salinity reduction in the project area was 8.2%. If the months during peak flooding are removed from the annual average, the salinity reduction increases to 9.9%. We also observed that the percent salinity reduction during the fall, which is when salinities were highest for the year, was greatest (-13.5%) indicating that the impact of the structure tended to increase during the period when highest salinity is occurring. Also observed is that the highest percent salinity reductions were in the intermediate (-15.3%) and fresh marsh (-26.2%) zones which are farthest away from the structure location while the brackish and saline percent reductions are more consistent under all other circumstances (-7.8 to 8.7% in brackish and -4.8 to -3.7% in saline marshes).

Emergent Wetland Benefits: The project boundary includes a total of 48,446 acres (Figure 3), encompassing Lake Mechant and surrounding wetlands. 2012 Land/Water data of DOQQ imagery indicates that the area consists of approximately 3,717 acres of intermediate marsh to the north, 13,171 acres of brackish marsh, and 2,533 acres of salt marsh at the southern-most end near the Grand Pass. From 1984 to 2011, USGS has determined that the area has been losing land at the rate of 186 acres per year or **-0.46%/y** (**Figure 4**).

Figure 3. USGS boundary map.

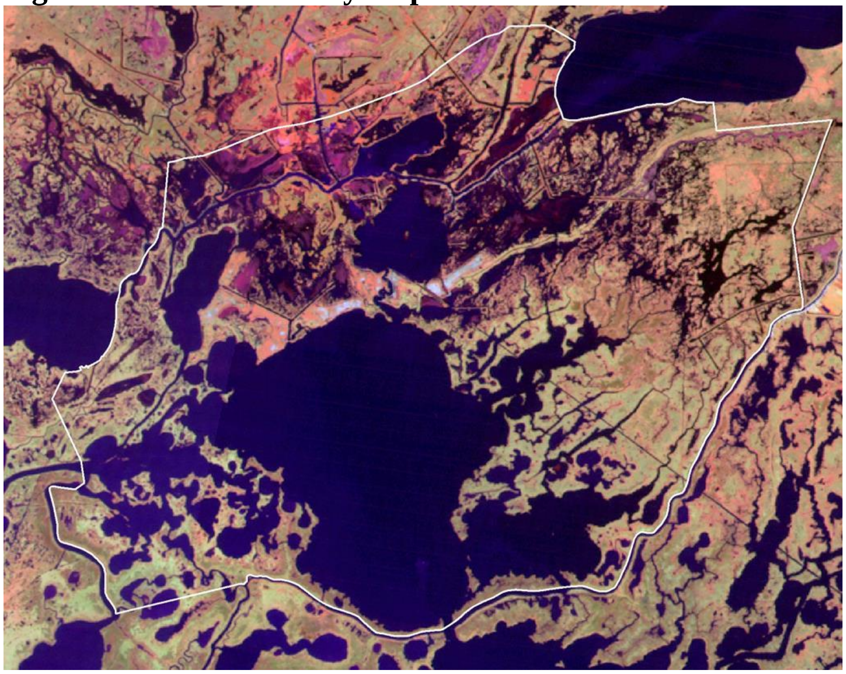
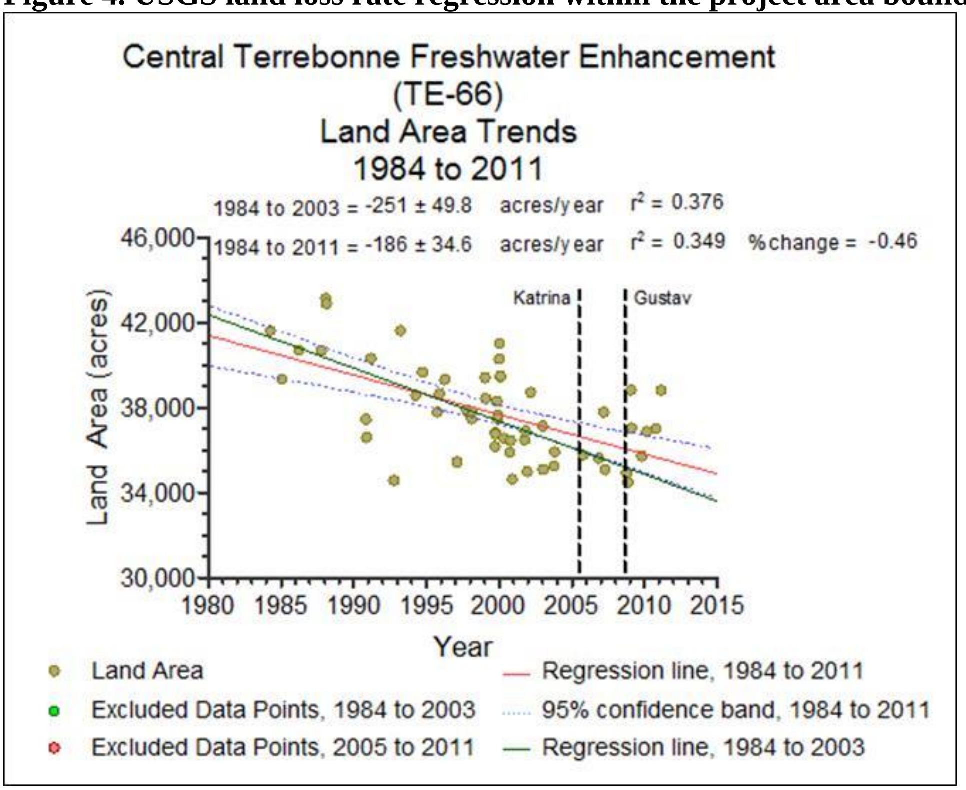


Figure 4. USGS land loss rate regression within the project area boundary.

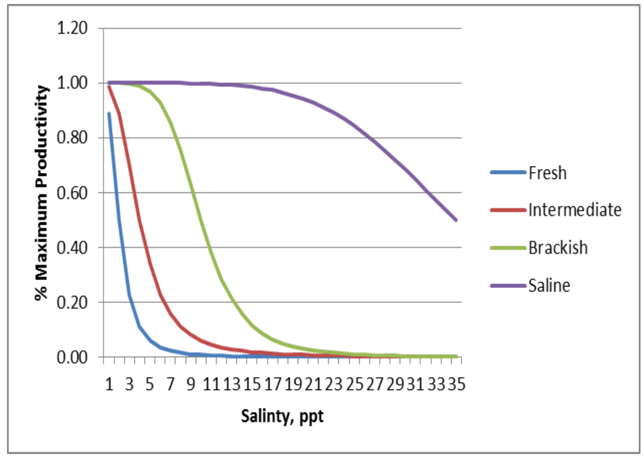


The project objective to reduce the volume flow of saline water moving through Grand Pass into Lake Mechant to reduce salinity intrusion into the upper basin has been demonstrated through two independent modeling efforts (NRCS preliminary modeling and FTN hydrodynamic model). The NRCS model consisted of a spreadsheet application indicating that the project would result in approximately 15% reduction in the project area salinity. The FTN model consisted of a much more intensive and sophisticated 2D hydrodynamic model indicating a lesser effect but also indicated that there was seasonal and quite likely inter-annual variability depending on annual flow of the Atchafalaya River. As discussed above, the 2011 flood year model estimate was 8.2% reduction in average monthly salinity. Removing the peak flood months (May, June, and July) adjusted the reduction to 10%. During fall, when minimum annual freshwater head is experienced, the structure effects increase the difference to 13.5%. Because 2011 was a flood year, NRCS expects that the reduction in average monthly salinity as a result of the structure would be similar to the **10%** reduction in salinity calculated when the peak flood months were removed.

Wetland Benefits Analysis: Salinity has been documented to directly affect plant productivity (LCA 2004, Appendix C). Plant production is an important component of marsh stability in that it provides the organic fraction of the marsh soils. Large areas of marsh loss have occurred in areas where marsh vegetation has been impacted by saltwater intrusion. This is particularly true in the highly organic fresh and intermediate marshes which are almost exclusively maintained by plant production. However, even brackish and salt marsh production is affected by salinity. Figure 5 shows four salinity productivity algorithms for the four marsh types originally derived from a series of studies used to develop the habitat switching models for the LCA (Snedden and Swenson 2012). Salinity increase progressively impacts productivity and, although salinity may not kill the plant directly, reduces the rate of production of a broad area, translating into a lack of organic matter production and a reduction in the internal accumulation of organic matter needed to sustain soil formation. Because *in situ* organic production is an important component to soil maintenance and to sustaining elevation, the inference is that the reduction in organic production will increase the land loss rate. Therefore, it can also be inferred that an increase in production will reduce the land loss rate by increasing organic production.

Figure 5. Salinity productivity algorithms by marsh classification (Snedden and Swenson 2012) with graph representation showing curves of lines.

Marsh type	Salinity
Swamp	$P_{sal} = \frac{1}{1+\left(\frac{sal}{4}\right)^3}$
Fresh	$P_{sal} = \frac{1}{1+\left(\frac{sal}{2}\right)^3}$
Intermediate	$P_{sal} = \frac{1}{1+\left(\frac{sal}{4}\right)^3}$
Brackish	$P_{sal} = \frac{1}{1+\left(\frac{sal}{10}\right)^5}$
Saline	$P_{sal} = \frac{1}{1+\left(\frac{sal}{35}\right)^5}$



The SPROD2 salinity model incorporates these salinity production curves to determine the change in percent maximum productivity for each marsh classification as a result of salinity reduction. In each marsh zone, productivity is determined for the initial and adjusted (FWP) average salinity and the difference is expressed as a percentage change in the percent of maximum productivity. In general, as salinity increases above the optimum salinity for maximum productivity, maximum productivity will decrease below 100% and organic carbon production will decrease. Organic production will increase toward maximum as salinity decreases. The percent difference in productivity is then used to calculate the amount of organic carbon produced. The SPROD2 model then calculates acres of benefit based upon the volume of organic matter produced, the density of the soil, and the depth of the area to fill.

The SPROD2 model was run on an hourly time step for approximately 32,400 hours of available data for Coastwide Reference Monitoring System (CRMS) sites located within the project area using STELLA modeling software (version 10.0.04). The future without project salinity data and water level data for the without project condition were obtained from the CRMS site located just southwest of the Grand Pass (CRMS 4455) (Figure 6). The future with project condition reflected the 10% salinity reduction estimate from the FTN hydrodynamic model. This data was matched with brackish and intermediate data from CRMS 396 and 398, respectively (Figure 7), to estimate a project effect.

Figure 6. Salinity and tide data used in model from CRMS 4455.

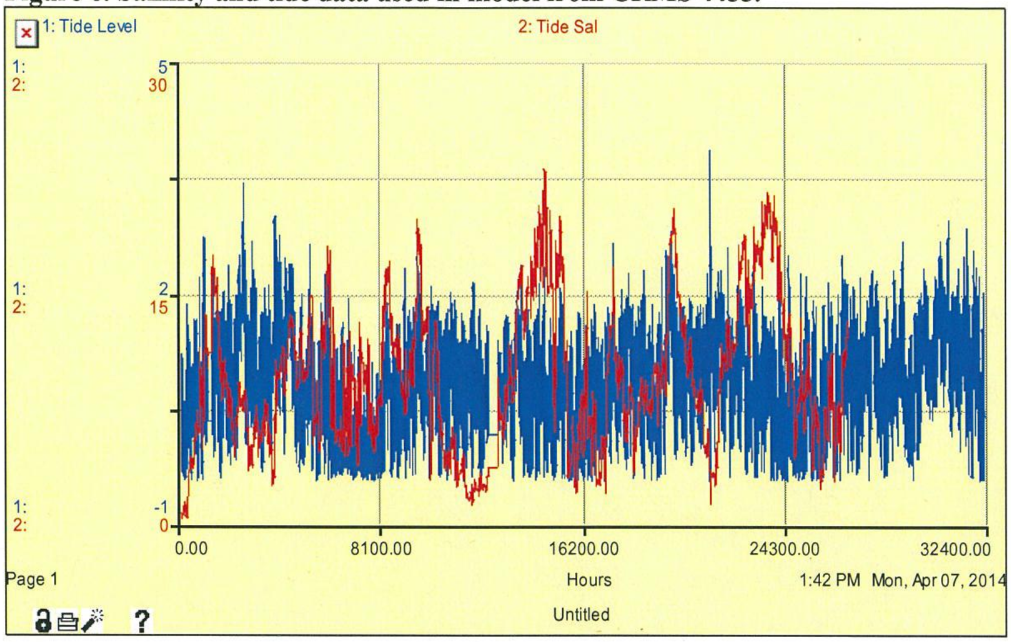
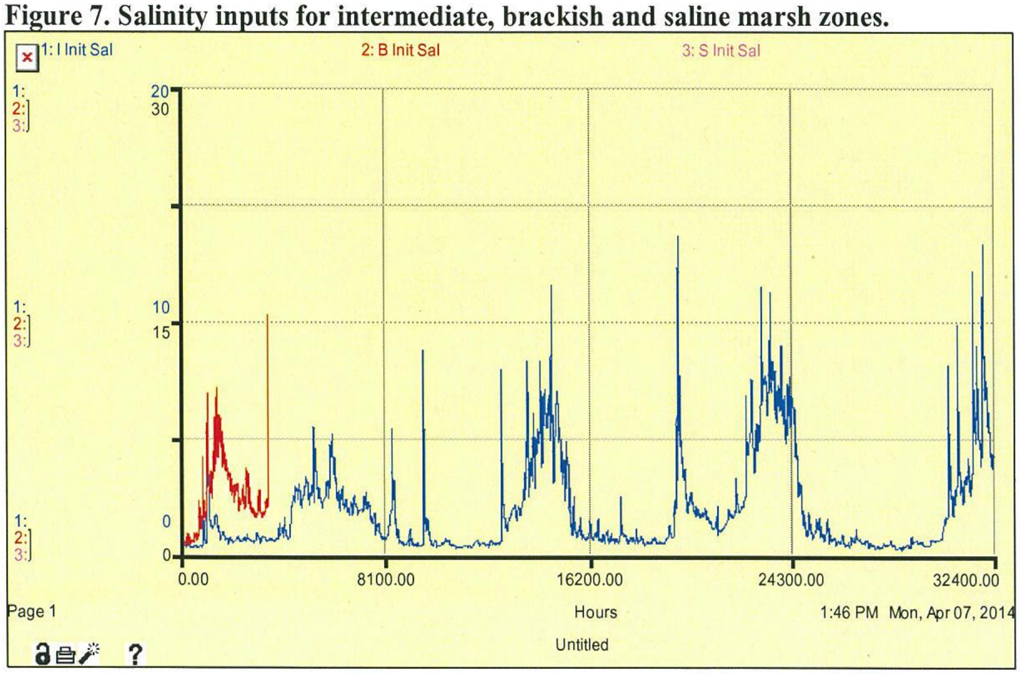


Figure 7. Salinity inputs for intermediate, brackish and saline marsh zones.



Using an average of 10% reduction in the salinity over the entire project area, the SPROD2 model indicates that the land loss rate would be reduced by **14.3%** annually which is the equivalent of **12.12 acres per year** across the entire project area.

The benefits (net acres created/restored/protected) were broken up according to the land area cover for each of the three zones referred to as AREA 1-Fresh/Intermediate (16%), AREA 2-Brackish (73%), AREA 3-Saline (11%) and analyzed on separate compound land loss spreadsheets through target year 20. The following are the net benefits from each of the project zones:

Fresh/Intermediate	45 acres
Brackish	158 acres
Saline	30 acres
Total Net Acres	**233 acres**

Marsh Creation Component

Historical and present vegetative community: In 1949 and 1968, the marsh creation area was classified as mostly saline marsh but some of the area consisted of brackish marsh. From 1978 on to 2013 the marsh creation area was entirely saline marsh. The latest salinity, marsh type classification, and vegetative transect data for CRMS station 4455 (Figure 8; Table 3) are shown below. Based on the historical classifications and the most recent observations, the project was evaluated using the **saline** marsh model.

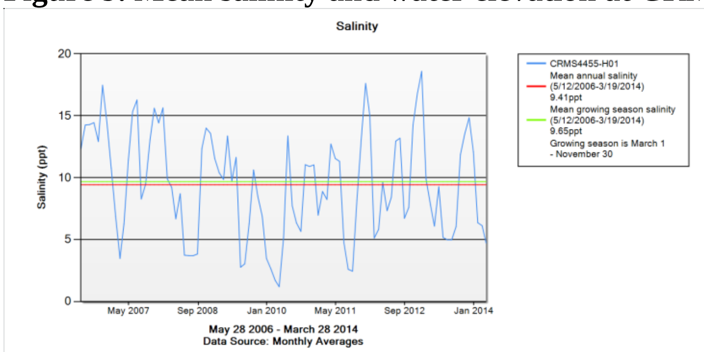
Figure 8. Marsh classification and location of CRMS 4455 station.

Table 3. Marsh types survey information for the marsh creation area.

According to 2013 marsh type survey (Sasser, C.E., Visser, J.M., Mouton, Edmond, Linscombe, Jeb, and Hartley, S.B., 2014, Vegetation types in coastal Louisiana in 2013: U.S. Geological Survey Scientific Investigations Map 3290, 1 sheet, scale 1:550,000, http://dx.doi.org/10.3133/sim3290.)						
Marsh Class	MC1	MC2	MC3	MC4	RidgeE	RidgeW
Brackish Marsh	0%	0%	0%	1%	10%	35%
Saline Marsh	22%	8%	8%	58%	54%	31%
Water	78%	92%	92%	41%	36%	34%
	100%	100%	100%	100%	100%	100%

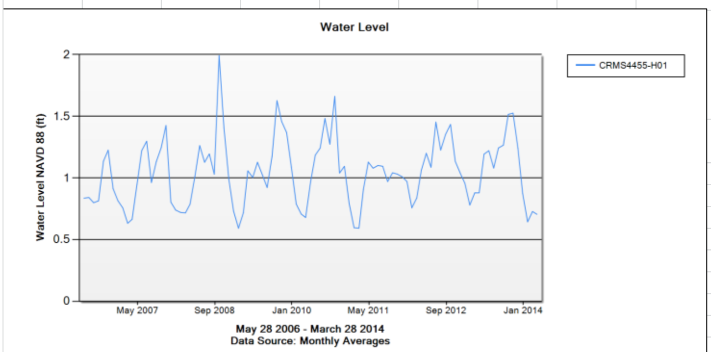
The mean salinity for the project area for 2013 was 8.14 ppt but the mean for the growing season was slightly higher at 8.5 ppt (Figure 9). The mean water elevation is 1.01 ft for that same period. The dominant vegetation at CRMS 4455 is *Juncus roemerianus* at 71.5% and *Spartina alterniflora* at 18.1% which is typical of a salt marsh (Figure 10).

Figure 9. Mean salinity and water elevation at CRMS monitoring station 4455.



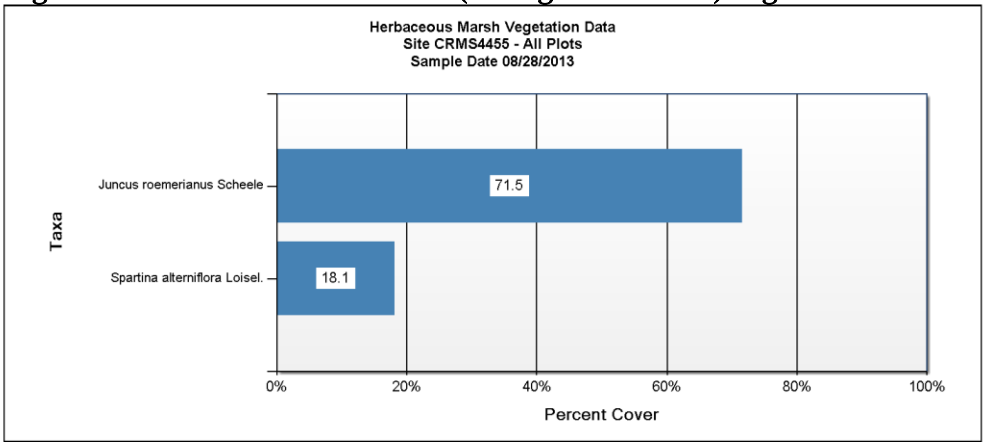
Mean 2013 Growing Season Salinity (March 1 – Nov 30): 8.5 ppt

Water Salinity (ppt) at the CRMS hydro station, CRMS4455-H01.				
	3/2013 - 3/2014	Mar 1 - Jun 30	Jul 1 - Oct 31	Nov 1 - Feb 28
Min	1.08	2.53	1.43	2.83
Mean	8.14	4.71	9.09	9.83
Max	18.89	9.91	16.51	18.89



Water Elevation (ft. NAVD 88) at the CRMS hydro station, CRMS4455-H01.				
	3/2013 - 3/2014	Mar 1 - Jun 30	Jul 1 - Oct 31	Nov 1 - Feb 28
Min	-0.06	-0.06	-0.03	-0.04
Mean	1.08	0.7	1.39	0.87
Max	2.79	1.66	2.79	2.72

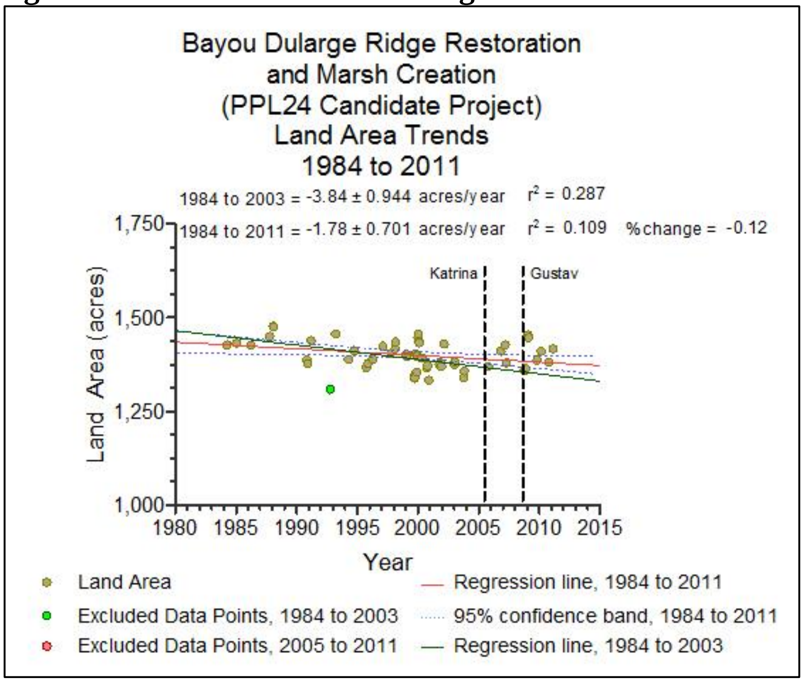
Figure 10. Dominant herbaceous (emergent wetland) vegetation at CRMS 4455 location.



Soils in the project area have a bulk density typical for salt marsh in the range of 0.22 to 0.32 g cm^{-3}. Subsidence does not seem to be a major problem as elevations have remained fairly stable. The main problem is the lateral shrinkage of the land form between the two large lake systems. Erosion continues to encroach on the marsh, reducing the land bridge that separates Lake Mechant from Caillou Lake.

Land loss: USGS calculated a historical loss rate using a hyper-temporal analysis for the period 1984 to 2011 (Figure 11). That analysis utilized a total of 56 TM satellite scenes. <u>The loss rate during that period was -0.12%/year</u>.

Figure 11. USGS land loss rate regression used for the marsh creation area.



Emergent wetland vegetation benefits: Initially, the marsh creation area consists of 185 acres of existing marsh and 305 acres of open water for a total of 490 acres. The project will fill the open water areas to create approximately 305 additional acres of emergent marsh and nourish the existing marsh. The net acres of marsh that are expected from the marsh creation component after 20 years are **282 acres**.

Ridge Restoration Component
The ridge feature will be constructed along the south bank of Bayou Dularge and tie into the hydrologic structure on either side of Grand Pass. The ridge construction will include at total 17,220 linear feet for a total land area cover of **25 acres**.

Planting Schedule

1) Construction Year: The goal is to establish low, herbaceous cover before planting hardwood seedlings and saplings the following year. Herbaceous cover will add organic material to the soil and provide a better ground "climate" for the seedlings. Tall herbaceous cover or woody growth is not desirable as they would compete with newly-planted seedlings. Six rows (rows 10' apart; 5'spacing on rows) of seashore paspalum will be planted across the ridge. Paspalum plantings and natural recruitment of other species should provide adequate herbaceous cover after one year of growth.
2) Year 1: Basal spray (Clearcast in July-September) of any Chinese tallow tree seedlings which may have colonized the site. The crown of the ridge will be "ripped" to loosen up the packed soil and allow for root expansion. Hardwood seedlings will be planted (December-March) on a 10'x10' spacing (435 trees per acre). Species include live oak, sugarberry, red mulberry, toothache tree, yaupon holly, and other suitable species. Tubex tree protectors will be installed to protect the seedlings from nutria herbivory. Saplings (500) will also be planted to accelerate canopy cover.
3) Year 2: In case of a complete planting failure, a full replant (seedlings and saplings) and Chinese tallow tree control will be included in the budget.
4) Years 4, 6, 8, 10, 12, and 14: Chinese tallow tree control until canopy closure occurs.

Summary of Project Benefits

The three project components (hydrologic restoration, marsh creation and ridge restoration) perform synergistically to provide benefits to over approximately 48,000 acres of wetlands. The project location provides a unique opportunity to manage salinity intrusion into a vast area where salinity was historically and naturally moderated through intact land features. By reducing the cross-section of Grand Pass and restoring the integrity of the land bridge that separates the two large lake systems (Lake Mechant and Caillou Lake), the project will result in 233 acres from the hydrologic restoration, 282 acres from the marsh creation and 25 acres of ridge for a total 540 acres of total direct net acres of benefit.

Hydrologic Restoration	233 acres
Marsh Creation	282 acres
Ridge Restoration	25 acres
Total Benefits	**540 acres**

Maintenance and Monitoring

The hydrologic restoration component consists of an engineered rock structure that may need periodic maintenance to maintain elevation in order to be fully effective. NRCS usually projects the costs of maintaining a structure based upon best available design information, including expected settlement. In the design phase of the project, geotechnical analyses are done on the soils to determine load bearing and the design will account for expected settlement. The analysis will also determine volume of rock material that will be needed to maintain the structure over time. This is budgeted in the calculation of the cost of the project. Monitoring of this structure will include annual inspections of the structure by the project team. Environmental monitoring will be included the Coastwide Reference Monitoring System (CRMS) that has been set up and is funded through the CWPPRA program. There are several continuous monitoring stations set up throughout the project area that will allow for observation on the performance of the project.

Design of the marsh creation component also includes geotechnical analysis to determine the initial elevation of fill material needed to compensate for settlement and achieve the target marsh elevation. This will be monitored through the use of preset staff gauges placed within the marsh creation cells. Following construction, the marsh creation cells will be monitored for natural colonization of native vegetation and, if natural colonization is low, the area may be planted.

The ridge restoration component has an intensive vegetation plan that includes timed planting of target native species and herbicide treatments to prevent invasive/exotics from preventing the establishment of desired species. This will require monitoring and coordination to optimize the development of the ridge feature as both quality habitat and as an important functional landscape feature.

Risks and Uncertainties

Working on the coast of Louisiana is a challenge; it is very difficult to move equipment into very remote locations that have elements of sensitivity. The coastal wetlands provide habitat for numerous fish and wildlife species and provide socioeconomic resources including commercial fishing (crabs, shrimp, and oysters), recreation fishing, and oil and gas infrastructure. All of these factors have to be considered when doing construction. However, the location of this project is primarily in open water and is readily accessible through several state-owned navigable waterways. All environmental and use compliances will be cleared before initiating any construction on this project.

Inherent uncertainties exist with the construction and sustainability of this type of project on the coast of Louisiana. The main constraint is in the ability of the soils to support any kind of structure, and rock structures in particular can be challenging because of weight. Standard load bearing calculations minimize the risk and inform the design to minimize the risk of failure. Proper budgeting for maintenance will also reduce the risk of failure and sustain the performance as designed.

The construction of the rock structure in the Grand Pass may pose some risk as both an obstruction and as a constriction of water flow that promotes greater water velocity through the structure with tidal movements. The hydrodynamic model analysis performed on this project has indicated that the preferred alternative provided the acceptable environmental benefits while also maintaining acceptable cross-section velocities. NRCS has taken this into account and is prepared to design the project feature in accordance to these specifications. The design will also address the issue of potential navigation obstruction by providing all necessary signage and markings that are required.

V. Budget Narrative

Each of the three components of this project involves extensive Engineering and Design detail in the initial Phase I development. While NRCS has completed initial feasibility work and modeling on the project to determine ecological benefits, engineering and design work remains to be completed prior to requesting full construction funding. Therefore, NRCS is requesting within this proposal the Phase I engineering and design funding to prepare the project for construction with the intent to seek additional funding through available sources to complete Phase II construction at a later date.

Engineering and Design:					
Engineering	$2,526,241				
Geotechnical Investigation	$733,600				
Hydrologic Modeling	$0				
Data Collection	$595,460				
Cultural Resources	$260,000				
				Subtotal:	$4,115,301
Supervision and Administration (includes NEPA Compliance)					$692,545
Easements and Land Rights					
Oyster **Seed** Ground in Project area/Borrow area (Yes/No) (No - if have Lease)	Yes	Assessment	$50,000		
Oyster **Lease** in Project area/Borrow area (Yes/No)	No	Survey	$0		
		Appraisal	$0		
Land Rights			$304,238		
				Subtotal:	$354,238
				Total Phase I Cost Estimate:	**$5,162,084**

VI. Environmental Compliance Checklist (Appendix B)

Gulf Coast Ecosystem Restoration Council
Environmental Compliance Checklist

Please check all federal and state environmental compliance and permit requirements as appropriate to the proposed project/program

Environmental Compliance Type	**Yes**	**No**	**Applied For**	**N/A**
Federal				
National Marine Sanctuaries Act (NMSA)		X		
Coastal Zone Management Act (CZMA)	X			
Fish and Wildlife Coordination Act	X			
Farmland Protection Policy Act (FPPA)		X		
NEPA – Categorical Exclusion		X		
NEPA – Environmental Assessment	X			
NEPA – Environmental Impact Statement		X		
Clean Water Act – 404 – Individual Permit (USACOE)	X			
Clean Water Act – 404 – General Permit(USACOE)		X		
Clean Water Act – 404 – Letters of Permission(USACOE)		X		
Clean Water Act – 401 – WQ certification	X			
Clean Water Act – 402 – NPDES	X			
Rivers and Harbors Act – Section 10 (USACOE)	X			
Endangered Species Act – Section 7 – Informal and Formal Consultation (NMFS, USFWS)	X			
Endangered Species Act – Section 7 - Biological Assessment (BOEM,USACOE)		X		
Endangered Species Act – Section 7 – Biological Opinion (NMFS, USFWS)		X		
Endangered Species Act – Section 7 – Permit for Take (NMFS, USFWS)		X		
Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) – Consultation (NMFS)	X			
Marine Mammal Protection Act – Incidental Take Permit (106) (NMFS, USFWS)		X		
Migratory Bird Treaty Act (USFWS)	X			
Bald and Golden Eagle Protection Act – Consultation and Planning (USFWS)	X			
Marine Protection, Research and Sanctuaries Act – Section 103 permit (NMFS)		X		
BOEM Outer Continental Shelf Lands Act – Section 8 OCS Lands Sand permit		X		
NHPA Section 106 – Consultation and Planning ACHP, SHPO(s), and/or THPO(s)	X			
NHPA Section 106 – Memorandum of Agreement/Programmatic Agreement	X			
Tribal Consultation (Government to Government)	X			
Coastal Barriers Resource Act – CBRS (Consultation)		X		
State				
As Applicable per State	X			

VII. Project Coordination (data and information sharing plan)

This project is a component of a much broader effort to restore coastal Louisiana. The project has been identified in the Louisiana State Master Plan (CPRA 2012) as a priority location and these components have been developed in collaboration with Louisiana Coastal Protection and Restoration Authority, Terrebonne Parish, and private landowners that are within the footprint of the project. In addition, the project has been vetted through a process of engineering and environmental scrutiny that includes the participation of several state and federal agencies including U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, NOAA National Marine Fisheries, U.S. Army Corp of Engineers, and the Louisiana Department of Wildlife and Fisheries.

VIII. Literature Cited

Boustany, R.G. 2011. A method for estimating the benefits of salinity reduction in coastal marsh communities. NRCS Louisiana Report. Lafayette, LA 70506

Boustany, R.G. 2014. Bayou Dularge Ridge Restoration and Marsh Creation. Wetland Value Assessment for the Coastal Wetland Planning, Protection and Restoration Act, Environmental Work Group. Natural Resources Conservation Service, Lafayette, LA.

Coastal Protection and Restoration Authority (CPRA). 2012. Louisiana's Comprehensive Master Plan for a Sustainable Coast. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.

FTN Associates. 2014. Central Terrebonne freshwater enhancement study (TE-66). Report to Natural Resources Conservation Service. FTN Report number R02700-0003-003. FTN Associates, Ltd. Little Rock Arkansas.

United States Army Corps of Engineers. 2004. Louisiana Coastal Area (LCA), Louisiana. Ecosystem Restoration Study, New Orleans, Louisiana. 506 pp. Internet URL: www.LCA.gov.

Snedden, G.A. and Swenson, E.M. 2012. Hydrologic index development and application to selected Coastwide Reference Monitoring System sites and Coastal Wetlands Planning, Protection and Restoration Act projects: U.S. Geological Survey Open-File Report 2012-1122, 25 p.

Wetland Value Assessment (WVA). 2013. Coastal Wetlands Planning Protection and Restoration Act. Wetland Value Assessment Methodology – Coastal Marsh Community Model. April 2013, Version 1.2. Environmental Work Group. Chairman Kevin J. Roy, U.S. Fish and Wildlife Service. Lafayette, LA 70506

IX. Other**: Supporting documentation**

CHITIMACHA
TRIBE OF LOUISIANA

November 13, 2014

U.S. Department of Agriculture
Secretary Thomas Vilsack
1400 Independence Avenue SW, Room 200-A
Washington, DC 20250

Dear Secretary of Agriculture Thomas Vilsack,

The purpose of this letter is to indicate our support for the Bayou Dularge Ridge Restoration, Marsh Creation and Hydrologic Restoration Project as proposed for consideration for funding by the RESTORE Council. The proposed project will improve this part of Central Terrebonne marshes, which are part of the Chitimacha homeland. The proposed project will benefit approximately 48,000 acres of wetlands through its three components by reducing the size of the opening at Grand Pass and restoring the integrity of land bridge that separates two large lake systems (Lake Mechant and Caillou Lake) located in Terrebonne Parish, Louisiana. This project will result in the gain of 233 net acres from the hydrologic restoration, 282 net acres from the marsh creation and 25 net acres of ridge for a total of 540 net acres of total direct benefit over its first 20 years.

For the reasons cited above, the Chitimacha Nation strongly supports the project as proposed and all other ecosystem restoration projects in St. Mary Parish that would preserve and protect valuable tribal resources and traditions important to the Chitimacha Nation.

It is our understanding that as a recognized American Indian Tribe, we are able to send RESTORE project proposals for potential inclusion on the Funded Project List to a RESTORE Council member for submission to the full Council. As you are a member of the RESTORE Council, we are sending the attached proposal to you for submission to the full RESTORE Council.

We also have the Cote Blanche Freshwater and sediment introduction, and shoreline protection project for your consideration. If we had to choose one of these projects as priority, it would be the St. Mary Parish project because it would more directly benefit the Tribe today in protecting our only existing land base.

Sincerely,

John Paul Darden

John Paul Darden,
Chairman

155 Chitimacha Loop Road P.O. Box 661 Charenton, LA 70523 (337) 923-7215 FAX (337) 923-9914

Land loss spreadsheet for AREA 1-Fresh/Intermediate Marsh

Land Loss Spreadsheet

Project:	TE-66 Central Terrebonne FEW-Intermediate				**Loss Rate (%/yr)**			
Total Acres	**Year**	**Marsh Acres**	**Water Acres**		-0.46			
7,526	2012	3,717	3,809					
7,526	2014	3,700	3,826		FWP Land Loss Rate Reduction			0.14

	FWOP				**FWP**					
TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Net Acres of Marsh	Total Acres Check
2012		3,717	49%	3,809						
2013	-0.0046	3,700	49%	3,826						
2014	-0.0046	**3,683**	**49%**	**3,843**						
1	-0.0046	3,666	49%	3,860	-0.003942	3,668	49%	3,858	2	7,526
2	-0.0046	**3,649**	**48%**	**3,877**	-0.003942	**3,654**	**49%**	**3,872**	5	7,526
3	-0.0046	3,632	48%	3,894	-0.003942	3,640	48%	3,886	7	7,526
4	-0.0046	**3,616**	**48%**	**3,910**	-0.003942	**3,625**	**48%**	**3,901**	10	7,526
5	-0.0046	3,599	48%	3,927	-0.003942	3,611	48%	3,915	12	7,526
6	-0.0046	3,582	48%	3,944	-0.003942	3,597	48%	3,929	14	7,526
7	-0.0046	3,566	47%	3,960	-0.003942	3,582	48%	3,944	17	7,526
8	-0.0046	3,550	47%	3,976	-0.003942	3,568	47%	3,958	19	7,526
9	-0.0046	3,533	47%	3,993	-0.003942	3,554	47%	3,972	21	7,526
10	-0.0046	3,517	47%	4,009	-0.003942	3,540	47%	3,986	23	7,526
11	-0.0046	3,501	47%	4,025	-0.003942	3,526	47%	4,000	26	7,526
12	-0.0046	3,485	46%	4,041	-0.003942	3,512	47%	4,014	28	7,526
13	-0.0046	3,469	46%	4,057	-0.003942	3,499	46%	4,027	30	7,526
14	-0.0046	3,453	46%	4,073	-0.003942	3,485	46%	4,041	32	7,526
15	-0.0046	3,437	46%	4,089	-0.003942	3,471	46%	4,055	34	7,526
16	-0.0046	3,421	45%	4,105	-0.003942	3,457	46%	4,069	36	7,526
17	-0.0046	3,405	45%	4,121	-0.003942	3,444	46%	4,082	38	7,526
18	-0.0046	3,390	45%	4,136	-0.003942	3,430	46%	4,096	41	7,526
19	-0.0046	**3,374**	**45%**	**4,152**	-0.003942	**3,417**	**45%**	**4,109**	43	7,526
20	-0.0046	**3,358**	**45%**	**4,168**	-0.003942	**3,403**	**45%**	**4,123**	45	7,526

Land loss spreadsheet for AREA 2-Brackish Marsh

Land Loss Spreadsheet

Project:	TE-66 Central Terrebonne FEW-Brackish				**Loss Rate (%/yr)**					
Total Acres	**Year**	**Marsh Acres**	**Water Acres**		-0.46					
35,361	2012	13,171	22,190							
35,361	2014	13,110	22,251		FWP Land Loss Rate Reduction			0.14		
FWOP					**FWP**					
TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Net Acres of Marsh	Total Acres Check
2012		13,171	37%	22,190						
2013	-0.0046	13,110	37%	22,251						
2014	-0.0046	**13,050**	**37%**	**22,311**						
1	**-0.0046**	**12,990**	**37%**	**22,371**	**-0.003942**	**12,999**	**37%**	**22,362**	**9**	35,361
2	-0.0046	12,930	37%	22,431	-0.003942	12,947	37%	22,414	17	35,361
3	**-0.0046**	**12,871**	**36%**	**22,490**	**-0.003942**	**12,896**	**36%**	**22,465**	**26**	35,361
4	-0.0046	12,812	36%	22,549	-0.003942	12,846	36%	22,515	34	35,361
5	**-0.0046**	**12,753**	**36%**	**22,608**	**-0.003942**	**12,795**	**36%**	**22,566**	**42**	35,361
6	-0.0046	12,694	36%	22,667	-0.003942	12,744	36%	22,617	50	35,361
7	-0.0046	12,636	36%	22,725	-0.003942	12,694	36%	22,667	59	35,361
8	-0.0046	12,578	36%	22,783	-0.003942	12,644	36%	22,717	67	35,361
9	-0.0046	12,520	35%	22,841	-0.003942	12,594	36%	22,767	75	35,361
10	-0.0046	12,462	35%	22,899	-0.003942	12,545	35%	22,816	83	35,361
11	-0.0046	12,405	35%	22,956	-0.003942	12,495	35%	22,866	91	35,361
12	-0.0046	12,348	35%	23,013	-0.003942	12,446	35%	22,915	98	35,361
13	-0.0046	12,291	35%	23,070	-0.003942	12,397	35%	22,964	106	35,361
14	-0.0046	12,234	35%	23,127	-0.003942	12,348	35%	23,013	114	35,361
15	-0.0046	12,178	34%	23,183	-0.003942	12,299	35%	23,062	121	35,361
16	-0.0046	12,122	34%	23,239	-0.003942	12,251	35%	23,110	129	35,361
17	-0.0046	12,066	34%	23,295	-0.003942	12,203	35%	23,158	136	35,361
18	-0.0046	12,011	34%	23,350	-0.003942	12,155	34%	23,206	144	35,361
19	-0.0046	11,956	34%	23,405	-0.003942	12,107	34%	23,254	151	35,361
20	**-0.0046**	**11,901**	**34%**	**23,460**	**-0.003942**	**12,059**	**34%**	**23,302**	**158**	35,361

Land loss spreadsheet for AREA 3-Saline Marsh

Land Loss Spreadsheet

Project:	TE-66 Central Terrebonne FEW-Saline				**Loss Rate (%/yr)**			
Total Acres	**Year**	**Marsh Acres**	**Water Acres**		-0.46			
5,559	2012	2,533	3,026					
5,559	2014	2,521	3,038		FWP Land Loss Rate Reduction			0.14

	FWOP				**FWP**					
TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Net Acres of Marsh	Total Acres Check
2012		2,533	46%	3,026						
2013	-0.0046	2,521	45%	3,038						
2014	-0.0046	**2,510**	**45%**	**3,049**						
1	**-0.0046**	**2,498**	**45%**	**3,061**	**-0.003942**	**2,500**	**45%**	**3,059**	**2**	5,559
2	-0.0046	2,487	45%	3,072	-0.003942	2,490	45%	3,069	3	5,559
3	**-0.0046**	**2,475**	**45%**	**3,084**	**-0.003942**	**2,480**	**45%**	**3,079**	**5**	5,559
4	-0.0046	2,464	44%	3,095	-0.003942	2,470	44%	3,089	7	5,559
5	**-0.0046**	**2,453**	**44%**	**3,106**	**-0.003942**	**2,461**	**44%**	**3,098**	**8**	5,559
6	-0.0046	2,441	44%	3,118	-0.003942	2,451	44%	3,108	10	5,559
7	-0.0046	2,430	44%	3,129	-0.003942	2,441	44%	3,118	11	5,559
8	-0.0046	2,419	44%	3,140	-0.003942	2,432	44%	3,127	13	5,559
9	-0.0046	2,408	43%	3,151	-0.003942	2,422	44%	3,137	14	5,559
10	-0.0046	2,397	43%	3,162	-0.003942	2,413	43%	3,146	16	5,559
11	-0.0046	2,386	43%	3,173	-0.003942	2,403	43%	3,156	17	5,559
12	-0.0046	2,375	43%	3,184	-0.003942	2,394	43%	3,165	19	5,559
13	-0.0046	2,364	43%	3,195	-0.003942	2,384	43%	3,175	20	5,559
14	-0.0046	2,353	42%	3,206	-0.003942	2,375	43%	3,184	22	5,559
15	-0.0046	2,342	42%	3,217	-0.003942	2,365	43%	3,194	23	5,559
16	-0.0046	2,331	42%	3,228	-0.003942	2,356	42%	3,203	25	5,559
17	-0.0046	2,321	42%	3,238	-0.003942	2,347	42%	3,212	26	5,559
18	-0.0046	2,310	42%	3,249	-0.003942	2,338	42%	3,221	28	5,559
19	-0.0046	2,299	41%	3,260	-0.003942	2,328	42%	3,231	29	5,559
20	**-0.0046**	**2,289**	**41%**	**3,270**	**-0.003942**	**2,319**	**42%**	**3,240**	**30**	5,559

Land loss spreadsheet for Marsh Creation

Land Loss Spreadsheet				5-Jul-13											
Project:	Bayou Dularge Ridge Restoration and Marsh Creation PPL24				Loss Rate (%/yr)			Total MC & MN (acres)							
Total Acres	Year	Marsh Acres	Water Acres		-0.12			475							
475	2012	170	305												
475	2014	170	305		FWP Land Loss Rate Reduction			0.50							
FWOP					FWP - Marsh Creation/Nourishment						FWP Totals				
					Created Marsh =		305	Nourished Marsh =		170					
TY	FWOP Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	FWP Loss Rate	Acres	Adjusted Marsh Acreage (10% @ TY1; 30% @ TY3 and 100% @ TY5)	FWP Loss Rate	Acres	Adjusted Marsh Acreage (50% @ TY1 and 100% @ TY3	Water (acres)	Marsh (acres)	% Marsh (V1)	Net Acres of Marsh	FWP Total Acres Check
2012		170	36%	305											
2013	-0.0012	170	36%	305											
2014	-0.0012	170	36%	305											
1	-0.0012	**169**	**36%**	**306**	-0.0006	305	**31**	-0.0006	170	**85**	**0**	**115**	**24%**	**-54**	475
2	-0.0012	169	36%	306	-0.0006	305		-0.0006	170						
3	-0.0012	**169**	**36%**	**306**	-0.0006	305	**91**	-0.0006	169	**169**	**1**	**261**	**55%**	**92**	475
4	-0.0012	169	36%	306	-0.0006	304		-0.0006	169						
5	-0.0012	**169**	**35%**	**306**	-0.0006	304	**304**	-0.0006	169	**169**	**1**	**474**	**100%**	**305**	475
6	-0.0012	168	35%	307	-0.0006	304	304	-0.0006	169	169	2	473	100%	305	475
7	-0.0012	168	35%	307	-0.0006	304	304	-0.0006	169	169	2	473	100%	305	475
8	-0.0012	168	35%	307	-0.0006	304	304	-0.0006	169	169	2	473	100%	305	475
9	-0.0012	168	35%	307	-0.0006	304	304	-0.0006	169	169	3	472	99%	305	475
10	-0.0012	168	35%	307	-0.0006	303	303	-0.0006	169	169	3	472	99%	305	475
11	-0.0012	167	35%	308	-0.0006	303	303	-0.0006	169	169	3	472	99%	305	475
12	-0.0012	167	35%	308	-0.0006	303	303	-0.0006	169	169	3	472	99%	304	475
13	-0.0012	167	35%	308	-0.0006	303	303	-0.0006	168	168	4	471	99%	304	475
14	-0.0012	167	35%	308	-0.0006	303	303	-0.0006	168	168	4	471	99%	304	475
15	-0.0012	167	35%	308	-0.0006	302	302	-0.0006	168	168	4	471	99%	304	475
16	-0.0012	166	35%	309	-0.0006	302	302	-0.0006	168	168	5	470	99%	304	475
17	-0.0012	166	35%	309	-0.0006	302	302	-0.0006	168	168	5	470	99%	304	475
18	-0.0012	166	35%	309	-0.0006	302	302	-0.0006	168	168	5	470	99%	304	475
19	-0.0012	166	35%	309	-0.0006	302	302	-0.0006	168	168	5	470	99%	304	475
20	-0.0012	**166**	**35%**	**309**	-0.0006	302	**302**	-0.0006	168	**168**	**6**	**469**	**99%**	**304**	475

ELIGIBILITY REVIEW

Bucket 2 – Council Selected Restoration Component

PROPOSAL TITLE

Bayou Dularge Ridge Restoration, Marsh Creation & Hydrologic Restoration; Phase 1

PROPOSAL NUMBER

USDA-T-1

LOCATION

Terrebonne Parish/Terrebonne Basin/LA

SPONSOR(S)

Department of Agriculture

TYPE OF FUNDING REQUESTED (Planning, Technical Assistance, Implementation)

Planning

REVIEWED BY:

Bethany Carl Kraft/ Ben Scaggs

DATE:

November 20, 2014

1. Does the project aim to restore and/or protect natural resources, ecosystems, fisheries, marine and wildlife habitat, beaches, coastal wetlands and economy of the Gulf Coast Region?

(●) YES ( ) NO

Notes:

Bayou Dularge Ridge Restoration Marsh Creation and Hydrologic Restoration proposal seeks funding for engineering and design to prepare the project for construction.

2. Is the proposal a project?

(●) YES ( ) NO

If yes, is the proposed activity a discrete project or group of projects where the full scope of the restoration or protection activity has been defined?

(●) YES ( ) NO

Notes:

3. Is the proposal a program?

○ YES ◉ NO

If yes, does the proposed activity establish a program where the program manager will solicit, evaluate, select, and carry out discrete projects that best meet the program's restoration objectives and evaluation criteria?

○ YES ○ NO

Notes:

4. Is the project within the Gulf Coast Region of the respective Gulf States?

◉ YES ○ NO

If no, do project benefits accrue in the Gulf Coast Region?

○ YES ○ NO

Notes:

Eligibility Determination

ELIGIBLE

Additional Information

Proposal Submission Requirements

1. Is the project submission overall layout complete? *Check if included and formatted correctly.*

- A. Summary sheet ☑
- B. Executive summary ☑
- C. Proposal narrative ☑
- D. Location information ☑
- E. High level budget narrative ☑
- F. Environmental compliance checklist ☑
- G. Data/Information sharing plan ☑
- H. Reference list ☑
- I. Other ☑

If any items are NOT included - please list and provide details

2. Are all proposal components presented within the specified page limits (if applicable)?

◉ YES ◯ NO

Notes:
