

Coastal Protection and Restoration Authority of Louisiana **State of Louisiana Coastal Protection and Restoration Authority**

2015 Operations, Maintenance, and Monitoring Report

for

Bayou Chevee Shoreline Protection (PO-22)

State Project Number PO-22 Priority Project List 5

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2015 Operations, Maintenance, and Monitoring Report For Bayou Chevee Shoreline Protection (PO-22)

Table of Contents

I.	Introduction1
П	Maintenance Activity 3
	a Inspection Purpose and Procedures 3
	b. Summary of Past Operations and Maintenance Projects
	c. Inspection Results
III.	Operation Activity
	a. Operation Plan
	b. Actual operations
	1
IV.	Monitoring Activity
	a. Monitoring Goals
	b. Monitoring Elements4
	c. Monitoring Results and Discussion
	i. Shoreline Change
	ii. Vegetation (SAV)12
v	Conclusions
۷.	Conclusions
	a. Project Effectiveness
	b. Recommended improvements
	c. Lessons Learneu10
VI	Pafarances 17
V	. References
VI	. Appendices
	Appendix A (Three Year Budget Projection)
	Appendix B (Inspection Photographs)
	Appendix C (Field Inspection Notes)
	Appendix D (Monitoring Budget)





Preface

The Bayou Chevee Shoreline Protection (PO-22) project was funded through the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) on the 5th Priority Project List with the United States Army Corps of Engineers (USACE) as the federal sponsor. This report includes monitoring data collected through September 2014, and Annual Maintenance Inspections through May 2015. The 2015 Operations, Maintenance, & Monitoring (OM&M) Report is the fourth in a series of reports. These reports will be made available for download at the following website: <u>http://cims.coastal.louisiana.gov/</u>

I. Introduction

The Bayou Chevee Shoreline Protection project is located within the northern section of the Bayou Sauvage National Wildlife Refuge, approximately 10 miles northeast of New Orleans, Louisiana (Figure 1). The project area is located on the southern shoreline of Lake Pontchartrain and is divided into two areas, the north cove area and the south cove area. The North Cove project area, comprising 164 acres, is located just north and west of Bayou Chevee. It extends 300 ft into the marsh from the existing shoreline of a 110-acre pond of open-water and includes 54 acres of brackish marsh. The South Cove area, consisting of 48 acres, is located southeast of Bayou Chevee and northwest of Chef Menteur Pass. It extends 300 ft into the marsh from the existing shoreline around a 27-acre cove and includes 21 acres of brackish marsh. Project and reference area marshes are dominated by *Spartina patens* (marshhay cordgrass) with *Spartina alterniflora* (smooth cordgrass), *Pluchea spp.*, and *Cyperus spp.* present.

High wave and current energies associated with Lake Pontchartrain and Chef Menteur Pass have caused extensive shoreline erosion along the Lake Pontchartrain shoreline that has been estimated to average 15 ft/yr, or approximately 3.55 ac/yr from 1958-1983 (U.S. Army Corps of Engineers [USACE] 1997). Over the twenty year life of the project, the shoreline would be expected to erode 300 feet without project implementation. Shoreline erosion was not a measurable problem for the interior pond of the north cove prior to 1997 when the pond was separated from Lake Pontchartrain by a 250-ft strip of marsh. However, by early 1997 this marsh had disappeared leaving the interior shoreline exposed to the wave energies of Lake Pontchartrain.

The PO-22 project consists of approximately 8,875 linear feet of rock bankline protection along the shoreline of Lake Pontchartrain, extending north and south from Bayou Chevee. Construction was completed on December 12, 2001. The shore protection should create conditions that allow for the enclosed shallow water areas to be colonized by a greater abundance of submerged aquatic vegetation (SAV).







Figure 1. Bayou Chevee Shoreline Protection (PO-22) project location and features.





II. Maintenance Activity

a. Inspection Purpose and Procedures

The purpose of the annual inspection of the Bayou Chevee Shoreline Protection Project (PO-22) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, CPRA shall provide a detailed cost estimate for engineering, design, supervision, inspection, construction contingencies, and an assessment of the urgency of such repairs (LDNR 2003). The annual inspection report also contains a summary of maintenance projects and an estimated projected budget for the upcoming 3 years for operation, maintenance, and rehabilitation. A summary of past operation and maintenance projects completed since completion of the project are outlined in Section II. The 3 year projected operation and maintenance budget is shown in Appendix C.

An inspection of the Bayou Chevee Shoreline Protection Project (PO-22) was held on May 14, 2015 (Richard 2015). Representatives in attendance included: Barry Richard, CPRA; Susan Hennington, USACE; and Keith O'Cain, USACE. At the time of the inspection the water level at the "Tally Ho" Hunting Club staff gauge was 0.3 feet NAVD88, based on Historical Online Data. Photographs were not taken at the time of this inspection.

b. Summary of Past Operation and Maintenance Projects

Since completion of construction, there have been no maintenance events.

c. Inspection Results

<u>Rock Rip Rap</u>

The seas were rough on the day of the inspection, which allowed CPRA and USACE personnel to assess the functionality of the rock structure. It was noted that whether the rocks were visible or not they were still reducing the fetch of the waves traveling toward the shoreline.

Settlement noted during the 2011 inspection is still evident. The rock structure has maintained its shape although some sections were beneath the water surface. No mud waves or loose geotextile were noticed. The settlement plates at each fish dip are no longer in operable condition. This was observed during the March 2012 survey.

III. Operation Activity

a. Operation Plan





There are no water control structures associated with this project; therefore a Structure Operation Plan is not required.

b. Actual Operations

There are no water control structures associated with this project; therefore, there are no required structure operations.

IV. Monitoring Activity

a. Monitoring Goals

The objective of the Bayou Chevee Shoreline Protection project is to provide shore protection for the north cove and south cove areas of the Bayou Sauvage National Wildlife Refuge and enhance the establishment of submerged aquatic vegetation in the south cove area while maintaining or enhancing their establishment in the north cove area.

The following goals will contribute to the evaluation of the above objective:

- 1. Decrease the mean rate of shoreline erosion in both the north and south cove areas.
- 2. Maintain (north cove) or maintain/increase (south cove) mean abundance of submerged aquatic vegetation in the ponds behind the rock dikes.

b. Monitoring Elements

The following monitoring elements provide the information necessary to evaluate the specific goals listed above:

Shoreline Change

To evaluate change in shoreline position, a sub-meter Differential Global Positioning Satellite (DGPS) system was used to document the position of the vegetated marsh edge. Shoreline position was documented as-built in early 2002; and post-construction in January 2005, May 2008, May 2011, and September 2014. Shoreline position data were then analyzed using the Digital Shoreline Analysis System (DSAS version 4.0) extension for ArcGIS[®] (Thieler et al. 2009). DSAS uses a measurement baseline method to calculate rate-of-change statistics for a time series of shorelines. A baseline is constructed from which regularly spaced transects are cast. The transects intersect each shoreline at the measurement points used to calculate shoreline erosion rates of the reference areas, and with historical rates of shoreline erosion collected by Gagliano et al. (1988). Additional surveys will be conducted in 2017, and 2020 post-construction for mapping shoreline change and movement over time.





Submerged Aquatic Vegetation (SAV)

The line-intercept method described in Nyman and Chabreck (1996) was used to determine the frequency of occurrence of SAV along two transects established in each of the north and south cove project and reference areas (Fig. 2). Transects in the North Cove area had 50 equally spaced sampling stations and transects in the South Cove area had 25 equally spaced sampling stations. Transects were traversed by airboat and at each sampling station a garden rake was dragged along the bottom to collect any SAV present. The presence or absence of SAV was recorded at each station to determine frequency of occurrence. When SAV was present it was identified to species to determine frequency of individual species. SAV was sampled for pre-construction years 1998 and 2001, and in 2004, 2008, 2011, and 2014 post-construction. Additional surveys will be conducted in years 2017, and 2020.



Figure 2. Yellow lines indicate the location of submerged aquatic vegetation transecst for the Bayou Chevee Shoreline Protection (PO-22) project.





2015 Operations, Maintenance, and Monitoring Report for Bayou Chevee Shoreline Protection (PO-22)

c. Monitoring Results and Discussion

Shoreline Change

All areas have experienced some shoreline retreat since the previous survey in 2011. For the period of time from 2011 to 2014 the North Cove project area experienced an average rate of shoreline retreat of 1.4 ft/yr (Table 1) and an average net shoreline loss of 4.8 ft (Table 2). This represents the lowest rate of shoreline retreat of any of the 4 time periods since project construction. Similar to patterns observed in previous surveys, the majority of the shoreline retreat in the North Cove project area occurred on the north facing bank along the southeastern shoreline (Figure 3).

The North Cove reference area is divided into 2 sub-areas: 1.) an interior pond protected by a narrow strip of marsh from the wave action of Lake Pontchartrain, and 2.) a northeast-facing segment of Lake Pontchartrain shoreline (Figure 4). For the 2011 – 2014 time period the pond portion of the North Cove reference area had a positive average rate of shoreline change of 0.3 ft/yr (Table 1), however it is unlikely that any land gain actually occurred. The small, positive rate of change is more likely the result of error inherent in the data collection and analysis processes. The Lake Pontchartrain shoreline portion of the North Cove reference area experienced an average rate of shoreline retreat of 3.9 ft/yr (Table 1), and an average net shoreline loss of 13.0 ft (Table 2). The shoreline has retreated along the entire surveyed length of the Lake Pontchartrain shoreline at a fairly uniform rate. At some point between the 2008 and 2011 surveys, the narrow strip of marsh separating the interior pond from the lake breached at the southern end, just below southern extent of the surveyed area, creating a connection between the two. This breach does not appear to have expanded since then; however, there are several other locations north of the breach where the strip of marsh separating the interior pond from Lake Pontchartrain is approximately 40-ft wide and in danger of breaching in the near future (Figure 4).

Rates of shoreline retreat in the North Cove project area have been greater than the reference area's interior pond in all time periods since construction, and greater than the reference area's Lake Pontchartrain shoreline in 2 of the 4 periods since construction (Table 1). Much of the shoreline retreat in the North Cove project area is concentrated along the southeastern shoreline. One explanation for the greater rate in the project area is the large extent of the open water area behind the rock structure in the North Cove. The open water area is as much as 700 yds across measured north to south. It is likely that waves which are broken by the structure are able to re-form behind the structure and impact the shoreline.

For the 2011 - 2014 time period, the South Cove project area experienced an average rate of shoreline retreat of 4.7 ft/yr (Table 1), and an average net shoreline loss of 15.5 ft (Table 2). The island created directly behind the rocks from the placement of spoil during construction remains intact, although it has decreased in size with each successive survey (Figure 5). Since construction, shoreline retreat along the eastern end of the South Cove project area has been greater than the western end. This phenomenon can be





Table 1. Rate of shoreline change for north and south cove project and reference areas for 5 time periods of the PO-22 project. Rates shown are the average of all transects for the given area and time period. All values are ft/yr. Negative values indicate shoreline retreat.

			Area		
Time Period	North Cove Project	North Cove Reference - Pond	North Cove Reference - LP Shoreline	South Cove Project	South Cove Reference
2002 - 2005	-2.2	0.0	-0.3	-4.2	-34.7
2005 - 2008	-26.5	-1.6	-3.0	-74.9	-160.6
2008 - 2011	-6.2	-2.3	-6.7	-7.2	-31.2
2011 - 2014	-1.4	0.3	-3.9	-4.7	-10.2
2002 - 2014	-8.5	-0.9	-3.5	-22.8	-64.8

Table 2. Net shoreline change for north and south cove project and reference areas for 5 time periods of the PO-22 project. Values shown are the average of all transects for the given area and time period. All values are in feet. Negative values indicate shoreline retreat.

		-	Area	-	-
Time Period	North Cove Project	North Cove Reference - Pond	North Cove Reference - LP Shoreline	South Cove Project	South Cove Reference
2002 - 2005	-6.6	-0.1	-0.9	-12.7	-104.1
2005 - 2008	-89.2	-5.4	-10.1	-252.0	-540.2
2008 - 2011	-18.8	-6.9	-20.4	-21.8	-94.7
2011 - 2014	-4.8	1.0	-13.0	-15.5	-33.7
2002 - 2014	-108.1	-11.4	-44.3	-289.2	-822.8

explained by the termination of the rock structure offshore rather than on land. Waves approaching from the northeast are not broken by the rocks and therefore are able to impact the shoreline behind the structure.

The South Cove reference area has experienced an average rate of shoreline retreat of 10.2 ft/yr (Table 1), and an average net shoreline loss of 33.7 ft (Table 2) for the time





period from 2011 - 2014. Although these rates are the lowest of any of the 4 time periods since project construction in the South Cove reference area, this area continues to experience the highest rates of shoreline retreat of any of the areas surveyed. Although shoreline retreat has occurred along the entire length of South Cove reference area shoreline, much of the retreat has occurred along the eastern and western ends of the shoreline reach (Figure 5). The section of shoreline in the center of the South Cove reference area has retreated to the natural levee created by a bayou that parallels the shoreline here. The marsh in this area is likely more resilient and resistant to erosion than the surrounding marsh, thus accounting for the slightly lower rate of shoreline retreat here.









Figure 3. 2002, 2005, 2008, 2011, and 2014 shoreline position for the North Cove project area of the Bayou Chevee Shoreline Protection (PO-22) project.







Figure 4. 2002, 2005, 2008, 2011, and 2014 shoreline position for the North Cove reference area of the Bayou Chevee Shoreline Protection (PO-22) project.







Figure 5. 2002, 2005, 2008, 2011, and 2014 shoreline positions for the South Cove project and reference areas of the Bayou Chevee Shoreline Protection (PO-22) project. The dashed line indicates the boundary between project and reference areas.



Vegetation (SAV)

The pre-construction surveys for overall SAV frequency for the North Cove showed mixed results. The project and reference areas showed very similar frequencies (96.8% and 100%, respectively) in the 1998 survey; however in 2001 SAV frequency in the project area had fallen to 6.2% versus 60.8% in the reference area (Figure 6). The post-construction surveys show higher SAV frequency in the project area in 2004 and 2011, with the 2008 and 2014 surveys showing higher frequency in the reference areas. Post-construction surveys indicate greater similarity between project and reference areas. Mean SAV frequency was 84.5% in the project area for the four post-construction surveys.

In the 2014 survey, Eurasian water milfoil, *Myriophyllum spicatum*, was the dominant species in the North Cove project area (Figure 7, Table 3), while wigeongrass, *Ruppia maritima* dominated the reference area. Southern naiad, *Najas guadalupensis*, was present in both areas but much more abundant in the reference area than the project area. Similar to previous surveys eelgrass, *Vallisneria americana*, was observed in the project area but not the reference area. The relative frequency of eelgrass increased in the 2014 survey, and a large eelgrass bed was observed in the northeastern portion of the project area.



Figure 6. Frequency of occurrence of submerged aquatic vegetation (all species) in samples for North Cove project and reference areas for survey years 1998, 2001, 2004, 2008, 2011, and 2014 for the Bayou Chevee Shoreline Protection (PO-22) project. Dashed line indicates project construction.



Species		N	orth Cov	/e Proje	ct		North Cove Reference									
Species	1998	2001	2004	2008	2011	2014	1998	2001	2004	2008	2011	2014				
Empty Sample	3.3	50.4	5.7	30.6		20.6		9.8	29.8	1.9	36.9	2.9				
Algae		46.0	58.1	14.4	15.0	51.4		81.4	27.4	18.3	14.6	50.0				
Ceratophyllum demersum	16.7		12.1						11.3							
Myriophyllum spicatum	88.3		66.1	31.5	97.0	72.0	100.0		21.0	45.2	50.5	75.5				
Najas guadalupensis	30.0		49.2			1.9	100.0		38.7	80.8	47.9	24.5				
Potamogeton pusillus				56.8						26.9						
Ruppia maritima	81.7	6.2	17.7	53.2	8.0		78.3	60.8	33.9	92.3	11.7	79.4				
Vallisneria americana	46.7			3.6	3.0	15.9										
Chara sp.						0.9						16.7				

Table 3. Relative frequency of submerged aquatic vegetation species for North Cove project and reference area during pre-construction years 1998 and 2001, and post-construction years 2004, 2008, 2011 and 2014 for the Bayou Chevee Shoreline Protection (PO-22) project. Values represent percentage of samples that contained a particular species. The symbol (.) denotes the species was not observed in that area.



Figure 7. Frequency of occurrence of submerged aquatic vegetation in samples for North and South cove project and reference areas during the 2014 survey for Bayou Chevee Shoreline Protection (PO-22).



In the South Cove, both pre-construction surveys for overall SAV frequency of occurrence showed similar results for project and reference areas. In 1998, both areas had frequencies of 43.3%. In 2001, no SAV was measured in either area. However, post-construction surveys show consistently higher SAV frequency in the project area than in the reference area (Figure 8). Mean SAV frequency for the three post-construction surveys was 72.3% in the project area and 13.3% in the reference area.

Although SAV frequency was high in the South Cove project area (86.8%) in 2014, species diversity was low (Figure 7, Table 4). Excluding algae, the SAV observed in the project area was entirely *Myriophyllum spicatum*. The South Cove reference area was mostly devoid of SAV; 88.0% of samples contained no SAV. The species composition of samples that did contain SAV was similar to the project area, with *Myriophyllum spicatum* accounting for all SAV in the area.



Figure 8. Frequency of occurrence of submerged aquatic vegetation (all species) in samples for South Cove project and reference areas for survey years 1998, 2001, 2004, 2008, 2011, and 2014 for the Bayou Chevee Shoreline Protection (PO-22) project. Dashed line indicates project construction



Table 4. Relative frequency of submerged aquatic vegetation species for South Cove project and reference area during pre-construction years 1998 and 2001, and post-construction years 2004, 2008, 2011, and 2014 for the Bayou Chevee Shoreline Protection (PO-22) project. Values represent percentage of samples that contained a particular species. The symbol (.) denotes the species was not documented in that area.

Species		S	outh Co	ve Proje	ct		South Cove Reference									
Species	1998	2001	2004	2008	2011	2014	1998	2001	2004	2008	2011	2014				
Empty Sample	56.7	100.0		63.5	5.4	13.2	56.7	100.0	64.5	90.0	88.0	88.0				
Algae			26.9	19.2	51.8	84.9			6.5	10.0	4.0	6.0				
Ceratophyllum demersum			28.9													
Myriophyllum spicatum	13.3		82.7	19.2	89.3	71.7	6.7		25.8		12.0	10.0				
Najas guadalupensis			5.8	13.5					1.6							
Ruppia maritima			21.2	11.5	1.8		13.3		4.8		2.0					
Vallisneria americana	36.7						30.0									

V. Conclusions

Project Effectiveness a.

For the most part, the project has been effective in achieving the goal of reducing the rate of shoreline erosion in the North and South Cove areas. However, as evidenced by the large amount of shoreline retreat between 2005 and 2008, the capacity of the rock structure to prevent erosion was overcome by the effects of Hurricane Katrina in 2005. For the period of time that included Hurricane Katrina (2005 - 2008), the rates of shoreline retreat in the North and South cove project areas were 4.3 and 10.4 times higher, respectively, than the next highest rates of retreat in any other time period.

The project has clearly been effective in achieving the goal of maintaining SAV abundance in the North Cove and maintaining/increasing abundance in the South Cove project areas. Frequency of occurrence of SAV in both the North Cove project and reference areas has been high since construction of the rock dike. In the South Cove, SAV frequency has been consistently higher behind the shoreline protection in the project area than in the reference area.

b. **Recommended Improvements**

A maintenance lift is necessary to raise the elevation of the rock dike in the areas where it has settled. The inspection team discussed a maintenance rock lift, which would require a request for additional funding due to the minimal amount of remaining Operations and Maintenance funds. Additional improvements discussed were extending the rock dike to meet the headland of Chef Menteur Pass. The agreed upon course of action was to contact the landowner (USFWS)





concerning their willingness to take ownership of the project features after the end of the 20-yr project life (2021). If they are willing to take ownership then the project team will design a rock lift, request the necessary funding from CWPPRA, and perform the lift within the final three years of the project life. This would prove to be most beneficial for the future benefits of this project feature.

c. Lessons Learned

This project shows how dynamic and vulnerable wetlands are. The high rate of shoreline retreat between 2005 and 2008 illustrates the destructive power of hurricanes. Efforts should be taken in the future to minimize construction delays. As a result of construction delays of the PO-22 project, the high rate of erosion along the south cove shoreline resulted in the rock structure terminating offshore rather than on land. Rock structures should terminate on land to prevent the "erosional shadow" created by having the rocks end in open water. Heavy erosion along north facing shorelines shows the need to consider prevailing wind direction and wave angles in project design.





VI. References

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Appendix A

3-Year O&M Budget Projection







Bayou Chevee Shoreline Protect	tion Proje	ct (PO-22)																				
Federal Sponsor: USACE																						
Construction Completed : Decemb	er 7, 2001																					
PPL 5																						
Current Approved O&M Budget	Year 0	Year - 1	Year - 2	Year -3	Year -4	Year -5	Year-6	Year -7	Year-8	Year -9	Year -10	Year -11	Year -12	Year -13	Year -14	Year -15	Year -16	Year - 17	Year -18	Year -19	Project Life	Currently
June 2009	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Budget	Funded
State O&M	\$0	\$3,940	\$0	\$0	\$4,255	\$0	\$206,911	\$4,596	\$0	\$0) \$(\$5,093	\$0	\$0	\$0	\$5,644	4 \$0	\$0	\$0	\$6,254	\$236,693	\$236,693
Corps Admin	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0) \$() \$0	\$0	\$0) \$0) \$(D \$0	\$0	\$0	\$0	\$0	\$0
Federal S&A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<mark>) \$(</mark>) \$0	\$0	\$0	<mark>) \$0</mark>	<mark>) \$(</mark>	<mark>) \$0</mark>	\$0	\$0	<mark>\$0</mark>	\$0	\$0
Total																					\$236,693	\$236,693
																					Remaining	Current 3 year
Projected O&M Expenditures																					Project Life	Request
Maintenance Inspection		\$3,940			\$4,255			\$4,596				\$5,093		\$5,361	\$10,000	\$10,000) \$10,000			\$6,254	\$36,254	\$30,000
General Maintenance																					\$0	\$0
Surveys																					\$0	\$0
Sign Replacement																					\$0	\$0
Federal S&A																					\$0	\$0
Maintenance/Rehabilitation																					\$0	\$0
E&D																		\$69,000			\$69,000	\$0
Construction																			\$2,611,110		\$2,611,110	\$0
Construction Oversight																			\$230,000		\$230,000	\$0
Total					\$4,255	\$0	\$0	\$4,596	\$0	\$0) \$(\$5,093	\$0	\$5,361	\$10,000	\$10,000) \$10,000	\$69,000	\$2,841,110	\$6,254	\$2,946,364	\$30,000
O&M Expenditures from COE Repo	ort			\$32,167				Current O8	&M Budget	less COE A	Admin		\$236,693				Current P	roject Life I	Budget less CC	DE Admin		\$236,693
State O&M Expenditures not subm	te O&M Expenditures not submitted for in-kind credit			\$0				Remaining	g Available	O&M Budg	get		\$204,526	i			Total Proj	ected Proje	ect Life Budge	t		\$2,978,531
Federal Sponsor MIPRs (if applicab	leral Sponsor MIPRs (if applicable)			\$0				Increment	al Funding	Request A	mount FY1	17-FY19	-\$174,526				Project Li	fe Budget F	Request Amou	nt		\$2,741,838
otal Estimated O&M Expenditures (as of April 2010)			\$32,167																			



Appendix **B**

Annual Inspection Photographs







Photo #1 – Terminus of Southern Reach.



Photo #2 –Northern Reach.







Photo #3 – Fish Dip, Northern Reach.



Photo #4 – Failed Section, Southern Reach.







Photo #5 – Submerged Aquatic Vegetation behind rock dike



Photo #6 – Behind rock dike





Appendix C

2014 Field Inspection Notes





MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: PO-22 Bayou Chevee Shoreline Protection

Structure No. no number assigned

Structure Description: _____Foreshore Rock Dike

Type of Inspection: Bi-Annual

Date of Inspection: <u>5/14/15</u> Time: <u>9:30 am</u>

Inspector(s): Richard, Hennington, O'Cain

Water Level Inside: <u>0.3'</u> Outside: <u>0.3'</u>

Weater Conditions: Cloudy, medium wind

Item	Condition	Pysical Damage	Corrosion	Photo #	Observations and Remarks
Foreshore					
Rock Dike	Fair	Settling	None		North end looking good. South end settling below acceptable grade.
North Cove		_			
Foreshore					
Rock Dike	Poor	Settling	None		Settling below acceptable grade.
South Cove					
USFWS Dike					
Segment	Poor	Settling	None		Settled below acceptable grade.
Exposed Shore		Inundated/			
South of Dike	Poor	Washed Away	N/A		This is recovering, but the process is slow. Needs protection.
					Remarks: Project needs maintenance lift.





Appendix D

Monitoring Budget





Bayou Chevee Shoreline Protection (PC	-22) - USACE	- Priority List	5																							
Infl. Rate	2.60%							NO CRMS CH	ANGES																	
Price Level	1998	Round 1	rip Mileage	200																						
		Monito	ring Budget	\$ 144,178																						
	Year	Prior	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Daily Rate Items	Rates																									
Base Field Equipment	160.90		2	2			3			3			3			3			3			3				
Surveying	1 500 00		_	2			2			2			2			2			2			2				
14' Airboat	183 38		2	2			- 3			3			3			3			- 3			3				
Two Man Crew	395.06		2	~			0			0			0			0			0			0				
Three Man Crew	502.50		2	2			3			3			3			3			3			3				
2 Man Lodging	100.00		1	2			5			5			5			3			5			5				
2 Man Bor Diam	48.00		2																							
2 Mail Fei Dielli	40.00		200	400			400			400			400			400			400			400				
Venicle (per mile)	0.29		200	400			400			400			400			400			400			400				
SAV (per trip)	000.74						1									I										
Annual Data Hanna																										
Annual Rate Items																										
Misc. Supplies	200.00		1	1			1			1			1			1			1			1				
Computer Database	\$ 566.00		1	1			1			1			1			1			1			1				
Monitoring Progress Report	1,473.75				1																					
Comprehensive Monitoring Report	4,138.73							1			1			1			1			1				1		
TAG Meetings	1,611.46							1			1			1			1			1				1		
Quality Assurance	200.00		1	1	1		1	1		1	1		1	1		1	1		1	1		1		1		
Habitat Mapping	\$ 8,559.41																									
Monitoring Plan Dev.	9,879.00		1																							
Bayou Chevee Shoreline Protection (PC	-22) - USACE	- Priority List	5																							
	Year	Prior	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Dailv Rate Items	Rates																									
Base Field Equipment	160.90		321.80	330.16			534.89			577.70			623.95			673.89			727.83			786.09				
Surveying	1.500.00			3.078.00			3.324.38			3,590,48			3,877,88			4,188,29			4.523.55			4,885,64				
14' Airboat	183.38		366 77	376.30			609.64			658 44			711 14			768.07			829.55			895.95				
Two Man Crew	395.06		790.12	010.00			000.01			000.11						100.01			020.00			000.00				
Three Man Crew	502.50		730.12	1 216 00			1 970 00			2 127 60			2 208 00			2 /81 05			2 680 62			2 805 10				
2 Man Lodging	100.00		100.00	1,210.00			1,370.00			2,127.03			2,230.00			2,401.33			2,000.02			2,035.13				
2 Man Day Diam	49.00		06.00																							
Z Mail Fel Dielii	40.00		57.00	116.06			126.22			126 //			147.26			150.16			171.90			10E 6E				
Venicie (per mile)	0.29		57.00	110.90			120.33			130.44			147.30			159.16			171.69			100.00				
SAV (per trip)	686.74		686.74				760.99			821.91			887.70			958.76			1,035.50			1,118.39				
Annual Rate Items																										
Misc. Supplies	200.00		200.00	205.20			221.63			239.37			258.53			279.22			301.57			325.71				
Computer Database	566.00		566.00	580.72			627.20			677.40			731.63			790.19			853.44			921.76				
Monitoring Progress Report	1,473.75				1,551.38																					
Comprehensive Monitoring Report	4,138.73							4,705.49			4,573.92			4,940.05			5,335.48			5,954.64				6,740.40		
TAG Meetings	1,611.46							1,832.13			1,978.79			2,137.18			2,308.25			2,493.02				2,762.58		
Quality Assurance	200.00		200.00	205.20	210.54		221.63	227.39		239.37	245.59		258.53	265.25		279.22	286.48		301.57	309.41		325.71		342.87		
Habitat Mapping	8,559.41	8,559.00																								
Monitoring Plan Dev.	9,879.00		9,879.00																							
Wave Height Measurements	-																									
DNR Expenditures To Date		5,438.75																								
*Other Federal Expenditures																										
Total		13,997.75	13,263.43	6,108.55	1,761.92	0.00	8,396.68	6,765.00	0.00	9,068.80	6,798.30	0.00	9,794.72	7,342.47	0.00	10,578.74	7,930.21	0.00	11,425.52	8,757.07	0.00	12,340.08	0.00	9,845.85	0.00	-
Projected - Running Total		13,997.75	27,261.18	33,369.73	35,131.65	35,131.65	43,528.33	50,293.33	50,293.33	59,362.13	66,160.43	66,160.43	75,955.14	83,297.62	83,297.62	93,876.36	101,806.56	101,806.56	113,232.08	121,989.15	121,989.15	134,329.24	134,329.24	144,175.08	144,175.08	144,175.08
Projected Grand Total		144,175.08						,				.,	.,	,	,		,	. ,	.,	,			. ,		,	,
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