Coastal Protection and Restoration Authority of Louisiana

Office of Coastal Protection and Restoration

2008 Annual Inspection Report

for

CAERNARVON OUTFALL MANAGEMENT (BS-03a)

State Project Number BS–03a
Priority Project List 2

March 4, 2008
Plaquemines Parish

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I. Introduction

The Caernarvon Outfall Management Project (State Project No. BS-03a) was approved on the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) Second Priority Project List The project is located to the south and west of Big Mar, a body of water which formed as the result of a failed agricultural impoundment. The project features are located entirely in Plaquemines Parish and the project outfall area encompasses 15,556 acres in Plaquemines Parish. Project features are located on a number of streams in the outfall area.

II. Inspection Purpose and Procedures

The purpose of the annual inspection of the Caernarvon Outfall Management Project (BA-03a) 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, OCPR shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs (O&M Plan May 15, 2003). The annual inspection report also contains a summary of maintenance projects and an estimated projected budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year projected operation and maintenance budget is shown in Appendix C. A summary of past operation and maintenance projects completed since completion of the Caernarvon Outfall Management Project are outlined in Section IV.

This annual inspection of the Caernarvon Outfall Management Project (BA-03a) was held on March 4, 2008 on a clear to partly cloudy and cold day with winds NW 20 to 25 mph. At the time of the inspection all 5 gates of the diversion structure were open with a flow of 7,100 cubic feet per second. The Marsh Gage reading was +2.5 feet NGVD and the River Gage reading was +9.5 feet NGVD. In attendance were Tom Bernard, Barry Richard, of OCPR; and Loland Broussard and Michael Trusclair of NRCS. Due to canal blockages from Katrina, the team was unable to reach the entire project using one launch site. Therefore; the team left the Scarsdale boat launch at 9:30 am to inspect the west portion of the project and later left the Delacroix Corporation boat launch in Caernarvon at noon to inspect the east portion of the project. Extreme windy conditions prohibited the use of air boats during this inspection. Photographs of that inspection are included in Appendix B of this report.

III. Project Description and History

In August, 1991, the Caernarvon Freshwater Diversion Structure on the east bank of the Mississippi River near Big Mar, was placed into operation. The Caernarvon structure was constructed (construction funded by the Water Resources Development Act) for the

purpose of diverting Mississippi River water through Big Mar into the marshes to the south and west of Big Mar. These marshes, since the early 1900's, had deteriorated due, largely, to being isolated, because of levee construction, from direct river influxes. This isolation, with the resultant absence of minerals and nutrients formerly regularly deposited during high river stages, caused a net loss of the organic soils prevalent in the project area. The specific mechanisms causing the soil loss included natural subsidence, erosion, salt water intrusion and oxidation.

In addition to the losses due to Mississippi River levee construction, the increased construction of navigation and oil/gas canals in the project area contributed to the problem. These straight canals provided a perfect avenue for saltwater intrusion and the canals' high water velocity led to increased erosion rates.

An earlier hurricane also contributed to the loss of wetlands in the project area. In 1965, storm surges from Hurricane Betsy traveled over the above-discussed canals and the forested swamp area in the northern part of the project area was destroyed by salt stress when the salt water from the storm surge became trapped behind Tigers Ridge.

From 1932 to 1990, 5,546 acres of land in the project area were converted to open water via the above-discussed mechanisms. In addition, by 1978, saltwater intrusion had transformed the project area from a primarily intermediate marsh to primarily a brackish marsh.

The Caernarvon Freshwater Diversion Structure was intended to counter some of the mechanisms causing wetlands loss in the project area particularly the saltwater intrusion and loss of sediment input resulting from the Mississippi River levee construction and the new oil/gas and navigation canals that have been constructed. Specifically, the Caernarvon structure was intended to increase wildlife and fisheries productivity, enhance emergent marsh vegetation growth, and reduce marsh loss.

The structure has a discharge capacity of approximately 8,000 cubic feet of freshwater per second. Once diversion waters enter Big Mar, 66% of the water exits to the southeast via Bayou Mandeville, which flows into Lake Lery. Eventually this flow reaches Bayou Terre aux Boeufs. So, in summary, 66 % of the discharge water flows to the southeast of Big Mar and only 34 % flows to the more-deteriorated marshes to the southwest of Big Mar. An additional problem is that, prior to the present Caernarvon Outfall Management Project, much of the flow of water to the southwest channeled rapidly to the lower reaches of the basin and did not inundate the interior marshes as was originally intended. The present project promotes better utilization and distribution of water from the Caernarvon Freshwater Diversion Structure. Project features will allow water from the channels to flow into the marsh interior and will cause the water to be retained in the marsh for a longer period of time.

The project features are listed below:

All elevations are at NAVD 88. Inspection photos of the features are shown in an attachment.

A. Site/Structure # 13 – Earthen channel plug with riprap armor located along the west bank of Bayou Mandeville. The plug is set at an elevation of +4.0 ft. and is 100 ft. long x 100 ft. wide with 18 inches of riprap armor. The crest of the structure is 10 ft. wide. The plug includes a one (1) 48" diameter corrugated aluminum pipe which passes through the rock fill plug at an elevation of -3.5 ft. with an aluminum combination gate attached to the pipe on the interior side of the marsh. A timber walkway to the gate is at elevation +4.0.

B. Site/Structure # 25 - Earthen channel plug with riprap armor located on the Forty Arpent Canal near Big Mar. The plug is set at an elevation of +4.0 ft and is 169 ft. long and 100 ft. wide with 18 inches of riprap armor. The crest of the structure is 10 ft. wide. The plug includes two (2) 48" diameter corrugated aluminum pipes which pass through the rock fill (and are supported by the rock fill) at an elevation of -4.0 ft. Earth fill has been placed on each side of the rock fill. Aluminum canal gates are attached to the end of each pipe on the exterior side of the marsh. A timber walkway to the gates is at elevation +4.0.

C. Site/Structure # 26 – Earthen channel plug with riprap armor plate located along Reggio Canal spoil bank. The plug is set at a crest elevation of +4.0 ft. and is 154 ft. long and 100 ft. wide and is capped with 18 inches of riprap rock. The crest of the structure is 10 ft. wide. The plug includes four (4) 48" corrugated aluminum pipe which pass through the earthen material at an elevation of -4.0 ft. Aluminum canal gates are attached to the end of each pipe on the exterior side of the marsh. The pipe and gates are supported by a timber pile system. A timber walkway is installed at elevation +4.0 ft.

D. Site/Structure # 32 – Riprap channel plug across an unnamed channel which flowed into Lake Lery at the west end of the lake. The plug is 117 ft. long and the 6 ft. wide plug crest is set at +4.0 ft. The 70 ft. stretch of channel from the plug eastward to Lake Lery has 2 feet thick riprap placed on both channel banks.

E. Site/Structure # 40 – Earthen channel plug with riprap armor along the Reggio canal spoil bank. The plug is 142 ft. long and 100 ft. wide. The crest of the structure is 10 ft. wide and is set at an elevation of +4.0 ft. The plug includes 2- 48" diameter corrugated aluminum pipes thorough the rock fill portion of the rock fill at an elevation of -4.0 ft. Earth fill was placed on each side of the rock fill. The entire structure is capped with an 18" thick layer of rip-rap. Aluminum canal gates are attached to the ends of the aluminum pipes on the exterior side of the marsh. The pipe and gates are supported by a timber pile system and a timber walkway to the gates is installed at elevation +4.0 ft.

F. Site/Structure # 50 – Earthen channel plug with riprap armor along the west bank of Bayou Mandeville. The plug is 55 ft. long and 100 ft. wide. The crest of the structure is

10 ft. wide and is set at an elevation of +4.0 ft. The plug includes one (1) 48" diameter corrugated aluminum pipe through an aggregate embankment at an elevation of -3.5 ft. The embankment is capped with an 18" thick layer of rip-rap. The pipe has a combination gate attached on the pipe end on the interior side of the marsh. The pipe and gate are supported by a timber pile system and a timber walkway to the gate is installed at elevation +4.0.

G. Site/Structure # **52** – Earthen channel plug with riprap armor along DP Canal spoil bank. The plug is 100 ft. long and 100 ft. wide. The crest of the structure is 10 ft. wide and is set at an elevation of +4.0 ft. The plug includes two (2) 48" diameter corrugated aluminum pipes through the embankment at -3.0 ft. The embankment is capped with a 18" thick layer of riprap. Aluminum combination gates are attached to the end of each pipe on the interior side of the marsh. The two pipes are supported by a timber pile system and a timber walkway to the gates is installed at elevation +4.0.

H. Site/Structure # 54 – Earthen channel plug with riprap armor located at the intersection of Reggio Canal and Promise Land Canal. The plug is 140 ft. long and 150 ft. wide. The crest of the structure is 10 ft. wide and is set at an elevation of +4.0 ft. The plug includes two (2) 48" diameter corrugated aluminum pipes through the rock fill portion of the embankment at an elevation of -4.0 ft. Earth fill was placed of each side of the rock fill. The entire embankment is capped with a 18" thick layer of riprap. Aluminum canal gates are attached to the end of each pipe on the exterior side of the marsh. The pipes and gates are supported by a timber pile system and a timber walkway to the gates installed at elevation +4.0 ft.

The existing spoil bank on the south side of Promise Land Canal was degraded in three locations on the west side of Structure # 54. The excavated material was placed on the south side behind the existing spoil bank.

I. Site/Structure # 56 - Rock riprap channel plug across an unnamed channel on the east side of the Reggio Canal. The plug is 208 ft. long and the side slopes of the plug are 3 horizontal to 1 vertical. The crest of the structure is 6 ft. wide and is set at an elevation of +4.0 ft.

J. Site #57 – Consists of 5,315 linear feet of spoil bank restoration along the east side of the Reggio Canal between the Delacroix Canal and Site # 54. The spoil bank restoration consists of an earth fill embankment placed on existing spoil to an elevation of +4.0 ft. with a 12 ft. top width and 3 horizontal to 3 vertical side slopes. The entire length of embankment has been seeded to permanent vegetation.

K. Site # 58 – Consists of 5,244 linear ft. of spoil bank restoration along the west side of Bayou Mandeville between the Delacroix Canal and Site # 13. The spoil bank restoration consists of an earth fill embankment placed on existing spoil to an elevation

of +4.0 ft. with a 12 ft. top width and 3 horizontal to 3 vertical slope. The entire length of embankment has been seeded to permanent vegetation.

L. Site/Structure # 60 – Earthen channel plug at the intersection of Reggio Canal and an existing pipeline canal. The plug is 200 ft. long and 100 ft. wide. The crest of the structure is 10 ft. wide and set at an elevation of +4.0. The plug includes two (2) 36" diameter corrugated aluminum pipes through the rock fill plug at an elevation of -3.0 ft. The entire length of the plug is capped with an 18" layer of riprap. Aluminum combination gates are attached to the end of each aluminum pipe on the interior side of the marsh. The pipes and gates are supported by a timber pile system and a timber walkway to the gates is installed at elevation +4.0 ft.

IV. Summary of Past Operation and Maintenance Projects

General Maintenance: Below is a summary of completed maintenance projects and operation tasks:

Three flow meters were installed at structures No. 26, 40, and 54 to monitor the flow of fresh water into the interior marshes to determine if it would be necessary to maintain the associated channels to increase flow. These flow meters were lost or removed as a result of Hurricane Katrina. Plans are in place to repair and replace those flow meters at their original locations mentioned above.

Since the last annual inspection, a team from OCPR & NRCS mobilized a mud boat and flushed out the culverts at sites # 40, 26, 54, & 60.

2007 Structure Operations:

In accordance with the operation schedule outlined in the Operations and Maintenance Plan, none of the structures were operated this past year. All gates have been left in the open position to allow fresh water in all the marsh areas except Structure 25, which was closed to minimize flow to the area behind Braithwaite, where emergency levee restoration was being constructed by the USACE. Plans are to now open that structure and operate it as outlined in the O & M Plan. In 2008, when the contract for operation of the main diversion structure is re-bid, the O & M of the outfall structures will be included. A monthly maintenance plan will be drafted for the contractor to follow. That contract will go into affect on July 1, 2008.

V. Inspection Results (See Appendix B for photos of each site)

Much of the marsh debris that was deposited throughout the area as a result of Hurricane Katrina has been cleared making the project accessible for this years' inspection. The main blockage, approx. 1,000 ft., still remains in the Delacroix Canal just east of structure #26. At the time of the inspection, water levels were high due to high diversion flows over a long period of time causing most of the marsh to be flooded. The water levels were only four to six inches from the bottom of the structure walkways and well above the tops of the culverts. Due to the fact that the entire outfall area had been flooded for a long period of time and strong SE winds and

tides had pushed much water over the spoil-banks into the marshes, there was evidence of water flowing out of the marsh into the canals, both over the banks and through the culverts. While the flow was high 7,100 cfs during the inspection, the strong NW winds was pushing much of the diverted water southward over and out the marsh and through the main channels.

A. **Site/Structure # 13 –** The gate was in the open position at the time of the inspection. Water flow was visibly going out, possibly due to a sufficient differential head. It was evident that not much (if any) blockage remains due to storm debris. Water was rushing out of the interior where it appeared that a few rocks were displaced on the north end of the closure accented by some scouring of the embankment at the tie-in. The timber walkway has separated from its support beam at one end.

B. **Site/Structure # 25 –**The structure remains covered with small amounts of marsh debris from the storm. The gates were padlocked closed at the time of the inspection but plans are in place to open these gates in the near future. It was not evident how much (if any) blockage remains due to storm debris. Note: The structure could be accessed due to water hyacinth and debris obstructions in the N-C canal.

C. **Site/Structure # 26 –** The structure is still has some storm debris deposits in spots. The gates were in the open position at the time of the inspection. Water flow was slightly visible, possibly due to a lack of sufficient differential head. It was evident that not much (if any) blockage remains due to storm debris. Padlocks on all 4 gates were non-functional. Delacroix Canal is completed plugged with storm-related debris thereby eliminating a substantial portion of freshwater flow from the diversion towards this portion of the project area.

D. **Site/Structure # 32 –**Overall condition was good with the exception of the area that was vandalized in early 2003. That area was partially repaired by the 2003 inspection team; however, that repair was again vandalized to the original depth. The condition of the closure appears not to have changed; most of the storm debris is gone. This structure was constructed to keep diversion water from entering Lake Leary from the western lake rim; the storm devastated that portion of the lake rim rendering this structure ineffective. Nothing needs to be done until the Lake Lery shoreline is re-built.

E. **Site/ Structure # 40 –** The structure is just slightly covered with storm debris. The gates were in the open position at the time of the inspection. Water flow was somewhat visible, possibly due to a lack of a large differential head. The culverts at this site was flushed out since the last inspection. The interior channel that leads to the site was relatively clear of debris and hyacinths. Padlocks on both gates were non-functional.

F. **Site/Structure # 50 –** The gate was in the open position at the time of the inspection. The outfall water elevations were so high that flow was visible over the entire

closure, as well as through the culvert. The timber walkway is slightly bowed. Padlock on the gate was non-functional.

G. **Site/Structure #52 –** The gates were in the open position at the time of the inspection. There appeared to be a vortex on the water surface near the inlet of the north culvert indicating some water flow. It was evident that much blockage remains due to storm debris in the north culvert. There is a tree ball located at the end of the combination gate that keeps it from operating. There was a moderate breach of the spoil bank to the right and left of the plug allowing some flow from the canal to the marsh. It is estimated that the canal water level was from 9 to 12 inches higher than the interior, which allowed much water to flow over the spoil-bank into the marsh. The padlock on the gate was non-functional.

H. **Site/Structure # 54 –** The structure has been cleared of all storm debris. The gates were in the open position at the time of the inspection. Water flow was not visible, due to a lack of sufficient differential head therefore it was not evident how much blockage remains due to storm debris. The culverts at this site were flushed out since the last inspection

I. **Site/ Structure # 56 -** No subsidence was noted in this rock structure since the last inspection. Some storm debris remains on the entire rock closure. The warning signs that were damaged during the storm have been reset. The middle section of the plug is approx. 0.5' lower than the sides.

J. **Site # 57 –**It appears that the vegetation on the spoil bank along the sides of the Reggio Canal that was damaged by the storm is recovering well although many sparse areas remain. There are small breaches in the spoil-bank between structure nos. 26 and 40. One large cut (~15' wide) exists in the spoil-bank east of structure no. 54.

K. Site # 58 –The vegetation on the spoil bank along the sides of the Bayou Mandeville that was damaged by the storm is recovering although many sparse areas remain.

L. Site/Structure # 60 – The gate structure is completely cleared from any storm debris. The gates were in the open position at the time of the inspection. Water flow was slightly visible; therefore, not much blockage remains due to storm debris. The culverts at this site were flushed out since the last annual inspection. The high water stage makes the rock closure on the east wing-wall appear to have subsided since the last inspection; however, the closure still is functioning as designed.

VI. Conclusions and recommendations

1. As you can see from the inspection report and photographs, areas of the outfall project show good signs of recovery from the Katrina Storm event. This recovery appears to be due to a steady moderate to high flow of river water through the diversion. Many structures may still be slightly blocked

by storm debris, but are slowly being cleaned out by water exchange through the culverts. Completed repair operations to the levee breaches that occurred behind Braithwaite and Scarsdale now allow the diversion structure to be operated above 5,000 cfs without fear of further flooding the east bank of Plaquemines Parish. OCPR and NRCS have tentatively agreed to pursue a 404 permit to clear approx. 4,800 lf of DC Canal to re-establish channel capacity and freshwater flows to the SW portion of the project area.

2. It is OCPR's conclusion that, the outfall project may never be restored to its original condition. The entire complexion of the project has been changed. It will take clearing of the channels, clearing of the remaining debris from and around some culverts, and repair all the washed out embankments that formed the perimeter affected by each individual structure. It will also be necessary to repair the entire west and north lake rim of Lake Leary that was damaged, so as not to allow diversion water to enter the lake from those sides.
3. OCPR suggests that we continue to aggressively operate the diversion structure with hopes that much of the marsh debris that was deposited by the storm will be displaced from the project area. It is also thought that by operating the structure aggressively, will allow more desirable vegetation to take over and expand where it did exist before the storm. The Delacroix Corp. has recently received a marsh management permit that will allow them to repair much of the spoil-banks and holding areas that contributed to the success of this project. That work should commence very soon. In the interim, we will continue to divert fresh water into the South and West section of the outfall area.

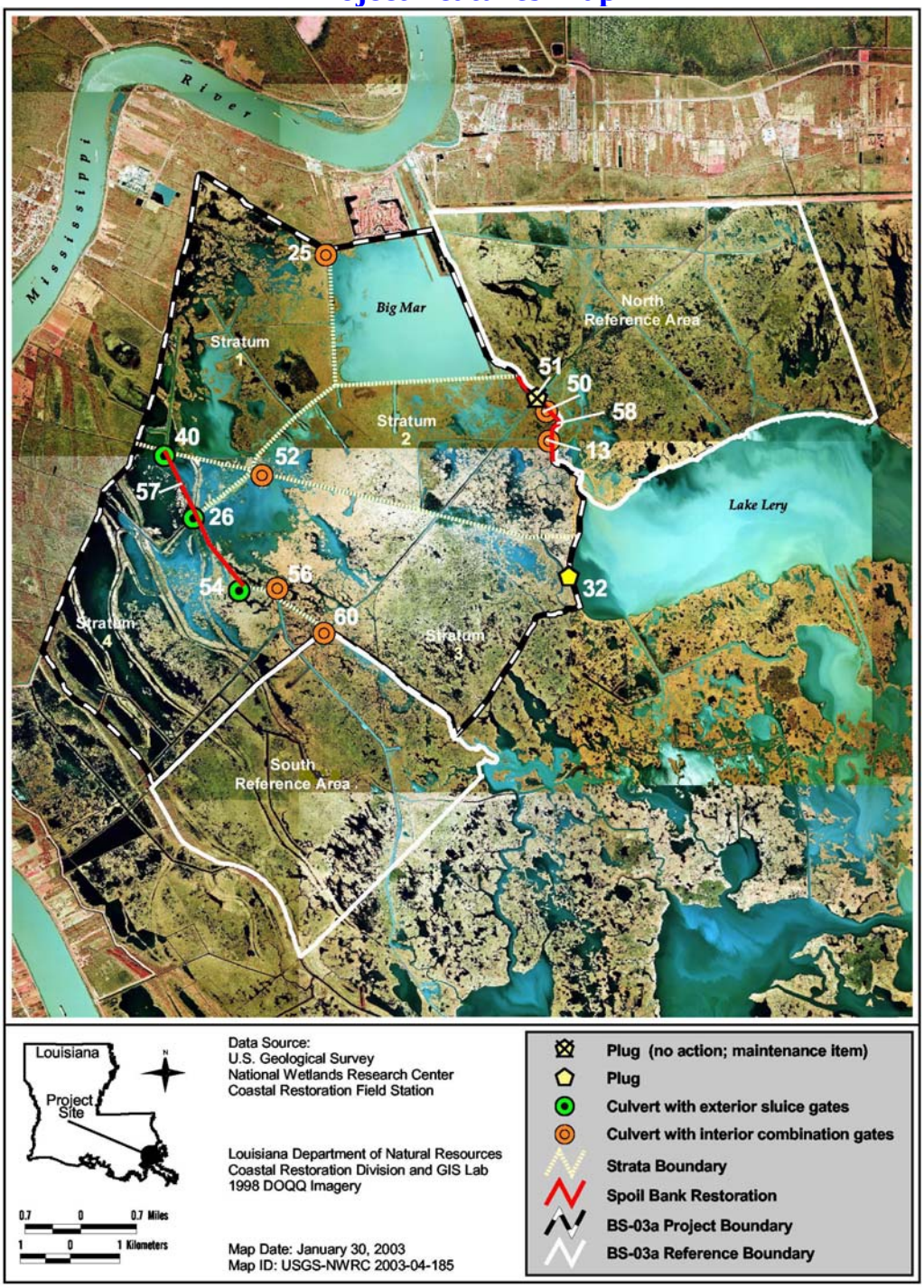
OCPR would also like to suggest that the State and NRCS continue to work together to make the necessary changes, to the original project, that were brought on by the following post design and construction events:

- **a.** Resolution of the oyster litigation that for so long influenced the operational plan for the diversion.
- **b.** Severe storm damage from Katrina that dramatically changed the complexion of the entire outfall landscape.
- **c.** Legislation resulting from the storm damage that granted the project $10.1 million by the 4th supplemental appropriation. These funds will be used to modify the Caernarvon Freshwater Diversion Project by restoring the surrounding wetlands to reverse wetland losses and modification of the main structure operations.
- **d.** Under that supplemental appropriation, the COE will look to re-authorize the project in order to maximize freshwater diversion to the Breton Sound Basin.

All of these events will influence the effectiveness of the Caernarvon Outfall Project as we now see it. It is anticipated that the low flows that initially were an integral part of the yearly operational plan will be a thing of the past. We are now looking at a more aggressive flow plan and, if the project is re-authorized, and given the demand for introduction of more

freshwater into the marshes, we could enter into a pattern that would approach maximum flow (8,000 cfs) whenever the river stage will allow.

APPENDIX A
Project Features Map



APPENDIX B
Photographs

Photo # 1 Site 13 (view 1) Corrosion of locking plates **c**aused them to separate making locking impossible.

Photo # 2 Site 13 (view 2) The extent of blockage of the culvert due to storm debris is mininal. Note the high water stages in the inside, flowing out into Bayou Mandeville. Approximately ½ foot difference in water levels. (2007 Photo)

Photo # 3 Site 25 The structure remains covered with storm debris. Both of the gates remained closed to reduce flow to the Braithwaite area where the USACE was constructing an emergency levee contract. That contract has since been completed. This site was not accessible during the 2008 inspection.

Photo #4 Site 26 The structure still has a small amount storm debris. The blockage of the culverts by storm debris has been cleared. The flow-meter, and all its attachments that were destroyed by the storm, will be replaced soon.

Photo # 5 Site 32 (view 1) This structure was opened to the waterline by vandals and was partially repaired by the 2003 inspection team. Destruction of the west lake rim of Lake Lery by the storm, now makes this closure irrelevant.

Photo # 6 Site 32 (view 2) Close up view of the vandalized area. Approximately 30% of the west lake rim was destroyed by the storms.

Photo # 7 Site 40 **S**mall amounts of storm debris still remains on structure. The blockage of the culverts by storm debris has been cleared. The flow-meter was damaged but recovered will be replaced. Note the high water stages from the structure westward to the Plaquemines east bank hurricane levee (tree line) in the background.

Photo # 8 Site 50 The extent of blockage of the culverts by storm debris is minimil. Slight erosion was evident on both sides of the rock plug where it ties into the earthen embankment. High flows such as this, allow water to flow around the structures to flood the marsh.

Photo # 9 Site 52 (view 1) Some storm debris remains on the inside of the culverts. A tree stump ball is blocking the north culvert opening on the inside.Slight erosion was evident on both sides of the rock plug where it ties into the earthen embankment.

Photo # 10 Site 52 (view 2) This breach in the earthen embankment is approximately 50 yards to the west of the rock plug. Many of these breaches are evident throughout the outfall area allowing free flowage from the conveyance channels into the interior marshes.

Photo # 11 Site 54. Structure is clear of storm debris. The blockage of the culverts from storm debris has been cleared. The flow-meter and all attachments on this structure that were destroyed by the storm will be replaced soon.

Photo #12 Site 56 The overall condition of the rock closure appears to be good. There is still much storm debris covering the closure. No noticeable subsidence has occurred since the last inspection.

Photo # 13 Site 57 (view 1) Reggio Canal spoil bank. Storm damage is still evident, but vegetation is rapidly recovering.

Photo # 15 Site 57(view 2) Reggio Canal spoil bank. More recovering vegetation. Note the gaps on the spoil bank caused by the storms.

Photo # 16 Site 57 (view 4) Reggio Canal spoil bank. More recovering vegetation.

Photo # 17 Site 58 Bayou Mandeville spoil bank. Many damaged trees along the bank line. Embankment is again heavily vegetated.

Photo # 19 Site 60(view 1) Slightly more subsidence is noticed in the center part of the rock closure..

Photo # 20 Site 60 (View 2) Structure is clear of all storm debris. The bockage of the culverts due to storm debris has been cleared. Some flow was visible through the culverts.

Appendix C
Three-Year Operations & Maintenance Budgets

Caernarvon Outfall Management / BS-03a / PPL 2
Three-Year Operations & Maintenance Budgets 07/01/2008 - 06/30/2011
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Project Manager	O & M Manager	Federal Sponsor	Prepared By
Thomas Bernard	*Thomas Bernard*	*NRCS*	*Thomas Bernard*

	2008/2009	2009/2010	2010/2011
Maintenance Inspection	$4,401.00	$4,516.00	$4,633.00
General Maintenance	$10,800.00	$10,800.00	$10,800.00
Structure Operation	$30,000.00	$30,000.00	$30,000.00
Administration	$5,000.00	$5,000.00	$5,000.00
Maintenance/Rehabilitation			

08/09 Description:

E&D	$0.00
Construction	$0.00
Construction Oversight	$0.00
Sub Total - Maint. And Rehab.	$ -

09/10 Description

E&D		$0.00
Construction		$0.00
Construction Oversight		$0.00
	Sub Total - Maint. And Rehab.	$ -

10/11 Description:

E&D			$0.00
Construction			$0.00
Construction Oversight			$0.00
		Sub Total - Maint. And Rehab.	$ -

	2008/2009	2009/2010	2010/2011
Total O&M Budgets	**$ 50,201.00**	**$ 50,316.00**	**$ 50,433.00**

O &M Budget (3 yr Total)	**$ 150,950.00**
Unexpended O & M Budget	**$ 941,528.45**
Remaining O & M Budget (Projected)	**$ 790,578.45**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 2008/2009

Caernarvon Outfall Management / BS-03a / PPL 2

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$4,401.00	**$4,401.00**
General Structure Maintenance	LUMP	1	$10,800.00	**$10,800.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations Contract	LUMP	1	$30,000.00	**$30,000.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**
ADMINISTRATION				
LDNR / CRD Admin.	LUMP	1	$5,000.00	$5,000.00
FEDERAL SPONSER Admin.	LUMP	1	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$5,000.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:	Relocate bouy anchors and minor repairs				
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$50,201.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 2009/2010

Caernarvon Outfall Management / BS-03a / PPL 2

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$4,516.00	**$4,516.00**
General Structure Maintenance	LUMP	1	$10,800.00	**$10,800.00**
Engineering and Design	LUMP	1		**$0.00**
Operations Contract	LUMP	1	$30,000.00	**$30,000.00**
Construction Oversight	LUMP	1		**$0.00**
ADMINISTRATION				
LDNR / CRD Admin.	LUMP	1	$5,000.00	$5,000.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$5,000.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	1	$1,351.00	
Signage		EACH	1	$5,763.00	
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$50,316.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 2010/2011

Caernarvon Outfall Management / BS-03a / PPL 2

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$4,633.00	**$4,633.00**
General Structure Maintenance	LUMP	1	$10,800.00	**$10,800.00**
Engineering and Design	LUMP	0	$0.00	**$0.00**
Operations Contract	LUMP	1	$30,000.00	$30,000.00
Construction Oversight	LUMP	0	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	1	$5,000.00	$5,000.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$5,000.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
	LUMP	0	$0.00	$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navigation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$50,433.00**

Appendix D
Field Inspection Form

FIELD INSPECTION CHECK SHEET

Project No. / Name: Caernarvon Outfall Management BS-03a

Date of Inspection: 3/4/2008 20 Time: 9:30 AM

Structure No. **See Report Section III**

Inspector(s): LDNR: Tom Bernard, Barry Richard
NRCS: Loland Broussard, Michael Trusclair

Structure Description: See Report Section III

Water Level: Inside: +2.5 NGVD Outside: +9.5 NGVD

Type of Inspection: 2008 Annual Inspection

Weather Conditions: Clear to Ptly. Cloudy, Wind NW 20 - 25 mph (7,100 CFS Diversion)

Item	Condition	Physical Damage	Corrosion	Photo	Observations and Remarks
CMP Culverts Earthen / Rock Embankment	Good	None	None	Appendix B	Some of the culverts have rotated slightly with the differential settlement of the rock structure. Most of the visible storm debris has cleared from the embankments. Small amounts of blockage remains in the culverts. Site No. 52 has one culvert totally blocked by tree root ball on the South end.
Water Control Gates	Fair/Good	None	Moderate	Appendix B	All water Control Gates appear to be in fairly good condition. Small amounts of marsh still cover some of the walkways while the gates are clear and operable. The end of the DP canal is still blocked by storm displaced marsh.
Rock Canal Closures	Good	See Remarks	N/A	Appendix B	The overall condition of the canal closures is good with some areas of erosion where the rock meets the earthen embankment. Site #32 that was vandalized by trappers in early 2003 remains that way, but does not affect the function of the closure.
Timber Piling at Culverts	Very Good	None	None	Appendix B	All of the timber piling are fine, some of the rock structures have settled as well as the culvert themselves causing some slight rotation in the culverts. Small amounts of storm debris still covers portions of some rock closures.
Timber walkways at Culverts	Very Good	See Remarks	N/A	Appendix B	Some of the 4 X 4 timber support posts for the timber walkways settled excessively causing the timber walkway to bend and twist slightly. Small amounts of displaced marsh debris is evident on some walkways but do not pose a hazard.
Spoilbank Restoration	Fair	Severe	N/A	Appendix B	The storm surge had caused extensive damage to all spoilbank work, which was suseptable to erosion from waves. Some of these areas have revegetated nicely since the storm. Vegetation is recovering at several other locations.
Flow Meters	N/A	Severe	N/A	N/A	Flow meters were installed at structures No. 26, 40, and 54 to monitor the flow of water going into the interior marsh were destroyed/damaged and have not yet been replaced. CRD has made most of the repairs and will be installing them soon.