



**State of Louisiana
Department of Natural Resources
Coastal Engineering Division**

**2005/2006 Annual Inspection
Report**

for

**GIWW/CLOVELLY
HYDROLOGIC RESTORATION**

State Project Number BA-02
Priority Project List 1

August 17, 2006
Lafourche Parish

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I. Introduction

The GIWW/Clovelly Hydrologic Restoration Project consist of 14,948 acres located in the Barataria Basin near the Gulf Intracoastal Waterway (GIWW) in Lafourche Parish, Louisiana. The project is bounded by the Gulf Intracoastal Waterway to the north and to the northeast, Bayou Lafourche to the west, Superior Canal to the south, Bayou Perot, Little Lake and Bayou L' Ours to the east (Attachment I).

The GIWW to Clovelly project is a hydrologic restoration project consisting of several fixed crest weirs with boat bays, rock rip rap channel plugs, rock lined channels, a variable crest weir structure, rock bank stabilization, lake-rim restoration and earthen embankments. These structures were designed to reduce the adverse tidal affects in the project area, reduce shoreline erosion and promote freshwater introduction to better utilize available freshwater and sediment retention to encourage the re-establishment of emergent aquatic vegetation (LDNR Monitoring Plan, 1997).

Construction of the GIWW to Clovelly Restoration Project was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) enacted on November 29, 1990 as amended. The GIWW to Clovelly Project was approved on the first Priority Project List.

In 2003, the CWPPRA Task Force determined that , due to LDNR being the responsible party for operation and maintenance phase of the vast majority of the CWPPRA projects, CWPPRA authorized LDNR, through SPR 15950, to be the responsible party for all Post Storm/Hurricane Assessments. After Hurricanes Katrina and Rita, every project appeared to be impacted by the storms; therefore, LDNR determined that all projects should be assessed for damages (Damage Assessment Cumulative Report, 2006). The damage assessment included a visual observation of all constructed project features and recommended possible corrective actions should maintenance be required. The annual inspection of the GIWW to Clovelly Project usually occurs in the first quarter (March/April) of each year. However, due to the devastation and destruction caused by Hurricanes Katrina and Rita, a damage assessment was performed immediately following the storms in October 2005. With concurrence from the federal sponsor NRCS (Natural Resources Conservation Service), LDNR has decided not to perform the annual inspection scheduled for March 2006 but rather use the field information gathered on the damage assessment field trip in October 2005 to produce the 2006 annual inspection report.

II. Inspection Purpose and Procedures

The purpose of the annual inspection of the GIWW to Clovelly Hydrologic Restoration Project (BA-02) is to evaluate the constructed project features, identify any deficiencies, prepare a report detailing the condition of such features and to recommend corrective actions needed, if any. Should it be determined that corrective actions are needed, LDNR shall provide, in report form, a detailed cost estimate for engineering, design, supervision, inspection, construction contingencies, and an assessment of the urgency of such repairs

(O&M Plan, 2002). The annual inspection report also contains a summary of maintenance projects undertaken since the constructed features were completed and an estimated project budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year projected operation and maintenance budget is shown in Attachment III. A summary of past operation and maintenance projects undertaken since the completion of the GIWW to Clovelly project are outlined in Section IV of this report.

Immediately following Hurricanes Katrina and Rita in 2005, the Louisiana Department of Natural Resources (LDNR) mandated that damage assessments of all CWPPRA projects be performed to determine the extent of damage and maintenance needs, if any. On October 4, 2005, an inspection of the GIWW to Clovelly Hydrologic Restoration Project (BA-02) was completed. Participants in the damage assessments included representatives from LDNR (Brian Babin and Shane Triche) and the Natural Resources Conservation Service (Brad Sticker). The attendees met at the Clovelly Canal Public Boat Launch. The inspection began at approximately 8:15 a.m. and ended at 11:30 a.m. Within this time frame, constructed features of the Barataria Landbridge (BA-27) project located on the southern banks of Bayou Rigolettes, Bayou Perot and the northern bank of Little Lake were also inspected.

The field inspection included a complete visual inspection of the entire project site. Staff gauge readings were used to determine approximate elevations of water, rock weirs, earthen embankments, lake-rim dike and other project features. A handheld GPS unit was used to mark the locations of low areas along the earthen embankments and rock structures that may require corrective action or periodic visual inspection on future site visits. Photographs were taken at each project feature (Attachment II) and Field Inspection notes were completed in the field to document and record measurements and deficiencies (Attachment V).

From watermarks observed within the project area, it appears that the storm surge from Hurricane Rita inundated the entire project area with an estimated 5 to 6 feet of water. To confirm our assumptions, two (2) continuous recorders operating during the storm captured the storm surge with respect to water levels and salinities.

Staff gauge readings were taken at several locations throughout the project area to determine water levels at the time of the inspection. Below are documented gauge readings and locations:

Monitoring station 54 – located along Clovelly Canal just west structure 14A. The water level at the time of the inspection was +2.25' NAVD at 8:30 a.m. (10/4/05).

Monitoring station 53 – located along an existing channel open to Little Lake behind structure #2. The water level reading at this gauge was +2.3' NAVD at 10:00 a.m. (10/4/05).

Monitoring station 57 – located along Superior Canal northwest of Structure No.1 at the mouth of an existing dead end canal. The water level was +2.3' NAVD at 10:45 a.m. (10/4/05).

III. Project Description and History

Within the GIWW to Clovelly Hydrologic Restoration Project, the average rate of change from marsh habitat to non-marsh habitat (including wetland loss to both open water and commercial development) has been increasing since the 1950's. The main reasons for wetland deterioration in the project area as reported by NRCS in the Wetlands Value Assessment (WVA) are saltwater intrusion, oil field activities, subsidence, lack of sedimentation, and reduced freshwater influx. The construction of canals has produced negative impacts on coastal marshes of Louisiana also.

The purpose of the GIWW/Clovelly Project is to protect intermediate marsh in the project area by restoring natural hydrologic conditions that promote greater use of available freshwater and nutrients. This will be accomplished by limiting rapid water level changes, slowing water exchange through over-bank flow, reducing rapid salinities increases, and reducing saltwater intrusion (LNDR monitoring report 1998). The project objectives and specific goals as outlined in the Monitoring Plan drafted by LDNR are the following:

- Protect and maintain approximately 14,948 acres of intermediate marsh. This will be achieved by restoring natural hydrologic conditions that promote greater freshwater retention and utilization, prevent rapid salinity increases, and reduce the rate of tidal exchange.
- Reduce shoreline erosion through shoreline stabilization

The specific goals for the project are:

- Increase or maintain marsh to open water ratios.
- Decrease salinity variability in the project area.
- Decrease the water level variability in the project area.
- Increase or maintain the relative abundance of intermediate marsh plants.
- Promote greater freshwater retention and utilization in the project area.
- Reduce shoreline erosion through shoreline stabilization.
- Increase or maintain the relative abundance of submerged aquatic vegetation (SAV).

The GIWW to Clovelly Hydrologic Restoraton Project involves the installation and maintenance of structures in two (2) construction units. Construction Unit No.1 was completed in November 1997 and Construction Unit No.2 was completed in October 2000. These structures were designed to reduce the adverse tidal effects in the project area and promote freshwater introduction to better utilize available freshwater and sediment retention. If these objectives are met, it is anticipated that the rate of shoreline erosion will be reduced and a hydrologic regime, conducive to sediment and nutrient deposition, will encourage the re-establishment of emergent and submergent vegetation in eroded areas to more historic low energy environment (LDNR Monitoring Plan, 1997).

The principle project features of Construction Unit No.1 include:

- Site 2 – Fixed crest weir with boat bay.
- Site 4 – Fixed crest rock weir with boat bay.
- Site 7 – Fixed crest rock weir with boat bay.
- Site 8 – Rock rip rap channel plug.
- Site 43 – Rock rip rap channel plug.
- Site 91 – Rock plug with culvert and flap gate.

The principle project features of Construction Unit No.2 include:

- Site 1 – Fixed crest rock weir with boat bay.
- Site 4B – Rock rip rap channel plug.
- Site 14A – Fixed crest rock weir with barge bay.
- Site 35 – Variable crest weir, water control structure.
- Site 90 – Rock rip rap channel plug.
- 5,665 linear ft. of Lake Rim Restoration
- 5,023 linear ft. of Rock Bank Stabilization
- 11,711 linear ft. of Earthen Bank Stabilization.

Structure #35 of the GIWW to Clovelly Restoration Project has an operation component which consists of an 80 ft. long fixed crest weir with a ten (10) ft. wide variable crest section and twelve (12) stop logs. As stipulated in the project permits, this structure shall be operated according to the following operation schedule:

Variable Crest Weir – the stop logs shall be set at 0.5 ft. BML (Below Marsh Level) from April to November and removed from November to April (weir sill level = 2.0 ft. BML) to allow for sediment and nutrient inflow during the spring.

Construction Unit No.1 has a twenty-year (20 year) economic life which began in November 1997 and Construction Unit No.2 began the 20 year economic life in October 2000.

VI. Summary of Past Operation and Maintenance Projects

2005 Structure Operations: In accordance with the operation schedule outlined in the Operation and Maintenance Plan, structure 35 has been operated during the months of April and November of each year since April 3, 2002. Due to the movement of marsh behind structure #35 resulting from Hurricane Rita, the structure has not been operated since November 2005. Corrective actions are in progress to obtain the necessary permits and prepare contract documents to clean out the channel behind the structure to allow water flow through the weir.

Navigation Aids Maintenance: Since the completion of the GIWW to Clovelly project, the navigation aids located adjacent to the barge bay at Structure 14A have been serviced on three

(3) separate occasions. Below are short description of repairs, dates and cost associated with the service of the navigation lights:

5/16/02 – Automatic Power of Larose, La. performed maintenance to repair navigation lights at Structure 14A. Seventeen (17) bulbs were replaced at a total cost of \$421.50.

12/16/03 – Automatic Power provided maintenance services to replace batteries and bulbs in all four (4) navigation lights at structure 14A at a total cost of \$2,189.80.

The navigation lights at structure 14A were inspected during the Hurricane Katrina damage assessment on 9/13/05. It was determined that two (2) of the four (4) lights (timber piles labeled “2” and “3”) were not functioning. Based on our inspection, we believe that the bulbs were burnt. On a subsequent trip on 9/27/05, the LDNR field engineering staff replaced the bulbs on lights “2” and “3”. The navigation lights were inspected again on 10/04/05 by LDNR and determined that all lights were function at this time and no apparent damage was sustained from Hurricane Rita.

V. Inspection Results

BA-02 Construction Unit No. 1

Construction Unit No.1 consisted of the construction of three (3) fixed crest weirs with boat bays, two (2) rock plugs, a rock plug with flap gate and rock lined channel. As noted in the previous annual inspections, the rock structures (Structures #2,4,7 & 8) located along the bank of Little Lake and Bay L’ Ours have settled at various degrees over time since construction was completed in 1997. The rock sections of these structures were under water at the time of this inspection due to high tides and do not appear to have sustained any significant damage from Hurricane Rita. However, in the case of Structure 4a & 4b (rock plug located along the west bank of Bay L’ Ours), we did observe that the section of marsh adjacent to the plug has eroded around the south side allowing transfer of water from the bay to the interior marsh behind the structure. The loss of marsh in this area is a direct impact from Hurricane Rita. Structures #43 and #91 appear to be in pre-storm condition with no apparent damage (Photos: Page 11).

BA-02 Construction Unit No. 1

Construction Unit No.2 consisted of the construction of two (2) fixed crest rock weirs with barge bays, two (2) rip rap channel plugs, a variable crest weir structure, rock bank stabilization and lake-rim restoration, and earthen bank stabilization. Structures #1 and #90 did not sustain any visible damage from Hurricanes Katrina or Rita. A large portion of the lake rim restoration along Bay L’ Ours and Brenton Canal was under water at the time of the inspection and did not appear to be further damaged or displaced during either storms.

Damage assessments of Hurricane Katrina revealed visible damage at structures #14A and #35 and along the earthen embankments. Upon inspection of the rock weir with barge bay located at the end of Clovelly Canal near Little Lake, we discovered that a 15’ x 10’ wide

section (approximate measurement) of the rock weir on the southeast corner of the barge bay had been displaced by the storm. It does not appear that any other damage has occurred at structure 14A from Hurricane Rita (Photos: Page 11).

Inspection of the variable crest weir structure #35 located at the end of an existing oilfield canal off of Brenton Canal revealed that a large section of the interior marsh had floated directly behind the structure filling the channel connecting the water control structure to the interior ponds, thus blocking the flow of water and rendering the structure inoperable. We concluded that the movement of marsh had taken place during Hurricane Katrina (Photos: Page 13).

While inspecting the existing earthen embankments along various oilfield canals, we noted three (3) breaches in the existing embankment that were caused by the storm in addition to the breaches noted on previous inspections (Photos: Page 14).

Earthen Bank Stabilization

Overall, the earthen embankments constructed along various oilfield canals appeared to be in good condition. On previous inspections prior to the storm, we identified a 200 ft. wide breach at Sta. 560+00, located at the end of an existing location canal south of Superior Canal adjacent to an existing pipeline right-of-way. Since this breach is located at the end of a channel which does not experience large flows, NRCS and LDNR has decided that repairing this breach will not enhance the function of the project and can be done at a later date. A smaller breach was also identified prior to the storms at Sta. 122+00 along the east bank of the second location canal off of Brenton Canal from Bay L' Ours. This breach is approximately 10' wide with water exchanging freely through the opening. This breach is opened to the interior marsh of the project area and is susceptible to infiltration of high saline waters and is recommended for repairs.

VI. Conclusions and Recommendations

Structure #14A – repair the southeast corner of the rock weir near the barge bay by recapping the sections of the rock weir which was dispersed during the storm with rip rap. From post storm inspections after Hurricanes Katrina and Rita, we determined that the damage to Structure #14A was caused by Hurricane Katrina.

Structure #35 – reopen the existing channel connecting the water control structure to the interior marsh by excavating material adjacent to the water control structure to open interior ponds to re-establish water flow. From inspection performed after both Hurricanes Katrina and Rita, it was determined that the movement of marsh behind structure #35 was caused by Hurricane Katrina.

Earthen embankments – repair the three (3) breaches caused by Hurricanes Katrina and Rita as well as breaches identified on previous inspection prior to the storm. The method of repair

for all breaches shall use dredge material from the adjacent canal and re-construct the earthen embankment to design elevations (Breach locations are shown on sheets 20 & 21).

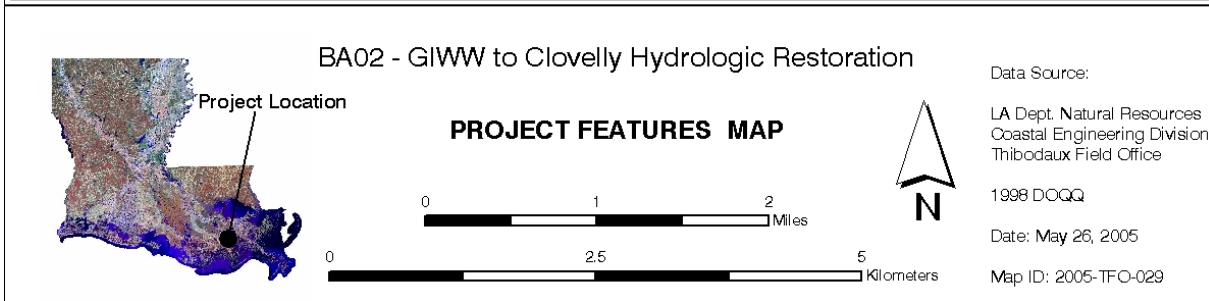
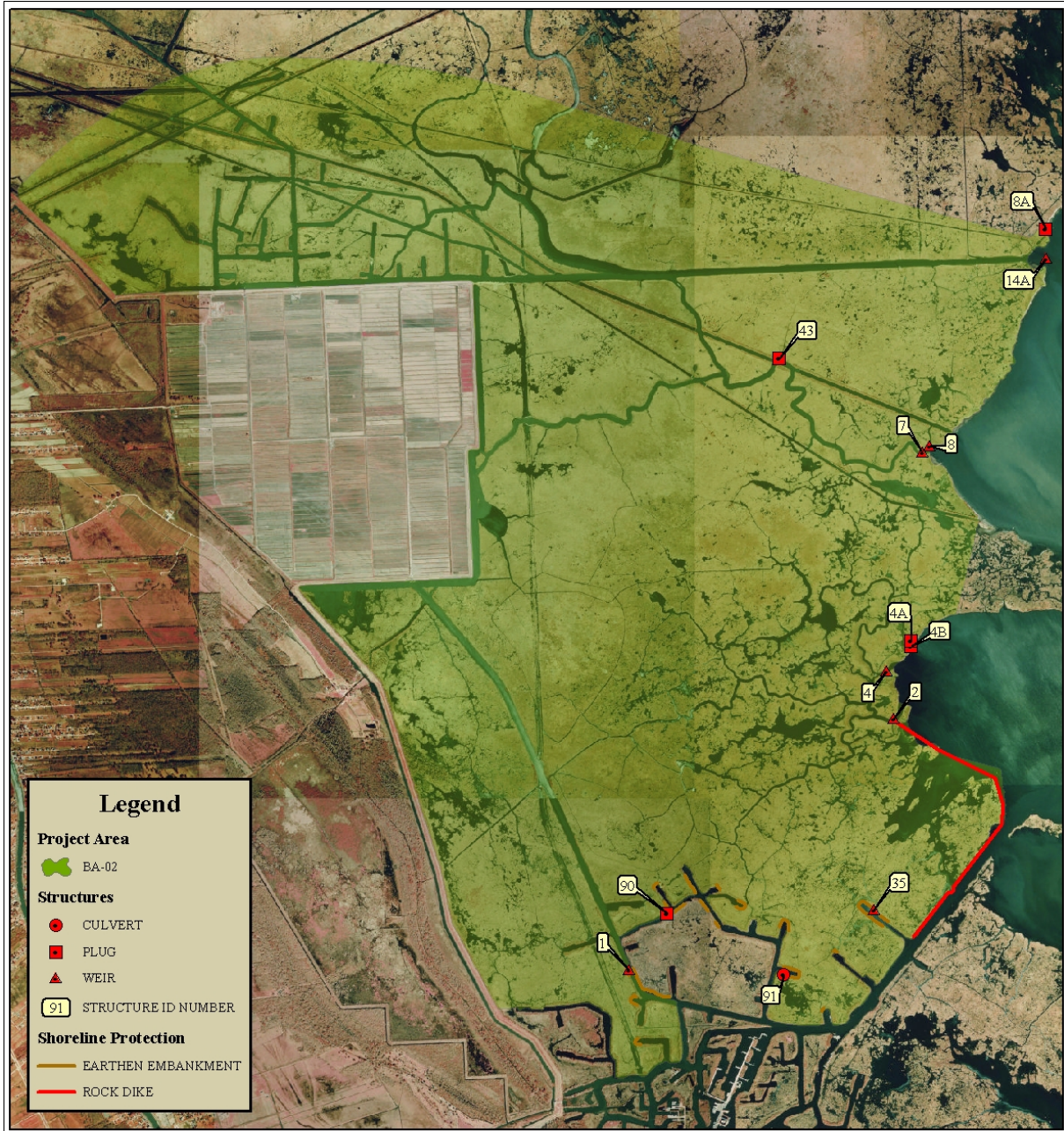
References:

Lear, Elaine, August 2003. *Monitoring Plan*, GIWW (Gulf Intracoastal Waterway) to Clovelly Hydrologic Restoration, Louisiana Department of Natural Resources, Coastal Restoration Division, 24 pp.

Broussard, M. Garrett, February 2006. *Damage Assessment Report for Hurricanes Katrina and Rita*, Louisiana Department of Natural Resources, Coastal Engineering Division, 5 pp.

LDNR, July 2002. *Operation, Maintenance and Rehabilitation Plan, GIWW to Clovelly Hydrologic Restoration Project (BA-02)*, Louisiana Department of Natural Resources, Coastal Engineering Division.

Attachment I
Project Features Map



Attachment II

Photographs



Structure 4A&B – large section of marsh eroded around the south side of the existing rock plug creating a breach allowing unimpeded flow behind structure looking northwest.



Structure 4A&B – large section of marsh eroded around the south side of the existing rock plug creating a breach allowing unimpeded flow behind structure looking north.



Structure 14A – displaced rock along rock weir south end of barge bay (Post Hurricane Katrina). Water level at time of photo approximately 1.6' NAVD.



Structure 14A – displaced rock along rock weir south end of barge bay (Post Hurricane Rita). Water level reading at time of inspection was approximately +2.25' NAVD.



Structure #35 – movement of marsh behind structure blocking flow through structure (Post Hurricane Katrina). Water level at time of photo was approximately 1.5' NAVD.



Structure #35 – movement of marsh behind structure blocking flow through structure (Post Hurricane Rita). Water level at time of photo was approximately 1.5' NAVD.



Breach 2 – located along oilfield canal adjacent to Superior Canal leading to Structure #91 on the west bank.



Breach 3 – located along the same canal as breach 2 further northward on the west bank.

Attachment III

Three Year Budge Projections and Worksheets

Annual Inspection Report
 GIWW/CLOVELLY PROJECT
 State Project No. BA-02

Three-Year Operations & Maintenance Budgets 07/01/2006 - 06/30/09			
<u>Project Manager</u>	<u>O & M Manager</u>	<u>Federal Sponsor</u>	<u>Prepared By</u>
	<i>Brian Babin</i>	<i>NRCS</i>	<i>Brian Babin</i>
	2006/2007	2007/2008	2008/2009
Maintenance Inspection	\$ 5,250.00	\$ 5,407.00	\$ 5,569.00
Structure Operation	\$ 8,000.00	\$ 8,000.00	\$ 8,000.00
Administration	\$4,500.00	\$ 4,500.00	\$ 4,500.00
Maintenance/Rehabilitation			
06/07 Description: breach repairs and dredging of channel behind structure #35, routine maintenance of navigational aids and structure repairs.			
<i>E&D</i>	\$15,500.00		
<i>Construction</i>	\$74,000.00		
<i>Construction Oversight</i>	\$18,000.00		
<i>Sub Total - Maint. And Rehab.</i>	\$ 107,500.00		
07/08 Description: navigational aid and structure repairs.			
<i>E&D</i>		\$ -	
<i>Construction</i>		\$ 5,000.00	
<i>Construction Oversight</i>		\$ -	
<i>Sub Total - Maint. And Rehab.</i>		\$ 5,000.00	
08/09 Description: navigational aid and structure repairs.			
<i>E&D</i>			\$ -
<i>Construction</i>			\$ 5,000.00
<i>Construction Oversight</i>			\$ -
		<i>Sub Total - Maint. And Rehab.</i>	\$ 5,000.00
	2006/2007	2007/2008	2008/2009
Annual O&M Budgets	\$ 125,250.00	\$ 22,907.00	\$ 23,069.00
O & M Budget (3 yr Total)			\$171,226.00
Unexpended O & M Funds			\$1,147,189.65
Remaining O & M Budget (Projected)			\$975,693.65

OPERATIONS & MAINTENANCE BUDGET WORKSHEET

Project: BA-02 GIWW to Clovelly Hydrologic Restoration Ph. 1 & 2

FY 06/07 –

Administration		\$ 4,500*
O&M Inspection & Report		\$ 5,250
Operation:		\$ 8,000
Maintenance:		\$107,500
E&D:	\$ 15,500	
Construction:	\$ 69,000	
Construction Oversight:	\$ 18,000***	
General Maintenance:	\$ 5,000**	

Operation and Maintenance Assumptions:

Structure Operations: water control structure operated twice annually for a total of \$4,000 per operation. (2)(\$4,000) = \$8,000 plus (\$2,000 for LDNR administration.)*

General Maintenance: Water control structure, navigation aids repair. (Construction : \$5,000)**. (Administration: \$2,500)*

Major Maintenance: earthen embankment repairs and clean-out behind structure #35. The estimated construction cost is outlined below:

Mobilization & Demob:	\$ 20,000	
Earthen embankment repairs:	\$ 25,000	
Clean-out structure #35	<u>\$ 12,500</u>	
	\$ 57,500	
Contingency (20%)	\$11,500	
Total Construction Cost:		\$69,000
Surveying (NRCS):	\$ 3,000	
Engineering & Design (LDNR):	\$ 8,500	
Construction Inspection: (IDIQ Contract: 200 hrs @ \$65/hr.)	\$13,000***	
LDNR Admin (Permit):	\$ 1,500	
Construction Admin LDNR:	\$ 5,000***	
NRCS Admin:	<u>\$ 2,500</u>	
		\$ 33,500
		\$102,500

FY 07/08 –

Administration		\$ 4,500
O&M Inspection & Report		\$ 5,407
Operation:		\$ 8,000
Maintenance:		\$ 5,000
E&D:	\$ 0	
Construction:	\$ 5,000	
Construction Oversight:	\$ 0	

Operation and Maintenance Assumptions:

Structure Operations: water control structure operated twice annually for a total of \$4,000 per operation. $(2)(\$4,000) = \$8,000$ plus \$2,000 for LDNR administration.

General Maintenance: Water control structure, navigation aids repair. Construction : \$5,000.
Administration: \$2,500

FY 08/09 –

Administration		\$ 4,500
O&M Inspection & Report		\$ 5,569
Operation:		\$ 8,000
Maintenance:		\$ 5,000
E&D:	\$ 0	
Construction:	\$ 5,000	
Construction Oversight:	\$ 0	

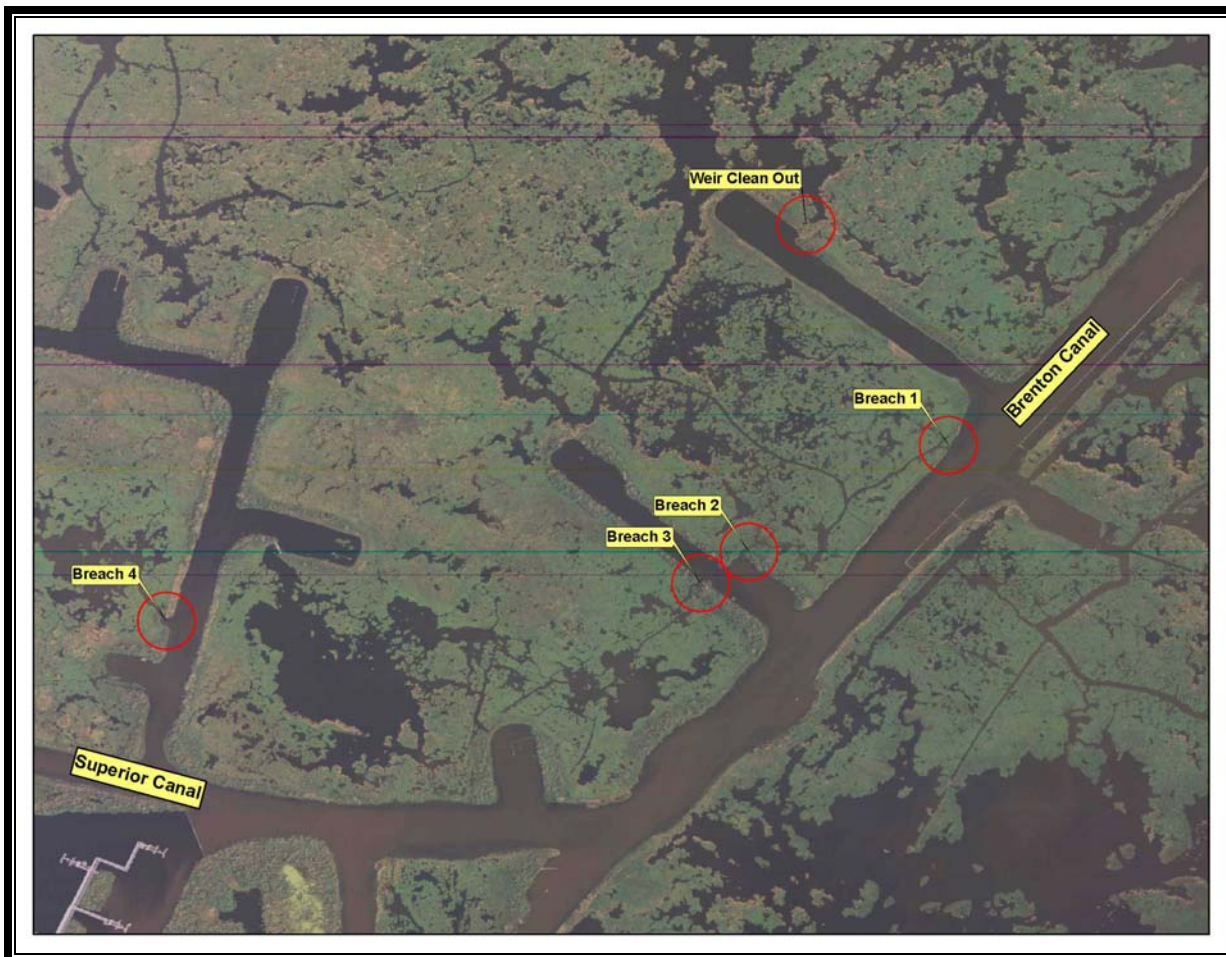
Operation and Maintenance Assumptions:

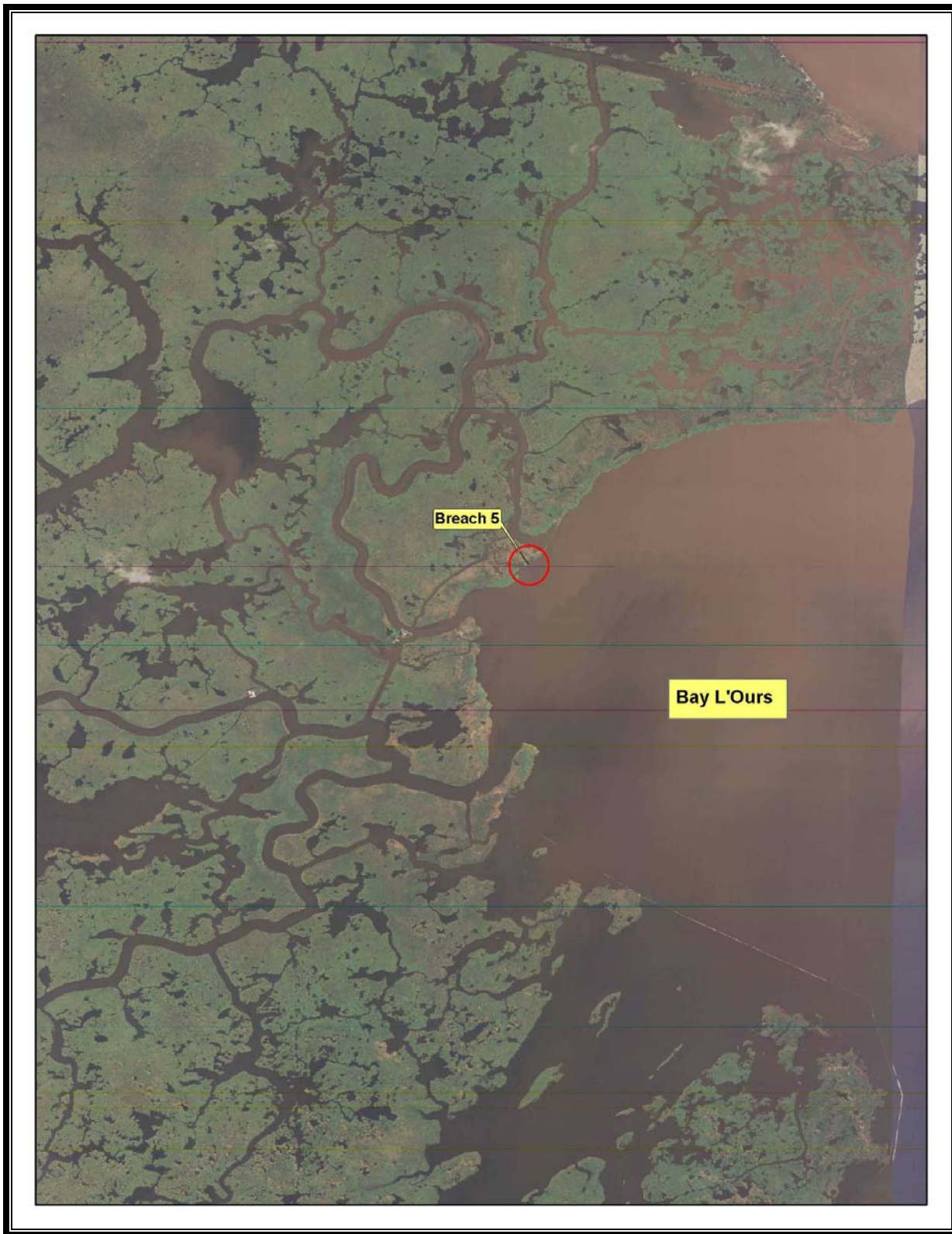
Structure Operations: water control structure operated twice annually for a total of \$4,000 per operation. $(2)(\$4,000) = \$8,000$ plus \$2,000 for LDNR administration.

General Maintenance: Water control structure, navigation aids repair. Construction : \$5,000.
Administration: \$2,500

Attachment IV

Location of Breaches





Attachment V

Field Inspection Notes

Post Hurricane Katrina (9/13/05)¹¹

Participants: Brian Babin LDUR
 Shawn Triche LDUR
 Glen Locke LDUR
 Brad Sticker NRC

1. Monitoring Station 5A 'water level' + 1.6'
 Station up and running

Structure 14A - navigation lights
 on Little Lake side not functioning
 lights No. 2 & 3 ^{red} _{blue} bulbs appear
 to have burnt out.

Notice that the ^{berge} rock at the bay
 on the south side has moved due to
 high water from storm.

Light crosses pt. marsh on the
 north (bent to dike tie-in) Photo.

erosion on the south side ^{as} noted
 in previous inspection, but not
 appear to have worsened.

Site 4A:AB - erosion on the south side
 as noted on last inspection. South
 side is ~~broadened~~ ~~of water transfer~~
 close to ~~being~~ ~~breached~~ ~~behind~~ ~~structure~~

Structure 4 - rock dike was not visible
 on the north side and
 barely visible on the south side.
 entire structure appears to have
 settled. Condition appears to
 be same as last inspection.

Structure 2 - water level gauge
 1.6' above. no additional
 damage from hurricane. Appears
 to be in same condition as
 last annual inspection.

Lake rim along Bay L'Ours - low areas
 are same as noted in previous annual
 inspection - no new damage from
 (Breach 3 1/2
 10' wide) Hurricane Katrina. Patches (w) along
 lake rim on way to #35 canal
 Bay L'Ours - breach widened from storm

Structure # 35 - marsh has moved
 from open pond adjacent to the structure
 the weir structure is completely blocked.
 channel blocked with marsh. for structure
 to be operational channel needs to be re-dug.
 low lying levee at end of channel
 was over topped.

Small breach on second canal appeared
 to be the same condition as previous
 inspections approx. 120' x 100'. All
 apparent damage from storm.
 Additional breach noticed on the
 left side of 2nd canal approx
 15' wide (storm damage) end of
 canal constructed w/ ~~without~~ ~~locks~~
 good. no damage

Structure 9a - rock dike - no
 apparent damage from hurricane.
 Some debris on rock plug.

Structure 91 - good condition /
no damage.

Breach 20' - located on right bank
from structure 91 ^{main canal} south
damage from Hurricane

Structure 1 - good condition / no
damage.

water level west of structure 1 1.5' high

Structure #43 - breach appears to
have closed with vegetation. No
significant damage evident.

Structure 2nd - no evident damage
point on marsh eroded back
significantly.

Structures - appear to be in good
condition as previous inspection
no storm damage.

Katrina Assessment

rock dike along lake Salvador
received no damage from storm

water elev. 1.25' Company Camp
6 Bayou Deschamps