State of Louisiana
Department of Natural Resources
Coastal Engineering Division

2005/2006 Annual Inspection Report

for

BLACK BAYOU HYDROLOGIC RESTORATION PROJECT (CS-27)

State Project Number CS-27
Priority Project List 6

October 6, 2005
Calcasieu and Cameron Parishes

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I. Introduction

The Black Bayou Hydrologic Restoration Project (C/S-27) is located approximately 18 miles west-northwest of Hackberry, Louisiana in northwest Cameron and southwest Calcasieu Parish. The project is bordered to the north by the Gulf Intracoastal Waterway (GIWW), to the south by Black Bayou, to the east by Gum Cove Ridge, and to the west by the Sabine River (figure 1). Total project area is approximately 25,529 acres and is comprised of approximately 6,516 acres of fresh/intermediate marsh, 7,353 acres of brackish marsh, and 11,660 acres of open water. (See Appendix A).

The Black Bayou Hydrologic 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 and approved on the sixth Priority Project List. The Black Bayou Hydrologic Restoration Project has a twenty year (20 year) economic life, which began in December 2003.

II. Inspection Purpose and Procedures

The purpose of the annual inspection of the Black Bayou Hydrologic Restoration Project (CS-27) 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, LDNR 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, 2004). The annual inspection report also contains a summary of maintenance projects, if any, which were completed since completion of constructed project features 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.

In 2003, the CWPPRA Task Force determined, due to the fact that LDNR was responsible for the operation and maintenance phase of the vast majority of CWPPRA projects, that LDNR would be the responsible party for all Post Storm/Hurricane Assessments. After Hurricanes Katrina and Rita, every project appeared to have been impacted by the storms; therefore, LDNR determined that all projects should be assessed for damages (Broussard, 2006). With concurrence from the federal sponsor, LDNR has decided to use the information obtained during this post hurricane assessment in this Annual Maintenance Inspection.

An inspection of the Black Bayou Hydrologic Restoration Project (CS-27) was held on October 6, 2005 under partly cloudy skies and mild temperatures. In attendance were Stan Aucoin, Herbert Juneau, Mark Mouledous, and Rickey Brouillette of LDNR. NOAA Fisheries was represented by Joy Merino. Parties met at the Lafayette Field Office of CED and proceeded to the CS-27 project area. The annual inspection began on the eastern end of the rock dike constructed along the southern bank of the GIWW.

The field inspection included a complete visual inspection of all features. Staff gauge readings were used to determine approximate elevations of water, rock weirs, earthen embankments, steel bulkhead structures and other project features. Photographs were taken at each project feature (see Appendix B) and Field Inspection notes were completed in the field to record measurements and deficiencies (see Appendix D).

III. Project Description and History

In the early 1900's the marshes in the project area supported vegetation typical of fresh or very low salinity conditions (i.e. *Spartina patens, Typha sp.,* and *Scirpus sp.*). The introduction of water and sedimentation into the project area was influenced mainly by precipitation, local drainage, and wind and tide generated water exchange associated with Sabine Lake through overland flow and small, meandering bayous. Marsh elevation was maintained through vegetative biomass production which compensated for losses due to subsidence and sea level rise (USDA/NRCS 1997). More recently, wetlands in the Black Bayou area have suffered a loss of approximately 10,000 acres, 33% of the project area. Factors contributing to these losses include, but are not limited to, hydrological changes; reduced freshwater inflow from the uplands north of the GIWW; increased magnitude and duration of tidal fluctuations; increased salinities; higher water levels; excessive water exchange; and
Artificial water circulation patterns (NMFS 1996).

Beginning in the late 1800's significant hydrologic changes effecting water level fluctuation and water circulation patterns occurred in the project area. Modifications to Calcasieu Pass such as the removal of the Calcasieu Pass oyster reef in 1876, increased the magnitude and duration of tidal fluctuations in both the lake and the surrounding marshes (LDNR 1993). Construction of the GIWW, North Line Canal, Central Line Canal, and South Line Canal established a hydrological connection between the Calcasieu and Sabine basins, allowing the saline waters of the Calcasieu Basin to encroach on the Sabine Basin. During ebb tide, these canals drain project area marshes simultaneously into both Sabine and Calcasieu Lakes. Water level fluctuations are also influenced by wind. A strong north wind can cause drastic de-watering of the marshes, while a strong sustained southerly wind can result in drastic increases in water levels blown in from the gulf. In addition “blowouts” (direct connections between a channel and an inland water body) often are formed by the water level drawdown effect and the wave wash from wakes created by passing boats and barges. “Blowouts” increase water circulation between the marsh and the GIWW, exposing fragile organic marsh soils to high energy and increased erosion (Good et al. 1995). The extensive system of navigation channels, natural drainage, bayous, oil exploration canals, trenasses, and “blowouts” have created several hydrologic units inside the project area (figure 2) and have allowed increased water fluctuations and salinities to reach the interior of the marsh (USDA, 1991).

Marsh types and the associated vegetation in and around the project area also indicate that salinities have been increasing for the last 45 years. Prior to man-induced alterations, these

marshes supported vegetation typical of fresh or very low salinity conditions. All of the project area was classified as fresh or low salinity (intermediate) marsh in 1949, except for the area adjacent to Sabine Lake and Sabine River just north of Black Bayou where brackish marsh conditions existed (Oneil 1949). Brackish marsh conditions in this area expanded north to the GIWW and eastward along Black Bayou to the Black Bayou Oil Field by 1968 (Chabreck 1968). Further expansion of high salinity marsh north and east of Black Bayou was documented in 1978 and again in 1988 (Chabreck 1978, 1988). By 1988, the majority of the project area was identified as brackish marsh with fresh marsh found only in the extreme northeast corner of the project area adjacent to the Gum Cove Ridge.

The Black Bayou Hydrologic Restoration Project includes structural and non-structural measures designed to allow freshwater from the GIWW near its confluence with the Vinton Drainage Canal into the wetlands south of the GIWW between the Sabine River, Gum Cove Ridge, and Black Bayou, and to create a hydrologic head that increases freshwater retention time and reduces salt water intrusion and tidal action in the Black Bayou watershed. Planned structural and non-structural measures and their intended functions are listed below (DNR CS-27 Monitoring Plan).

a. Repair breaches in the GIWW spoil bank west of the Gum Cove Ridge with approximately 24,000 linear ft. of rock foreshore dike to an elevation of +3.0 NAVD88.

b. Construct a weir with a barge bay at the GIWW in the Black Bayou Cut Off Canal with a 70 foot wide sill constructed to -7.0 NAVD88.

c. Construct a rock plug with a 15 ft. boat bay at - 4 ft. NAVD88 bottom elevation in the Burton Canal at the intersection with the Sabine River.

d. Construct a rock weir with a 15 ft. boat bay at - 3 ft. NAVD88 bottom elevation at the intersection of Blocks Creek with Black Bayou.

e. Vegetative plantings of approximately 55,000 linear ft. of bullwhip (*Scirpus califorinicus)* or other suitable vegetation in the large open water area within the NO-13 unit. Plants should be in one gallon trade containers with a minimum of 5 stems per container. Planting should be in two staggered rows on 5 ft. centers. An estimated 22,000 plants will be required.

f. Vegetative plantings of approximately 26,000 linear ft. of bullwhip (*Scirpus califorinicus)* or other suitable vegetation in the large open water area within the NO-17 unit. Plants should be in one gallon trade containers with a minimum of 5 stems per container. Planting should be in two staggered rows on 5 ft. centers. An estimated 10,400 plants will be required.

g. Vegetative plantings of approximately 26,000 linear ft. of bullwhip (*Scirpus califorinicus*) or other suitable vegetation in the large open water area within

the NO-18 unit in a similar configuration to the plantings in unit NO-17. An estimated 10,400 plants will be required.

h. Vegetative plantings of approximately 26,000 linear ft. of bullwhip (*Scirpus califorinicus*) or other suitable vegetation in the large open water area within the NO-19 unit in a similar configuration to the plantings in unit NO-17. An estimated 10,400 plants will be required.

i. Construct a steel sheet pile weir of 40 foot width with a "self regulating tide gate" (SRT) of 4' x 8' size, with a crest Elevation +0.6 feet NAVD88. Site of the SRT gate/weir structure was located in an abandoned oilfield road. The structure serves as the primary drainage outlet and access for minimal tidal exchange for the marsh area of the project.

j. Construction of a rock plug to Elevation +3.0 NAVD88 across an eroded channel in the vicinity of the SRT Gate.

IV. Summary of Past Operation and Maintenance Projects

General Maintenance: Below is a summary of completed maintenance projects and operation tasks performed since December 2003, the construction completion date of the Black Bayou Hydrologic Restoration Project.

Construction Adjustments: Although construction of the original project components was completed in December 4, 2001, it was determined that leaks along the GIWW rock dike would have detrimental effects on the project. The rock dike along the GIWW was removed at four separate locations and plugs consisting of "C" stone were constructed at "water" connections between the marsh area and the GIWW existing to the north to reduce or eliminate tidal flow through these locations. The original signs installed at the Black Bayou Cut-Off Structure on timber pilings were either leaning or missing. Signage was relocated on concrete bases on top of the rock weir. Also, at the SRT gate, a railing was constructed on the sheet pile cap to reduce the chance of persons falling into the water in the area around the structure. This work was completed in December 2003 and construction was considered to have been complete after these adjustments.

Navigational Aid Light Repairs: A letter was received from the US Coast Guard in July 2003 reporting problems with the navigational lights at the Black Bayou Cut-Off Canal weir. The problem was investigated and repaired in October 2003 by Wet-Tech Energy, Inc. at a total cost of $1,250.00.

SRT Gate modification and culvert installation: In the spring of 2005, it was determined that water was "stacking up" on the southeast corner of the project area. In order to correct the situation, it was decided to decrease the cross sectional

area of the SRT Gate by attaching a flap to the railing. Also, two 30" flapgated culverts on the southern boundary of the project will relieve excess waters. A Notice to Proceed dated July 20, 2005 was issued to Duphil, Inc. of Orange, Tx. Construction was underway at the time of this inspection but was delayed due to Hurricane Rita. Estimated construction costs will be $77,719.29.

2005 Structure Operations: There are no active operations associated with this project.

V. Inspection Results

GIWW rock dike

Tie-ins on both the east and west end of the dike are stable. Several random spots along the dike were checked and no apparent toe scour is occurring. There is one section approximately 10 feet in length near the eastern most plug where the rock dike is slightly low in elevation. Near the first pine ridge from the Vinton Canal, along an approximately 50' section, rock has been displaced apparently by being hit by a barge. On the western end of the second plug from the west, an alligator crossing has developed and will need to be monitored. The warning signs at the Vinton Canal and at Black Bayou have been stolen. The piling for the sign at Black Bayou was cut with a chain saw. Replacement of these signs may not be necessary. The other situations mentioned in this section are considered minor and not requiring repair at this time. (Photos: Appendix B, Photos 1 - 6)

Black Bayou Cut-Off Canal

This component is in immediate post construction condition. No need for maintenance at this time. Conditions of the Navigational Aid Lights will have to be evaluated at a later date by trained personnel. (Photos: Appendix B, Photo 7)

Self Regulating Tide Gate (SRT)

The structure is in excellent condition. Signage, railings, wingwalls, etc. in as-built condition. No need for maintenance other than that which is underway at this time. (Photos: Appendix B, Photos 8-9)

Rock Plug

The plug is excellent condition and in no need of maintenance. (Photos: Appendix B, Photo 10)

Blocks Creek

The rock weir is in excellent condition. Signage is stable. No need for maintenance at this time. Conditions of the Navigational Aid Lights will have to be evaluated at a later date by trained personnel. (Photos: Appendix B, Photo 11)

Burton Canal
The weir is in good condition. There is some minor scouring along the canal banks inside of the weir at the end of the dike that will be monitored. Severe current through the weir has caused problems for boaters in the area. The pilings with the arrow signs are fairly close together and pose a collision hazard. As a result of this inspection, it is recommended that these pilings be removed and warning signs similar to the ones on the Black Bayou Cut-Off canal be used. Conditions of the Navigational Aid Lights will have to be evaluated at a later date by trained personnel. (Photos: Appendix B, Photo 12)

Culvert 1: This is the easternmost culvert site that will be installed on the southern boundary road of the project area and will be included in future annual inspections. (Photos: Appendix B, Photo 13)

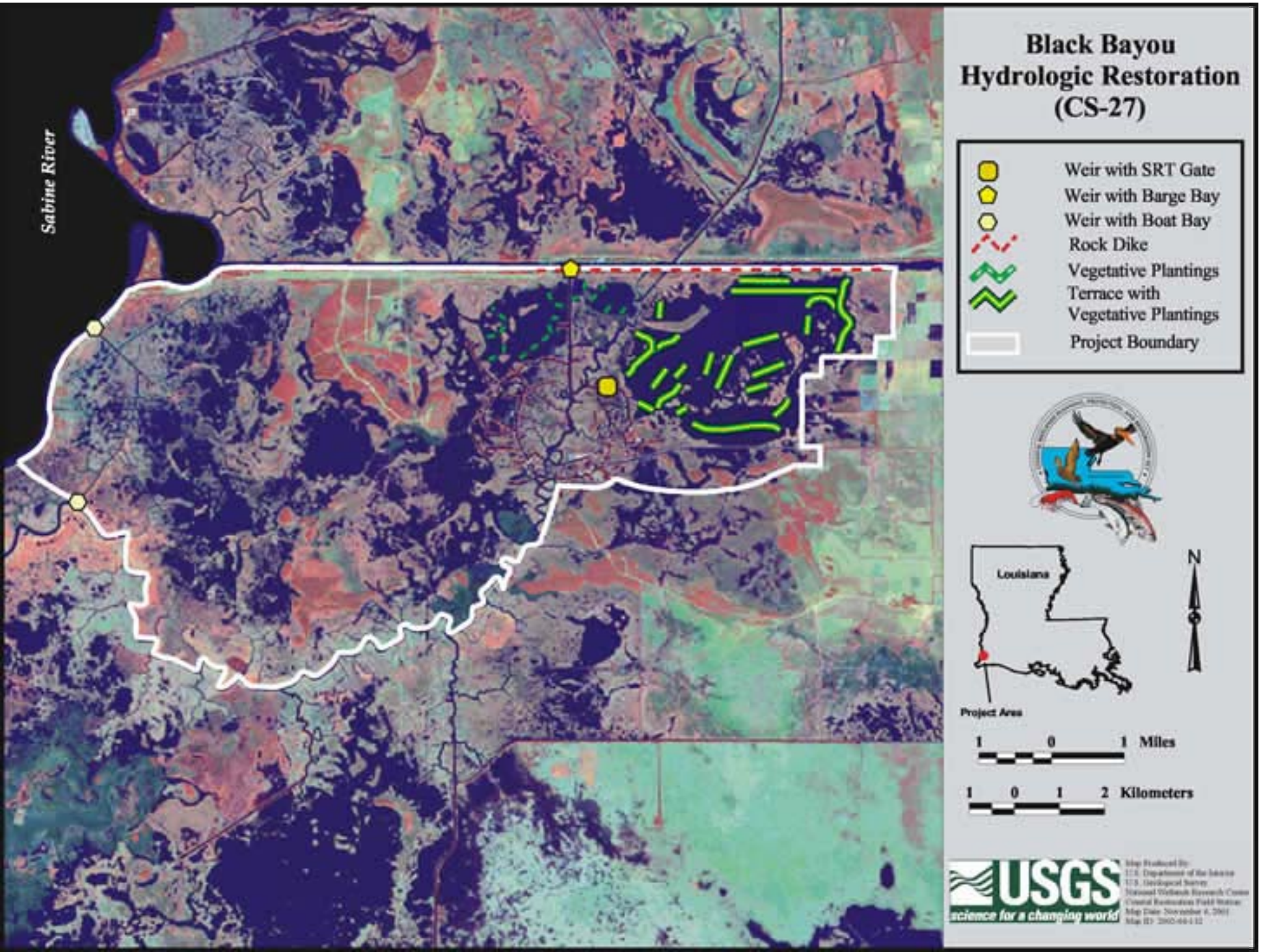
Culvert 2: This is the westernmost culvert site that will be installed on the southern boundary road of the project area and will be included in future annual inspections. (Photos: Appendix B, Photo 14)

VI. Conclusions and Recommendations

The Black Bayou Hydrologic Restoration Project is in good condition and functioning as intended. Project features survived Hurricane Rita basically intact. Installation of staff gauges in convenient locations within the project area is recommended. Warning signs in areas of severe current caused by installation of rock or sheet pile weirs should always include warning signs. These signs should be installed in concrete blocks out of the way of traffic since this has proven to be very effective. Also, railings or fences around water control structures should be considered.

Appendix A

Project Features Map


Sabine River
Black Bayou
Hydrologic Restoration
(CS-27)
Weir with SRT Gate
Weir with Barge Bay
Weir with Boat Bay
Rock Dike
Vegetative Plantings
Terrace with
Vegetative Plantings
Project Boundary
Louisiana
Project Area
N
1 0 1 Miles
1 0 1 2 Kilometers
USGS
science for a changing world

Appendix B

Photographs

Photo 1—eastern tie-in of rock dike

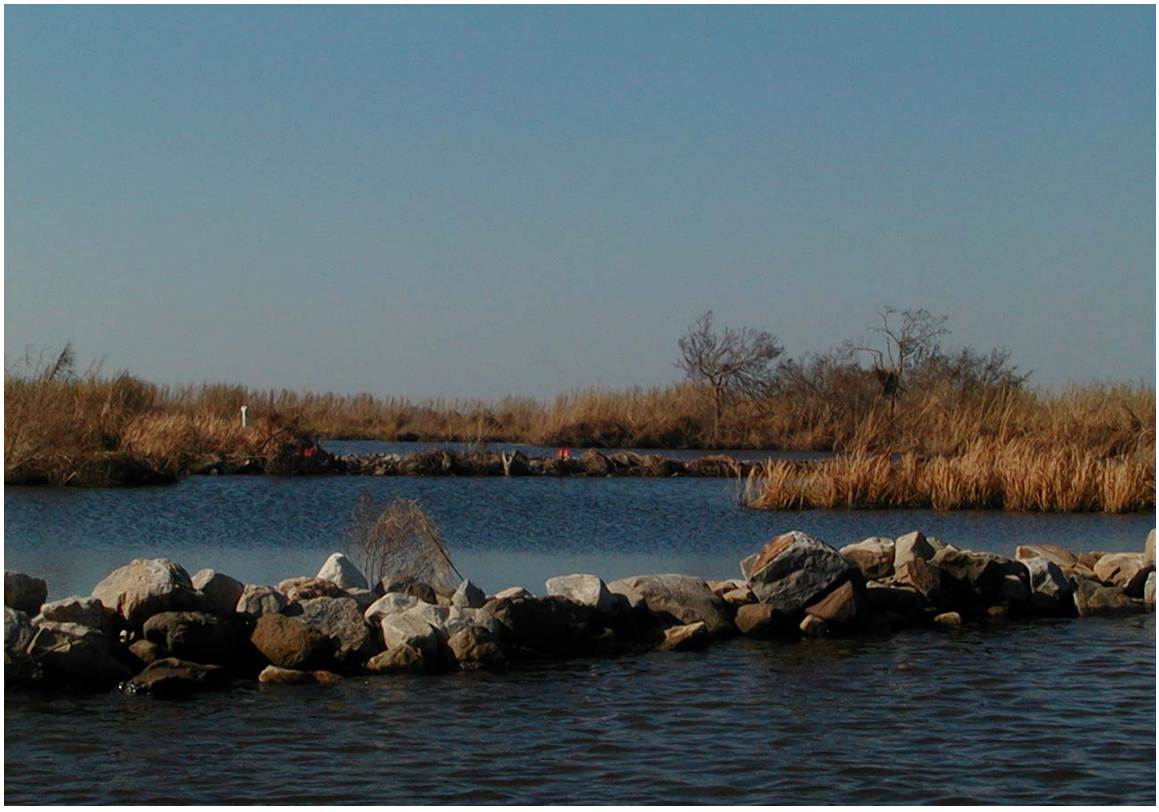


Photo 2—plug behind dike

Photo 3--plug behind dike

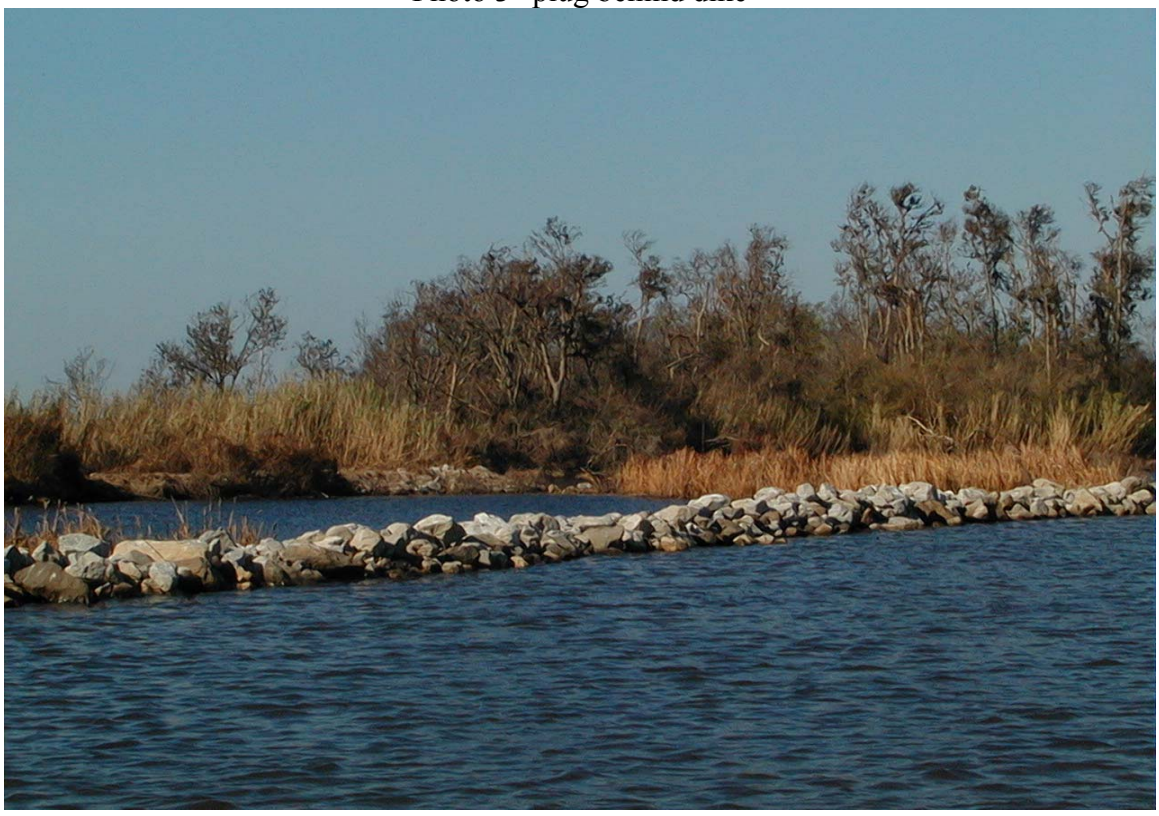


Photo 4--plug behind dike

Photo 5-- plug behind dike

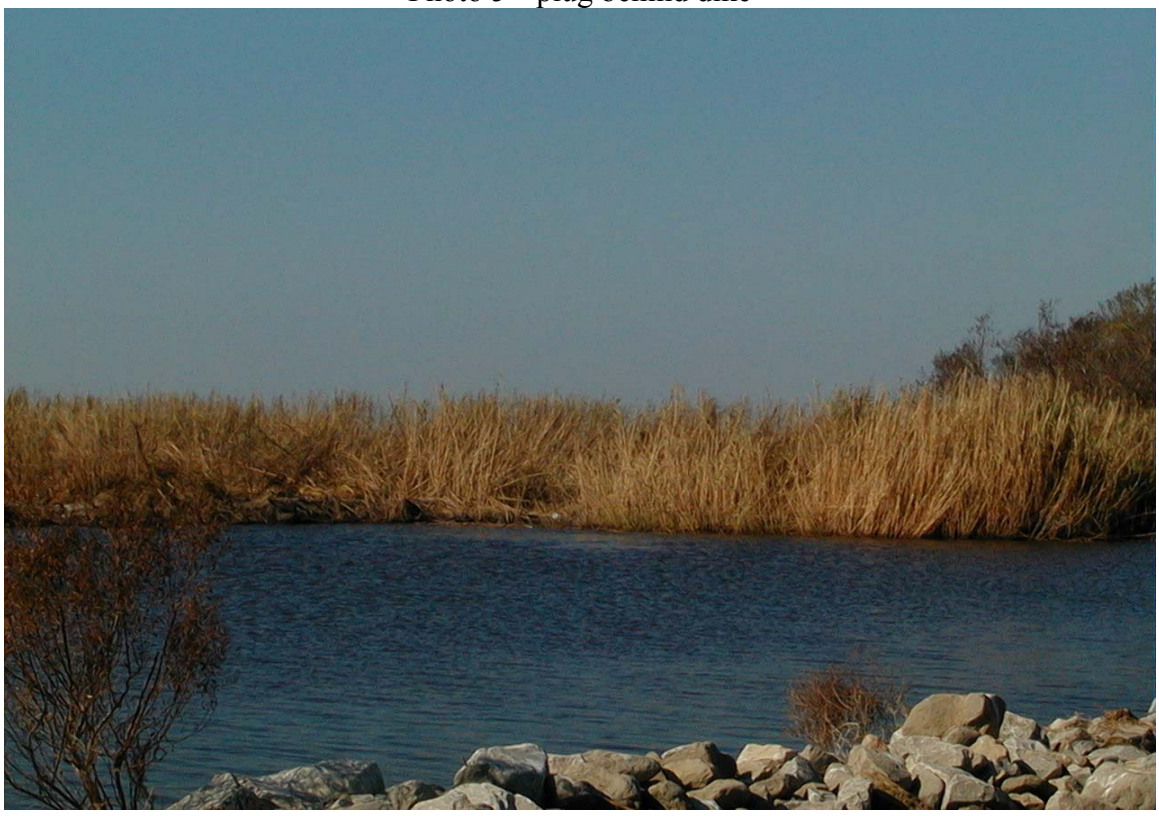


Photo 6—Area of potential problem around rock

Photo 7—Black Lake Cut-Off Structure

Photo 8—SRT Gate

Photo 9—SRT Structure

Photo 10—Rock plug near SRT

Photo 11—Block's Creek Structure

Photo 12—Burton Canal Structure

Photo 13—Site of Culvert #1

Photo 14—Site of Culvert #2

Appendix C

Three Year Budget Projection

BLACK BAYOU HYDROLOGIC RESTORATION/ CS27 / PPL 6

Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08

Project Manager	O & M Manager	Federal Sponsor	Prepared By
Herb Juneau	*Herb Juneau*	*NMFS*	*Stan Aucoin*

	2005/2006	2006/2007	2007/2008
Maintenance Inspection	$ 4,955.00	$ 5,250.00	$ 5,407.00
Structure Operation ***	$ 5,842.00		
Administration		$ -	$ -
Maintenance/Rehabilitation			

05/06 Description: Modify SRT; install two 30" flapgated culverts---***costs to inspect and repair navigational aid lighting

E&D	$ 13,434.00
Construction	$ 77,719.29
Construction Oversight	$ 20,151.00
Sub Total - Maint. And Rehab.	$ 111,304.29

06/07 Description

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

07/08 Description:

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

	2005/2006	2006/2007	2007/2008
Total O&M Budgets	$ 122,101.29	$ 5,250.00	$ 5,407.00

O &M Budget (3 yr Total)	**$ 132,758.29**
Existing O & M Budget	**$ 168,611.00**
Remaining O & M Budget (Projected)	**$ 35,852.71**

Note: Maintenance Project for 2005/2006 completed, therefore these funds already expended

Appendix D

Field Inspection Form

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:CS-27 Black Bayou Hydrologic Restoration

Date of Inspection: October 6, 2005 Time:

Structure No. ___ N/A

Inspector(s):Stan Aucoin, Herb Juneau, Ricky Brouillette & Mark Mouledous (LDNR) & Joy Merino (NMFS)

Structure Description: Rock Dike, SRT Gate, Rock Plug, Boat Bay

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions:partly cloudy and mild

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps					
Steel Grating					
Stop Logs					
Hardware					Staff gauges will have to be re-established at selected locations.
Timber Piles Burton Canal	Good				These piling pose a collision hazard with swift current.
Timber Wales					
Galv. Pile Caps					
SRT Gate	Good				
Signage /Supports Vinton Canal					Signs missing at Vinton Canal and Black Bayou closures along GIWW.
Rip Rap (fill) Rock Dike at GIWW	Good				Low area on eastern end, approx. 10 feet in length, 50 foot section pushed back by barge.
Block's Creek Rock Plug	Good Good				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism? Yes, signs missing.

Appendix E

Locations to be Monitored