

State of Louisiana Coastal Protection and Restoration Authority Operations Division

# **2012 Biennial Inspection Report**

for

# **BIG ISLAND MINING PROJECT**

State Project Number AT-03 Priority Project List 2

December 15, 2012 St. Mary Parish

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# I. Introduction

The Atchafalaya delta and the Wax Lake delta formed in the shallow Atchafalaya Bay between the mouth of the Atchafalaya river navigation channel and the Point au Fer shell reef (Curole, 2003). The Atchafalaya River has been a distributary of the Mississippi River since the 1500's and is typical of diversion or capture of mainstream flow by distributary (van Heerden and Roberts, 1980). In 1960, the Old River control structure was completed by the U.S. Corps of Engineers (USACE) and has since maintained the flow of the Atchafalaya River at the historic rate of 30% of the combined flow the Mississippi and Red Rivers (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993). A subaqueous delta began to form at the mouth of the Atchafalaya River between 1952 and 1962 with the introduction of silts and fine sands to the bay. Prior to 1952 the lakes and bays within the Atchafalaya Basin floodway system, north of the Atchafalaya Delta, filled with sediment. Only prodelta clay deposition was occurring in the Atchafalaya Bay due to contact with higher salinity waters (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993). From 1962 to 1972, coarser materials began to be deposited into the bay and a period of distal bar and subaqueous bar accretion occurred (van Heerden and Roberts, 1980). The spring flood of 1973 produced the first subareial growth of the Atchafalaya Delta on both sides of thee navigation channel (Curole, 2003).

The Atchafalaya delta is bisected by the Lower Atchafalaya River navigation channel which is maintained by the USACE for navigational purposes. Dredge material on the channel banks and increased channel depths have created unnatural conditions forming an efficient conduit for river sediment to the Gulf of Mexico, depriving the adjacent delta environments of sediment critical to the delta building process (Curole, 2003). Spoil material deposited along the western portion of the navigation channel formed Big Island. This island effectively limits westward flow of sediment rich Atchafalaya River water (van Heerden, 1983). A comparison can be made between the Atchafalaya delta and the Wax Lake delta to the west. Dredging ceased on the Wax Lake Outlet in 1980 and this delta has flourished, building land naturally since that time (Curole, 2003).

The Big Island Mining (AT-03) project is a distributary channel maintenance and delta lobe creation project located in the northwestern region of the of the Atchafalaya delta within the Atchafalaya Delta Wildlife Management Area, in the southwest corner of St. Mary Parish, La. The project is bounded by Shell Island and Shell Island Pass to the north and west, Ameranda Pass to the south, and the Atchafalaya Bay Channel to the east and southeast (Monitoring Plan, 2003). A map of the project boundary and features are shown in Appendix A. The objective and specific goals of the project according to the Monitoring Plan prepared by the Louisiana Department of Natural Resources (LDNR) are outlined below:

Project Objectives:

- 1. Establish a sediment delivery system in the western portion of the Atchafalaya delta, thereby enhancing the system's natural delta-building potential.
- 2. Utilizing dredged material from the creation of the distributary channels to create delta lobe islands suitable for establishment of emergent marsh.

Specific Goals:

- 1. To increase the project areas delta-building potential through the establishment of effective distributary channels.
- 2. Create approximately 850 ac. of delta lobe islands through the beneficial use of dredge material at elevations suitable for emergent marsh vegetation.
- 3. Increase the rate of subaerial growth in the project area to that measured from historical photography since 1956 with the project area.

# **II.** Inspection Purpose and Procedures

The purpose of the annual inspection of the Big Island Mining Project (AT-03) is to evaluate the constructed project features, identify any deficiencies and 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, the Coastal Protection and Restoration Authority (CPRA) 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. 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 Appendix C. A summary of past operation and maintenance projects undertaken since the completion of the Big Island Mining Project (AT-03) are outlined in Section IV of this report.

An inspection of the Big Island Mining Project (AT-03) was held on April 9, 2012 under clear skies and mild temperatures. In attendance were Brian Babin and Adam Ledet of the OCPR, Dr. John Foret of the National Marine Fisheries Service (NMFS), Edmond Mouton and Tyson Croch with the Louisiana Department of Wildlife and Fisheries (LDWF). The attendees met at the Berwick Public Boat Launch in St. Mary Parish. The inspection began at approximately 9:00 a.m. and ended at 10:30 p.m.

The field trip included a visual inspection and limited soundings of Breaux's Pass (Channel "A") and Channels "D", "B", "E" and "C". No attempt was made to measure the geometry of the channels other than periodic depth measurements recorded using a hand-held fathometer. The primary sources of information and data used in this report are the 2008 Topographic and Bathymetric surveys performed by Morris p. Hebert, Inc., and the 2010 Operations, Maintenance and Monitoring report prepared by Mr. Glen Curole of OCPR.

## **III.** Project Description and History

The Atchafalaya Delta is bisected by the Lower Atchafalaya River which is maintained by the U.S. Corps of Engineers to an elevation of -20.0 NGVD with a 400 foot bottom width for navigation purposes. The continued dredging and placement of spoil material along the banks of the river has caused sediment deprivation in adjacent delta environments.

The Big Island Mining (AT-03) and Atchafalaya Sediment Delivery (AT-02) projects were constructed as a Coastal Wetlands, Planning, Protection, and Restoration Project (CWPPRA) with the Louisiana Department of Natural Resources as the local state sponsor and the National Marine Fisheries Service of the Department of Commerce as the federal sponsor. The general contractor that constructed both projects, which was accomplished under one contract by the State of Louisiana Division of Administration, and administered by the Louisiana Department of Natural Resources (LDNR) was River Road Construction Co. of Mandeville, LA. The Atchafalaya Sediment Delivery Project (AT-02) and the Big Island Mining Project (AT-03) were constructed during the period of January 28, 1998 and October 27, 1998. Final cost of the construction oversight for the projects was \$7,238,449.36. The design, engineering, and construction oversight for the projects was performed under an engineering services contract with LDNR by Brown, Cunningham, and Gannuch Engineers.

The principle project features of the Big Island Mining (AT-03) project include:

- Channel A 20,600 linear ft. of dredged channel from the Atchafalaya River starting with an 800 ft. bottom width at an elevation of -20 ft. NGVD contour of the Atchafalaya River to a 400 ft. bottom width at an elevation of -10.0 ft. NGVD. The remainder of Channel A was dredged to -10.0' NGVD. Bottom width of the channel was 400 ft. to Sta. 145+00, thence 375 ft. between Stations 145+00 to 180+00, thence 250 ft. wide between Stations 180+00 and 200+00, thence 200 ft. wide between Stations 200+00 and 206+00.
- Channel B 5,500 linear ft. of dredged channel with a bottom width of 160 ft.
- Channel C 2,400 linear ft. of dredged channel with a bottom width of 125 ft.
- Channel D 4,000 linear ft. of dredged channel with a bottom width of 160 ft.
- Channel E 4,150 linear ft. of dredged channel with a bottom width of 125 ft.

## **IV.** Summary of Past Operations and Maintenance Projects

Since completion of the Big Island Mining (AT-03) project in October 1998, no maintenance dredging or marsh creation efforts have been recommended or undertaken. As recommended in the 2005 Biennial Inspection Report, a complete survey of all dredged channels and marsh fill areas was completed in the spring of 2008 by Morris P. Hebert, contracted by the Louisiana Department of Natural Resources (LDNR). The inspection results in this report are based primarily on the 2008 surveys, visual observations in the field and monitoring results outlined in the 2010 OM&M report.

## V. Inspection Results

Inspection of the Big Island Mining Project (AT-03) began at the head of Channel "A", known as Breaux's Pass", near the beginning reach at Sta. 20+00. As part of the scheduled monitoring program, a topographic and bathymetric survey was conducted in 2008 by Morris P. Hebert of Houma, La. to determine the extent of shoaling in all channels and to evaluate settlement of the constructed disposal areas. The survey of Channel "A" began near Sta. -2+89.82 in the center of the Atchafalaya River southwest to the Atchafalaya Bay near Sta. 206+00. Depths from Sta. -2+89.82 to Sta. 10+00 ranged from -18' NAVD 88 to -10' NAVD 88. Signs of sediment deposits in the channel were not evident until Sta. 10+00 where the channel bottom sloped upwards from -5' NAVD 88. Since the 2008 surveys, we observed severe settlement at the head of Breaux's Pass to the extent that it was difficult to navigate with an outboard boat. In 2009, the LDWF dredged small corridor at the head of Breaux's Pass to reopen and mark a channel through the shoaled areas for access to the island. The channel section became better defined as we reached Sta. 30+00 with water depths of 5 ft. As in the case of Natal Channel on the Atchafalaya Sediment (AT-02) project, a smaller channel section had developed on the south side of the original channel with the majority of shoaling on the north side. In 2008, the smaller narrower channel was approximately 300' wide, 10' deep and stretched from Sta. 30+00 to 70+00, near the head of Channel "D". From Sta. 70+00 westward along Channel "A", the channel opened up to its originally constructed section of 500' with slightly shallower depths in the range of -5.0' to -7.0' NAVD 88. The channel width and depth remained constant to the end of the 500' section near Sta. 200+00, west of Channels "E" and "F". The remaining 300' wide section from Sta. 200+00 to Sta. 206+00 had completely filled in to an elevation of -1.0' NAVD. It is possible that a smaller, narrower channel has developed between the new deltaic lobes outside of the original survey limits shown on the construction drawings. Without more recent bathymetric data, we were unable to determine if additional shoaling has occurred beyond the recently dredged section near the head of the pass (Sta. 0+00 to 25+00).

Channel "D" extends northwest on the north side of the first "fork" in Breaux's Pass between Shell Island and dredge disposal area #5. In 2003, there was approximately 4 feet of water in the initial reach at the mouth of the channel. The depths increased to 5 feet and held steady from the initial reach northwestward towards Shell Island Pass (Juneau, 2003 Inspection Report). The 2005 inspection revealed significant shoaling along the entire length of Channel "D" with depth measured between 2 and 3 feet. From survey data collected in 2008, the data suggested that the upper reach of Channel "D" had completely shoaled in and that very little flow was occurring in the lower reach of the channel. In 2010, the inspection team was unable to access the channel due to shallow water depths to determine if additional shoaling has occurred. During our 2012 inspection, we noticed that areas of shoaling at the head of Channel "D" had become vegetated broken marsh. We believe that it is likely that the channel will continued to shoal and that very little flow is being diverted through the Channel "D". Based on current flow rate and flow patterns of Breaux's Pass and the negative influence from Shell Island Pass, it is unlikely that maintenance dredging of Channel "D" would produce substantial benefits in that the channel would most likely continue to shoal shortly after the channel was dredged.

Channel "B" is approximately 5,500 linear feet in length and is the second distributary channel along the north bank of Breaux's Pass extending in a northwesterly direction towards Shell

Island Pass. Soundings taken during the 2003 inspection revealed that the water depths in the upper reach of Channel "B" were 4.0' deep and 8.0' to 9.0' deep in the lower reach near Shell Island Pass (Juneau, 2003 Inspection Report). In 2005, fathometer readings in Channel "B" indicated depths of 4' from the head of the channel for several hundred feet downstream and increased to 8' to 9' at the end of the channel near the Shell Island Pass to the northwest. From survey data collected in 2008, the entire reach between Sta. 5+00 and 40+00 has completely shoaled in with channel bottom elevations between 0.0' and -1.0' NAVD 88. Downstream of Sta. 40+00 where Channel "B" gets closer to the Shell Island Pass Channel, depths begin to deepen to elevations of -2.0' to -5.0' NAVD 88. During our recent 2012 inspection, we observed that a large vegetated marsh platform had developed at the head of Channel "B" with water hyacinth on both sides blocking access to the channel. The water depth in Channel "A" at the head of Channel "B" was approximately 2.5' at the time of the inspection. We suspect that the flow patterns affecting velocities in the Channel "D" are also prevalent in Channel "B", causing sediment to settle out in the channel rather than forming deltaic land formations at the end of the reach as designed. As in the case of Channel "D", it is unlikely that maintenance dredging of Channel "B" would produce long term project benefits.

Channel "E" is approximately 4,150' linear feet and is the first channel located along the south bank of Breaux's Pass extending to a cul-da-sac on the interior of Big Island. From soundings taken in 2003, controlling depths of 2 feet over a hump approximately 150 feet in length downstream from the head was reported. Thereafter, water depths increased to 5', gradually sloping down to -10', proceeding 1,500 feet down to the cul-da-sac location. (Juneau, 2003 Inspection Report). It was apparent from field observations and channel conditions in 2003 that Channel "E" was receiving significant deposits of sediment from Channel "A" which were falling out at the mouth of the channel due the minimal hydraulic gradient and inadequate velocities required for transporting sediment (Juneau, 2003 Inspection Report). Channel "E" is frequently used by the Louisiana Department of Wildlife and Fisheries for access to public hunting grounds and biological data collection stations. The maintenance of this channel is primarily for access and provides little deltaic formation benefits. Survey data collected in 2008 reveals similar conditions reported in previous inspection reports. During the recent 2012 Inspection, we observed depths of less than 1' at the head of Channel "E" with depths averaging 6.5' at the end of the channel near the cul-da-sac. Since Channel "E" is the primary access to Big Island for hunting, LDWF regularly maintains access by dredging the head of the channel near Breaux's Pass.

Channel "C" is approximately 2,400 linear feet and is a small distributary channel at the end of Breaux's Pass extending in a southwesterly direction leading into Catfish Pass. In 2003, depth measurements indicted approximately 5' of water at the head near Channel "A" and 6' to 7' depths downstream towards Catfish Pass (Juneau, 2003 Inspection Report). In 2005 a visual inspection and limited soundings revealed a large build-up of sediment overgrown with vegetation in the center of the channel (Babin, 2005 Inspection Report). The 2008 survey data confirms the observation of previous years of shoaling in the center of the channel. It appears that the shoaling is concentrated in the center of the original dredge section. Elevations ranged between 0.0' and -2.0' NAVD 88 in the center where shoaling has developed and -6.0' NAVD 88 near the shifted channel section on the right side. In 2012, Channel "C" was entirely shoaled

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in at the head of the channel. In 2009, LDWF dredged the head of the channel for access from Channel "C" to Catfish Pass. The channel that LDWF dredged appears to have completely closed. The PVC markers placed after dredging are still visible and are surrounded by marsh and vegetation. Although the head of the channel was blocked, the adjacent marsh appeared to be healthy and thriving.

Channel "F" is approximately 2,400 linear feet and extends in a northwesterly direction towards Shell Island Pass. In 2003, approximately 4' of controlling water depth was evident at the mouth of Channel "F" near Breaux's Pass for several hundred feet. Further downstream, closer to the Shell Island Pass, a consistent bottom depth of 6' was found (Juneau, 2003 Inspection Report). In 2005, a visual inspection revealed no serious silting or shoaling in Channel "F" with estimated depths of 7' in the center of the channel (Babin, 2005 Inspection Report). The data results collected in 2008 indicated more shoaling than previously reported in 2005. Large portions of the original section has shoaled in, leaving a much smaller channel along the left descending bank which was approximately 50 wide with bottom elevations ranging from -7.0' NAVD 88 to -10.0 NAVD 88. As in the case of Channels "D" and "B", velocity through Channel "F" is influenced by Shell Island Pass causing sediments to collect in the channels rather than creating deltaic lobial features. However, Unlike Channels "D" and "B", Channel "F" has remained opened with remnants of a small channel that directs flow from Breaux's Pass towards the From the 2012 inspection, Channel "F" appears to not have changed Atchafalaya Bay. significantly from the 2010 Inspection.

### **VI.** Conclusions and Recommendations

Overall, The Big Island Mining (At-03) project was exhibiting substantial shoaling throughout the distributary and tertiary channels of the project. As noted in the inspection results, the influence of Shell Island Pass on the north side of the project is having a negative impact on the ability of the tertiary channels ("D", "B" and "F") to effectively transport sediment to areas where deltaic land formations can be formed. We believe that the hydraulic inefficiencies of the tertiary channels are promoting a reduced discharge resulting in the severe shoaling of Channels "CD", "CB" and "CF". Based on these observations, maintenance dredging of these channels would not likely provide the desired benefits and would continue to shoal several years after dredging. Therefore, we are not recommending maintenance dredging of these channels ("CD", "CB" and "CF") at this time. However, in order to assess the extent of shoaling that has taken place in the distributary and tertiary channels of the project since 2008 and the major flood of 2011, we are recommending another bathymetric survey of all channels. Once this survey data is collected and evaluated, an informed decision as to which channels would benefit from redredging can be made. Although there are limited O&M funds available for hydraulic dredging, there may be areas in these channels that may benefit from mechanical dredging to re-open the most critical areas of shoaling.

References:

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Curole, G. P. and B. J. Babin. 2010. 2010 Operations, Maintenance, and Monitoring Report for Atchafalaya Sediment Delivery (AT-02), Coastal Protection and Restoration Authority of Louisiana, Office of Coastal Protection and Restoration, Thibodaux, Louisiana. 38 pp.

Appendix A

PROJECT FEATURES MAP



Appendix B

PHOTOGRAPHS



Photo 6104 – Channel "A" on Big Island looking back towards the Atchafalaya River.



Photo 6105 – view of broken marsh at the mouth of Channel "D" from Breaux's Pass.



Photo 6106 – view of Channel "A" on Big Island looking downstream near Channel "D".



Photo 6107 – another view of broken marsh at the mouth of Channel "D" looking towards the river.



Photo 6108 – view of marsh and water hyacinth blocking the mouth of Channel "B".



Photo 6109 – view of marsh and water hyacinth blocking the mouth of Channel "B".



Photo 6110 - view of the mouth of Channel "E" from Breaux's Pass.



Photo 6111 – view of the mouth of Channel "E" from Breaux's Pass.



Photo 6112 – view of Channel "E" from the mouth near Breaux's Pass.



Photo 6113 – view of Channel "E" about midway from the mouth to the cul-da-sac.



Photo 6114 – view of the marsh on the right side of Channel "E" midway to the cul-da-sac.



Photo 6115 - view of the marsh on the left side of Channel "E" midway to the cul-da-sac.



Photo 6116 – view of the dock and self-clearing station at the end of the cul-da-sac of Channel "E".



Photo 6117 – view of marsh at the end of Breaux's Pass (Channel "A")



Photo 6118 – view of marsh at the end of Breaux's Pass (Channel "A").



Photo 6119 – view of Channel "C" from Breaux's Pass looking downstream.



Photo 6120 – view of Channel "C" from Breaux's Pass looking downstream.



Photo 6123 – view of PVC pipe and original access through Channel "C" now silted in.

# Appendix C

Three (3) Year Budget Projections

## BIG ISLAND MINING PROJECT (AT-03) Three-Year Operations & Maintenance Budgets 07/01/2012 - 06/30/15

Project Manager	<u>O &amp; M Manager</u>	Federal Sponsor	Prepared By
	Brian Babin	NMFS	Brian Babin
	2012/2013	2013/2014	2014/2015
Maintenance Inspection	\$ 2,814.00	\$ -	\$ 2,985.00
Structure Operation	\$ -	\$ -	\$ -
Administration			\$ -
Maintenance/Rehabilitation			
12/13 Description:			
F&D	\$ 16 560 00		
Construction	\$ -		
Construction Oversight	\$ -		
Sub Total - Maint. And Rehab.	\$ 16,560.00		
13/14 Description: Allowance for M	laintenance Dredging by lan	downer (LDWF)	
E&D		\$ 5,000.00	
Construction		\$ 300,000.00	
Construction Oversight		\$ 20,000.00	
	Sub Total - Maint. And Rehab.	\$ 325,000.00	
14/15 Description:			
E&D			\$ -
Construction			\$ -
Construction Oversight			\$-
	0040/0040	Sub Total - Maint. And Rehab.	<u>\$</u>
	2012/2013	2013/2014	2014/2015
Total O&M Budgets	<u>\$ 19,374.00</u>	\$ 325,000.00	<u>\$2,985.00</u>
-			<b>A</b>
I otal O&M Budget 2012 t	\$336,465		
Unexpended U&M Budge			\$347,17U
Remaining O&M Budget	\$10,705		

#### **OPERATIONS & MAINTENANCE BUDGET WORKSHEET**

#### Project: Big Island Mining Project (AT-03)

#### FY 12/13 -

Administration		\$ 0
O&M Inspection & Report		\$ 2,814
Operation:		\$ 0
Maintenance:		\$ 16,560
E&D:	\$ 16,560	
Construction:	\$	
Construction Oversight:	\$	
General Maintenance:	\$	

#### **Operation and Maintenance Assumptions:**

#### 2012 Bathymetric Survey:

Survey Crew: 36 hours @ \$125/hr = \$4,500Boat: 3 days @ \$600/day = \$1,800Equipment: 3 days @ \$500/day = \$1,500Data Processing/Report: = \$5,000\$13,800(20% Contingency)\$ 2,760Total:\$16,560

#### FY 13/14 -

Administration		\$	0
O&M Inspection & Report		\$	0
Operation:		\$	0
Maintenance:		\$ 325,	,000
E&D:	\$ 5,000**		
Construction:	\$300,000		
Construction Oversight:	\$ 20,000***		

#### **Operation and Maintenance Assumptions:**

Maintenance Dredging of Channels "A" and "C". Included in year 11/12 is a lump sum of \$300,000 for planning, permitting and dredging of Channels "A" and "C" should the landowner agree to perform the work. OCPR administration costs for planning and construction oversight of maintenance dredging is estimated to e approximately \$5,000\* and \$20,000\*\*\*, respectively.

# FY 14/15 -

Administration		\$	0
O&M Inspection & Report		\$	2,985
Operation:		\$	0
Maintenance:		\$	0
E&D:	\$ 0		
Construction:	\$ 0		
Construction Oversight:	\$ 0		

# **Operation and Maintenance Assumptions:**

# 2010-2013 Accounting

Total O&M Budget:	\$ 409,773.00
Total Expenditures by LDNR:	<u>\$ 62,602.94</u>
Estimated Unexpended Funds:	\$ 347,170.06