

**BENEFICIAL USE OF DREDGED MATERIAL
DISPOSAL HISTORY
ALONG SELECT NAVIGATIONAL CHANNELS IN LOUISIANA**

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INTRODUCTION

Beginning in the late 1970's, the U.S. Army Corps of Engineers (USACE) began placing dredged material in an effort to create and restore coastal habitats. In 1994, the Beneficial Use Monitoring Program (BUMP) was instituted to quantify the amount of new habitat created and to improve dredge disposal placement in order to maximize the beneficial use. As part of BUMP, the University of New Orleans- Coastal Research Laboratory (UNO-CRL) performed a cumulative landscape history of the BUMP monitored sites between 1985 and 2000 to determine the net amount of sub-aerial land created by the USACE. The study will be continued on a yearly basis to determine the net land created between the current year and base year of 1985.

DATA

The base year color infrared (CIR) photography used in the study was flown in December 1985 by the NASA- Ames Research Center. The photography was captured using a Wild RC10 camera at an altitude of 65,000 feet (1:65,000 scale).

For comparison, the current fiscal year (FY) CIR photography was used. The FY 2000 photography was flown by Aerial View Point in December of 2000 and January 2001. The photography was captured with a Wild RC30 camera at an altitude of 12,000 feet (1:24,000 scale).

METHODS

The CIR photography was first scanned at a resolution of 600 dpi, and then imported into Erdas Imagine file format. The photography was then geo-referenced and a CIR photo-mosaic was created. For the land water classification, an ISODATA algorithm was performed on the CIR photo-mosaic to separate the imagery into 85 unique spectral classes. These 85 classes were then examined for spectral homogeneity and assigned either a final class of land or water. The image was then recoded to produce a land-water image. This procedure was followed for both the 1985 and FY 2000 CIR mosaics.

Once a land-water image was finalized for a study site, a change detection matrix was computed and a change detection image created. From this image, the areas of direct land created due to dredged material disposal was delineated using information from the disposal history of each study site.

RESULTS

The goal of the study was to determine the amount of sub-aerial land created by the USACE. Since this study was a comparison of two time periods, the polygon delineations and acreage of BUMP created land represents a net change in the landscape based on current conditions. However, it was beyond the scope of the study to determine the amount of new land created by "BUMP assistance." The natural processes of re-working sediment placed into a system are numerous; making the determination of

BUMP assisted land creation difficult. Table 1 summarizes the results of the study and is followed by figures presenting the cumulative landscape change for each study site.

Table 1 Summary of BUMP created land by study site.

BUMP Study Site	BUMP Created (Acres)	BUMP Created (Hectares)	Figure Number
Atchafalaya- Avoca Island	1,066	432	1
Atchafalaya- Delta	2,924	1,184	2
Atchafalaya- Horseshoe Bend	1,256	508	3
Baptiste Collette	6,239	2,527	4
Barataria- Inland	141	57	5
Barataria- Bay	60	24	6
Barataria- Grand Terre	121	49	7
Calcasieu- Brown Lake	195	79	8
Calcasieu- Sabine	745	302	9
Freshwater Bayou	21	8	10
Houma- Navigation Canal	13	5	11
Houma- Wine Inland	48	19	12
Mermentau River	63	25	13
MRGO- Inland	289	117	14
MRGO- Jetties	319	129	15
MRGO- Breton Island	29	12	16
South Pass	396	161	17
Southwest Pass	3,096	1,254	18
Tiger Pass	347	140	19
Total	17,367	7,034	

BENEFICIAL USE OF DREDGED MATERIAL DISPOSAL HISTORY
MISSISSIPPI RIVER-GULF OUTLET, LA
INLAND REACH
Through FY 2000

The Rivers and Harbors Act of 1956 authorized the USACE-NOD to construct and maintain a deep draft navigational channel 36 feet deep by 500 feet wide from the Inner Harbor Navigation Canal in New Orleans to the Chandeleur Islands (Mile 66.0 to Mile 0) and a channel 38 feet deep by 600 feet wide from the islands to the 38 foot contour in the Gulf of Mexico (Mile 0 to Mile -9.0). Construction of the Mississippi River - Gulf Outlet (MR-GO), Louisiana, navigational channel was initiated in 1958 and enlargement to full project dimensions was completed in 1968. Maintenance of discontinuous reaches of the channel has been accomplished on an annual basis since construction was completed.

Prior to and including the USACE-NOD Fiscal Year 1988 maintenance event, dredged material removed from the Inland Reach, Mile 66 to Mile 23 of the channel was placed into existing upland confined disposal facilities located on the south bank of the navigational channel.

Mile 60 to Mile 50

For the FY 1993 maintenance event, dredged material removed from the Inland Reach vicinity of Mile 60 to Mile 50 was placed within confined wetlands development disposal areas A, B, C, D and F located on the north bank of the navigational channel. The disposal areas are located between Lake Borgne and the MR-GO navigational channel. In general, the dredged material was pumped into shallow, open-water areas and ponds within the marsh and allowed to flow unrestricted within the confining dikes. The dikes were constructed along the perimeter of the disposal areas to prevent the dredged material from flowing into the navigational canal, Lake Borgne, Shell Beach Bayou and a no-work area. The maximum initial height of the dredged material placed for wetlands development/restoration was not to exceed +3.0 feet Mean Low Gulf (MLG) (+2.2 National Geodetic Vertical Datum (NGVD)).

During the FY 1995 maintenance events, dredged material removed from the Inland Reach vicinity of Mile 60 to Mile 50 and Michoud Canal was placed within confined wetlands development disposal areas B, D, E, and F. Dredged material was pumped into shallow open water areas within the disposal area and into the borrow canals that were excavated during retention dike construction and allowed to flow unrestricted into shallow ponds and broken marsh areas. At disposal area E earthen closures with a shell cap were constructed along Bayou Beinvenue bankline and plastic sheet pile closures were constructed along the Lake Borgne shoreline to prevent dredged material from flowing into Bayou Bienvenue and Lake Borgne. During FY 1995 the initial height of the dredged material placed in the disposal areas was not to exceed +3.5 feet MLG (+2.7 NGVD).

No maintenance dredging occurred in this reach of the MR-GO during FY 1996 - FY 2000.

Figure 4 illustrates the dredged material disposal history for the MR-GO-Inland Reach Vicinity Mile 60-50 BUMP study area prior to November 1996.

Mile 38 to Mile 32.6

During the FY 2000 maintenance event (October 9-December 21, 2000), shoal material removed from the Mile 38 to 32.6 reach was placed at 4 abandoned petroleum industry canal disposal areas (4, 5, 7A, and 7B) located along the north channel bank. Dredged material was placed to a maximum initial elevation of +3.5 feet MLG (+2.72 feet NGVD) and was allowed to overflow from these disposal areas to adjacent wetlands to nourish the existing marsh. Overflow material was not allowed to exceed a height of 1 foot above the existing marsh elevation. About 484,370 CY of dredged material was placed at disposal area 4; 722,316 CY at disposal area 5; 334,055 CY at disposal area 7A; and 490,000 CY was placed at disposal area 7B.

Mile 32.6 to Mile 27.0

During FY 1992 and FY 1995, two pipeline canals near Mile 27-28 were in-filled (figure 5).

MISSISSIPPI RIVER GULF OUTLET DREDGING HISTORY

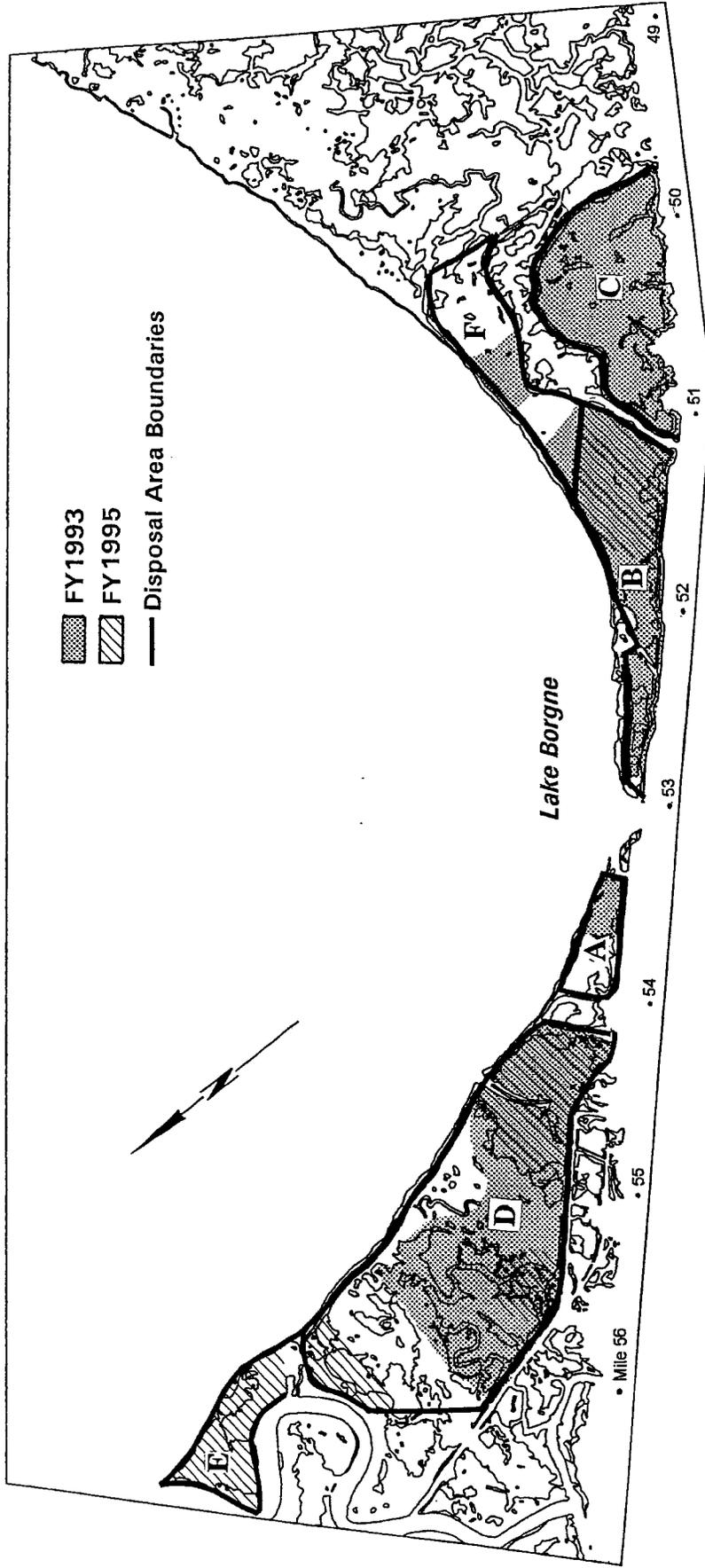
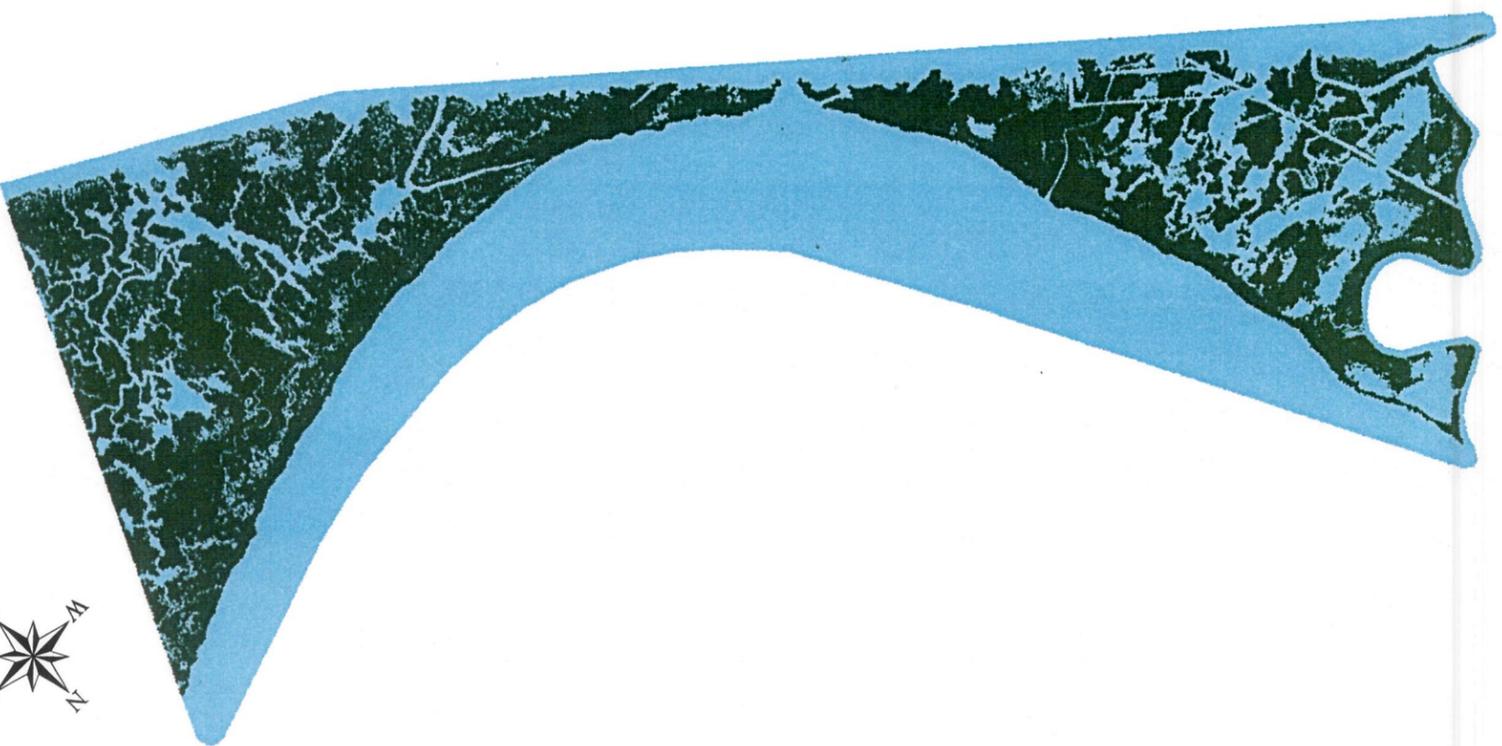
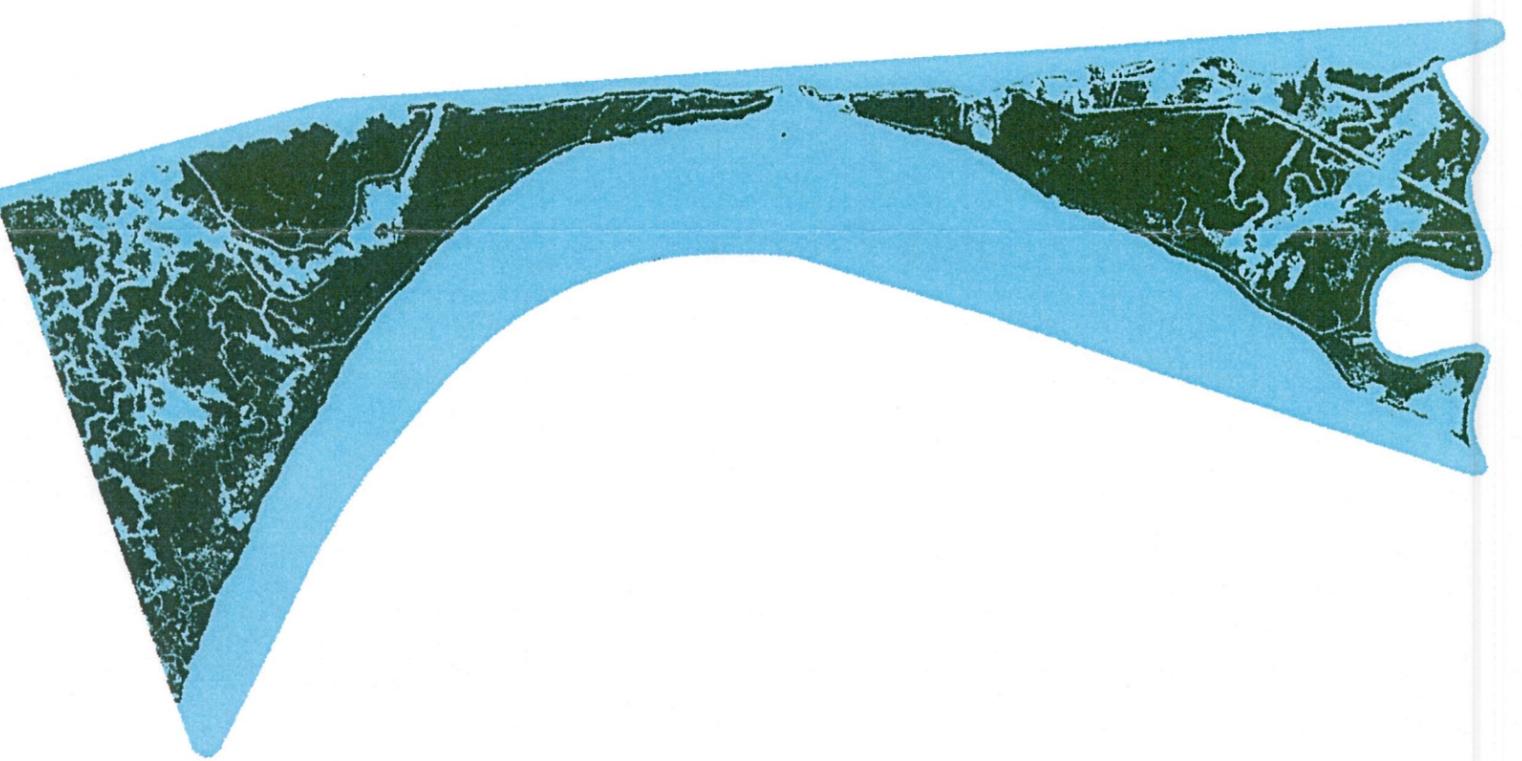


Figure 4. The dredged material disposal history for the Mississippi River-Gulf Outlet, Louisiana - Inland Reach Vicinity Mile 60-50 BUMP study area before November 1996, and the USACE-NOD designated disposal areas.

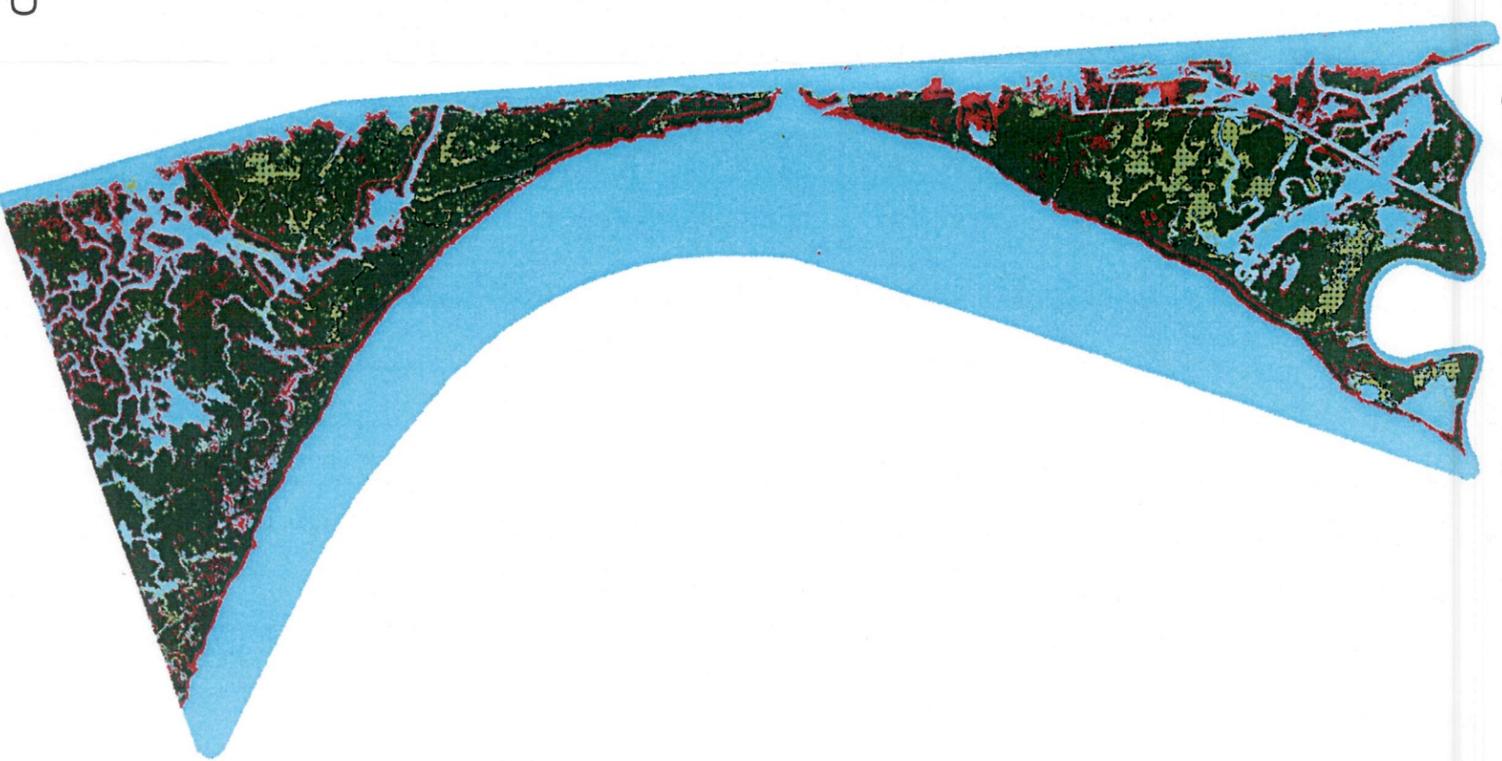
1985 Land-Water Classification



2000 Land-Water Classification



Change Detection: 1985-2000



LEGEND

-  BUMP Created Land
-  Other New Land
-  Unchanged Land
-  Land Loss
-  Water



Figure 14 Cumulative Landscape Change for MRGO-Inland: 289 Acres

BENEFICIAL USE OF DREDGED MATERIAL DISPOSAL HISTORY
MISSISSIPPI RIVER-GULF OUTLET, LA
JETTIES REACH AND BRETON SOUND
Through FY 2000

The Rivers and Harbors Act of 1956 authorized the USACE-NOD to construct and maintain a deep draft navigational channel 36 feet deep by 500 feet wide from the Inner Harbor Navigation Canal in New Orleans to the Chandeleur Islands (Mile 66.0 to Mile 0) and a channel 38 feet deep by 600 feet wide from the islands to the 38 foot contour in the Gulf of Mexico (Mile 0 to Mile -9.0). Construction of the Mississippi River - Gulf Outlet (MR-GO), Louisiana, navigational channel was initiated in 1958 and enlargement to full project dimensions was completed in 1968. Maintenance of discontinuous reaches of the channel has been accomplished on an annual basis since construction was completed.

Prior to and including the USACE-NOD Fiscal Year 1988 maintenance event, dredged material from the Mile 23.1 to Mile 15 reach of the channel was placed unconfined in shallow, open water adjacent to the south jetty for wetland creation. The initial height of the dredged material placed for wetland creation adjacent to the south jetty was +3.0 feet Mean Low Gulf (MLG) (+2.22 National Geodetic Vertical Datum (NGVD)).

During the FY 1991 maintenance event, dredged material from Mile 21.4 to Mile 15.3 reach was placed adjacent to the south jetty for wetland creation.

In FY 1992, dredged material from the Mile 27.0 to Mile 23.1 reach was placed into existing oil exploration canals and into shallow open water adjacent to the north jetty for wetland creation. The initial height of the dredged material placed into the canals was +3.5 feet MLG (+2.72 feet NGVD) and the initial height of the material placed adjacent to the north jetty was +5.78 feet MLG (+5.0 feet NGVD).

During the FY 1993 maintenance event, dredged material from the Mile 23.0 to Mile 22.5 reach was placed adjacent to the north jetty for wetland creation and material from the Mile 20 to Mile 15.3 reach was placed adjacent to the south jetty for wetland creation. Dredged material from the Mile 22.5 to Mile 20.5 reach was placed adjacent to the south jetty to begin construction of an *interior barrier island* perpendicular to the jetty. The initial height of the material for *barrier island* construction was +4.5 feet MLG (3.72 feet NGVD).

There was no maintenance dredging in the Mile 30 to Mile 18 reach of the navigational channel during FY 1994. However there was unconfined disposal at Mile 7, 9, 11, and 13 which remained intertidal.

During the FY 1995 maintenance event, dredged material from the Mile 18.0 to Mile 15.3 reach was placed adjacent to the south jetty, and at Mile 15 into a single point discharge area.

During the FY 1996 maintenance event, dredged material was placed at Mile 21 adjacent to the *interior barrier island* created in FY 93, at Mile 20.3, and at Mile 19.5.

During FY 1997, the passage of Tropical Storm Josephine (October 4-8, 1996) with its strong easterly winds resulted in severe shoaling of the MR-GO Breton Sound and bar channel reaches. Two vessel groundings following the storm's passage prompted emergency maintenance dredging activities. A hopper dredge was used in the Mile 18 to 0 reach to sidecast shoal material to either side of the navigational channel to quickly reopen the channel for safe vessel passage. A cutterhead dredge was subsequently deployed from April 14 to July 17, 1997, to remove this sidecast material from the channel. Shoal material removed from the Mile 18.1 to 7.5 reach by cutterhead dredging was placed unconfined behind the south jetty at single point discharge sites (SPDS) located at Miles 17.5, 16.5, and 15.5. Dredged material was placed to a maximum initial elevation of +3.0 feet MLG (+2.22 feet NGVD) at these sites. Shoal material was also placed unconfined at SPDS located at Miles 13, 11, 9, and 7. A water injection dredge was utilized between Miles 13.1 and 8.9 to facilitate the production rate of the cutterhead dredge working in this reach.

No maintenance dredging was necessary in the jetties reach of the MR-GO during FY 1998.

During FY 1999, the passage of Hurricane Georges (September 27-28, 1998) resulted in severe shoaling of the MR-GO Breton Sound and bar channel reaches. Beginning on October 4, 1998, emergency dredging activities were implemented to re-establish the navigational channel's authorized dimensions. A contract to dredge the Mile 23 to -3.3 MR-GO reach began on this date and was completed on August 20, 1999. Shoal material removed from this dredging reach during this contract was placed unconfined adjacent to the north jetty; adjacent to the south jetty at the *interior barrier island* disposal site; at SPDS located at Miles 19.5, 18.5, 17.5, 16.5 and 15.5; at SPDS located at Miles 2.5 and 1.0; and at Breton Island berm site. Placement of shoal material at the Mile 15.5 SPDS was performed as part of a Section 204 of the Water Resources and Development Act (WRDA) of 1992 project to develop wetlands. Approximately ~~3.5~~^{4,853,290} million cubic yards of material was placed at this site from February 7-21, 1999, to a maximum initial elevation of +3.0 feet MLG (+2.22 feet NGVD).

Four additional FY 1999 maintenance dredging contracts were awarded for the MR-GO Mile 27 to 2.3 reach. The Mile 12 to 8 reach was dredged between December 15, 1998, and March 6, 1999, and the dredged material was placed at SPDS located at Miles 11 and 9. The Mile 8 to 4 reach was dredged from April 19 through May 17, 1999, and the dredged material was placed at SPDS located at Miles 7 and 5. The Mile 27 to 23 reach was dredged from August 5 through September 3, 1999 and the dredged material was placed adjacent to the north jetty. The Mile 12 to 2.3 reach was dredged from August 24 through December 13, 1999, and dredged material was placed at SPDS located at Miles 11, 9, 7, and 5, and at Breton Island.

Mississippi River Gulf Outlet Jetties Reach Dredged Material Disposal History

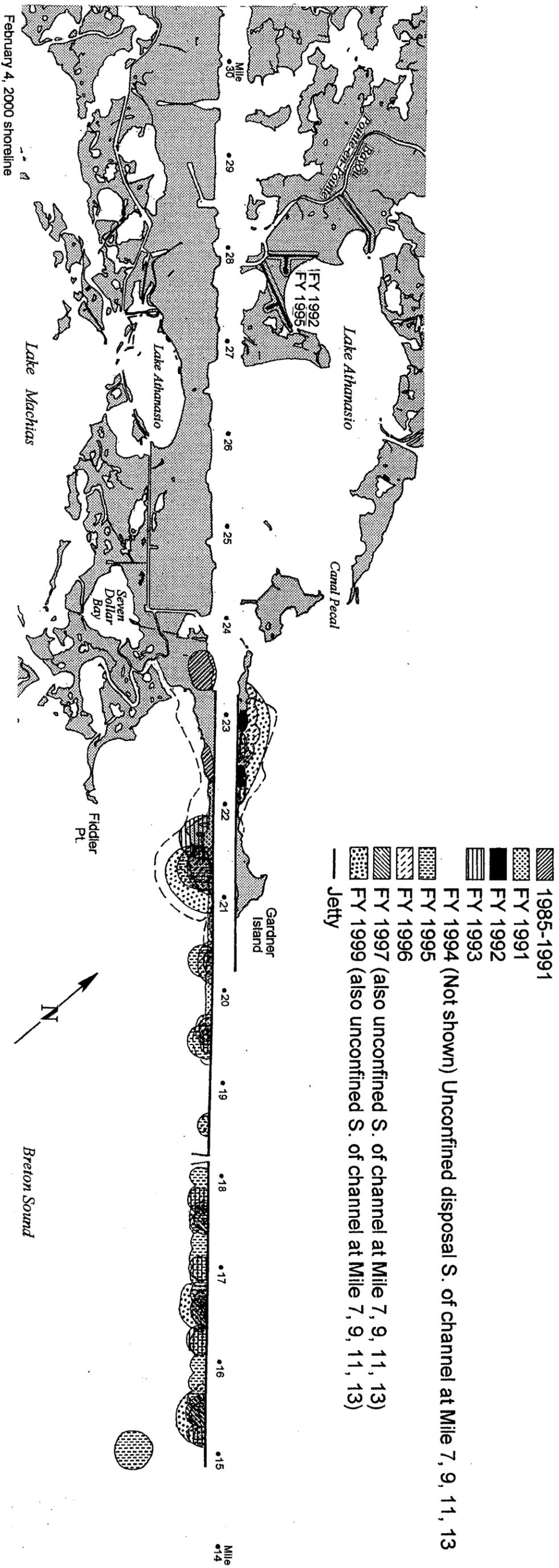
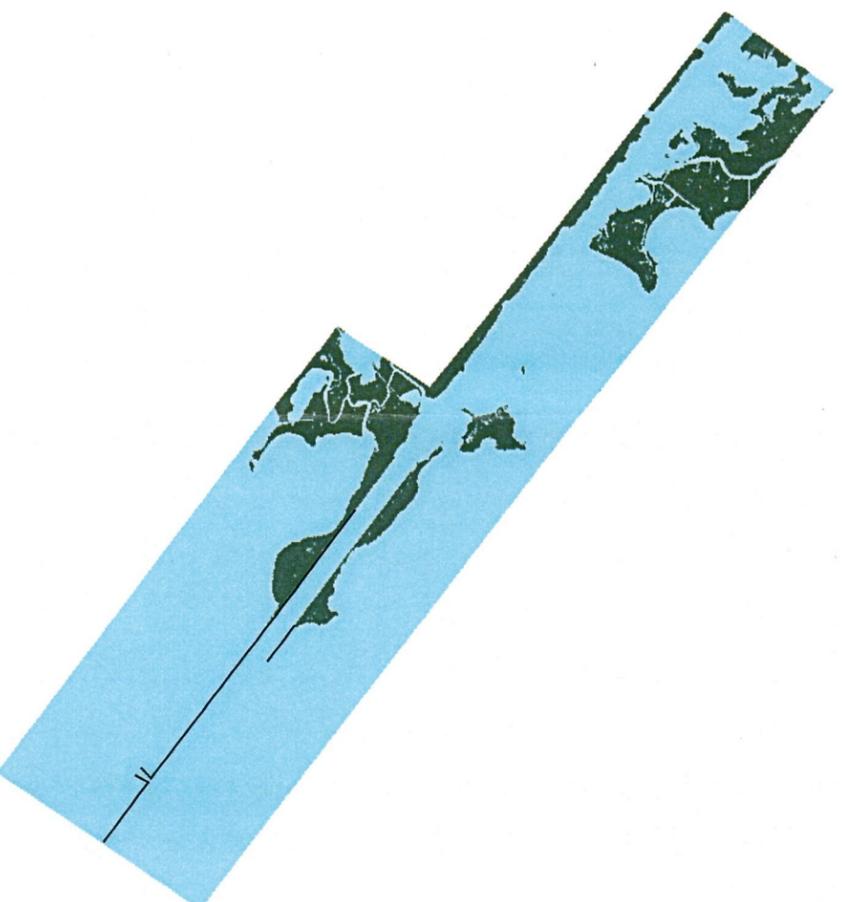
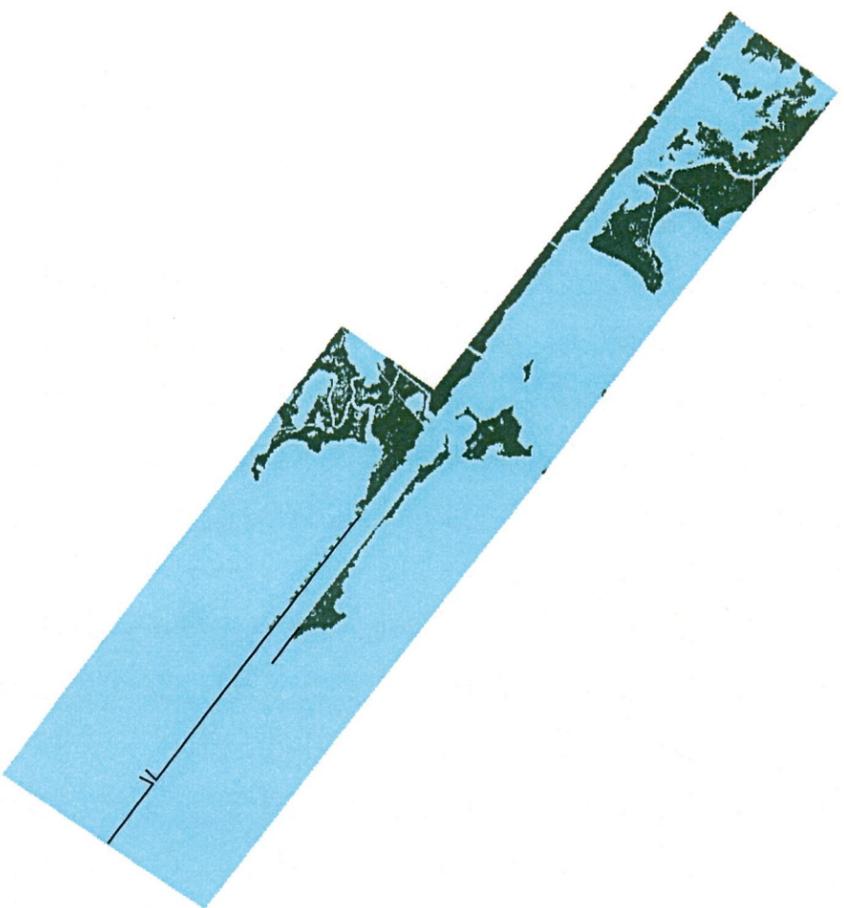


Figure 5. The dredged material disposal history for the Mississippi River-Gulf Outlet, Louisiana - Jetties BUMP study area through FY 2000.

1985 Land-Water Classification

2000 Land-Water Classification

Change Detection: 1985-2000



LEGEND

-  BUMP Created Land
-  Other New Land
-  Unchanged Land
-  Land Loss
-  Water

Figure 15 Cumulative Landscape Change for MRGO- Jetties: 396 Acres

BENEFICIAL USE OF DREDGED MATERIAL DISPOSAL HISTORY
MISSISSIPPI RIVER-GULF OUTLET, LA
BRETON ISLAND
Through FY 1999

The Rivers and Harbors Act of 1956 authorized the USACE-NOD to construct and maintain a deep-draft navigational channel 36 feet deep by 500 feet wide from the Inner Harbor Navigation Canal in New Orleans to the Chandeleur Islands (Mile 66.0 to Mile 0) and a channel 38 feet deep by 600 feet wide from the islands to the 38-foot contour in the Gulf of Mexico (Mile 0 to Mile -9.0). Construction of the Mississippi River Gulf Outlet (MR-GO) channel was initiated in 1958 and enlargement to full project dimensions was completed in 1968. Maintenance of discontinuous reaches of the channel has been accomplished on an annual basis since construction was completed.

Historically, shoal material from the bar channel (Mile 0 to Mile 9.0) was removed by hopper dredges and placed into an Environmental Protection Agency designated ocean dredged material disposal site (ODMDS) located southwest of the navigational channel. During annual coordination prior to the Fiscal Year 1992 maintenance event, the Louisiana Department of Natural Resources (DNR) asked USACE-NOD to investigate the feasibility of berm construction with dredged material from the MRGO bar channel. According to DNR, construction of a berm adjacent to Breton Island could nourish and/or protect the island from continued erosion.

Scientists from the USACE Waterways Experiment Station's Coastal Engineering Resource Center (CERC) assisted USACE-NOD with development of a plan to construct and monitor a near-shore berm. CERC recommended construction of a *pilot* near-shore berm to 1) determine the constructability of a berm using a hydraulic cutterhead pipeline dredge; 2) investigate the mounding potential of the extremely fine-grained dredged material; and to 3) monitor dispersion of the berm. Little, if any, experience existed for constructing a near-shore berm by hydraulic pipeline using such fine-grained material. Therefore, experience gained from constructing and monitoring the pilot near-shore berm would be used to assess the feasibility of a larger berm to benefit Breton Island.

USACE-NOD determined the dredged material placement location and approximate configuration with guidance from CERC. Monitoring consisted of pre- and post-construction hydrographic surveys, seabed drifter studies, sediment sampling, dredging operations inspection and documentation, and data analysis.

Approximately 1.7 million cubic yards of dredged material from the Mile 0 to Mile -2.5 reach of the MRGO bar channel was placed at the pilot near shore berm location (Figure 6A) in September, 1993. Post-construction surveys revealed that approximately 400,000 cubic yards of the dredged material placed at the pilot near-shore berm site remained in a mound at the site following construction.

Breton Island is being monitored by the dredged material BUMP to determine the benefits of an offshore feeder berm to the adjacent shoreline. Breton Island is suffering from shoreline erosion rates in excess of 100 ft/yr and land loss rates of 6 acres/yr. The Breton Island feeder berm has two goals: shoreline nourishment and wave protection. The potential exists for onshore/longshore sediment transport from the feeder berm to nourish Breton Island and slow or halt the rate of shoreline erosion. The second benefit of the feeder berm is to potentially reduce and alter the near-shore wave climate

in such a manner as to reduce or locally reverse shoreline erosion.

During FY 1999, the passage of Hurricane Georges (September 27-28, 1998) resulted in severe shoaling of the MR-GO Breton Sound and bar channel reaches. Beginning on October 4, 1998, emergency dredging activities were implemented to re-establish the navigational channel's authorized dimensions. Approximately 3.8 million cubic yards (CY) of material were placed at the Breton Island berm site from May 26 through August 20, 1999.

Dredged material was placed directly on Breton Island from early September through October 23, 1999, as part of a Section 204 of WRDA 92 project to restore barrier island habitat damaged by storms and erosion. Dredged material was placed at 3 sites along the island's northeastern rim that had been breached. To plug these breaches, dredged material was placed to a maximum initial elevation of +1.5 feet MLG (+.72 feet NGVD). About 221,500 CY of dredged material was placed at Breach A, about 626,000 CY was placed at Breach B, and About 253,600 CY was placed at Breach C (Figure 6B).

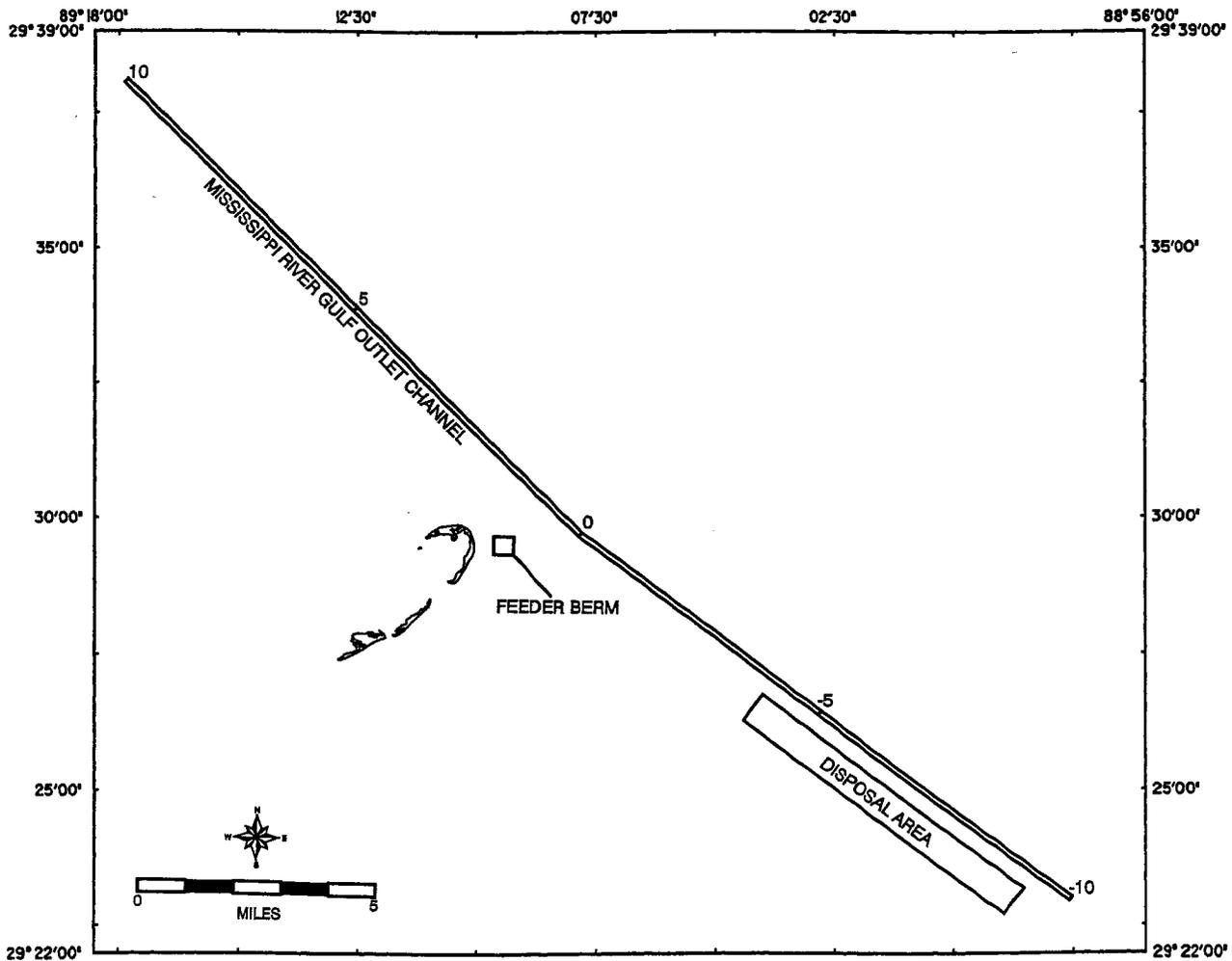


Figure 6A. The location of the beneficial use of dredged material offshore feeder berm in relation to Breton Island.

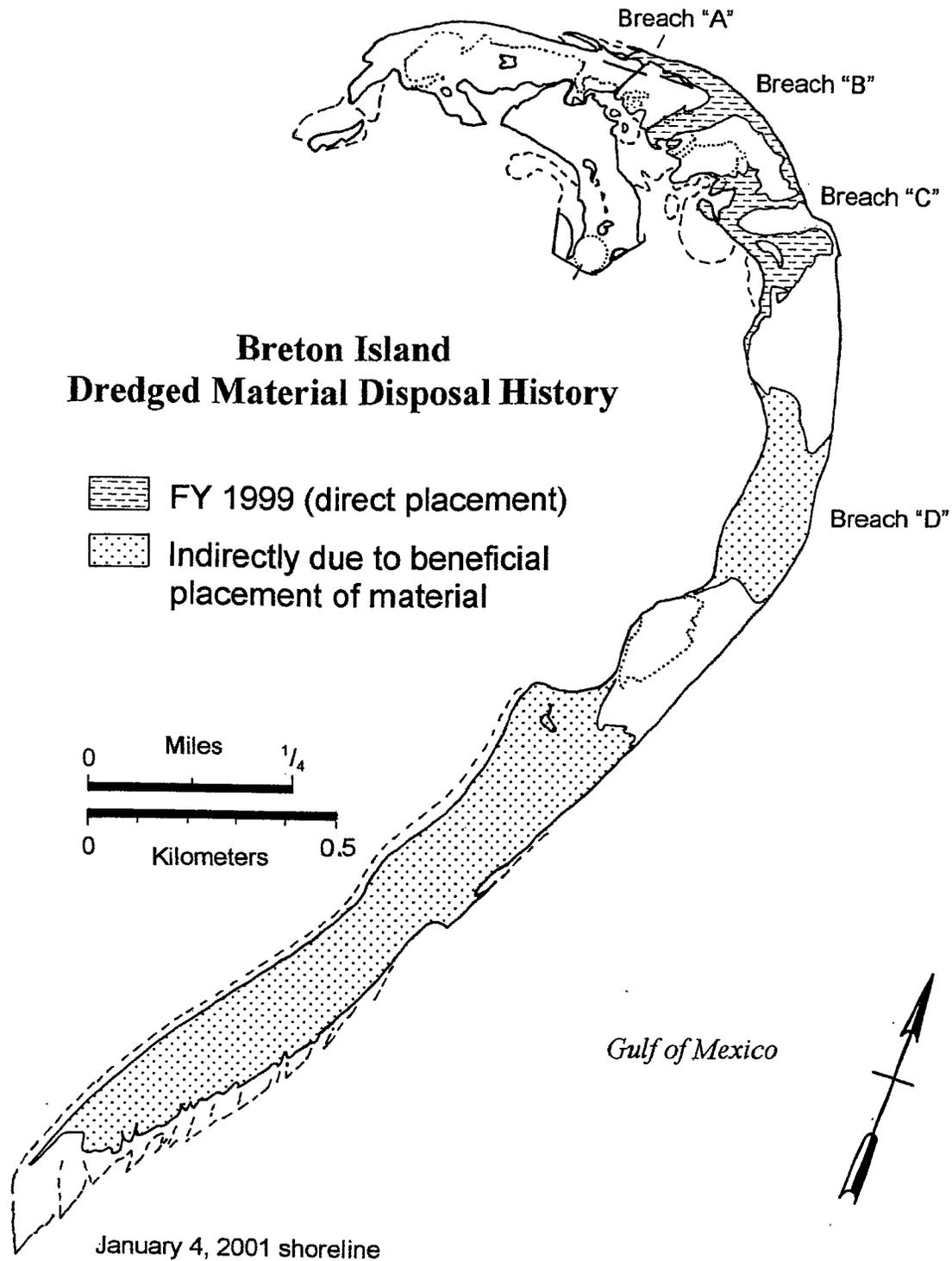
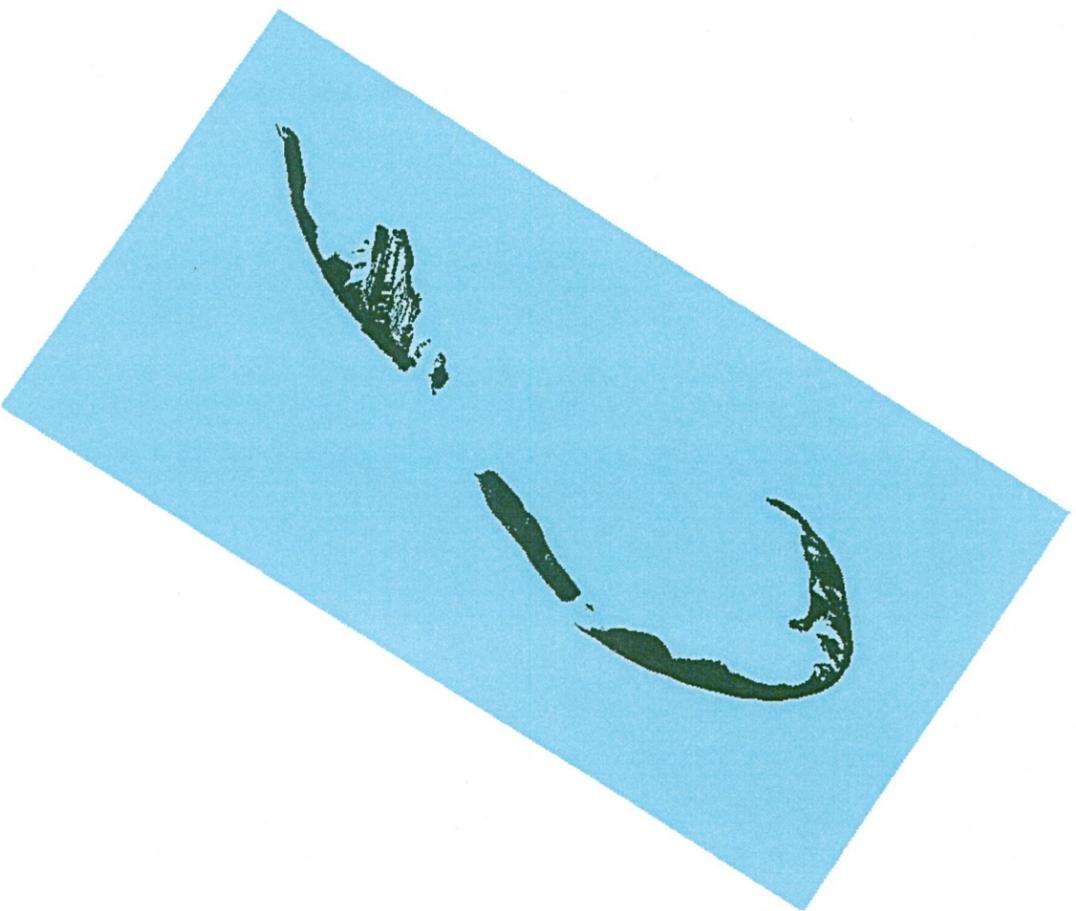
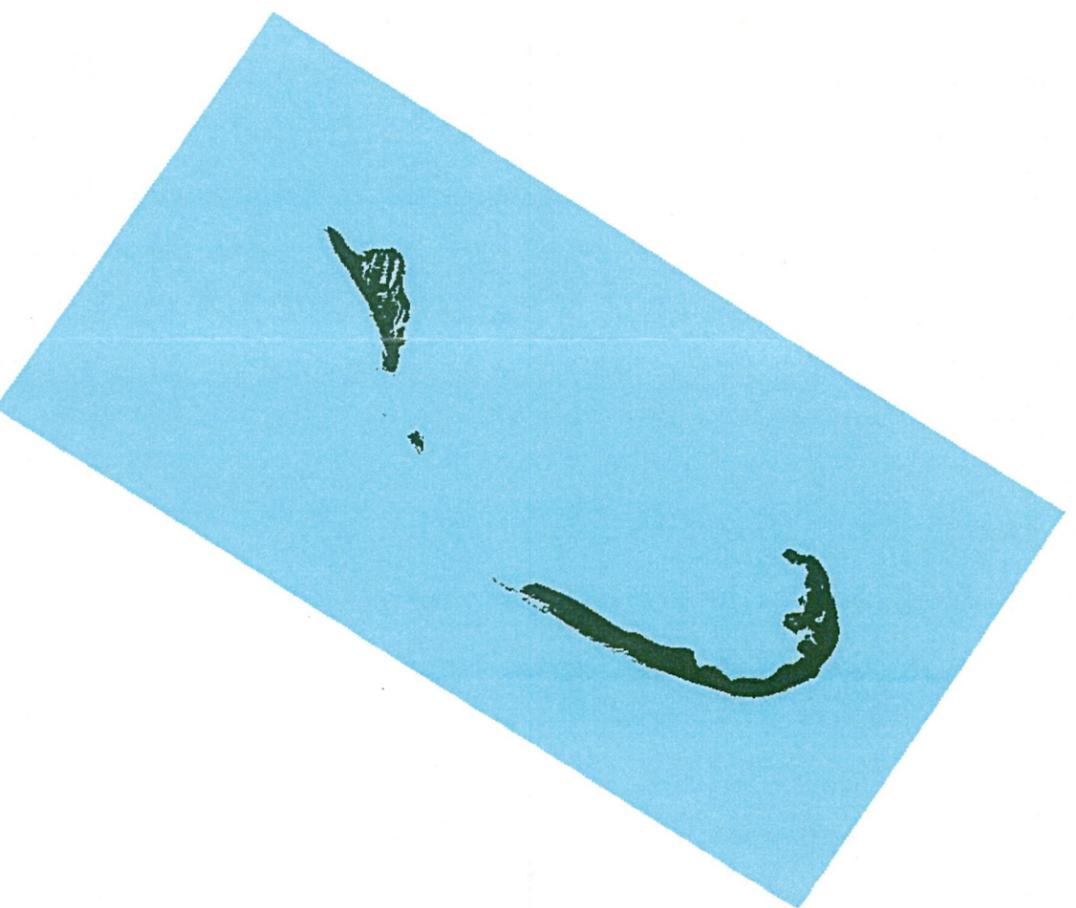


Figure 6B. The dredged material disposal history for the Mississippi River-Gulf Outlet, Louisiana - Breton Island BUMP study area through FY 2000.

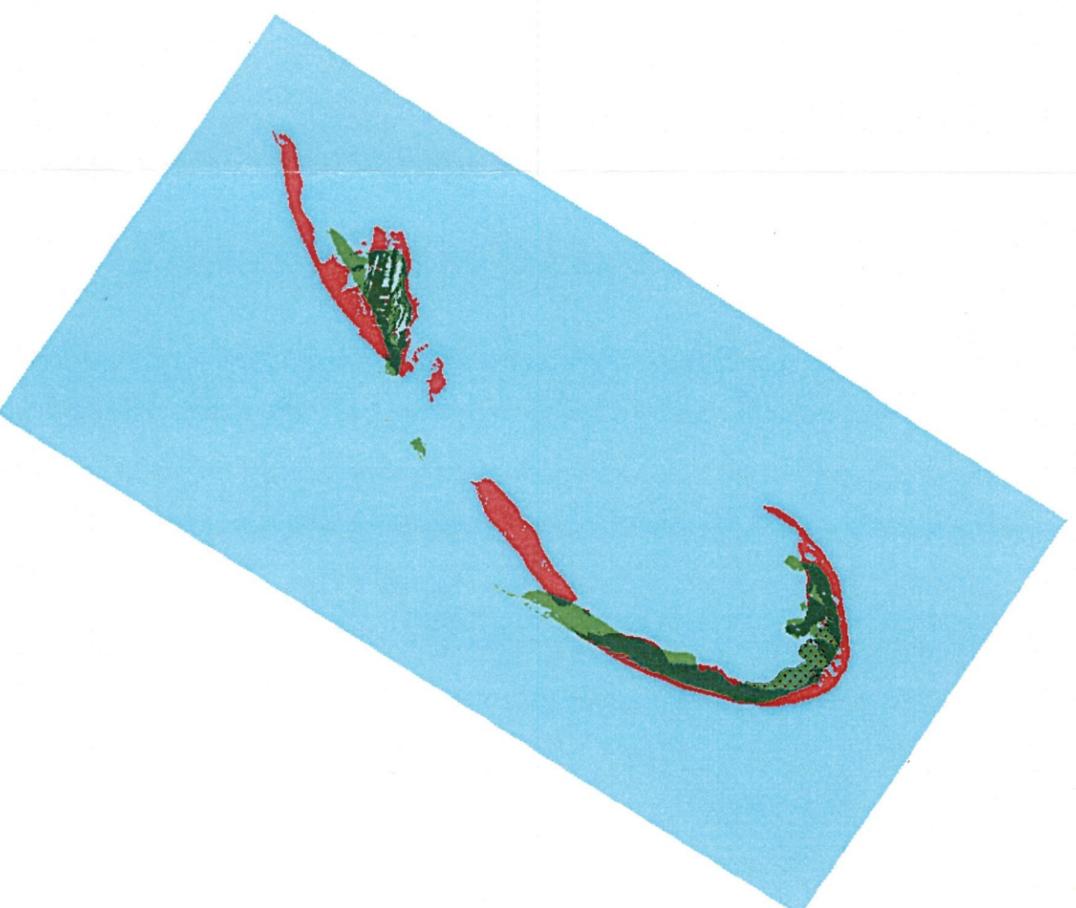
1985 Land-Water Classification



2000 Land-Water Classification



Change Detection: 1985-2000



LEGEND

-  BUMP Created Land
-  Other New Land
-  Unchanged Land
-  Land Loss
-  Water



Figure 16 Cumulative Landscape Change for MRCGO Breton Island: 29 Acres