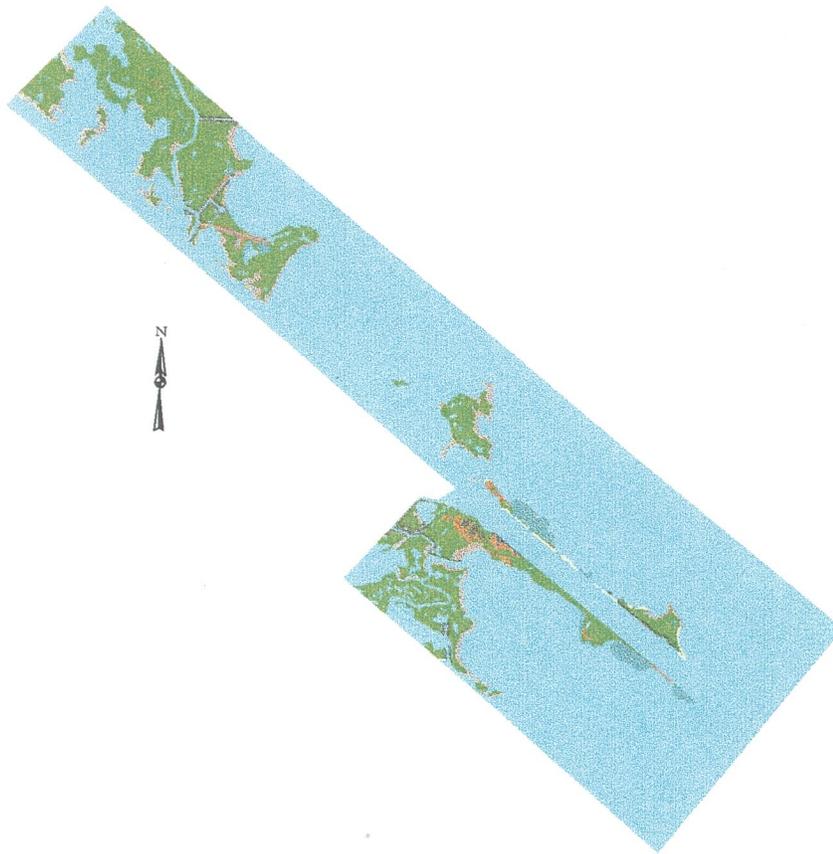


U.S. Army Corps of Engineers - New Orleans District  
Louisiana State University - Coastal Studies Institute

# **BENEFICIAL USE OF DREDGED MATERIAL MONITORING PROGRAM 1996 ANNUAL REPORT**

## **Part 3: Results of Monitoring the Beneficial Use of Dredged Material at the Mississippi River Gulf Outlet, Louisiana - Jetties**

**Base Year 1985 through Fiscal Year 1996**



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## INTRODUCTION

The Mississippi River Gulf Outlet (MRGO) navigation channel - jetties study area is located 30 miles southeast of New Orleans between MRGO Mile 18 and Mile 30 (Figure 1). The U.S. Army Corps of Engineers - New Orleans District (USACE-NOD) maintains this navigation channel through the abandoned St. Bernard delta complex. Because the St. Bernard delta complex is abandoned, it is experiencing rapid coastal erosion and wetland loss.

The Beneficial Use of dredged material Monitoring Program (BUMP) at Louisiana State University - Coastal Studies Institute (LSU-CSI) is documenting the beneficial use of dredged material using aerial photography, geographical information system (GIS) analysis, and field surveys through the sponsorship of the USACE-NOD. BUMP results are provided in map series, annual reports, and scientific literature.

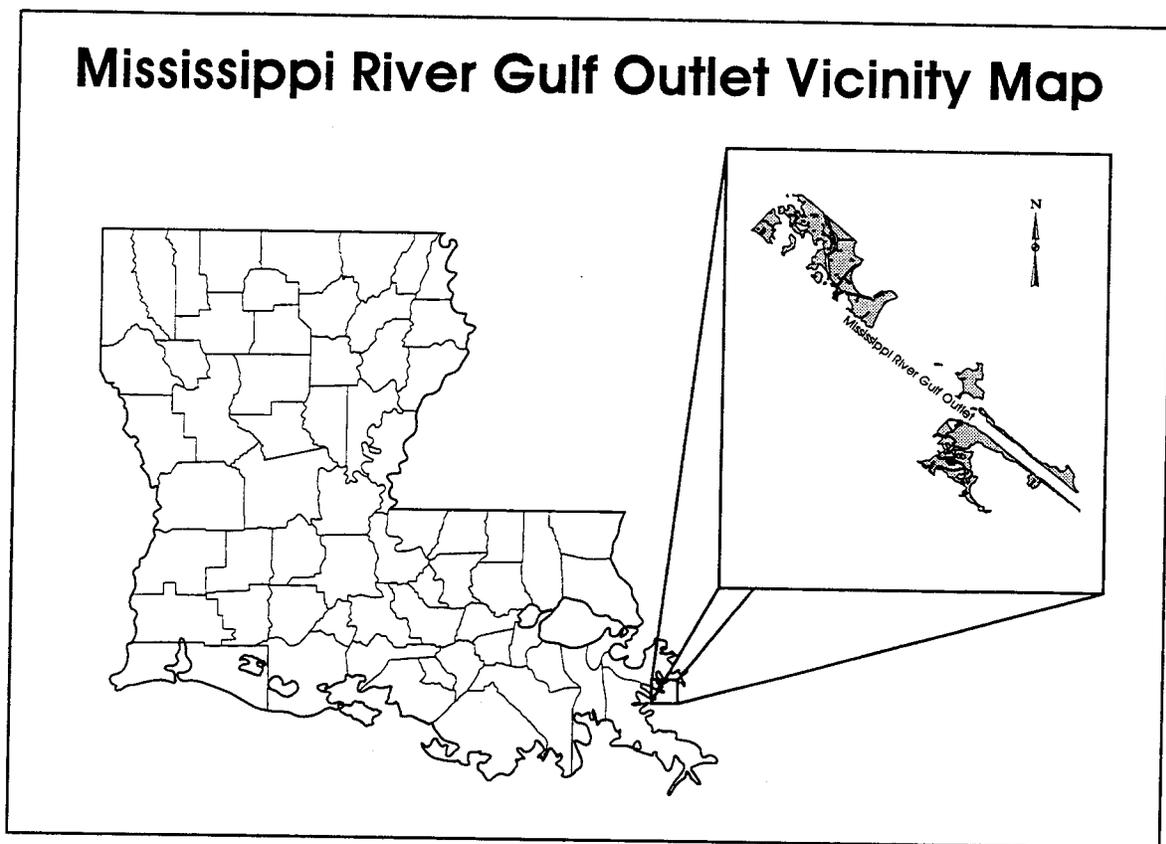


Figure 1. The location of the Mississippi River Gulf Outlet, Louisiana - Jetties BUMP study area in Louisiana.

In this report, LSU presents the results of the BUMP analysis at the Mississippi River Gulf Outlet navigation channel - jetties study area, representing monitoring results through the USACE-NOD Fiscal Year 1996. This is the third part of the six part Beneficial Use of dredged material Monitoring Program (BUMP), 1996 Final Report. The nine parts are:

- Part 1: Introduction and Methodology
- Part 2: Results of Monitoring the Beneficial Use of Dredged Material at the Mississippi River Gulf Outlet, Louisiana - Mile 47-59
- Part 3: Results of Monitoring the Beneficial Use of Dredged Material at the Mississippi River Gulf Outlet, Louisiana - Jetties
- Part 4: Results of Monitoring the Beneficial Use of Dredged Material at the Mississippi River Gulf Outlet, Louisiana - Breton Island
- Part 5: Results of Monitoring the Beneficial Use of Dredged Material at the Mississippi River Outlet, Venice, Louisiana - Baptiste Collette Bayou
- Part 6: Results of Monitoring the Beneficial Use of Dredged Material at the Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana - Southwest Pass
- Part 7: Results of Monitoring the Beneficial Use of Dredged Material at the Houma Navigation Canal, Louisiana - Bay Chaland
- Part 8: Results of Monitoring the Beneficial Use of Dredged Material at the Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana - Lower Atchafalaya River Horseshoe
- Part 9: Results of Monitoring the Beneficial Use of Dredged Material at the Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana - Atchafalaya Bay/Delta and Bar Channel

Using aerial photography LSU classified the natural and man-made habitats in the study area for December 1985, February 1995, November 1995, and November 1996 including habitat created during the USACE-NOD FY1996 maintenance event. There was no maintenance dredging between Mile 18 and 30 during FY94. Through the GIS analysis, these areas were calculated and changes documented between 1985, 1995 and 1996. Field surveys were conducted on the beneficial use area created during the Fiscal Year 1992 and FY1993, and the FY96 maintenance events. Habitats were ground truthed and survey transects established to document vegetation species, stacking elevations, and subsidence. Figure 2 shows the areas of minimum air photo mosaic coverage and the limit of the digitized area.



## DREDGED MATERIAL DISPOSAL HISTORY: 1985 -1996

The Rivers and Harbors Act of 1956 authorized the USACE-NOD to construct and maintain a deep draft navigation 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 (MRGO), Louisiana, navigation 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 Mile 27.0 to Mile 32.1 reach of the channel was placed into an existing confined disposal facility located on the south bank of the navigation channel (Figure 3). 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 navigation channel during FY 1994. However there was unconfined disposal at Mile 7, 9, 11, and 13 which remained intertidal. Figure 3 illustrates the dredged material disposal history for the MRGO-jetties BUMP study area prior to February 1995.

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. Two pipelines near Mile 27-28 were in-filled.

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.

### Mississippi River Gulf Outlet Disposal History

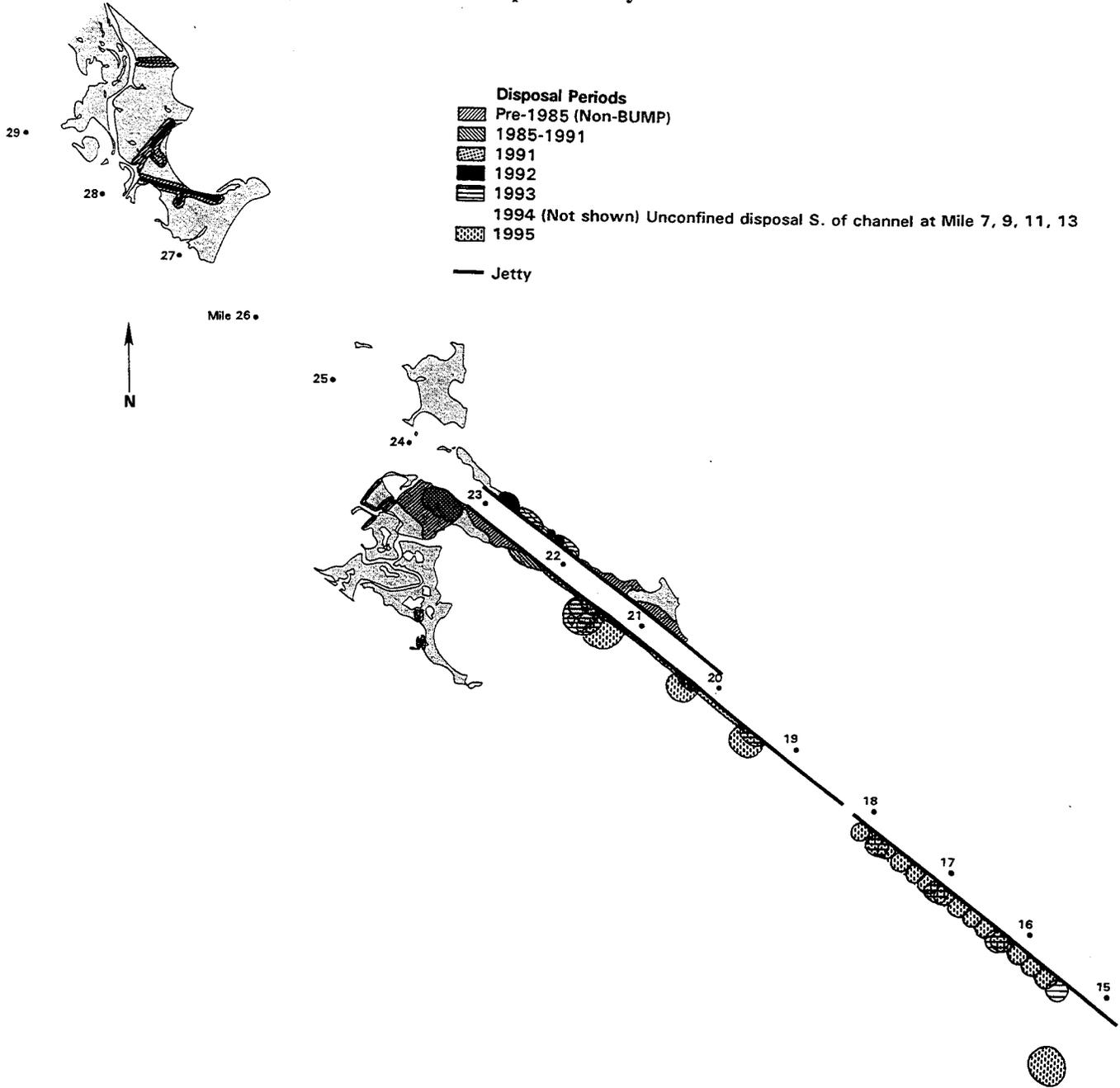


Figure 3. The dredged material disposal history for the Mississippi River Gulf Outlet - Jetties BUMP study area before November 1996.

## FIELD SURVEY RESULTS

### Methodology

#### Elevation Profile Surveys

The MRGO - Jetties study area is located where the MRGO leaves the St. Bernard marshes and enters Breton Sound. A peninsula was created by the USACE-NOD at Mile 21.5 along the south jetty during the FY1993 maintenance event representing the initial phase of *interior barrier island* construction. Two pipelines were in-filled during the FY95 maintenance event and one of these was added to the 1996 BUMP field monitoring program (Figure 4).

The collection of survey profiles was made in two phases. Phase-I involved assessing the characteristics of the area to determine the most applicable position to setup a long-term monitoring. This was accomplished using vertical aerial photography, reviewing dredging schedules and history, ground truthing the study area, and defining varying vegetation and peninsula morphology. Based on these factors, in May 1995 two transect lines were positioned along the peninsula, and three stakes, 33 feet apart, were permanently placed to represent the two profile transects. Stakes 1-0 and 2-0 represent the longitudinal profile (A-A'), and stakes 1-0 and 3-0 represent the lateral profile (B-B'). In Nov 1996, one transect was positioned across one of the in-filled pipelines, and two stakes, 30 feet apart, were placed to define the orientation of the transect (C-C'). Permanent 1-inch diameter by 6-foot galvanized stakes were driven approximately 3.5 feet into the ground and secured with concrete. The position of the stakes were determined using a Global Positioning System (GPS). Temporary white, ten-foot PVC poles with flagging and neon orange paint were slipped over the galvanized stakes to make profile siting and re-location easier.

Phase-II involved the actual collection of profile datum. In May 1995 and in June 1996, profile surveys were conducted along the transects defined by the stakes during phase-I. One longitudinal (perpendicular to jetty) profile and one lateral (parallel to jetty) profile transect were collected from MRGO- Jetties area. In November 1996, another profile was established across a pipeline. Survey datum and profiles were collected using a Topcon GTS-300<sub>DPG</sub> Total-Station, tri-prism, and TDS48 Data Collection System. Horizontal accuracy of the GTS-300 is 0.25 ft ± 0.0125 ft., with a vertical accuracy of 0.45 ft ± 0.0125 ft. The maximum horizontal range with tri-prism is 3,525 ft. A Pathfinder Professional MC-5 global positioning system (GPS) device was used to record the horizontal positions of each stake, instrument location, and the position and exact orientation of each transect line. The transect datum collected were processed, referenced to local benchmarks or tide gage, and entered into a graphic software program to produce topographic profiles.

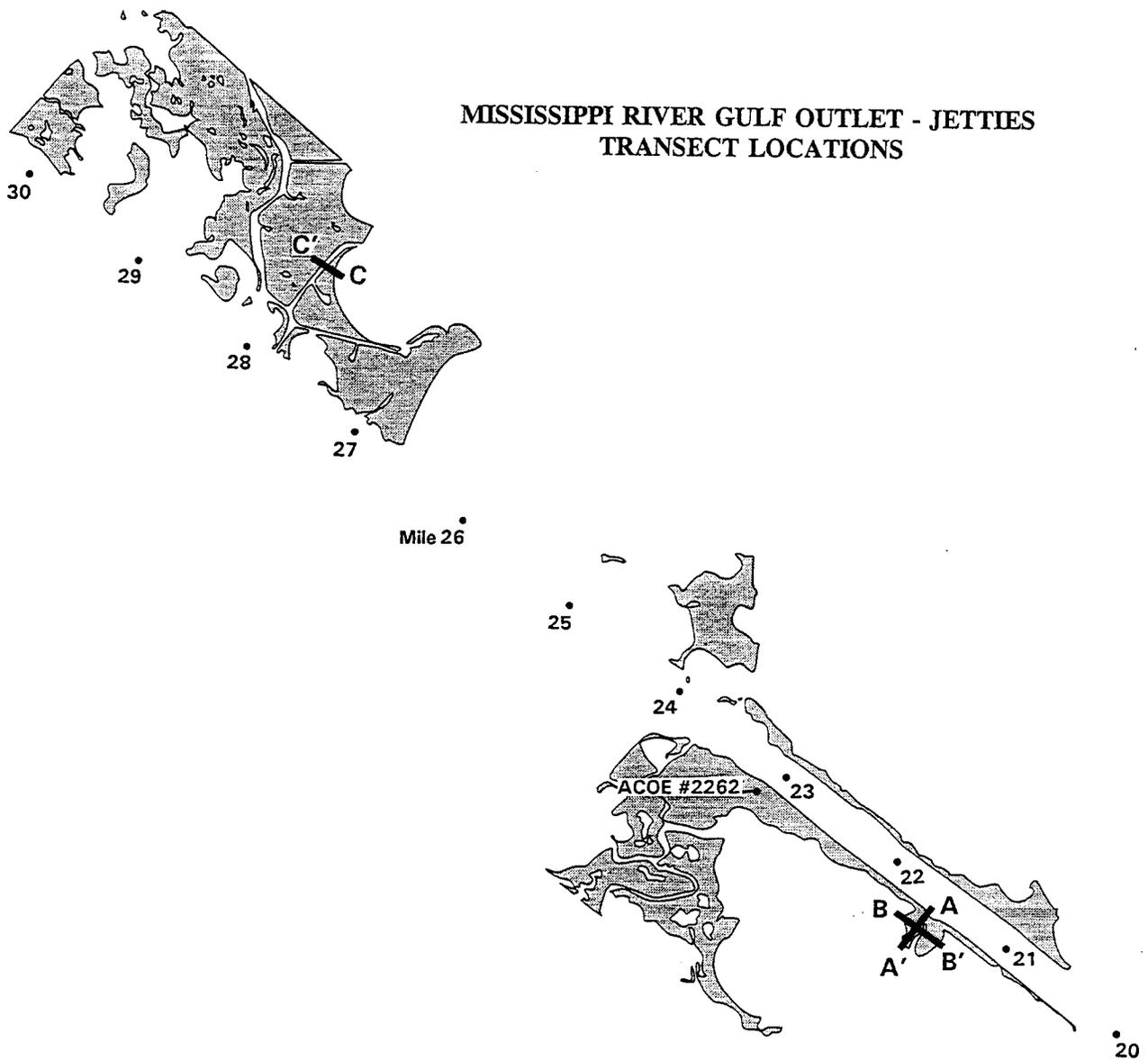


Figure 4. Location of the MRGO - Jetties BUMP study area profile transects and the benchmark available to reference the elevation data. A) The peninsula B) In-filled pipelines.

## **Vegetation Surveys**

Ground truthing for vegetative species composition and habitat verification was done in May 1995 and June 1996 on the peninsula, and in November 1996 for the pipeline. Species composition was determined within an approximate six-foot swath along each transect. No submerged aquatic species were considered for this report. Plants were identified in the field with only representative specimens taken for confirmation by taxonomic keys and/or verification by the LSU Department of Plant Biology. The better specimens and uncommon specimens were entered into the LSU herbarium collection; all others were archived by the author. The percent composition of each species was visually estimated in order to determine the relative abundance and dominance of species for habitat determinations. These percentages were not intended to provide scientific ratios or statistics. The species list included in Appendix 3A of this report is not complete; it reflects only those species that were readily observed during the profiling period. Some plants can only be identified during a short flowering period which may not have coincided with the time of the profile collection or ground truthing, and therefore can not be included in the list other than by a broad classification.

## **Profiles**

Elevation data and vegetation data were acquired initially on the peninsula in May 1995, and were re-visited with new data collected in June 1996. The pipeline site was established and initial data acquired in November 1996. The MRGO - Jetties topographic profiles for the peninsula were constructed in reference to the U. S. Army Corps of Engineers benchmark #2262 (Figure 4) and the pipeline transect was constructed in reference to the Shell Beach- Lake Borgne Tide Gage. The mean diurnal tidal range for the MRGO - Jetties BUMP study area is published as 1.3 ft.

### **MRGO Jetties Peninsula**

Figure 5 compares profile data at A-A' for 1995 and 1996. In May 1995, profiles here ranged in length from 1380 to 1500-feet. Maximum relief along profile A-A' was 2.26 feet, with an average relief of 1.66 feet. In June 1996, profiles ranged in length from 1600 to 1800 feet. Maximum relief along profile A-A' was 2.5 feet, with an average relief of 1.36 feet. In June 1996, the vegetation that had begun colonizing in 1995 was well established and had become a lush, healthy saltmarsh in 1996. A comparison of the 1995 and 1996 field surveys indicated this area had subsided -0.63 feet.

Figure 6 compares profile data at B-B' for 1995 and 1996. Profile B-B' exhibited a maximum relief of 1.67 feet, with an average relief of 1.41 feet. Profile B-B' exhibited a maximum relief of 1.71 feet, with an average relief of 1.34 feet.

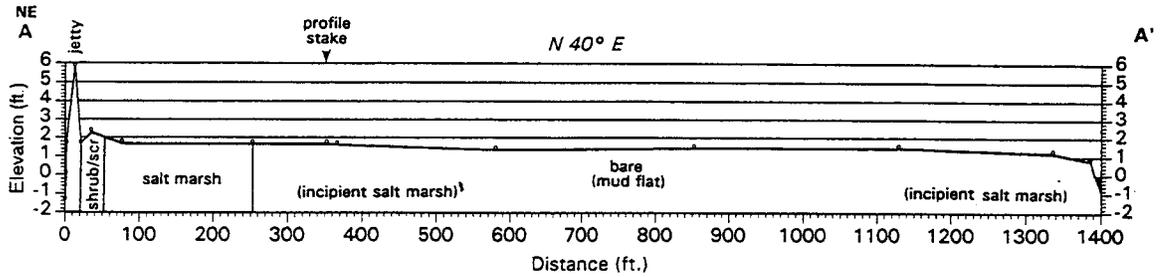
The peninsula was characteristically defined as a low relief tidal flat well colonized by saltmarsh. The surficial sedimentology of the peninsula is composed of tidalite type sediments (silty clays, with very fine quartz sand). The tidal amplitude of the area was defined by the evidence of tidal pools, mud crack polygons, and vegetation distribution.

**A**

**Mississippi River Gulf Outlet**

Jetty Site (MRGO-1.0)

May 16, 1995



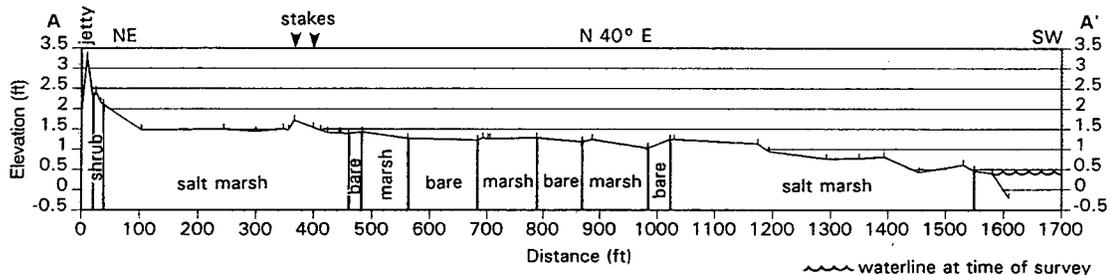
*Spartina alterniflora*  
*Iva frutescens*  
*Baccharis halimifolia*

**B**

**MISSISSIPPI RIVER GULF OUTLET**

USACE Site, MRGO Jetty (MRGO-1-0)

June 20, 1996



*Spartina alterniflora*  
*Borichia frutescens*  
*Iva frutescens*

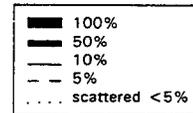
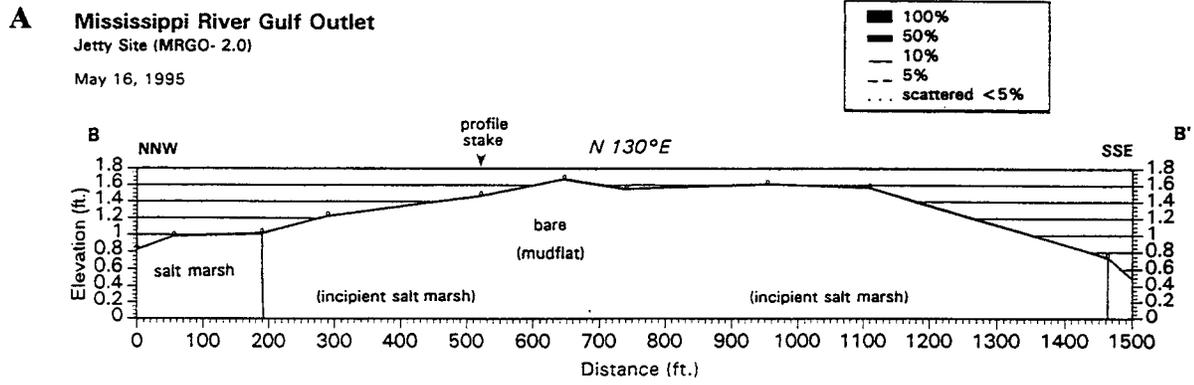
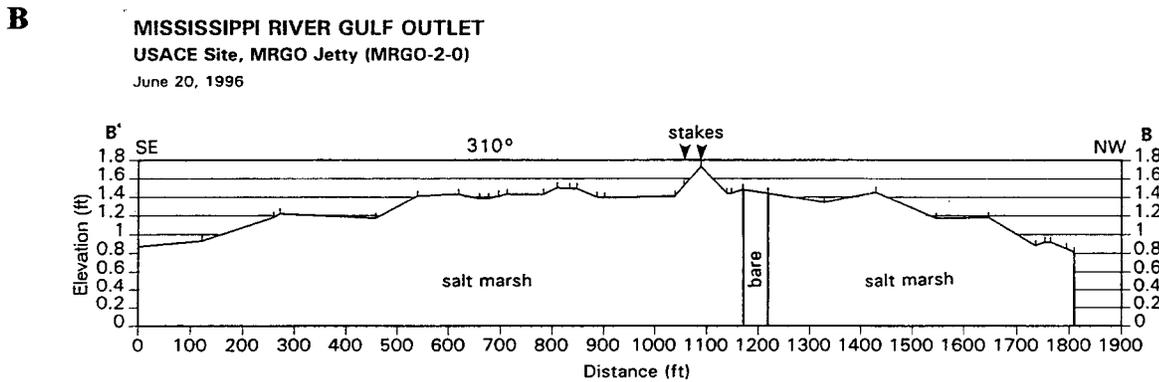
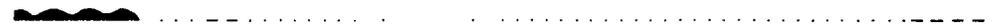


Figure 5.

A comparison between 1995 and 1996 data for the strike profile at stake 1.0 (A-A') at MRGO Jetties peninsula showing colonization of vegetation over a one-year period. A) 1995 elevation and vegetation data. B) 1996 elevation and vegetation data.



*Spartina alterniflora*



*Spartina alterniflora*



Figure 6. A comparison between 1995 and 1996 data for the dip profile at stake 2.0 (B-B') at MRGO Jetties peninsula showing colonization of vegetation over a one-year period. A) 1995 elevation and vegetation data. B) 1996 elevation and vegetation data.

### MRGO Jetties Pipeline

This transect was recorded from the nearshore water of Breton Sound, across the profile, and well into the marsh on the other side. The profile was 1050 feet in length. Maximum relief along the profile was found on the retaining levee on the north side of the pipeline of 5.7 feet, with an average relief of 1.64 feet (Figure 7). The pipeline area was characteristically defined as a low relief tidal flat, well colonized by saltmarsh. The surficial sedimentology of the area is composed of tidalite type sediments (silty clays, with very fine quartz sand).

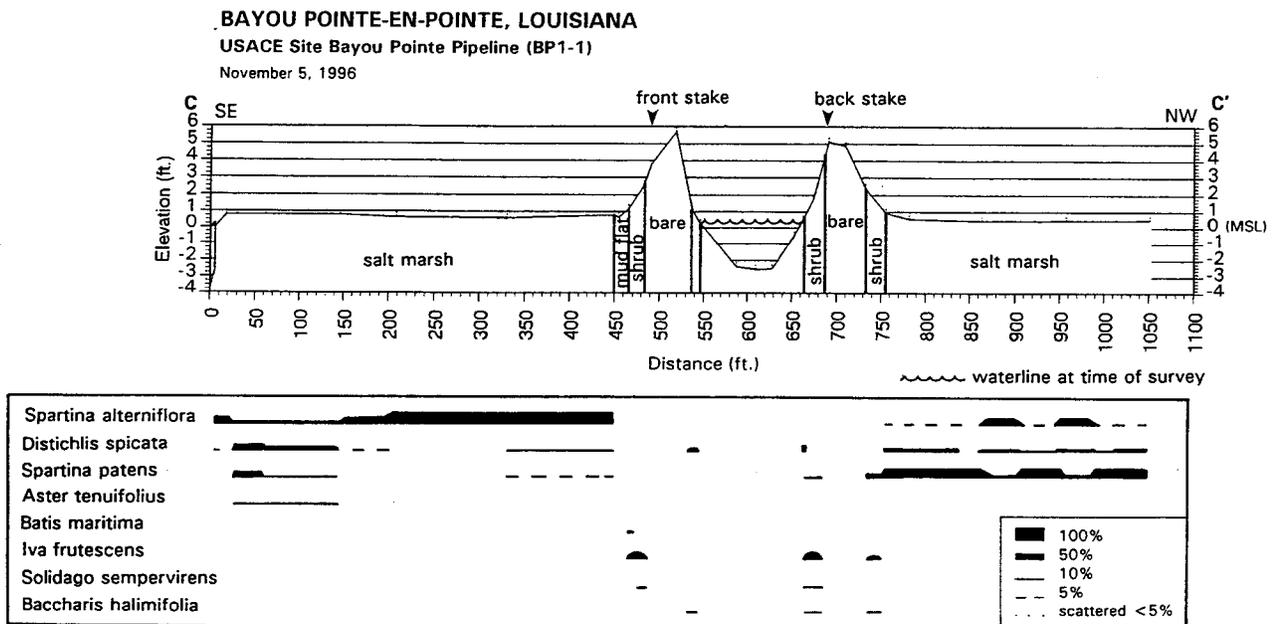


Figure 7. 1996 Elevation profile of MRGO-Jetties Pipeline near Bayou Pointe en Pointe with vegetation data illustrated.

## **Vegetative Character**

### **General Description**

The overall marsh type for this area would be classified as salt marsh. The only other vegetative habitat found at this site was a narrow shrub/scrub zone occupying a ridge near to and paralleling the jetty. The substrate was very soft, fine-grained silt and mud. This was a very active, high bird-use area.

The material deposited in the unconfined disposal area at Mile 20.5 was very successful in inducing saltmarsh colonization. However, much of the material deposited within the pipelines near Mile 27-28 appears to have been removed by tidal action and was shallow open water at the time of the transect.

### **Vegetative community types**

The salt marsh in the study area was represented exclusively by *Spartina alterniflora*, growing thickly throughout the mudflat area.

Shrub communities usually indicate older, more stable, elevated areas. The narrow shrub zone near the jetty was primarily 5-6 foot *Iva frutescens* with some *Baccharis halimifolia* and an understory of *Borrchia frutescens* and *Distichlis spicata*.

## GIS ANALYSIS RESULTS

### Shoreline Changes: 1985-1996

Figure 8 graphs the spatial history of the MRGO - Jetties BUMP study area between December 1985 and February 1995 shown in Table 1 and illustrated in figure 9. In December 1985, the jetties BUMP study area was measured at 2594.0 acres. The jetties area of the MRGO in November 1996 was measured at 2466.9 acres. This is an area decrease of - 127.1 acres or a decrease in area of 5 percent. Between 1985 and 1996, the rate of area lost was about -11.6 acres per year. Without the contribution of the new habitats due to the beneficial use of dredged material, the total coastal land loss in the study area would have exceeded 301.0 acres at a rate of -27.4 acres per year.

Between December 1985 and February 1995, the total area of the jetties area decreased by 120.2 acres at a rate of -127.1 acres per year for this - 11.6 year period. The primary areas of progradation took place along the south side of the jetty. Land loss was associated with the north side of the jetty, navigation channel margin, and the expansion of interior ponds.

Between February 1995 and November 1995, the study area decreased by 145.3 acres. Land gain occurred primarily in the beneficial use disposal areas. Land loss occurred throughout the study area.

Between November 1995 and November 1996, the area for this time period increased by +138.4 acres. Land gain occurred primarily in the beneficial use and other man-made disposal areas. Land loss occurred in isolated ponds in the study area.

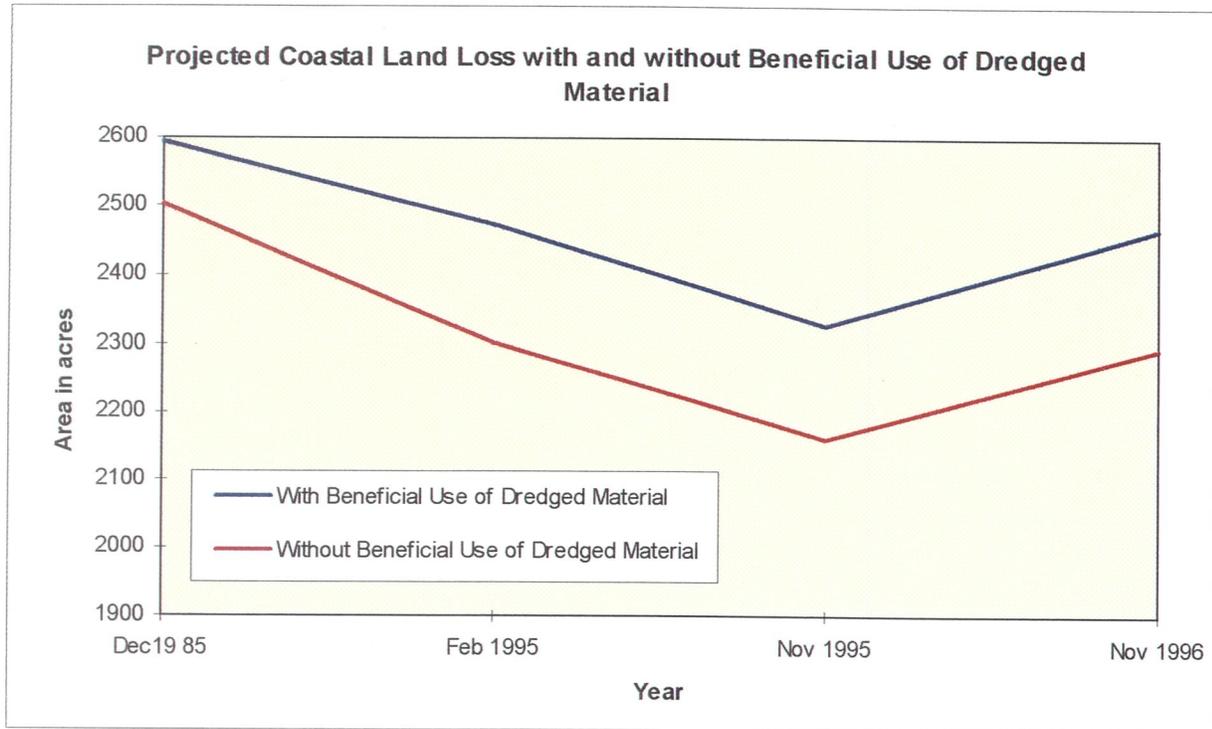


Figure 8. Graph of the area of the Mississippi River Gulf Outlet - Jetties BUMP study area over time, with and without the placement of dredged material.

**TABLE 1**  
**MRGO- Jetties Area: 1985-1996**

Area in acres	Dec 1985	Feb 1995	Nov 1995	Nov 1996
Natural Areas	2211.5	2035.7	2019.4	2015.8
Other Man-made Areas	291.3	268.6	142.1	277.2
BUMP-made Areas	91.2	169.5	167.0	173.9
	2594.0	2473.8	2328.5	2466.9

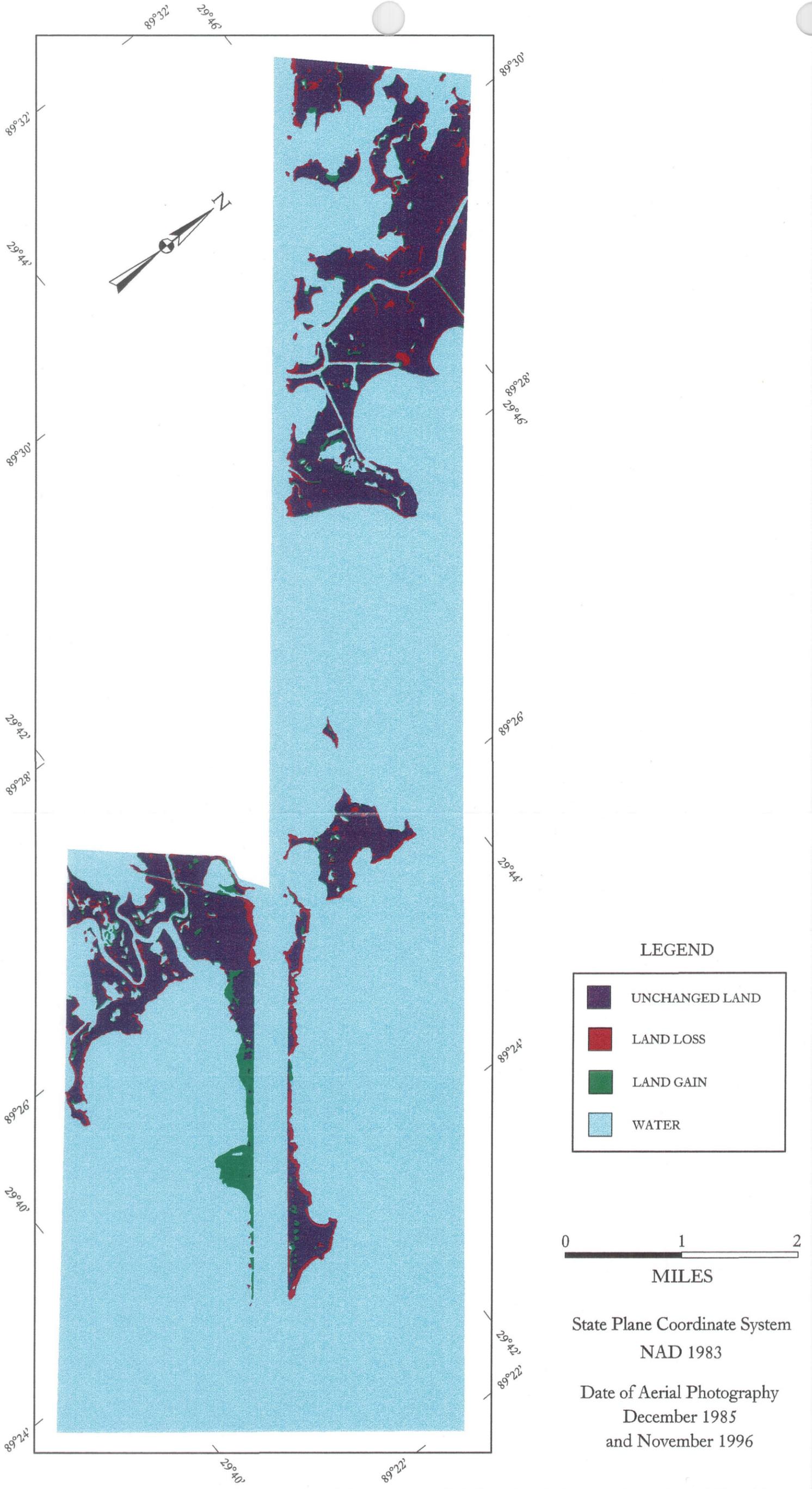


Figure 9. Shoreline changes of the Mississippi River Gulf Outlet - Jetties BUMP study area between December 1985 and November 1996.

## Habitat Inventory

The aerial photographic interpretation combined with field surveys identified six major habitat types in the MRGO - Jetties BUMP study area. These habitats are further classified as natural and man-made. The natural class identifies natural deltaic processes as responsible for habitat creation. The BUMP man-made (BUMP-made) class identifies the habitats created by the placement of dredged material. The Non-BUMP man-made class (other-made) separates areas created that were not part of the BUMP effort, such as areas created in association with the oil industry access and pipeline canals. On the habitat maps presented in this report, an intertidal class is included to indicate nearshore topography. Because the seaward extent of these areas is not clearly defined, the area of this class is not calculated or included in the inventory.

Table 2 lists the areas of the five habitat types found in the MRGO - Jetties BUMP study area in December 1985. The location and arrangement of these habitats is presented in figure 10. The total area of the MRGO jetties site was 2594 acres. Of this total, 2211.5 acres were natural and 382.5 acres were other-made including 91.2 acres of BUMP-made and 291.3 acres of other-made or 85 percent were natural, 4 percent were BUMP-made and 11 percent were other-made. In order of decreasing size and importance, the largest habitat found was natural marsh (2088.0 acres) followed by other-made marsh (157.5 acres), natural upland (104.5 acres), other-made shrub/scrub (67.6 acres), other-made upland (42.3 acres), BUMP-made bare land (39.3 acres), BUMP-made marsh (35.8 acres), natural beach (18.4 acres), other-made beach (15.0 acres), BUMP-made beach (9.3 acres), other-made bare land (8.9 acres), BUMP-made upland (6.8 acres), and natural bare land (0.6 acres). The December 1985 MRGO - Jetties inventory did not delineate any natural or BUMP-made shrub/scrub habitat areas.

In terms of habitat totals, marsh (2281.3 acres) dominated the MRGO - Jetties landscape.

**TABLE 2**  
**December 1985 Habitat Inventory of the MRGO-Jetties BUMP Study Area**

HABITAT	TOTAL	NATURAL	OTHER MAN-MADE	BUMP MAN-MADE
Marsh	2281.3	2088.0	157.5	35.8
Upland	153.6	104.5	42.3	6.8
Shrub/Scrub	67.6	0.0	67.6	0.0
Bare Land	48.8	0.6	8.9	39.3
Beach	42.7	18.4	15.0	9.3
<b>Habitat Total</b>	<b>2594.0</b>	<b>2211.5</b>	<b>291.3</b>	<b>91.2</b>

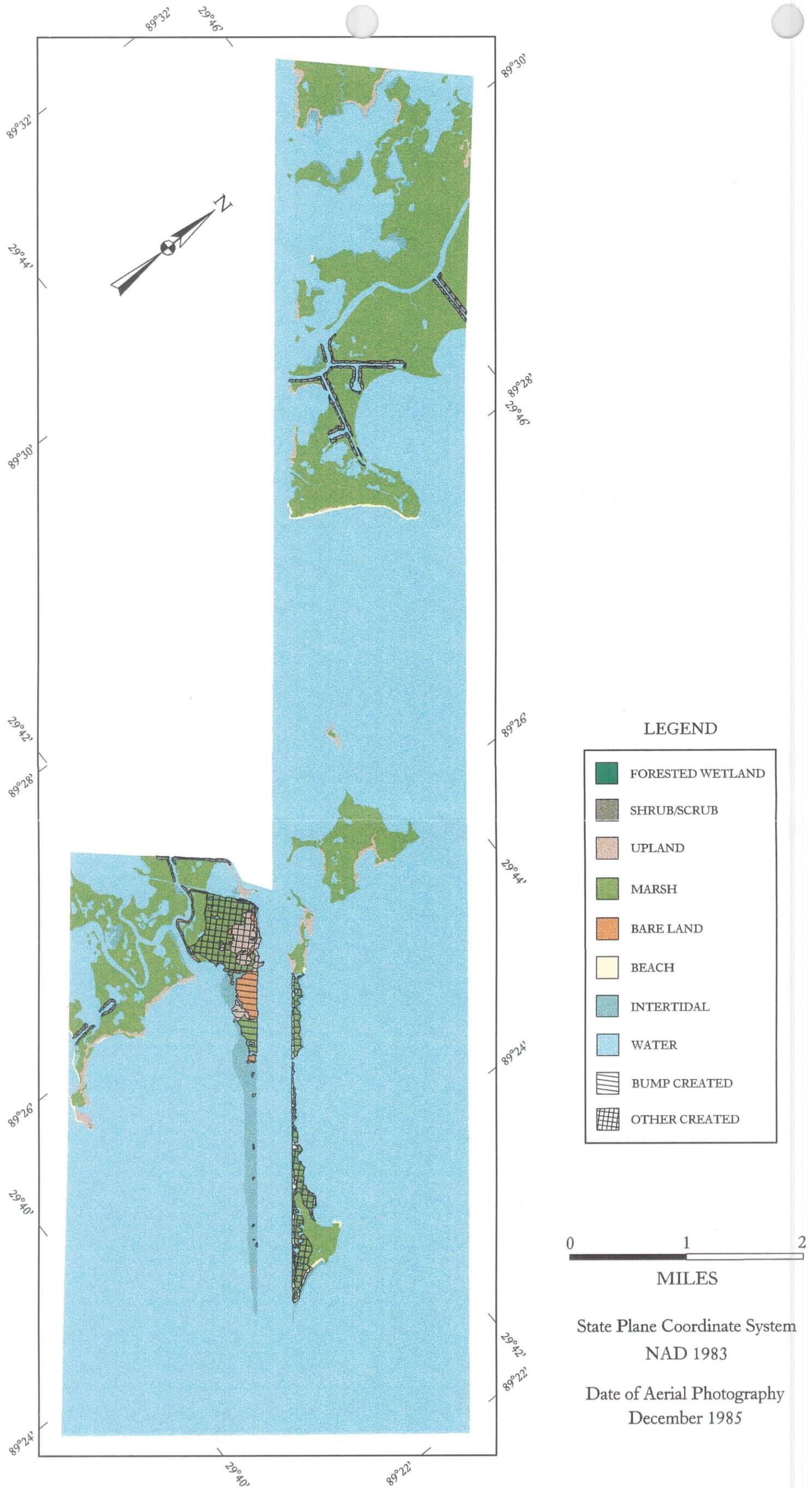


Figure 10. Habitat inventory map of the Mississippi River Gulf Outlet - Jetties BUMP study area in December 1985.

Table 3 lists the areas of the five habitats found in the Mississippi River Gulf Outlet - Jetties BUMP study area in February 1995. The location and arrangement of these habitats is presented in figure 11. In February 1995, the total area of the MRGO - Jetties BUMP study area was calculated at 2473.8 acres. Of this total, 2035.7 acres were natural and 438.1 acres were man-made including 169.5 acres BUMP-made and 268.6 acres other-made, or 82 percent was natural, 7 percent was BUMP-made and 11 percent was other-made. In order of decreasing size and importance, the largest habitat found is natural marsh (1826.3 acres) followed by natural upland (173.9 acres), other-made marsh (146.3 acres), BUMP-made marsh (103.2 acres), other-made shrub/scrub (94.3 acres), BUMP-made bare land (39.6 acres), natural beach (26.5 acres), BUMP-made shrub/scrub (14.3 acres), other-made beach (11.5 acres), other-made bare land (10.4 acres), BUMP-made beach (7.2 acres), other-made upland (6.1 acres), natural bare land (5.5 acres), and BUMP-made upland (5.2 acres).

In terms of total area, marsh (2075.8 acres) dominated the landscape of the MRGO - Jetties BUMP study area.

**TABLE 3**  
**February 1995 Habitat Inventory of the MRGO-Jetties BUMP Study Area**

HABITAT	TOTAL	NATURAL	OTHER MAN-MADE	BUMP MAN-MADE
Marsh	2075.8	1826.3	146.3	103.2
Upland	185.2	173.9	6.1	5.2
Shrub/Scrub	112.1	3.5	94.3	14.3
Bare Land	55.5	5.5	10.4	39.6
Beach	45.2	26.5	11.5	7.2
<b>Habitat Total</b>	<b>2473.8</b>	<b>2035.7</b>	<b>268.6</b>	<b>169.5</b>



Table 4 lists the areas of the five habitats found in the Mississippi River Gulf Outlet - Jetties BUMP study area in November 1995. The location and arrangement of these habitats is presented in figure 12. In November 1995, the total area of the MRGO - Jetties BUMP study area was calculated at 2328.5 acres. Of this total, 2019.4 acres were natural and 309.1 acres were man-made including 167.0 acres BUMP-made and 142.1 acres other-made, or 88 percent was natural, 6 percent was BUMP-made and 6 percent was other-made.

In order of decreasing size and importance, the largest habitat found is natural marsh (1787.0 acres) followed by natural upland (223.5 acres), BUMP-made (130.2 acres), other-made marsh (118.7 acres), BUMP-made beach (22.0 acres), other-made beach (17.7 acres), natural bare land (8.9 acres), BUMP-made shrub/scrub (7.9 acres), BUMP-made bare land (6.9 acres) and other-made bare land (5.7 acres). The November 1995 MRGO inventory did not delineate any other-made or BUMP-made upland habitat, natural or other-made shrub/scrub, or natural beach habitat areas.

In terms of total area, marsh (2035.9 acres) dominated the landscape of the MRGO - Jetties BUMP study area.

**TABLE 4**  
**November 1995 Habitat Inventory of the MRGO-Jetties BUMP Study Area**

HABITAT	TOTAL	NATURAL	OTHER MAN-MADE	BUMP MAN-MADE
Marsh	2035.9	1787.0	118.7	130.2
Upland	223.5	223.5	0	0
Shrub/Scrub	7.9	0	0	7.9
Bare Land	21.5	8.9	5.7	6.9
Beach	39.7	0	17.7	22.0
<b>Habitat Total</b>	<b>2328.5</b>	<b>2019.4</b>	<b>142.1</b>	<b>167.0</b>

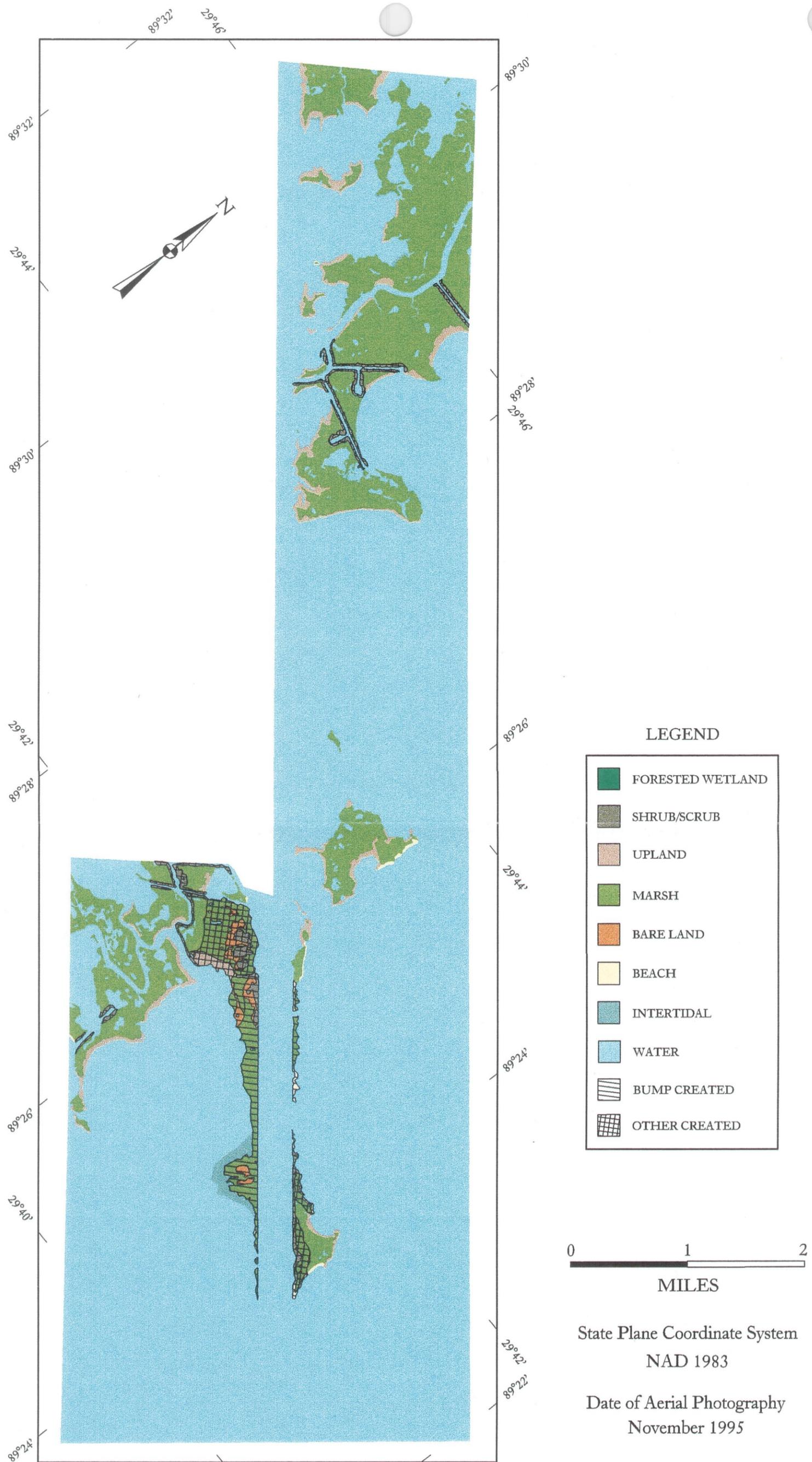


Figure 12. Habitat inventory map of the Mississippi River Gulf Outlet - Jetties BUMP study area in November 1995.

Table 5 lists the areas of the five habitats found in the Mississippi River Gulf Outlet - Jetties BUMP study area in November 1996. The location and arrangement of these habitats is presented in figure 13. In 1996, the total area of the MRGO - Jetties BUMP study area was calculated at 2466.9 acres. Of this total, 2015.8 acres were natural and 451.1 acres were man-made including 173.9 acres BUMP-made and 277.2 acres other-made, or 82 percent was natural, 7 percent was BUMP-made and 11 percent was other-made.

In order of decreasing size and importance, the largest habitat found is natural marsh (1774.0 acres) followed by natural upland (227.3 acres), BUMP-made marsh (136.4 acres), other-made marsh (118.7 acres), other-made shrub/scrub (93.4 acres), other-made beach (38.0 acres), BUMP-made beach (20.1 acres), other-made upland (20.0 acres), natural beach (10.2 acres), BUMP-made bare land (9.5 acres), BUMP-made shrub/scrub (7.9 acres), and natural bare land (4.3 acres). The November 1996 inventory did not delineate any BUMP-made upland or natural shrub/scrub habitat areas.

In terms of total area, marsh (2029.1 acres) dominated the landscape of the MRGO - Jetties BUMP study area.

**TABLE 5**  
**November 1996 Habitat Inventory of the MRGO-Jetties BUMP Study Area**

HABITAT	TOTAL	NATURAL	OTHER MAN-MADE	BUMP MAN-MADE
Marsh	2029.1	1774.0	118.7	136.4
Upland	247.3	227.3	20.0	0.0
Shrub/Scrub	101.3	0.0	93.4	7.9
Bare Land	20.9	4.3	7.1	9.5
Beach	68.3	10.2	38.0	20.1
Habitat Total	2466.9	2015.8	277.2	173.9

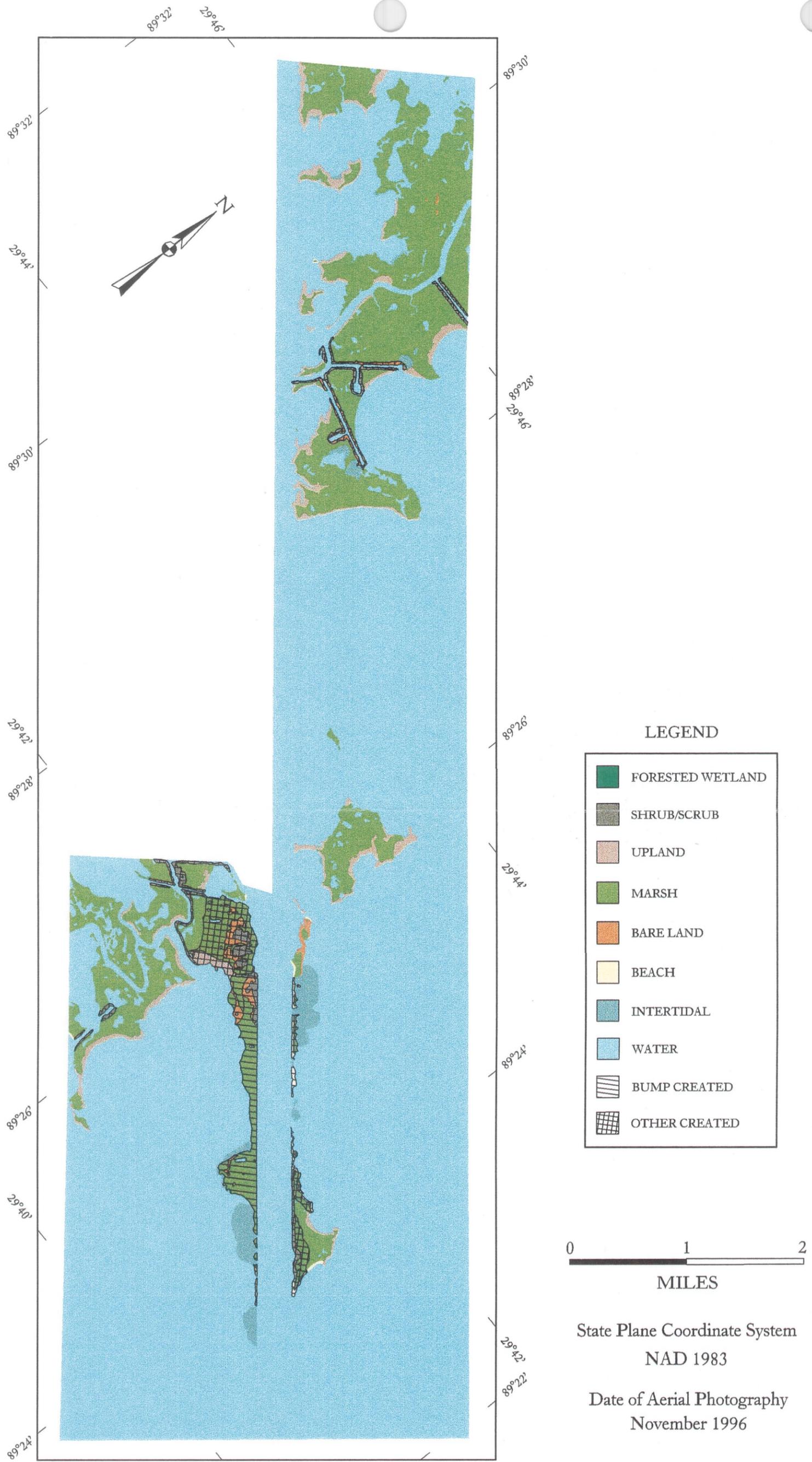


Figure 13. Habitat inventory map of the Mississippi River Gulf Outlet - Jetties BUMP study area in November 1996.

## **Habitat Change**

Figure 14 shows the creation of new habitat, both natural and man-made, along the MRGO - Jetties BUMP study area by comparing December 1985 and November 1996. Land loss dominates the natural processes of this area. The total area decreased by -127.1 acres which represents a -5 percent decrease in area between 1985 and 1996. There was an overall decrease of -195.7 acres of the natural habitats and a decrease of -14.1 acres in other-made habitats, offset by an overall +82.7 acres of increase in man-made habitats due to the placement of dredged materials. Table 6 lists the major habitat changes during the period between December 1985 and November 1996.

The major habitat-change was the cumulative decrease by natural processes of natural marsh (-314.0 acres). In terms of the beneficial use process, the greatest areas of new habitat creation include BUMP-made marsh (+100.6 acres), BUMP-made beach (+10.7 acres), and BUMP-made shrub/scrub (+7.9 acres).

Figure 15 shows a time series of habitat changes along the MRGO- Jetties BUMP study area. 15A graphs the natural habitat changes over time. Natural marsh erosion dominates the natural habitat class. 15B graphs the man-made habitat changes. Marsh creation by beneficial use of dredged material dominates the man-made class.

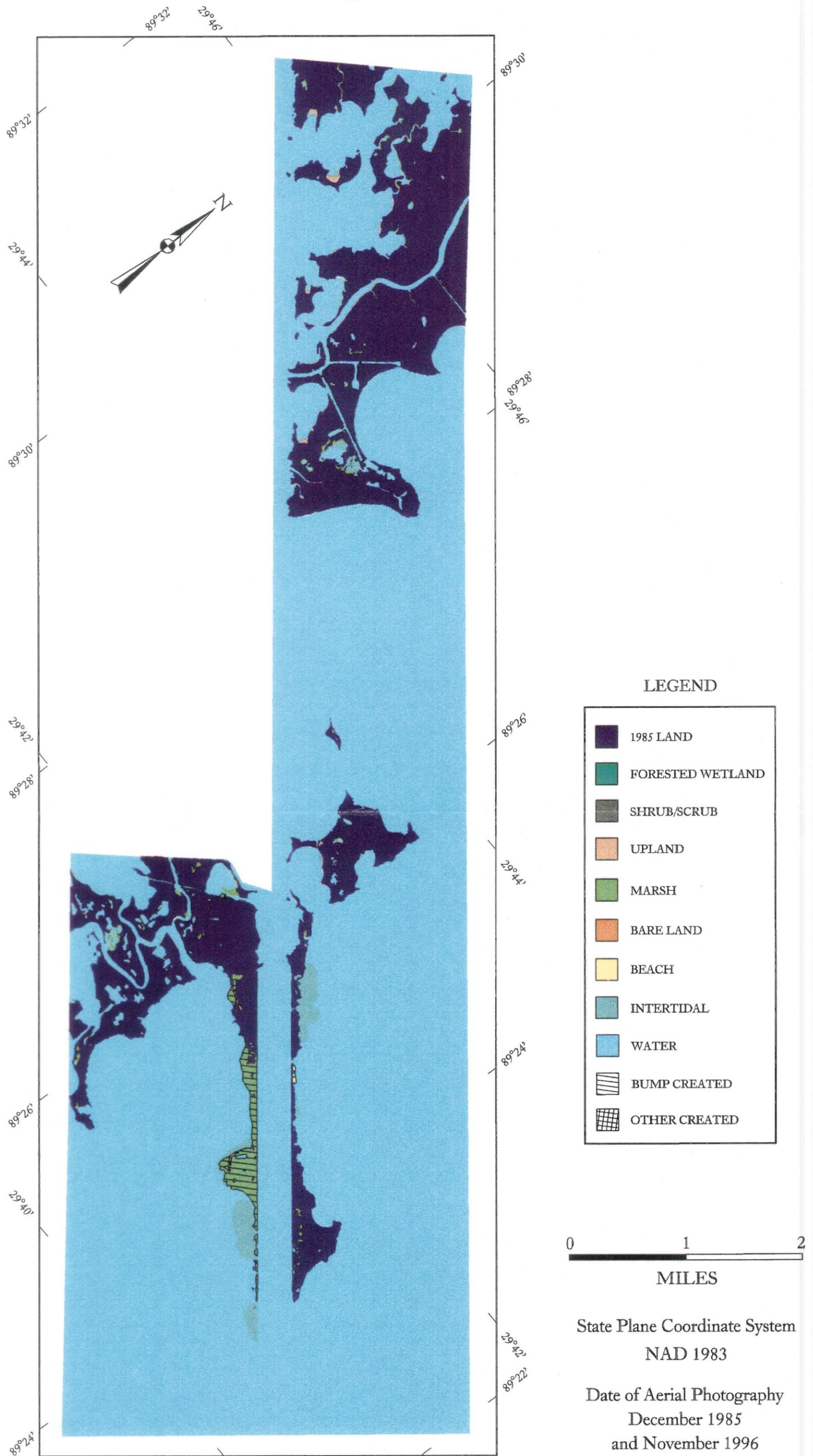


Figure 14. Map of the Mississippi River Gulf Outlet - Jetties BUMP study area showing the new habitats created by beneficial use of dredged materials or formed by natural processes between December 1985 and November 1996.

**TABLE 6**  
**Change in Total Acres of each Habitat**  
**in the MRGO-Jetties BUMP Study Area between 1985 and 1996**

HABITAT	Dec 1985- Feb 1995 <sup>1</sup>	Feb 1995- Nov 1995 <sup>1</sup>	Nov 1995- Nov 1996 <sup>1</sup>	Dec 1985- Nov 1996 <sup>1</sup>
Natural Marsh	-261.7	-39.3	-13.0	-314.0
Natural Upland	+69.4	+49.6	+3.8	+122.8
Natural Shrub/Scrub	+3.5	-3.5	0.0	0.0
Natural Bare Land	+4.9	+3.4	-4.6	+3.7
Natural Beach	+8.1	-26.5	+10.2	-8.2
<b>Total Natural Habitats</b>	<b>-175.8</b>	<b>-16.3</b>	<b>-3.6</b>	<b>-195.7</b>
Other Man-made Marsh	-11.2	-27.6	0.0	-38.8
Other Man-made Upland	-36.2	-6.1	+20.0	-22.3
Other Man-made Shrub/Scrub	+26.7	-94.3	+93.4	+25.8
Other Man-made Bare Land	+1.5	-4.7	+1.4	-1.8
Other Man-made Beach	-3.5	+6.2	+20.3	+20.3
<b>Total Other Man-made Habitats</b>	<b>-22.7</b>	<b>-126.5</b>	<b>+135.1</b>	<b>-14.1</b>
BUMP-made Marsh	+67.6	+27.0	+6.2	+100.8
BUMP-made Upland	-1.7	-5.2	0.0	-6.9
BUMP-made Shrub/scrub	+14.3	-6.4	0.0	+7.9
BUMP-made Bare Land	+0.3	-32.7	+2.6	-29.8
BUMP-made Beach	-2.2	-14.8	-1.9	+10.7
<b>Total BUMP-made Habitats</b>	<b>+78.3</b>	<b>-2.5</b>	<b>+6.9</b>	<b>+82.7</b>
<b>HABITAT TOTAL</b>	<b>-120.2</b>	<b>-145.3</b>	<b>+138.4</b>	<b>-127.1</b>

<sup>1</sup> in acres

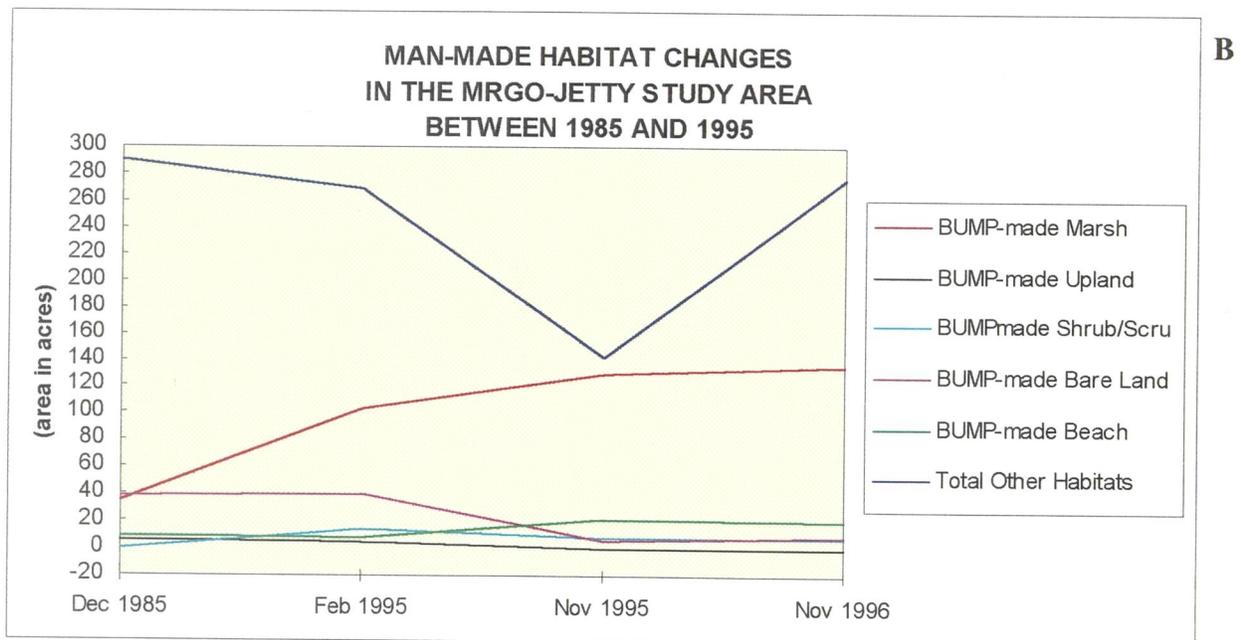
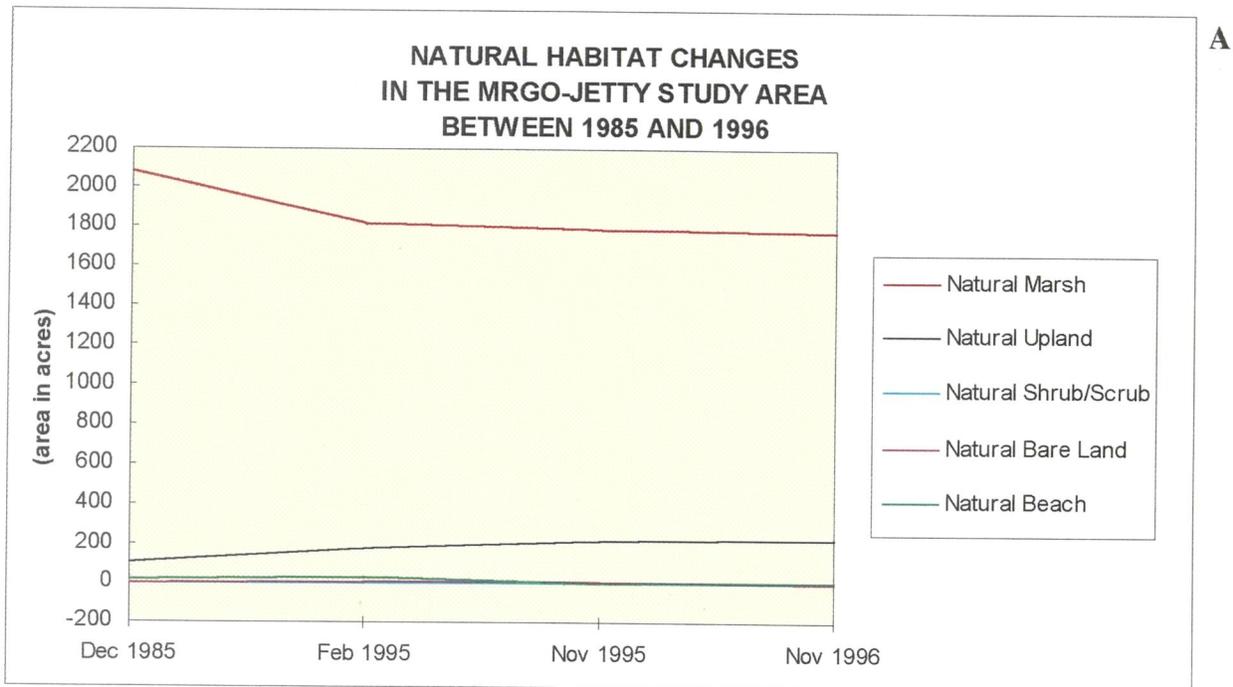


Figure 15. Time series showing the changes in total area of each habitat in the MRGO - Jetties BUMP study area between December 1985 and November 1996. A) natural habitat changes. B) man-made habitat changes.

## CONCLUSIONS

1. The total area of the MRGO - Jetties BUMP study area in December 1985 was 2594.0 acres. Natural processes accounted for 2211.5 acres or 85 percent of the total area. Man-made processes related to beneficial use of dredged material accounted for +91.2 acres or 4 percent of the total area. Other man-made area accounted for 291.3 acres or 11 percent of the study area.
2. The total area of the MRGO - Jetties BUMP study area in November 1996 was 2466.9 acres. Natural processes accounted for 2015.8 acres or 82 percent of the total area. Man-made processes related to the beneficial use of dredged material accounted for 173.9 acres or 7 percent of the total area. Other man-made areas accounted for 277.2 acres or 11 percent of the study area.
3. The MRGO - Jetties BUMP study area decreased by -127.1 acres between December 1985 and November 1996. Natural processes were responsible for -195.7 acres of decrease and the beneficial use of dredged material was responsible for +82.7 acres of increase.
4. Natural processes are responsible for eroding the marsh. Beneficial use of dredged material appears to be effective in creating a variety of habitats including beach, shrub/scrub, bare land, and marsh.
5. The field surveys indicate the current stacking heights are optimal for creating marsh and to a lesser extent shrub/scrub. The optimal elevation for marsh creation appears to be less than +2 feet MSL (+2.78 feet MLG).
6. At the MRGO - Jetties BUMP study area, the beneficial use of dredged material created +82.7 acres of new habitat between December 1985 and November 1996. This total includes: +100.8 acres of marsh, +7.9 acres of shrub/scrub, and +10.7 acres of beach. In contrast, BUMP related upland decreased by -6.8 acres and beach by -29.8 acres.
7. Within the MRGO - Jetties BUMP study area, the beneficial use of dredged material reduced the amount of coastal land loss by 39 percent.

**APPENDIX 3A**

**LIST OF VEGETATIVE SPECIES  
IN THE MISSISSIPPI RIVER GULF OUTLET - JETTIES**

**LIST OF VEGETATIVE SPECIES  
IN THE MISSISSIPPI RIVER GULF OUTLET - JETTIES**

An alphabetical list of observed and collected plant species follows. This list is not complete, but is meant to establish vegetative character and indicate dominant species observed. The list includes the species name, alternate scientific names, common names, and general habitat description for each plant. The habitat information was taken from the Manual of the Vascular Flora of the Carolinas or The Smithsonian Guide to Seaside Plants of the Gulf and Atlantic Coasts.

<b>Aster tenuifolius</b> L. . . . .	perennial saltmarsh perennial; fresh to brackish marsh aster
<b>Baccharis halimifolia</b> L. . . . .	Groundselbush shrub; elevated sites in fresh to saline marshes
<b>Batis maritima</b> L. . . . .	Saltwort succulent subshrub; salt marshes, salt flats, brackish marshes, muddy seashores, drift zones
<b>Borrichia frutescens</b> (L.) . . . . .	sea ox-eye rhizomatous shrub; brackish marsh or upper zones of salt marsh
<b>Distichlis spicata</b> (L.) Greene . . . . .	salt grass rhizomatous perennial; brackish marshes and flats
<b>Iva frutescens</b> L. . . . .	marsh elder shrub; brackish marshes, upper zones of salt marsh
<b>Solidago sempervirens</b> L. . . . .	seaside goldenrod perennial; brackish marsh or saline sand
<b>Spartina alterniflora</b> Loisel. . . . .	oyster grass rhizomatous perennial; salt and brackish marshes
<b>Spartina patens</b> (Aiton) Muhl. . . . .	marsh hay cordgrass rhizomatous perennial; brackish marsh, low dunes, sand flats