

**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
MERMENTAU RIVER, LA
Through FY 2000

The purpose of the Mermentau River, Louisiana project is to improve the discharge of flood flow in lower Mermentau River below Grand Lake and in the Inland Waterway from Vermilion Bay to Grand Lake; to improve navigation by enlargement of the North Prong of Schooner Bayou and Schooner Bayou Cutoff; and to maintain a navigational channel from Grand Chenier, Louisiana to the Gulf of Mexico, via the Lower Mermentau River, by removing bottom sediments with a hydraulic cutterhead dredge.

The Flood Control Act of 1941, as modified by the Rivers and Harbors Act of 1946, authorized enlargement of the Lower Mermentau River below Grand Lake to a minimum cross sectional area of 3,000 square feet below Mean Low Gulf (MLG) to accommodate discharge of flood flows; construction of a sector gated control structure in Mermentau River at Catfish Point, Mile 24; channel enlargement and realignment of the Inland Waterway from Vermilion Bay to Grand Lake to provide a minimum cross-sectional area of 3,000 square feet below Mean Low Gulf for discharge of flood flows and interflow between lakes; construction of a sector gated control structure in the enlarged channel near Schooner Bayou Lock; enlargement of the North Prong of Schooner Bayou and the Schooner Bayou Cut-off to a channel 6 by 60 feet at Mean Low Gulf level for navigation purposes. The Act further provides for incorporation into the Mermentau River, Louisiana Project, the existing projects: "Waterway for White Lake to Pecan Island, Louisiana" and that part of the "Inland Waterway from Franklin, Louisiana to the Mermentau River," west of Vermilion Bay. The Waterway from "White Lake to Pecan Island" consists of a channel 5 by 40 feet at Mean Low Gulf level.

The project was reclassified as an "Operation and Maintenance, General" project under the category, "Navigation (locks, dams, reservoirs and canals)" by authority of the Office, Chief of Engineers, in 1st Endorsement, 23 April 1956, on letter of the Division Engineer, U.S. Army Engineer Division, Lower Mississippi Valley, 6 March 1956, subject, "Classification of the Mermentau River and Bayou Teche and Vermilion River, Operation and Maintenance, General Projects."

A 4.6-mile channel from Grand Chenier to the Gulf of Mexico, described as "the Mermentau River, Gulf of Mexico Navigation Channel, LA, project," was constructed in 1971 by the East Cameron Port, Harbor, and Terminal District of Cameron Parish. Federal assumption of maintenance of this locally-constructed channel by USACE-NOD was authorized by Congress in 1976, under the Water Resources Development Act of 1976 (Public Law 94-587). Its point of entry is from the Mermentau River into Lower Mud Lake and extends in a southerly direction to the Gulf of Mexico.

The Mermentau River, Gulf of Mexico Navigation Channel, LA is maintained to a depth of -15.0 feet MLG over a width of 200 feet in the jetty and bar channel segments (from Mile 3.1 to Mile 1.2), and to a width of 100 feet in the inland segment from Grand Chenier at Mile 6.5 to the Gulf at Mile 3.1.

Usually about 1,000,000 cubic yards of material is removed from the Mile 6.5 to Mile 1.2 reach by cutterhead dredge every 3 to 4 years; the most recent dredging event occurred in late fall of 2000. The resultant dredged material is used to create wetlands in Lower Mud Lake and to attempt beach nourishment adjacent to the existing shoreline and west jetty. Until 1997, dredged material from the Gulf reach (Mile 3.1 to Mile 1.2) was placed in the Ocean Dredged Material Disposal Site (ODMDS) located on the right-descending bank of the bar channel.

History of Maintenance Dredging Events with a Beneficial Use Component

From November, 1962 through June, 1963, about 2,222,902 cubic yards of material were dredged from the Mermentau River from Mile -0.7 at the mouth of the Mermentau River in Vermilion Bay and to about Mile 13.0 of the waterway. Most of the material was placed in upland/confined disposal areas on either bank. However, at around Mile 6.5 in an area 1000 feet south of and parallel to the centerline of the channel, dredged material was placed in the upper part of Lower Mud Lake at a surface elevation not exceeding +3.0 feet MLG (Figure 14A). This could be considered the first example of beneficial use of dredged material for this waterway though likely unintentional. Due to the silty nature of the material, it probably would not stack any higher and settled to an elevation that encouraged wetland development for at least some time before erosion took its toll. At this time, the Mermentau River channel extended through the original mouth of the Mermentau River to the Gulf.

During FY 1982 (January 6 through February 21, 1982), USACE-NOD performed maintenance dredging of the “new” navigational channel from about Mile 6.2 at Grand Chenier through Mile 1.2 in the Gulf of Mexico (GOM). It was dredged by a hydraulic dredge and the dredged material was placed in one of three locations: an area about 500 yards west of the channel centerline in Lower Mud Lake at an elevation not to exceed +5.0 feet MLG in an effort to create marsh; in a confined disposal area on the east bank of the channel just north of the GOM shore; and in the ODMDS.

During FY 1985 (January 8 through January 27, 1985), maintenance of the Mile 6.2 to Mile 1.2 reach of the channel took place again. Approximately 724,000 cubic yards were removed from the channel and placed in the following designated disposal areas: the Lower Mud Lake disposal area west of the channel with the maximum elevation specified to not exceed +5.0 feet MLG; the ODMDS; and a new area identified as a “shoreline restoration area” in the near open waters west of the west jetty. High tidal energy in the last disposal area prevented subaerial accumulation of material.

The next maintenance event occurred during FY 1986 (March 15 - June 10, 1986), and extended from Mile 6.2 to about Mile 24.0 of the Mermentau River (not within study area). Most of the material was placed in confined disposal areas (dike height elevations ranging from +3.0 to +5.0 feet MLG) on either side of the waterway. Efforts were undertaken to create a bird island 2 to 3 acres in size in open water in the southern part of Upper Mud Lake. Due to the very soft nature of the dredged material, an island only one-half acre in size could be created, with a maximum height of +4.3 feet MLG. Tide elevation of +3.0 feet MLG rendered approximately 2000 square feet of subaerial island area.

During FY 1987 (June 22 through July 16, 1987), a cutterhead dredge removed material from Mile 6.2 to the GOM reach. All dredged material was placed in the same three disposal areas west of the channel used in 1985. The only difference in disposal was that the dredged material placed in the shoreline restoration areas was deposited at a minimum distance of 500 feet west of the existing jetty.

The next maintenance dredging event for this Mile 6.2 to GOM reach occurred during FY 1991 (April 29 through June 10, 1991). Material removed by cutterhead dredges was placed unconfined in the same disposal locations as happened in the 1987 maintenance event except that no material was placed in the ODMDS. About 390,000 cubic yards of dredged material normally placed in the ODMDS was placed in the lower southeast corner of the Lower Mud Lake disposal area, with a final average fill height of +3.5 feet MLG. No cubic yardage amounts were available for the disposal into the upper part of the Lower Mud Lake disposal area or into the shoreline restoration area. Elevation of dredged material in the shoreline restoration averaged about +4 to +4.5 feet MLG along the beachline. In this particular disposal area, dredged material was initially placed about 250 to 300 feet from the existing shoreline creating a “bar” and then material was placed in the area between the “bar” and the existing shoreline, with some material overflowing the “bar” gulfward by about 200 feet. The entire disposal area extended westerly for approximately 300 feet.

During FY 1996 (April 10, 1996 through May 22, 1996), dredged material from maintenance of the Mile 6.5 to Mile 1.2 reach was placed into the Lower Mud Lake disposal area which was subdivided into “Cell A” and “Cell B”; into the shoreline restoration area; and into the ODMDS. Cell A received approximately 234,778 cubic yards of dredged material while Cell B received about 172,362 cubic yards of material (the dredged material height did not exceed +4.0 feet MLG in either area). The shoreline restoration area and ODMDS received about 355,799 and 272,496 cubic yards of material, respectively. Dike work was required for this maintenance event prior to disposal in Lower Mud Lake. Dikes on the channel side of the Lower Mud Lake disposal areas were built to a surface elevation of +6.0 feet to prevent backflow of dredged material into the channel. The dikes constructed to contain the dredged material within the disposal cells were limited to a surface elevation of +4.0 feet MLG, and dredged material disposal surface heights in Cells A and B were restricted to +4.0 feet MLG.

The next maintenance dredging event for this reach occurred during FY 2000 (September 26, 2000 - November 9, 2000). Hydraulically removed dredged material was placed for beneficial use into the Lower Mud Lake disposal area (509,104 cubic yards) and into the shoreline restoration area (829,000 cubic yards). The Lower Mud Lake disposal area was divided into two areas, one on each side of a small channel leading from the navigational channel into Lower Mud Lake. Dike work was done to confine dredged material in the disposal area located on the south side of the small channel. The elevation of the containment dike was +4.0 feet MLG and the dredged material surface elevation was also restricted to +4.0 feet MLG. The average height of the dredged material in the shoreline restoration area was about +3.0 feet MLG with most of the buildup occurring near the jetty closure and along the shoreline.

Figure 14A illustrates the dredged material disposal history for the study area in detail between FY 1963 and FY 1987. Figure 14B illustrates the more recent dredged material disposal history up to

FY 2000, showing FY 1991 through FY 2000 disposal in detail.

Mermentau River, Louisiana Dredged Material Disposal History FY 1963 through FY 1987

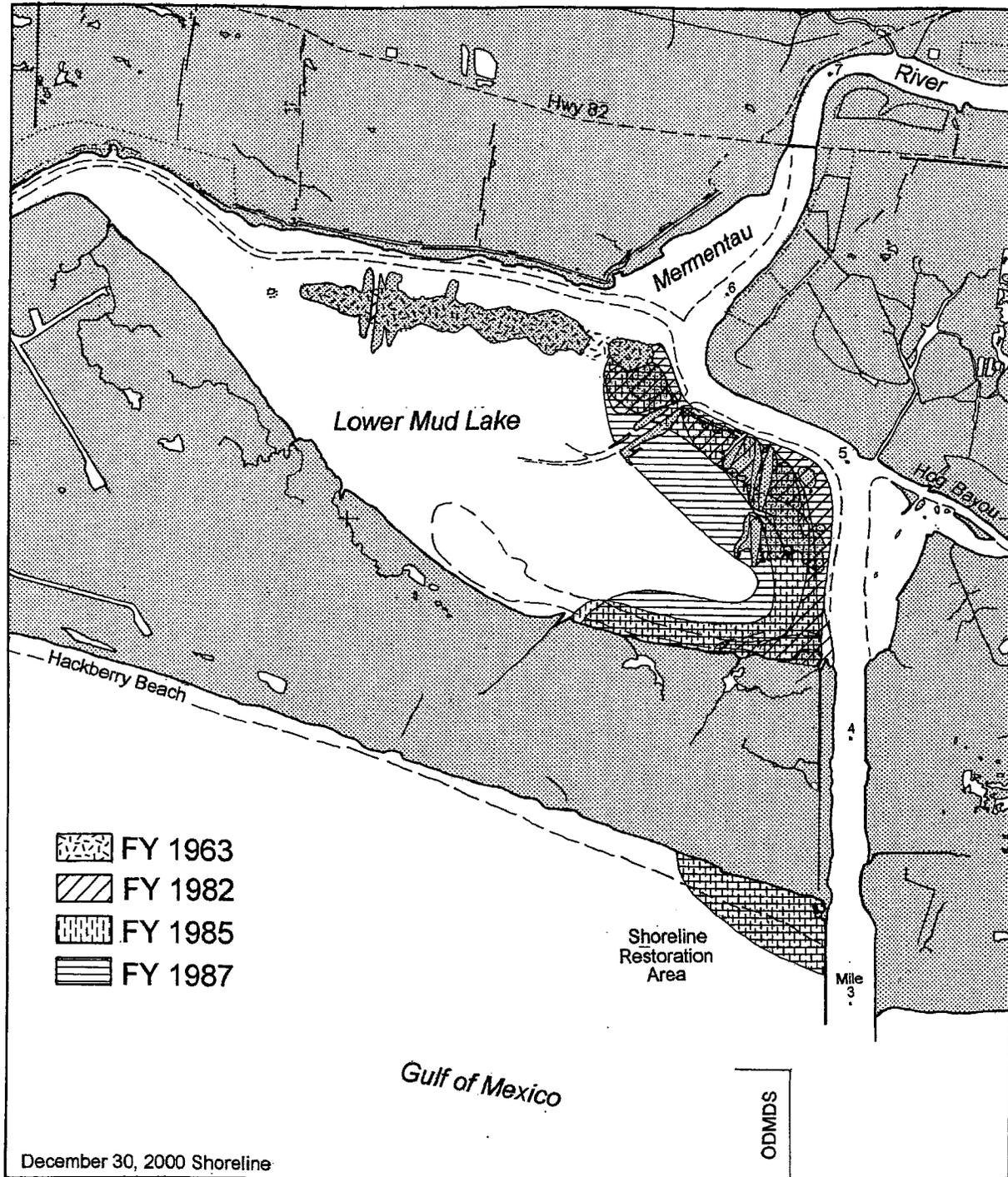


Figure 14A. The dredged material disposal history for the Mermentau River, La. BUMP study area, showing disposal through FY 1987. More recent disposal is detailed on the following figure.

Mermentau River, Louisiana Dredged Material Disposal History Through FY 2000

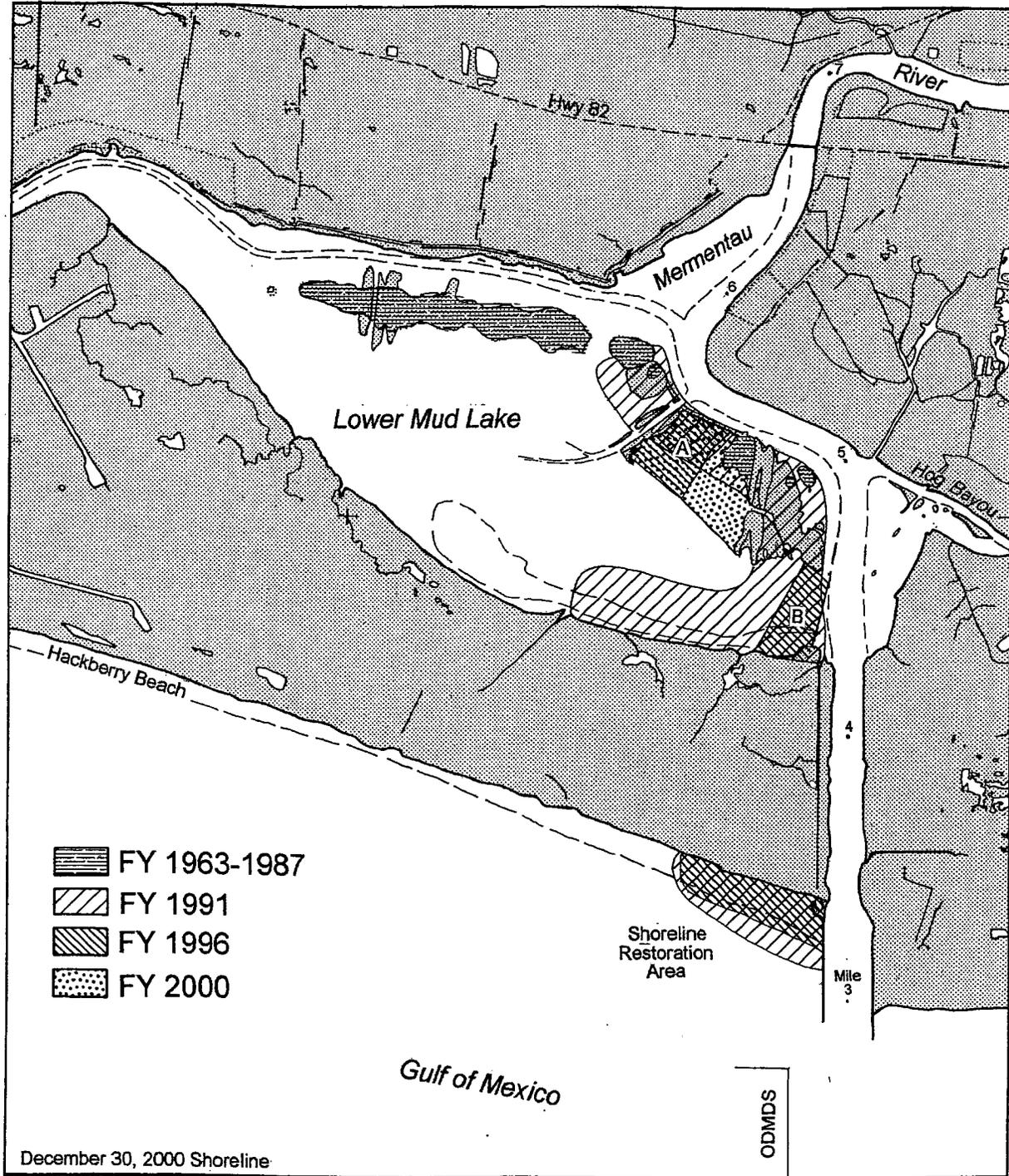
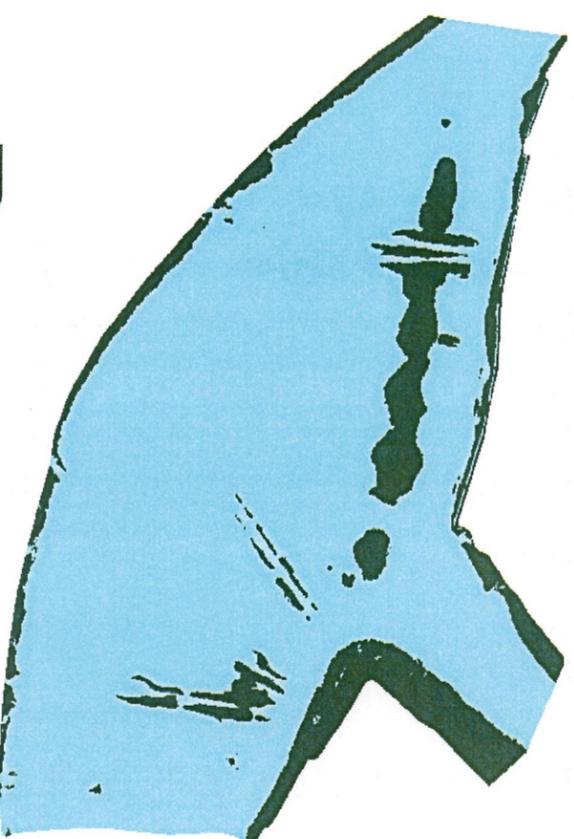


Figure 14B. The dredged material disposal history for the Mermentau River, Louisiana BUMP study area, showing disposal through FY 2000. Disposal prior to FY 1991 is detailed on previous figure.

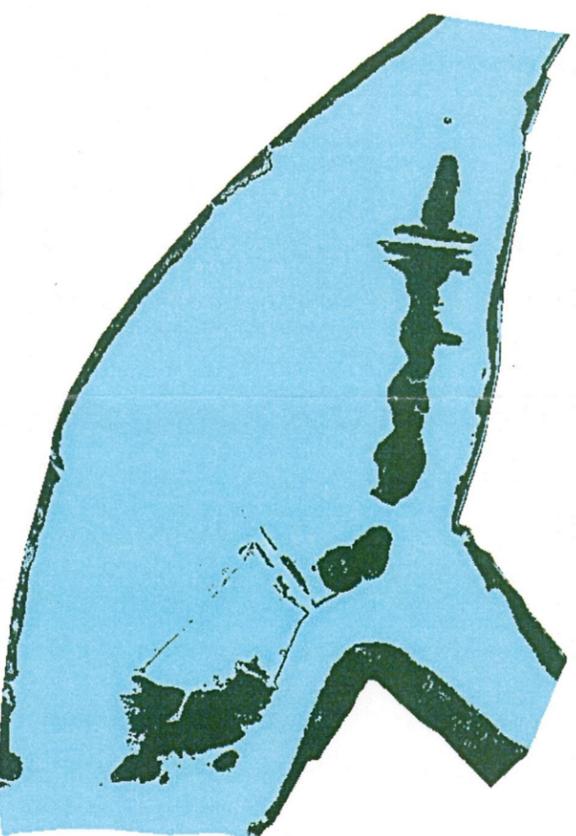
1985 Land-Water Classification

Lower Mud Lake



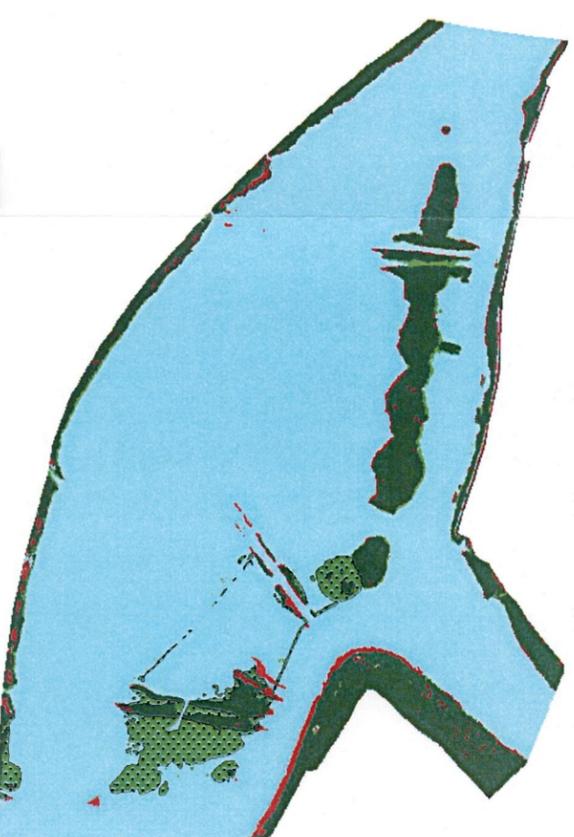
2000 Land-Water Classification

Lower Mud Lake



Change Detection: 1985-2000

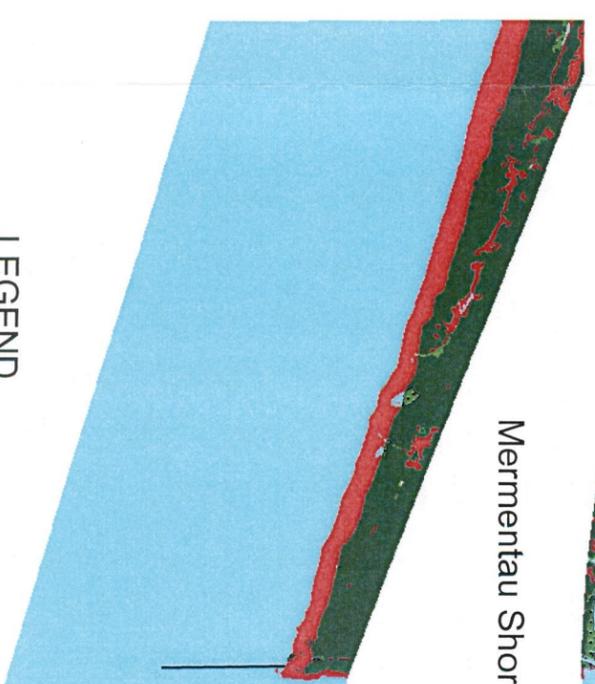
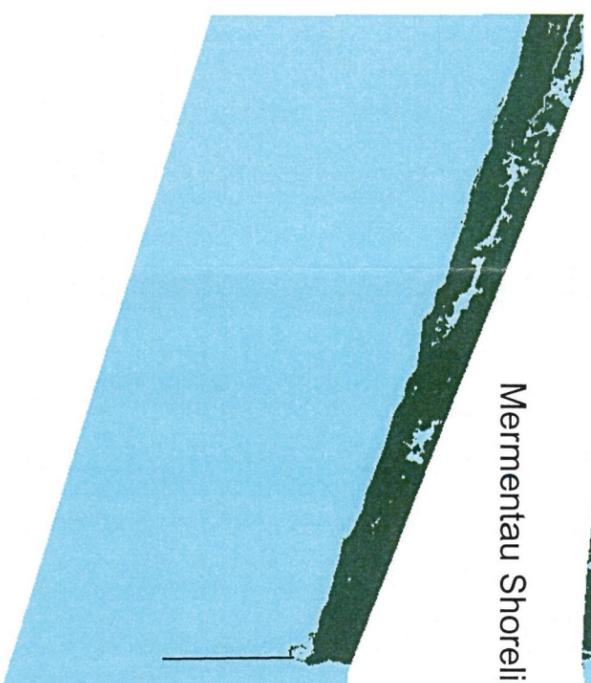
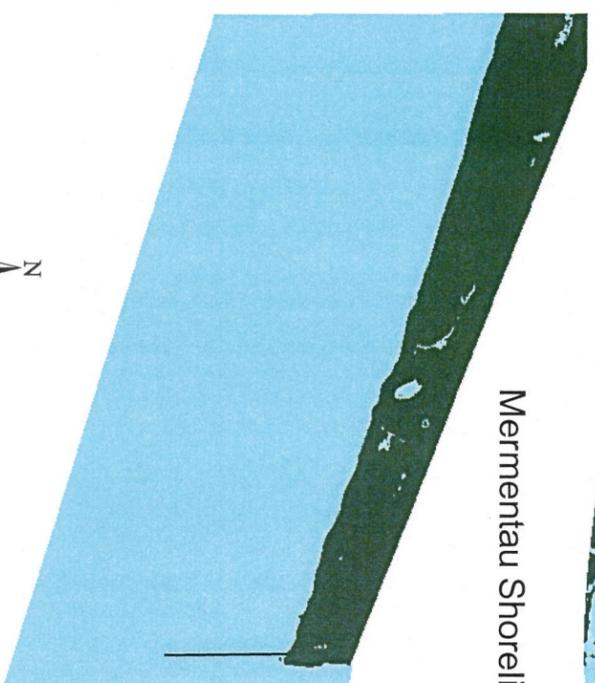
Lower Mud Lake



Mermentau Shoreline

Mermentau Shoreline

Mermentau Shoreline



LEGEND

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



Figure 13 Cumulative Landscape Change for Mermentau: 63 Acres