

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

Prepared for  
The U.S. Army Corps of Engineers  
New Orleans District

Prepared by  
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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.

<b>BUMP Study Site</b>	<b>BUMP Created (Acres)</b>	<b>BUMP Created (Hectares)</b>	<b>Figure Number</b>
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
<b>Total</b>	<b>17,367</b>	<b>7,034</b>	

**BENEFICIAL USE OF DREDGED MATERIAL DISPOSAL HISTORY**  
**CALCASIEU RIVER AND PASS, LA**  
Through FY 2000

The Calcasieu River and Pass, Louisiana, project consists of a number of individual projects designed to improve navigation from the Gulf of Mexico to port facilities in and around Lake Charles, Louisiana, and to prevent salt water intrusion in the river above Lake Charles.

The Rivers and Harbors Act of July 24, 1946, House Document 190, 79<sup>th</sup> Congress, 2<sup>nd</sup> Session and prior Rivers and Harbors acts authorized the USACE-NOD to construct and maintain a channel 35 feet deep and 250 feet wide from the wharves of the Lake Charles Harbor and Terminal District (including the Loop around Clooney Island) to the Gulf of Mexico, via Calcasieu Lake and through Calcasieu Pass; a channel 35-37 feet deep and 250 feet wide between the jetties; and an approach channel 37 feet deep and 400 feet wide seaward to the 37-foot depth contour in the Gulf of Mexico. This act also authorized reconstruction and extension of improvement of the river from Lake Charles to Phillips Bluff by removing logs, snags, overhanging trees and dredging. Construction of these channel improvements was completed in April, 1953.

The Rivers and Harbors Act of July 14, 1960, House Document 436, 86<sup>th</sup> Congress, 2<sup>nd</sup> Session authorized modification of the existing project to provide an approach channel having a depth of 42 feet below Mean Low Gulf (MLG) over a bottom width of 800 feet from the 42-foot depth in the Gulf of Mexico to the jettied channel; a channel between the jetties varying in depth from 42 to 40 feet at the seaward end and shoreline, respectively, over a bottom width of 400 feet; a channel 40 feet deep over a bottom width of 400 feet from the shoreline at Mile 0.0 to the wharves of the Port of Lake Charles at Mile 34.1; enlargement of the existing turning basin at Mile 29.6 to a depth of 40 feet; a mooring basin at about Mile 3.0 having a width of 350 feet, a length of 2000 feet, and a depth of 40 feet; extension of the ship channel at a depth of 35 feet below MLG over a bottom width of 250 feet from the wharves of the Port of Lake Charles, Mile 34.1, to the vicinity of the bridge on U.S. Highway 90, Mile 36.0; a turning basin of the same depth at the upper end having a width of 750 feet and a length of 1000 feet; and maintenance of the existing channel 12 feet deep and 200 feet wide from the ship channel to Cameron, Louisiana, via the old channel of the Calcasieu River. Construction under this modification was initiated in April, 1962, and completed in October, 1968.

The Rivers and Harbors Act of October 23, 1962, House Document 582, 87<sup>th</sup> Congress, 2<sup>nd</sup> Session authorized construction of a salt water barrier structure with five 40-foot tainter gates in a new bypass channel; a parallel channel with navigation structure and a single sector type gate; an earth closure dam; and a woven lumber type revetment. The salt water barrier was completed in January, 1968.

The Senate Public Works committee on December 27, 1970, and the House Public Works committee on December 15, 1970, adopted resolutions giving the USACE-NOD authority to construct and maintain the project at Devil's Elbow under the provisions of Section 201 of the Flood Control Act of 1965 (Public Law 89-298; S.D. 91-111). This project involved enlarging 2.3 miles of the existing industrial channel to a 40-foot depth over a bottom width of 400 feet; a ½ mile

eastward extension of the enlarged channel; and the construction of a 1200-foot by 1400-foot turning basin south of the extended channel at its landward end. Construction of the Devil's Elbow Industrial Channel was begun in 1976 and completed in 1978.

Construction and maintenance of the Calcasieu River at Coon Island, Louisiana, project was authorized under Section 107 of the Rivers and Harbors Act of 1960, as amended by Section 310 and Section 112 of the Rivers and Harbors Acts of 1965 and 1979, respectively. The project consists of deepening and widening to -40 feet by 200 feet for a distance of 6,943 feet, and the existing turning basin to -40 feet by 750 feet by 1000 feet. Construction of this project commenced in 1973 and was completed in 1974.

Dredging records dating back to 1949 indicate that maintenance of discontinuous reaches of the inland reach and bar channel of the 35-foot navigation project occurred on an annual basis from 1953 to 1962. Dredged material from construction and all maintenance events within the inland reach (Mile 34.1 to Mile 0.0) was placed in confined disposal facilities or placed unconfined in open water in Calcasieu Lake. Material from the bar channel was placed in open water off the right-descending bank of the navigational channel.

Maintenance of discontinuous reaches of the inland reach (Mile 36.0 to Mile 0.0) and/or the bar channel of the deep-draft/40-foot navigation project has occurred every year since project completion except for 1970, 1974, 1977 and 1982. Maintenance dredging of the inland reach is accomplished using hydraulic cutterhead pipeline dredges; hopper dredges are used for maintenance of the bar channel. Dredged material removed during construction of the inland reach and during all maintenance events until 1983 was placed into confined disposal facilities located on either side of the channel. Dredged material from maintenance of the deep-draft channel in the bar is placed in open water off the right-descending bank of the navigational channel.

The first beneficial use of dredge material from maintenance of the Calcasieu River and Pass, Louisiana, navigational channel took place in 1983 (April 5, 1983 - July 28, 1983) as part of the maintenance of the Mile 5.0 to Mile 22.7 reach. Approximately 20,000 cubic yards of dredged material was placed at two sites within the Sabine National Wildlife Refuge off the right-descending bank of the channel adjacent to the Mile 10 in an attempt to stabilize the bank and restore eroded wetlands (Figure 15A). Earthen dikes were constructed on the channel-side of these open water disposal areas to prevent the flow of dredged material back into the navigational channel; however, no other dikes were constructed. The maximum height of the dredged material placed in these disposal areas was +4.0 feet Mean Low Gulf (MLG).

During the 1985 maintenance of the Mile 5.0 to Mile 22.7 reach (August - December, 1985), the open water areas located between the 1983 sites on Sabine National Wildlife Refuge were used for the placement of dredged material. Earthen dikes were constructed on the channel-side of these areas and dredged material was placed in the same manner as in 1983 except that earthen dikes also were constructed perpendicular to the channel on the north and south sides of these sites to keep the dredged material off the 1983 sites.

In 1992, the USACE-NOD designated shallow open water areas in the vicinity of Brown Lake and

in the Sabine National Wildlife Refuge pursuant to Section 404 of the Clean Water Act for the placement of dredged material from maintenance of the navigational channel for wetlands restoration. These areas had been identified as alternatives for the placement of dredged material for beneficial use during development of the Long Term Disposal Plan/Dredged Material Management Plan for the Calcasieu River and Pass, Louisiana, project; however, use of the sites required special authority and funding because placement of dredged material into these sites was beyond the Base Plan.

Prior to the 1993 maintenance of the Mile 5.0 to Mile 22.7 reach, Congress provided authorization and funding for the beneficial use of dredged material in association with maintenance of the navigation project in the Fiscal Year 1993 Energy and Water Appropriation Act. The USACE-NOD also sought and received authority and funding pursuant to Section 1135 of the Water Resources Development Act of 1986 for the beneficial use of dredged material at Sabine National Wildlife Refuge. The state of Louisiana was the non-Federal sponsor for the Section 1135 project. Detailed plans for the placement of dredged material at both Brown Lake and the Sabine National Wildlife Refuge were developed in coordination with state and Federal natural resources agencies, the Sabine National Wildlife Refuge manager, and private land owners.

During the 1993 maintenance event (February 26 - August 23, 1993), dredged material from Mile 5.0 to Mile 22.7 was placed at both Brown Lake and within the Sabine National Wildlife Refuge to restore wetlands. Five (5) contiguous containment cells were constructed on the eastern side of Brown Lake (Figure 15B). Containment dikes were constructed to a height sufficient to contain the dredged material to a maximum height of ~~+3.0~~<sup>+5.3</sup> feet MLG. The interior dikes were constructed to allow the containment cells to be filled in pairs; dredged material was placed directly into one cell and the effluent from that cell passed through the next adjacent cell. Dredged material discharge was into cell #1, #2, #3, and #5. Approximately 756,000 cubic yards of material removed from Mile 18.0 to Mile 19.3 were placed in the Brown Lake containment cells during this event.

At Sabine National Wildlife Refuge, containment dikes were constructed only along the navigational channel and along the north bank of West Cove Canal; no back dikes were required (Figure 15A). Approximately ~~78,000~~<sup>1,830,343</sup> cubic yards of dredged material removed from Mile 7.8 to Mile 12.2 of the navigational channel were placed in the refuge north of West Cove Canal. The maximum initial height of the dredged material was +4.0 feet MLG.

The USACE-NOD placed additional dredged material from maintenance of the Mile 5 to Mile 22.7 reach of the navigational channel in the Sabine National Wildlife Refuge pursuant to Section 204 of the Water Resources Development Act (WRDA) of 1992 during the 1996 maintenance event (May, 1996 - January 1997). The state of Louisiana was the non-federal sponsor for this project. The Sabine National Wildlife refuge staff and other state and Federal natural resources agencies participated in the development of the disposal plan. Containment dikes were constructed along the south bank of West Cove Canal and along the east bank of Hog Island Gully (Figure 15A). Approximately 1,291,236 cubic yards of material removed from Mile 7.0 to Mile 11.5 of the navigational channel were placed in the refuge south of West Cove Canal. The initial height of the dredged material slurry was +5.0 feet MLG.

During the 1998 maintenance of the Mile 14.0 to Mile 26.0 reach of the navigational channel (October, 1998 - July, 1999), the USACE-NOD obtained authority and funding under Section 204 of WRDA 1992 to place dredged material removed from Mile 16.5 to Mile 21.0 at Brown Lake. The state of Louisiana was the non-federal sponsor for this project and the property manager and other state and Federal natural resources agencies participated in the development of the disposal plan. The primary disposal site for this event consisted of four (4) additional contiguous containment cells, "A", "B", "C", and "D", constructed on the western side of Brown Lake (Figure 15B). Four (4) of the cells constructed during the 1993 maintenance event, cells #2, #3, #4, and #5, were specified as a secondary disposal site to be used if the primary disposal site could not contain all of the material from the specified reach. Although the contract specified that the perimeter dikes be constructed to a height of +8.0 feet MLG, soil conditions at the primary disposal site precluded construction of dikes at cell "C" and "D" to this height. Perimeter dikes at cells "A" and "B" were constructed to +8.0 feet MLG; dikes at cells "C" and "D" were built to +6.5 feet and +6.8 feet MLG, respectively. Low-level internal dikes constructed to +5.0 feet MLG separated the cells in the primary disposal area and allowed effluent to flow from one cell to the next. The dredged material discharge was directed into cell "A". Approximately 1,233,539 cubic yards of dredged material were placed into the primary disposal site before the discharge was placed in cell #2 of the secondary disposal site. The elevations of the dredged material slurry in the cells at the primary disposal site at the time that discharge therein was halted were as follows: in "A" +6.2 feet MLG to +6.0 feet MLG; in "B" +6.0 feet MLG to +4.4 feet MLG; in "C" +4.1 feet MLG to +4.0 feet MLG; and in "D" +3.9 feet MLG. Approximately 727,100 cubic feet of material was placed in cell #2 of the secondary disposal site. The elevation of the dredged material slurry in cell #2 was limited to +6.0 feet MLG.

The USACE-NOD again received Section 204 authority and funding to place dredged material from the Mile 5.0 to Mile 14.2 reach of the navigational channel in Sabine National Wildlife Refuge during the 1999 maintenance event (July - November, 1999). The state of Louisiana was the non-Federal sponsor for this project, and the Sabine National Wildlife Refuge staff and other state and Federal natural resources agencies participated in the development of the disposal plan. Perimeter dikes were constructed to an elevation of +8.0 feet MLG along the north bank of West Cove Canal and on the east and west boundaries of the disposal site; a low level dike was constructed to an elevation of +4.5 feet MLG along the northern boundary of the disposal site (Figure 15A). Approximately 1,394,000 cubic yards of dredged material from the Mile 7.0 to Mile 11.5 reach of the navigational channel was placed into the disposal site. The elevation of the dredged material slurry was limited to +5.0 feet MLG. A booster pump was required to pump the dredged material from the navigational channel to this disposal site.

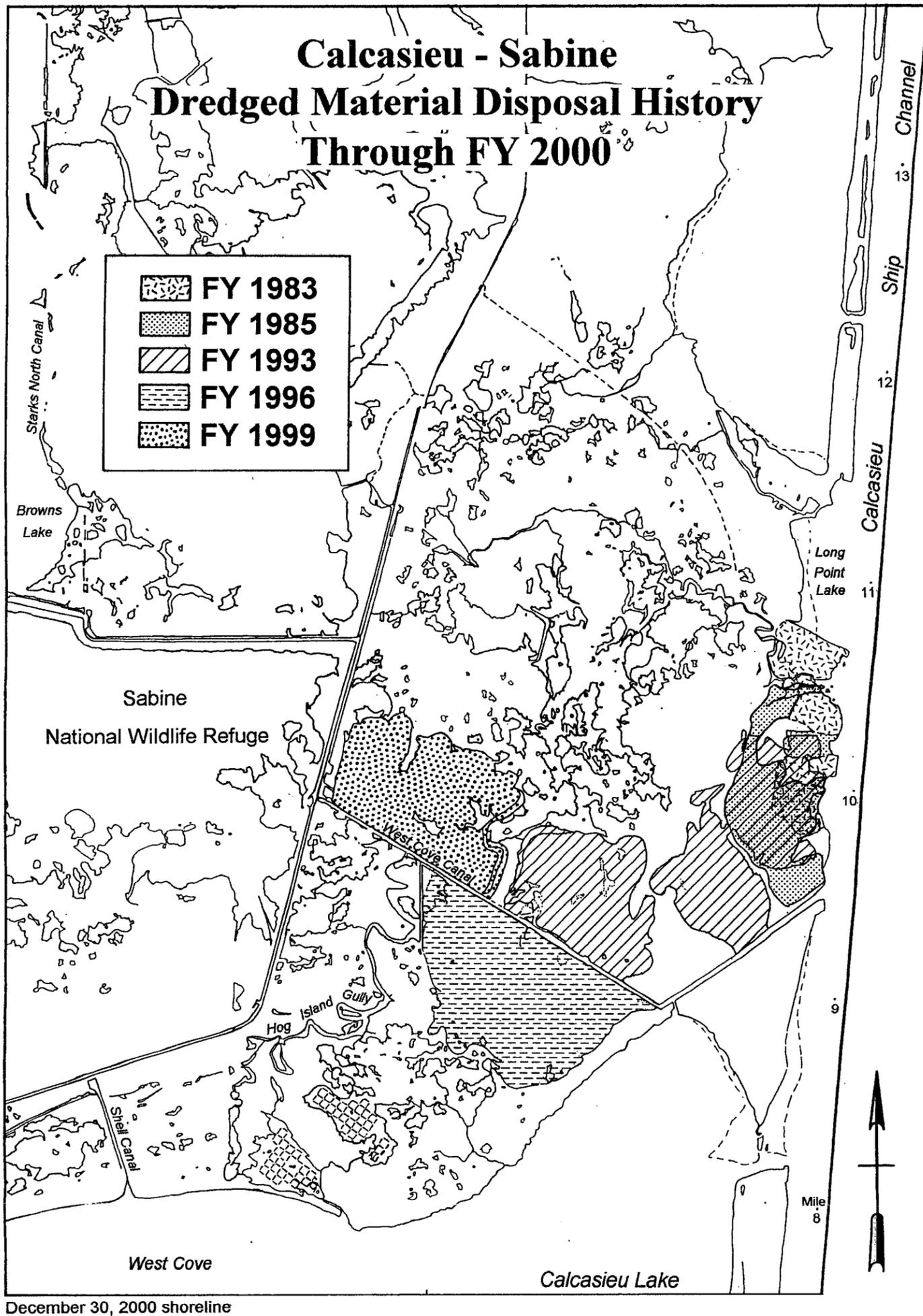
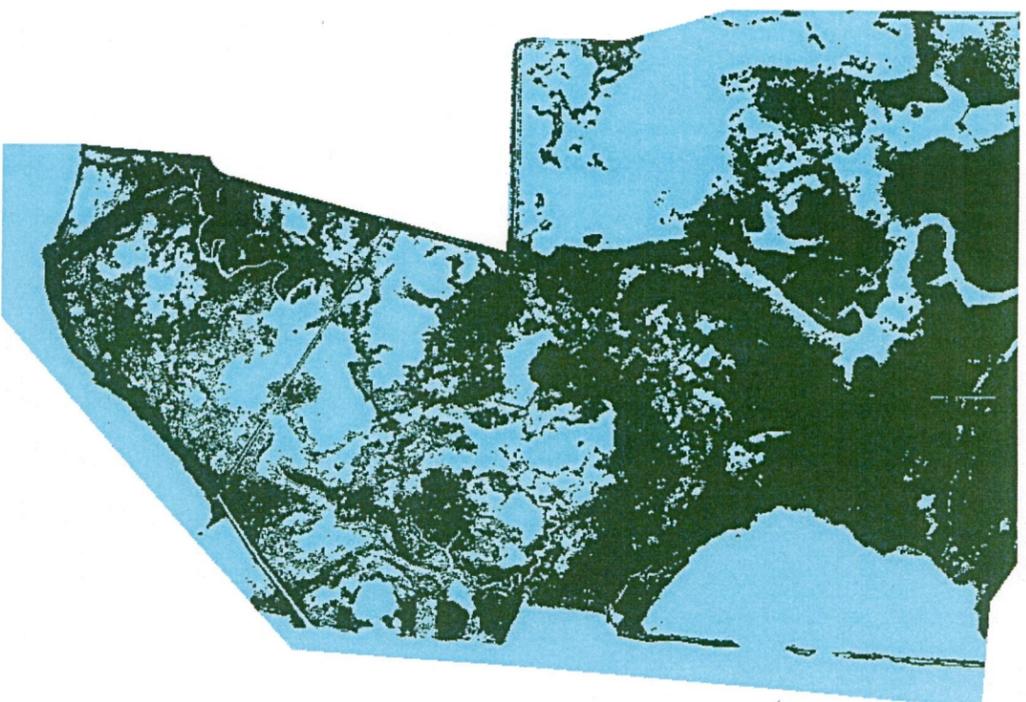
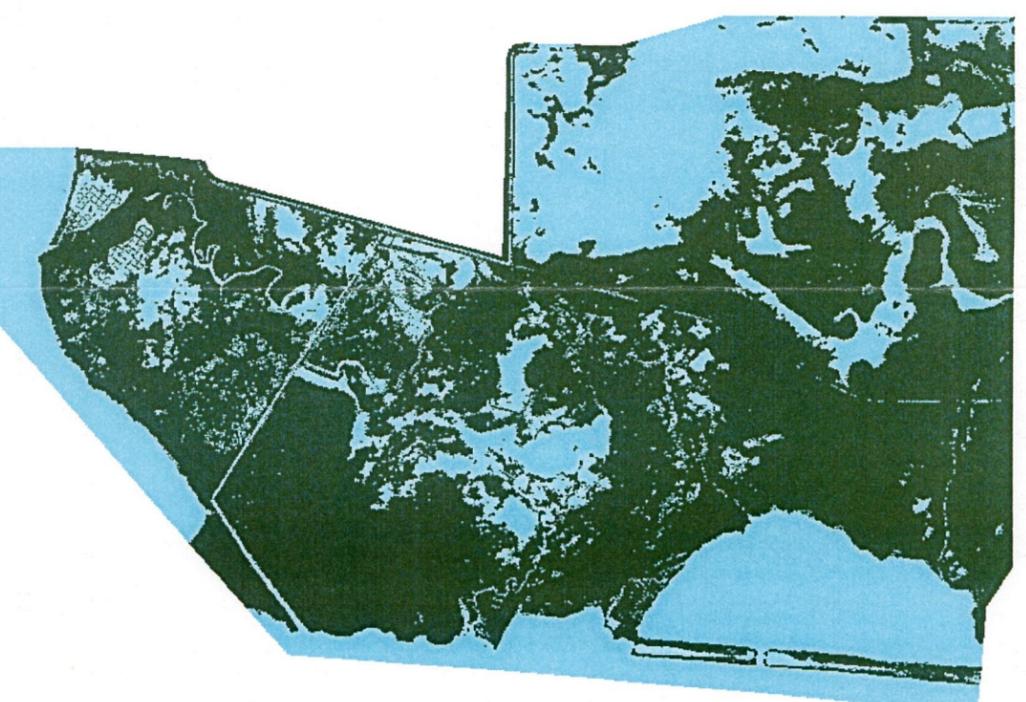


Figure 15A. The dredged material disposal history for the Calcasieu River and Pass, Louisiana - Sabine National Wildlife Refuge BUMP study area, showing disposal through FY 2000.

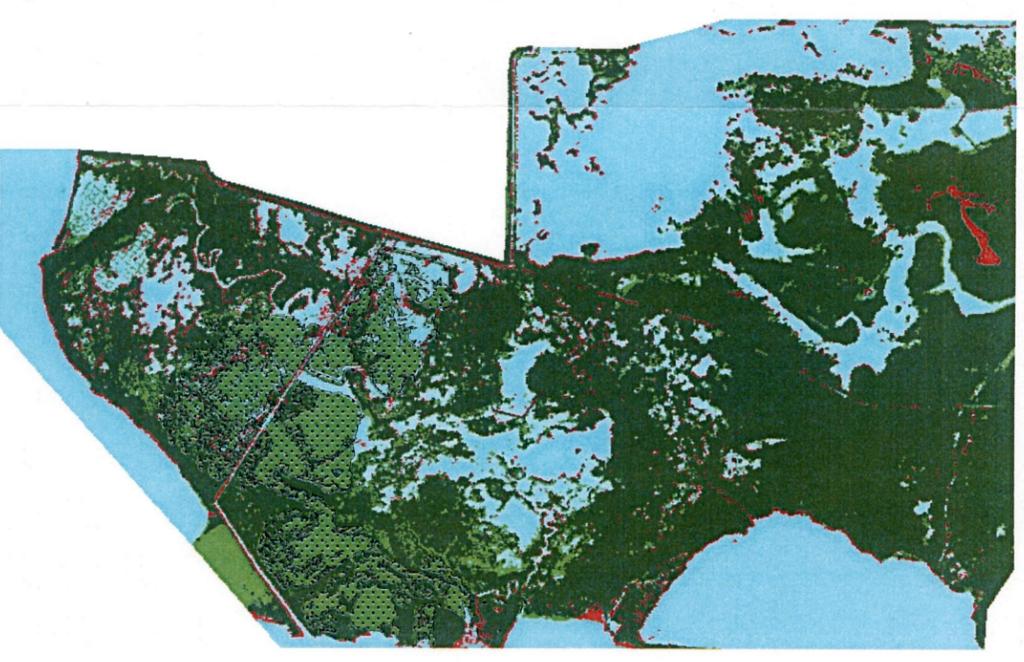
1985 Land-Water Classification



2000 Land-Water Classification



Change Detection: 1985-2000



LEGEND

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



Figure 9 Cumulative Landscape Change for Calcasieu Sabine: 745 Acres

## Calcasieu - Brown Lake Dredged Material Disposal History Through FY 2000

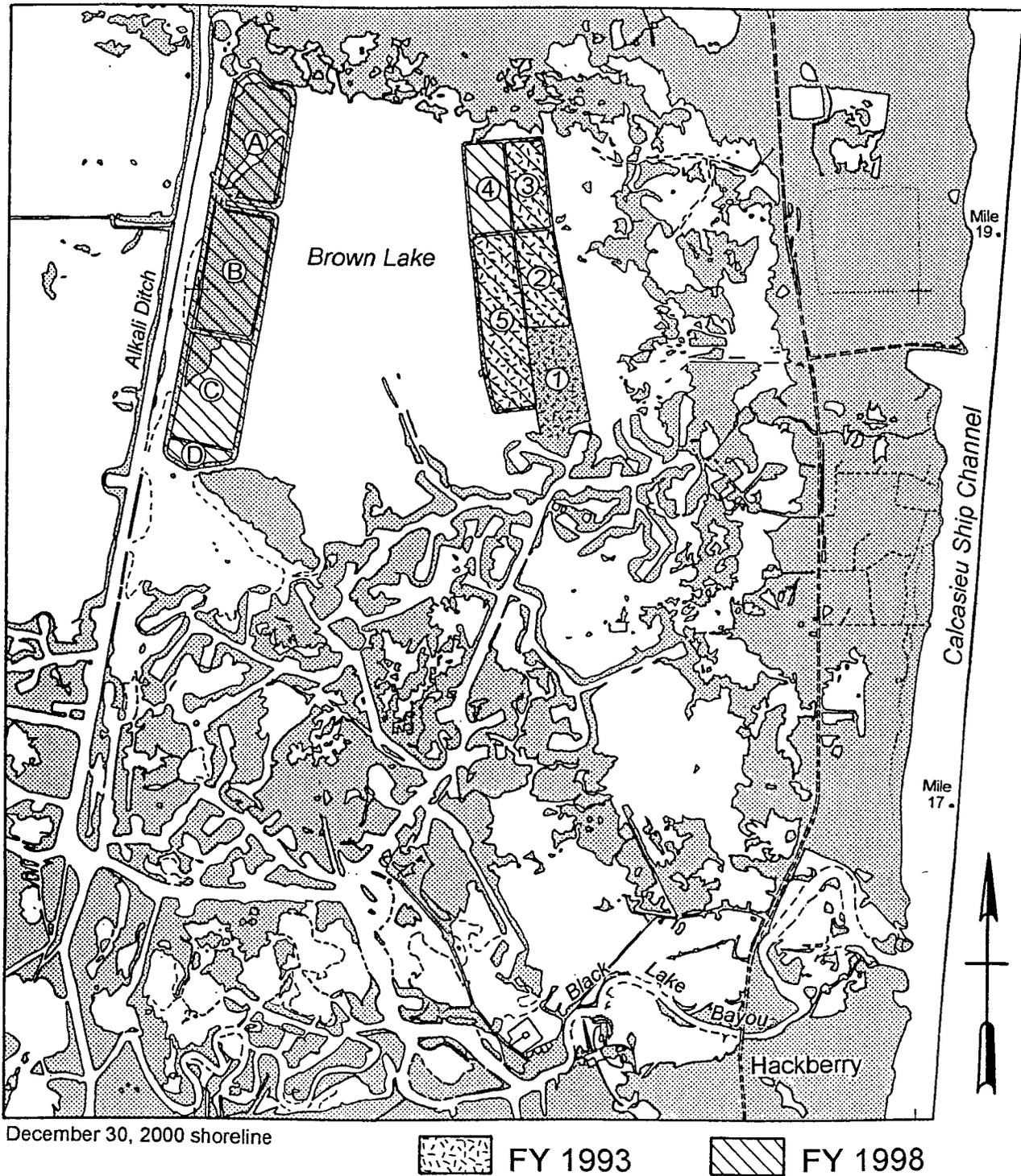
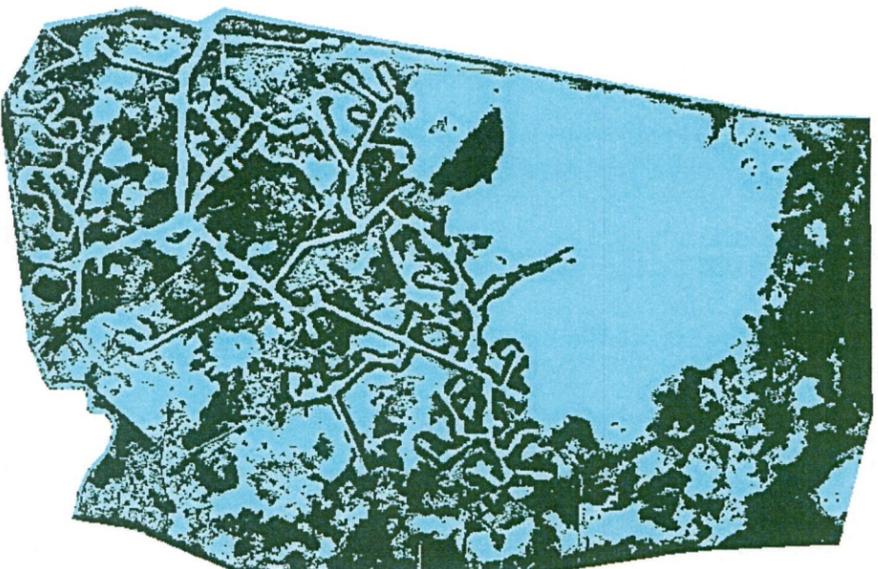
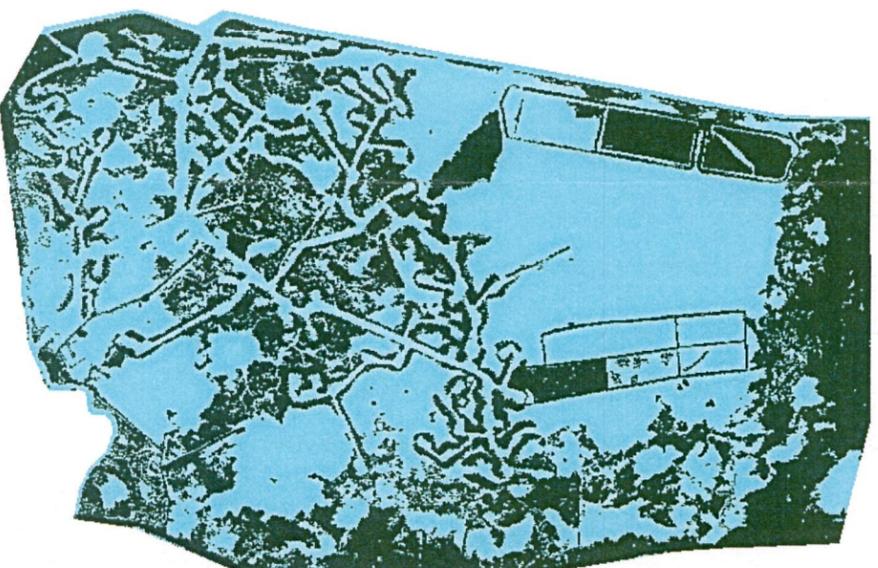


Figure 15B. The dredged material disposal history for the Calcasieu River and Pass, Louisiana - Brown Lake BUMP study area, showing disposal through FY 2000.

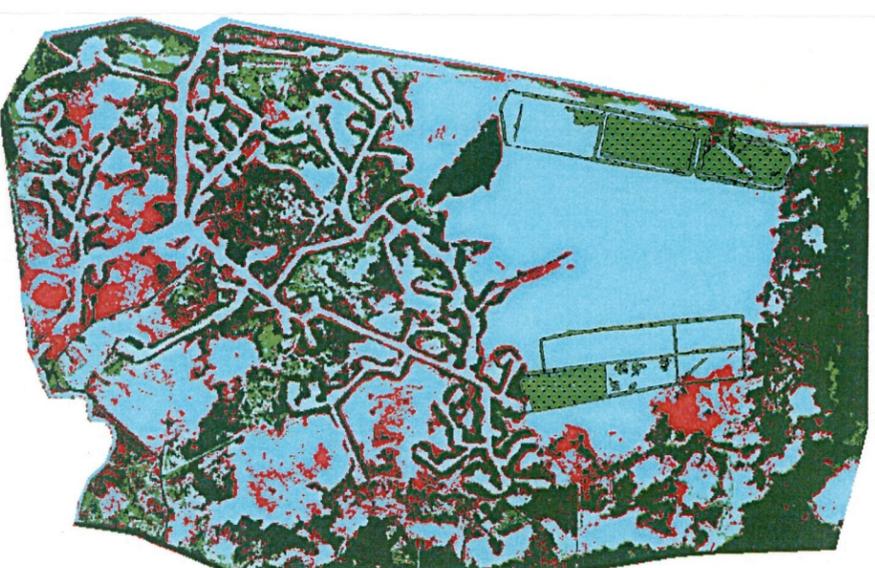
1985 Land-Water Classification



2000 Land-Water Classification



Change Detection: 1985-2000



LEGEND

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



Figure 8 Cumulative Landscape Change for Calcasieu- Brown Lake: 195 Acres