FEASIBILITY STUDY

SWEET LAKE / GULF INTRACOASTAL WATERWAY BANK RESTORATION

CAMERON PARISH

prepared for

LOUISIANA DEPARTMENT OF NATURAL RESOURCES

COASTAL RESTORATION DIVISION

prepared by

BROWN & ROOT, INC.

ENGINEERS AND CONSULTANTS

BELLE CHASSE, LOUISIANA

OCTOBER 1992

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EXECUTIVE SUMMARY

Sweet Lake is located in Cameron Parish, Louisiana, approximately 3.5 miles west of the Gibbstown Bridge (LA 27). It is bounded by the Gulf Intracoastal Waterway (GIWW) to the south and west and by marsh to the north and east. Due primarily to heavy boat traffic and strong northerly winds during the winter, approximately one mile of the narrow barrier between the GIWW and Sweet Lake has eroded. Restoration of this bankline, as proposed in the 1991 Coastal Wetlands Conservation and Restoration Plan (CWCRP), is intended to reduce turbidity and wave action produced by the GIWW and promote aquatic plant growth in Sweet Lake. In the course of this study however, it became evident to us that this may not have been the original motive for the project. Conversations with Soil Conservation Service and Amoco Corporation personnel, local sponsors of the project, indicate the original motive for the Sweet Lake project may have been to protect the barrier between the GIWW and Blind Lake, directly across from Sweet Lake. As the 1989 Blind Lake breakwater project has remedied that problem, restoration of the bankline between Sweet Lake and the GIWW may be a redundant operation.

The alternative recommended in this study is a more direct stabilization method involving construction of brush fencing along 11,000 linear feet of north and northwest Sweet Lake shoreline. Implementation of this alternative will allow much

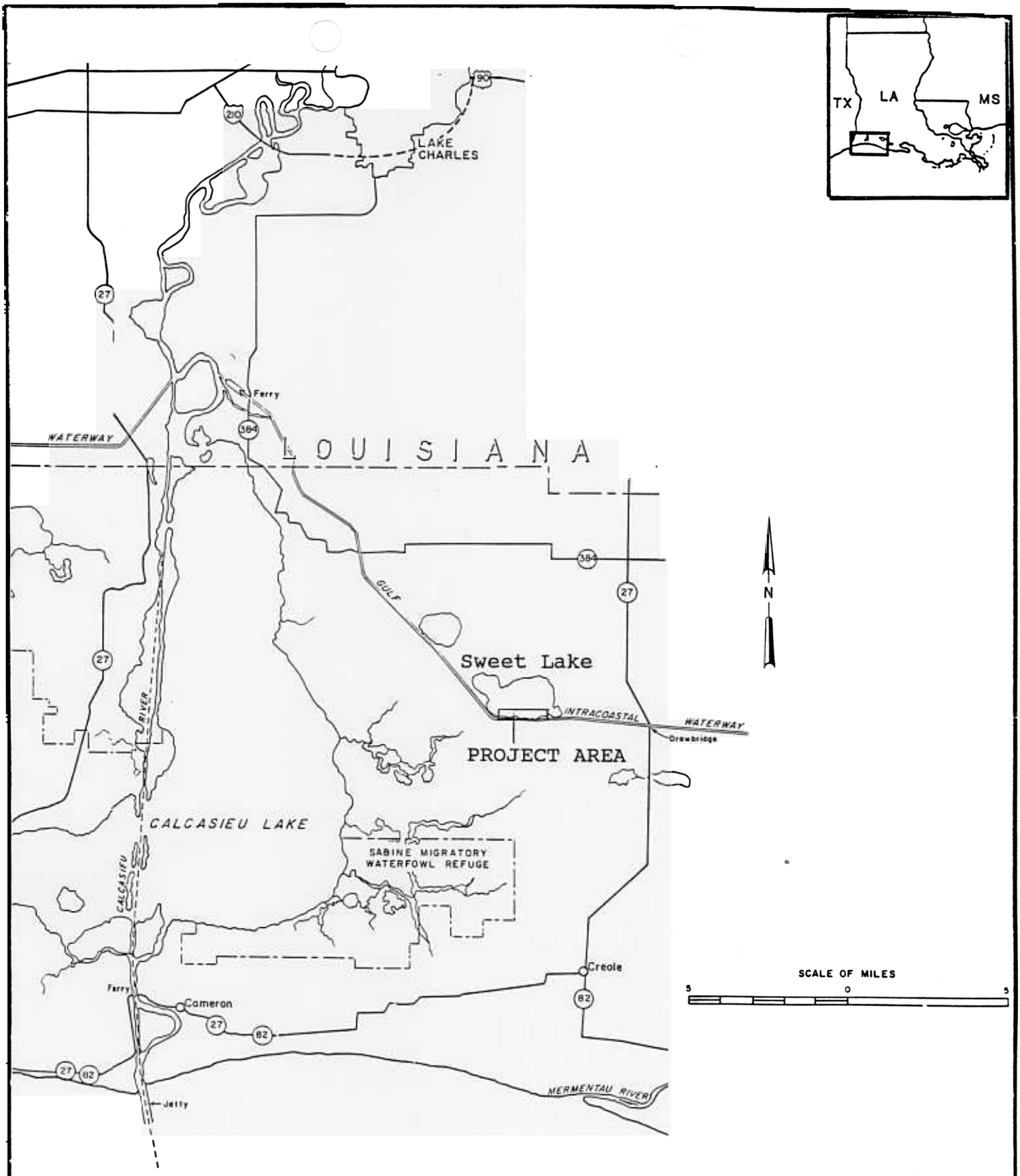
of the unstable, deteriorating marsh to stabilize by dissipating wave energy and promoting sediment deposition. At an estimated initial cost of $165,000, the brush fencing method offers an economical means of year-long shoreline protection.

INTRODUCTION

Louisiana Department of Natural Resources (DNR) tasked Brown & Root, Inc., under DNR contract number 25030-91-36, to conduct a feasibility study of a bank restoration project along the south shore of Sweet Lake. Identified as project C/S-11 in the 1991-92 Coastal Wetlands Conservation and Restoration Plan (CWCRP), the project is located at the boundary between the Gulf Intracoastal Waterway (GIWW) and Sweet Lake in Cameron Parish (Figure 1)

primarily to heavy boating traffic, approximately 1 mile of shoreline along the north GIWW bank has eroded, leaving Sweet lake vulnerable to increases in turbidity and wave action produced in the GIWW. Reestablishment of a hydrologic barrier between Sweet Lake and the GIWW, as suggested in the CWCRP, is intended to reduce turbidity and promote aquatic plant growth in Sweet Lake. Submergent vegetation would dissipate wave energy and reduce shoreline erosion along the Sweet Lake shoreline.

property is owned by the Amoco Corporation and leased for oil and gas exploration and production, as well as managed for waterfowl, furbearers, hunting, and fishing. To protect the eroding shoreline of Sweet Lake, a number of alternatives were evaluated with consideration to the needs of wetland restoration and conservation, wildlife and fisheries resources, and privately held lands that may be affected by the project



GULF OF MEXICO

DEPARTMENT OF NATURAL RESOURCES
STATE OF LOUISIANA

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VICINITY MAP

SWEET LAKE /GIWW BANK RESTORATION

FIGURE 1

EXISTING CONDITIONS

Sweet Lake is located in the Calcasieu/Sabine hydrologic basin approximately 3.5 miles west of the Gibbstown Bridge (LA 27) in Cameron Parish, Louisiana. This freshwater lake is approximately 3.6 square miles (2300 acres) in area and is bounded by the Gulf Intracoastal Waterway (GIWW) to the south and west and by marsh to the north and east. Construction of the GIWW occurred in 1920's. Due to heavy boat traffic and strong northerly winds during the winter, the narrow barrier between the GIWW and Sweet Lake eroded, and in the 1960's was breached. Since then, approximately one mile of north shoreline of the GIWW has eroded, creating direct water exchange into Sweet Lake

A comparison of 1978 infrared aerial photography (National High Altitude Photography Program)(Figure 2) to 1990 infrared aerial photography (National Aerial Photography Program)(Figure 3) reveals the barrier between Sweet Lake and the GIWW, as well as the shoreline around Sweet Lake, have eroded quite considerably. A historical shoreline comparison has been prepared for the project area by superimposing digitized images of the 1978 and 1990 infrared photographs using Intergraph Microstation 32 (Figure 4). As indicated by this study north shoreline of Sweet Lake has been severely eroded. In some locations, the shoreline has retreated as much as 265 feet over


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STATE OF LOUISIANA
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BATON ROUGE, LOUISIANA
OCTOBER 1978
SCALE 1:24000
SWEET LAKE /GIWW BANK RESTORATION
FIGURE 2

DEPARTMENT OF NATURAL RESOURCES
STATE OF LOUISIANA

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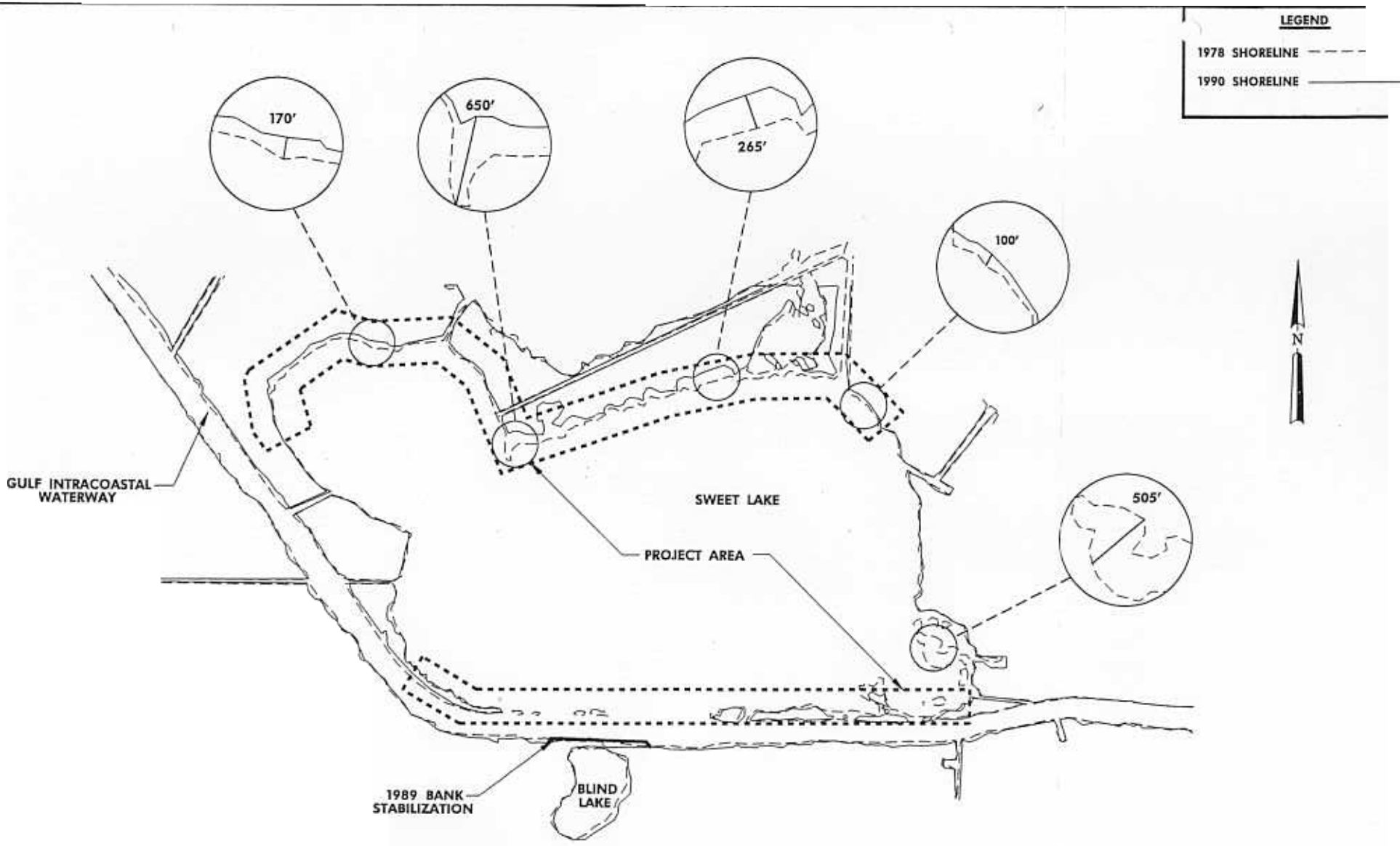
DECEMBER 1990 **SCALE 1:24000**

SWEET LAKE /GIWW BANK RESTORATION

FIGURE 3


LEGEND
1978 SHORELINE
1990 SHORELINE
170'
650'
265'
100'
505'
N
GULF INTRACOASTAL WATERWAY
SWEET LAKE
PROJECT AREA
1989 BANK STABILIZATION
BLIND LAKE
SCALE: 1" = 2000'
2000' 0 2000' 4000' 6000' 8000'
DEPARTMENT OF NATURAL RESOURCES STATE OF LOUISIANA
Brown O'Rourk, Inc.
SHORELINE HISTORY MAP
SWEET LAKE / GIWW BANK RESTORATION
FIGURE 4

study period of twelve years, an average rate of 22 feet

year. Land loss rates for the project area are equally as alarming. A survey conducted by the U.S. Army Corps of Engineers, New Orleans District revealed that between 1955 and 1990, the average land loss rate in the Sweet Lake quadrangle a 40,000 acre area, was over 700 acres per year. (Dunbar et al., 1992).

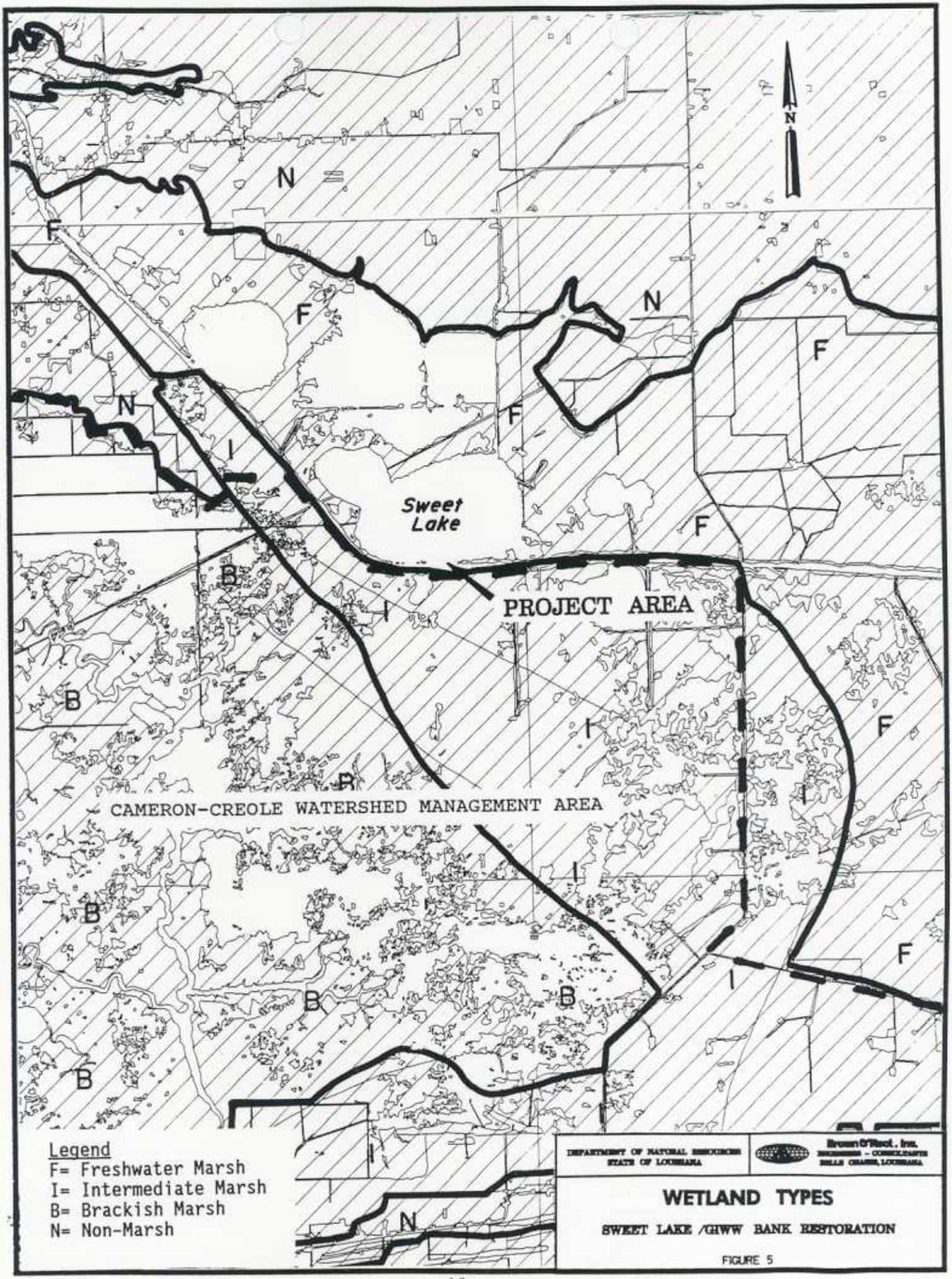
Louisiana Department of Wildlife and Fisheries classified

area surrounding Sweet Lake as fresh marsh in 1988 (Figure

The 63,000 acre marsh south of the project area, below the GIWW, is known as the Cameron-Creole Watershed Management Area As a direct result of the Cameron-Creole Watershed Management Project (CCWP), this historically intermediate marsh has in recent years become more fresh.

CAMERON-CREOLE WATERSHED MANAGEMENT PROJECT

Completed in 1989, the CCWP is a multi-million dollar marsh management project developed to control saltwater intrusion and stabilize marsh soils in the Cameron-Creole Watershed Management Area. Management objectives of this project include soil stabilization, floodwater abatement, ecosystem diversity and socio-economic development. Water levels and salinities are maintained at levels mandated by the CCWP management plan Control structures are manipulated to achieve optimal water


N
Sweet Lake
PROJECT AREA
CAMERON-CREOLE WATERSHED MANAGEMENT AREA
Legend
F= Freshwater Marsh
I= Intermediate Marsh
B= Brackish Marsh
N= Non-Marsh
DEPARTMENT OF NATURAL RESOURCES
STATE OF LOUISIANA
Brown & Root, Inc.
WETLAND TYPES
SWEET LAKE /GHWW BANK RESTORATION
FIGURE 5

levels, salinities, estuarine organism movement, and introduction of freshwater and sediments. Ecosystem response to the CCWP management plan has been positive. In general, marsh has experienced decreased water salinities, increased plant diversity and community biomass, shoreline stabilization, perennial plant expansion, and increased wildlife and fisheries diversity (DeLany et al., 1991).

BLIND LAKE PROJECT

Shortly after completion of the CCWP, the northern hydrologic boundary of the project area was threatened with the possibility of a breach between the GIWW and Blind Lake. Located directly across from the Sweet Lake bank restoration project site, the barrier between the GIWW and Blind Lake had eroded to a critically narrow configuration. To prevent breaching, a 2339 foot limestone breakwater, placed 70 from the south bank of the GIWW at Blind Lake, was constructed (See Figure 4). This emergency operation was performed by the Louisiana Department of Natural Resources (DNR) in September 1989, at a cost of $173,433.00. The project design consisted of placing limestone rip rap (LA DOTD specifications on "Heavy Deposited" rip rap, # 711.02 [c] upon a six-inch bedding layer of shell and geofabric. The breakwater crest width and height were 1 foot and +2 feet MSL , respectively, with 1 vertical on 2 horizontal side slopes. A second phase of the project

involved the transplanting of 400 giant cutgrass (Zizaniopsis miliaceae) plants along 2,000 feet of bank on the leeward side of the breakwater. As of March 1992, survey data revealed that behind the breakwater, an average increase in elevation of .41 inches had occurred due to deposition of suspended sediments and increased organic matter from decaying vegetation. The cutgrass plantings have been successful and should eventually colonize the entire area behind the breakwater. The breakwater itself had settled no more than 1 foot. Overall, the project has been successful in maintaining the hydrology of the Cameron-Creole Watershed area and protecting the GIWW shoreline at Blind Lake (Louisiana Department of Natural Resources, 1992).

FIELD INVESTIGATION

On March 31, 1992, Brown & Root personnel conducted an aerial survey of the Sweet Lake/GIWW bank restoration project area by a Cessna 185 amphibian seaplane. Viewed from an altitude of approximately 1500 feet, the 1 mile plus breach between the south shore of Sweet lake and the GIWW was easily identified (Figure 6). Due to heavy boat traffic and strong winds, a landing in the project area was not attempted.

On June 24, 1992, Brown & Root personnel consisting of an engineer and a biologist visited the project area by boat. We

Figure 6. Looking north, this photograph shows Blind Lake breakwater project, GIWW, former GIWW / Sweet Lake bankline, and Sweet Lake.

Figure 7. Remnant islands of Sweet Lake / GIWW bankline

were accompanied by personnel from the Cameron District of the U.S. Soil Conservation Service (SCS) and Amoco Corporation who submitted the original recommendation for the Sweet Lake bank restoration project. The main purposes of this trip were to determine the water depths at which the bank restoration would occur, make observations regarding the overall quality of the interior marsh and habitat composition, and assess the effects of boat traffic on Sweet Lake and its shorelines

Water depths taken at a number of locations ranged from 0.5 to 3 feet, averaging around 2 feet. Bottom soil conditions, sampled at several locations along the project area, were found to be comprised of very soft, uncompacted organic material, less than one foot thick, overlaying a grey clay layer. According to the U.S. Soil Conservation Service, the Allemands series soils in this area have a high subsidence potential and low bearing strength (U.S. Soil Conservation Service, 1989). A few small remnant islands remain along the former bankline (Figures 6 & 7). Plant species observed on these islands include giant cutgrass (Zizaniopsis miliacea), elephant ear (Colocasia antiquorum), Chinese tallow (Sapium sebiferum), and black willows (Salix nigra). Roseau cane (Phragmites communis), maidencane (Panicum hemitomon) and water hyacinth (Eichhornia crassipes) also occur in these areas

Tug boat and barge traffic was observed to be heavy along the

GIWW in the project area. The wakes created by the larger vessels, ranged from 1 to 3 feet high. These wakes were not observed to propagate into Sweet Lake however, as they were tripped by the shallow GIWW bank. Apparently boating traffic has no effect on the Sweet Lake northern shoreline.
The Blind Lake project, across the GIWW from the project area along the south bank of the GIWW, was also examined. The limestone breakwater appeared to be wearing well, and showed indications of sediment deposition and vegetative expansion in its lee

In Sweet Lake itself, depths ranged from 2 to 5 feet, being deepest in the middle of the lake. The northern shoreline of Sweet Lake, which has experienced the most severe erosion in the project area in recent years, was severely scarred in many areas. The dominant plant species observed here included giant cutgrass (Zizaniopsis miliacea), elephant ear (Colocasia antiquorum), roseau cane (Phragmites communis), bulltongue (Sagittaria lancifola), morning glory (Ipomoea sagittaria), and water hyacinth (Eichhornia crassipes).

To promote vegetative expansion and protect a portion of the northern Sweet Lake shoreline, a fence has been installed along approximately 2000 feet of the shoreline, 20 to 50 feet from shore (Figures 8 & 9). The steel wire fence installed in the summer of 1991 by SCS and Amoco Corporation personnel, was

Figure 8. Vegetation Entrapment Fence, North Sweet Lake Shoreline

Figure 9. Vegetation Entrapment Fence, North Sweet Lake Shoreline

designed to trap floating vegetation, specifically water hyacinth (Eichhornia crassipes). It was intended that an accumulation of floating vegetation behind the fence, fronting the shoreline, would absorb much of the wind-induced wave energy directed towards the shoreline. Thus far, the vegetation entrapment fence has worked as proposed, protecting a portion of the Sweet Lake north shoreline. A healthy volume of water hyacinth was observed to have accumulated behind the fence, and apparently a decrease in shoreline erosion, and subsequent vegetative expansion, has occurred this year.

FISH AND WILDLIFE

The productivity of fish and wildlife in the area is directly related to the plants produced within the area. The marsh grasses form the basis of this ecosystem by contributing organic detritus to the food web. These wetlands provide cover habitat for furbearers, reptiles, amphibians, and numerous birds, as well as insects, crustaceans, and fishes. Mammals such as nutria, otter, mink, rabbits, raccoons, deer, muskrats, foxes, armadillos, bats, and opossum are found in the project area. Reptiles inhabiting the area include alligators, a variety of snakes, turtles, and lizards. Resident amphibians include toads, frogs, and salamanders.

Many birds and waterfowl are common year-round or seasonal

residents. Among the birds commonly seen in the area are swallows, wrens, terns, gulls, pelicans, cormorants, herons, egrets, white ibis, snow geese, vultures, and hawks. Mottled ducks, teal, pintail, American wigeon, mallards, and gadwall represent the waterfowl that congregate in the marshes during the winter.

Although there are no known endangered species that inhabit marshes surrounding Sweet Lake, a few species migrate through the area periodically. These include the peregrine falcon (Falco peregrinus), bald eagle (Haliaeetus leucocephalus), red wolf (Canis rufus) (U.S. Fish and Wildlife Service, 1992).

Many finfish and shellfish are permanent or transient inhabitants of these marshes. Many species utilize these habitats for nursery areas and spawning grounds, feeding on abundant food sources, and then move to the more saline waters of the Gulf of Mexico for maturation and mating. Finfish found in these areas include bass, gars, tarpon, eels, carp, catfish, perch, and mullet. Crabs, shrimp, clams, and oysters comprise the economically important shellfish which spend all or parts of their lives in the Sweet Lake marshes.

ALTERNATIVE SOLUTIONS

A number of coastal erosion control alternatives have been considered that would protect and enhance the wetlands bordering Sweet Lake. Restoration of the bankline between Sweet Lake and the GIWW, as proposed in the CWCRP, was the primary alternative for consideration. In the course of the field investigation however, it became evident to us that the intent of the Sweet Lake Bank Restoration project, as described in the CWCRP, may not have been the original motive for the project. Conversations with SCS and Amoco Corporation personnel indicate the original motive for the Sweet Lake project may have been to protect the barrier between the GIWW and Blind Lake from wave energy induced by northerly winds. As the Blind Lake breakwater project has remedied that problem, restoration of the bankline between Sweet Lake and the GIWW may be a redundant operation. Nevertheless, this operation as well as other, more direct methods of shoreline stabilization were examined as alternatives to protecting the north Sweet Lake shoreline from continued erosion

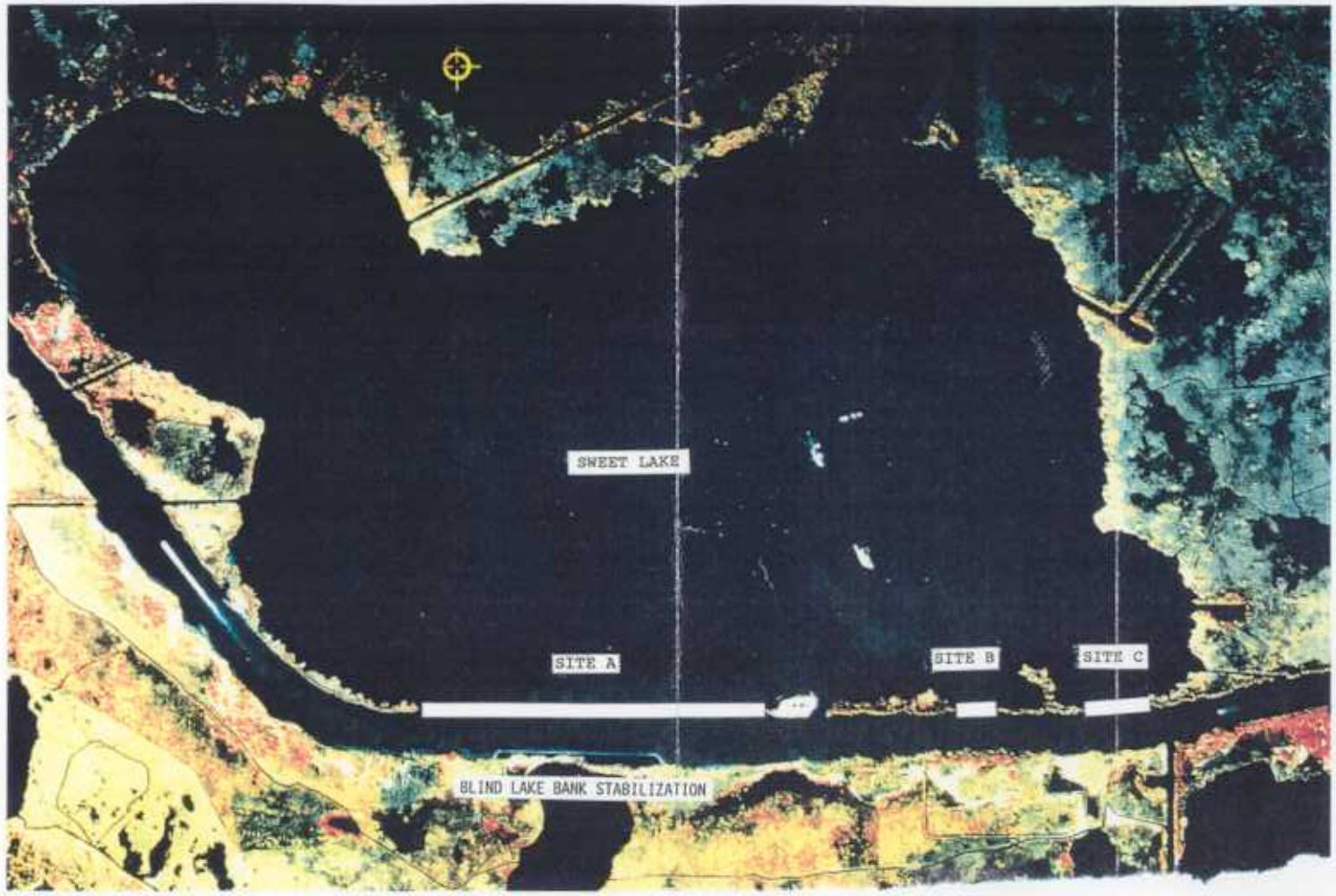
SWEET LAKE / GIWW BANK RESTORATION

Although reconstruction of the bank at the south shore of Sweet Lake would do little to protect the eroding north shore of Sweet Lake from wind-induced wave energy, it would reduce the

inflow of more turbid water from the GIWW into the lake. A reduction in turbidity would create conditions more favorable to aquatic plant growth. Submergent vegetation would dissipate wave energy and reduce shoreline erosion along the Sweet Lake shoreline.

RIP RAP BREAKWATER

Because of the success of the Blind Lake project, similar construction of a rip rap breakwater structure was considered as an alternative method of reconstructing the bank between Sweet Lake and the GIWW. The project site generally has the same soil characteristics and water depths as did the Blind Lake project site. The project design consisted of placing limestone rip rap (LA DOTD specifications or. "Heavy Deposited" rip rap, # 711.02 [c] upon a six-inch bedding layer of shell over filter cloth. The breakwater crest width and height are 1 foot and +2 feet MSL, respectively, with 1 vertical on 2 horizontal side slopes. The design cross section is assumed to be the same for restoration of the Sweet Lake/GIWW bankline The project length may vary. Figure 10 shows three former banklines within the project site boundary that may be restored. Site A, the largest breach, is approximately 4600 feet long with two small remnant islands remaining along it Costs of restoring this site with a limestone breakwater like that of the Blind Lake project are estimated at $450,000. Site



ALTERNATIVE PROJECT AREAS

SWEET LAKE / GOWW BANK RESTORATION

FIGURE 6

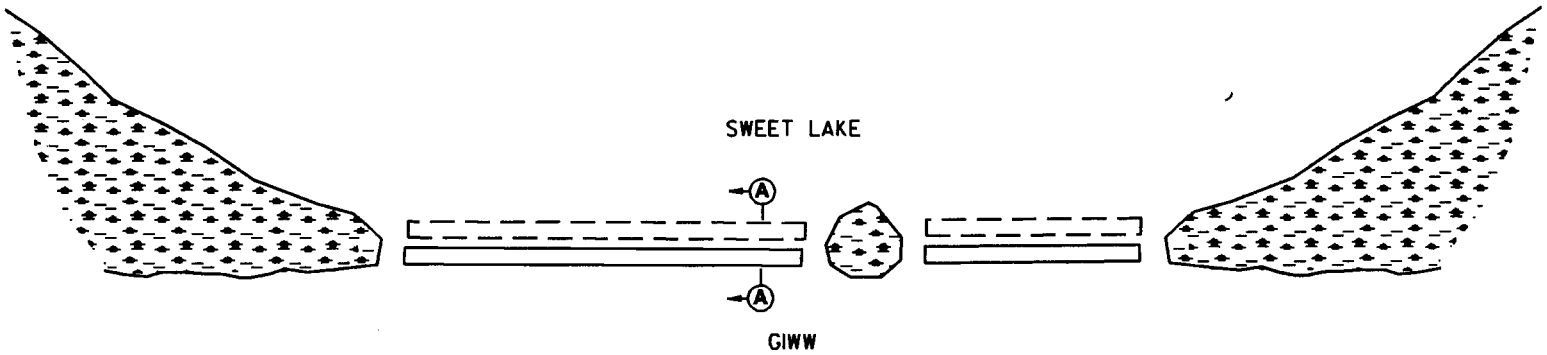
B, a 400 foot breach, could be restored for approximately $30,000. Site C, the easternmost breach along the south Sweet Lake shoreline, is approximately 600 feet wide and can be restored for an estimated $45,000. Implementation of this alternative would require that detailed geotechnical and hydrographic survey data be acquired. To restore the entire Sweet Lake/GIWW bank with the same type of breakwater system as used at Blind lake, the cost would approximately be $525,000.

DREDGE MATERIAL

The GIWW is a unique waterway in that it is a self- maintaining channel. Minimal dredging is required to maintain its 12 foot deep by 125 foot wide minimum dimensions. The Sweet Lake project, located between mile 202 and 205, lies within the Mermentau River - Calcasieu River section of the GIWW. This section was last dredged between September 1982 and January 1983, when 3,200,000 cubic yards of material were removed and placed in unconfined disposal areas (U.S. Army Corps of Engineers, 1992) (Appendix A). In an effort to ensure adequate disposal areas for dredge material removed during routine maintenance of the GIWW for the next twenty years, the New Orleans District of the COE has evaluated the existing disposal plan and possible alternatives. The COE realizes there are many areas throughout the GIWW, like Sweet Lake, that are experiencing substantial erosion. Yet, the channel adjacent to

these areas does not require maintenance. The COE is not authorized to use project funds to repair these areas; thus other means will be needed to make such repairs provided the local sponsor is unable to do so

Although the COE currently has no plans to dredge the GIWW in the vicinity of Sweet Lake, it may be possible to dredge material from the waterway or lakeside of the former bankline using a private cutterhead dredge. Earthen terracing could be constructed along the Sweet Lake south shoreline in much the same manner as would the rip rap breakwater mentioned above Suitable dimensions of the terrace would be a crest elevation of +3 feet MSL, crest width of 5 feet, and 1 vertical on 4 horizontal side slopes. Assuming 50 percent settlement, approximately 7 cubic yards of material would be required for each linear foot of terrace (Figure 11). Costs of constructing Sites A, B, and C are estimated at $79,000, $ 7,000, and $11,000, respectively. Restoration of the entire Sweet Lake south bankline would cost an estimated $97,000. To stabilize the terracing, vegetative planting of giant cutgrass (Zizaniopsis miliaceae) should be done. Transplanting this species within the project area is estimated to cost $1.00 per linear foot of plantings. As with the rip rap breakwater, if this plan was implemented, detailed soils information along with hydrographic survey information would be required before final cross section and quantities could be developed Maintenance of the terraces, involving placement of additional



PLAN
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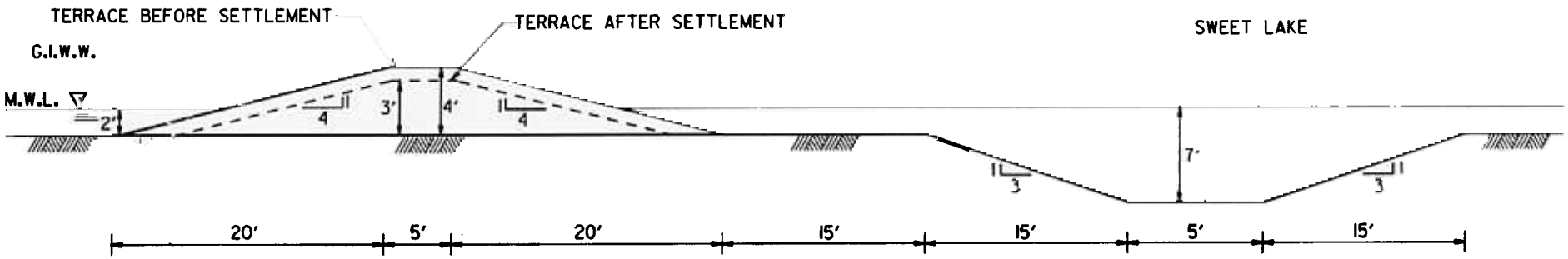


SECTION A-A
N.T.S.

DEPARTMENT OF NATURAL RESOURCES STATE OF LOUISIANA	Brown & Root, Inc. ENGINEERS - CONSULTANTS HELLE CHASSE, LOUISIANA

EARTHERN TERRACE

SWEET LAKE /GIWW BANK RESTORATION

FIGURE 11

dredge material, would be required approximately every five to ten years, depending upon subsidence, including settlement due to placement on terrace material, and erosion rates

STABILIZATION OF NORTHERN SWEET LAKE SHORELINE

To address the severe erosion problem along the north shoreline of Sweet Lake, a number of other shoreline protection alternatives should be considered.

WIRE MESH FENCING

To promote vegetative expansion and protect a portion of the northern Sweet Lake shoreline, a fence has been installed along approximately 2000 feet of the shoreline, ranging 20 to 50 feet offshore. The steel wire fence installed in the summer of 1991 by SCS and Amoco Corporation personnel was designed to floating vegetation, specifically water hyacinth (Eichhornia crassipes). It was intended that an accumulation of floating vegetation behind the fence, fronting the shoreline, would absorb much of the wind-induced wave energy directed towards the shoreline. Thus far, the fence, although already beginning to rust, has worked well, protecting approximately 2000 feet of Sweet Lake north shoreline. At approximately $5.00 per linear foot installed, the vegetation entrapment fence offers an economical solution to shoreline protection. To install a fence

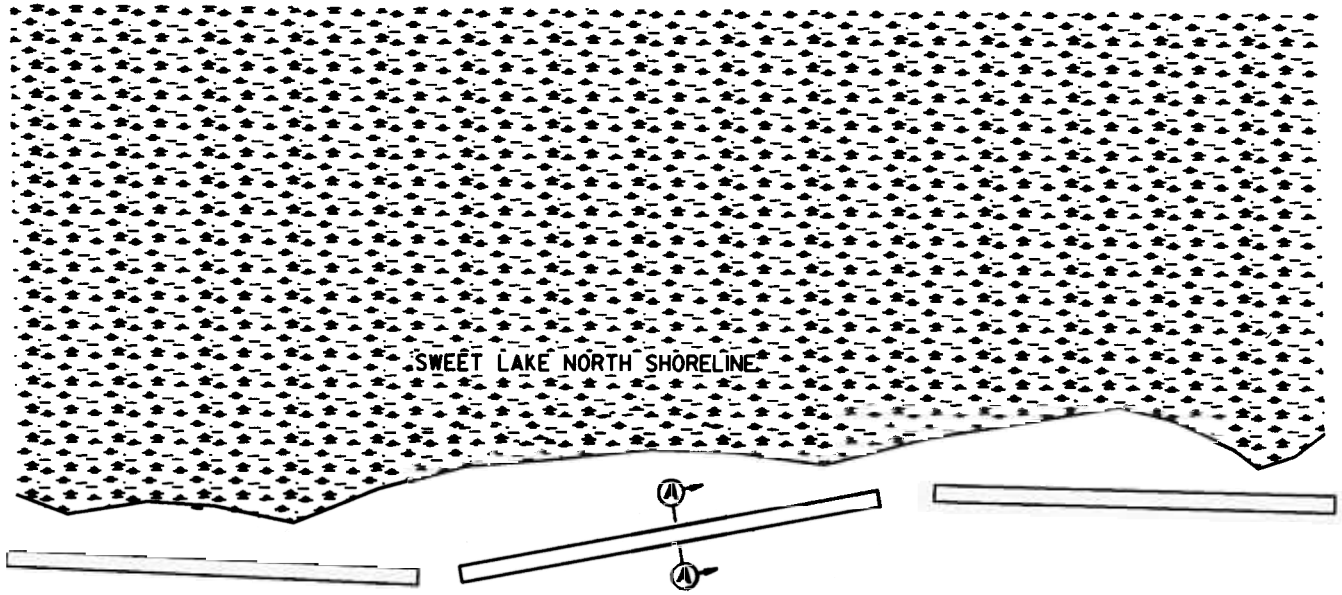
along approximately 11,000 feet of severely eroding north northwest Sweet Lake shoreline, would cost approximately $55,000. Judging from the rapid rate of corrosion incurred by the fence installed in 1991, the estimated life span of such a project is five years. Galvanized fencing could possibly increase the useful life of the project, at about twice the cost of the standard steel fencing. Because the fencing itself is not a wave absorbing mechanism, it requires that floating vegetation be accumulated in its lee. Because water hyacinth, the target species, is prevalent only during the summer months, the protection afforded by the vegetative entrapment fence during other parts of the year would be minimal. However, over time deposition of sediment in suspension and detritus from the trapped floating plants will accumulate and offer some fortification against wave energy. However, consideration should be given to the affect a deteriorating wire mesh fence would have on wildlife and water quality

BRUSH FENCING

Brush fencing has been used for many wetland conservation projects within the Louisiana coastal zone. Its primary applications have been in shallow, low energy nearshore environments; however, it has been installed in some medium to high energy environments. At Fontainebleau State Park, on north shore of Lake Ponchartrain, an investigation was

conducted by the U.S. Army Corps of Engineers under the Shoreline Erosion Control Demonstration Program (Section 54) Results indicated brush fencing mechanisms to be only a moderately to poorly effective shoreline protection method for moderate to high energy shorelines. However, in areas with lower wave energies such as marsh ponds, and small lakes, brush fencing has been successfully used. One form of brush fencing, Christmas tree fencing, has been constructed recently in many coastal parishes, and have shown good results. Brush fencing, constructed along the northern shoreline of Sweet Lake, a to moderate wave energy shoreline, would dissipate wave energy and promote sediment deposition. To withstand the two to three foot waves occasionally experienced here, the fencing would be constructed using three rows of 4-inch diameter fence posts (Figure 12). The three rows would be spaced three feet apart and the longitudinal spacing would be four feet. The area between the fence post would be filled with 2-inch to 6-inch diameter brush cut in lengths no shorter than eight feet brush would be placed in-line with the fence. The fence post would be connected together using timber stringers.

A disadvantage often associated with brush fencing projects has been the lack of a readily available source of brush. Recent conversations with Lake Charles Public Works personnel indicate smaller trees are harvested annually by landowners, especially in spring, in Cameron and neighboring parishes. Yearly, the



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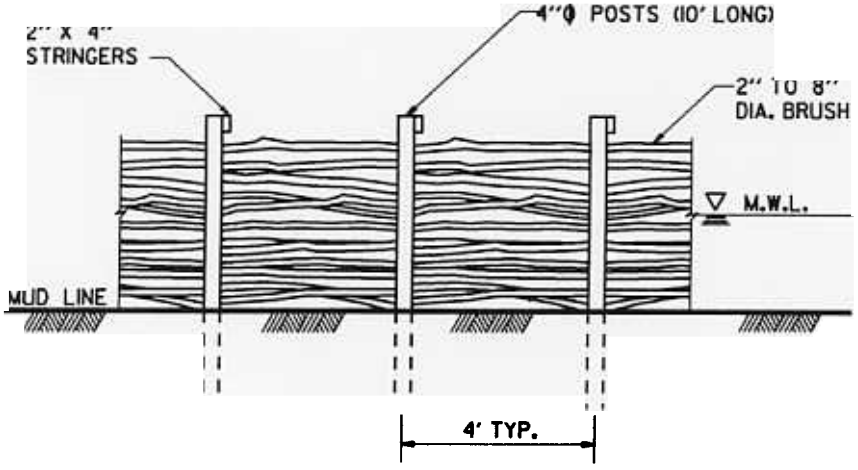

FRONT VIEW
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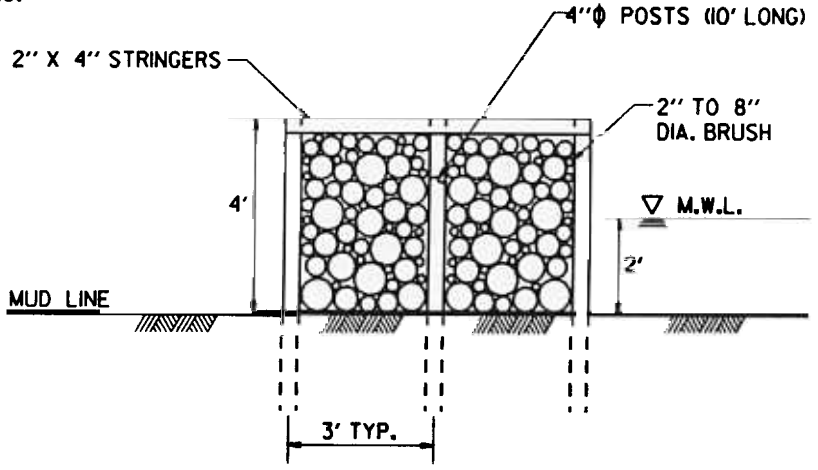

SECTION A–A
N.T.S.

DEPARTMENT OF NATURAL RESOURCES
STATE OF LOUISIANA

Brown & Root, Inc.
ENGINEERS – CONSULTANTS
BELLE CHASSE, LOUISIANA

BRUSH FENCE

SWEET LAKE /GIWW BANK RESTORATION

FIGURE 12

Public Works Department collects and incinerates up to 160,000 cubic yards of wood combustible products, much of which is in the form of smaller cut trees. Because the Public Works Department only collects up to 4 inch- diameter by 4 foot-long brush, thicker, and longer brush could be available for collection from landowners.

It is estimated that 11,000 linear feet of brush fencing could adequately protect the marsh within the project area. Transportation of brush would be necessary from the Department of Public Works incinerator in Lake Charles approximately 40 miles to the project area. Shallow draft skiffs could be used to ferry the brush to the actual project site within the marsh. With materials, transportation, and labor considered, it is estimated that brush fencing for this project would cost $15.00 per linear foot installed. The total estimated cost of 11,000 feet of brush fencing installed along the project shoreline is $165,000. The useful life span of such a fencing system is dependant upon a number of factors. Soil conditions, size and type of brush used, quality of construction, and storm activity will all influence the brush fences capacity to withstand and dissipate wave forces. Project maintenance would be required approximately every one to five years, and include replacement of deteriorated brush as well as reinforcement or replacement of any framework. In five years, approximate costs of maintenance would be $15.00 per linear foot of brush fence.

CONCLUSION AND RECOMMENDATIONS

Stabilization of the barrier bankline between the GIWW and Blind Lake, which reportedly was the original intention of the Sweet Lake/GIWW bank restoration, was accomplished by the Blind Lake project in 1989. The results of this feasibility study indicate the suggested Sweet Lake/GIWW bank restoration alternative does not completely address the more severe problem of shoreline erosion along the northern Sweet Lake shoreline.

The recommended alternative is a more direct stabilization method involving construction of brush fencing along 11,000 linear feet of north and northwest Sweet Lake shoreline. Implementation of this alternative will allow much of the unstable, deteriorating marsh to stabilize by dissipating wave energy and promoting sediment deposition. The estimated first cost for this project is $165,000. Maintenance will be required approximately every one to five years, and include replacement of deteriorating brush as well as reinforcement of any timber framework. In five years maintenance costs should be approximately $15.00 per linear foot of brush fence.

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APPENDIX

U.S ARMY CORPS OF ENGINEERS

NEW ORLEANS DISTRICT

THE GULF INTRACOASTAL WATERWAY

PROPOSED LONG TERM DISPOSAL PLAN

THE GULF INTRACOASTAL WATERWAY

PROPOSED LONG TERM DISPOSAL PLAN

I. PURPOSE. In an effort to ensure adequate disposal areas for dredged material removed during routine maintenance of the Gulf Intracoastal Waterway (GIWW) for the next twenty years, the New Orleans District evaluated the existing disposal plan and possible alternatives.

II. OBJECTIVE. To develop a more environmentally acceptable plan at a reduced, comparable, or justifiably increased cost. The goal is a long term disposal plan incorporating beneficial use of the dredged material to the maximum extent practicable.

III. WORK GROUP MEMBERS. A work group was formed of District personnel familiar with past and present dredging requirements and environmental effects of dredging the GIWW Members of the group include:

Mr. John Flanagan, Project Manager, O & R Division
Dr. Linda Glenboski, Environmental Resource Specialist, O & R Division
Mr. Rick Broussard, Supvr. Civil Engr., Engr. Division
Mr. Larry Hartzog, Fisheries Biologist, Planning Division.

IV. PROJECT AUTHORIZATION. River and Harbor Act of 24 July 1945, Senate Document 242, 79th Congress, 2nd Session, and prior R & H Acts, provide for a waterway 384.1 miles long, 12 feet deep and 125 feet wide at mean low gulf from Lake Borgne Light No. 29 (formerly No. 41), near the mouth of the Rigolets to the Sabine River, Louisiana and Texas, except in the section between Lake Borgne Light No. 29 and New Orleans (33.1 miles long via land cut through the marsh and the Industrial Canal), where a width of 150 feet is provided. An alternate route 40.5 miles long, 9 feet deep by 100 feet wide between Lake Borgne Light No. 29 and New Orleans via Rigolets, Lake Pontchartrain, and Industrial Canal, an alternate connection with the Mississippi River below Algiers approximately 9 miles long, 12 feet deep and 125 feet wide with a lock (Algiers Lock) at the river end; an alternate route 12 feet deep and 125 feet wide from Morgan City, Louisiana to Port Allen, Louisiana via the East Atchafalaya Basin Protection Levee Borrow Pit, Bayou Sorrel Lock, Lower Grand River and Bayou Plaquemine to Indian Village thence via Bayou Grosse Tete and new land cut to the Mississippi River passing through a terminal lock in levee at Port Allen opposite Baton Rouge; a

channel 9 feet deep and 100 feet wide from Indian Village via Bayou Plaquemine to Plaquemine, Louisiana, improvement of Franklin Canal as a connecting channel from GIWW (mile 121) to Franklin, Louisiana, 8 feet deep by 60 feet wide, with its upper 300 feet having a width of 100 feet. The construction of a lock at Harvey, Louisiana (Harvey Lock), a saltwater guard lock (Leland Bowman Lock) in the waterway at mile 182.8 west of Harvey Lock, a saltwater guard lock (Calcasieu Lock) in the waterway at mile 238.5 west of Harvey Lock, and a lock at mile 93.5 (Bayou Boeuf Lock) west of Harvey Lock, constructed under the existing project "Flood Control, Mississippi River and Tributaries". The project also provides for the following: widening of bends, passing places, mooring basins, such as railroad and highway bridges over artificial cuts as are necessary; purchase of pipeline dredge; construction and operation of new drainage canals and pumping facilities to restore parish drainage systems where intercepted; construction of a double leaf bascule four-lane highway bridge with approaches at Louisiana State Highway No. 47; construction of movable bridges at M.P.R.R. and Louisiana State Highway Nos. 23 and 406; fixed trestle bridges for crossing of proposed landside drainage canals, lift bridges at Louisiana State Highway No. 1 at Port Allen, Louisiana, T&P R.R. at Port Allen, Louisiana, T&P R.R. at Morley, Louisiana; construction of bulkheads and jetties at Lake Borgne and Chef Menteur, Louisiana, if found necessary, and for annual payments to the Board of Commissioners of the Port of New Orleans for use of a portion of the Inner Harbor Navigation Canal and Lock. The length of waterway within the U.S. Army Engineer District, New Orleans, is 384.1 miles via the northernly or Port Allen route and 299.4 miles via the southernly or Harvey Canal route.

V. HISTORY. The GIWW is a unique waterway in that it is a self-maintaining channel. The historical data is very limited due to its self-maintaining characteristic. Enclosure 1 shows the District's boundries relative to the GIWW. The GIWW is divided into seven reaches and are as follows:

REACH	DISTANCE
A. New Orleans-Rigolets	36.4 Miles
B. Miss. River-Atch. River	95.5 Miles
C. Atch. River-Vermilion River	63.6 Miles
D. Vermilion River-Mermentau River	42.7 Miles
E. Mermentau River-Calcasieu River	37.1 Miles
F. Calcasieu River-Sabine River	27.1 Miles
G. Port Allen-Morgan City (Alternate Route	64.1 Miles

VI. DREDGING HISTORY. (last 20 years)

REACH	DISPOSAL	QUANTITY	COMMENCED	COMPLETED
GIWW 11.3 to 235.2(NC)	Confined	1,360,000	Jun 72	Nov 72
Atch-Verm 145.9-174.9(NC)	Confined	1,800,000	Oct 74	Jan 75
Miss-Atch 19.3-57(NC)	Confined	3,500,000	Jul 78	Apr 79
Verm-Merm 164.9-201.6(NC)	Unconfined	3,800,000	Oct 81	Apr 82
Merm-Calc 202.6-237.9(NC)	Unconfined	3,200,000	Sep 82	Jan 83
Atch-Verm 100-158(NC)	Unconfined	3,200,000	Mar 85	Nov 85*
Atch-Verm 108.9-160.3(NC)	Unconfined	sta to sta	Feb 87	Jun 87

* This contract was terminated for convenience of the Government. The work was complete via the FY 87 contract

VII. CURRENT DISPOSAL PLAN. Prior to 1987, all dredged material was placed in confined disposal areas. In 1987 we began to create and nourish marsh by disposing in unconfined areas.

VIII. LONG TERM DISPOSAL PLAN (LTDP). The Soils Conservation Service (SCS) participated in a study to determine areas throughout the entire GIWW that require attention, i.e. bank stabilization, wetland creation, and marsh nourishment.

If there is a need to dredge in any particular reach we feel that enough areas exist to utilize the dredged material beneficially. Bank stabilization could be performed without the use of rip-rap in given areas with the use of bucket dredges. Creation and nourishment of wetlands can be performed with hydraulic cutterhead dredges. There are areas throughout the GIWW that are experiencing substantial erosion, consequently, freshwater marsh is lost, yet the channel adjacent to these areas does not require maintenance. The Corps of Engineers is not authorized to use project funds to repair these areas. Therefore, for example, if an eroded bankline does not fall in the general area of dredging, another means of authority will be needed to make such repairs provided the local sponsor is unable to do so. These areas may qualify for assistance under other programs such as the Coastal Wetlands Planning and Restoration Act or Section 1135.

IX. CONCLUSION. Theoretically, this is a 20 year disposal plan, however, that doesn't mean that this entire waterway will be dredged during that 20 year period.

We believe that this proposal which plans to fill old pipeline canals, restore eroded banklines, create wetlands, and nourish marsh is the most economical plan that meets the federal standard. The reason for this is due to SCS's "hot spots" which are located within our disposal areas, subsequently, there will be no need to procure additional rights-of-way.

NOTE: Aerials of the project will be presented at the meeting indicating the Corps disposal areas.