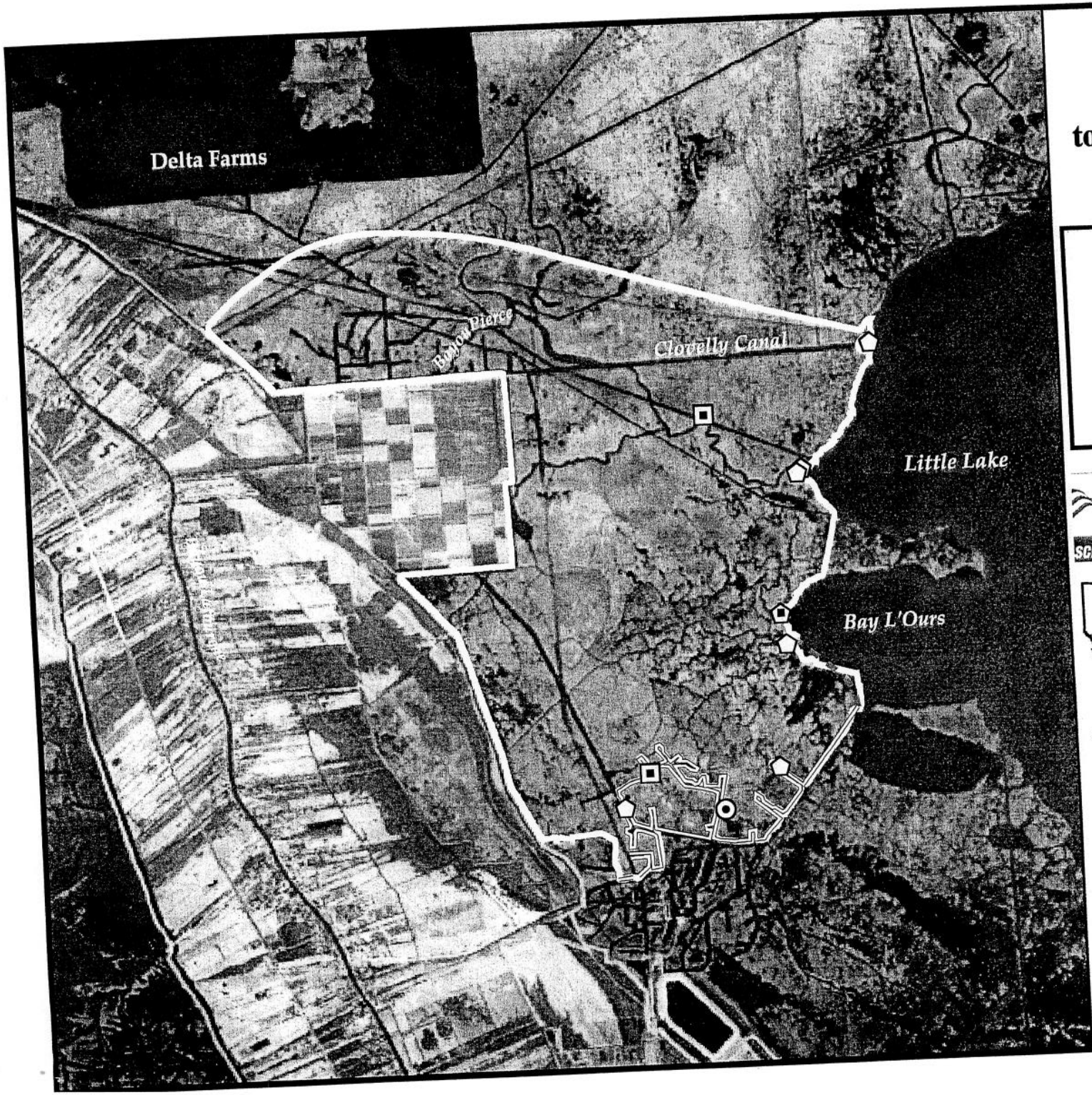
F E A S I B I L I T Y R E P O R T

PROJECT NO. BA-2
GIWW TO CLOVELLY WETLANDS

Completed by
USDA-Soil Conservation Service
for
LA. DNR - Coastal Restoration Division

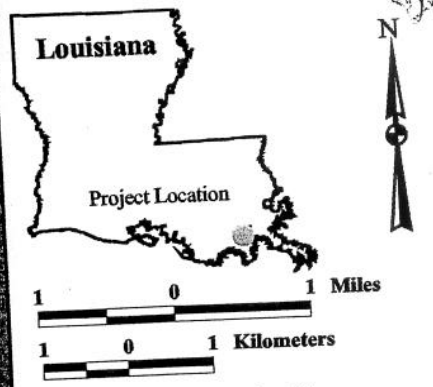
September 30, 1991



GIWW (Gulf Intracoastal Waterway) to Clovelly Hydrologic Restoration (BA-02)

- Culvert
- Plug
- Weir
- Weir and Plug
- Spoil Bank
- Shoreline Protection
- Project Boundary

USGS
science for a changing world



Map Produced By:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station

Background Imagery:
Thematic Mapper Satellite Imagery 2000

Map Date: August 27, 2002
Map ID: 2002-11-738
Data accurate as of: August 27, 2002

PROJECT
BA-2 GIWW TO CLOVELLY WETLANDS
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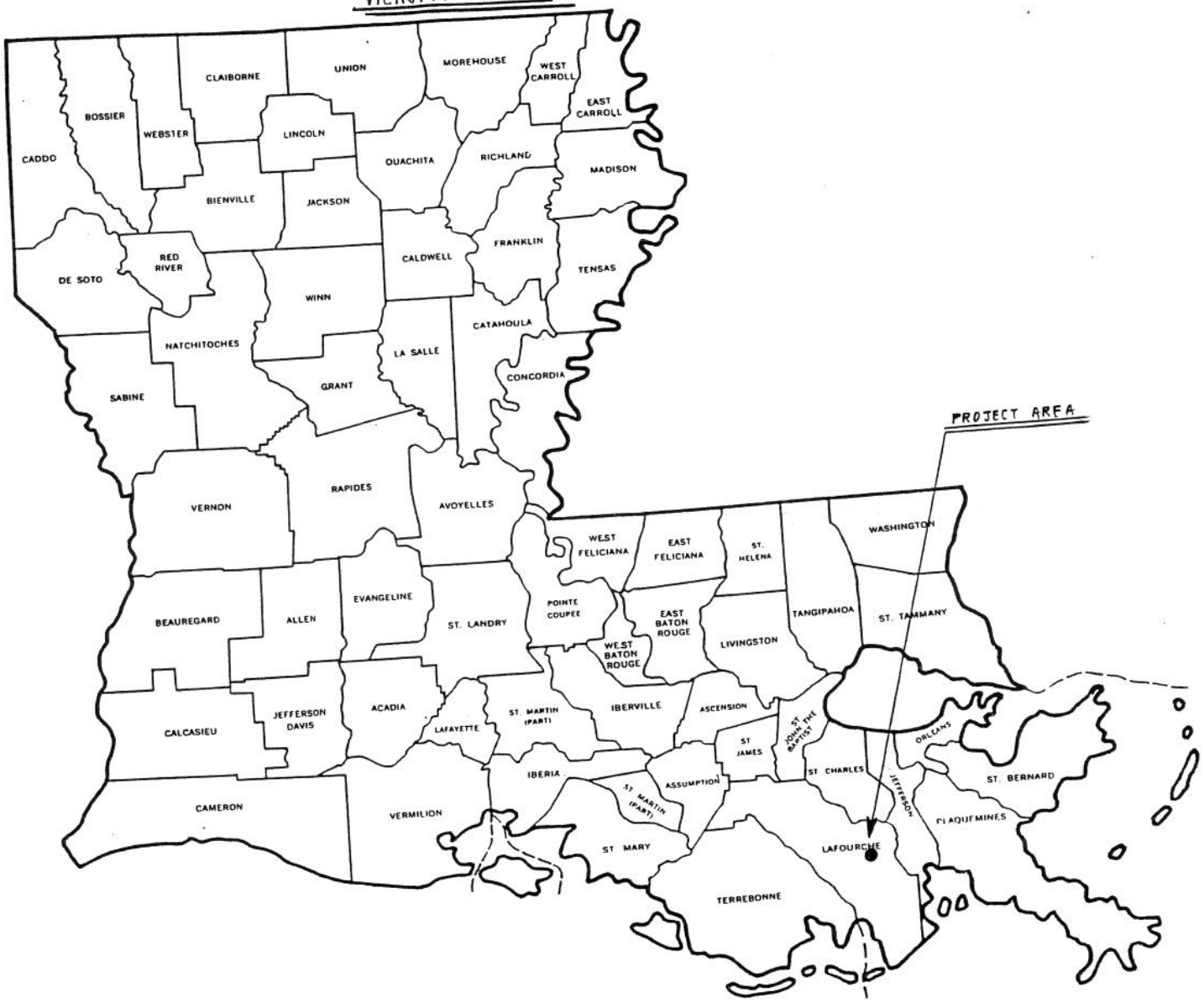
VICINITY MAP



0 50 100 150 Miles

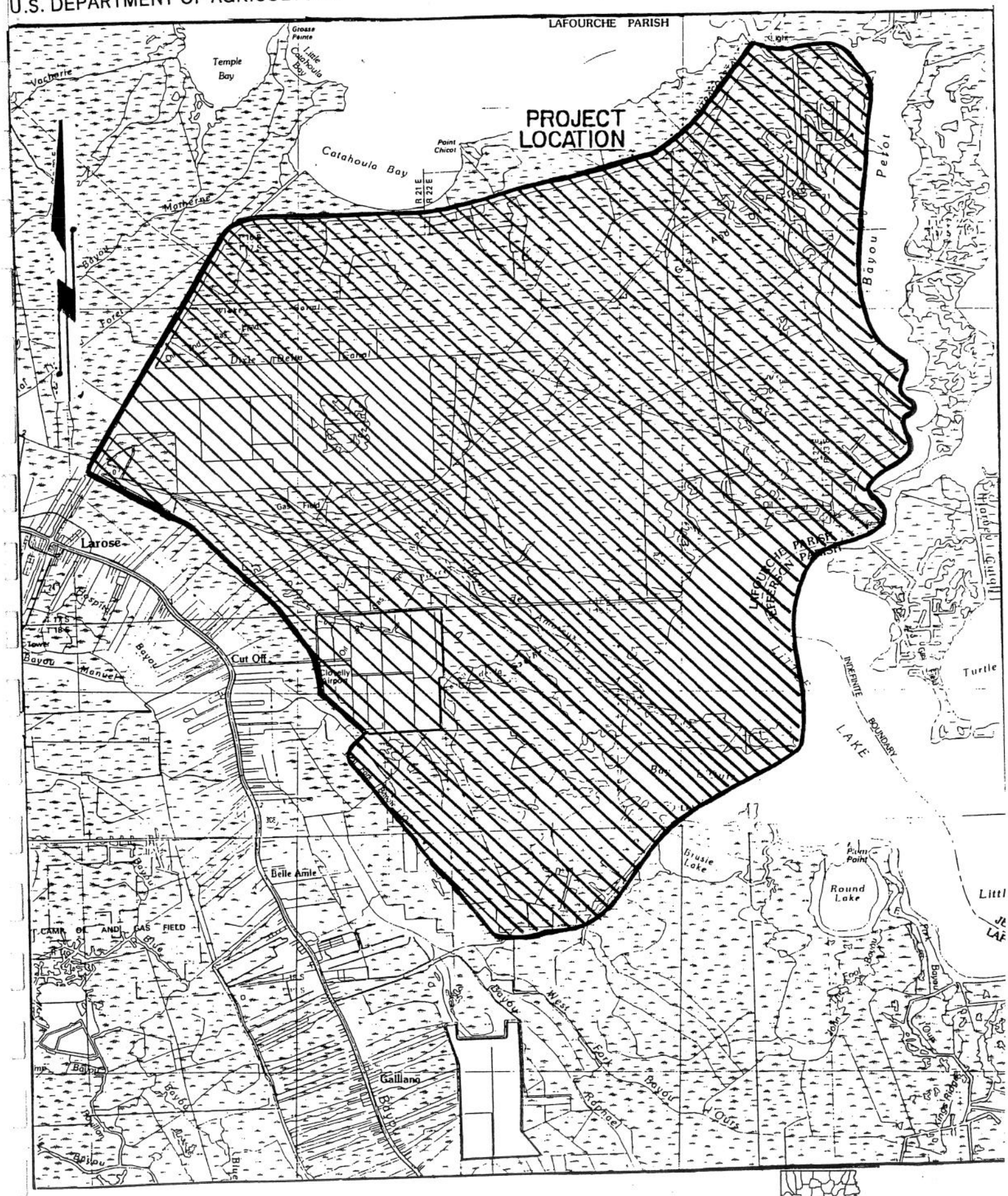
Base 4-L-15779A

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Alexandria, Louisiana

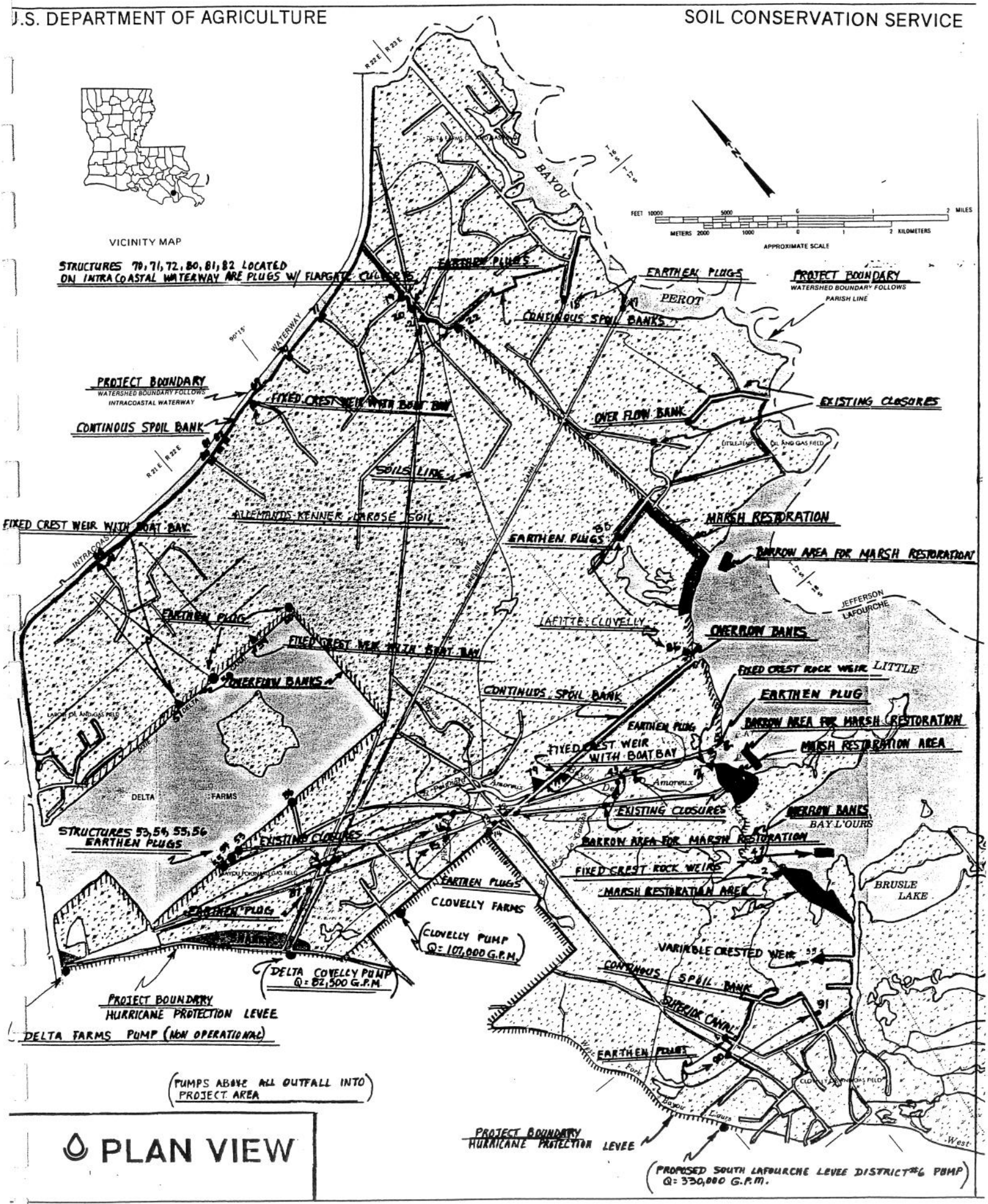
USDA-SCS-FORT WORTH, TEX. 1965

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



VICINITY MAP


VICINITY MAP
APPROXIMATE SCALE
FEET 10000 5000 0 1 2 MILES
METERS 2000 1000 0 1 2 KILOMETERS
STRUCTURES 70, 71, 72, 80, 81, 82 LOCATED ON INTRACOASTAL WATERWAY ARE PLUGS W/ FLAPGATE CULVERTS
EARTHEN PLUGS
EARTHEN PLUGS
PROJECT BOUNDARY
WATERSHED BOUNDARY FOLLOWS PARISH LINE
PEROT
CONTINUOUS SPOIL BANKS
WATERWAY
PROJECT BOUNDARY
WATERSHED BOUNDARY FOLLOWS INTRACOASTAL WATERWAY
FIXED CREST WEIR WITH BOAT BAY
EXISTING CLOSURES
CONTINOUS SPOIL BANK
OVER FLOW BANK
SOILS LINE
ALLEMANDS KENNER LAROSE SOIL
FIXED CREST WEIR WITH BOAT BAY
MARSH RESTORATION
EARTHEN PLUGS
BARROW AREA FOR MARSH RESTORATION
JEFFERSON
LAFOURCHE
EARTHEN PLUG
LAFITTE CLOVELLY
OVERROW BANKS
FIXED CREST WEIR WITH BOAT BAY
OVERFLOW BANKS
FIXED CREST ROCK WEIR
LITTLE
CONTINUOUS SPOIL BANK
EARTHEN PLUG
BARROW AREA FOR MARSH RESTORATION
EARTHEN PLUG
MARSH RESTORATION AREA
FIXED CREST WEIR WITH BOAT BAY
Amoreux
DELTA
FARMS
EXISTING CLOSURES
OVERROW BANKS
BAY L'OURS
STRUCTURES 53, 54, 55, 56 EARTHEN PLUGS
EXISTING CLOSURES
BARROW AREA FOR MARSH RESTORATION
FIXED CREST ROCK WEIRS
MARSH RESTORATION AREA
BRUSLE LAKE
EARTHEN PLUGS
CLOVELLY FARMS
EARTHEN PLUG
(CLOVELLY PUMP Q= 107,000 G.P.M.)
VARIABLE CRESTED WEIR
CONTINUOUS SPOIL BANK
(DELTA COVELLY PUMP Q= 82,500 G.P.M.)
PROJECT BOUNDARY
HURRICANE PROTECTION LEVEE
DELTA FARMS PUMP (NON OPERATIONAL)
SUFFOLK CANAL
EARTHEN PLUGS
(PUMPS ABOVE ALL OUTFALL INTO PROJECT AREA)
PROJECT BOUNDARY
HURRICANE PROTECTION LEVEE
(PROPOSED SOUTH LAFOURCHE LEVEE DISTRICT #6 PUMP Q= 330,000 G.P.M.)

PLAN VIEW

PROJECT DESCRIPTION

Location

The GIWW to Clovelly Wetlands project is located east of Cut Off, Louisiana. The area is bounded on the north by Bayou Perot and the Intracoastal Waterway; on the south by the Superior canal; the east by Bayou Perot, Little Lake, and Bay L'Ours; and the west by the Intracoastal canal and the Lafourche Parish Force Drainage Levee, the West Fork of Bayou L'Ours and Clovelly Farms. The project area and benefited area is in excess of 60,000 acres of fresh, intermediate and brackish wetlands located in parts of T-16S R-21E, 22E, 23E, T-17S R-21E, 22E, 23E, and T-18S R-21E, 22E, in the Barataria Basin of Lafourche parish. The approximate location of the center of the project is longitude 90° 15′ 00" and latitude 29° 36′ 15".

Justification

The GIWW to Clovelly Wetlands are deteriorating due to saltwater intrusion, oil field activities, subsidence, lack of sedimentation, and reduced freshwater influx. The area lost 6455 acres of vegetated wetlands to open water between 1956 and 1984. An additional 9036 acres changed from solid marsh to broken marsh between 1978 and 1984. Acres of broken marsh will soon convert to open water, due to the aforementioned factors. Literature has cited a loss of

22.5% of land area from 1956 to 1984 (Table 1). At the current rate of erosion, this valuable estuary system, which is the largest contiguous system remaining in coastal Louisiana, will be lost within the foreseeable future.

Vegetation

This area was classified as a solid fresh marsh by O'Neil in 1947. In 1978 it was classified as intermediate by Charbreck. Research indicates that the fresh and intermediate line has been retreating northward since 1956. This can be seen by changes in vegetative types. At present, the lower part of the project area would be classified based on vegetative type as brackish marsh.

A vegetative transect of the interior marsh shows areas at the southern part of the project to be 90-95% marshhay cordgrass (*Spartina patens*) with traces of olney threesquare (*Scirpus olneyi*), saltmarsh loosestrife (*Lythrum lineare*), and bristlegrass (*Setaria sp.*). As you move north into the project area, the percent of marshhay cordgrass decreases with a corresponding increase of bulltongue (*Sagittaria lancifolia*) with traces of other more fresh species such as cattail (*Typha glauca*), and cutgrass (*Zizaniopsis miliacea*). Bulltongue composes up to 95% of the emergent vegetation in the north part of the project area. Marshhay cordgrass was observed at all but three of the 16 sites on the vegetation

transect. Vegetation along the shorelines are smooth cordgrass (Spartina alterniflora), saltgrass (Distichlis spicata), and marshhay cordgrass (Spartina patens). The dominate vegetation along many of the canals and natural bayous in the fresh inland is marshhay cordgrass (Spartina patens), indicating saltwater is entering or has entered the area at some time.

Habitat Changes

The following chart shows habitat changes in the area:

	1956 to 1978		1978 to 1984	
Description of Change	Area (acres)	Percent	Area (acres)	Percent
water to water	3775	6.3	7235	13.1
water to marsh	796	1.3	2391	4.3
water to land	132	0.2	361	0.7
marsh to water	3744	6.3	2711	4.9
marsh to marsh	41785	70.1	28748	51.8
marsh to land	1619	2.7	1735	3.1
land to water	3800	6.4	367	0.7
land to marsh	3251	5.5	1038	1.9
land to land	700	1.2	447	0.81
water to broken marsh			1006	1.8
marsh to broken marsh			9036	16.3
land to broken marsh			386	0.7
Total	59603		55462	

Table 1

Shoreline Erosion

Shoreline erosion rates were determined from aerial photographs dated 1953 and 1980 and are listed in the table below:

WATER BODY	FEET/YEAR
Bayou L'Ours	7'
Little Lake	7'
Bayou Perot	10'
GIWW	6'

The major causes of erosion along bays and bayous are boat wake and wind generated wave action. Daily tidal fluctuations, ranging from 0.2 to 2.2 feet, also contributes to shoreline erosion.

Hydrology

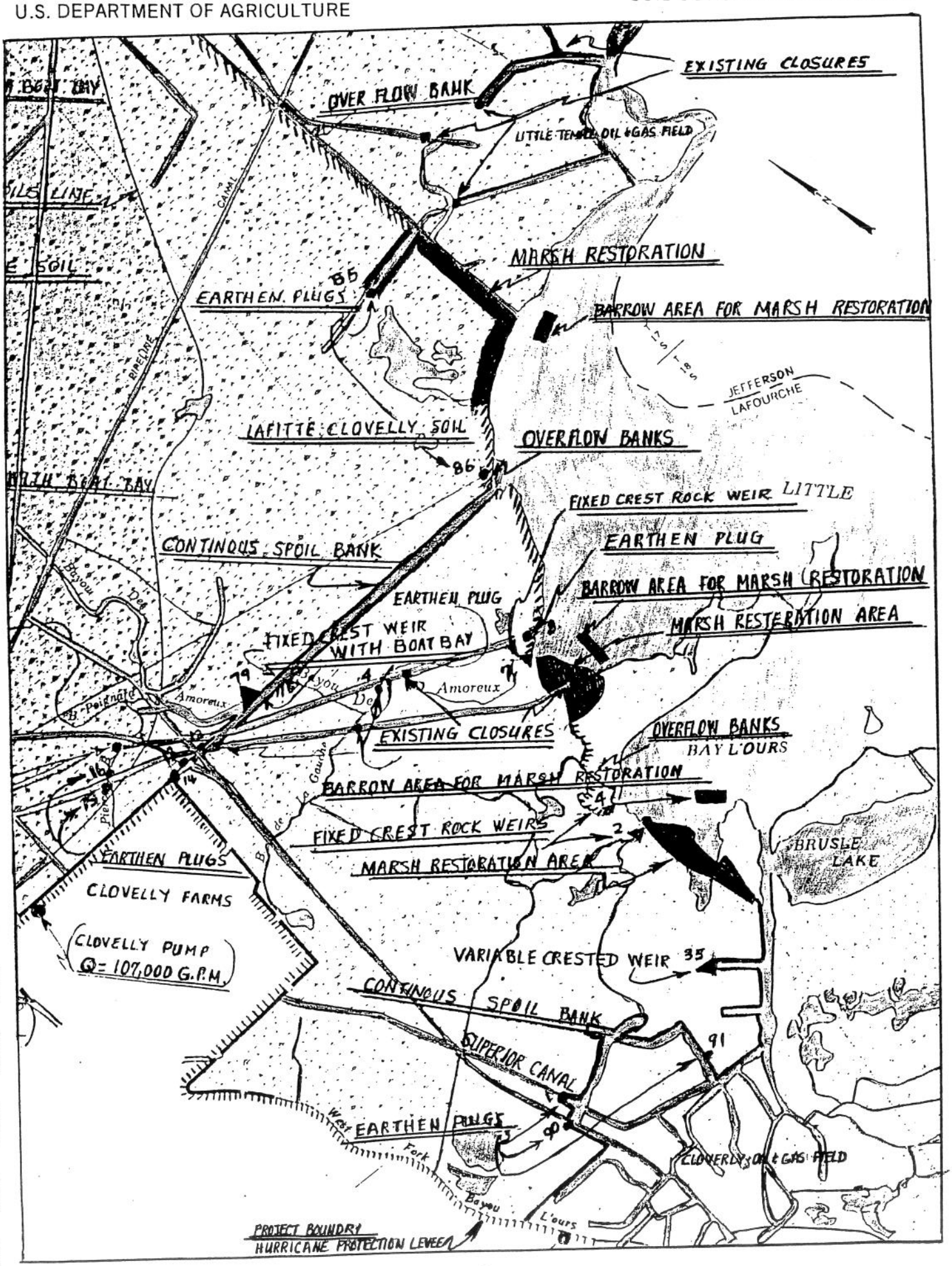
Hydrology of the area, which historically included meandering bayous and ridge system has been greatly altered. Canals such as the SNG pipeline canal and the Superior Canal transport higher salinity water from Little Lake and Bay L'Ours further into the inland fresher marshes. Increased tidal waters also enter from the GIWW. Construction of these and other canals such as the Clovelly Canal, and associated oil and gas canals has resulted in increased tidal fluctuations. Several natural bayous still provide water exchange between the marsh and adjacent waters.

This project includes the use of dredge material along the shoreline of Bay L'Ours. An area of 4.5 miles (23,760 ft) by 200 ft (109 acres) will have dredge material placed on it for marsh creation and stabilization (Figure 1).

The purpose of the dredge material placement is to recreate the natural slightly raised bay shoreline. Smooth cordgrass (Spartina alterniflora) will be planted at the edge of the shoreline and on dredge material, once it has consolidated, for erosion protection. Wave dampening fences will be used to abate wave action and allow establishment of plants. The present vegetation is marshhay cordgrass, a typical interior marsh plant, not a typical shoreline plant, that cannot withstand constant wave action. The typical shoreline vegetation which can better tolerate wave action has been lost to erosion.

Soils

The plan area is composed of several soil types including Allemands, Kenner-Larose, Lafitte-Clovelly, and Timbalier-Bellpass, and Sharkey soil association. The Allemands and Kenner-Larose association is characterized by level, poorly drained organic and semifluid soils in fresh marshes. The Lafitte-Clovelly and Timbalier-Bellpass associations have similar characteristics but are located in


EXISTING CLOSURES
OVER FLOW BANK
LITTLE TEMPLE OIL & GAS FIELD
MARSH RESTORATION
EARTHEN PLUGS
BARROW AREA FOR MARSH RESTORATION
JEFFERSON
LAFOURCHE
LAFITTE CLOVELLY SOIL
OVERFLOW BANKS
FIXED CREST ROCK WEIR
LITTLE
EARTHEN PLUG
CONTINOUS SPOIL BANK
BARROW AREA FOR MARSH RESTORATION
EARTHEN PLUG
MARSH RESTERATION AREA
FIXED CREST WEIR WITH BOAT BAY
Bayou Amoreux
EXISTING CLOSURES
OVERFLOW BANKS
BAY L'OURS
BARROW AREA FOR MARSH RESTORATION
FIXED CREST ROCK WEIRS
MARSH RESTORATION AREA
BRUSLE LAKE
EARTHEN PLUGS
CLOVELLY FARMS
CLOVELLY PUMP
Q= 107,000 G.P.M.
VARIABLE CRESTED WEIR
CONTINOUS SPOIL BANK
SUPERIOR CANAL
EARTHEN PLUGS
CLOVERLY OIL & GAS FIELD
Bayou L'ours
PROJECT BOUNDRY
HURRICANE PROTECTION LEVEE

more brackish to saline areas. These soils are highly organic and in some cases are floating. Floating marshes are known as flotants. Flotant marshes are not as severely affected by subsidence because of their buoyant nature. Sharkey soils are level, poorly drained clayey soils, which are occasionally flooded. These soils are found along the Bayou Lafourche ridge.

Salinity

The mean salinity for the project area over the last 20 years ranges from 0 - 5 parts per thousand (ppt) over approximately 97% of the area. The remainder of the area (in the southwest corner) ranges from 6 - 10 ppt.

During normal years, salt water intrusion coupled with less rainfall from September through October is partly responsible for the southern portion being in the salinity range of 6 - 10 ppt.

These figures reflect adequate salinity conditions for fresh marsh vegetation; however, they are averages over 20 years and do not reflect large infusions of saltwater that have occurred in the past.

OBJECTIVES and GOALS

The objectives of this project are to enhance the overland flow of freshwater and return the flow to as close to the historical sheet flow pattern, as possible; to abate saltwater intrusion and improve water quality; to restore wetlands along bay boundaries; to decrease and prevent adverse increases of tidal water exchange through tidal channels and breaching into ponds; and to reduce shoreline erosion and land loss. Specific goals needed to achieve these objectives are:

(1) Maintain or recreate natural levees along bays and boundaries to re-establish natural overland flow and historical hydrology in the area and reduce rapid tidal exchange.

(2) Reroute pump discharges through marshes.

(3) Moderate salinity levels and rapid tidal fluctuations through freshwater introduction and structural measures.

(4) Isolate canals from the marsh system to reduce the negative influence to the marsh hydrology.

Additional Benefits

Additional benefits expected from this project are to aid in freshwater recharge in the event of a hurricane, and reduce rapid deterioration and prolong the life of this valuable estuarine system.

EVALUATION of ALTERNATIVES

Several alternatives were considered prior to the selection of the proposed plan. Following is a list of changes which were incorporated into the plan as a result of environmental and socio economic concerns raised during the planning/permitting process:

1. Boat bays were added to all fixed crest weir structures.
2. Rock weirs were incorporated for ingress and egress of fisheries organisms and replaced typical weirs where feasible.
3. Structures planned on the GIWW were changed from solid plugs to plugs with flap gated culverts to allow suspended sediments from the GIWW to enter the project area when available.
4. Plans developed by private consultants and federal agencies were reviewed.
5. The plan was once considered by the Soil Conservation Service as a land treatment project with no cost sharing. A supplement has been added to include a cost share rate.
6. Additional structures and changes in structures were added to benefit fisheries and reduce ponding.
7. A plug in the Clovelly canal has been changed to a movable plug to accommodate oilfield activities.

EVALUATION of SELECTED PLAN

The selected project is expected to meet the following objectives and goals:

1.) Increase overland flow.

2.) Reduce saltwater intrusion.

3.) Increase vegetated marshland.

4.) Create marsh.

5.) Reduce shoreline erosion.

6.) Reduce land loss.

7.) Enhance the hydrology of the area.

8.) Better utilize fresh water input into the area.

9.) Increase sediments and nutrients to the area.

10.) Improve water quality.

Plan Components

The selected plan is composed of the following components: (1) 5 plugs w/48" diameter gated culverts, (2) 3 rock weirs installed with vertical slots to a depth of $\geq$ 4′ and channel widths $\geq$ 50′ at low tides, (3) 1 variable crest weir (sill 4′BML), (4) 22 earthen plugs w/sheet piling cores, (5) 1 36" diameter gated culvert, (6) 8 fixed crest weirs w/10′boat bays and sills set at 0.5′ BML, (7) 2 open culverts, (8) approximately 285,120′ or 54 miles of spoil bank maintenance, (9) approximately 105,600′ or 20 miles of "overflow banks", (10) degrading approximately 1600′ of

existing spoil banks to marsh level, (11) diverting water from 6 drainage pumping stations with a capacity of 573,725 gallons per minute or 925,000 acre feet/year, (12) the placement of spoil on 23,760′ or 4.5 miles by 200′ (109 acres) of area for marsh creation and restoration, and (13) fifty miles of shoreline erosion protection by vegetative plantings.

Water Management Scheme

A combination of passive and active water control systems compose the water management scheme. Passive elements are (1) fixed-crest weirs with boat bays, (2) earthen plugs, (3) rock weirs, (3) overflow banks, (4) spoil banks, and (5) spoil bank degradation. Once installed, these water control measures will function without manipulation by man except for periodic maintenance; hence, no operational schedule is required. The sill heights or elevations, widths, etc. determines the capacity of the passive elements to regulate or control the target water parameters of salinity, depth, and sediment load. Specifications of the passive elements are detailed in the engineering section of this report.

A variable-crest weir, gated culverts, and pumping stations make up the active water control system. The operational schedule for the active measures is as follows:

Active element	Schedule of Operation
(a) Variable-crest weir (ES 35)	This structure is planned to allow for sediment introduction and will not function as a salinity control structure. All stop-logs in this weir will be removed from November to April. Stop logs will be set at .5 feet below marsh level the remainder of the year.
(b) Culverts w/screw gates and/or flap gates ES-70 ES-71 ES-80 ES-81 ES-82 ES-91	These structures are planned to allow freshwater/sediment introduction into the interior marsh from the freshwater/sediment supply source (GIWW and Canal Site 91). The screw gates on the culverts installed between GIWW and the adjacent marsh are scheduled to be closed when the salinity level in the GIWW exceeds 2 ppt at site number 71. Flap gates on the marsh side of the culverts will flap continually. No closure safeguard is necessary for the flap-gated culvert installed at site 91

	because salinity levels within the canal do not reach deleterious levels. This structure will flap year round.
(c) Pumping stations (Site A through N)	All pumping stations are existing except for the station at Site N which is permitted for construction. The pumping stations discharge freshwater runoff from adjacent developed areas to the project area. The primary source of water supplied via pumping stations is runoff from rainfall. All pumping stations are operated in response to rainfall events. No specific, predetermined operation schedule is planned.

SOCIO - ECONOMIC CONCERNS

Social Impacts and Concerns

Public scoping meetings have been held and comments from the agencies involved in planning and funding were solicited and also comments from the following agencies:

U.S. Agriculture Stabilization & Conservation Service

U.S. Forest Service

U.S. Army Corps of Engineers

Office of the Governor - Louisiana

Louisiana Cooperative Extension Service

Louisiana Dept. of Transportation and Development

Louisiana Dept. of Agriculture and Forestry - Office of Soil & Water Conservation

Louisiana Universities Marine Consortium

Louisiana Geological Survey

Louisiana Dept. of Culture, Recreation, and Tourism

Comments from all the preceding agencies are listed in Supplement No.1 of the West Fork Bayou L'Ours Watershed Plan Environmental Assessment. All concerns, including environmental and socio-economic, were discussed when considering alternatives and have been addressed and agreed upon prior to issuance of the permits.

The following is the status of the environmental compliance:

a. NEPA - Process complete; full compliance.

b. Section 10/404 - Applied for an approved; Expected in September 1991.

c. LA Coastal Zone Management Permit - Applied for and received.

d. Water Quality Certification - Applied for and received.

e. Endangered Species Act - Compliance, the American alligator will benefit from project measures, and no other threatened or endangered species will be adversely affected.

There are three primary landowners in the project with over 233 leasees using the area for hunting, fishing, trapping, campsites or boat sheds.

Protected Cultural and Environmental Resources

Thirteen archaeological sites are known to exist within the boundaries of the project area. The type and number of each site is as follows:

11 prehistoric shell middens (predominantly clam shells)

1 prehistoric mound

1 hamlet

Project implementation is not expected to produce any significant impacts upon the cultural resources located in the area.

The proposed project site provides critical habitat for several species of threatened and endangered wildlife. The area affords

habitat for the endangered bald eagle (Haliaeetus leucocephalus), threatened piping plover (Charadrius melodus), and threatened peregrine falcon (Falco peregrinus). The continued existence of threatened and endangered species depends primarily upon man's ability to restore and preserve the few remaining areas containing the essential habitat components required by these creatures. The planned project is expected to maintain and/or improve the habitat base upon which the aforementioned species derive their livelihood. Action taken by project implementation is not expected to jeopardize the continued existence of listed species, nor is action taken expected to adversely impact the habitat utilized by these species.

Estimated Project Schedule

Planning:

The planning of the project is completed.

Construction & Implementation:

a. Start engineering and design October 1, 1991.

b. End engineering and design February 1, 1992.

c. Start construction April 15, 1992.

d. End construction September 30, 1993.

Monitoring:

A monitoring plan has been completed by the Dept. of Natural Resources \ Coastal Restoration Division and should be followed for both pre & post construction monitoring.

Changes Suggested
+ sent to Faye 10-11-91
10/11/91 Faye said it was to late
to change costs as reports had already
been mailed.

Estimated Cost

Estimated costs associated with this project are as follows:

Engineer Services:	Initial Cost:	Annual cost:
Engineering Design	~~$228,900~~ 301,900	
E&D Sup. & Admin.	$ ~~57,200~~ 60,380	
Construction:		
Structures	~~$2,861,000~~ 3,019,000	
Sup. & Inspect.	$ ~~286,100~~ 301,900	
Monitoring:		
Equipment & Installation	$48,000	
Platform construction	$36,000	
Miscellaneous Material	$ ~~5,000~~ 3,000	$ ~~5,000~~ 3,000
Photography	$ ~~1,000~~ 500	$ ~~1,000~~ 500
Operation, maintenance, data collection	~~$48,000~~ 28,000	~~$48,000~~ 28,000
Annual manpower	~~$20,000~~ 10,500	~~$15,000~~ 10,500
	$158,000	~~$69,000~~ 42,000
Operation & Maintenance:		$57,200

Estimated Cost

Estimated costs associated with this project are as follows:

	Initial Cost:	Annual cost:
Engineer Services:		
Engineering Design	$228,900	
E&D Sup. & Admin.	$ 57,200	
Construction:		
Structures	$2,861,000	
Sup. & Inspect.	$ 286,100	
Monitoring:		
Equipment & Installation	$48,000	
Platform construction	$36,000	
Miscellaneous Material	$ 5,000	$ 5,000
Photography	$ 1,000	$ 1,000
Operation, maintenance,		
data collection	$48,000	$48,000
Annual manpower	$20,000	$15,000
	$158,000	$69,000
Operation & Maintenance:		$57,200

COMMENTS & RECOMMENDATIONS

It is felt that all objectives of the project can be met with the recommended plan.

The culverts with flap gates along the GIWW will increase sediments and nutrients and aid in reducing rapid tidal exchange. The re-routing of pumping stations will increase sediments and nutrients to the area, increase overland flow, reduce saltwater intrusion and aid in restoring the historic hydrology. Plugs, fixed crest weirs, rock weirs, and variable crest weirs will reduce rapid tidal exchange and aid in reduction of saltwater. Overflow banks will aid in recreating the natural hydrology. Dredge placement will re-create the natural shoreline and restore some eroding areas.