EAST MUD LAKE MARSH MANAGEMENT (C/S-20)
C/S-20-MSPR-1196-1
PROGRESS REPORT No. 1
for the period
May 1, 1996 to November 4, 1996

Project Description/Status

The East Mud Lake Marsh Management project area consists of 8,054 acres located in the Calcasieu/Sabine Basin in Cameron Parish, Louisiana. The project is bounded by the southern FINA property line to the south, La. Hwy. 27 to the west, the property line north of Magnolia Road to the north and an existing step levee and property line near Oyster Bayou to the east (figure 1).

The Calcasieu-Sabine Basin suffers from human-induced hydrologic changes to the system (U.S. Department of Agriculture-Soil Conservation Service [USDA-SCS] 1993), which have led to the deterioration of the marsh since 1953. The Calcasieu Ship Channel (CSC), which is 1 mi east of the project area, was first constructed in 1874 and redredged in 1951 and 1968 to a final width of 400 ft and a depth of 40 ft (USDA-SCS 1993). The CSC provides an avenue for extreme salinities (4–32 ppt) and rapid water movement into the East Mud Lake project area via West Cove, Oyster Bayou, and Mud Bayou (figure 1). These connections facilitate increases in turbidity and scouring within the project area. Analysis of aerial photos of the project area indicate a marsh loss rate of 76 acres per year from 1953 to 1983 (USDA-SCS 1992). Excluding Mud Lake, the land to open-water ratio has deteriorated from 99:1 in 1953 to 70:30 in 1983.

Another problem associated with the project area is excessive water levels over the surface of the marsh for prolonged time periods. The construction of La. Hwy. 27 to the west and La. Hwy. 82 to the south have decreased avenues for drainage from the western and southern areas of the project. This has lead to prolonged periods of sustained high water levels and "ponding," which has resulted in the deterioration of the vegetation (USDA-SCS 1994). The East Mud Lake project addresses these problems by increasing the total number of outlets for the area. Subsidence and sea level rise have also exacerbated the problem, resulting in a relative water level increase of 0.25 in./yr from 1942 to 1988 (Penland et al. 1989).

The project area has been divided into two Conservation Treatment Units (CTU) that are separated hydrologically and will be managed independently (figure 1). CTU #1 contains Mud Lake and will be managed passively. Structures and features present in CTU #1 consist of vegetative plantings, earthen plugs, culverts with flap gates and variable crest culverts. CTU #2 will be actively managed and will have drawdown capabilities in order to encourage shallow areas to revert to emergent vegetation. Structures and features present in CTU #2 consist of vegetative plantings, variable crest culverts with flap gates, a gated culvert, and a variable crest box structure (figure 1).

The main project objectives are to (1) prevent wetland degradation by reducing vegetative stress, thereby improving the abundance of emergent and submergent vegetation and (2) stabilize the shoreline of Mud Lake through vegetative plantings.

Specific measurable goals are to (1) decrease rate of marsh loss, (2) increase vegetative cover along shoreline of East Mud Lake, (3) increase percent cover of emergent vegetation in shallow open-water areas, (4) increase abundance of vegetation in presently vegetated portions of project area, (5) reduce water-level and salinity fluctuations to within 15 ppt salinity and 6 in below marsh level to 2 in above marsh level for water levels, (6) decrease duration and frequency of flooding over marsh, (7) decrease mean salinity in Conservation Treatment Unit #2, and (8) increase sediment accretion in Conservation Treatment Unit #2. Maintaining fisheries abundance is not a specific goal as addressed in the project documentation. However, due to concerns regarding potential fishery impacts, it has been included in the monitoring plan.

The area east of the project area Conservation Treatment Unit #2, between the Calcasieu Ship Channel and Oyster Lake and Mud Bayou (reference area #1) was selected as the best reference area for the evaluation of the water level, salinity, and fisheries monitoring elements. Both the project area and this reference area are classified as brackish marsh (Chabreck and Linscombe 1988) and contain mainly the organic Bancker and Creole soils (USDA-NRCS 1995). Both the project and the reference areas are directly influenced hydrologically by the CSC and are dominated by *Spartina patens*. The area north of Magnolia Road (reference area #2) is a suitable reference area for the evaluation of the vegetative, accretion, water-level, salinity, fisheries, and soil monitoring elements. Both the project area and this reference area are classified as brackish marsh (Chabreck and Linscombe 1988) and both contain mainly the organic Bancker and Creole soils (USDA-NRCS 1995). Both areas are influenced hydrologically by the CSC and Calcasieu Lake through West Cove Canal.

Monitoring Design

Color-infrared, aerial photography (1:12,000 scale) was obtained December 26, 1994, and will be used to document changes in marsh loss rates over time. Additional photography will be obtained at years 5, 11, and 17 ± 3 yr.

Vegetative plantings were conducted by the Department of Natural Resources vegetative planting program June 5 through July 8, 1995. A total of 7200 *Spartina alterniflora* plugs were planted along the step levee in CTU #2. Due to the cut bank configuration of most of the Mud Lake shoreline, only areas adjacent to structures #17, #13, and the earthen plug west of #17 were planted for a total of 480 plants. To document vegetative planting success, 5% of the plants along the step levee and 5% of the plants along the East Mud Lake shoreline were sampled at 1 mo postplanting, and will be sampled at 6 mo and 1 yr after planting and every 3 yr until plants become indistinguishable. Thirty-five plots along the step levee and 4 plots along the shoreline, consisting of 10 plants spaced 5 ft apart, were sampled for percent survival of planted vegetation, species composition of encroaching vegetation, and percent cover for each species present. The monitoring stations were selected through the vegetative program to have 1 plot every 1,000 ft.

Sites to monitor existing vegetation were selected using a systematic transect pattern in which five transect lines were drawn in a northwest to southeast configuration from the Calcasieu Lake/West Cove shoreline in the project area and reference area #2. Five stations were chosen uniformly across each transect line, for a total of 25 stations in the project area and 20 stations in reference area #2, to obtain an even distribution of stations throughout the marsh (figure 2). Percent cover, heights of dominant plants, and species composition were initially documented June 20, 1995, in 1.0-m^2 plots marked with 2 PVC poles. These vegetation sites will be visited every 2 yr to document change over time.

Discrete hydrologic variables are monitored monthly and are available from October 11, 1994, to present. Hydrologic variables include salinity, specific conductivity, and water temperature at 16 stations throughout the project area. Continuous data are logged hourly by YSI 6000 datasondes at four stations in the project area and two stations in the reference areas (figure 3). Time periods of available continuous data are summarized in table 1. Monthly staff gage readings from 18 locations are available from May 21,1996, to present (figure 4).

Feldspar platforms were constructed August 1995 at 20 stations in the project area and 20 stations in reference area #2 along the same transect lines as the vegetation stations to detect changes in sediment accretion (figure 2). Feldspar was placed in 0.5-m^2 plots marked with 2 PVC poles at opposite corners for locating the feldspar over time (Knauss and Cahoon 1990). Due to low water levels in the area at the time of initial placement, feldspar plots were established at only 15 of the 20 stations in the project area and 17 of the 20 stations in the reference area. The remaining plots will be established when these areas are accessible. The feldspar plots will be sampled by cryogenic core to determine vertical accretion every 6 mo. Additional feldspar will be placed after 2 yr or earlier, if needed.

Sediment Erosion Tables (SET) were established in August 1995 at 12 of the 32 feldspar stations to detect changes in elevation due to subsidence and accretion/erosion combined (figure 2). Three SET stations were located in each of the Bancker and Creole soil types for a total of 6 stations each in the project and reference area #2. Nine measurements were taken in four directions at each of the stations. Detailed procedures for the SET are documented in Steyer et al. 1995. Initial SET measurements were taken prior to the beginning of construction, December 11–14, 1995. Measurements were obtained again after the completion of construction, July 8–12, 1996. Due to low water levels, only 10 of the 12 SET stations were accessible for the first 2 measurements. Additional measurements will be conducted every 6 mo to coincide with the monitoring of the feldspar plots.

A three-way analysis of variance (ANOVA) will be performed on SET data. Because the initial settings of SET values were different between the areas and among different stations, only the time-related sources of variance will be utilized for detecting elevation changes between the time periods.

Soil samples will be collected and analyzed to determine grain size, percent organic, bulk density, and soil salinity. Initial soil samples were collected at the existing vegetation stations within CTU #2 and reference area #2 from July 8–12, 1996. Additional soil samples will be collected at years 5, 11 and 17 ±3 yr.

Fisheries monitoring is conducted to estimate abundance and species composition for both project and reference areas to determine whether the project affects fish abundance. Twenty-five samples are collected from each the project and reference areas #1 and #2 during each sampling period using a 1-m^2 throw trap (Kushlan 1981). Additional samples are collected randomly using a 20-ft minnow seine (3/16" mesh) to compensate for the deficiency of the throw traps for species composition. A minimum of three seine pulls will be conducted for each the project area and the reference area at each sampling event. Abundance is recorded as catch per unit effort (CPUE; number of individuals per sample) and total biomass is recorded as dry weight (in grams). Species composition is represented by number of species per sample and their ecological affinity is defined as estuarine, fresh water, estuarine dependent, or marine. Sampling locations are randomly chosen from a grid pattern for each sampling trip.

Sampling will be conducted 3 times prior to construction and 3 times a year postconstruction for the first 2 yr of drawdown. Drawdowns will be attempted postconstruction until two successful drawdown years are achieved. Sampling will be conducted prior to the closing of the gates for the drawdown (February), late spring, and in the fall at the times when the water level is at or below marsh elevation, to determine whether fisheries access is limited by the project features.

Results/Discussion

Ground control GPS has been completed and photo mosaicking and georectification is being conducted on the aerial photography collected to date. Results will be included in future progress reports.

The 1-mo postplanting sampling of smooth cordgrass was conducted July 30 and 31, 1996. Those raw data are presented in table 2. A survival rate of 98.61% for the step levee and 100% for the lake shoreline was indicated (table 3). The average percent cover of *Spartina alterniflora* in the sampling plots was 9.68% for the step levee plantings and 4.65% for the shoreline plantings. Several vegetative species have begun to naturally colonize the step levee and shoreline to varying degrees. Excluding the planted vegetation, six species were noted in the step-levee sampling plots and three species were noted in the shoreline sampling plots (table 2).

Raw data from vegetation plots in the marsh interior are presented in table 5. There was a total percent coverage of 84.4% (Standard deviation [SD] = 22.3) live *Spartina patens* for the project area and 88.0% (SD = 14.8) for the reference area (table 4). The project area showed more diversity with the additional species occurring in sparse amounts throughout the project area. This could be a reflection of slightly higher elevations and/or lower salinity spikes within the project area. *Baccharis sp*., *Aster tenuifolius*, *Spartina cynosuroides*, and *Spartina spartinae* all colonize higher elevations such as ridges or levees. *Spartina spartinae* was observed in the reference area along a ridge at the northern portion, however, there was no occurrence in any of the plots.

Mean monthly marsh inundation data from the four constant recorders from June 1995 show a similiar pattern between the project area and the reference area (figure 5). Although structural drawdown did not begin until May 5, 1996, water levels were maintained below marsh level for the project and reference areas beginning in December 1995 (figure 5). Low rainfall held water levels low providing conditions that exhibited an early drawdown effect. Cumulative statewide precipitation totalled less than two-thirds of the normal level from January to May 1996, ranking as the fifth driest January to May total in the last century (Louisiana Office of State Climatology [LOSC] 1996). Water level was variable, as indicated by monthly standard deviation, in project area (SD = 0.32) and reference areas (SD = 0.40). Two additional recorders were deployed in June 1996. Data from these recorders will be available in future progress reports.

Mean monthly salinity calculated from the four constant recorder sondes illustrated similar salinity trends inside the project area and in the reference areas, but with salinities in the project area averaging 5.5 ppt lower than salinities in the reference areas (figure 6). Preconstruction salinity data show highest salinity levels occurring in the early fall (Sept. 1995) and spring (Mar. 1996), with the lowest salinity levels occurring in the winter (Jan. 1996) and summer (July 1995) months. Average monthly salinity variability was higher in the reference areas (SD = 5.05) and lower in the project area (SD = 2.38) since salinity in the reference area was more directly influenced by the CSC. Discrete data collected monthly (Oct. 1994– Apr. 1996) show a spatial distribution of salinity occurring with the highest values at the eastern portion of the project area decreasing westward (figure 7). The highest salinity levels were recorded at the structures that are linked to the CSC through West Cove of Calcasieu Lake, Mud Bayou, and Oyster Bayou. Salinity decreases westward into the marsh and towards Mud Lake.

The results of an ANOVA on the SET data indicate a significant overall decrease ($p<0.05$) of 2.04 cm in elevation between December 1995 and July 1996 from both the project area and reference area #2 (table 6). The nonsignificant interaction ($p>0.05$) between area and time period indicated that the rates of elevation change were same for both project area and reference area #2 (table 7). The decrease in elevation between visits for both the project and reference areas could reflect compaction of the soil surface due to the low water levels in the region (LOSC 1995). Due to extreme weather patterns and low rainfall, water levels in the area were dropping at approximately the time of the first SET sampling. This condition simulated the effects of a drawdown by keeping the water levels low throughout most of the spring prior to the second SET sampling period that occurred during drawdown.

In order to conduct baseline comparison between the project and reference areas, preconstruction sampling was conducted in June 1995, October 1995, and April 1996. On May 5, 1996, all structures for access into the area were closed for the initiation of the first drawdown. However, there was little to no water flow into the project area previous to that due to low water conditions which had occurred since December 1995 (figure 6).

Thirty species of fish and shrimp were collected in both throw trap and seine samples and were categorized as either estuarine resident (13 species), freshwater (2 species), estuarine dependent (11 species), or marine (4 species). Six of the 11 estuarine dependent species collected in the preconstruction samples were found in both the project and the reference areas (table 8). Due to seasonal changes in abundance, the CPUE (table 9) and total weight (table 10) varied between the different sampling periods. Total CPUE and total weight were greater for the reference area in June 1995 and April 1996, but were greater for the project area in October 1995 (table 11). Access into the project area is limited to small canals and culvert openings, whereas access to the reference areas are directly linked to the CSC, which is open to the Gulf of Mexico through major bayous and canals. Although no postconstruction fisheries data have been collected, the April 1996 data reflect a time of very limited fisheries access to the project area. The April 1996 sampling period was preceded by low water levels (LOSC 1995) (figure 5) leading to limited fishery access, however, of the 13 species collected in April 1996, 8 were present in the project area samples.

All 3 sampling events were conducted using the 1-m^2 throw traps as described by Kushlan (1981). A comparison between the throw traps and seine samples in the April 1996 trip showed that several marine or estuarine dependent species (spot, anchovy, gulf flounder, and croaker) did not occur in the throw trap collections (table 12). Field observation and seine sampling indicated these species were abundant in the sampling area. These species noted are fast swimmers, which could explain their absence from the throw trap samples. Boat disturbance and sampling deficiency could also explain their absence. In the future sampling efforts, we will continue to collect samples using the seine to compensate for the low catch of the throw traps.

<u>References</u>

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Monitoring Implementation	October 1, 1994	
Construction Start:	January 1, 1996	
Construction End:	May 1, 1996	

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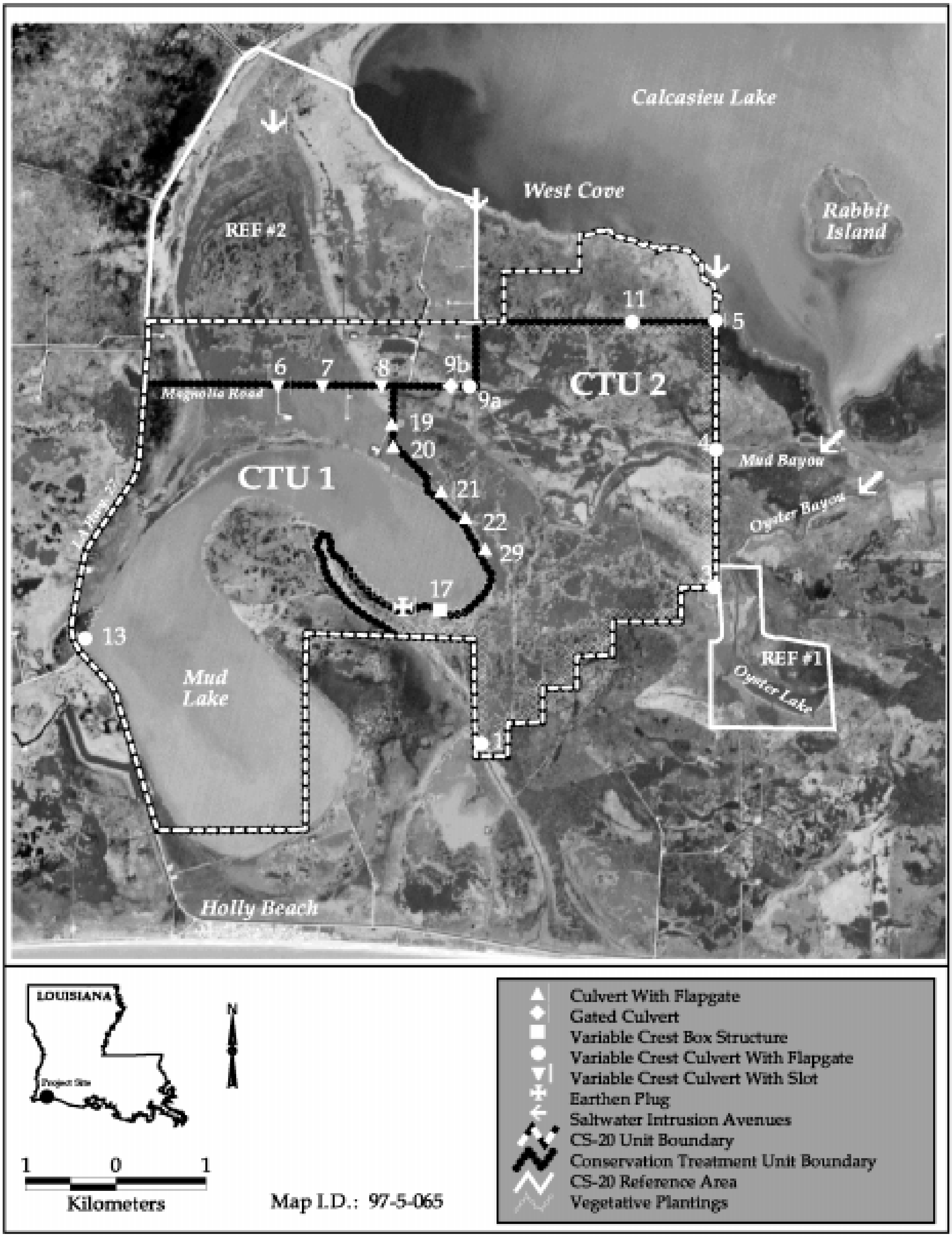

Figure 1. East Mud Lake project area with structures and numbered labels.

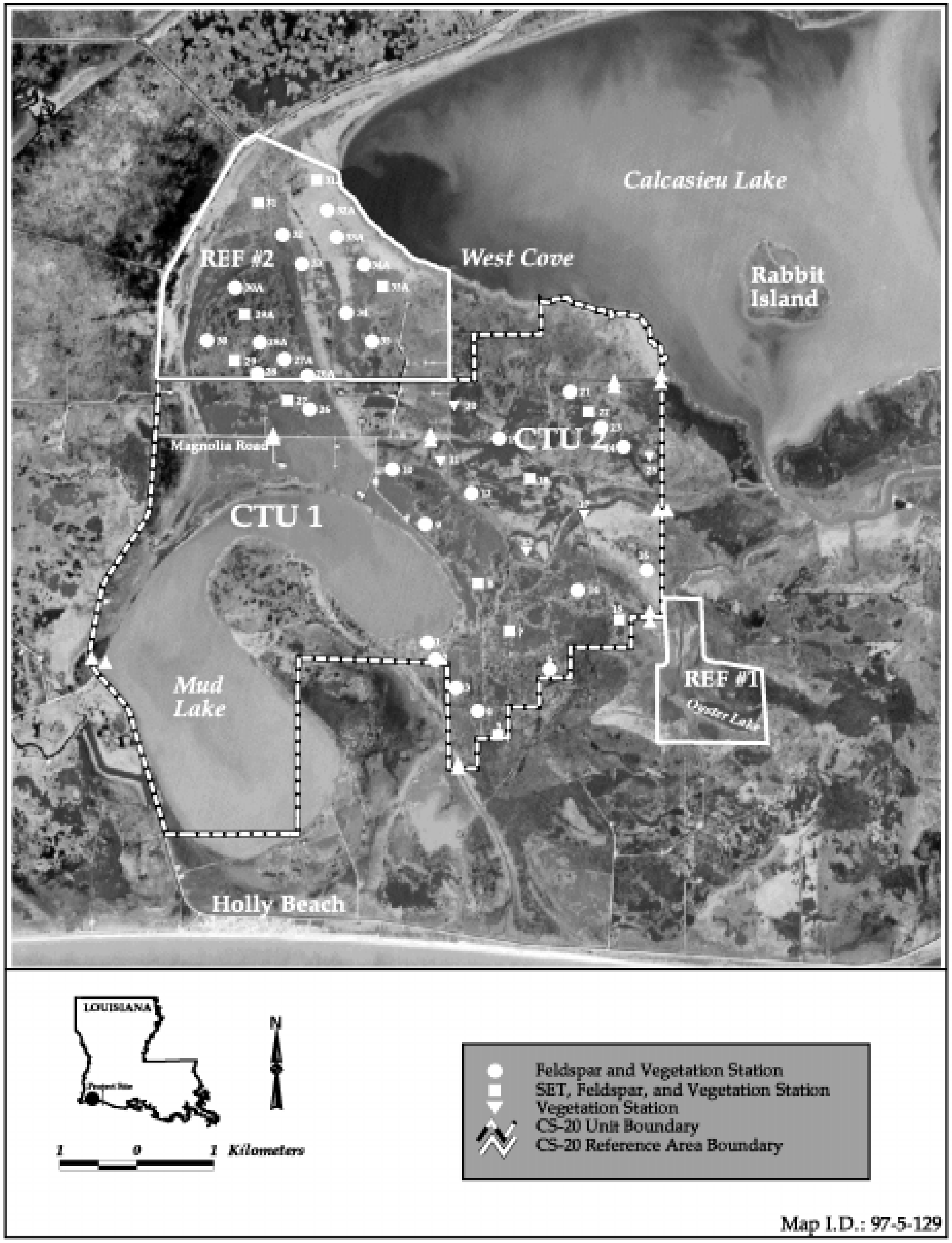

Figure 2. Location of vegetation, feldspar, and SET monitoring stations.

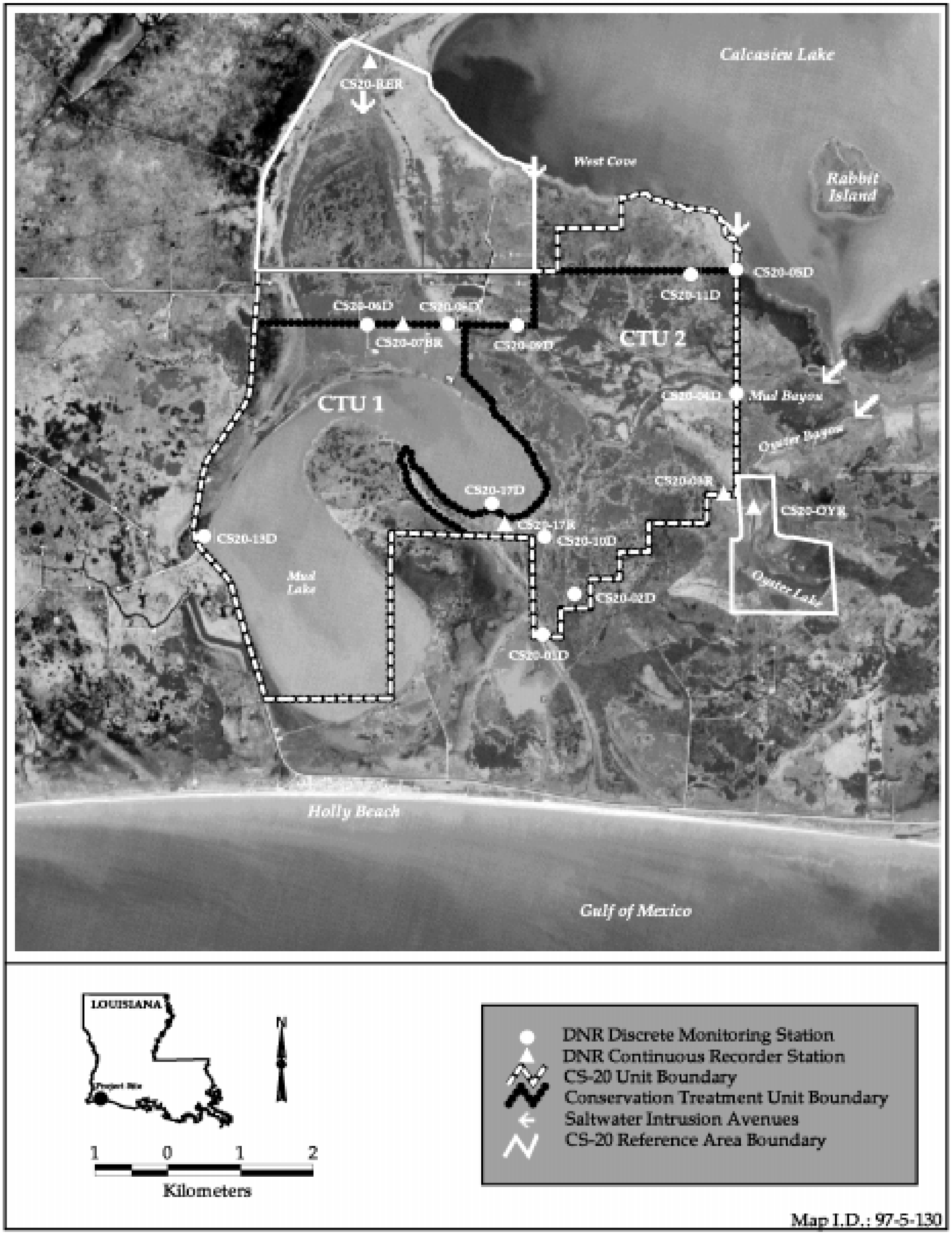

Figure 3. Location of discrete and continuous hydrologic stations at East Mud lake.

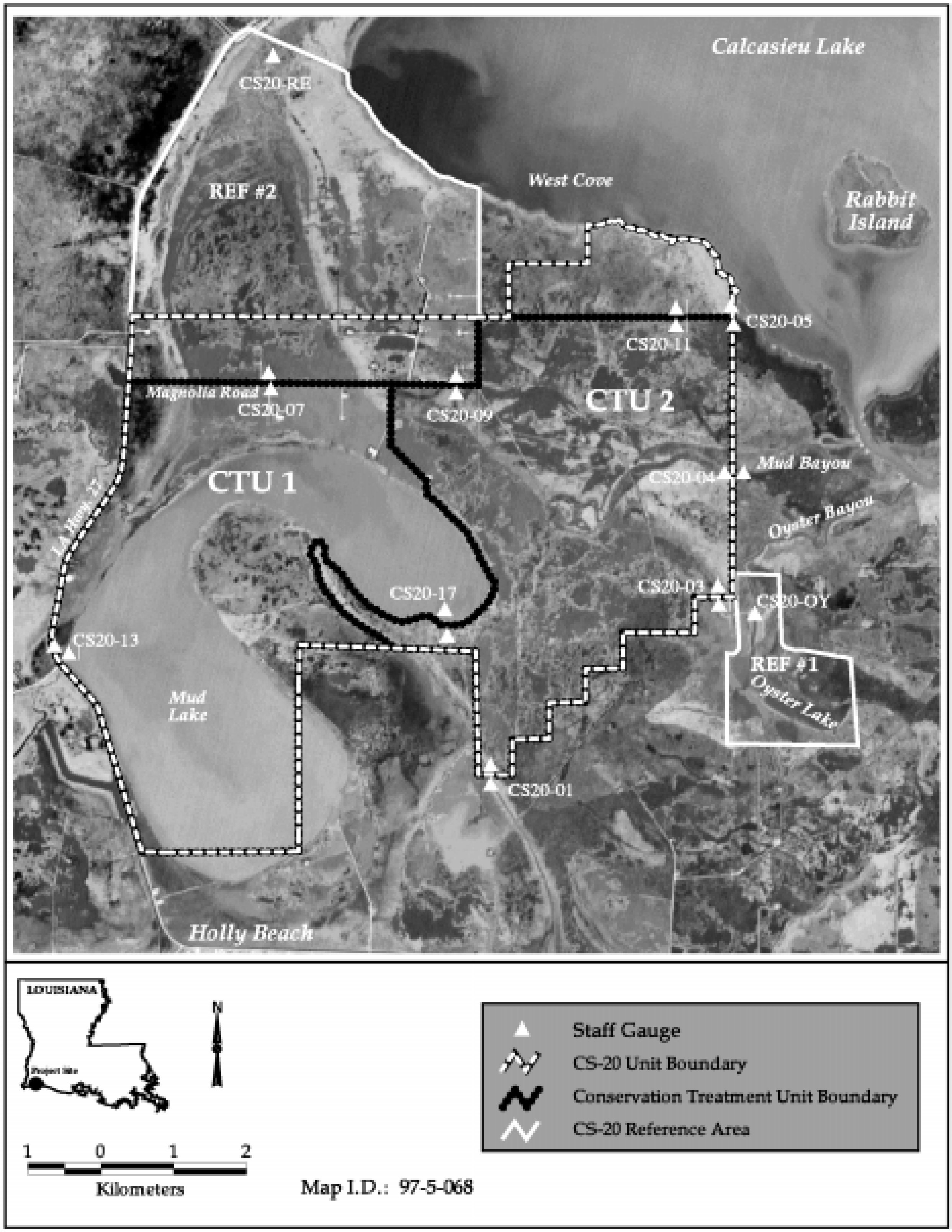

Figure 4. Staff gauge locations at East Mud Lake.

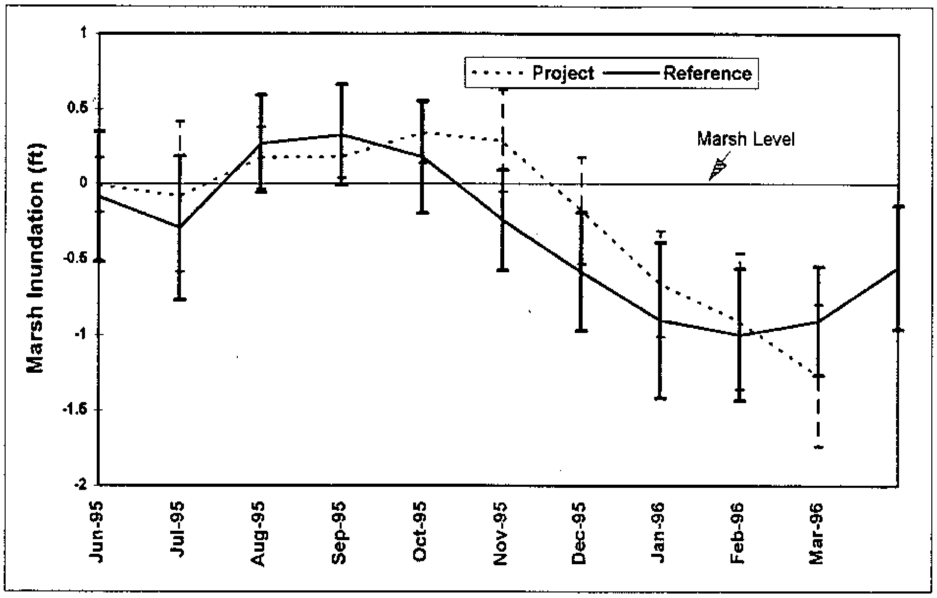

Figure 5 . Mean Marsh Inundation (± SD) for the East Mud Lake project and reference areas preconstruction.

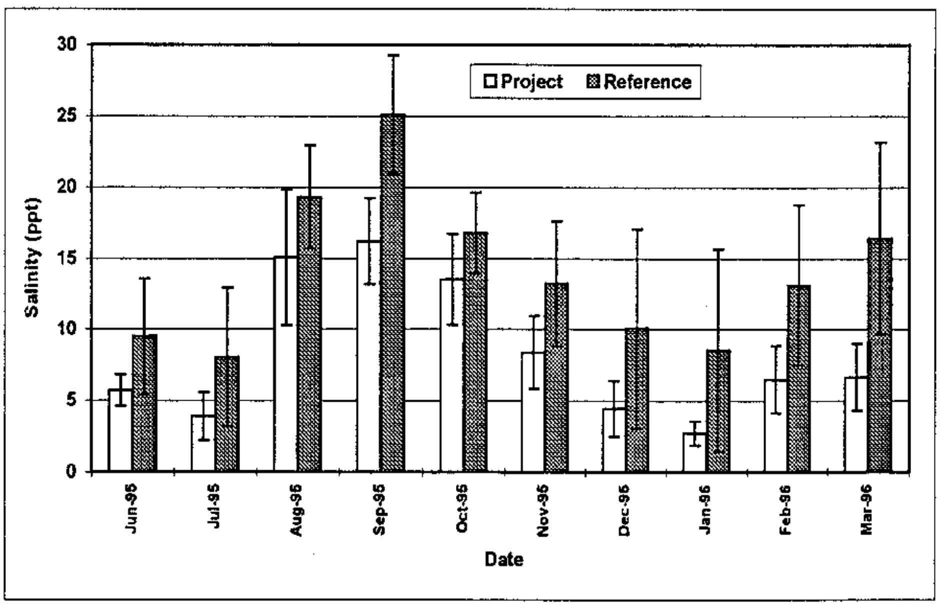

Figure 6 . Monthly mean salinity (± SD) for the East Mud Lake project and reference areas preconstruction.

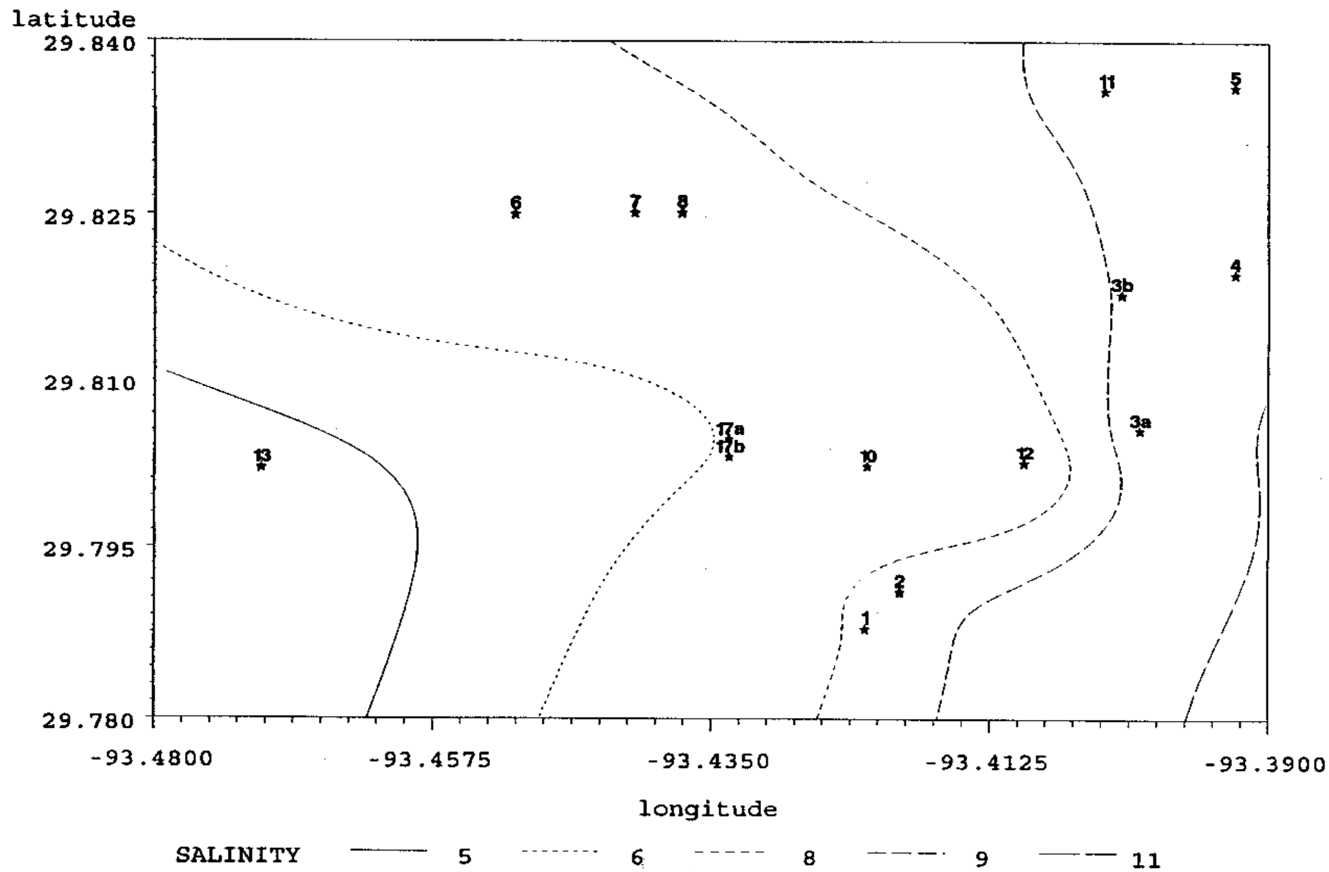

Figure 7. Spatial distribution of salinity for the East Mud Lake (C/S-20) project using preconstruction discrete data from October 1994 to April 1996.

Table 1. Continuous recorder data available for East Mud Lake (C/S-20) in Cameron Parish, from November 1994 to August 1996.

	Station						
Date	CS20RE	CS20OY	CS2017	CS204b	CS203a	CS207b	CS209a
Nov 94			o				
Dec 94			x				
Jan 95			x				
Feb 95			x				
Mar 95			x				
Apr 95			x				
May 95			x				
Jun 95	o	o	o	o			
Jul 95	x	x	x	x			
Aug 95	x	x	x	x			
Sept 95	x	o	x	x			
Oct 95	x	x	x	x			
Nov 95	o	x	x	x			
Dec 95	o	x	x	x			
Jan 96	x	x	x	x			
Feb 96	x	x	x	x			
Mar 96	x	o	x	o			
Apr 96	x		o				
May 96	x	o	o				
Jun 96	x	x			o	o	o
Jul 96	x	x	o		x	x	x
Aug 96	o	o	o		o	o	o

x = full month available, o = partial month available

Table 2. Vegetative planting percent survival and percent cover for 36 step-levee plots and 4 shoreline plots planted in *Spartina alterniflora* collected for East Mud Lake (C/S-20) in Cameron Parish, July 30,1996.

	Station													
	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Spartina alterniflora Loisel. (% survival)	100	100	100	90	100	100	90	100	100	100	100	100	100	90
Spartina alterniflora (% cover)	11.6	9.5	6.8	10.1	15.3	6.2	9.4	17.8	8.4	7.8	6.2	8.2	34.5	3.7
Distichlis spicata (L.) (% cover)	4.3	22.0	0.1	12.5	1.0	0.5	0.1	0.5	0.1	2.0	1.0	0.5		0.5
Spartina patens (Ait.) (% cover)		0.5	0.5		0.1	0.5			0.5					0.1
Heliotropium currassavicum L. (% cover)		0.5		0.5		1.5				1.0	0.5			
Lycium carolinianum Walt. (% cover)												1.0		
Salicornia bigelovii Torr. (% cover)												0.5		
Acnida cuspidata Bert. (% cover)														

Table 2. (continued)

	Station													
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Spartina alterniflora Loisel. (% survival)	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Spartina alterniflora (% cover)	4.9	4.9	8.2	19.0	11.6	20.5	13.2	15.8	22.3	12.5	4.3	5.1	5.0	4.5
Distichlis spicata (L.) (% cover)	1.0	0.1	0.5				0.5	0.5	1.5	7.0	1.5	4.5	3.0	8.0
Spartina patens (Ait.) (% cover)	1.0	0.3	0.5							1.0	0.5		2.0	1.0
Heliotropium currassavicum L. (% cover)		0.5												
Lycium carolinianum Walt. (% cover)	2.0	1.8												
Salicornia bigelovii Torr. (% cover)	0.2		0.1			0.1		0.1					0.1	
Acnida cuspidata Bert. (% cover)									0.1			1.0		

Table 2. (continued)

	Station											
	29	30	31	32	33	34	35	36	37	38	50	51
Spartina alterniflora Loisel. (% survival)	80	100	100	100	100	100	100	100	100	100	100	100
Spartina alterniflora (% cover)	3.8	4.8	5.6	5.4	5.0	5.0	5.6	5.9	5.2	4.0	4.8	4.6
Distichlis spicata (L.) (% cover)	1.5		1.5	0.5	3.0	1.0	2.0	0.5			1.5	
Spartina patens (Ait.) (% cover)	2.0				1.0				1.0			
Heliotropium currassavicum L. (% cover)				0.5	0.5	0.5	1.0	0.5	1.0			
Lycium carolinianum Walt. (% cover)												
Salicornia bigelovii Torr. (% cover)												
Acnida cuspidata Bert. (% cover)					0.1	0.5						

Table 3. Average vegetative planting percent survival (SE) and percent cover (SE) for 36 step-levee plots and 4 shoreline plots planted in *Spartina alterniflora* collected for East Mud Lake (C/S-20) in Cameron Parish, July 30,1996.

	Step Levee	Shoreline
Spartina alterniflora Loisel. (% survival)	98.61 (0.70)	100 (0)
Spartina alterniflora (% cover)	9.68 (1.10)	4.65 (0.25)
Distichlis spicata (L.) (% cover)	2.31 (0.71)	0.38 (0.38)
Spartina patens (Ait.) (% cover)	0.32 (0.09)	0.25 (0.25)
Heliotropium currassavicum L. (% cover)	0.21 (0.06)	0.25 (0.25)
Lycium carolinianum Walt. (% cover)	0.13 (0.07)	
Salicornia bigelovii Torr. (% cover)	0.03 (0.02)	
Acnida cuspidata Bert. (% cover)	0.05 (0.03)	

SE = Standard error

Table 4. Vegetative species composition, percent cover and heights of dominant plants (SD) averaged from 25 plots in the project area and 10 plots in the reference area at East Mud Lake (C/S-20) in Cameron Parish, collected July 30,1996.

	Project Area	Reference Area
Average canopy height (ft)	3.64 (0.69)	4.08 (0.73)
Spartina patens	84.4 (22.3)	87.5 (14.8)
Spartina patens (dead)	8.0 (23.9)	16.5 (22.5)
Spartina spartinae	3.0 (15.0)	
Scirpus americanus	2.0 (10.0)	
Spartina cynosuroides	1.44 (0.99)	
Scirpus robustus	1.0 (0.0)	
Spartina alterniflora	0.6 (3.0)	
Distichlis sp.	0.2 (1.0)	
Baccharis sp.	TR	
Ruppia maritima	TR	
Aster tenuifolius	TR	
Paspalum fluitans	TR	
Scirpus olneyi	TR	

SD = Standard deviation

Table 5. Vegetative species composition, percent cover and heights of dominant plants from 25 plots in the project area and 10 plots in the reference area at East Mud Lake (C/S-20) in Cameron Parish, collected July 30,1996.

	Stations											
	01	02	03	04	05	06	07	08	09	10	11	12
Canopy height (ft)	4.2	4.6	4.3	3.5	3.7	3.5	4.2	4.4	4.2	4.0	2.1	4.0
Spartina patens	40	100	85	60	100	40	100	95	100	95	100	100
Spartina patens (dead)					20			10				
Spartina spartinae												
Scirpus americanus												
Spartina cynosuroides	18											
Scirpus robustus											15	
Spartina alterniflora												
Distichlis sp.				5								
Baccharis sp.	TR											
Ruppia maritima						TR						
Aster tenuifolius												
Paspalum fluitans												
Scirpus olneyi												

Table 5. (continued)

	Stations											
	13	14	15	16	17	18	19	20	21	22	23	24
Canopy height (ft)	3.8	3.8	2.9	2.4	3.0	2.8	3.8	4.3	2.9	4.5	4.0	3.4
Spartina patens	100	30	75	80	100	100	95	50	80	100	95	95
Spartina patens (dead)								100	70			
Spartina spartinae		75										
Scirpus americanus			50									
Spartina cynosuroides				18								
Scirpus robustus												10
Spartina alterniflora												
Distichlis sp.												
Baccharis sp.		TR										
Ruppia maritima												
Aster tenuifolius		TR										
Paspalum fluitans	TR											
Scirpus olneyi											TR	

Table 5. (continued)

	Stations										
	25	26	27	28	29	30	31	32	33	34	35
Canopy height (ft)	2.8	4.5	4.5	4.9	4.0	3.6	3.0	4.2	2.8	4.6	4.7
Spartina patens	95	55	75	85	100	100	85	100	95	100	80
Spartina patens (dead)		80	10	10	10	15	10	10	5	5	10
Spartina spartinae											
Scirpus americanus											
Spartina cynosuroides											
Scirpus robustus											
Spartina alterniflora	15										
Distichlis sp.											
Baccharis sp.											
Ruppia maritima											
Aster tenuifolius											
Paspalum fluitans											
Scirpus olneyi											TR

Table 6. ANOVA results of SET measurements at 10 stations in both project and reference areas at East Mud Lake in Cameron Parish, collected December 1995 and July 1996.

SOURCE	DF	F-VALUE
Area	1	15.23*
Station	4	2.93ns
Area*Station	4	44.61**
TP	1	10.87*
Area * TP	1	0.00 ns
Station*TP	4	1.67ns
Area*Station*TP	4	2.30ns

TP = time period; ns = nonsignificant ; * = significant (P<0.05);
** = highly significant (P<0.01).

Table 7. Means and standard deviation (SD) of SET measurement between Dec 95 and Jul 96 from both project and reference areas at East Mud Lake in Cameron Parish.

Area	Time Period of measurement	Numbers of Points measured	Means (cm)	S.D.	Elevation Change
Project	1	180	30.65	7.23	
Project	2	180	28.61	7.79	2.04
Reference	1	180	18.21	8.02	
Reference	2	180	16.17	7.57	2.04

SD = Standard deviation

Table 8. Species list and ecological affinity for fisheries sampling for project and reference areas at East Mud Lake in Cameron Parish, collected with 1-m^2 throw traps.

			Ecological	Jun-95		Oct-95		Apr-96	
Family	Species	Common Name	Affinity	Project	Reference	Project	Reference	Project	Reference
Atherinidae	*Menidia beryllina*	Tidewater silverside	ES	X	X	X	X	X	X
Cyprinodontidae	*Cyprinodon variegatus*	Sheepshead minnow	ES	X	X	X		X	X
Palaemonidae	*Palaemonetes* sp.	Grass shrimp	ES	X	X	X	X	X	X
Poeciliidae	*Gambusia affinis*	Mosquitofish	FW	X	X	X	X	X	X
Poeciliidae	*Poecilia latipinna*	Sailfin molly	FW	X	X	X		X	
Clupeidae	*Brevortia patronus*	Menhaden	ESD		X			X	X
Portunidae	*Callinectes sapidus*	Blue crab	ESD				X	X	X
Sciaenidae	*Leiostamus xanthurus*	Spot	ESD	X	X				X
Cynoglossidae	*Symphurus plagiusa*	Blackcheek tonguefish	MA		X		X		X
Engraulidae	*Anchoa mitchilli*	Bay anchovy	ESD		X	X	X		
Cyprinodontidae	*Fundulus pulvereus*	Bayou killifish	ES	X	X			X	
Penaeidae	*Penaeus aztecus*	Brown shrimp	ESD	X	X				
Penaeidae	*Penaeus setiferus*	White shrimp	ESD			X	X		
Syngnathidae	*Syngnathus*	Pipefish	ES	X	X				
Gobiidae	Gobiidae fam	Goby	ES			X	X		
Bothidae	*Paralichthys albigutta*	Gulf flounder	MA		X				
Bothidae	*Citharichthys spilopterus*	Bay whiff	ESD		X				
Mugilidae	*Mugil cephalus*	Striped mullet	ESD		X				
Mugilidae	*Mugial curema*	White mullet	MA						X
Sciaenidae	*Microponias undulatus*	Croaker	ESD						X

ES= estuarine resident; FW= fresh water; ESD= estuarine dependent; MA= marine

Table 8. (continued)

Family	Species	Common Name	Ecological Affinity	Jun-95 Project	Jun-95 Reference	Oct-95 Project	Oct-95 Reference	Apr-96 Project	Apr-96 Reference
Sciaenidae	Sciaenidae fam.		ESD				X		
Sparidae	*Archaosargus*	Sheephead	ESD						X
Cyprinodontidae	*Fundulus grandis*	Guld killifish	ES	X					
Cyprinodontidae	*Lucania parva*	Rainwater killifish	ES	X					
Gobiidae	*Gobiosoma boleosoma*	Darter goby	ES		X				
Gobiidae	*Gobionellus shufeldti*	Freshwater goby	ES		X				
Gobiidae	*Microgobius thalassinus*	Green goby	ES		X				
Gobiidae	*Gobiosoma bosci*	Naked goby	ES		X				
Gobiidae	*Gobionellus hastatus*	Sharptail goby	ES		X				
Ophichthidae	*Myrophis punctatus*	Speckled worm eel	MA		X				

ES= estuarine resident; FW= fresh water; ESD= estuarine dependent; MA= marine

Table 9. CPUE (# organisms/ # samples) for fisheries sampling for project and reference areas for dominant species at East Mud Lake in Cameron Parish, collected with 1-m^2 throw traps.

			Ecological	Jun-95		Oct-95		Apr-96	
Family	Species	Common Name	Affinity	Project	Reference	Project	Reference	Project	Reference
Atherinidae	*Menidia beryllina*	Tidewater silverside	ES	2.03	0.20	6.64	0.56	0.68	0.04
Cyprinodontidae	*Cyprinodon variegatus*	Sheepshead minnow	ES	0.10	0.43	5.36		0.04	0.04
Palaemonidae	*Palaemonetes* sp.	Grass shrimp	ES	2.43	1.93	9.44	0.72	18.60	7.52
Poeciliidae	*Gambusia affinis*	Mosquitofish	FW	2.13	5.77	13.04	0.04	2.20	0.08
Poeciliidae	*Poecilia latipinna*	Sailfin molly	FW	0.07	7.53	2.00		0.16	
Clupeidae	*Brevortia patronus*	Menhaden	ESD		0.03			0.04	25.44
Portunidae	*Callinectes sapidus*	Blue crab	ESD				0.16	0.08	1.20
Sciaenidae	*Leiostamus xanthurus*	Spot	ESD	0.07	7.53				0.28
Cynoglossidae	*Symphurus plagiusa*	Blackcheek tonguefish	MA		0.40		0.12		0.16
Engraulidae	*Anchoa mitchilli*	Bay anchovy	ESD		0.83	0.04	0.96		
Cyprinodontidae	*Fundulus pulvereus*	Bayou killifish	ES	0.03	0.67			0.08	
Penaeidae	*Penaeus aztecus*	Brown shrimp	ESD	0.03	0.37				
Penaeidae	*Penaeus setiferus*	White shrimp	ESD			0.04	0.60		
Syngnathidae	*Syngnathus*	Pipefish	ES	0.03	0.03				
Gobiidae	Gobiidae fam	Goby	ES			0.16	0.28		

ES= estuarine resident; FW= fresh water; ESD= estuarine dependent; MA= marine; CPUE= catch per unit effort

Table 10. Total weight (g) for fisheries sampling for project and reference areas for dominant species at East Mud Lake in Cameron Parish, collected with 1-m^2 throw traps.

			Ecological	Jun-95		Oct-95		Apr-96	
Family	Species	Common Name	Affinity	Project	Reference	Project	Reference	Project	Reference
Atherinidae	*Menidia beryllina*	Tidewater silverside	ES	13.44	2.11	32.67	6.32	10.35	0.95
Cyprinodontidae	*Cyprinodon variegatus*	Sheepshead minnow	ES	0.99	16.55	28.00		1.00	1.32
Palaemonidae	*Palaemonetes* sp.	Grass shrimp	ES	7.87	6.08	16.64	3.25	43.18	28.35
Poeciliidae	*Gambusia affinis*	Mosquitofish	FW	2.31	26.45	47.85	0.19	11.55	0.68
Poeciliidae	*Poecilia latipinna*	Sailfin molly	FW	0.36	108.67	5.36		1.18	
Clupeidae	*Brevortia patronus*	Menhaden	ESD		1.29			0.25	89.01
Portunidae	*Callinectes sapidus*	Blue crab	ESD				0.12	0.34	8.06
Sciaenidae	*Leiostamus xanthurus*	Spot	ESD	9.31	13.36				2.19
Cynoglossidae	*Symphurus plagiusa*	Blackcheek tonguefish	MA		1.04		1.39		0.53
Engraulidae	*Anchoa mitchilli*	Bay anchovy	ESD		3.34	0.51	6.76		
Cyprinodontidae	*Fundulus pulvereus*	Bayou killifish	ES	0.22	15.40			0.77	
Penaeidae	*Penaeus aztecus*	Brown shrimp	ESD	7.42	31.29				
Penaeidae	*Penaeus setiferus*	White shrimp	ESD			3.23	24.13		
Syngnathidae	*Syngnathus*	Pipefish	ES	0.21	0.04				
Gobiidae	Gobiidae fam	Goby	ES			2.10	0.98		

ES= estuarine resident; FW= fresh water; ESD= estuarine dependent; MA= marine

Table 11. Total CPUE (# organisms/ # samples) and total weight (g) for throw traps from all three fisheries sampling events at East Mud Lake in Cameron Parish.

	Total CPUE		Total Weight	
	Project	Reference	Project	Reference
June 1995	9.17	19.4	52.29	279.18
October 1995	37.52	3.92	136.36	44.36
April 1996	22.76	35.12	73.3	210.19

Table 12. Species catch for fisheries sampling for April 1996; throw trap vs. seine catch at East Mud Lake in Cameron Parish.

			Ecological	Project		Reference	
Family	Species	Common Name	Affinity	Throw trap	Seiine	Throw trap	Seine
Atherinidae	*Menidia beryllina*	Tidewater silverside	ES	X	X	X	
Cyprinodontidae	*Cyprinodon variegatus*	Sheepshead minnow	ES	X	X	X	
Palaemonidae	*Palaemonetes* sp.	Grass shrimp	ES	X	X	X	X
Poeciliidae	*Gambusia affinis*	Mosquitofish	FW	X	X	X	X
Poeciliidae	*Poecilia latipinna*	Sailfin molly	FW	X	X		
Clupeidae	*Brevortia patronus*	Menhaden	ESD	X		X	X
Portunidae	*Callinectes sapidus*	Blue crab	ESD	X	X	X	X
Sciaenidae	*Leiostamus zanthurus*	Spot	ESD		X	X	
Cynoglossidae	*Symphurus plagiusa*	Blackcheek tonguefish	MA			X	
Engraulidae	*Anchoa mitchilli*	Bay anchovy	ESD				X
Cyprinodontidae	*Fundulus pulvereus*	Bayou killifish	ES	X			
Gobiidae	Gobiidae fam.	Goby	ES		X		X
Bothidae	*Paralichthys albigutta*	Gulf flounder	MA				X
Mugilidae	*Mugil curema*	White mullet	MA		X	X	
Sciaenidae	*Micropogonias undulatus*	Croaker	ESD		X	X	X
Sparidae	*Archaosargus*	Sheephead	ESD			X	

ES= estuarine resident; FW= fresh water; ESD= estuarine dependent; MA=marine