BAYOU LA BRANCHE WETLAND (PO-17)
PO-17-MSPR-1196-3
PROGRESS REPORT No. 3
for the period
April 1, 1994 to October 10, 1996

Project Status

The following data collection and analysis activities have been conducted since the previous progress report:

On May 6, 1996, vegetation sampling was conducted at 84 sites located along the elevation survey lines. Vegetative species composition and relative abundance were determined, using 1-m^2 plots. Nineteen sediment staff gauges have been monitored since May 1996. In addition, two continuous recorders have been collecting data in the area since April 1996. One recorder (station 43) is located in the project area at the z-wall between Pond A and Pond B (figure 1). The reference area recorder (station 44) is located in the large open-water area southeast of the containment levee. Data from these units will be used to determine the variability between water level in the project and reference areas. In May 1996, 10-cm soil cores were collected at 24 stations in the project area and analyzed for percent organic matter, bulk density, salinity, and water content. A discussion of results from this analysis as well as the continuous recorder data will be included in the April 1997 progress report.

Project Description

The Bayou LaBranche Wetland project (PO-17) encompasses a 436-acre area located in St. Charles Parish on the southwestern shore of Lake Pontchartrain (figure 1). Historically, this area was a brackish marsh (Chabreck and Linscombe 1968) that served as a nursery ground for commercial and recreational finfish species (Hinchee 1977; Cramer 1978). A failed attempt at agriculture in the early 1900s caused subsidence of the interior marsh, which led to the formation of a large open-water pond. The pond has progressively increased in size, leaving just a narrow band of marsh on the Lake Pontchartrain shoreline. Shoreline retreat between 1955 and 1972 was estimated to be 9.5 ft/yr for this section of Lake Pontchartrain (Coastal Environments, Inc. 1984).

The purpose of this project is to create new vegetated wetlands in the Bayou La Branche area utilizing dredged sediment. The specific measurable project goals are to create approximately 305

acres of shallow-water habitat conducive to the natural establishment of emergent wetland vegetation and maintain a ratio within the project area of 70% emergent marsh and 30% open water.

Project components include an earthen containment berm surrounding the pond area and approximately 2.7 million yds^3 of sediment dredged from the nearby Lake Pontchartrain water bottom. The project is divided into two areas: Pond A and Pond B (figure 1). The barrier between the ponds consists of a natural ridge with a sheet pile z-wall closure and a concrete weir (weir 1, figure 1), which allows water to flow between Pond A and Pond B. Exterior weirs (weirs 2 and 3, figure 1) on the eastern berm of Pond B allow excess water to flow out of the project area, and provide an avenue for ingress and egress of marine species during periods of high water.

The sediment was pumped into the project area between February and April of 1994. In July 1994, the dredged material was aerially seeded with Japanese millet *(Echinochloa crus-galli* var. *frumentacea*) to enhance volunteer plant growth and reduce aeolian transport of sediment. Five years after construction, the sediment is expected to consolidate to an elevation of 0.65–1.62 North American Vertical Datum (NAVD)(Cottone 1996). Once the sediment has consolidated completely, bald cypress (*Taxodium distichum*) and undetermined brackish marsh plant species will be planted.

Monitoring Design

Vegetation is monitored using the Braun-Blanquet method (Mueller-Dombois and Ellenberg 1974) to quantify species composition and relative abundance of emergent vegetation. Stations consist of duplicate 1-m^2 plots taken at 440-ft intervals along 6 transect lines for a total of 84 plots (figure 2). In order to generate mean percent coverage for each vegetation type, solitary and trace occurrences are assigned percentages of 1 and 3, respectively. Sampling is conducted during periods of peak vegetation biomass (April-August). Vegetation will be monitored once before project construction and following project completion at years 2, 3, and 4, and every 3 years thereafter.

Elevation surveys are conducted to coincide with vegetation sampling and are used to document the settling rate of the dredged sediment. Nineteen staff gauges (figure 2), surveyed to NAVD, are monitored at intervals of 6 wks to qualify the rate of consolidation of the dredged sediment.

Water level is collected hourly using continuous recorders located inside (station 43) and outside (station 44) (figure 1) of the project area. These data will be used to determine the duration and frequency of marsh flooding within the project and reference areas.

To characterize sediment composition, 10-cm soil samples are collected using a Swenson corer (Swenson 1982). Soil core sampling will coincide with the vegetation monitoring; once preconstruction and following construction at years 2, 3, and 4, and every 3 years thereafter. Lab analysis will be performed to determine percent organic matter, bulk density, salinity, and water content.

Near vertical, color-infrared aerial photography (1:12,000 scale) will be taken before project construction and at least four times following project completion at years 1994, 1996, 1998, and 2016.
The photography will be georectified, photointerpreted, mapped, and analyzed with a Geographic Information System (GIS) to measure marsh to open-water ratios and to document the marsh loss rate for the project and reference areas.

Results/Discussion

Preconstruction vegetation and sediment sampling was performed on February 4, 1994. The only emergent vegetation sampled was dwarf spikerush (*Eleocharis parvula*), which occurred around the edges of shallow ponds (table 1). Submerged aquatic vegetation was abundant in the ponds with dominate species being water-milfoil (*Myriophyllum spicatum*) and coontail grass (*Ceratophyllum demersum*). The preconstruction sediment samples had a high water content, averaging 53.2%. Sample bulk densities ranged from 0.69 to 1.16 g/cc, percent organic matter was between 7.9 and 26.8, and average soil salinity was 3.62 ppt (table 2). The elevation survey and vegetation sampling were not conducted the first year following project completion because the unconsolidated sediment did not allow work crews to traverse the area.

On May 6–7, 1996, the initial postconstruction vegetation sampling was performed. The dominant vegetation in the project area was seaside goldenrod (*Solidago sempervirens*) and buttercup *(Ranunculus sp.*) (table 3). *Solidago sempervirens* was present in 64 of the 84 plots sampled. This species was found throughout the project area (mean coverage = 21.24%), but appeared to be more abundant at sample sites in pond A (mean coverage = 27.15%) than pond B (mean coverage = 6.19%). The coverage of *Solidago sempervirens* in Pond A was significantly different than pond B ($p < 0.05$).

Ranunculus occurred in 63 of the plots sampled and had a mean coverage of 20.18%. Mean coverage of *Ranunculus* in pond A (13.8%) was significantly lower than mean coverage in pond B (34.3%) ($p < 0.05$). Dwarf spikerush (*Eleocharis parvula*) and groundsel bush (*Baccharis halimifolia*) were each found at 23 sites, having a mean coverage of 7.3% and 5.32%, respectively.

These four vegetation types are frequently categorized as colonizing species. The majority of these species have become established since spring 1995, following the die off of the aerial seeded annual *Echinochloa crus-galli* (Cambre 1995). As the sediment in the project area continues to consolidate, the colonizing vegetation types are expected to diminish, supplanted by more wetland-specific species.

In the spring of 1994 and 1995, unsuccessful attempts were made to establish the required amount of sediment staff gauges in the project area. Six staff gauges were set, but because of logistical problems, readings were only collected five times during the 1994-95 period. These readings indicated that the survey used to install the gauges may not have been accurate, therefore, the data will not be used or presented.

On April 1–12, 1996, 19 staff gauges were established in the project area to determine the extent of sediment consolidation. Sediment elevation data from these staff gauges were monitored at approximately 6-wk intervals from May through August 1996 (table 4). The elevation of the sediment decreased at all staff gauge locations, with the greatest reduction occurring at station 12 (-0.25 ft NAVD). The mean elevation change in the project area over the 4-mo period was -0.13 ft NAVD. The target elevation for the dredged material, following 5 yrs of settlement, is estimated between 0.65 and 1.62 NAVD (Cottone 1996). The sediment at 18 of the 19 staff gauges has settled to elevations within this range (mean elevation is 1.29 NAVD). However, it is apparent from the vegetation survey that the targeted elevation maximum (1.62) is not suitable for the establishment of wetland vegetation. During the next 3 years, staff gauge data and elevation surveys will be used to determine the extent of sediment consolidation and to help evaluate the short-term effectiveness of the project. If after 5 yrs the sediment has not consolidated to an elevation conducive to the development of wetland vegetation, additional project features may be considered to facilitate the growth of such species.

Preconstruction aerial photographs were taken on November 7, 1993, and the first postconstruction photos were taken on December 19, 1994. The National Wetlands Research Center analyzed the 1993 and 1994 aerial photography using GIS and estimated that the 436-acre project area had 404 acres of vegetation and 32 acres of open water (figure 3). The vegetated area consisted of 342 acres of new vegetation and 62 acres previously existing marsh (figure 3). These data translate to a ratio of 94% marsh to 6% open water. The 342 acres of new vegetation exceeds the amount needed to achieve the project goal of 70% marsh to 30% open water. However, sediment elevations in the project area appear to be declining, thus the 70:30 ratio may still be reached as the area continues to settle.

References

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Construction Start:	January 5, 1994	
Construction End:	April 1, 1994	

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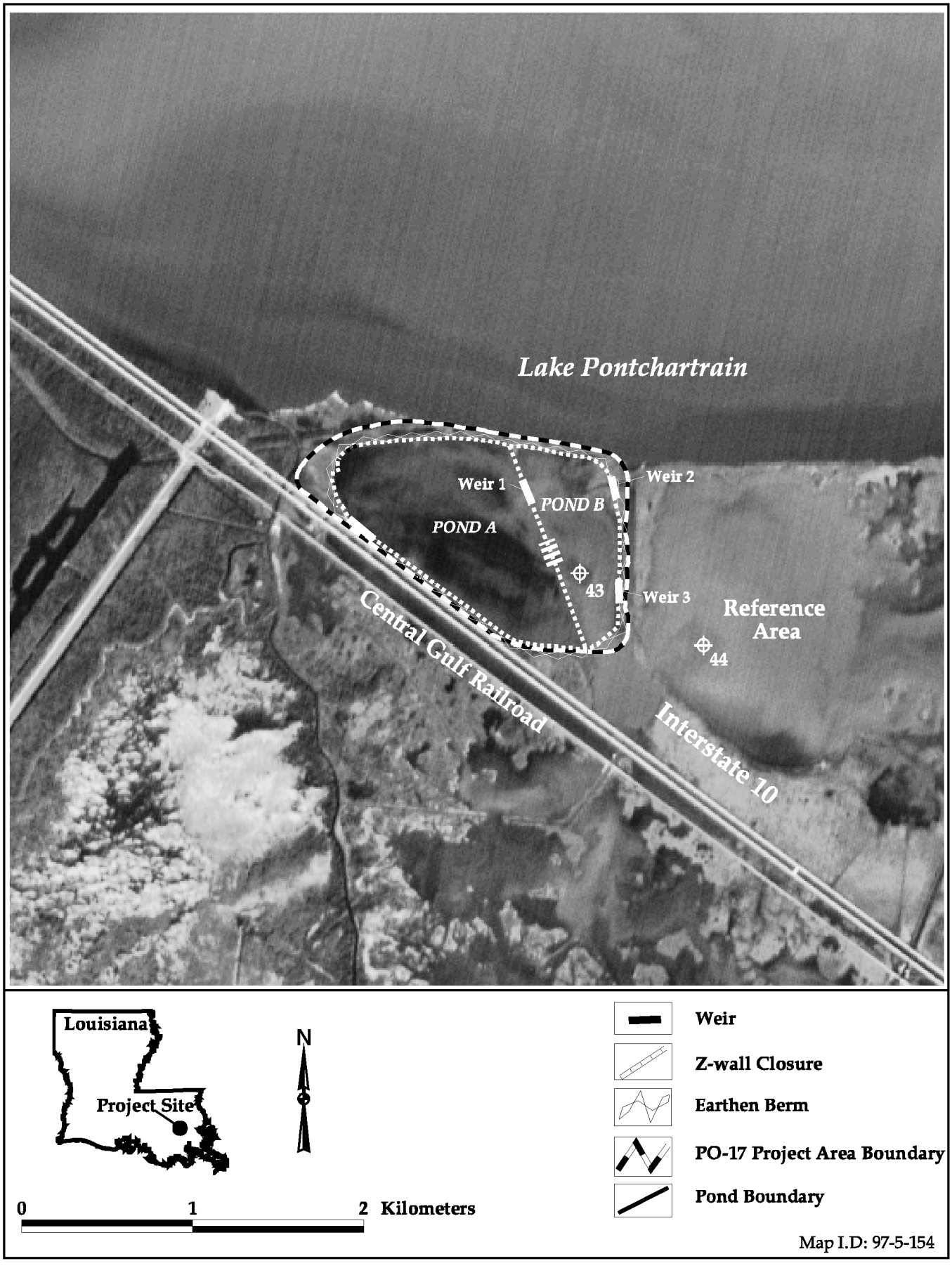


Figure 1. Bayou La Branche Wetland (PO-17) project features.

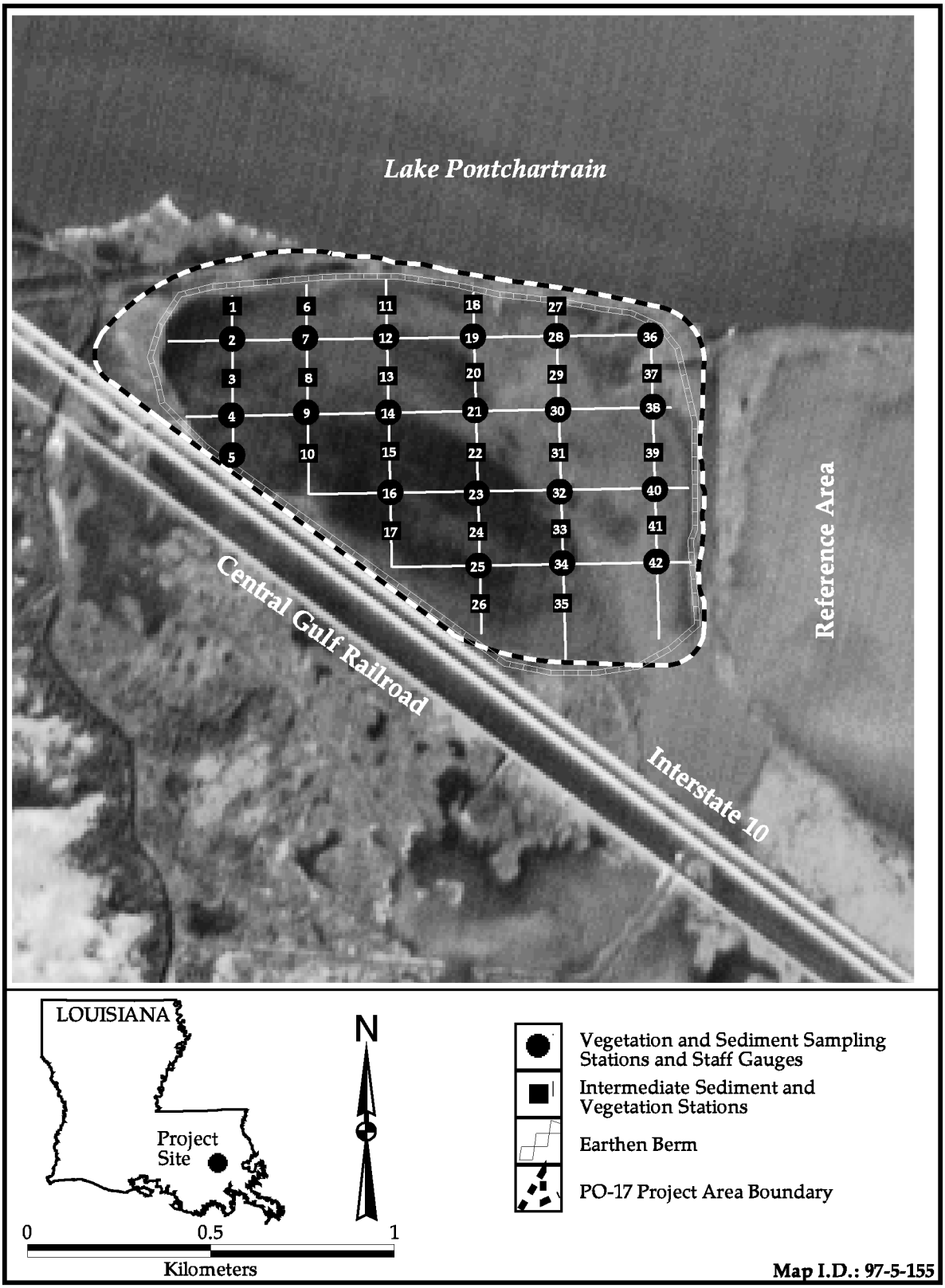
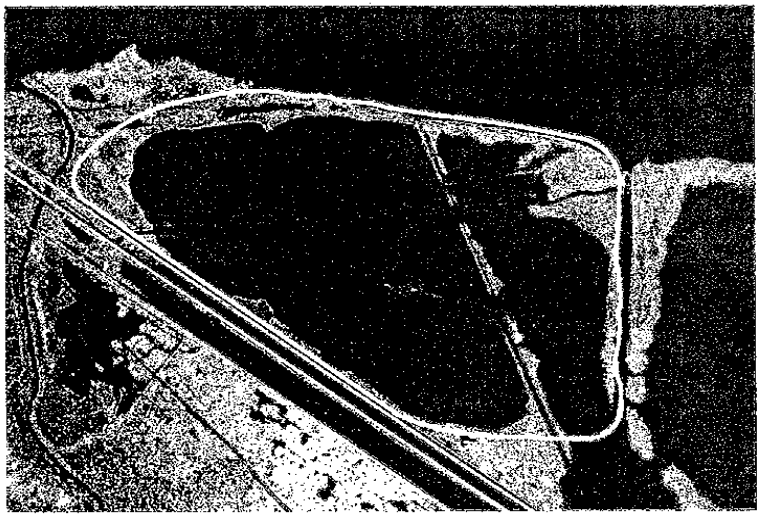
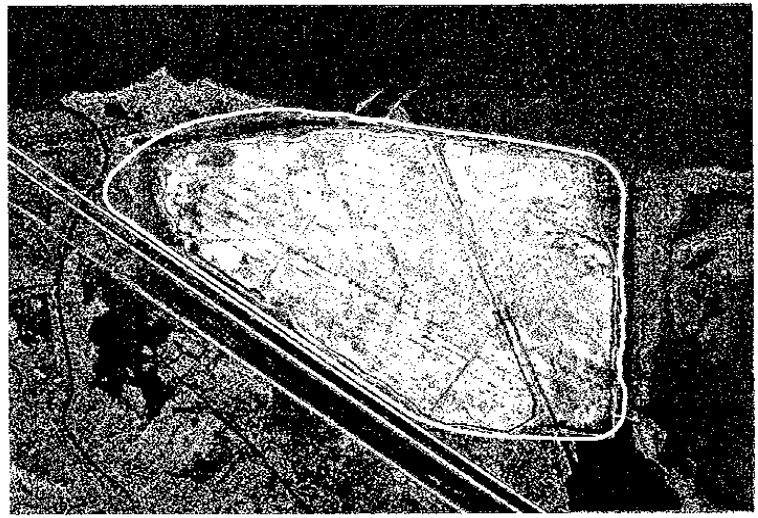


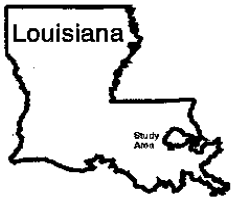
Figure 2. Bayou La Branche Wetland (PO-17) location of vegetation stations, sediment stations, sediment staff gauges, and elevation transects.

Bayou La Branche Wetland Restoration





PRE-CONSTRUCTION
November 7, 1993



Project Boundary

Acreage Summary

Habitat	Acres
Existing Vegetation	62
Open Water	374
	436

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POST-CONSTRUCTION
December 19, 1994

Acreage Summary

Habitat	Acres
Restored Vegetation	342
Existing Vegetation	62
Open Water	32
	436

95-02-002

Figure 3. Bayou La Branche Wetland (PO-17), GIS Analysis of Pre-Construction and Post-Construction Aerial Photography.

Table 1. Results of the preconstruction vegetation sampling conducted February 1994 at Bayou La Branche (PO-17).

	Eleocharis parvula	*Algae spp.*	*Ceratophyllum demersum*	*Myriophyllum spicatum*	*Najas guadalupensis*	*Ruppia maritima*
Station	% cover	% cover	% cover	% cover	% cover	% cover
1	0	0	25	45	80	0
2	0	2.5	75	2	5	0
3	0	25	2.5	0	42.5	0
4	0	0	0	3	0	0
6	0	0	50	55	2.5	20
7	0	0	0	3	0	0
8	0	2.5	15	75	5	0
9	0	0	0	35	35	0
10	0	0	35	20	20	0
11	0	0	0	50	0	0
12	0	0	50	50	35	0
13	0	0	50	75	5	0
14	0	0	100	10	10	0
15	0	10	75	10	35	0
16	0	0	0	50	60	0
17	0	0	0	0	0	0
18	0	0	25	30	0	0
19	0	0	2.5	52.5	7.5	0
20	0	0	25	35	10	0
21	0	0	50	50	20	0
22	0	0	100	50	5	0
23	0	0	50	50	5	0
24	0	0	60	20	20	0
25	0	100	30	10	10	0
26	0	100	50	50	52.5	0
27	0	0	7.5	2.5	0	0
28	0	0	30	50	0	15
29	0	0	0	0	0	0
30	0	0	0	0	0	0
31	0	0	0	0	5	3
32	0	0	0	0	2.5	0
33	0	0	0	0	0	2.5
34	0	30	0	0	5	0
35	0	0	0	0	100	0
36	52.5	0	0	0	0	0
37	52.5	0	0	0	0	0
38	0	0	0	0	0	100
39	50	0	0	0	0	50
40	50	0	0	0	0	50
41	100	0	0	0	0	0
42	27.5	2.5	0	0	2.5	0
Mean	**8.1**	**6.6**	**22.1**	**21.5**	**14.1**	**5.9**
Standard Dev.	**21.5**	**22.3**	**29.6**	**24.8**	**23.3**	**18.9**

Table 2. Physical characteristics of preconstruction sediment samples from Bayou La Branche (PO-17).

Station	Organic Matter (%)	Conductivity (µS/cm)	Salinity (ppt)	Dry Weight (g)	Volume (cc)	Bulk Density (g/cc)	Wet Weight (g)	Water (%)
2	17.3	5550	3.66	32.02	41.5	0.77	69.94	54.2
4	15.3	5300	3.5	32.85	41.5	0.79	70.96	53.7
7	15.7	5500	3.63	25.43	31	0.82	58.37	56.3
8	18.2	5575	3.71	26.94	35	0.77	64.5	58.2
9	21.7	5425	3.6	14.25	38.5	0.37	68.21	61.2
12	15.3	5550	3.66	29.07	30	0.97	70.02	58.5
14	11	5500	3.63	32.53	34	0.96	66.15	50.8
16	15.8	5575	3.68	25.87	37.5	0.69	63.6	59.4
19	16	5550	3.67	27.9	35	0.80	68.67	59.4
21	14.2	4725	3.37	23.6	34	0.69	61.27	61.2
23	17.2	5500	3.63	30.38	34	0.89	68.61	55.7
24	19	5475	3.61	29.9	38.5	0.78	71.08	58.0
25	26.8	5425	3.58	25.23	30	0.84	62.92	59.9
27	13.2	5600	3.69	32.27	38.5	0.84	75.85	57.4
28	17.1	5675	3.75	31.11	37.5	0.83	66.38	53.2
30	26.8	5500	3.63	38.64	35	1.10	70.33	45.1
32	16	5450	3.6	37.59	32.5	1.16	71.62	47.5
33	18.8	5450	3.6	29.68	33.5	0.89	67.92	56.3
34	12.4	5100	3.37	39.85	38.5	1.04	75.7	47.4
38	7.9	5850	3.86	47.55	44.5	1.07	80.91	41.2
40	12.8	5275	3.48	43.98	45	0.98	77.88	43.6
41	9.4	5625	3.72	45.29	40	1.13	79.29	42.3
42	8.3	5500	3.63	46.43	44.5	1.04	80.65	42.4
Mean	**15.9**	**5464**	**3.62**	**32.54**	**37.0**	**0.88**	**70.04**	**53.2**
Standard Dev	**4.86**	**217.01**	**0.11**	**8.20**	**4.48**	**0.18**	**6.12**	**6.67**

Table 3. Results of vegetation sampling conducted May 6, 1996, at Bayou La Branche (PO-17).

		Solidago semipervirens	*Ranunculus sp.*	*Eleocharis parvula*	*Baccharis halimifolia*	Other Species
Station	Plot	% cover	% cover	% cover	% cover	% cover
1	1	80	5	0	0	0
	2	90	5	0	0	0
2	1	10	20	0	0	75
	2	40	30	0	0	25
3	1	30	30	0	0	0
	2	5	4	40	0	1
4	1	25	15	50	0	5
	2	30	40	0	0	5
6	1	70	30	0	0	0
	2	50	0	0	15	0
7	1	70	0	0	0	0
	2	40	15	0	0	0
8	1	50	0	25	25	0
	2	50	10	0	25	0
9	1	80	5	0	0	0
	2	60	10	0	0	0
10	1	80	0	0	0	5
	2	80	0	0	5	0
11	1	0	0	0	40	1
	2	3	3	0	25	0
12	1	5	0	0	10	0
	2	75	5	0	5	0
13	1	20	15	0	5	0
	2	25	0	0	10	0
14	1	10	10	0	0	0
	2	25	10	0	0	0
15	1	50	0	0	0	0
	2	60	0	0	0	0
16	1	70	20	0	0	0
	2	50	5	0	0	0
17	1	15	10	0	0	23
	2	20	80	0	0	0
18	1	30	0	0	0	6
	2	45	0	0	0	0
19	1	0	5	0	0	3
	2	0	5	0	0	3
20	1	25	20	0	0	0
	2	20	40	0	0	0
21	1	1	1	25	0	10
	2	5	15	0	0	3
22	1	25	5	0	1	3
	2	30	15	0	0	3
23	1	5	60	15	0	0
	2	0	0	40	0	8

Table 3. Results of vegetation sampling conducted May 6, 1996, at Bayou La Branche (PO-17).

		Solidago sempervirens	*Ranunculus sp.*	*Eleocharis parvula*	*Baccharis halimifolia*	Other Species
Station	Plot	% cover	% cover	% cover	% cover	% cover
24	1	1	15	0	0	1
	2	0	40	5	0	0
25	1	0	3	65	0	5
	2	0	0	10	0	50
26	1	3	3	75	0	3
	2	0	3	0	0	93
27	1	5	0	0	5	15
	2	0	10	0	60	0
28	1	0	70	0	15	23
	2	0	30	0	30	10
29	1	0	90	0	0	25
	2	0	80	0	20	5
30	1	60	20	0	10	3
	2	0	0	80	0	0
31	1	5	55	20	0	18
	2	10	70	5	3	8
32	1	10	60	3	3	36
	2	15	25	5	0	21
33	1	5	90	0	0	13
	2	5	30	5	0	6
34	1	35	15	20	0	3
	2	10	60	15	0	23
35	1	5	0	30	0	24
	2	0	0	70	0	6
36	1	10	100	0	30	0
	2	5	80	0	5	0
37	1	0	0	0	50	3
	2	10	50	0	0	3
38	1	10	50	0	50	11
	2	5	60	0	0	63
39	1	6	3	3	0	84
	2	5	25	0	0	16
40	1	10	15	5	0	2
	2	0	0	0	0	0
41	1	0	0	0	0	0
	2	0	0	0	0	0
42	1	0	0	3	0	3
	2	0	0	0	0	0
Mean:		**21.24**	**20.18**	**7.31**	**5.32**	**8.99**
Standard Dev.		**25.96**	**26.62**	**17.88**	**12.54**	**18.51**

Table 4. Bayou La Branche (PO-17) sediment staff gauge elevations from May through August 1996.

Station	Elevation May '96 (ft. NAVD)	Elevation June '96 (ft. NAVD)	Elevation Aug '96 (ft. NAVD)	Elevation Change May - August '96
2	1.60	1.50	1.40	-0.20
4	1.10	1.08	1.05	-0.05
7	1.80	1.70	1.60	-0.20
9	1.60	1.50	1.45	-0.15
12	1.80	1.75	1.55	-0.25
14	1.55	1.50		
16	1.45	1.30	1.25	-0.20
19	1.50	1.40	1.40	-0.10
21	1.30	1.30	1.15	-0.15
23	1.30	1.25		
25	1.10	1.05	1.05	-0.05
28	1.90	1.80	1.70	-0.20
30	1.25	1.25	1.20	-0.05
32	1.20	1.10	1.05	-0.15
34	1.40	1.35	1.35	-0.05
36	1.50	1.50	1.40	-0.10
38	1.50	1.45	1.40	-0.10
40	1.10	1.00	1.00	-0.10
42	1.00	1.00	0.95	-0.05
Mean	**1.42**	**1.36**	**1.29**	**-0.13**