Coastal Protection and Restoration Authority of Louisiana
Office of Coastal Protection and Restoration

2008 Operations, Maintenance, and Monitoring Report

for

BAYOU LA BRANCHE WETLAND CREATION

State Project Number PO-17
Priority Project List 1

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Orleans Parish

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For
Bayou La Branche Wetland Creation (PO-17)

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Preface

The 2008 OM&M Report format is a streamlined approach which combines the Operation and Maintenance annual project inspection information with the Monitoring data and analyses on a project-specific basis. The report format for 2008 includes monitoring data collected through December 2007, and annual Maintenance Inspections through June 2007. Monitoring data collected in 2008 and maintenance inspections conducted between July 2007 and June 2008 will be presented in the 2009 OM&M Report.

I. Introduction

The Bayou La Branche Wetland Creation Project (PO-17) encompasses 436 ac (176.4 ha) and is located in St. Charles Parish, Louisiana, on the southwestern shore of Lake Pontchartrain (figure 1). The project area is bounded by Lake Pontchartrain (north), the Illinois Central Gulf Railroad (south), an unnamed pipeline canal (east) and Bayou La Branche (west) (figure 2).

Historically the La Branche wetlands have been classified as brackish marsh (O'Neil 1949, Chabreck and Linscombe 1968, 1988), as the hydrology is significantly influenced by Lake Pontchartrain. The wetlands receive tidal waters from the lake through two openings in the shoreline and are flooded during normal high tide. Water circulation in the area is also greatly influenced by winds. Consequently, the wetlands experience flooding at times other than high tide and may also be drained at times other than low tide.

A combination of events dating back to the 1800's has contributed to an almost complete loss of marsh in the area and a subsequent conversion into open water (Pierce et al. 1985). The construction of the Illinois Central Railroad in 1830 significantly altered the hydrology of the area by creating a barrier to drainage and sheet flow across the marsh from upland areas. In the early 1900's, an attempt to reclaim the area for agriculture failed, after which open water areas began to appear. During the construction of Interstate 10 in the 1960's, access canals were dug through the area, which further altered hydrology and provided a conduit for saltwater intrusion from Lake Pontchartrain into the interior marsh. Two natural events that have received blame for land loss in the area were Hurricane Betsy in 1965 and Hurricane Camille in 1969. The tidal surge generated from these storms most likely created prolonged flooding of the Bayou La Branche wetlands with higher saline water from Lake Pontchartrain. Because of the altered hydrology of this area, floodwaters may have taken several weeks to drain from the wetlands, thereby stressing vegetation and contributing to the loss of marsh acreage (Montz and Cherubini 1973).

In addition to these major events that have impacted the La Branche wetlands, subsidence and shoreline erosion have also contributed to land loss in the area. Pierce et al. (1985) estimated that subsidence was 0.39 in (1 cm) per year in the La Branche Wetland. Erosion of the Lake

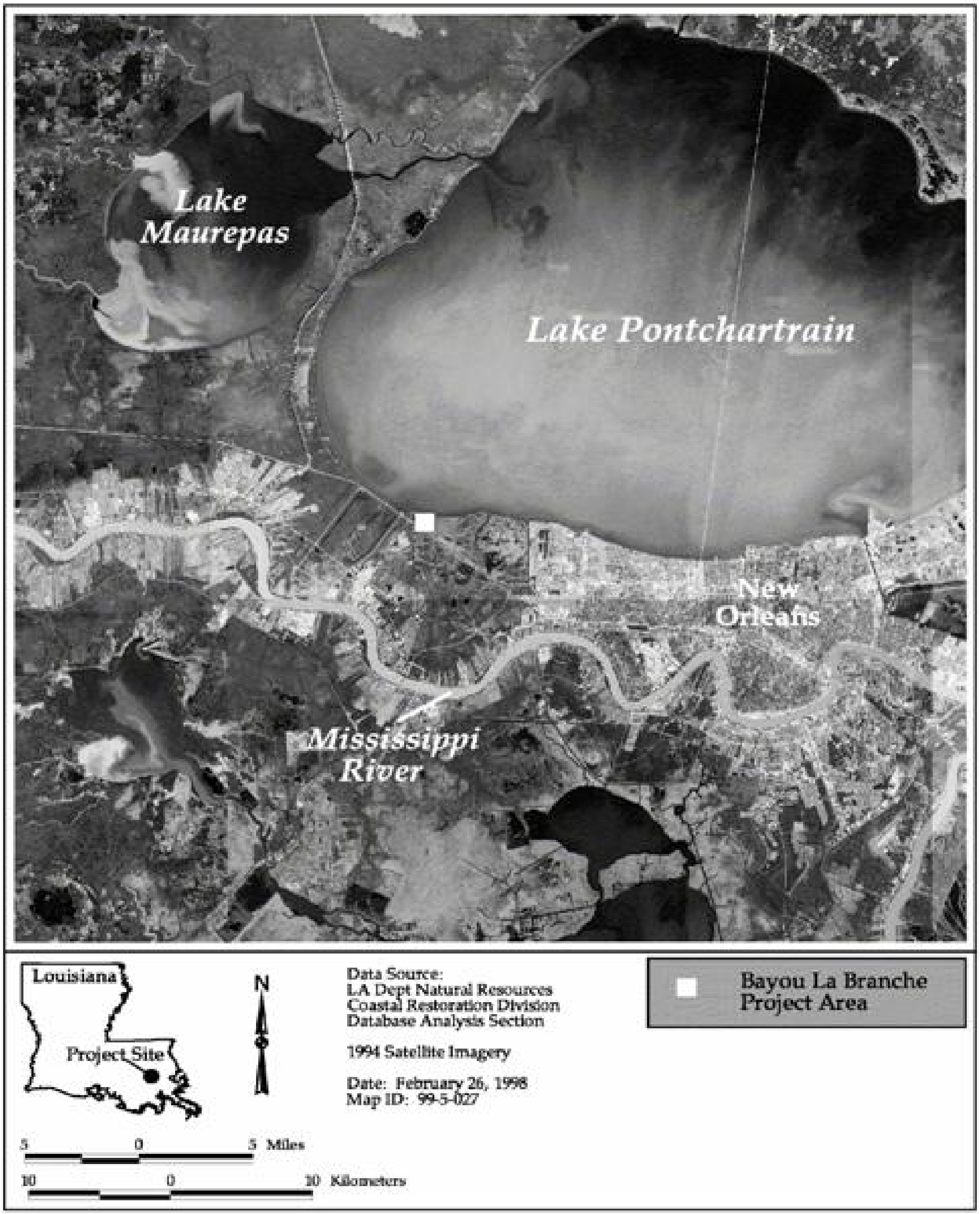


Figure 1. Location of the Bayou La Branche Wetland Creation (PO-17) project.

Pontchartrain shoreline was estimated to be 9.5 ft/yr (2.9 m/yr) between 1955 and 1972 (Coastal Environments, Inc. 1984).

A method used to impede land loss in many states, including Louisiana, is to create or restore wetlands through the beneficial use of dredge materials (Broome 1988, Patrick et al. 1984, USACE and LSU 1995). Although many factors are to be considered when creating wetlands from dredged material, many studies lack geomorphological attributes to aid engineers and planners in improving design and construction (Shafer and Streever 2000). In addition, literature suggests that dredged material sites do not necessarily perform as nearby natural sites but provide some of the functions of natural marshes (Streever 2000). When creating a wetland with dredged materials, the most important factor to consider is the elevation of the deposited sediments in relation to the hydrologic regime of which the vegetation of interest is adapted (Broome 1988). Sediment elevation affects the frequency and duration of flooding, which in turn affects the species of vegetation that become established within the wetland and the distribution of those species throughout the area.

The Bayou La Branche Wetland Creation Project was the first project built through the Coastal Wetlands Planning, Protection, and Restoration Act. Due to significant land loss, the project area was mostly shallow, open-water habitat, and only a narrow band of marsh along the shoreline separated the project area from the lake. Thus, the aim of the project was not just to create marsh, but also to create marsh in an area of critical need within the landscape by preventing shoreline breaching and subsequent exposure of interior wetlands to wave energy and other influences from Lake Pontchartrain.

The objective of the Bayou La Branche Wetland Creation was to create new emergent marsh in the open water area of the Bayou La Branche wetlands by utilizing dredged sediment from Lake Pontchartrain. Specific objectives were (1) to create approximately 305 ac (123.5 ha) of shallow-water habitat conducive to the natural establishment of emergent wetland vegetation and (2) to produce a minimum ratio of 70% emergent marsh to 30% open water within 5 years following project completion.

The Bayou La Branche Wetland Creation project construction was completed April 1, 1994.

The principal project features include:

- An earthen berm was constructed to confine the 2.7 million yds^3 (2.1 million m^3) of dredged sediment that were pumped into the project area. The area is divided by a spoil ridge that contains a sheet pile z-wall closure and a concrete weir (weir 1, figure 2). The removal of several segments of the z-wall and the opening of the weir allows the exchange of water between these two areas.

- Two weirs and four box culverts located in the containment berm allow water to flow in and out of the project area, and provide for ingress and egress of marine species during periods of high water (figure 2).

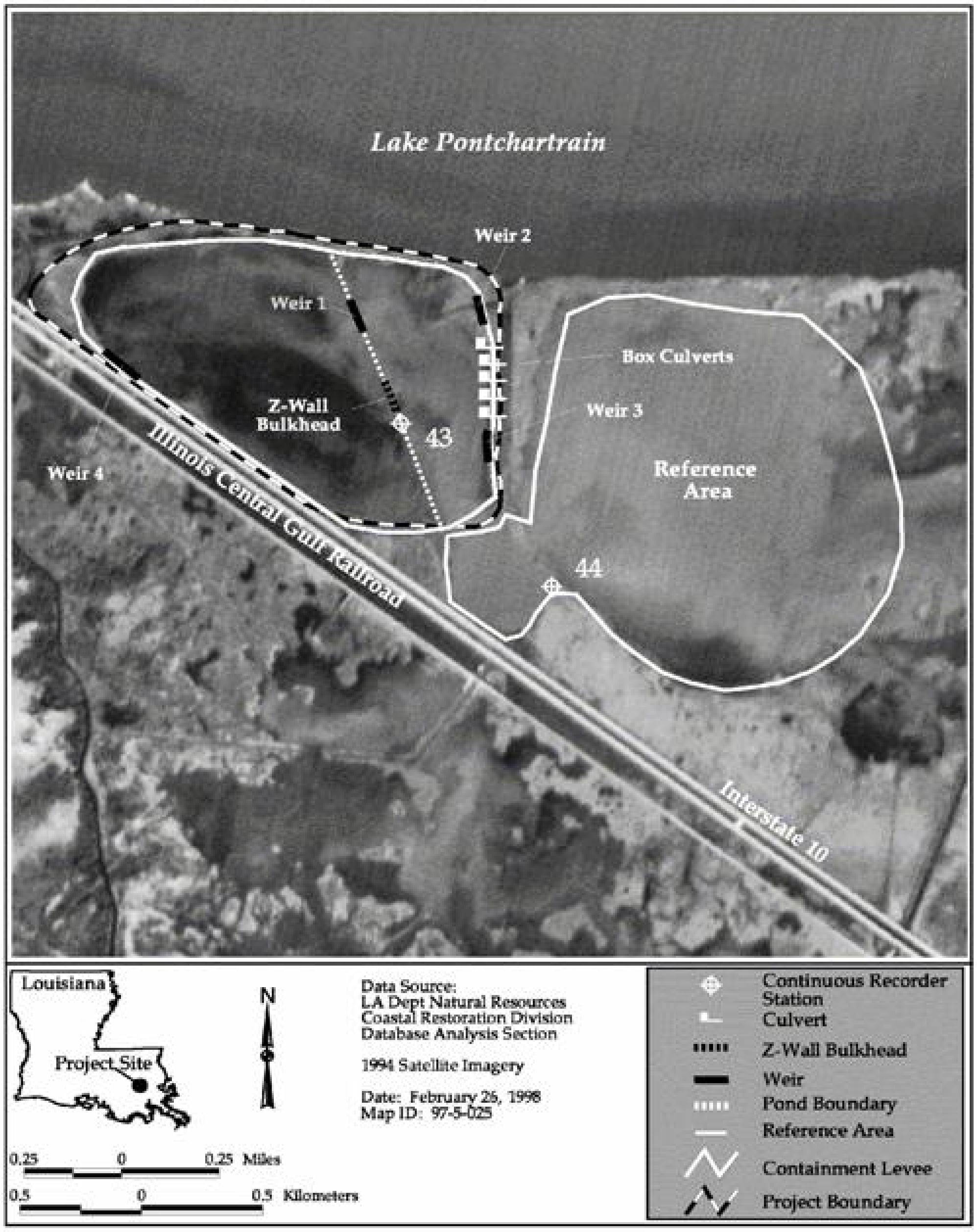


Figure 2. Locations of the Bayou La Branche wetland creation (PO-17) project area, reference area, project features and continuous recorder stations (PO17-43) and (PO17-44R),

II. Maintenance Activity

There is no immediate maintenance planned in the near term for this project.

III. Operation Activity

There are no operations for this project.

IV. Monitoring Activity

a. Monitoring Goals

The objective of the Bayou La Branche Wetland Creation is to create new vegetated wetlands in the Bayou La Branche area utilizing dredged sediments.

The following goals will contribute to the evaluation of the above objective:

1. Create approximately 305 acres (123ha) of shallow-water habitat conducive to the natural establishment of emergent wetland vegetation.

2. Increase the marsh: open-water ratio in the project area to a minimum of 70% emergent marsh to 30% open water after 5 years following project completion.

b. Monitoring Elements

Salinity

Salinity was recorded hourly at two continuous recorder stations (YSI Model 6000 or 6920 Water Quality Analyzers), from April 1996 – December 2002. One located in the project area (station 43), and one in the reference area (station 44) (see figure 2). Although salinity monitoring was not a goal of this project, the data were used to evaluate the changes in emergent wetland vegetation species and to characterize the spatial and temporal variation in salinity within the project and reference areas.

Water Elevation

Water level was recorded hourly at two continuous recorder stations. One recorder was located in the project area (station 43), and one was located in the reference area (station 44). Staff gauges were established and surveyed at each continuous recorder station in August 1997 so that staff gauge data could be used to convert water level data from the recorders to a datum North American Vertical Datum 1988 (NAVD 88). Water elevation and marsh elevation, were used to calculate frequency and duration of flooding in the project and reference areas.

Sediment Elevation

Staff gauges NAVD 88 were installed in the project area to monitor elevation of the dredged sediments. In 1994, seven temporary staff gauges were set up around the perimeter of the area. Five gauges were installed in Pond A, and two were installed in Pond B. In 1996, 19 permanent staff gauges were installed along north-south transects, as outlined in the project monitoring plan, and data were collected twice per year from 1996 - 2002 (LDNR 1994).

Soil Properties

To characterize soil composition in the project area, 10-cm soil samples were collected at the 19 staff gauge stations with a Swenson corer (Swenson 1982). Soil samples were taken to coincide with vegetation surveys, once during pre-construction and at post –construction years two (1996), three (1997), four (1998), seven (2001), eight (2002), ten (2004), eleven (2005) and thirteen (2007). The soil cores were analyzed to determine percent organic matter, bulk density (g/cc), and percent moisture.

Vegetation

Species composition and relative abundance of emergent vegetation were quantified using techniques described in Steyer et al. (1995). Forty-two stations were surveyed during pre-construction and at post-construction years two (1996) and three (1997) however, due to budget cuts the number of stations were reduced to 19 for the year four (1998), seven (2001), eight (2002), ten (2004), eleven (2005) and thirteen (2007) surveys and all future surveys.

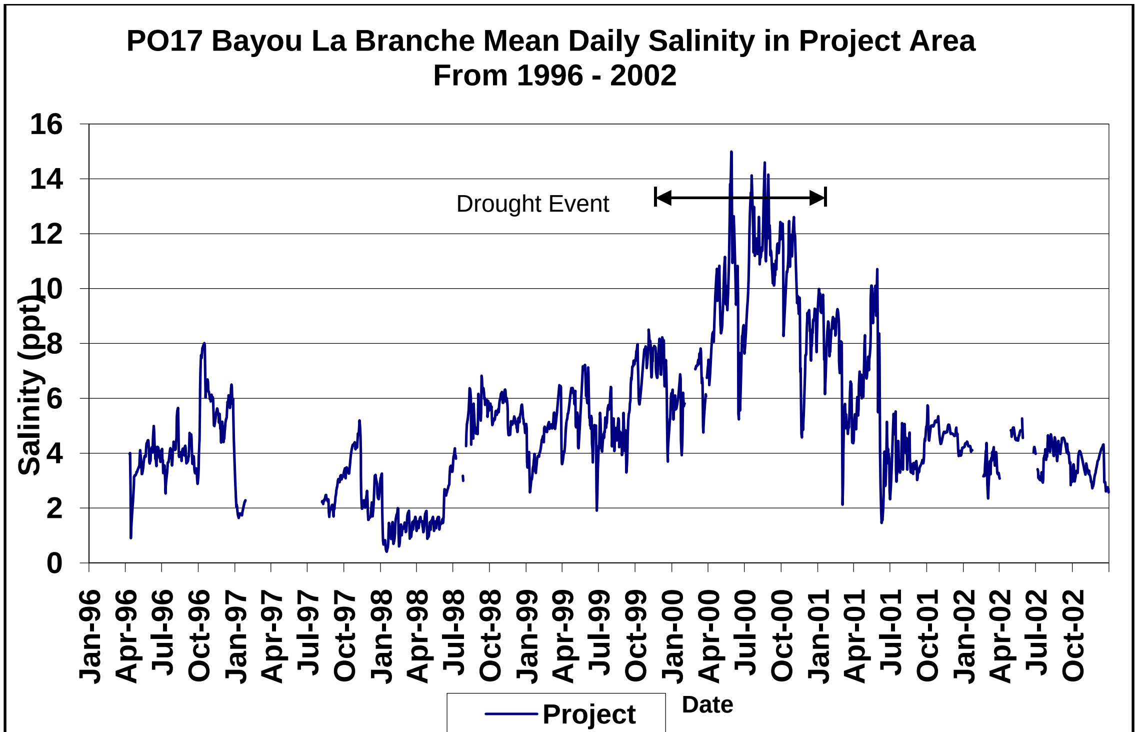
Habitat Mapping

At the U.S. Geological Survey's National Wetlands Research Center (NWRC), 1:12,000 scale color infrared aerial photography was classified and photo-interpreted to measure land to open water ratios and map habitat types in the project and reference areas. The photography was obtained in 1993 (pre-construction), 1994, 1997, and will again be obtained in 2012.

c. Preliminary Monitoring Results and Discussion

Salinity

Average project area salinity (5.3 ppt) was statistically higher ($F_{1,4178}$=75.97, P<0.0001) than reference area salinity (4.6 ppt). Salinity in the project and reference areas was highest during the drought period that extended from September 1999 through December 2000 (figure 3). Differences in salinity in the project and reference areas were likely due to the semi-impoundment of the project area leading to less tidal flushing and concentration of salts due to evaporation. Although at times the salinity levels were higher (prolonged drought period) and water levels lower, the marsh vegetation types in the project area did not seem to be adversely altered.



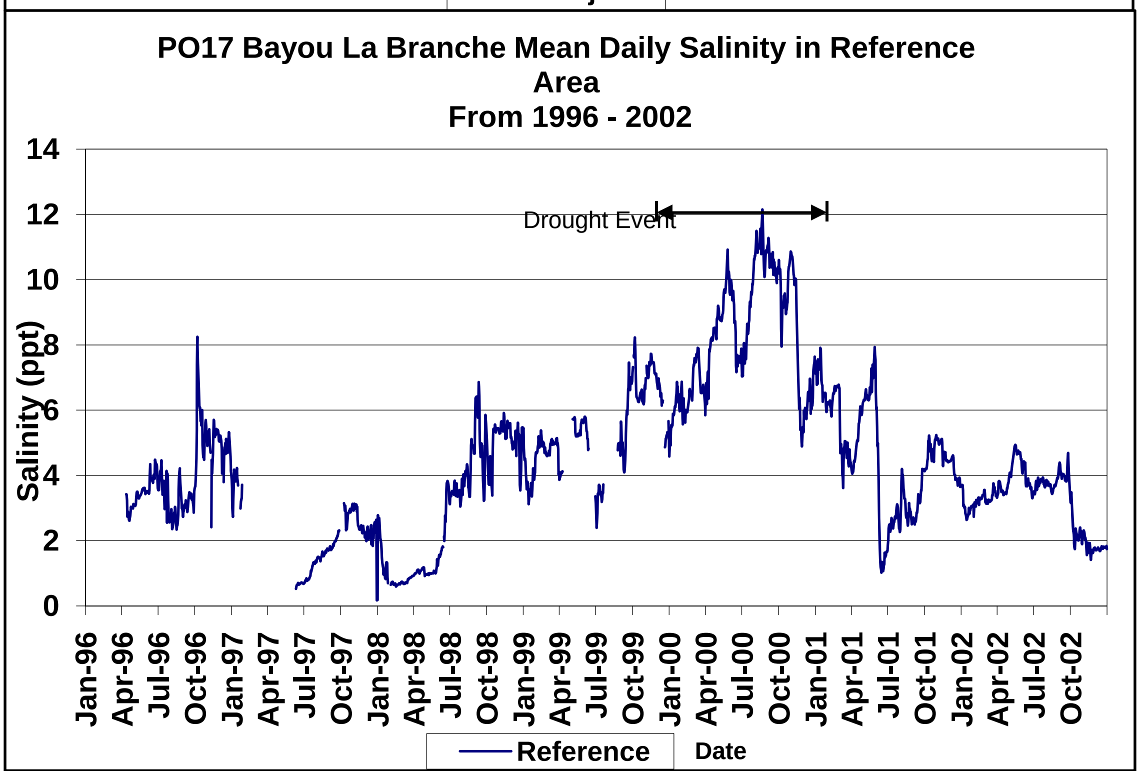


Figure 3. Mean daily salinity within the Bayou La Branche Wetland Creation (PO17) project and reference areas from 1996 to 2002.

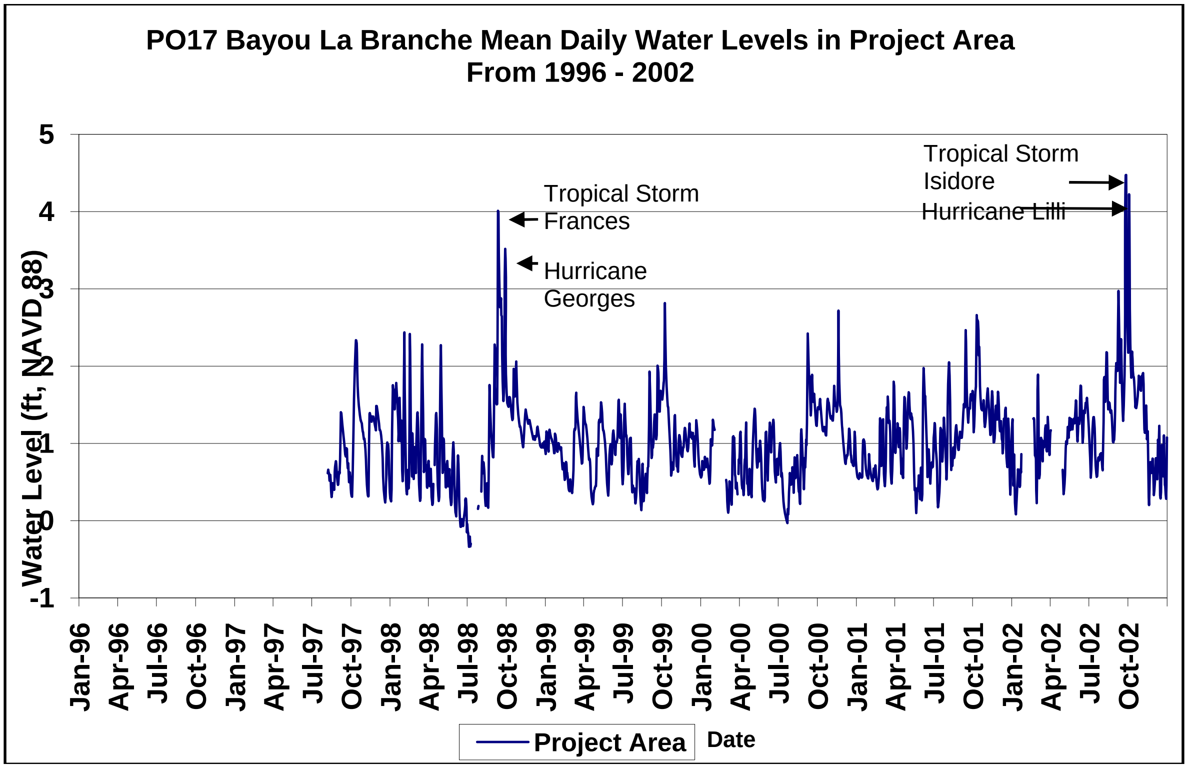
Salinity levels in the project area were in the lower mesohaline range (5.0 - 18.0 ppt) which falls into the historical La Branche classification of brackish marsh (O'Neil 1949, Chabreck and Linscombe 1968, 1988).

Water Elevation

Water level in the project and reference areas followed similar patterns from 1996 to 2002 for all years (figure 4). Average water level in the project area [1.03 ft (0.31 m) NAVD 88] was significantly higher ($F_{1,3599}$=59.55, $p<0.001$) than water level in the reference area [0.88 ft (0.27m) NAVD 88]. However, differences in frequency and duration of flooding were noted. The reference area was inundated more frequently than the project area each year; however, the average duration of flooding was greater in the project area. The maximum duration of a single flood event in the project area was 122 days, whereas the maximum duration in the reference area was 46 days (table 1).

Differences in the frequency and duration of flooding between the project and reference areas were likely due to the semi-impoundment of the project area. During construction a small levee was built around the project area to contain the dredged sediments, and box culverts were installed to allow water to drain from the project area as the dredged sediments de-watered. Over the life of the project, the containment levee has been breached three times (once by USACE and twice naturally). One breach was left open and accounts for some tidal variation; however, the other two breaches were closed with weirs or sandbags. In addition, the drainage culverts in the eastern levee were blocked with lumber (2x4's) during the fall and winter months. All of these structures, and modifications to them, affect water flow into and out of the project area. Members of a local duck-hunting club were responsible for closing the two breaches and for blocking the culverts (personal communication, Ensminger 1996). It is presumed that they made these modifications to hold more water in the project area in order to create a more desirable habitat for wintering waterfowl.

The variability of water levels in the project area is important because it can affect the establishment of marsh vegetation (Chabreck and Hoffpauir 1965). Weirs prevent impounded areas from dewatering during low tides, and stabilize water levels by reducing tidal exchange (Cowan et al. 1988). In turn, stabilization of water levels reduces environmental stress on certain species of vegetation, which can increase diversity and production of certain aquatic vegetation species (Larrick and Chabreck 1976, Davidson and Chabreck 1983). Conversely, other species of aquatic vegetation may become stressed or even excluded if high water levels are maintained (Conner et al. 1981). For example, extended floods associated with consecutive tropical storms and hurricanes occurred in the early fall of 1998 and 2002. Although Lake Pontchartrain and New Orleans were not directly impacted by these storms and hurricanes, storm surge from the Gulf of Mexico caused a temporary increase in water levels of three to four feet above normal. However, vegetation was not adversely affected during these storm events.



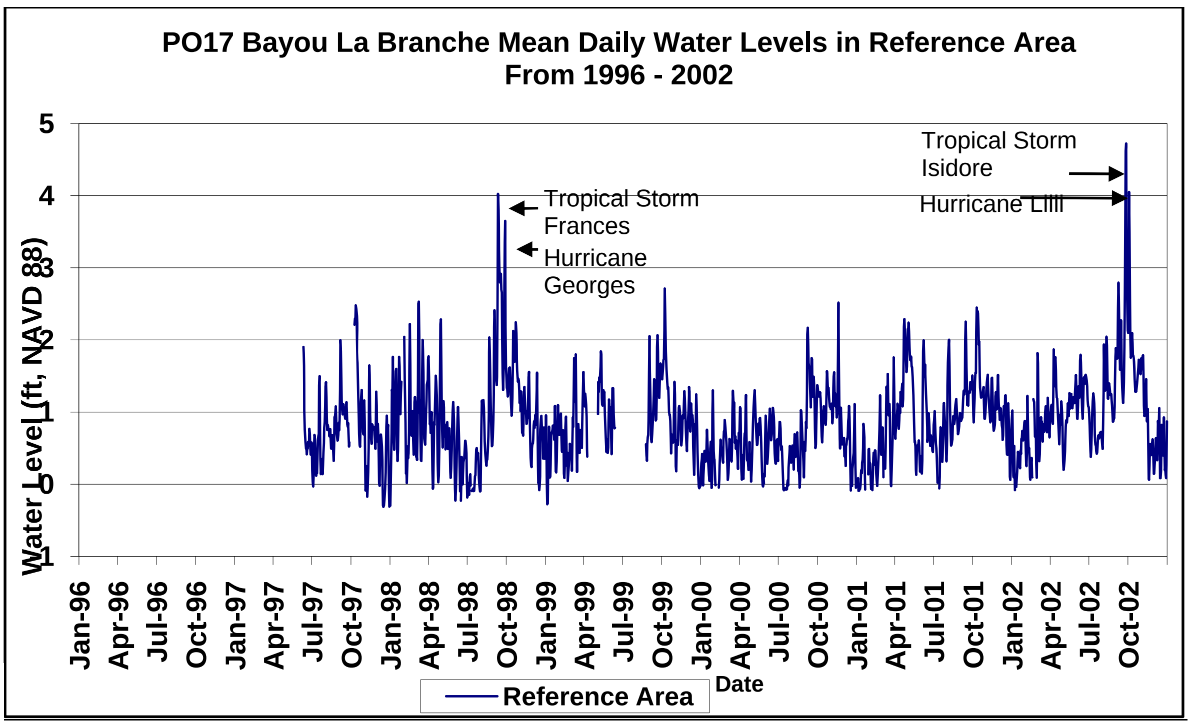


Figure 4. Mean daily water levels within the Bayou La Branche Wetland Creation (PO-17) project and reference areas from 1996 to 2002.

Table 1 Frequency and duration of flooding in the Bayou La Branche Wetland Creation (PO-17) project and reference areas from 1997 to 2002.

	Project Area				Reference Area			
Year	# Flood Events	% Time Flood	Mean Depth (ft)	Mean Duration (Days)	# Flood Events	%Time Flood	Mean Depth (ft)	Mean Duration (Days)
1997*	3	35.37	1.25	17.3	12	17.19	0.93	2.75
1998	14	58.48	1.12	14.28	26	36.13	0.99	4.96
1999	21	54.79	0.96	9.52	17	30.48	0.85	4.8
2000	14	43.36	0.96	10.5	17	16.57	0.79	2.88
2001	18	61.64	1.04	12.5	21	36.29	0.87	6
2002	9	73.08	1.12	19	16	43.16	0.90	7.68

Sediment Elevation

Sediment elevation measured from the temporary staff gauges just after project construction in October 1994, ranged from 1.33 to 2.80 ft (0.41 to 0.85 m) NAVD 88, and had a mean elevation and standard error of 1.93 ± 0.22 ft (0.59 ± 0.06 m) NAVD. In June 1995, sediment elevation ranged from 0.82 to 1.62 ft (0.25 to 0.49 m) NAVD, with a mean of 1.17 ± 0.09 ft (0.36 ± 0.03 m) NAVD. The analysis of sediment elevation data measured from the permanent staff gauges (1996 - 2007) showed a significant (df = 1, $F = 172.84$, $p < 0.0001$) time effect, which accounted for 85% of the variation in sediment elevation in the project area. A plot of mean sediment elevation by year (figure 5) displays a negative trend in sediment elevation from 1994 to 1998 with less variation from 1999 to 2007. The remaining variation in sediment elevation was between stations, among which significant differences (df = 18, $F = 29.57$, $p < 0.0001$) were also present. In general, stations located in the northern section of the project area had higher elevations than those in the southern project area. In addition, the greatest changes in elevation have occurred at several of the northern stations (2, 7, 9, 12, 14, and 19). One of the most important factors to consider when creating a wetland is the elevation of the deposited sediments in relation to the tidal regime (Broome 1988). Elevation affects the frequency and duration of flooding, which determines the zonation of vegetation. The target range of sediment elevation for this project, after five years of consolidation, was estimated at 0.65 to 1.62 ft (0.20-0.49 m) NAVD (personal communication, Cottone 1996). As of August 2007, elevation at 11 of the 19 staff gauge stations was within this target range.

The north-south elevation gradient in the project area may be explained by the manner in which the area was filled with dredged sediments. During construction, discharge pipes from the dredge were placed in several locations along the northern (lake) shore of the project area

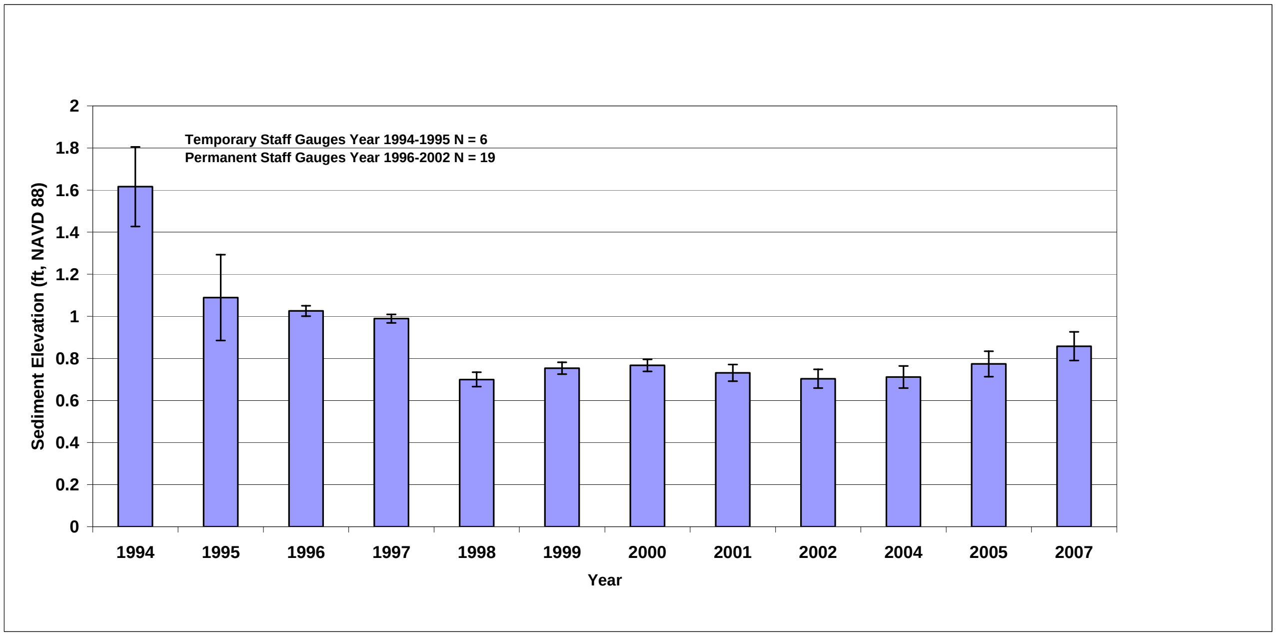


Figure 5. Yearly mean (standard error) sediment elevation from 1994 to 2007 for the Bayou La Branche Wetland Creation Project. Data from years 1994 and 1995 were measured from eight temporary staff gauges and were not used in statistical analyses.

and the dredged sediments were allowed to flow south into the area. During this process, sediment would have been stacked more in the northern areas around each discharge location, and areas furthest from the discharge pipes would have received less sediment. Another aspect of construction was that no direct sediment discharge was allowed within 1000 ft (305 m) of the Interstate-10 bridge because of concerns that the deposited dredged sediments would displace the underlying peat foundation in the project area, possibly affecting the interstate's infrastructure (Wilde 1997). Thus, the southern section of the project area, much of which borders the interstate, received less sediment than the northern section during placement of the dredge materials.

The greatest amount of sediment consolidation seems to have occurred during the first two years after project construction, followed by a more moderate decrease in elevation, through year five. By 1998, the elevation "stabilized" and has been consistent through 2007. Interestingly, elevation was slightly lower in 1998 than the following years; however, an extended drought occurred from fall 1998 to winter 2000, during which water level remained well below marsh elevation. During this period, large cracks in the sediment were observed throughout the project area, and most of the deep channels in the area were void of standing water.

Soil Properties

Organic matter remained below 5% from 1996 to 1998 but was significantly higher (df = 7, F = 47.27, $p < 0.0001$) from 2001 to 2007 (figure 6). Bulk density was also significantly different (df = 7, F = 167.51 $p < 0.0001$) among years, with a decrease from 1996 to 2007. However, a slight increase was seen in 2002. Soil moisture content varied and was significantly different (df = 7, F = 45.74, $p < 0.0001$) among years. However, it remained near 47% during 2004, 2005, and 2007.

Soils of newly created wetlands are composed largely of mineral material and have low organic matter content (Odum 1988). It was not surprising, therefore, to see low values during the early years for percent organic matter in the Bayou La Branche project area relative to the surrounding wetlands, which have been shown to contain soils with greater than 50% organic matter (Palmisano and Chabreck 1972). Further compaction of the sediments appear to have stabilized therefore it would be likely to see an increasing trend in percent organic matter as bulk density decreases. Percent moisture may be explained by water levels in the marsh at the time the soil samples were taken.

Habitat Mapping

GIS land-water analysis of aerial photography revealed that the land to open water ratio in the project area increased between 1993 and 1997 but remained unchanged in the reference area during the same time period (figure 7). In the project area, the proportion of land to water increased from 18.5% land and 81.5% water in 1993 to 81.7% land and 18.3% water in 1997. In the reference area, the land to open water ratio remained constant at 2.2% land and 97.8% water in both 1993 and 1997.

The most notable habitat changes in the project area were the increase in palustrine emergent marsh and scrub-shrub from 1.7 ac (0.69 ha) in 1993 to 305.6 ac (123.7 ha) in 1997 and the corresponding decrease in estuarine open water and aquatic beds from 356.9 ac (144.4 ha) in 1993 to 14.0 ac (5.7 ha) in 1997. Upland habitats in the project area increased from 8.0 ac (3.2 ha) in 1993 to 12.6 ac (5.1 ha) in 1997. In the reference area, only small changes in habitat distribution were evident. Total open water increased from 504.3 ac (204.1 ha) in 1993 to 505.1 ac (204.4 ha) in 1997. Also, estuarine emergent wetland decreased from 8.4 ac (3.4 ha) in 1993 to 6.1 ac (2.5 ha) in 1997, whereas upland habitats increased from none in 1993 to 0.9 ac (0.4 ha) in 1997.

The establishment of wetland vegetation in the project area is meaningful to the success of this project. Therefore, it is important to note that although the GIS land/water analysis indicated that approximately 82% of the project area was land in 1997, only 51% of the project area was emergent marsh. The remaining 31% of the area was scrub-shrub habitat, which mostly consisted of *Baccharis halimifolia* (groundsel bush) and upland habitats. The majority of the scrub-shrub habitat was confined to the northern section of the project area and along the canal banks.

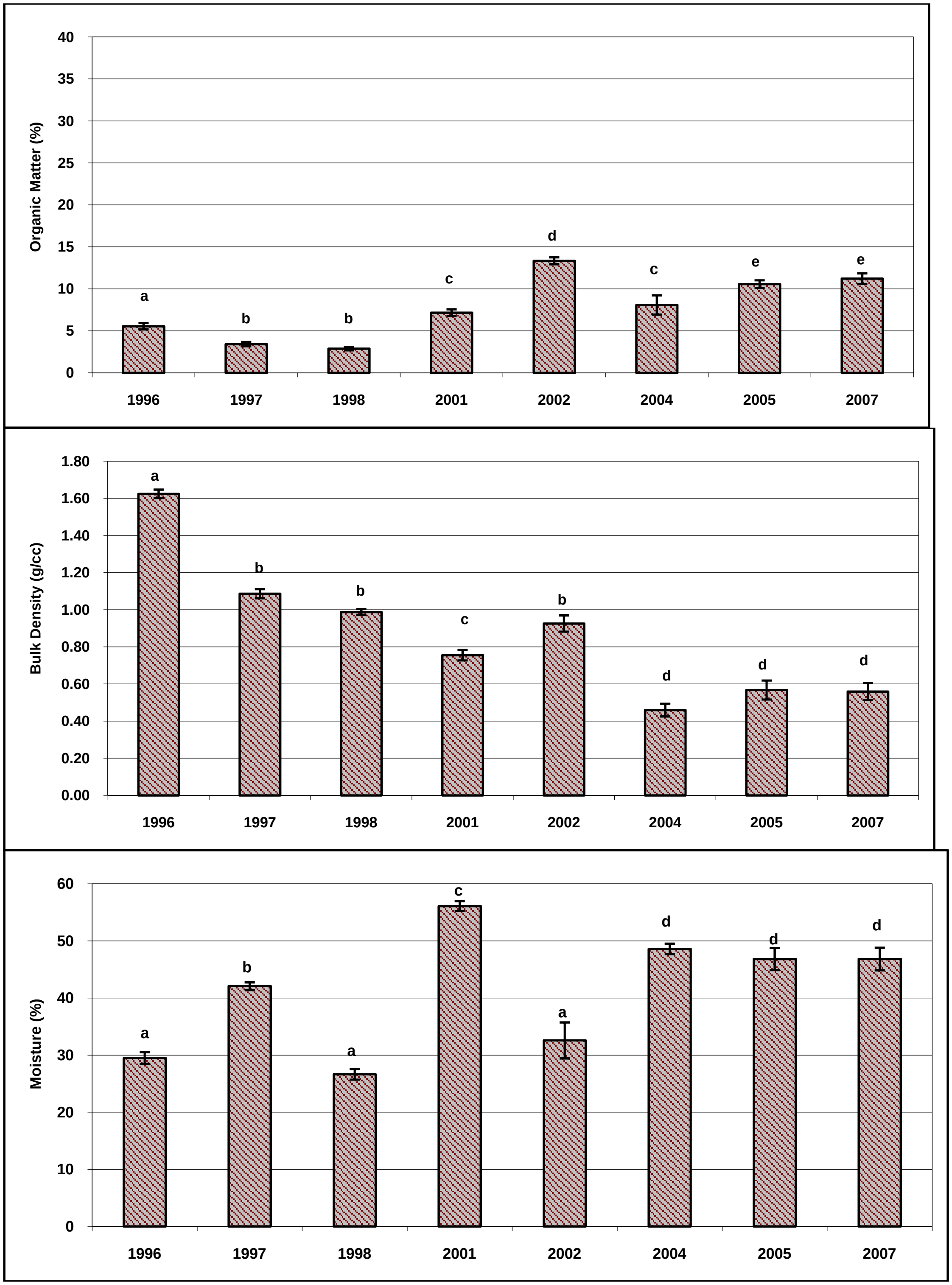


Figure 6. Mean (SE) percent organic matter, bulk density, and percent moisture for dredged sediments in the Bayou La Branche Wetlands Creation (PO-17) project area from 1996 to 2007. Different letters represent differences among means ($P<0.05$).

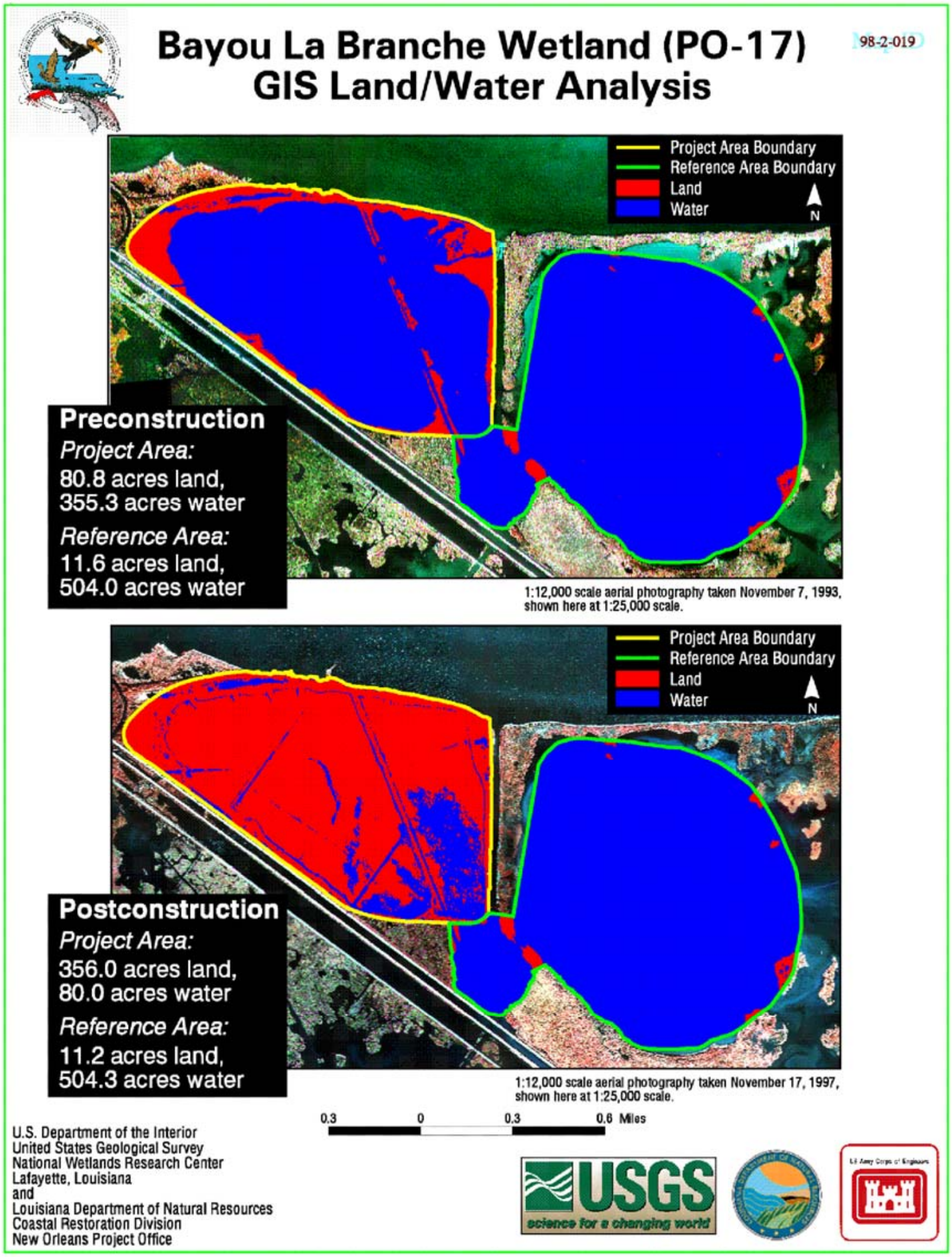


Figure 7. GIS land-water analysis of The Bayou La Branche Wetland Creation (PO-17) project and reference areas before and after project construction.

Although habitat analyses (post 1997) are not available, recent observational data show that scrub-shrub species decreased significantly over time and occupied less area than reported in the 1997 habitat analysis. Much of the area is now comprised of herbaceous vegetation, as our data suggests.

Vegetation

At the time of the pre-construction vegetation survey, the project area was mostly an open water pond and was dominated by *Myriophyllum spicatum* (Eurasian watermilfoil) and *Ceratophyllum demersum* (coontail grass). The only emergent vegetation that was present was *Eleocharis parvula* (dwarf spikerush), which occurred around the edges of the pond. During the initial post-construction vegetation survey conducted in May 1996, the project area was dominated by *Solidago sempervirens* (seaside goldenrod) and *Ranunculus* spp. (buttercup), which were both present at 79% and 84% of the survey stations (table 2). Other frequently encountered species included *E. parvula*, *B. halimifolia* and *Bacopa monnieri* (coastal water-hyssop), which were found at 42%, 32%, and 26% of the stations, respectively. Ten additional species were found, but at much lower frequencies. In addition to being the most frequently encountered species in this survey, *S. sempervirens* and *Ranunculus* spp. also had the highest mean percent cover values.

The June 1997 vegetation survey revealed moderate changes in species composition from the previous year with a decrease in species richness from 15 to 10 species. The most noticeable changes in frequency involved *Ranunculus* spp. This plant was encountered most frequently in 1996, but was absent in 1997. Moreover, *B. halimifolia* was found at fewer stations yet had the highest percent cover within the survey plots, followed by *E. parvula*, *Schoenoplectus robustus* (sturdy bulrush), and *Lemna minor* (common duckweed).

Table 2. Presence-absence and frequency (% of stations where present) of vegetation species within the Bayou La Branche Wetland Creation (PO-17) project area from 1996-2007.

Species	Common Name	1996	1997	1998	2001	2002	2004	2005	2007
Alternanthera philoxeroides	Aligatorweed	.	.	10.00	.	.	.	.	.
Amaranthus australis	Southern amaranth	.	.	.	5.26	.	.	.	10.00
Amaranthus spp.	Pigweed	10.53	.	25.00	.	.	.	.	.
Azolla caroliniana	Carolina mosquitofern	.	5.88	.	.	.	.	.	.
Baccharis halimifolia	Eastern baccharis	31.58	17.65	70.00	15.79	10.00	5.26	5.00	5.00
Bacopa monnieri	Coastal waterhyssop	26.32	64.71	70.00	21.05	35.00	42.11	20.00	10.00
Cuscuta indecora	bigseed alfalfa dodder	.							5.00
Cyperus compressus	Poorland flatsedge	.	.	10.00	.	.	.	.	.
Cyperus odoratus	Fragrant flatsedge	5.26	.	.	5.26	5.00	10.53	.	.
Distichlis spicata	Seashore saltgrass	.	.	15.00	21.05	20.00	.	5.00	5.00
Echinochloa spp.	Cockspur grass	5.26	.	.	.	.	.	20.00	.
Echinochloa walteri	Coast cockspur	.	.	30.00	.	.	.	.	.
Eleocharis parvula	Dwarf spikesedge	42.11	23.53	20.00	42.11	20.00	.	.	.
Ipomoea sagittata	Saltmarsh morninglory	.	.	.	.	.	.	.	.
Iva frutescens	Bigleaf sumpweed	.	.	5.00	5.26	5.00	15.79	10.00	30.00
Lemna minor	Common duckweed	.	29.41	.	.	.	.	.	.
Leptochloa fusca	Bearded sprangletop	.	.	.	.	10.00	.	5.00	.
Packera glabella	Butterweed	5.26	.	.	.	.	.	.	.
Panicum capillare	Witchgrass	.	.	5.00	.	.	.	.	.
Panicum spp.	Panicgrass	.	.	15.00	.	.	.	.	5.00
Panicum repens	Torpedograss	.	5.88	15.00	21.05	10.00	15.79	10.00	15.00
Paspalum spp.	Crowngrass	.	.	5.00	.	.	.	.	.
Paspalum dissectum	mudbank crowngrass	.		.			5.26	.	.
Paspalum vaginatum	Seashore paspalum	5.26	.	.	.	.	.	.	.
Pluchea camphorata	Camphor pluchea	10.53	.	95.00	.	15.00		.	.
Polygonum punctatum	Dotted smartweed	5.26	.	.	.	.	.	.	.
Polypogon interruptus	Ditch rabbitsfoot grass	5.26	.	.	.	.	.	.	.
Ranunculus spp.	Buttercup	84.21	.	.	.	.	.	.	.
Salix nigra	Black willow	.	.	20.00	.	.	.	.	.
Schoenoplectus americanus	chairmaker's bulrush							5.00	.
Schoenoplectus californicus	California bulrush	.	.	5.00	.	.	5.26	5.00	5.00
Schoenoplectus pungens	Common threesquare	.	.	10.00	42.11	25.00		.	.
Schoenoplectus robustus	Sturdy bulrush	.	11.76	10.00	.	.	26.32	15.00	10.00
Sesbania drummondii	Poisonbean	.	.	45.00	.	.	.	.	.
Sesbania herbacea	Bigpod sesbania	5.26	.	.	.	.	.	.	.
Sesuvium maritimum	Slender seapurslane	.	.	5.00	.	.	.	.	.
Setaria pumila	Yellow bristlegrass	.	5.88	.	.	.	.	.	.
Solidago spp.	Goldenrod	.	.	.	.	.	.	.	.
Solidago sempervirens	Seaside goldenrod	78.95	35.29	10.00	.	.	.	.	.
Sorghum halepense	Johnsongrass	.	.	.	.	5.00		.	.
Spartina alterniflora Loisel.	Smooth cordgrass	.	5.88	.	.	.	47.37	45.00	70.00
Spartina cynosuroides	Big cordgrass	.	.	10.00	31.58	40.00		.	.
Spartina patens	Marshay cordgrass	.	.	15.00	5.26	10.00	26.32	30.00	35.00
Symphyotrichum subulatum	Coastal Waterhyssop	.	.	65.00	21.05	.	.	.	.
Symphyotrichum tenuifolium	Perennial saltmarsh aster	10.53	.	.	15.79	25.00	10.53	5.00	15.00
Typha spp.	Cattail	.	.	5.00	.	.	.	.	.
Vigna luteola	Hairypod cowpea	.	.	10.00	.	.	.	.	5.00

The 1998 vegetation survey revealed an increase in species richness from 10 to 26 species. Interestingly, many of the species that were observed in 1996 were absent from the plots in 1997, but were again present in 1998. Two of these plants, *Pluchea camphorata* (camphorweed) and *Amaranthus* spp. (pigweed), occurred at a much higher percentage of stations in the 1998 survey. Furthermore, *P. camphorata*, *B. halimifolia*, and *B. monnieri* were not only the most frequently encountered species, but also were the dominant in percent cover. *B. halimifolia* is normally considered a facultative upland or scrub-shrub species but is occasionally found in marshes subject to frequent drying (Reed 1998, Tiner 1993, Chabreck and Condrey 1979, Cowardin et al. 1992). Thus, in 1996 it was not surprising to see *B. halimifolia* dominate vegetation stations in the northern section of the project area when higher sediment elevations existed and again during a drought in 1998.

The 2001, 2002, 2004, 2005, and 2007 surveys indicated a decrease in species richness from the 26 species in 1998 to an average of 13 species through the 2007 survey. Recent surveys have indicated an increase in *Spartina alterniflora* (smooth cordgrass) and *Spartina patens* (marshay cordgrass) in both occurence and percent cover across all stations, while species such as *B. halimifolia*, *B. monneri* and *Panicum. repens* (torpedo grass) have decreased.

Differences in the vegetation community among years were indicative of the changes in sediment elevation and water levels in the project area. The decrease in sediment elevation and the longer duration of flooding in the area caused the obligate wetland species to increase in occurrence (i.e. percentage of stations where present) and percent cover, and the facultative wetland species to generally decrease in occurrence and cover (figure 8). These results agree with Dell (1990), who found that higher water levels were the major force driving shifts in the vegetative community in a created marsh at Savage Island in the Delta National Wildlife Refuge, Louisiana.

The mean wetland status or prevalence index (i.e. OBL=1, FACW=2, and FAC=3) for the project area varied from an index reading of 1.54 ∀ 0.13 SE in 1998 and 2001 to 1.78 ∀ 0.18 SE in 2002. The latest year, 2007, was 1.69 ± 0.13 SE with a mean index reading of 1.62 for all years. An analysis of variance indicated that no significant differences were found in these index values among years. Nonetheless, the index indicates that the project area was classified as hydrophitic vegetated wetland (a prevalence index less than three) for all years.

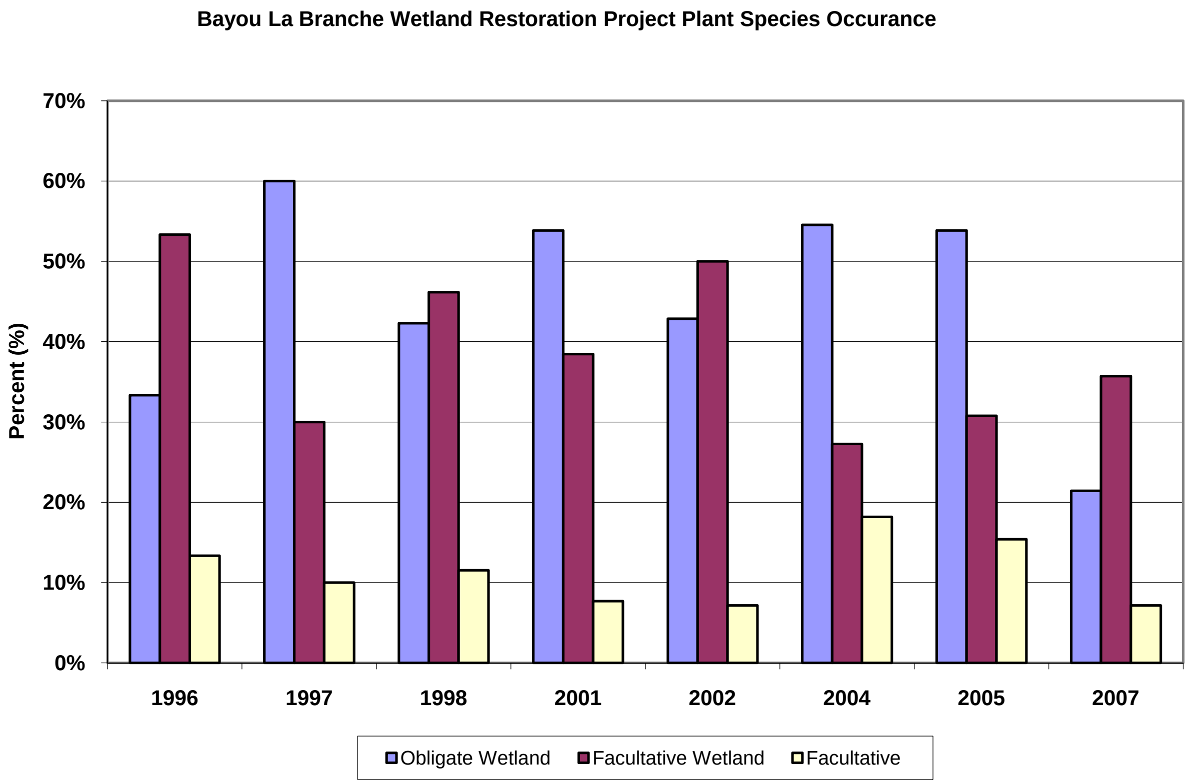


Figure 8. Occurrence (% of stations where present) of vegetation classes in the Bayou La Branche Wetland Creation (PO-17) project area during the 1996, 1997, 1998, 2001, 2002, 2004, 2005. and 2007 vegetation surveys.

VI. Conclusions

a. Project Effectiveness

The Bayou La Branche Wetland Creation project has benefited the La Branche wetlands by convering open water to marsh in an area of critical need along the Lake Ponchartrain shoreline. As of 1997, the project area contained approximately 82% land and 18% water, which was higher than the minimum goal of 70% marsh to 30% water. The consolidation of dredged material over time has reached an elevation that appears to sustain the 70% (land and marsh) component of the project area. Furthermore, the soil properties and the vegetation community of the project have developed into characteristic wetland habitat for the region.

b. Recommended Improvements

Gaps should be created in the containment dikes to increase tidal exchange for increased productivity of the project. Marsh elevation should continued to be monitored. If necessary, dredged material should be added to the project area to prevent open water conversion; however, minimum maintenance should be incorporated in the design.

c. Lessons Learned

Data gathered should be utilized to a greater extent to facilitate the engineering design and construction of future wetland creation projects. Thus, a greater degree of coordination between biologists and engineers should occur. Clearly, the data gathered for calculating and maintaining the correct elevations of the dredged material and its placement were the most important aspect in creating wetlands for this project.

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