

BARATARIA BAY WATERWAY WETLAND RESTORATION (BA-19)

BA-19-MSPR-0597-1

PROGRESS REPORT NO. 1

for the period

October 1, 1996 to May 15, 1997

Project Status / Description

The Barataria Bay Waterway Wetland Restoration (BA-19) project is a beneficial use of dredged material project located on Queen Bess Island. Queen Bess Island is located within the southeastern portion of Barataria Bay (figure 1), approximately 1 mi east of the Barataria Bay Waterway (BBW) at mile 3, east of Mendicant Island and north of Grand Isle and Grand Terre Islands in Jefferson Parish.

Due to significant erosion over the last 100 yr, the island has been reduced in size from 45 acres (1956) to 17 acres (1989), and the elevation has been reduced so that the island is frequently overwashed by small storms (Raynie and Sutton 1992).

Additionally, Queen Bess Island is one of only three *Pelecanus occidentalis carolinensis* (brown pelican) rookeries in Louisiana. Reduction in island size, as well as the loss of *Avicennia germinans* L. (black mangrove) from the island, has severely limited nesting habitat for the endangered *P. carolinensis* and many other avian species.

In October 1990, as a part of Phase 1 of the Queen Bess Island State Restoration Project (BA-05b), an 1,800-ft retainment dike was constructed on the western side of Queen Bess Island (figure 2). This dike linked the northern and southern tips of the island, creating an 8-acre dredged material containment site. Approximately 75,000 yd³ of material were removed from a 2-mi segment of the BBW and placed in the shallow-water containment area at the western edge of the island. This area was filled to an initial height of +3.22 ft NGVD (+4.0 ft MLG). To increase the elevation of the island, a breach was made in the shore dike through which effluent from the 8-acre containment site was routed to the interior marsh.

In June 1991, *Myrica cerifera* L. (wax myrtle); *A. germinans*; *Baccharis halimifolia* L. (baccharis); *Lycium carolinianum* W. (matrimony vine); and *Iva frutescens* L. (marsh elder) were planted on the island and in the containment area (for planting scheme and vegetation monitoring results, see Raynie and Sutton 1992). In July 1991, Louisiana Department of Natural Resources, Coastal

Restoration Division (LDNR/CRD) personnel noted that *Spartina alterniflora* L. (smooth cordgrass) was beginning to naturally spread from the island into the containment site. It was determined that the cordgrass covered 30% of the northern third, 15% of the middle third, and 40% of the southern third of the spoil area (LDNR/CRD 1992).

In October 1992, Phase 2 of the Queen Bess Island State Restoration Project (BA-05b) was completed. This phase of BA-05b was designed to place riprap and crushed limestone around the entire perimeter of the island. In the fall of 1992, a riprap and crushed stone dike was placed completely around the island along the existing natural levee (figure 2). The dike was built to an elevation of approximately 3 ft above the marsh level using roughly 3 yd³ of stone per linear foot. This dike served to armor the island and provide a raised nesting area for *P. carolinensis*.

In May 1993, 700 *A. germinans* seedlings were planted by Natural Resources Conservation Service (NRCS) and CRD personnel. The vegetation was planted along the western side of the island on the inside of the rocks (figure 3). This completed the construction of the Queen Bess Island State Restoration Project (BA-05b).

The BA-19 project involves the beneficial use of dredged material for the creation of an additional 9 acres of wetland habitat on Queen Bess Island. This project is similar to BA-05b in that it utilizes dredged material removed during routine maintenance of the BBW.

The objectives of the BA-19 project is to enhance wildlife habitat through the creation and enhancement of nesting areas for *P. carolinensis* and a variety of other colonial nesting waterbirds, to protect the island from shoreline erosion due to boat traffic, wave action, and tidal scour, and to limit erosion caused by storm events.

A 1,650-ft aggregate shell dike was constructed to an elevation of +5.22 ft NGVD (+6.0 ft MLG) to create a 9-acre containment area along the southwest side of Queen Bess Island (figure 4). Dredged material was pumped into the containment area to an elevation of approximately +3.72 ft NGVD (+4.5 ft MLG), with the effluent routed through the 8-acre wetland created in 1990, as well as the natural wetland on the original Queen Bess Island (figure 4). Effluent exiting Queen Bess Island was trapped in silt screens to prevent impacts to adjacent oyster reefs.

The project construction began in August 1996 and was completed in November 1996. Following 2 yr of consolidation, the containment area is predicted to have a final elevation of approximately +1.22 ft NGVD (+2.0 ft MLG). To avoid the nesting season of endangered *P. carolinensis* that use the island as a nesting area, no work will take place on the island during the period from November through July.

Monitoring Design

Data from color-infrared aerial photography (1:12,000 scale, with ground control markers) collected during pre and postproject implementation will be used to determine acres of wetlands created in the containment area, to assess changes in marsh loss/gain rates on Queen Bess Island, and to document vegetated and nonvegetated areas. The photography will be geo-rectified using NWRC standard operating procedures as described in Steyer et al. (1995). Photography was obtained prior to construction (10/14/82, 12/90, 4/22/92, 12/1/93, 11/94, 11/96) and will be obtained three times following construction, at years 2, 9, and 18 (+/- 3 yr for each). These photographs will be analyzed using a planimeter to determine the acres of wetlands created.

A total of 7 northeast-to-southwest vegetation transects will be delineated every 200 ft between the rock berm created during the 1990 Queen Bess Island project, across the containment area to the newly created dike (figure 5). Additionally, 5 vegetation transects with a similar configuration will be delineated across the original island and will be used as a reference area. Cover and species composition will be estimated by two individuals for a 1-m-wide track along each transect line in both the project and reference area. Vegetation transects will be sampled postconstruction at years 0, 1, 2, 9, and 18 (+/- 3 yr).

Containment site elevations will be estimated using six sediment staff gauges placed at random heights in the containment area (figure 6). These gauges will be read for relative levels postconstruction at years 0, 1, 2, 9, and 18 (+/- 3 yr) and used to evaluate the rate of settlement of the dredged material. In addition, the elevation in the containment site will be determined and related to average marsh elevation in the adjacent natural wetland. Elevation surveys will be performed both pre and postconstruction at years 0, 2, 9, and 18 (+/- 3 yr), provided sediment consolidation is sufficient to allow traversing of the containment area.

To document sediment accretion from the dredged material effluent, which will be channeled to flow over the natural wetland on the original island, feldspar marker horizons will be used (Steyer et al. 1995). Stations will be located in the marsh, at the breach in the western shore dike, and at the effluent exit at the east side of the island. A total of 10 stations (0.5 m x 0.5 m) will be established in both the natural wetland on the original island and reference area on Mendicant Island using systematic sampling based on topography (figure 6). After one year of settlement, a cryogenic corer will be used to determine the rate of sediment accretion in the project and reference areas (Knaus and Cahoon 1990).

Monitoring of *P. carolinensis* population and nesting site availability on Queen Bess Island is handled by the Louisiana Department of Wildlife and Fisheries (LDWF), through the Grand Terre Research Station.

Results/Discussion

According to engineering estimates, the size of Queen Bess Island has been increased from 17 (1989) to 32.3 (1997) acres. Sediments deposited from runoff of the dredged material effluent covered both the original portion of the island and the section of the island created by the 1990 Queen Bess Island project. Depths of the deposited material appeared to range from 0.7 to 1.0 ft in the original and 1990 created sections of the island.

Sediment staff gauges used to measure consolidation of the dredge disposal material were installed in the dredge containment area in May 1996 (figure 6). Although only 6 staff gauges were required, 12 were installed as a preventive measure in case the dredged material spraying process destroyed any of the staff gauges. Fortunately, none of the staff gauges were destroyed and all 12 staff gauges could be read. As of November 21, 1996, the dredged material had not consolidated enough to traverse. There was approximately 0.5 ft of standing water on the soil surface of the project area. All sediment staff gauges were read for relative levels in November 1996 (table 1). The baseline relative levels ranged from 0.0 ft to 1.2 ft. Upon consolidation, the elevation in the containment area and the original natural wetland area will be surveyed to NGVD.

Feldspar markers used to measure sediment accretion were placed on Queen Bess Island and in the reference area on Mendicant Island in September 1996 (figure 6). Cryogenic cores will be taken from each feldspar marker plot in September 1997 to determine the rate of sediment accretion in the project area.

Baseline vegetation sampling was conducted in November 1996 (figure 5); (tables 2 and 3). Since the dredged material was freshly sprayed and still unconsolidated, no individual vegetation plots could be analyzed. However, no natural vegetation had established itself within the project area and no vegetation had been planted (table 2). In the vegetation reference area (the original portion of the island), all vegetation was partially or completely buried by the dredged material and showed signs of stress. *S. alterniflora* was the dominant species and there were scattered clumps of *L. carolinianum* throughout the area (table 3). Clumps of *L. carolinianum* and *A. germinans* were scattered around the perimeter and on the old levee areas of the original portion of the island.

Results from the 1990 Queen Bess Island project included increased nesting habitat of *P. carolinensis* due to the high survival rate of *A. germinans*, *B. halimifolia*, *L. carolinianum*, and *I. frutescens*. Preliminary data indicate that BA-19 has increased the size of Queen Bess Island and, upon revegetation, it can be anticipated that the *P. carolinensis* nesting habitat area will also increase.

References

- Louisiana Department of Natural Resources, Coastal Restoration Division 1992. Queen Bess Island vegetative planting assessment. 6 pp. Baton Rouge: Louisiana Department of Natural Resources.
- Knaus, R.M. and D.R. Cahoon, 1990. Improved cryogenic coring device for measuring soil accretion and bulk density. *Journal of Sedimentary Petrology* 60:622–623.
- Raynie, R.C. and B. Sutton 1992. Annual monitoring report for Queen Bess Island (BA-05b). Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division.
- Steyer, G.D., R.C. Raynie, D.L. Steller, D. Fuller and E. Swenson 1995. Quality management plan for Coastal Wetland Planning, Protection, and Restoration Act monitoring program. Open-file report 95–01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division.
- U.S. Soil Conservation Service 1983. Soil Survey of Jefferson Parish, Louisiana. 228 pp. New Orleans, Louisiana: U.S. Department of Agriculture, Soil Conservation Service.

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Construction Start:	August 30, 1996	
Construction End:	November 1, 1996	

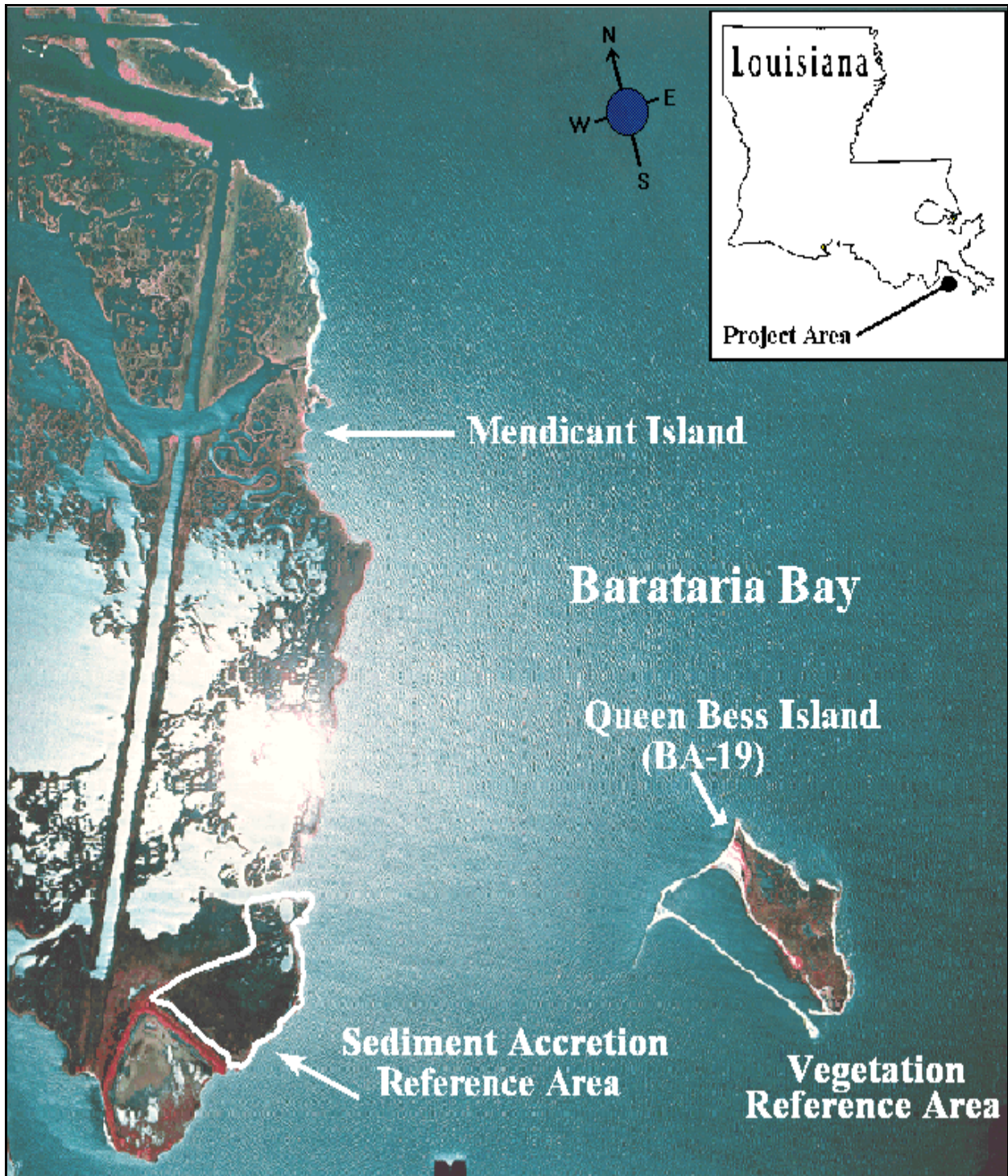


Figure 1. Location of the Barataria Bay Waterway Restoration (BA-19) project and reference areas (1995).

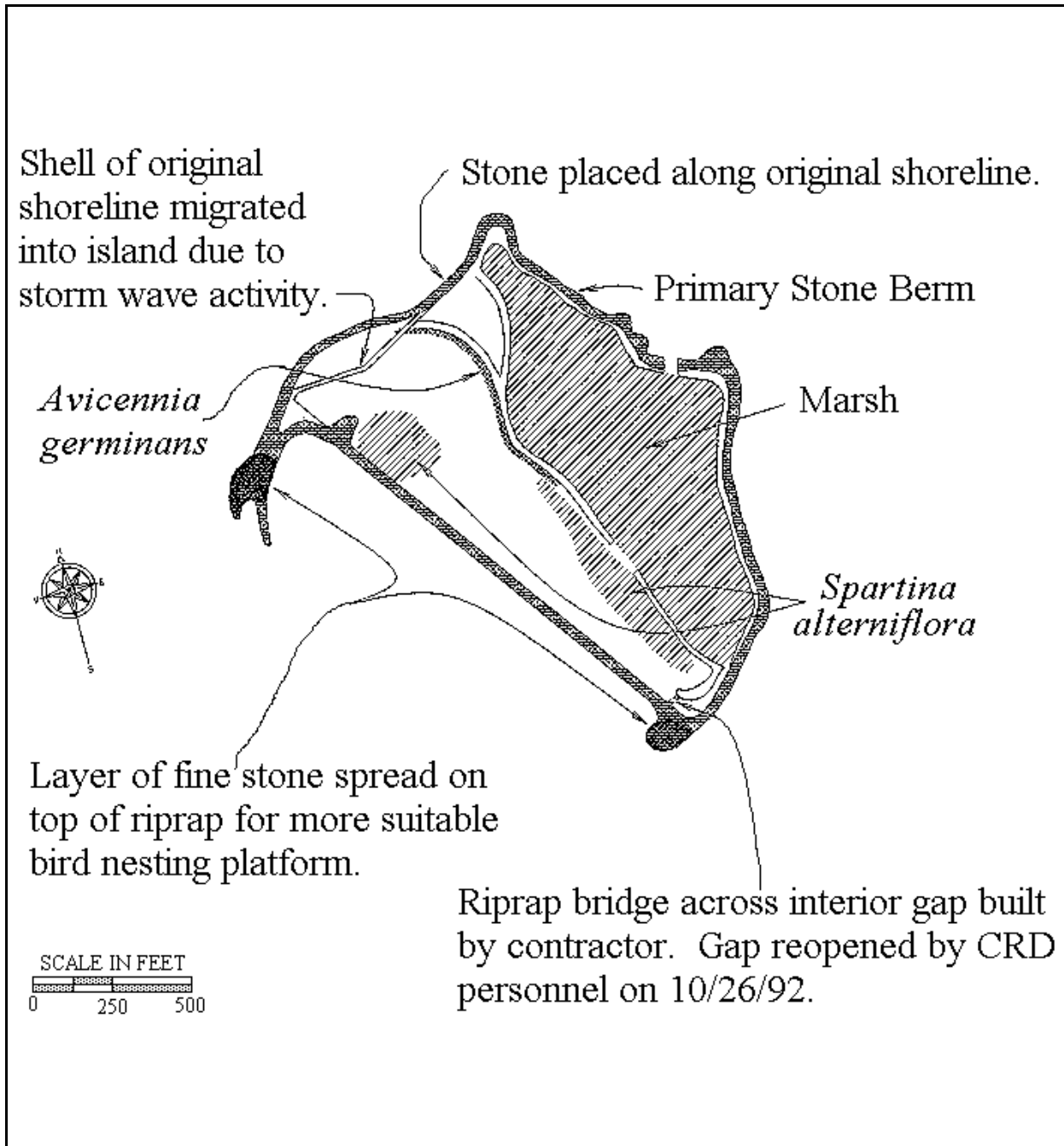


Figure 2. Queen Bess Island with project plantings and restoration elements of the Queen Bess Island State Restoration (BA-05b) project (1992).

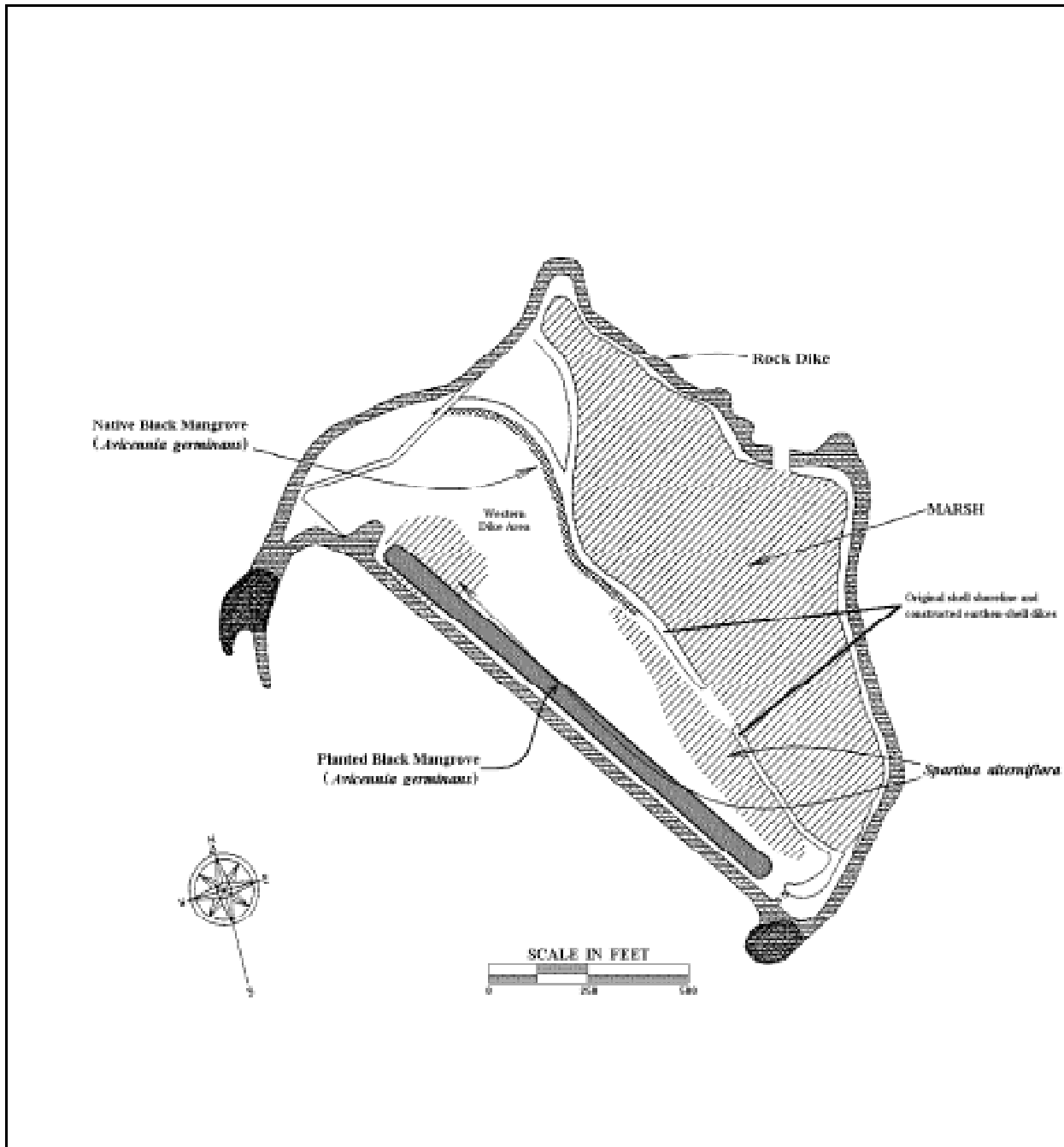


Figure 3. Location of the black mangrove plantings conducted in May 1993 for the Queen Bess Island State Restoration (BA-05b) project (1993).

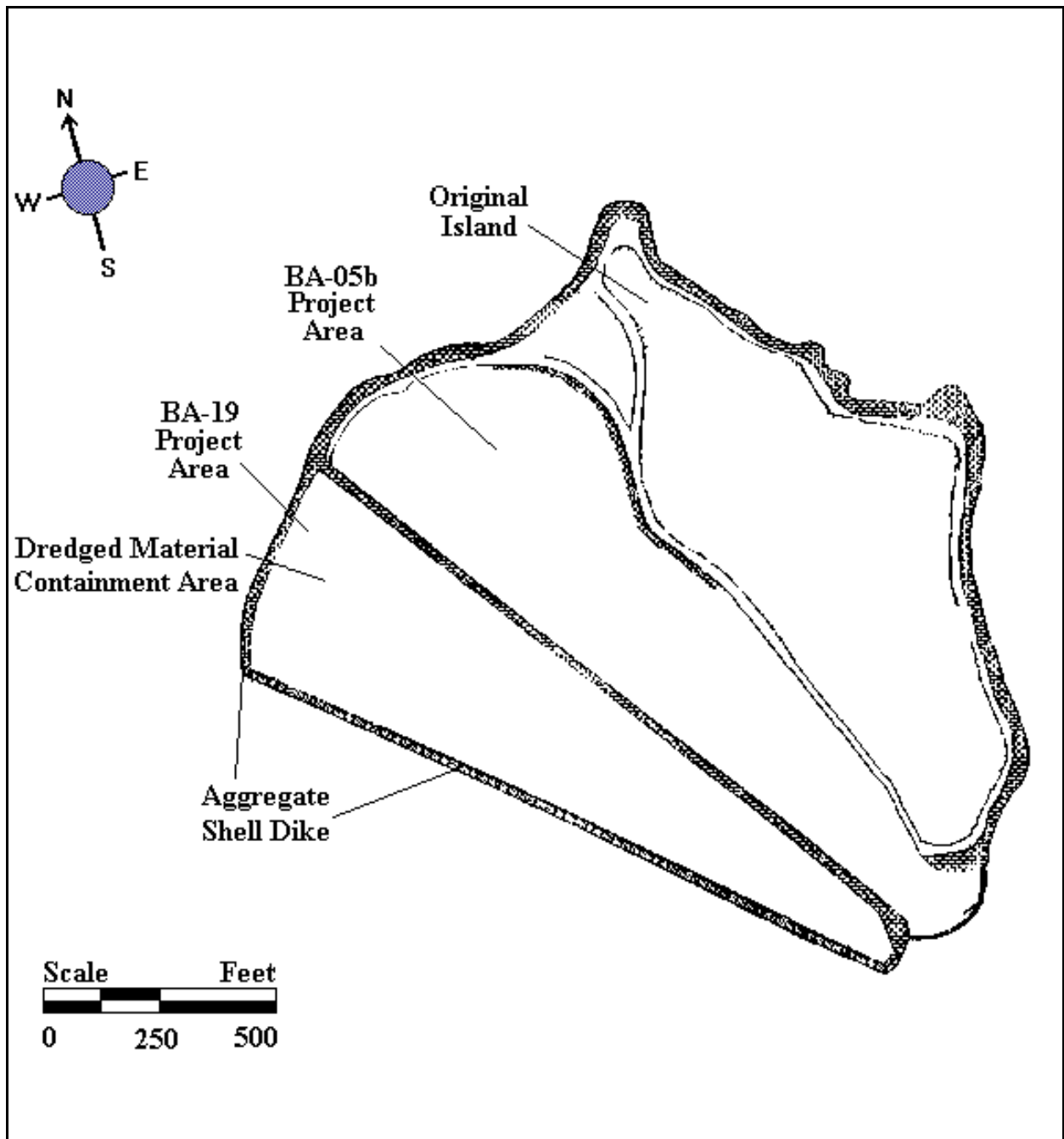


Figure 4. Location map showing additional 9-acre containment area on Queen Bess Island for the Barataria Bay Waterway Wetland Restoration (BA-19) project (1996).

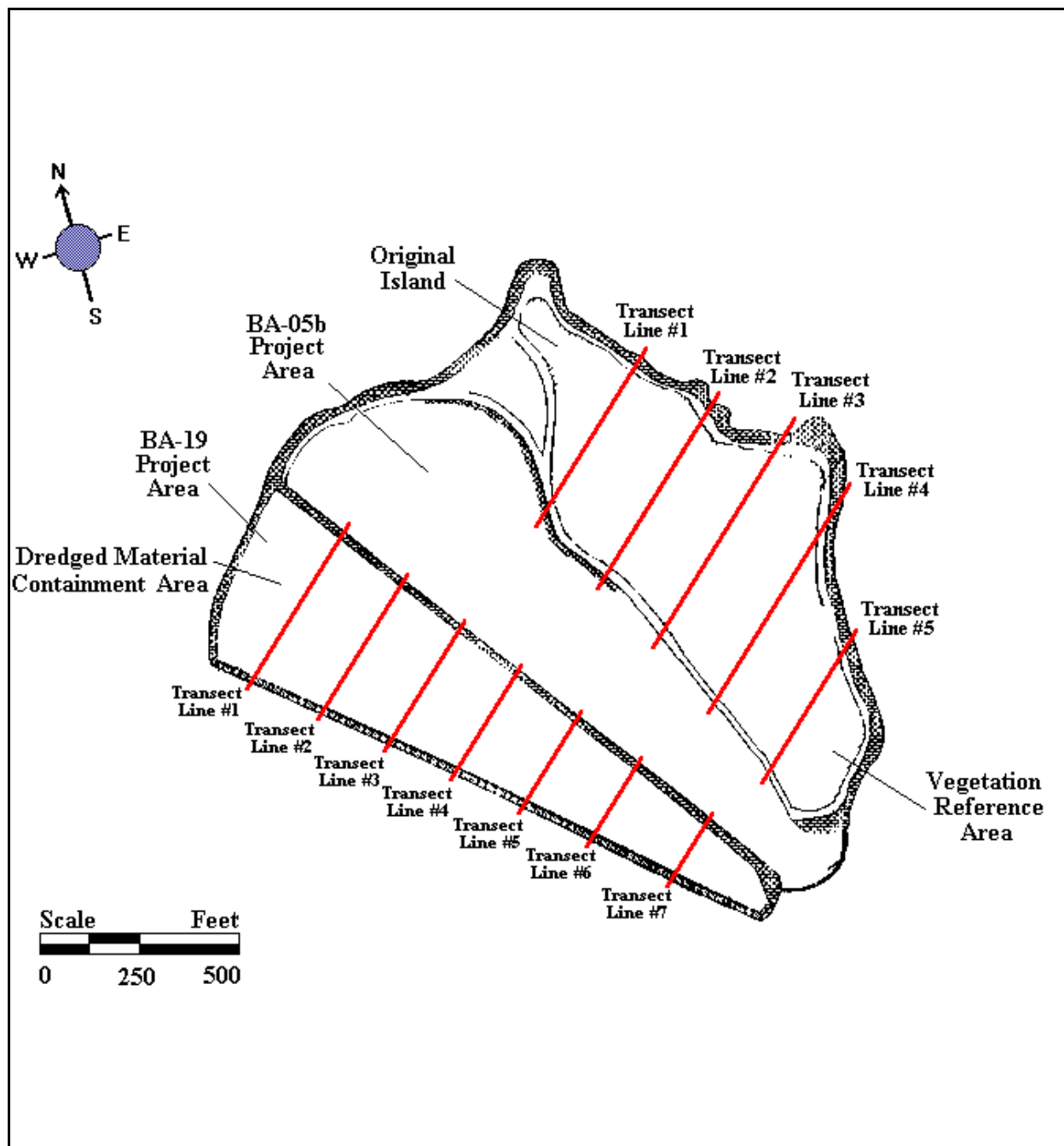


Figure 5. Outline of Queen Bess Island showing the location of the vegetation transect lines for the project and reference areas of the Barataria Bay Waterway Wetland Restoration (BA-19) project (1996).

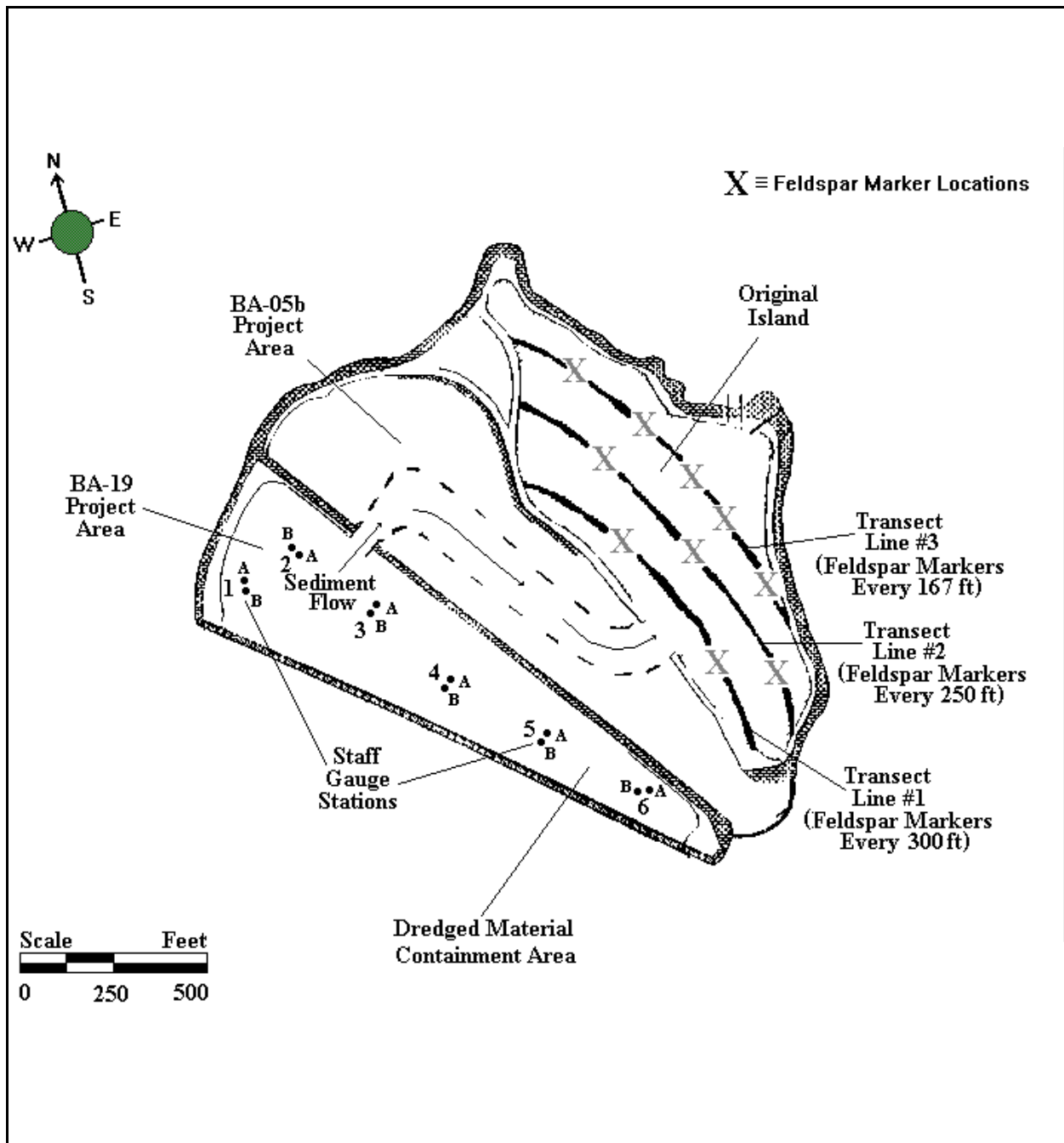


Figure 6. Location of staff gauges (2 per station) and feldspar marker plots used to measure elevation and accretion in the project area for the Barataria Bay Waterway Restoration (BA-19) project.

Table 1. Barataria Bay Waterway Wetland Restoration (BA-19) project dredged material levels for time = 0 (\approx 0.5 ft of water over sediment surface). Readings are of relative height.

Station	Sediment Staff Gauge (ft)
1A	0
1B	0
2A	0.3
2B	0.2
3A	1.2
3B	0.1
4A	0.2
4B	0.4
5A	0.4
5B	0.4
6A	0
6B	0.1

Table 2. Barataria Bay Waterway Wetland Restoration (BA-19) project vegetation sampling for time = 0 in the project area.

Project Area	% Cover Total	% Cover <i>Spartina alterniflora</i>	% Cover <i>Lycium carolinianum</i>
Transect 1	0	0	0
Transect 2	0	0	0
Transect 3	0	0	0
Transect 4	0	0	0
Transect 5	0	0	0
Transect 6	0	0	0
Transect 7	0	0	0

Table 3. Barataria Bay Waterway Wetland Restoration (BA-19) project vegetation sampling for time = 0 in the reference area.

Reference Area	% Cover	% Cover	% Cover	Reference Area	% Cover	% Cover	% Cover
	Total	<i>Spartina alterniflora</i>	<i>Lycium carolinianum</i>		Total	<i>Spartina alterniflora</i>	<i>Lycium carolinianum</i>
Transect 1				Transect 4			
TOTAL	31	30	0.5	TOTAL	14	13.5	0
½ Transect	44	42.5	1.5	½ Transect	10	10	0
Plot 1	0.5	0.5	0	Plot 1	15	15	0
Plot 2	0	0	0	Plot 2	0	0	0
Plot 3	15	15	0	Plot 3	0	0	0
Plot 4	0	0	0	Plot 4	0	0	0
Plot 5	0	0	0	Plot 5	0	0	0
Plot 6	0	0	0	Plot 6	0	0	0
Plot 7	0	0	0	Plot 7	0	0	0
Plot 8	0	0	0	Plot 8	0	0	0
Plot 9	0	0	0	Plot 9	0	0	0
Plot 10	0	0	0	Plot 10	2	2	0
Transect 2				Transect 5			
TOTAL	41	40	0.5	TOTAL	1	1.25	0
½ Transect	38	37.5	0.5	½ Transect	1	0.5	0
Plot 1	0	0	0	Plot 1	0	0	0
Plot 2	0	0	0	Plot 2	0	0	0
Plot 3	0	0	0	Plot 3	0	0	0
Plot 4	40	40	0	Plot 4	0	0	0
Plot 5	30	30	0	Plot 5	0	0	0
Plot 6	10	10	0	Plot 6	0	0	0
Plot 7	2	2	0	Plot 7	0	0	0
Plot 8	3	3	0	Plot 8	0	0	0
Plot 9	0	0	0	Plot 9	0	0	0
Plot 10	0	0	0	Plot 10	0	0	0
Transect 3							
TOTAL	40	40	0				
½ Transect	49	49	0				
Plot 1	0	0	0				
Plot 2	0	0	0				
Plot 3	0	0	0				
Plot 4	0	0	0				
Plot 5	0	0	0				
Plot 6	10	10	0				
Plot 7	3	3	0				
Plot 8	25	25	0				
Plot 9	15	15	0				
Plot 10	0.5	0.5	0				