Coast 2050 Region 3

POINT AU FER ISLAND HYDROLOGIC RESTORATION (TE-22)
TE-22-MSPR-0498-1
PROGRESS REPORT No. 1
for the period
July 18, 1995 to May 8, 1998

Project Status

Preconstruction bankline measurements were determined in October 1995 within Phase I. Construction of seven earthen plugs and maintenance of the existing plug at the southern end of Transco Canal was completed in November 1995. Post-construction bankline measurements within Phase I were taken in September 1997. The Phase II portion of the project, which consisted of the placement of riprap along a 3,600 ft (1,100 m) section of the Mobil Canal and Gulf of Mexico interface, was completed in May 1997.

Near-vertical, color-infrared pre-construction aerial photography obtained in December 1994 has been georectified and photomosaicked. Post-construction aerial photography was obtained in November 1997, but has not been georectified or photointerpreted.

Project Description

Point Au Fer Island is located approximately 6.2 mi (10 km) southeast of the Atchafalaya River delta and is bordered by the Gulf of Mexico to the south, Atchafalaya Bay to the west, Four League Bay to the north and northeast, and Oyster Bayou to the east. The Point Au Fer Island Hydrologic Restoration project (TE-22) consists of two phases (figure 1). Phase I is designed to restore the natural hydrology of the project area by placement of seven new canal plugs and maintenance of one existing plug along two oil and gas access canals (figure 2). Phase II is a shoreline protection project and requires the placement of riprap along 3,600 ft (1,100 m) of shoreline located in the southwestern portion of the island. There is no reference area for Phase I. The reference area for Phase II is located between the two project areas (figure 1).

The Atchafalaya River carries 30% of the combined flows of the Mississippi and Red Rivers. Four League Bay carries a portion of the discharge from the Atchafalaya River, suggesting that sediment and nutrients should be readily available for the northern reaches of Point Au Fer island. Salinities range from near 0 ppt at the northernmost reaches of the island to 25 ppt along the Gulf side, and the mean tidal amplitude is 1 ft (0.3 m) (Raynie 1991; Raynie and Shaw 1994).

The marsh habitat on the island is predominantly brackish marsh with intermediate marsh in the interior of the island. Saline marsh exists along the southeastern and eastern borders of the island. Along the west side of the Transco South Canal (N-S canal in the southeast portion of the island, Phase I), the marsh is predominately *Spartina patens* (marshhay cordgrass). As a result of controlled burning, *Scirpus tabernarmontani* (saltmarsh bulrush) is also present. Other plant species present indicate a brackish marsh. The marsh along Locust Bayou is also brackish and is dominated by *S. patens* with traces of *Spartina alterniflora* (smooth cordgrass) (National Marine Fisheries Service [NMFS] 1992).

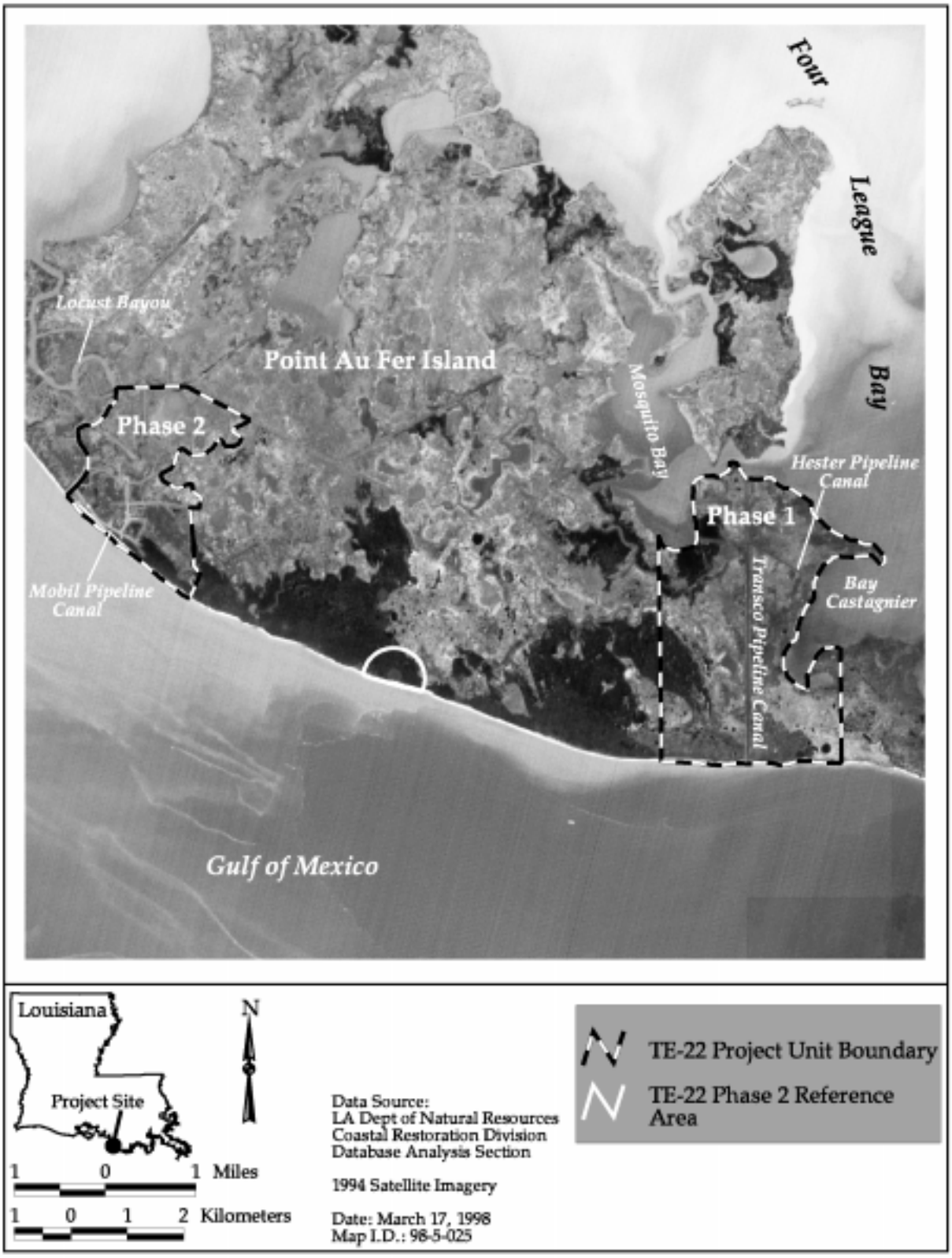

Figure 1. Point Au Fer Hydrologic Restoration (TE-22) project area.

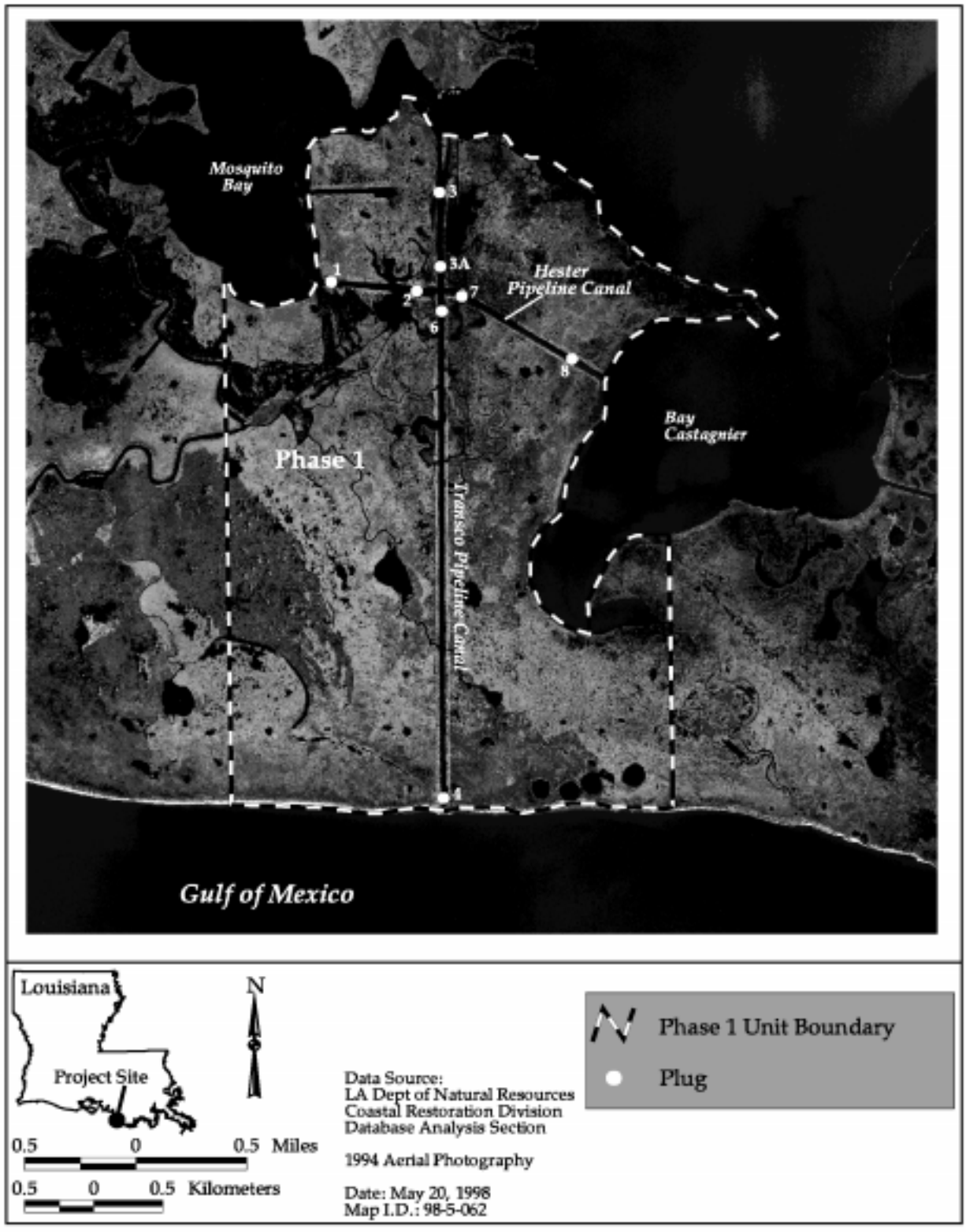

Figure 2. Point au Fer Island Hydrologic Restoration (TE-22) project map of Phase I area showing placement of plugs.

In recent years, certain areas of Point Au Fer Island have deteriorated, creating potential avenues for saltwater intrusion from the Gulf of Mexico. Historical values report erosion rates of 2 ft/yr (0.61 m/yr) (May and Britsch 1987). The Mobil Canal levee (Phase II) was breached during Hurricane Andrew and the Transco Canal (Phase I) has almost breached into the Gulf of Mexico at the southern end. The objectives of Phase I are to reduce marsh loss and the potential for saltwater intrusion from storm surges and high tides, and restore hydrologic circulation close to historical conditions before access and pipeline canals were dredged. The objective of Phase II is to reduce the chance of breaching between the Gulf of Mexico and Mobil Canal during overwash events, consequently reducing the potential for interior marsh loss via shoreline breaching and beach overwashing. The specific goals needed to achieve these objectives are:

1. reduce the rate of marsh loss (Phase I);

2. reduce the rate of canal widening (Phase I); and

3. maintain or decrease local shoreline erosion rate within the project area (Phase II).

Methods

A detailed description of the monitoring design over the entire project life is found in Raynie (1994).

The National Wetlands Research Center (NWRC) in Lafayette, Louisiana, obtained 1:24,000 scale near-vertical color-infrared aerial photography on December 26, 1994 (pre-construction) and November 24, 1997 (post-construction). Pre-construction photography was scanned at 300 dots per inch, indexed and archived. Individual frames of photography were georectified with ground control points collected in the field, using ERDAS Imagine, an image processing and geographic information system (GIS) software and a differential global positioning system (GPS) with sub-meter accuracy. These rectified frames have been photomosaicked and a GIS land-water analysis is underway utilizing standard methodology (Steyer et al. 1995).

To document the widening of canals, bankline markers were placed along the Hester and Transco pipeline canals in July 1995. Three sets of markers were placed on each side of the canals behind plugs 1, 3, 6, and 8 (figure 2). Pre-construction bankline measurements (baseline data) were determined (table 1, figure 2) within Phase I. Distance was measured between vegetated edges of the canals and the markers. Construction of the earthen plugs was completed in November 1995. The first set of post-construction bankline data was collected in September 1997. These and future values will be compared with historical estimates of canal widening.

Results

Our data indicate that the plugs located in the phase I area have slowed bankline erosion to a mean erosion rate of 0.65 ft/yr (0.20 m/yr)(table 1, figure 3). Results from aerial photography will also help determine if the plugs are reducing tidal movement and thus decreasing marsh loss in the

Table 1. Point Au Fer Island Hydrologic Restoration (TE-22) project bankline measurement (ft) sampling for pre-construction and post-construction in the Phase I project area.

Plug	Station	Pre-construction (10/95)	Post-construction (9/97)	Bankline Change (10/95 - 9/97)
1	TE26-01	5.12	5.16	0.03
1	TE26-02	4.38	4.67	0.28
1	TE26-03	4.52	3.20	-1.33
1	TE26-04	5.55	5.08	-0.47
1	TE26-05	5.06	2.69	-2.38
1	TE26-06	5.47	3.15	-2.32
3	TE26-07	5.44	6.34	0.90
3	TE26-08	5.41	4.41	-1.01
3	TE26-09	5.38	4.44	-0.94
3	TE26-10	5.69	5.24	-0.46
3	TE26-11	6.25	5.90	-0.35
3	TE26-12	5.90	2.15	-3.75
6	TE26-13	7.85	6.57	-1.28
6	TE26-14	8.34	6.87	-1.47
6	TE26-15	6.69	3.11	-3.58
6	TE26-16	4.27	4.40	0.13
6	TE26-17	4.2	3.02	-1.18
6	TE26-18	5.29	4.48	-0.81
8	TE26-19	11.18	3.21	-7.98
8	TE26-20	7.79	5.04	-2.75
8	TE26-21	6.18	5.60	-0.58
8	TE26-22	4.77	8.54	3.78
8	TE26-23	7.16	4.86	-2.30
8	TE26-24	6.17	3.82	-2.35
			Average	-1.34
			Yearly Average	-0.65

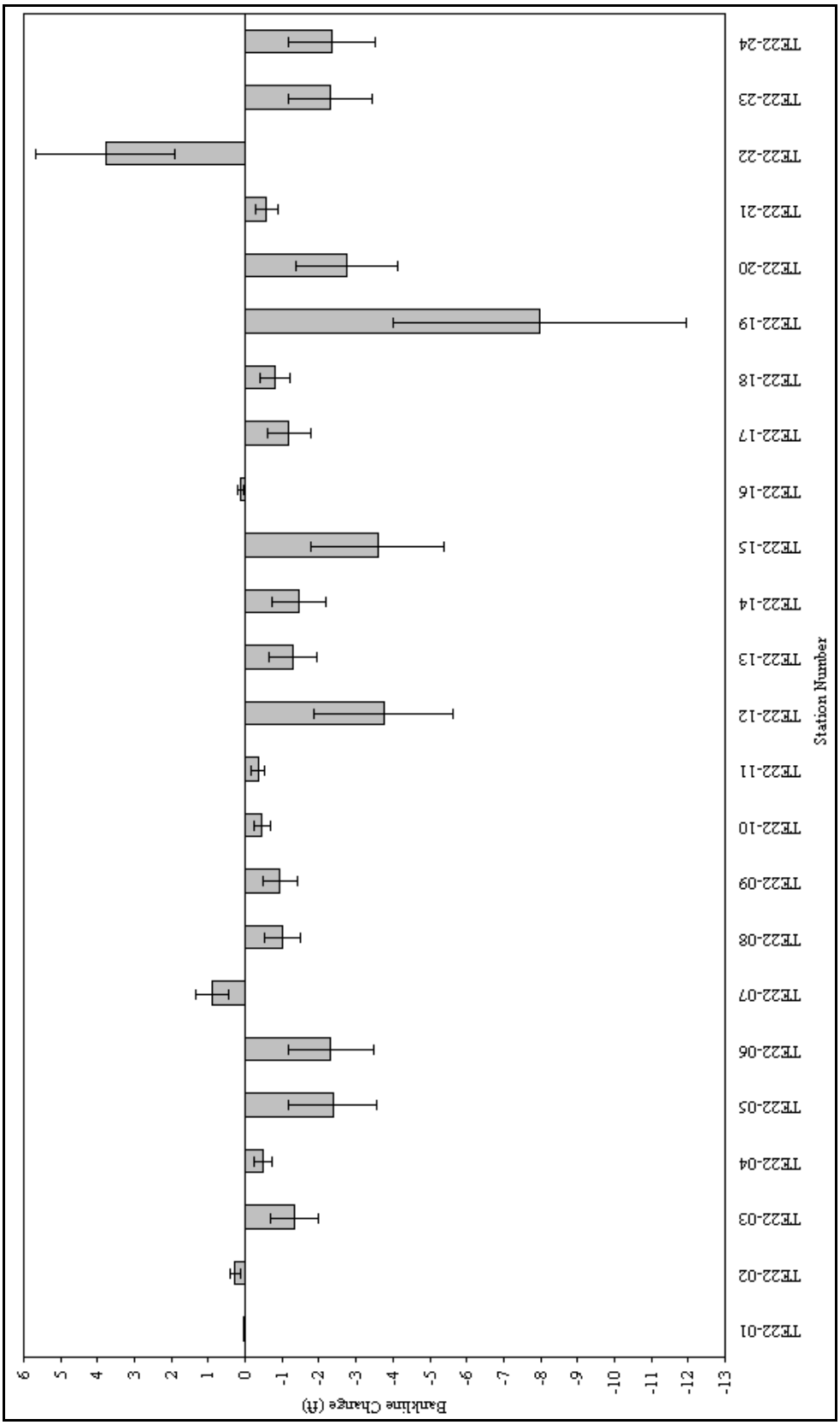

Figure 3. Point Au Fer Island Hydrologic Restoration (TE-22) project bankline change (10/95 - 9/97).

project area. The bankline change was statistically analyzed (a = 0.05) to determine differences in bankline movement among plugs and/or differences among the two perpendicular canals. The means were not significantly different (P = 0.83) at all four plugs and both canal directions. No plug or canal, regardless of direction/location, appears to be eroding faster than any other, although high variances exist within the data.

Aerial photography analysis currently underway will determine if shoreline stabilization along the Mobil Canal and Gulf of Mexico interface of Phase II successfully prevents breaches.

Discussion

A change analysis will be conducted comparing the pre-construction and post-construction aerial photography once the post-construction photography has been georectified, mosaicked and analyzed.

The high variances in the phase I data could be a result of the sample size being too small (n = 24). Plug 8 had the highest variance of data. This was the first plug to be constructed and wheel wash from the boat was facing inside the project area. This may explain some of the high variability of bankline measurements at this plug.

Breaching will likely occur in the phase II area if steps are not taken to extend the western end of the rock riprap to protect that area of shore. The rock riprap appears to be holding up well (B. Kendrick 1998). Erosion was not evident except at the west end of the riprap placement where approximately 50 ft (15 m) of shoreline is eroding. It appears the reference area for Phase II has not yet breached, but is frequently overwashed during severe storm events. There is still a small portion of beach remaining.

Conclusion

Preliminary results from the TE-22 project indicate the construction of the plugs has slowed erosion rates in the phase I project area. However, because only one pre-construction data set was taken, a pre-construction rate of erosion will not be available to compare post-construction rates of erosion, although it was less than May and Britsch (1987) reported. Comparisons may be made to historical data, but no actual data will be available for statistical analysis. Construction of rock riprap in Phase II appears to be slowing erosion rates along the Point au Fer Island gulf shoreline, although no data is available to support this, only observations.

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Prepared on April 29,1998, by Marc Fugler

DNR Monitoring Manager:	Marc Fugler	(504) 447-0995
DNR DAS Assistant:	Chris Cretini	(504) 342-7308
DNR Project Manager:	Brian Kendrick	(504) 447-5057
Federal Sponsor:	NMFS/Terry McTigue	(318) 482-5915

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Construction End:	May 28, 1997