NAOMI FRESHWATER DIVERSION (BA-03)
BA-03-MSPR-1095-1
PROGRESS REPORT No. 1
for the period
November 17, 1992 to October 15, 1995

Project Description/Status

The Naomi project area contains approximately 13,000 acres of intermediate and brackish marsh located within the parishes of Plaquemines and Jefferson. The area is bound to the north by the Ollie Canal, to the east by the Pen and a mineral access canal off of Bayou de Fleur, to the south by Bayou Dupont, and to the east by a storm protection levee (figure 1). The project area, as is true with the Barataria basin, suffers from a lack of fresh water and sediments due to the building of the flood control levee along the Mississippi River. The freshwater diversion structure is located at river mile 64 AHP (above head of passes) at Naomi, Louisiana, and consists of eight 72-in. diameter siphon tubes with a maximum discharge of 2144 cfs. The siphons empty into a revetted discharge pond with one 30 ft wide by 3,300 ft long outfall channel (Brown & Root, Inc. 1992). All operational changes in siphon flow are performed by Plaquemines Parish government (PPG) (table 1). These changes are based on an operational scheme developed in 1992 by Brown and Root, Inc., based on a TABS-2 environmental model (table 2).

The main project objective is to protect approximately 13,000 acres of intermediate and brackish marsh from continued degradation by introducing into the area fresh water through the west bank of the Mississippi River. The Mississippi River water will bring sediment and nutrients into the project area to improve growing conditions for fresh and intermediate marsh plant species.

Specific measurable goals were established to evaluate project effectiveness. The project plans are to increase marsh to open-water ratios, reduce and stabilize mean salinity, and increase relative abundance of fresh and intermediate marsh plant species.

Monitoring Design

Health-related (fecal coliform) and discrete hydrologic variables are monitored biweekly and are available from November 17, 1992, to present. Hydrologic variables include salinity and water temperature (surface and bottom) at 16 stations and water level at 7 staff gauges surveyed to the National Geodetic Vertical Datum (NGVD). Plant species composition and abundance is measured

at 6 stations annually (figure 1). An initial vegetative delineation of the project area, using the 6 vegetation stations, was performed in June 1992 by Allan Ensminger of Wetlands and Wildlife Management Co. under contract with the Louisiana Department of Natural Resources/Coastal Restoration Division (LDNR/CRD). Aerial photography is flown biannually and used to calculate marsh to open-water ratios and for vegetation delineations. Change in marsh to open-water ratios from preoperation (1992) to five yr postoperation will be evaluated in 1997. Aerial photographs are also used to delineate the extent of the turbidity plume caused by the siphons. The extent of the turbidity plume will be evaluated on a monthly basis beginning October 1995 by looking at water transparency with an 8-in. Secchi Disc. Daily siphon discharge in cubic feet per second (cfs) is currently being calculated.

All discrete biological monitoring is performed biweekly by PPG with LDNR/CRD accompanying PPG on every other trip. On the monthly joint monitoring trips, PPG obtains fecal coliform samples and LDNR/CRD records all hydrologic variables. PPG independently monitors the project monthly two weeks after the joint monitoring trip. During those trips, PPG obtains fecal coliform samples and records all hydrologic variables. LDNR/CRD performs all vegetative monitoring. There were several periods of time when the siphons were not functioning after the initial opening on February 3, 1993. Data from these time periods are treated as preoperational.

Results/Discussion

There was an overall decrease in mean project area salinity immediately following the opening of the structure on February 3, 1993. A large increase in overall salinity occurred between August and October 1994 (figure 2). It was at this time that the siphon ceased to flow because of a combination of low river stage and faulty butterfly stop valves. The structure was not restarted again until July 1995 because of pending lawsuits against Plaquemines Parish government and the state of Louisiana by several oyster fishermen. The intermittent salinity patterns are difficult to correlate with siphon flow because of variable siphon operation. Based on all stations collectively, mean salinity in the project area has been reduced as a result of siphon operation. Mean preoperational salinity was 0.99 ppt ($\pm$0.03 SE), while mean salinity during structure operation was 0.38 ppt ($\pm$0.01 SE). Individual station mean salinity has been reduced in varying degrees as a result of siphon flow (figure 3). Any spatial pattern of salinity decrease is difficult to currently ascertain. However, a statistical analysis of the salinity data is anticipated for December 1995 that will uncover any spatial variability that may be present. Generally, highest salinities are recorded from the southernmost stations in the vicinity of Bayou Dupont and the Chenier Traverse Bayou (stations 5, 6, 7, and 10). Salinity range has been reduced from 0–4.6 ppt to 0–3 ppt as a result of siphon flow. However, by only sampling discrete salinities, extreme peaks may be missed, thus affecting the overall range. This may be alleviated by placing continuous recorders in the project area and possibly in a reference area. Mean water level has increased from 1.51-ft NGVD preoperation to 1.67-ft NGVD postoperation. However, this increase is because of the increase in water level at station 14, which is located in the outfall pond and thus directly influenced by siphon flow. Station 14 has increased from a mean of 1.12-ft NGVD to 2.50-ft NGVD as a result of siphon operation. If station 14 is removed from the

calculation of project area mean water level, there has been no change. Mean water level has remained constant at 1.57 ft NGVD.

Aerial photographs from February 1993 were used to delineate the extent of the turbidity plume caused by siphon flow. The plume covered the entire northern half of the project area from station 15 to the Brady Canal. The Brady Canal may serve as a conduit for the exit of a portion of the fresh water and sediment from the project area to the Pen. This will be addressed in the outfall management plan, which seeks to reduce some of the apparent channelized flow that occurs via the Brady Canal. Annual reports were written for the 1992 and 1993 monitoring years and are available.

The original 6 vegetation stations were revisited in July 1995 by LDNR/CRD. Both the 1992 and 1995 vegetation studies generally found the intermediate marsh area (stations 1-4) to contain mostly *Sagittaria lancifolia* (table 3). Ensminger, however, observed a larger amount of *Scirpus americanus* in 1992 than did LDNR/CRD in 1995. Both Ensminger in 1992 and LDNR/CRD in 1995 observed that the southern brackish marsh area was overwhelmingly dominated by *Spartina patens*. There was no indication in 1995 that the intermediate to brackish marsh boundary had shifted from that established previously by Chabreck and Linscombe in 1988 or Ensminger in 1992. The flow of the siphon to date has been highly variable, including a 9-mo period of no flow. As a result, it may as yet be too early to speculate on the effects that the diversion is having on the vegetation.

References

Chabreck, R. H., and J. Linscombe 1988. Vegetative type map of the Louisiana coastal marshes. New Orleans: Louisiana Department of Wildlife and Fisheries. Scale 1:62,500.

Brown and Root, Inc. 1992. LaReussite (Naomi) freshwater diversion siphon. A management, operation, and monitoring plan. Unpublished final report prepared for Plaquemines Parish Government, Department of Health and Hospitals. Belle Chasse, La.: Brown and Root, Inc. 123 pp.

Ensminger, A. B. 1992. Vegetative delineations for the Naomi freshwater diversion outfall area project No. BA-03. Unpublished final report prepared for the Louisiana Department of Natural Resources/Coastal Restoration Division. Belle Chasse, La.: Wetlands and Wildlife Management Co. 29 pp.

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Figure 1. Location of Naomi project area and hydrologic, health-related, and vegetative sampling stations.