VEGETATIVE DELINEATION REPORT

NAOMI FRESHWATER DIVERSION SIPHON OUTFALL AREA (BA-3)

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PURPOSE OF REPORT

The purpose of this report is to document the location and extent of each marsh vegetative zone (i.e. fresh/intermediate, brackish, saline, cypress/tupelo swamp) in the management area from 1992 near-vertical, color-infrared aerial photography. These data will be used to evaluate the effectiveness of structures and structure management on vegetative communities. This report also depicts the location of selected vegetative data stations used to determine vegetative zone locations. These findings will provide baseline information on the project area's present condition. After baseline information is collected, vegetative surveys will be conducted every June and August at the same stations to provide spatial and temporal data between flight dates. Five years after completion, the project will be flown again and all data will be used to evaluate the effectiveness of the structures and structure management on the vegetative communities. The data collected every flight year will be used to measure changes over time and assess the success or failure of the project.

STUDY AREA

This project is in Plaquemines Parish on the west bank of the Mississippi River, 12 mi south of Belle Chasse (figure 1). Plaquemines Parish and the Louisiana Department of Natural Resources (DNR) have constructed a large freshwater diversion facility to take Mississippi River water and introduce it into wetlands on the parish's west bank. Some effects will benefit Jefferson Parish wetlands east of the large, open water area known as the "Pen" at Lafitte.

The outfall management area is approximately 8200 acres of marsh located in all or parts of T16S-R24E and T17S-R24E. The project area is bounded on the north by the Ollie and Bayou de Fleur, on the west by the Pen, on the south by a segment of Bayou Du Pont and Cheniere Traverse Bayou, and on the east by a man-made storm water protection Freshwater should flow well beyond the study area boundary and provide unquantified benefits to a much larger area of deteriorated wetlands in this portion of the state.

The outfall management strategy will be to restore deteriorated wetlands using freshwater introduced through the siphon system. The program will also reduce ongoing saltwater encroachment by channel training freshwater and actively maintaining existing spoil banks and natural ridge systems. Extensive vegetated land loss has occurred south of the project area through excessive tidal exchange and saltwater intrusion into intermediate and brackish marsh areas. Man-made access channels to oil and gas deposits and spoil-bank openings left for permit requirements account for much of the increased tidal exchange. Salinity encroachment is from Barataria Bay through large navigation channels such as the Dupre Cut-off Canal and the Wilkerson Canal.

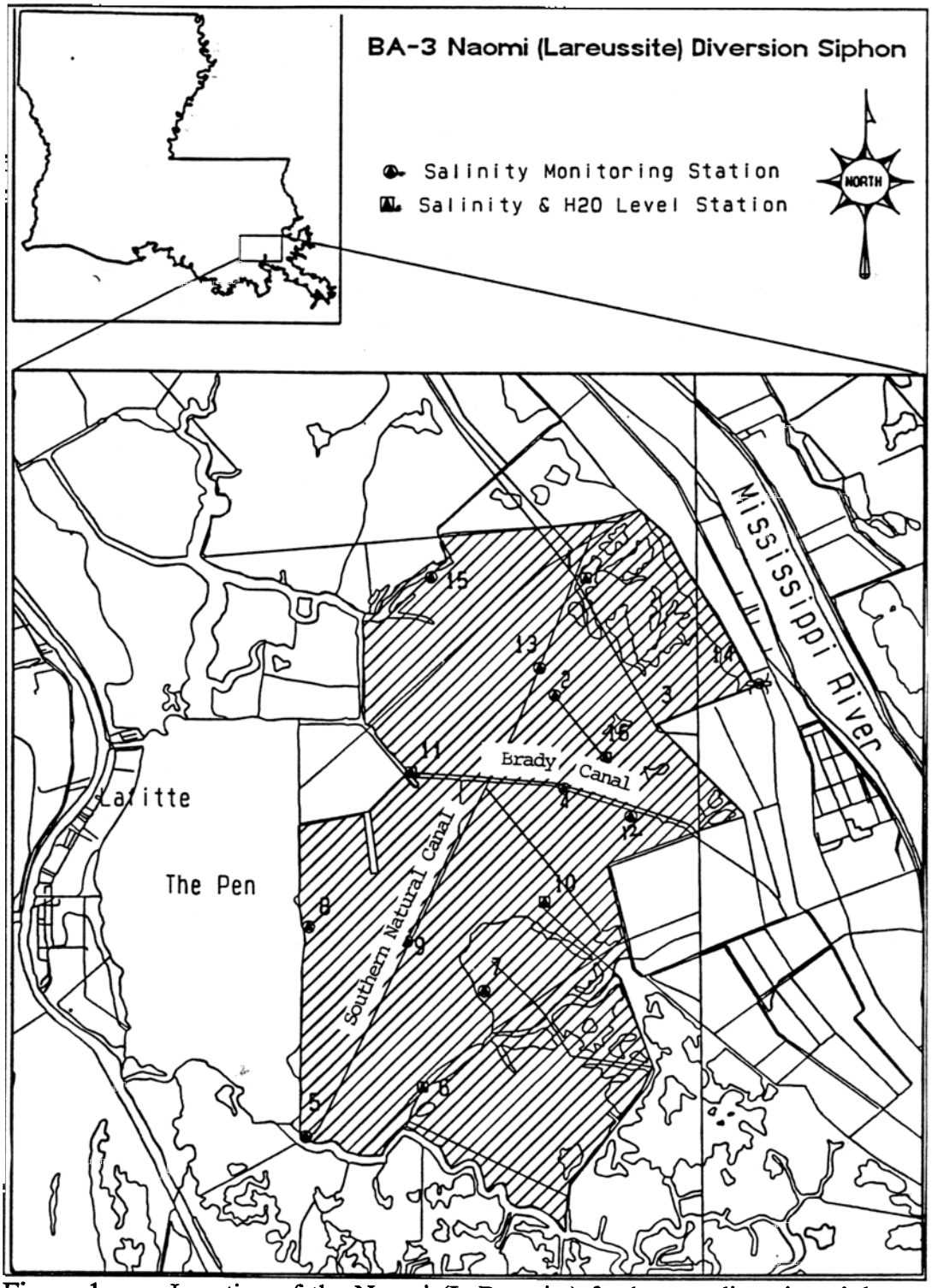

Figure 1. Location of the Naomi (LaReussite) freshwater diversion siphon (BA-03) structure and project area.

For more than 100 years, the Mississippi River flood protection levee system has prevented this area from receiving silt-laden freshwater from periodic overbank flooding. The vegetated coverage has remained relatively stable for the past 25 years in species composition; however, the overall quality in the plant communities has been reduced. This condition may have occurred from a combination of pump water discharge into the Ollie Canal and a slight head of freshwater entering from the north through the Gulf Intracoastal Waterway by means of the Harvey and Algiers navigation locks connecting to the Mississippi River. Chabreck and Linscombe (1978) listed the study area as intermediate on the upper half and brackish on the lower half. Since their 1988 survey, the brackish marsh along the Pen has moved north and is now listed along the Brady Canal, a distance of approximately 2 mi. Our field investigation was conducted in a much more detailed manner and confirmed their observation.

Investigations of this area were made by the author of this report in 1955, as a service of the Louisiana Department of Wildlife and Fisheries. The area was in the early exploration stages for oil and gas deposits and a portion of the existing mineral access canal system had been constructed. The interior marsh between the Pen and protection levee along the riverbank's residential section contained more shrub vegetation such as wax myrtle (*Myrica cerifera*) and a stand of bald cypress (*Taxodium distichum*) outside the levee. Marsh vegetation was composed of maiden cane (*Panicum hemitomon*), cattail (*Typha spp.*), and bullwhip (*Scirpus californicus*). Roseau cane (*Phragmites communis*) was present in large stands in various parts of this marsh ecosystem. Only small amounts of marshhay cordgrass (*Spartina patens*) were present in the lower portion of the present study area and most of the lower half of the area contained good stands of three-cornered grass (*Scirpus olneyi*).

Muskrat trapping had been the major source of income for property owners. Nutria were just starting to appear in large enough numbers to become a problem for trappers because they did not know how to skin and prepare pelts. Also, the market for nutria hides was very limited. The combination of these conditions reduced trapping efforts and adversely impacted plant stands. The field investigation notes were lost during Hurricane Audry (1957) and we do not have the reports provided to the landowners, so these remarks are only based on my recollections of the area. However, I frequently flew across here from 1959 through 1984 and I have hunted waterfowl on wetlands adjacent to the upper boundary of the study area annually from 1959 to the present.

Vegetative changes have certainly been significant. Maidencane has disappeared and bulltongue (*Sagittaria lancifolia*) has extensively increased. In many areas bullwhip has been eliminated and marshhay cordgrass is in much greater percentage. Large nutria populations have occupied this section of Plaquemines and Jefferson parishes for the entire time that I have been associated with the area. Nutria have caused large vegetation eatouts in the marsh areas and damaged vegetable farms and citrus groves in the Jesuits Bend community.

The major waterway is the Brady Canal, an oil and gas access canal system, that enters near the northeast corner of the Pen and extends east along the Mississippi River to the back levee system of fast lands. One management problem will be trying to get sufficient freshwater flows across this canal without diverting the flow into the Pen. During low water stages following the passage of winter cold fronts, drainage will occur. Proposed outfall management includes structural measures to address this situation and to enhance freshwater retention.

In addition to saltwater intrusion and increased open water, this section of the wetlands has a recent geological origin and is rapidly subsiding. The live oak (*Quercus virginiana*) and hackberry (*Celtis laevigata*) trees along Cheniere Traverse Bayou are in advanced stages of stress. This bayou also has many dead trees. Some loss can be attributed to saltwater impact; however, the root systems of these large trees may have drowned.

METHODS

Vegetative zones were delineated using 1:12,000-scale color-infrared photographs. The vegetative zones were ground-truthed by identifying species composition, water levels, salinity, and landmarks in the field at different stations. The primary field work for plant identification was carried out on July 22, 1992. Aerial observations were made by helicopter on July 30, 1992 and by floatplane and helicopter during the summer and fall of 1992. The project area was then mapped with vegetative zones, stations, and landmarks in place. The percent area of each habitat type and open water areas was then calculated. Details of the methodology can be found in Appendix B.

RESULTS

The location of vegetative data collection stations and marsh zone delineations are shown in figure 2. Three plant zones were confirmed by the field investigation. The area next to the siphon facility outflow and northwest for approximately 2 mi should be classified as a freshwater marsh/swamp complex. This area is a narrow strip of marsh and cypress swamp that was not included in the drainage system when the back protection levee was constructed. Some

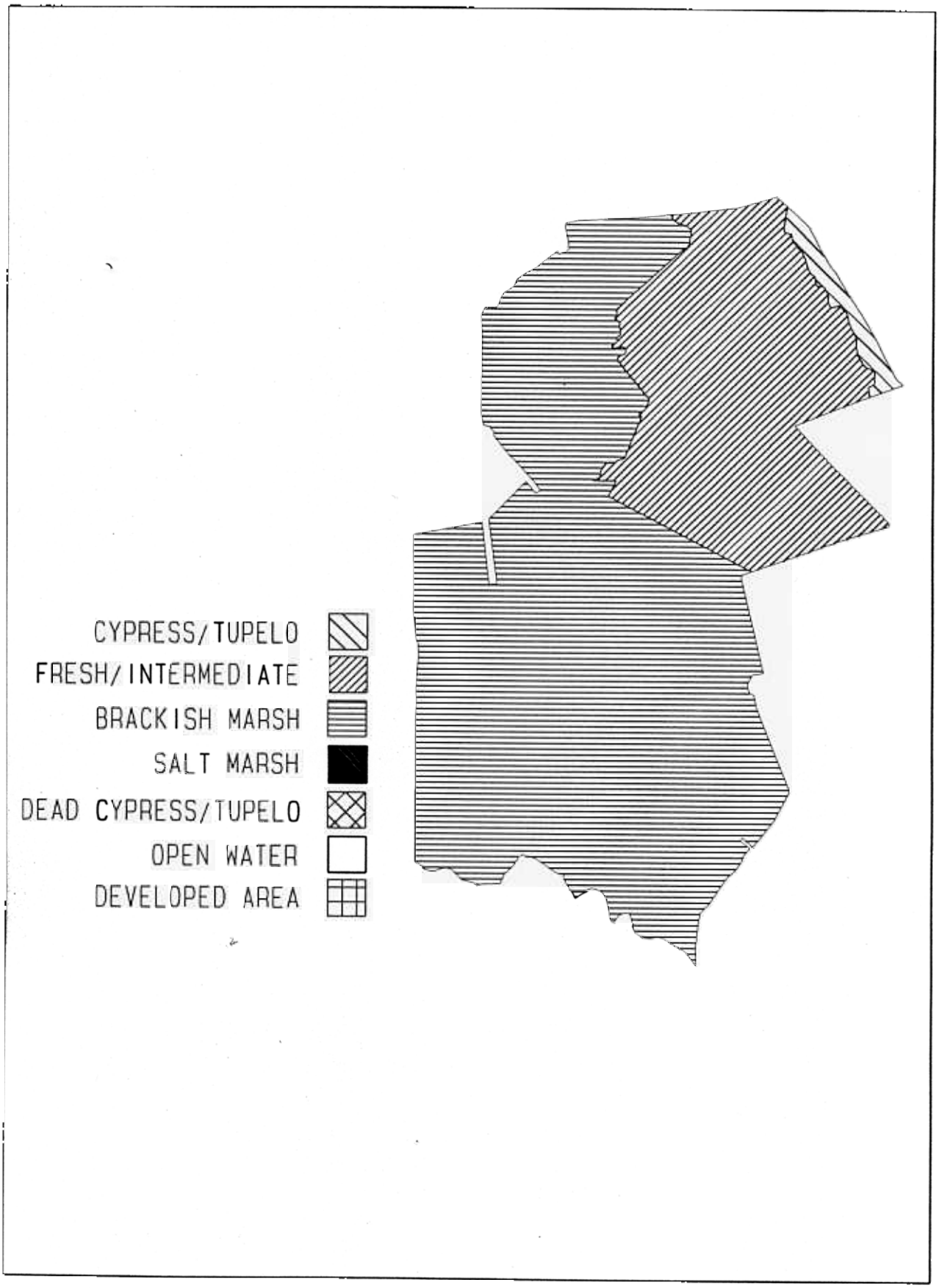

Figure 2. Naomi Siphon project area showing vegetative zone locations

deterioration is noticeable in the stressed cypress trees and open water areas. One active southern bald eagle nest is located in this area approximately mi west-northwest of the siphon.

The intermediate marsh plant zone occupies approximately the north half of the project area. The line of demarcation between this zone and the brackish marsh was difficult to pinpoint in the field; however, there was a marked change in the amount of marshhay cordgrass in the area near Bayou Du Pont and Cheniere Traverse Bayou. As the amount of marshhay cordgrass increased, the amount of cattail, wax myrtle, and bullwhip decreased.

The brackish marsh area extends just above Cheniere Traverse Bayou and throughout the remainder of the study area. The marsh south of Cheniere Traverse Bayou has opened up into large lakes and ponds, which may be indirectly related to the amount of tidal interchange through waterways connected to Bayou Du Pont and then to the Barataria Navigation Channel.

In addition to this change in natural hydrology, many oil and gas access canals have been cut into the interior marsh. Many have spoil banks that either gap as a regulatory requirement or have deteriorated, thereby encouraging daily tidal exchange. This hydrologic process contradicts the natural processes that formed these marshes through silt introduction from the Mississippi River and organic soil development by plant communities. While some of these processes were gradual, others such as gaps in the spoil banks drastically changed marsh hydrology and allowed extensive transport of plant and soil particles out of the system with each tidal cycle.

Salinity encroachment is occurring through these same spoil bank openings. The amount and duration of saltwater intrusion depends on the Barataria Bay salt content and tide stage. Event conditions associated with unusually high tides such as storms introduce excessive amounts

of water with high salt content into fresh and intermediate ecosystems. Such events may cause an increase in soil salinity and result in a loss of key plant species like bald cypress long after the water level and salinity return to normal. As an ongoing monitoring program, an extensive soil salinity survey may be advisable and useful in attempting to restore indigenous plant species.

Vegetative Station Data

Six vegetative stations were established throughout the project area. Area access is possible through a network of man-made canals and natural waterways. Water salinity values taken at each vegetative station during the initial ground-truthing effort. Species composition and percent of dominate vegetative species were noted at each station.

Station 1 is in a pond near the northeastern corner of the study area and is approximately ½ mi west of the active eagle nest. A large pipeline canal was constructed by Southern Natural Gas Company several years ago and converges with other pipeline canals at the back levee system. Openings through the pipeline canal spoil bank allow water interchange with the marsh

Salinity in the pond was .5 part per thousand (ppt) at the time of the field survey. The dominate emergent plants in the area were bulltongue (75%), cattail (15%), and bullwhip (10%). Aquatic vegetation was composed of southern naiad (*Najas quadalupensis*), coontail (*Ceratophyllum demersum*), duckweed (*Lemna minor*), and water hyacinth (*Eichhornia crassipes*). The submerged aquatics were occupying approximately 80% of the pond area (figures 3, 4, and 5).

Station 2 is located at an opening in an oil and gas canal spoil bank. Salinity was 2 ppt and vegetation was three-cornered grass (85%), bulltongue (10%), and a 5% combination of a belle dame (*Acnida cusidata*), deerpea (*Vigna luteola*), smartweed (*Polygonum spp.*), and

stinking fleabane (*Pluchea foetida*). This area also contained a very minor amount of smooth cordgrass (*Spartina alterniflora*) and marshhay cordgrass along the edge of the spoil bank opening (figures 6, 7, 8, and 9).

Station 3 is near the corner of the Citrus Land of Louisiana back levee system. A pond area is located in the marsh next to a break in the canal system levee. Small boats can access the marsh interior. Marsh vegetation was bulltongue (80%), cattail clumps (10%) and three-cornered grass (10%). Though many other plants were observed, the combined amount of these species did not constitute a large enough portion of the entire plant community to rate a percentage designation. Some of the other plants observed in this area were pennywort (*Hydrocotyle umbellata*), waterhyssop (*Bacopa monnieri*), spikerush (*Eleocharis parvula*), alligatorweed (*Alternanthera philoxeroides*), Walter's millet (*Echinochloa walteri*), marsh morningglory (*Ipomoea sagittata*), and traces of smooth cordgrass and marshhay cordgrass. An attempt had been made to close the opening in the spoil bank and some of the timbers are still present (figures 10, 1, 12, and 13). Water salinity at this station was 2 ppt. A remote sensing station is located near this station in one of the mineral access canals (figure 14).

Station 4 is in the entrance to a small ditch leading southeast from the main mineral access canal system. Water salinity was 2 ppt. This station is near a demarcation between intermediate and brackish marsh. Area plants were marshhay cordgrass (25%), bulltongue (20%), three-cornered grass (20%), camphorweed (*Pluchea camphorata*) (10%), millet (5%), spikerush (5%), sedge (*Carex spp.*) (5%), belle dame (5%), and deerpea (5%). This marsh is a good, broken marsh with approximately 10% open ponds with aquatic vegetation. Small

clumps of wax myrtle are visible in the marsh interior from this station and are good indicators of a slight surface elevation (figures 15 and 16).

Station 5 is in a small bayou on the north side of Bayou Du Pont. Water salinity was 4 ppt. The marsh is brackish and the vegetation was marshhay cordgrass (90%) and three-cornered grass (10%). Minor amounts of other plants were observed at this site and consisted of the same mixture as at Station 4. Aquatic vegetation in this area was Eurasian watermilfoil (*Myriophyllum spicatum*). There was a total lack of duckweed, a good indicator of the increased amount of saltwater that enters this section on occasion (figures 17, 18, and 19).

Station 6 is in an interior ditch north of Bayou Du Pont in a brackish marsh. The water salinity was 4 ppt. Marshhay cordgrass is the major vegetation (95%) with a mixture of other minor plants as listed at the other stations. This site had been disturbed by pipeline construction in the past, which had created some open ponds growing watermilfoil and coontail (figures 18, 20, 21, 22 and 23).

Vegetative Area Calculations

This project area (13,205.74 acres) is basically made up of three different vegetative zones: fresh/intermediate marsh, brackish marsh, and cypress/tupelo swamp (figure 2). The cypress/tupelo swamp is located within the immediate outfall, running from the siphon north along the hurricane protection levee. This cypress/tupelo zone covers 215.7 acres which is .6% of the project. The fresh/intermediate zone covers the entire immediate outfall area and extends out from the outfall approximately 2-3 miles. This zone covers 3,760.67 acres or 28.5% of the project. The brackish zone is the biggest zone and it covers 9,229.37 acres or 70% of the project area.

DISCUSSION

The Naomi Freshwater Siphon Structure is complete and should be operated as soon as Mississippi River water levels reach a point where flow is optimum. The receiving marsh near the siphon discharge is a fresh to intermediate marsh ecosystem in which river water impacts should be minimal. Large amounts of silt discharged into this marsh may cause existing vegetation to temporarily die back. However, more new species and increased vigor of those existing communities adjusting to the new edaphic conditions could offset this loss.

The major obstacle will be transporting large amounts of freshwater to the southern end of the system beyond the Cheniere Traverse Bayou natural ridge system. The Brady Canal system is still servicing oil and gas facilities and cannot be closed. Restoring bulkheads and spoil banks along pipeline canal levees will be possible because these canals are only navigated by recreational fishermen and hunters.

The Pen's east shoreline must be restored by dredging to prevent freshwater loss into the Barataria Navigation Canal. Several miles of levee will be required along Bayou Du Pont to contain any freshwater directed across the Cheniere Traverse Bayou ridge system. The large, open water area south of the ridge has developed from excessive tidal interchange through gaps in oil and gas access canals (figure 24). These openings should be plugged where unused canals depart from navigable waterways.

Wetland quality should improve within the first growing season after the siphon is operational. Depending on how the overall outfall management plan is implemented, much of the open water in the upper part of the project will be restored. Some restoration of the large,

open water area south of the Cheniere Traverse Bayou ridge system can be expected; however, because this area has been severely impacted by tidal action, it is likely that only an aquatic ecosystem will establish.

REFERENCES

Chabreck, R. H., G. Linscombe 1978. Vegetative Type Map of the Louisiana Coastal Marshes.

Chabreck, R. H., G. Linscombe 1988. Louisiana Coastal Marsh Vegetative Type Map 1988.

APPENDIX A

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