VEGETATIVE DELINEATION REPORT

WEST POINT A LA HACHE FRESHWATER DIVERSION (BA-4)

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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 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 located in Plaquemines Parish at West Pointe a la Hache, Louisiana. Plaquemines Parish and the Louisiana Department of Natural Resources (DNR) have constructed a large diversion facility to take freshwater out of the Mississippi River and introduce it into wetlands on the parish west bank. The outfall management area is approximately 9200 acres of marsh located in all or parts of sections 1–6 and 25–28 in T17S-R26E, all or parts of sections 1–9, 11, 13–21, 25–28, and 47 of T18S-R26E, and all or parts of sections 13–15, 20, 23, 24, 26, and 32 in T18S-R27E in Plaquemines Parish. The project area is bounded on the north by Lake Hermitage, on the south by the Bayou Grande Chenier ridge, on the east by the forced drainage system levee, and on the west by Bayou Grande Chenier ridge (illustration 1). The approximate project center is at latitude 29 degrees 31' 46" and longitude 89 degrees 48' 27". (USDA/Soil Conservation Service 1991)

Marsh plant communities have undergone extensive changes because of altered hydrologic conditions such as natural subsidence, loss of freshwater input through Mississippi River natural distributary channels, loss of silt loads from the Mississippi River during high stages, and interior channelization for drainage and access. Each of these conditions are closely related to saltwater intrusion. During 1954–1984, the ratio of water to land increased from 10.41 percent to 43.28 percent and appears to be continuing.

Ted O'Neil (1949) designated the area as a brackish marsh with a small trace of saline marsh adjacent to the back levee system between Grand Bayou and the Mississippi River natural levee terrace. This small strip of saline plant association may have come from lower marsh surface elevations in farming areas of breadhed reclamation districts prior to his field

investigation. Many field drains exist today that originate at the edge of the river terrace and empty into Grand Bayou. Some of these ditches contain relics of pumping station foundations.

Chabreck and Linscombe designated approximately half of the outfall management area as saline marsh in 1978, but as all brackish marsh on their 1988 Louisiana Coastal Marsh Vegetative Type Map. Due to the excessive amount of tidal exchange in the area and an obvious increase of saline water into the interior marsh, plant communities are more characteristic of a lower salinity saline marsh.

Grand Bayou was the major natural drainage system for this area. Mineral access canals have connected many of the area's small natural waterways and interior ponds. Oil and gas activity here has been through flotation canal construction. Two large pipeline systems were also installed in the area using flotation canal systems and both cross the Bayou Grande Chenier ridge system. Many other pipelines have been installed by the less damaging method of push ditches in recent years. One of the pipeline canals crossing the system is partially closed with a combination bulkhead and rip rap dam. The other canal has been closed on occasions with earthen plugs, but is presently open allowing water interchange through the ridge system.

The Jefferson Lake Sulphur Company constructed a large mineral access canal several years ago to provide access for barge traffic from their mining site south of Hermitage village to a dock facility next to Highway 23. A large ship dock was in the Mississippi River adjacent to where the West Pointe a la Hache Freshwater Diversion Facility is now located. This major canal system also crosses the Bayou Grande Chenier ridge system and allows for extensive saltwater interchange from the upper reaches of Barataria Bay. This canal system crosses the upper reach of Grand Bayou approximately ¼ mi from its beginning at the Citrus Lands of

Louisiana levee system. The original canal users are no longer in business; however, commercial and recreational fishermen make extensive use of the waterway. Some local producers use the canal for oil and gas access.

A maze of man-made canals interconnects Grand Bayou and the Jefferson Lake Sulphur Company Canal. There is also a great deal of water interchange through broken marsh and small waterways created by wetland deterioration. Several active oil and gas producing wells and production facilities are located within the freshwater introduction outfall management area, and they are all accessed by waterways. Two natural waterways, Bayou Hermitage and Johnson Bayou, cross the Bayou Grande Chenier ridge system. Bayou Hermitage provided watershed drainage for Lake Hermitage until recent hydrologic alteration by canals leading into Grand Bayou rerouted some of this system. Additionally, major changes in the Lake Hermitage watershed hydrology have occurred from marsh deterioration southeast and east of the lake.

Johnson Bayou, an extension of Bayou Cheneu, also crosses Bayou Grande Chenier and allows some water interchange between the wetlands to the south and Bay Batiste. This opening allows a minor amount of tidal action and saltwater intrusion and should be given high priority for closure with a rock weir in the freshwater management program.

The small villages of Grand Bayou and Hermitage are home to many permanent residences. Grand Bayou is primarily a commercial fishing village, but also supports many sport and commercial fishing camps. The area is extensively fished because it is accessible by Highway 23 and several canals. Hermitage village is accessible by a public road and has several permanent residents. Recreational and commercial fishing is common.

Hunting in the area is limited because waterfowl habitat has been lost by marsh conversion from low brackish to more saline and deteriorated conditions. Waterfowl hunting blinds were only seen north of Lake Hermitage and at one site east of the lake. Aquatic vegetation was limited in distribution and was abundant in only one pond system near the management area center. Several pairs of native mottled ducks were seen, but many wading birds were observed feeding in the area and gulls and terns were observed feeding near trawl boats. A wide variety of songbirds were observed using the low shrub-brush complex on the levee system. Several muskrat houses and nutria feeding activity were observed at many sites in the management area; however, very little high quality food plants for these two herbivores was noted. Limited amounts of three-cornered grass (*Scirpus olneyi*) and saltmarsh bulrush (*Scirpus maritimus*) were found in several sites. Raccoon tracks were common.

The most unique land feature of this area is the old Bayou Grande Chenier ridge complex. At several sites along the system, the remains of dead trees are still evident and a few live oak (*Ouercus virginiana*) and hackberry (*Celtis laevigata*) are still living. This area is an excellent example of natural subsidence in the Louisiana coastal marsh. Large tree loss is evident above Bayou Hermitage on the ridge system between the village and the Mississippi River, which is not subjected to daily tidal exchange. Most of the live oak trees deaths can be attributed to inundation of their root systems from subsidence rather than to saltwater intrusion. Though squirrel hunting was common near the village of Hermitage during the early 1960's, the area no longer provides habitat for these forest game animals.

At points where mineral canals cross the Bayou Grande Chenier ridge system, spoil banks support a large number and variety of brush and trees. Within the old Bayou Grande Chenier

waterway, there are only a few sites where the bayou is not open to water movement. This will be an important feature for long-term distribution of lower salinity water to the marsh adjacent to this ridge system.

METHODS

Vegetative zone delineation was performed using color-infrared photographs (scale 1:12,000). Vegetative zones were ground-truthed on June 23 and 24, 1992 by identifying species, landmarks, waterways, etc. in the field at each station. The project area was then mapped with vegetative zones, stations, and landmarks in place (illustration 2). The percent area of each habitat type and percent water was calculated using GIS software (Infocad ver. 7.0). Details of the methodology can be found in Appendix B.

RESULTS

The project site was visited on June 23 and 24, 1992 and an extensive effort was made to view and photograph with 35mm color film each geographic unit or section of the outfall management area. Though some sites were beyond the facility's expected limits of freshwater influence (i.e., north and west of Lake Hermitage near the natural ridge system), they are important because they provided good comparative plant communities for future investigators. This marsh receives rainfall runoff from the ridge system and area plant communities are healthy, while across Lake Hermitage to the southeast, the marsh has undergone some extensive deterioration and is now primarily open water.

Plant composition in the outfall management area is typical brackish and low salinity saline marsh communities. The dominate plant species observed were smooth cordgrass

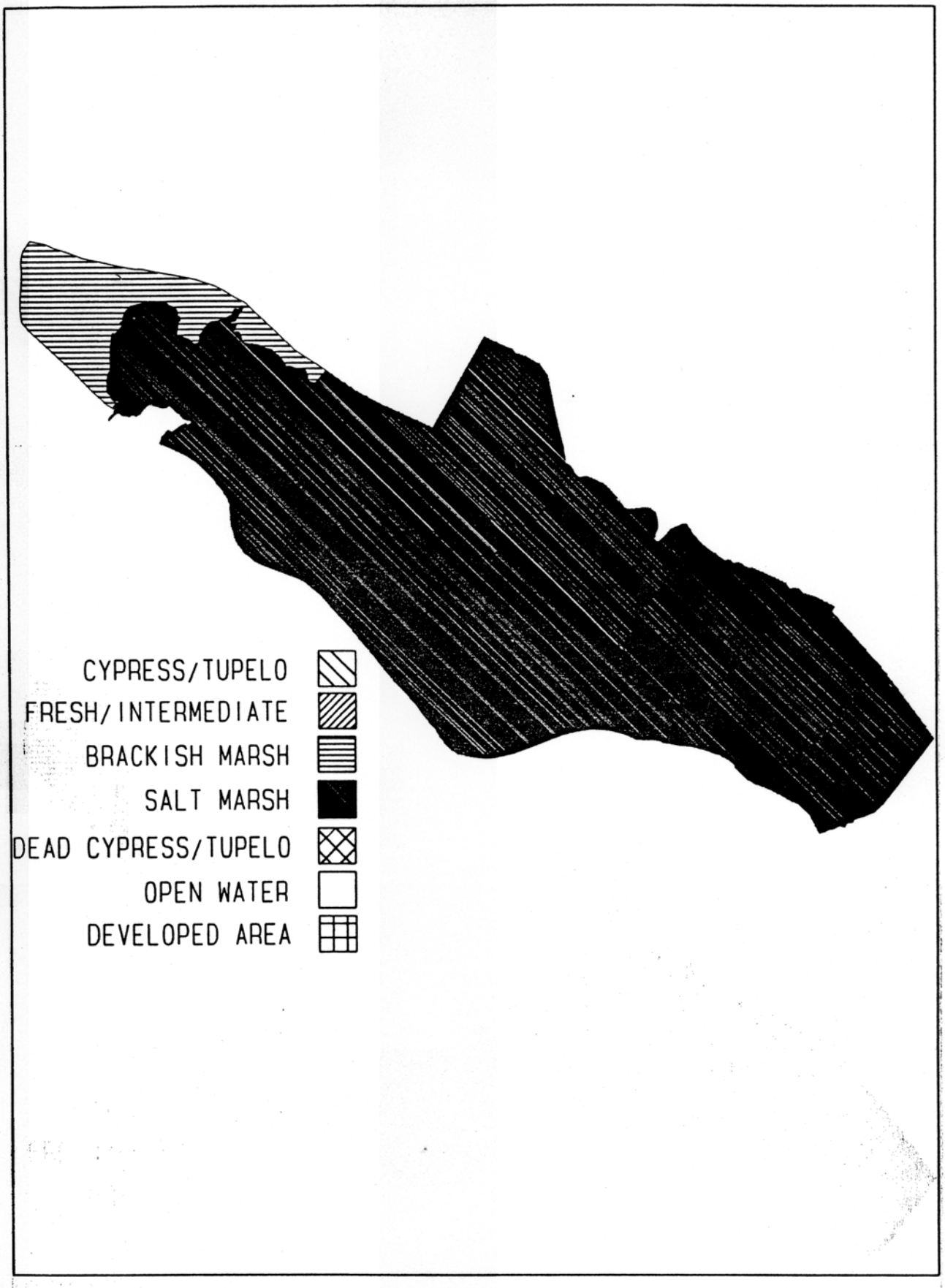

Illustration 2. West Point a la Hache project area showing vegetative zone delineations.

(*Spartina alterniflora*) and marshhay cordgrass (*Spartina patens*). Salt grass (*Distichlis spicata*) is common along ponds and natural waterways with a slight elevation of the marsh surface. Widgeongrass (*Ruppia maritima*) was the dominate aquatic vegetation observed throughout this study area. One small site of coontail (*Ceratophyllum demersum*) was noted in the discharge canal of a pumping station.

Sparse stands of three-cornered grass (*Scirpus olneyi*) and saltmarsh bulrush (*Scirpus maritimus*) were seen in several sections of the study area but did not make up significant percentages of any community. Nutria and muskrat feeding was noted in areas containing these two desirable wildlife food plants. A long-range management program to stimulate plant production and to encourage recovery of some of the less deteriorated stands of marshhay cordgrass and smooth cordgrass would include periodic control burning.

Vegetative station data

The location of vegetative data collection stations and marsh zone delineations are shown in illustrations and 2. Twenty-one vegetative stations were taken and, therefore, a great deal of duplication exists. Though repetitive in the early monitoring stage of this deteriorated wetland the duplication will be beneficial to field investigators in the future because each station should be readily accessible and any species composition changes would be noticeable.

Station is near the end of the northern-most distribution ditch of the structure's outfall pond (figure 1). Several small ditches were cut using a suction dredge and the material excavated was discharged into the marsh. Vegetation is growing on these spoil sites and is mainly smooth cordgrass (figure 2). The discharge ditches terminated in the marsh interior but did not connect to adjacent existing waterways (figures 3 and 4). Salinity at Station 1 was 11

ppt and vegetation was smooth cordgrass (60%), salt grass (35%), and marshhay cordgrass (5%). The general area is composed of approximately 50% open water (figure 5).

Station 2 is in a small marsh opening on the north side of the Jefferson Lake Sulphur Company Canal and south of the Citrus Lands of Louisiana protection levee. This marsh is broken and has an old ditch system that allows excessive drainage and tidal exchange (figure 6). Salinity was 11 ppt and plant composition was 60% smooth cordgrass, 35% salt grass, and 5% marshhay cordgrass.

Station 3 is located where the Jefferson Lake Sulphur Company Canal crosses Bayou Grande Chenier. Salinity at this site was 10.5 ppt. All of the original large tree species on the old bayou banks have been killed by subsidence and saltwater intrusion (figure 7). Marsh plants are dominantly marshhay cordgrass (60%) and smooth cordgrass (35%) with some salt grass (5%).

Station 4 is located where United Gas Pipeline canal crosses Bayou Grande Chenier. Plant composition is marshhay cordgrass (60%) and smooth cordgrass (35%) with some salt grass (5%). Water salinity was 10.5 ppt. This canal has been plugged in the past, but is now open and provides an excessive amount of water interchange through the natural ridge system (figures 8 and 9).

Station 5 is at a dead end mineral canal system that has been plugged on both sides of Bayou Grande Chenier. The plugs are constructed with soil and will need periodic maintenance to prevent wash out (figure 10). Marsh vegetation in this area is 60% marshhay cordgrass with approximately 30% smooth cordgrass and 10% salt grass.

Station 6 is near the outfall center in a section of intensive oil and gas operations. Several large ponds have developed (figure 11). Vegetation is this area has approximately 45% marshhay cordgrass and 45% smooth cordgrass with a good stand of salt grass (10%) along the edge of the levees.

Station 7 is at an area where large ponds exist on the west side of Grand Bayou. Pond areas were supporting good stands of widgeongrass (*Ruppia maritima*) (100%) and approximately 80% of the ponds were covered (figure 12). Salinity in this area was 12.5 ppt. The spoil bank along the edge of the ponds was covered with 80% salt grass, 10% marshhay cordgrass, and 10% smooth cordgrass.

Station 8 is in the mouth of a small ditch off Grand Bayou which leads from the high ground near the back protection levee to Grand Bayou (figure 13). Vegetation in this area was 60% smooth cordgrass, 35% salt grass, and 5% marshhay cordgrass. Salinity was 12 ppt. Marshhay cordgrass was present but in minor amounts. A large pumping station discharges into the marsh in this area. There was no indication from the vegetation that enough freshwater was available to influence the brackish-saline marsh plant species composition.

Station 9 is in a small drainage canal on the lower side of Grand Bayou village and is between the bayou and the Mississippi River. Salinity in this canal was 15 ppt and the marsh vegetation was 70% smooth cordgrass, 20% salt grass, 5% marshhay cordgrass, and 5% saltmarsh bulrush (figure 14). Very little marshhay cordgrass was noted and some saltmarsh bulrush was observed. These species were in scattered sprigs in the smooth cordgrass.

Station 10 is near a former pumping station's old brick foundation near the back levee system north of the Grand Bayou village and east of Grand Bayou. Salinity in this area was 13

ppt and the marsh was very broken. Approximately 70% of the area was open water and the plant communities were composed mainly of smooth cordgrass (70%) and salt grass (20%), with only 10% marshhay cordgrass (figure 15). Widgeongrass covered approximately 60% of the pond areas.

A remote sensing station is located in Grand Bayou near the point where the Jefferson Lake Sulphur Company Canal crosses (figure 16). This unit will provide excellent information that will be used to guide area management functions regarding water quality and levels.

Station 11, on the northwest side of Lake Hermitage, should provide good comparative data for restoration attempts south and east of the lake. A new pipeline will be installed adjacent to an existing line through this section of marsh (figure 17). Vegetation in this area was 95% marshhay cordgrass with a 5% combination of deerpea (*Vigna luteola*), eastern baccharis (*Baccharis halimifolia*), and marshmallow (*Hibiscus lasiocarpo*). Water salinity was 10 ppt. The main ridge system in this area still supports live trees; however, the section between this site and Lake Hermitage village has extensive stands of dead trees. This section of coastal wetlands was impacted several years ago by an active mosquito control program that included extensive ditching efforts to remove standing water from the ridge edge. This program also allowed high tides to introduce saltwater into areas that were previously isolated from daily tidal action. This process may have accelerated the killing of some vegetation.

Station 12 is west of a large pond on the north side of Lake Hermitage and near the natural ridge system. Salinity at this site was 10 ppt and the vegetation was 95% marshhay cordgrass with 5% smooth cordgrass and three-cornered grass. Large live oak trees have been

killed along the ridge system from this point south because of subsidence and saltwater intrusion (figure 18).

Station 13 is west of a small ditch out of the north end of Lake Hermitage. Salinity was 10 ppt and the marsh vegetation was 90% marshhay cordgrass with small patches of three-cornered grass (5%) and smooth cordgrass (5%) (figure 19). A few muskrat houses were observed in this area.

Station 14 is in the discharge waterway from the Citrus Lands of Louisiana pumping station that serves this portion of their fast lands (figure 20). Water salinity in the area was 10 ppt and is an indication that the pumps had not been operated during the several days prior to our survey. Marsh vegetation was 90% marshhay cordgrass, 5% smooth cordgrass and 5% three-cornered grass. A small patch of coontail was growing in the waterway.

Station 15 is in ponds east of Lake Hermitage and near the Citrus Lands of Louisiana levee system. This site is where marshhay cordgrass dominance (45%) gives way to smooth cordgrass (55%) (figure 21). The large trees visible in the background of this figure are where the Jefferson Lake Sulphur Company Canal crosses the Bayou Grande Chenier ridge system. Salinity in the area was 9 ppt.

Station 16 is north of the Jefferson Lake Sulphur Company Canal. This site has broken marsh vegetation along the edge of natural ponds and the dominate vegetation is smooth cordgrass (60%) with a decreased percentage of marshhay cordgrass (40%) (figure 22). Salinity was 10.5 ppt this area. Tidal action in this area is excessive, and openings of water depth. Salt grass is established along pond and canal edges.

Station 17 is at the end of a mineral access canal where an existing Shell Pipeline crosses (figure 23). Salinity in this area was 12 ppt and some widgeongrass was noted in the edge of the ponds. Marsh vegetation was smooth cordgrass (80%) and marshhay cordgrass (20%). Salt grass was also present in minor amounts along the pond bank edges.

Station 18 is located where a Southern Natural Gas Pipeline crosses the Bayou Grande Chenier ridge system (figure 24). A bulkhead and rip-rap pipeline closure are approximately 1000 ft southeast of the natural ridge system. An opening has been created in the structure and is serving as a small weir (figure 25). Salinity in the area was 13.5 ppt and the marsh vegetation was dominated by 95% smooth cordgrass and 5% marshhay cordgrass. Tidal action was moving into the area during field observation on June 24, 1992.

Station 19 is located where Johnson Bayou crosses Bayou Grande Chenier (figure 26). Some live oak, yaupon, toothache, hackberry, and wax myrtle trees are still alive on the natural bayou banks (figure 27). Such sites may reveal archeological middens. Marsh vegetation was dominated by smooth cordgrass (95%) with 5% marshhay cordgrass. The water salinity was 14 ppt. This site should be included in any outfall management plan calling for structural control of saltwater intrusion.

Station 20 is located where Johnson Bayou crosses the Shell Pipeline south and west of the Grand Bayou village. This site is dominated by 80% smooth cordgrass with 15% salt grass and 5% marshhay cordgrass. Salinity was 12.5 ppt and some widgeongrass was observed along the pond edges.

Station 21 is south of Lake Hermitage between the lake and the Jefferson Lake Sulphur Company Canal. The present site is where Willow Bayou used to serve as a drainage outlet for

this portion of the Lake Hermitage watershed. The marsh is very broken and the natural waterway is no longer discernable from the ponds (figure 28). Vegetation in the area is 50% smooth cordgrass and 50% marshhay cordgrass. Salinity was 10 ppt and tidal action was very noticeable.

Vegetative Area Calculations

This project area (18,747.72 acres) is basically made up of two vegetative zones: brackish marsh and saline marsh. The brackish marsh is located on the northern and eastern sides of Lake Judge Perez and covers 1,589.53 acres or 8.5% of the project area. Saline marsh covers the remaining 17,158.19 acres (91.5%) in the project area.

DISCUSSION

The marsh area to be served by the West Pointe a la Hache Freshwater Diversion Facility is in poor condition for wildlife habitat and wetlands vegetation. A host of features have contributed to this degraded condition. Early European settlers interfered with the natural process of Mississippi River overbank flooding by constructing a protection levee to prevent flooding of agricultural areas. The eventual closing of Bayou Grande Chenier as a distributary channel for river water eliminated the natural sources of silt-laden freshwater to the area. In more recent times, the upgrading of the Mississippi River levee system to provide flood control for this portion of Plaquemines Parish sealed the river off from the wetlands that had received freshwater during flood stages. Grand Bayou served as the major natural drainage outlet for the area between Bayou Grand Chenier and the Mississippi River's natural terrace system until construction of oil and gas access canals and natural subsidence caused a drastic change in the hydrology.

Large populations of muskrat and nutria have been common in this section of the Louisiana coastal wetlands for the past 25 years and have contributed to some of the deterioration. In recent years, low winter temperatures may have contributed to die-off of stressed plant communities during low tide periods.

Increased tidal exchange between the interior marsh areas and large bays along the north edge of Barataria Bay has contributed to scouring of the deteriorated marsh and marsh ponds. This process has also contributed to an increased water salinity levels, and plant communities are rapidly changing to a more saline composition.

Some area structural management is possible by partially closing the major waterways crossing the Bayou Grande Chenier natural ridge system. For optimum benefits, channel training of water from the West Pointe a la Hache Freshwater Diversion facility is necessary.

Connecting the Jefferson Lake Sulphur Company Canal with the Grand Bayou headwaters may have had the greatest single adverse impact upon the hydrology of this area and should be controlled to reduce tide action circulation. This same situation applies to the United Gas Pipeline Canal that crosses Bayou Grande Chenier; however, completely closing this canal is possible without having an extensive impact upon local recreational navigation.

Suggestions provided by the USDA Soil Conservation Service in the Feasibility Report dated September 30, 1991 should be given high priority in developing the outfall management plan.

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APPENDIX A

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

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Figure 8

Figure 9

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Figure 17

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Figure 19

Figure 20

Figure 21

Figure 22

Figure 23

Figure 24

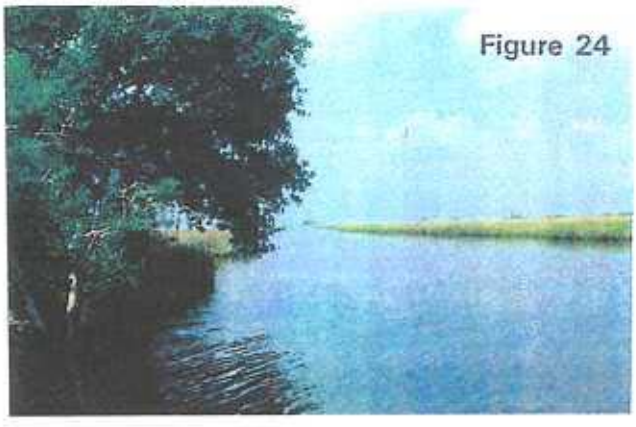

Figure 25

Figure 26

Figure 27

Figure 28