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ST. BERNARD PARISH COASTAL MANAGEMENT PROGRAM DOCUMENT

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ST. BERNARD PARISH
COASTAL MANAGEMENT PROGRAM DOCUMENT

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COASTAL MANAGEMENT PROGRAM DOCUMENT

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ST. BERNARD PARISH

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PREFACE AND ACKNOWLEDGEMENTS

The development of St. Bernard's Coastal Management Program occurred over a six-year time interval. Accordingly, this program document represents the culmination of efforts which occurred during those years and necessarily builds on previous studies and reports. The chapters concerning setting and forms and processes, resources, and socio-economic characteristics, environmental concerns, and goals borrow directly from earlier works, especially from Coastal Environments, Inc. (CEI, 1972, 1976; Wicker et al. 1982) and Burk and Associates, Inc. (B & A I 1978a, 1979).

The management approach described herein is new in that it does not rely on zoning concepts but rather on performance standards which are implemented through a permit process for local uses. The authority for implementation of the program is contained in a newly enacted "...Ordinance Implementing the St. Bernard Parish Coastal Zone Management Plan and Providing for the Regulation of Control of Coastal Uses of Local Concern"; a copy of which is included in Appendix 1. The document contains new, straight-forward procedures for special areas, program implementation, uses of greater than local benefit, and interagency coordination.

Special appreciation goes to the St. Bernard Parish Police Jury for their support of the program and the timely consideration of the ordinance, the Planning Commission and staff for their active participation, and the Coastal Advisory Committee for their unstinting labors over a period of years. Thanks also to Charles Neupert who provided the draft ordinance and Mike Wascom who reviewed it, both of Louisiana State University's Sea Grant Legal Program. The following CEI staff members are acknowledged for their contributions: Dr. Karen Wicker for technical comments, Nancy Sarwinski for compilation of data, Susan Pendergraft for production editing, and Bettye Perry, Ludy Dyason, and Ree Musso for typing the report.

CHAPTER I: INTRODUCTION AND SUMMARY

The St. Bernard Parish Coastal Management Program (CMP) has been developed in response to a locally perceived need for comprehensive and scientific management of the parish's abundant but threatened coastal resources. The mechanism and much of the guidance for program development is in Act 361 of 1978 (the state and local Coastal Resources Management Act of 1978), as amended, and in regulations promulgated thereof. This program document represents the culmination of a long and productive partnership between St. Bernard Parish and the Coastal Management Section (CMS) now within the Louisiana Department of Natural Resources (DNR). An overriding consideration during program development was to provide a coastal resource management program incorporating a balance of conservation and development, an efficient administrative arrangement, and a straightforward, but effective, procedure for program implementation.

PHYSICAL SETTING

St. Bernard Parish is located in southeastern Louisiana, entirely within the Louisiana Coastal Zone. It is bounded on the north by Orleans Parish and Mississippi Sound, on the south and west by Plaquemines Parish, and on the east by the Gulf of Mexico. In 1978, St. Bernard Parish encompassed 1,061,840 acres of water, 238,900 acres of wetlands, and 26,550 acres of urbanized, agricultural, and forested upland, comprising 13 distinctive environmental units (Figure 1-1).

St. Bernard Parish is in a unique environmental situation. On one side are pressures of the expanding urbanization of Orleans Parish and the impact of shipping interests seeking new channels and port facilities. On the other side is the pressure of the Gulf of Mexico and associated waterbodies gradually expanding their domain at the expense of parish lands. The urbanized area of the parish is an "island" between these competing forces.

Development in St. Bernard Parish is concentrated on the relatively small portions of levee land most suitable for human occupation. Even this land has been developed and maintained at considerable economic cost. However, the contrasting amenities of the New Orleans metropolitan region to the north and west, and the extensive marshlands to the south and east, make it one of the most desirable living areas in the state.

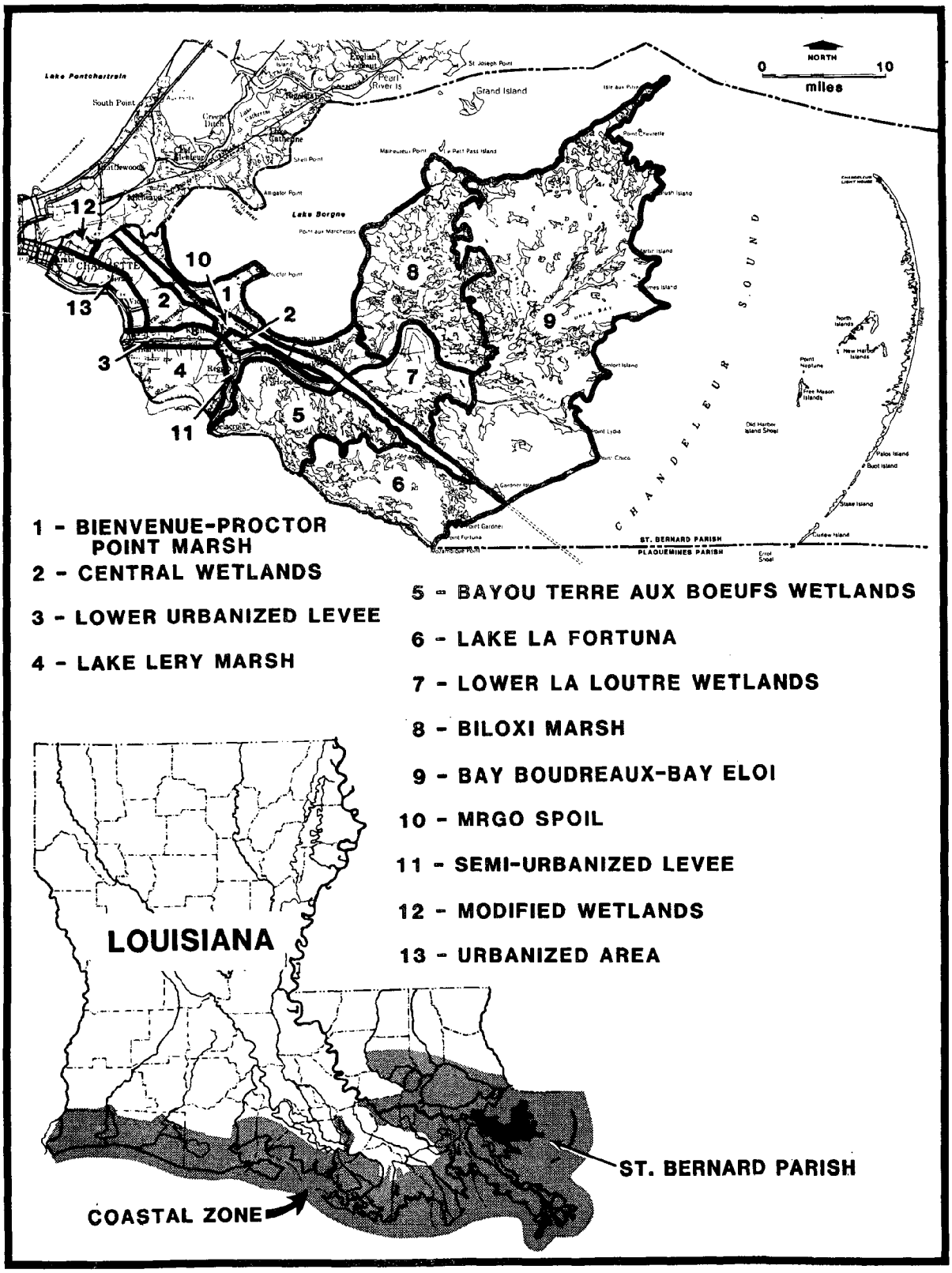


Figure 1-1. Location of study area within Louisiana coastal zone and environmental management units of St. Bernard Parish.

The environmental setting of the parish is one of rapid change. Unlike highland areas where the landscape can be expected to remain relatively stable over hundreds of years, the landscape of St. Bernard can be expected to change noticeably and significantly within a single generation. Man modifies the landscape through drainage, canal building, hurricane protection levees, and other adaptations to his surroundings. Natural forces of land erosion, subsidence, and storm attack work persistently in reshaping the parish. Thus, a combination of interrelated man-made and natural forces contribute to an extremely rapid landscape evolution.

Chapter II contains detailed information on the physical setting of the parish.

PRINCIPAL RESOURCES

The principal natural resources of St. Bernard Parish are generally related to the vast wetland areas within the parish. The fisheries, fur, and recreational interests of the parish are dependent upon wetlands and associated water bodies for extractable resources, while most of the petroleum industry is also located in swamps, marshes, shallow bays, and offshore areas.

Fisheries

The extensive brackish marsh zones of the parish are extremely productive areas for aquatic species such as fish, oysters, shrimp, and crabs. Some of these species require marsh and tidal water environments during their entire life cycle, while for others, it is only important during some stages of their life cycle. The majority of the offshore fisheries catch in the area is dependent on the marsh region as a nursery zone.

Minerals

Minerals produced in St. Bernard Parish, in order of their value, are natural gas liquids, natural gas, petroleum, sand, and clay. The parish is a leader in mineral production.

Furs

The coastal marshes are of great value to the fur industry. Principal fur-bearing mammals found in the area are the common muskrat (*Ondatra zibethicus*) and the nutria (*Myocastor coypus*). Environmental changes brought about by natural forces,

such as hurricanes, or by man, such as control of freshwater influx into the marsh areas, usually alter the habitat upon which these animals are dependent. Such environmental changes have a relatively rapid impact on the fur industry, which has experienced a decline in fur-bearing animal production within the latter half of the twentieth century.

Recreation

The potential of the parish for marsh- and water-based recreation is practically unlimited. Its many waterways and their relative ease of access allow an outlet for boating, fishing, and hunting not only to parish residents, but also to many residents of the New Orleans area. St. Bernard Parish provides for recreation potential in its many bayous and small lakes in protected areas, and in larger bayous and lakes in vast, open marsh area; it offers access to the Gulf of Mexico on both its eastern and southern exposures. The parish land area contains scenic sites and rivers and other areas unique for particular reasons.

Resource Use Conflict

The close proximity of these resources and users is leading increasingly to resource use conflicts as one use impacts or infringes upon another. Chapter III contains more detailed information on the parish's principle resources and conflicts.

SOCIO-ECONOMIC CHARACTERISTICS

Since prehistoric times, man has realized the richness of coastal areas and deltaic plains. Early cradles of civilization flourished in these environments. The abundance of the resources at hand, the fertility of the soils, and the ease of water transportation contributed to this development. The Louisiana coastal zone, especially the Mississippi River alluvial coastal plain, is one of the most resource-rich areas of the world. Many prehistoric and early historic Indian middens and mounds provide evidence of man's long-term habitation of this area. Europeans started settling the coastal area around St. Bernard Parish in the eighteenth century. Since then, this region has developed into the most important economic, industrial, commercial, and trading center of the Louisiana coast.

The geological and physical history of the origin and development of St. Bernard Parish can shed light on the values and constraints of this fragile, but very rich, natural

environment. Its cultural history tells of the relationship between man and the land and its resources. The significant role that the Mississippi River system and the proximity of the Gulf of Mexico waters have always had and continue to have on the life of the people is apparent.

As modern man established himself in this environment, he left his imprint on the landscape. This is evident in the different land uses and development patterns present in the area, some of which reflect regional and cultural characteristics inherent to Louisiana's coastal physiography and to the different nationalities of its settlers.

As population in the parish increases, residential, commercial, and industrial land use needs will increase, creating development pressures in marginal wetland areas where poor drainage and soil conditions present major constraints to development.

Farming acreage will decrease while the demand for fish and shellfish will grow. While the total production of oil and gas within the parish is expected to decrease in the future, the level of activity may increase in the near future as increased product price makes smaller yields profitable.

For more information on the socio-economic aspects of St. Bernard Parish see Chapter IV.

ENVIRONMENTAL CONCERNS

St. Bernard Parish's location within the New Orleans metropolitan region places it under pressure of expanding urban, industrial, and commercial demands. The forces behind development-oriented activities may look upon the parish's undeveloped land and water areas as potential areas to accommodate the needs of future growth.

The coastal wetlands of St. Bernard are a dynamic system undergoing constant change in response to a combination of natural and man-made processes. The environment is experiencing rapid modifications which, if left unchecked, will destroy the productive, renewable resource-rich wetlands.

A variety of processes have caused the deterioration of the wetlands including saltwater intrusion, erosion, subsidence, canal construction, wetland reclamation, and spoil deposition. These factors are interrelated and interactive, in that each one contributes to the other.

The Mississippi River-Gulf Outlet (MRGO) is the largest man-made channel in the parish. It has caused extensive erosion and a three-fold increase in salinity along it's length.

Other transportation routes in the parish have been developed historically on higher areas which were less subject to flooding and which offered more stable soil foundations. Water transportation was along the main natural waterways. New construction methods and techniques have made it possible for man to build highways through marshes and dig transportation channels through the wetland environments. The detrimental repercussions occur not only in these fragile wetland environments, but are also in certain sectors which are founded on wetland-dependent natural resources, such as the fur-trapping industry. Modified drainage patterns, resulting from the development of a variety of networks including transportation, communications, utilities, and oil and gas pipeline systems, have had tremendous consequences in this parish and throughout the whole coastal region.

Extraction of non-renewable resources also affects the renewable resources of the parish. Extraction is accompanied by support activities for exploration, transportation, and manufacturing. More detailed information on environmental concerns are contained in Chapter V.

GOALS, OBJECTIVES, AND POLICIES

The policy of St. Bernard Parish, as contained in the parish's coastal management ordinance is:

1. To promote the health, safety, convenience and general welfare of the inhabitants of the parish of St. Bernard.
2. To bring about the coordinated, efficient, and economical development of the parish.
3. To protect, develop, and, where feasible, restore and enhance its resources.
4. To support and encourage multiple use of resources consistent with maintenance and enhancement of renewable resource management and productivity, with the need to provide for adequate economic growth and development; and with minimization of adverse effects of one resource use upon another without imposing undue restrictions on any user.
5. To develop and implement management programs which are based on consideration of the resources, environment, and needs of the people of St. Bernard Parish.

6. To establish goals and plans for St. Bernard Parish, based on economic, envionmental, and social needs which will guide activity in conformance to this Statement of Policy.
7. To establish separate guidelines for wetlands which recognize that:
   a) The wetlands of St. Bernard Parish, although part of a larger estuarine ecosystem stretching from Lake Maurepas to the Chandeleur Islands, consist of a series of distinct geographic units. These units have been combined into appropriate districts to facilitate management of these areas.
   b) Individual permissible uses for each wetland management unit are based on a balance of economic, environmental, and social priorities and needs for each area.
   c) The primary goal for future use of parish wetlands is to maintain them in their natural condition and to restore, when possible, those areas that have deteriorated due to natural and cultural factors. A major aspect of these restoration activities should be the preservation of the parish's archaeological and historical resources. Maximum utilization of the renewable and non-renewable resources of the wetlands is encouraged so long as high productivity is maintained and the ecological balance of the wetlands is not further disrupted.

The goals, which are also in the ordinance, are designed to achieve the aims of the policies and are listed below:

1. Attain proper use of parish resources through a balance of conservation and development.
2. Identify areas with unique characteristics and develop methods to maintain them.
3. Determine the degree of development intensity suitable for all areas of the parish.
4. Enhance the biologically productive and physically protective aspects of the parish's wetland environment.
5. Enhance cultural and recreational opportunities in the parish by the development of ecologically sensitive facilities within the context of a comprehensive program.

The policies and goals were developed over a number of years with the active participation of the Police Jury, Planning Commission, Coastal Advisory Committee, scientists, citizens, and agency personnel. The policies and goals provide a framework and direction to which the St. Bernard CMP will adhere during implementation.

The policies and goals, as applied to management units, result in recommendations, management unit goals, and permissible uses. Chapter VI contains more detailed information on goals, objectives, and policies.

PROGRAM ADMINISTRATION

The manner and procedures by which the program will be administered represent an important element of the program. The CMP will be implemented and administered by the St. Bernard Parish Planning Commission which will be responsible for grant administration, overall program management, and program guidance, including new initiatives.

The permit procedure will involve the submission of coastal-use permit applications to the St. Bernard Department of Safety and Permits which, in consultation with the Planning Commission staff (hereinafter referred to as "staff"), will decide if the use is one of state or local concern and forward a copy to the administrator of the CMS in DNR. The staff will conduct an environmental review utilizing parish goals, policies, and performance standards and make a recommendation to the Office of Safety and Permits. That office will grant or deny the permit with conditions based on the environmental review. An appeal may be taken to the Police Jury and subsequently to the Louisiana Coastal Commission.

Enforcement and monitoring will be the responsibility of the Department of Safety and Permits, with unofficial monitoring being conducted by the staff during the course of their normal duties. Activities or uses conducted within leveed areas (fastlands) or above the 5-foot contour generally do not require a coastal use permit.

In implementing the program, the Planning Commission will utilize a number of techniques, including mitigation, where appropriate, consistency, and the use of available funding to carry out necessary studies, activities, and management strategies.

The procedures for the designation of special areas involves a nomination with documentation by any person, a review by the staff and recommendation by the Police Jury to the Administrator. Procedures for the consideration of uses greater than local concern involve review by the staff, provision for public presentations, and appeals, thus insuring fair and objective decisions by the CMP. More detailed information on program administration is contained in Chapter VII.

Public Participation

Public involvement in the development of St. Bernard's CMP has been intensive and wide-spread. The primary vehicle for public input has been, and continues to be, the local Coastal Advisory Committee which meets monthly and diligently considers coastal management matters in a public "town meeting" forum. Other public education efforts involve public meetings, publications, studies, newspaper coverage, and presentations. Public participation in St. Bernard Parish has been and will continue to be a model effort and is further discussed in Chapter VIII.

CONCLUSIONS

The CMP in St. Bernard Parish is a mature and workable program. It has the necessary goals, policies, procedures, authorities, and administrative framework to achieve a balanced management approach which is necessary for the future health and welfare of the parish.

CHAPTER II: PHYSICAL SETTING

INTRODUCTION

The physiography of St. Bernard Parish reflects the deltaic nature of its origin. St. Bernard Parish, situated east of New Orleans, is a product of sediments deposited by the Mississippi River in several delta-building phases which extended from 700 to 4000 years ago. Four relict Mississippi River channels--Bayous LaLoutre, Terre aux Boeufs, Des Familles, and Sauvage--were involved in building the delta complex. However, natural forces such as downwarping, subsidence, erosion, and tropical storms have contributed to breaking up these intertidal lowlands. Today, the natural levees of Bayou LaLoutre and the east bank of the Mississippi River form the backbone of the parish and contain almost all of the parish's population. The Chandeleur Barrier Island complex extends along the eastern perimeter of the parish and is separated from the remainder of the parish by the relatively shallow waters of Chandeleur Sound. This narrow island chain was formed by the reworking of the outer fringes of the older deltaic lobes after the Mississippi shifted its course to the present (Plaquemines-Belize) delta.

All of St. Bernard Parish, containing approximately 1,327,310 acres, is within the Louisiana Coastal Zone. In 1955, a little more than three-fourths (78.5%) of the parish was water and less than one-fourth was land. By 1978, the water area had increased to about 81% and land had decreased to 20%. (Data cited in this section were derived from the compilation of areal measurements obtained in a habitat mapping study of the Mississippi Deltaic Plain Region [Wicker et al. 1980, Wicker 1982, personal communication]. See Table 2-1 for a summary of the habitat change [Wicker 1981].)

St. Bernard Parish is losing land because of erosion, subsidence, and canal construction. Saltwater intrusion, especially that associated with construction of the Mississippi River-Gulf Outlet (MRGO), has virtually eliminated the freshwater marshes and swamps. Between 1955 and 1978, 10,107 acres of swamp (95%) were lost, primarily because of saltwater intrusion. The natural forest habitat also decreased (6036 acres or 42%) because of land clearing, and in low-lying, localized areas because of saltwater intrusion. Man-influenced forests increased by 76 acres (65%) as a result of canal dredging and spoil deposition. The area of natural scrub/shrub habitat increased by 228 acres (74%), primarily because of old field succession on abandoned agricultural lands. Man-influenced scrub/shrub underwent an enormous expansion in habitat area (15,353 acres or 21,599%) as a result of canal dredging and subsequent

Table 2-1. Habitat Change in St. Bernard Parish, Louisiana: 1955/56 - 1978.

Habitat Type	1955/56 Area (in acres)	%	1978 Area (in acres)	%	Change (in acres)	%
Developed	4,753	0.4	13,818	1.0	+9,065	190
Agriculture	8,137	0.6	3,032	0.2	-5,105	62
Forest	14,300	1.0	8,341	0.6	-5,959	42
Swamp	10,593	0.8	486	0.0	-10,107	95
Scrub/Shrub	379	0.0	15,961	1.2	+15,582	4108
Fresh Marsh	20,218	1.5	12	0.0	-20,206	99
Nonfresh Marsh	226,152	17.0	215,773	16.3	-10,379	5
Water	1,040,150	78.4	1,067,964	80.4	+27,814	3
Beach/Reef	2,623	0.2	1,925	0.2	-698	27
TOTAL	**1,327,305**	**99.9**	**1,327,312**	**99.9**		

Source: Wicker 1981

spoil deposition both for navigation and petroleum purposes, but largely because of spoil deposition from MRGO construction.

Between 1955 and 1978, the fresh marsh habitat in St. Bernard Parish, for all practical purposes, disappeared (20,206 acres or 99.9%). Some loss was due to construction and landfill but most was related to saltwater intrusion. The natural nonfresh marsh habitat decreased by 16,050 acres (7%) because of erosion and canal dredging, especially the MRGO. Man-influenced nonfresh marsh increased by 5670 acres (89%) as nonfresh marsh was ditched and leveed for management. Natural beach/reef deposits also decreased (698 acres or 26%) primarily because of shoreline erosion.

The dune vegetation habitat types shows an increase of 49 acres, but this is the result of the interpreter's ability to discern dune vegetation on the 1978 color infrared imagery (CIR) of the Chandeleur Islands (Wicker et al. 1980). Agricultural habitat decreased by 5154 acres (63%) parishwide, mostly because of development but also because some lands were abandoned and revegetated by trees and shrubs. The amount of developed habitat almost tripled in area (up 9046 acres or 190%).

Analysis of habitat change and land loss data indicates that St. Bernard Parish is a dynamic environment experiencing great physiographic changes as a result of both natural and man-made processes. In order to manage the coastal zone in the best, long-term interest of the parish, management goals, objectives, and priorities must be established. These management objectives are facilitated through documentation of the parish's cultural and physical environment, natural resources, and environmental constraints as presented in the following sections of this report:

I. Geology and Soils
II. Climate
III. Hydrology
IV. Vegetation
V. Wildlife and Fisheries
VI. Endangered and Threatened Species
VII. Cultural Resources
VIII. Transportation
IX. Land Use

GEOLOGY AND SOILS

Geology

St. Bernard Parish lies in the Louisiana Gulf Coastal Plain and its physical features reflect the deltaic nature of its origin, i.e., the deposition and reworking of sediments deposited by the Mississippi River in several delta building phases (Figure 2-1). The most recent of these phases was the St. Bernard delta lobe, active between 1500 B.C. and A.D. 700 (Wiseman et al. 1979). Historically, the St. Bernard delta complex is one of five major subdelta complexes of the Louisiana deltaic plain. The others are the Teche, LaFourche, Maringouin, and Plaquemines-Belize (Modern)." The latter is the present, active Mississippi River delta lobe (Figure 2-2).

The Mississippi River deltaic processes have been demonstrated to be cyclic (Coleman and Gagliano 1964; Morgan 1972). The constructional stage of delta growth is characterized by rapid deposition of coarse, inorganic material, subsequent subaerial delta aggradation and progradation, and development of prominent natural levees. During the latter period of the constructional phase, the rate of deposition slows and eventually ceases, initiating the abandonment phase. During the latter period of the constructional phase, the rate of subsidence exceeds the rate of sediment influx and the region is characterized by extensive bays, interdistributary lakes, and levee flank depressions. The process of subsidence is two-fold: it results from the loading of massive local sediment accumulations (e.g., natural levees) and downwarping along the Gulf Coast Geosyncline, a regional tectonic zone of subsidence active along the entire northwestern Gulf of Mexico.

The destructional phase of the deltaic cycle is initiated by the shifting of the river's main channel, the closing of active distributary channels, and the curtailment of the flow of sediment-laden waters to the delta. This cycle is characterized by erosion of land areas, a lowering of delta relief, and enlargement of water area. Beaches and barrier islands are formed by the reworking of sand and shell material by waves. In the absence of high freshwater discharge, saltwater flooding of low-lying marshes by tidal and storm processes creates saline marshes on the delta margin. The St. Bernard Parish delta complex entered its destructional phase about 900 years before present (B.P.) (Wiseman et al. 1979).

At present, the environment of St. Bernard Parish can be divided into two larger physiographic systems, fastlands and wetlands, separated by a smaller interface or

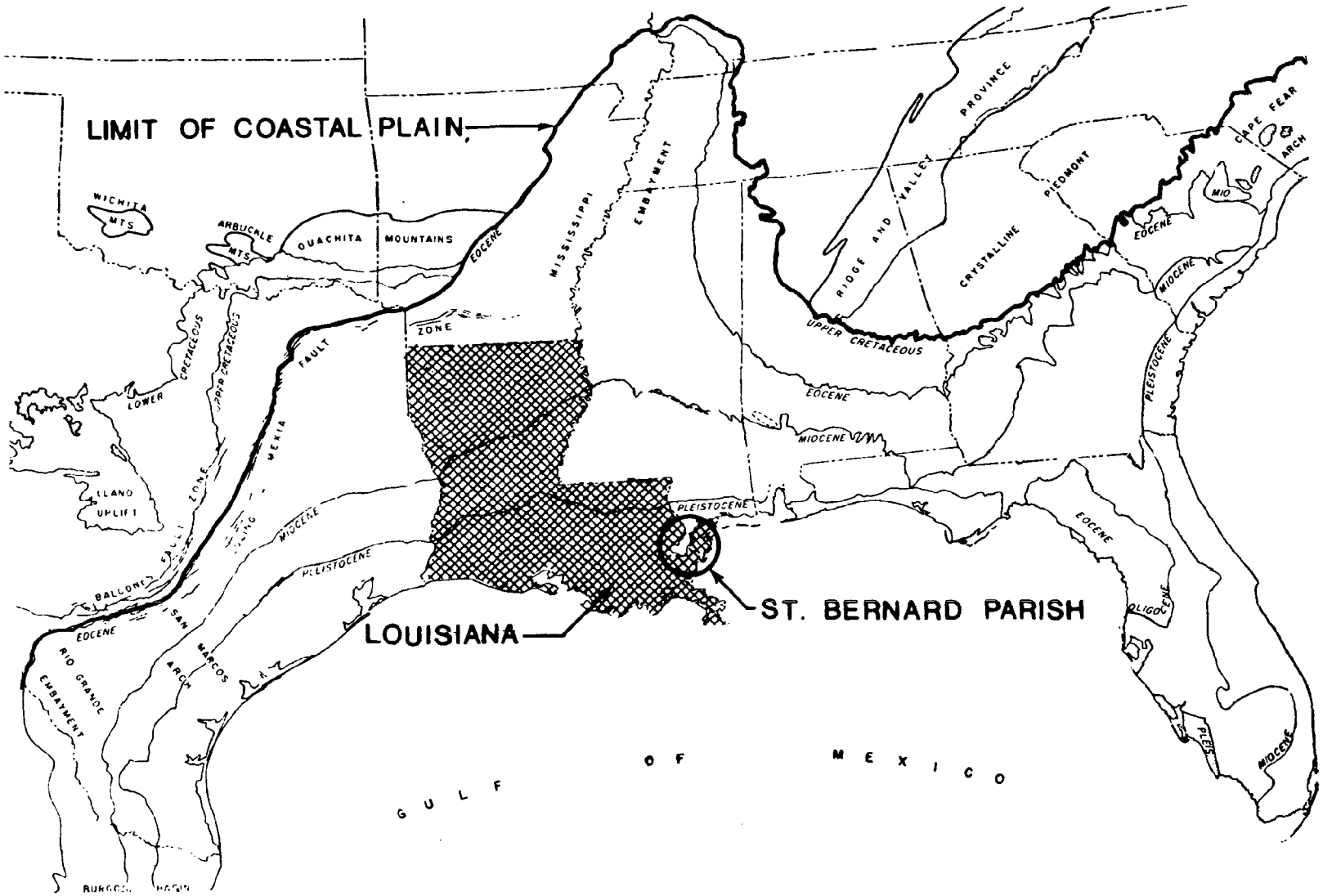


Figure 2-1. Location of Louisiana and St. Bernard Parish within the Mississippi embayment portion of the Gulf Coastal Plain (modified from Eardley 1962).

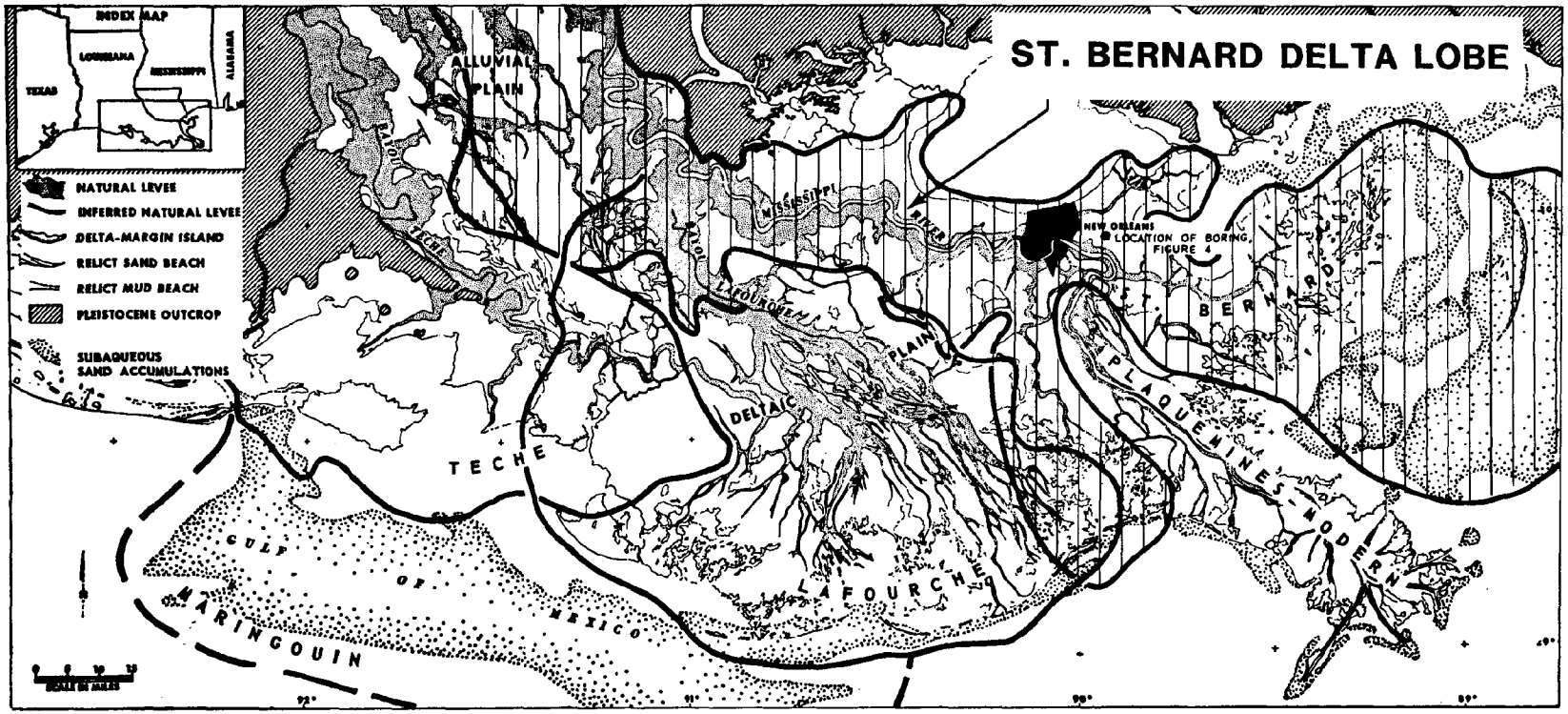


Figure 2-2. The five historic delta lobes of the Mississippi deltaic plain (after CEI 1972, from Frazier 1967).

buffer zone (Figure 2-3). The fastlands, consisting of natural levee ridges (5 to 10 feet in elevation) and flanking bottomland hardwoods and backswamps are enclosed by flood and hurricane protection levees, and drainage in the area is manipulated by canals and pumps. Segments of the Bayou Terre aux Boeufs and Bayou LaLoutre levees lie outside the levee but are considered fastlands because of their elevation and better drainage. A small portion of the parish's wetlands, consisting of freshwater swamps, marshes and bottomland hardwoods, lies inside the hurricane protection levees at the base of the natural levees and constitutes a buffer zone between the developed areas and the wetlands. The majority of the wetlands, constituting about 98% of the parish's area, lies outside of the levees and consists of low-lying (near sea level) brackish to saline marshes and very limited amounts of intermediate marsh and stressed cypress swamps.

Soils

The soils types found in St. Bernard Parish are closely correlated to specific geomorphic features (Figure 2-4) (Table 2-2). The loamy, alluvial land is found in the battures situated between the Mississippi River channel and the flood protection levees. Sediment in this region consists of stratified, grayish-brown silty loam and very fine and fine sandy loam materials which are constantly reworked by river currents and human activities such as dredging and construction. The natural levees adjacent to the Mississippi River and battures consist of the Commerce-Sharkey association. The narrow, elevated levee crests contain Commerce soils consisting of dark grayish-brown silt loam or silty clay loam on the surface and a grayish-brown silty clay loam subsoil. Sharkey soils are poorly drained and occur in depressions and downslope from the levee crests. The surface soils are dark gray clay while the subsoil is a gray clay. The only area in the parish that could qualify as having a Commerce-Sharkey association soil type is the low-lying natural levee of a former Bayou Terre aux Boeufs course located in the northeastern corner of the Lake Lery Marsh Unit (Unit 4 in Burk and Associates, Inc. [B & A I] 1979). This soil association could possibly qualify as a prime farmland (Mangum 1978, personal communication), but there are no detailed soils maps of St. Bernard Parish to verify this.

The backswamps, located at the backslopes and toes of the natural levees, contain a swamp soil association which is near sea level and flooded most of the time. Much of the swamp has an organic surface layer ranging from one to several feet thick overlying firm to semi-fluid gray clays (Soil Conservation Service [SCS] 1970). The soils of the unit, if similar to others in the region, will range from Gentilly mucks with

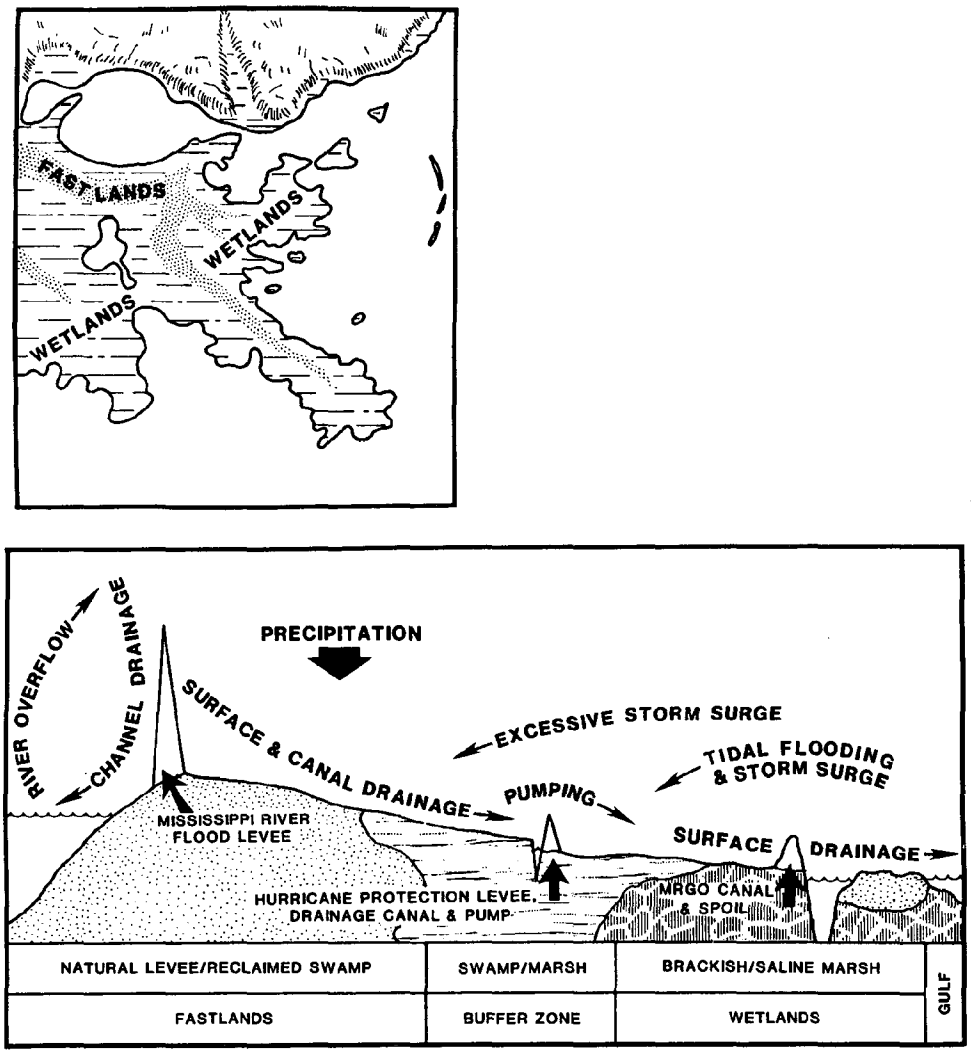


Figure 2-3. Forms and processes associated with delta progradation, abandonment and human landscape modification (after Wicker et al. 1982).

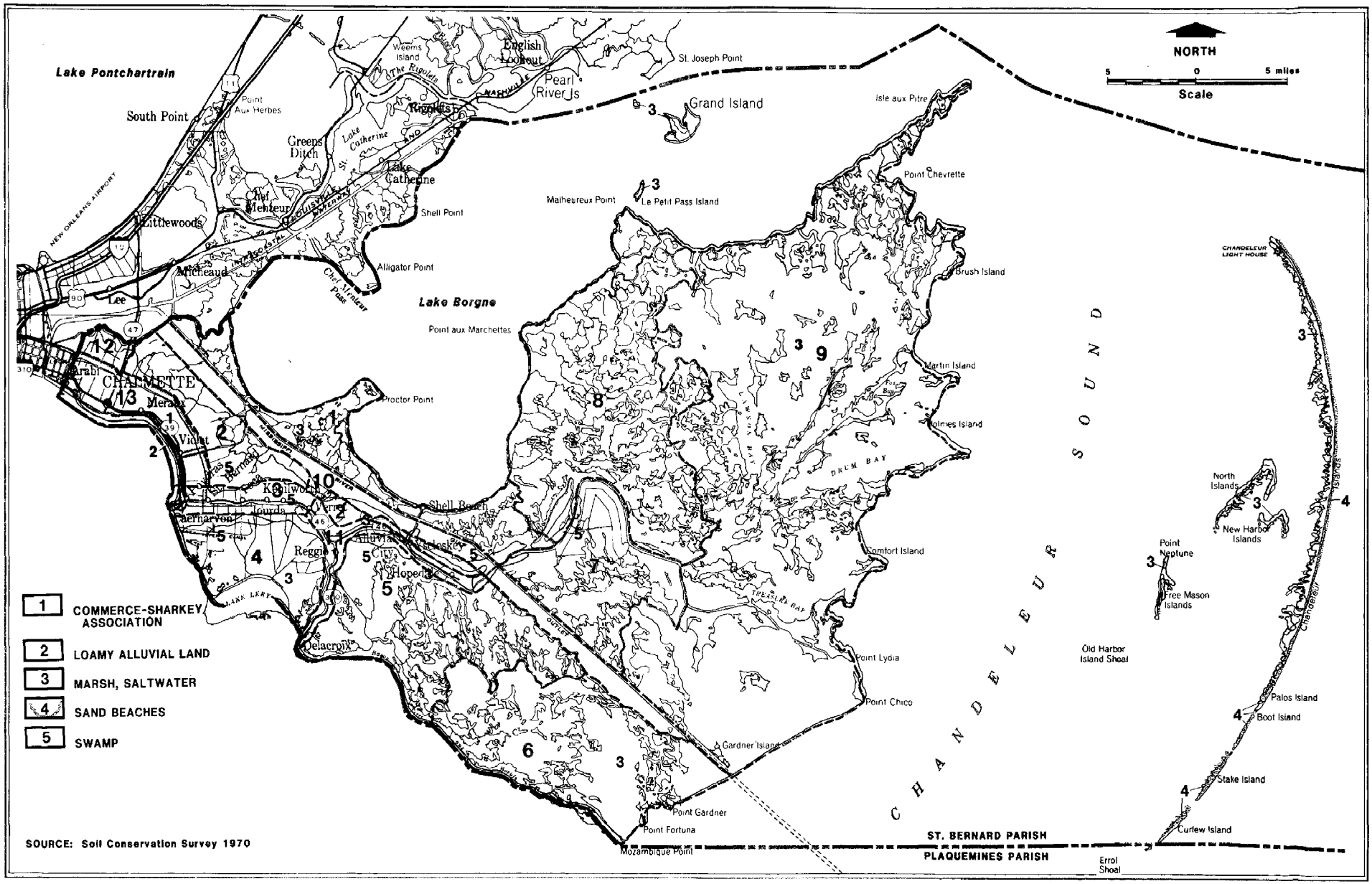
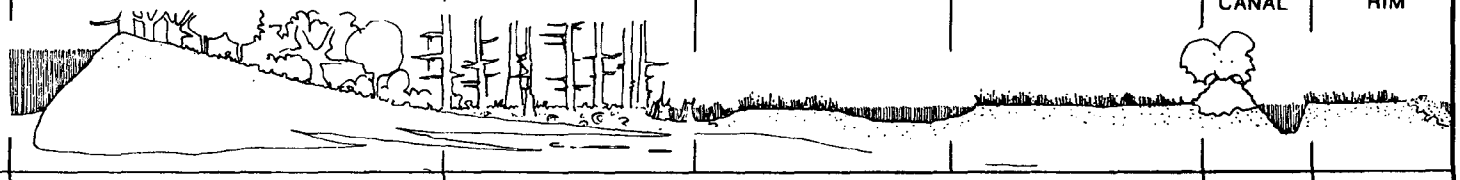


Figure 2-4. General soils map of St. Bernard Parish (after Soil Conservation Survey 1970).



SOIL ASSOCIATION	COMMERCE SHARKEY		FRESHWATER SWAMP TO		BRACKISH MARSH		SPOIL	BRACKISH MARSH
TYPICAL SOIL TYPE	COMMERCE SILT LOAM	SHARKEY CLAY	ALLEMANDS PEAT	MAUREPAS MUCK	LAFITTE MUCK			KENNER MUCK
GENERAL SOIL CHARACTERISTICS	MINERAL SOILS WITH CONSOLIDATED CLAYEY OR LOAMY LAYERS; TYPICALLY HIGHER	MINERAL SOILS WITH CONSOLIDATED CLAYEY OR LOAMY LAYERS THROUGHOUT	MINERAL SOILS WITH THIN ORGANIC SURFACE LAYERS; ORGANIC SOILS UNDERLAIN BY CLAY.	ORGANIC SOILS WITH 5-12 FT. OF WOODY ORGANIC MATERIALS; LOG LAYERS, STUMPS, SEMIFLUIDS.	ORGANIC SOILS WITH 5-12 FT. OF HERBACEOUS ORGANICS OVER SEMIFLUID CLAYS.			5-12 FT. OF HERBACEOUS ORGANIC SOILS
GENERAL ENGINEERING CHARACTERISTICS	LOW SUBSIDENCE POTENTIAL, LOW TO VERY HIGH SHRINKAGE POTENTIAL; NO PILINGS FOR ONE OR TWO STORY BUILDINGS; MODERATE TO SEVERE LIMITATIONS FOR MOST URBAN USES AFTER DRAINAGE.	LOW SUBSIDENCE POTENTIAL, LOW TO VERY HIGH SHRINKAGE POTENTIAL; NO PILINGS FOR ONE OR TWO STORY BUILDINGS; MODERATE TO SEVERE LIMITATIONS FOR MOST URBAN USES AFTER DRAINAGE.	MEDIUM TO HIGH SUBSIDENCE POTENTIAL; VERY HIGH SHRINK-SWELL POTENTIAL AND LOW BEARING STRENGTH; MOST ONE OR TWO STORY BUILDINGS REQUIRE PILING. SEVERE LIMITATIONS FOR MOST URBAN USES AFTER DRAINAGE.	VERY HIGH SUBSIDENCE; SEVERE FIRE HAZARD; LOW BEARING STRENGTH; IRREGULAR SUBSIDENCE; ONE OR TWO STORY BUILDINGS REQUIRE PILINGS. SEVERE OR VERY SEVERE LIMITATIONS FOR MOST URBAN USES AFTER DRAINAGE.	VERY HIGH SUBSIDENCE; SEVERE FIRE HAZARD; LOW BEARING STRENGTH; ONE OR TWO STORY BUILDINGS REQUIRE PILINGS. VERY SEVERE LIMITATIONS FOR MOST URBAN USES AFTER DRAINAGE.			HIGH SUBSIDENCE SEVERE FIRE HAZARD; PILING REQUIRED; VERY SEVERE LIMITATIONS FOR MOST URBAN USE.
SUITABILITY								
TOP SOIL	GOOD	POOR	NOT SUITABLE	NOT SUITABLE	NOT SUITABLE			NOT SUITABLE
HIGHWAY SUBGRADE & BASE	FAIR TO POOR	POOR TO NOT SUITABLE	NOT SUITABLE	NOT SUITABLE	NOT SUITABLE			NOT SUITABLE
RESIDENTIAL FILL	GOOD	POOR	NOT SUITABLE	NOT SUITABLE	NOT SUITABLE			NOT SUITABLE
DEGREE OF LIMITATION	DRAINED / UNDRAINED	DRAINED / UNDRAINED	DRAINED / UNDRAINED	DRAINED / UNDRAINED	DRAINED / UNDRAINED			DRAINED
HOMESITES - LIMITED INDUSTRY	MODERATE / NOT RATED	SEVERE / NOT RATED	SEVERE / VERY SEVERE	VERY SEVERE / VERY SEVERE	VERY SEVERE / VERY SEVERE			VERY SEVERE
LANDSCAPE - GARDENS - LAWNS	SLIGHT / NOT RATED	SEVERE / NOT RATED	SEVERE / VERY SEVERE	SEVERE / VERY SEVERE	SEVERE / VERY SEVERE			SEVERE
PLAYGROUNDS - PICNIC AREA	MODERATE / NOT RATED	SEVERE / NOT RATED	SEVERE / VERY SEVERE	SEVERE / VERY SEVERE	SEVERE / VERY SEVERE			SEVERE
STREETS AND ROADS	MODERATE / NOT RATED	SEVERE / NOT RATED	SEVERE / VERY SEVERE	VERY SEVERE / VERY SEVERE	VERY SEVERE / VERY SEVERE			SEVERE
DRAINAGE FACTORS	NO SIGNIFICANT FACTOR	NO SIGNIFICANT FACTOR	HIGH SUBSIDENCE; FIRE HAZARD; POOR TO FAIR SLOPE STABILITY	HIGH SUBSIDENCE, SEVERE FIRE HAZARD; POOR SLOPES	VERY HIGH SUBSIDENCE; FIRE HAZARD; POOR SIDE SLOPE STABIL.			HIGH SUBSIDENCE FIRE HAZARD

RESULTS IN AN INTERMIXED SOIL PROFILE OF MIXTURE OF ORGANICS & CLAYS

SOURCE: SCS, USDA, 1970, Soil Survey of Portions of Jefferson, Orleans, and St. Bernard Parishes.

Table 2-2. Typical Soil Characteristics (after CEI 1977).

thin, organic surfaces underlain by consolidated clayey layers in the better drained portions of the swamp, to Maurepas muck, loggy with 5 to 12 feet of woody, organic materials and layers of logs and stumps over a semi-fluid mineral soil layer in the poorly drained areas (CEI 1972). This soil association has "very severe limitations due to permanently high water table, flooding hazard, and subsidence if drained" (SCS 1970).

The marshlands of St. Bernard Parish are classified in the marsh, saltwater association. These wetlands are located near sea level and the water table is at or above the surface of the marsh most of the year (SCS 1970). The soils consist of peat or muck underlain by slightly firm to semi-fluid gray clays (SCS 1970). This association includes Lafitte muck and associated soil types which are organic soils with 5 to 12 feet of herbaceous organic materials over semi-fluid clayey layers (CEI 1972). Beneath the surface, at depths of 10 to 20 feet are interdistributary trough fill and tidal flat deposits of silty clays and sands. These soils have "very severe limitations due to unstable condition, permanently high water table, flooding hazard, and subsidence if drained" (SCS 1970:n.p.).

The sand beaches of St. Bernard Parish are located primarily along the Chandeleur Island chain in the eastern portion of the parish. They are composed predominantly of grayish-brown fine sands, sometimes mixed with shell fragments, which are subject to constant reworking by marine processes (SCS 1970). Small, pocket shell beaches are situated along the south shore of Lake Borgne. They are derived from wave-tossed shells originating from the bottom of Lake Borgne or from spoil deposits, as well as wave-worked, prehistoric Indian middens. The sand beach soil association has "severe to very severe limitations due to unstable conditions and flooding hazard" (SCS 1970:n.p.).

CLIMATE

St. Bernard is located in a subtropical latitude experiencing mild winters and warm, humid summers. Prevailing southerly winds produce afternoon thundershowers in the summer and river fogs are common in the winter and spring when the Mississippi River temperature is slightly colder than the air temperature. The overall temperature range (Figure 2-5) can be described as moderate, with the average summer temperature being 83.1° F and the average winter temperature being 56.1° F. The subtropical-latitude rainfall (Figure 2-6) averages 63 inches per year. Summer showers occur frequently from mid-June to mid-September, and the average monthly high, 7.9 inches, occurs in July. Heavy winter rains generally occur from mid-December to mid-March.

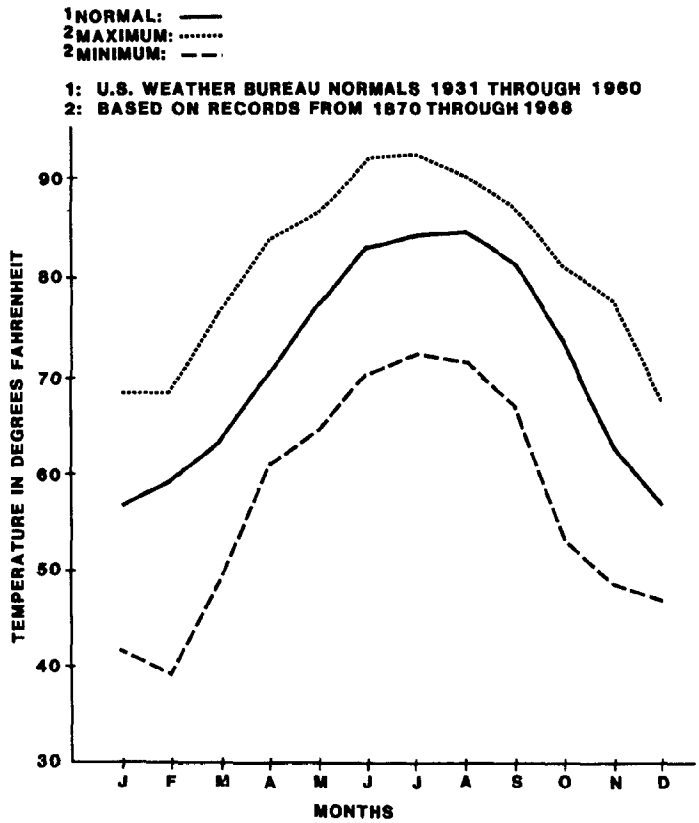


Figure 2-6. Monthly temperature taken at New Orleans, Louisiana (after Wicker et al. 1982).

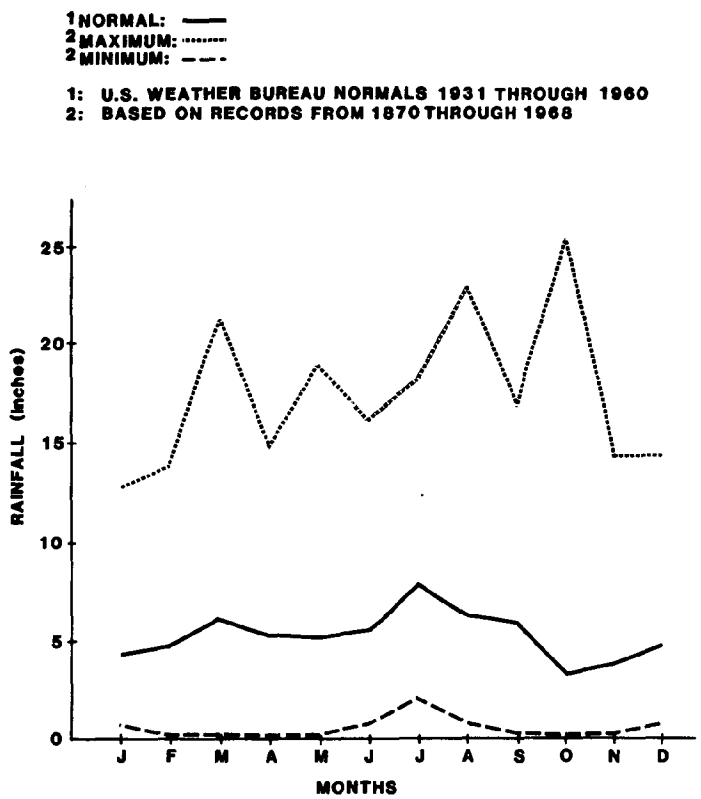


Figure 2-6. Monthly rainfall in inches taken at New Orleans, Louisiana (after Wicker et al. 1982).

Monthly lows average about 3.2 inches in October. Annual rainfall has varied from a high of 85.7 inches in 1875 to a low of 31.3 inches in 1899. Monthly rainfalls exceeding 12 inches are not uncommon; 25 inches is the maximum recorded in a single month. Snow and sleet are infrequent occurrences; the last measureable snowfall was 4.5 inches recorded on 31 December 1963 (CEI 1972).

Prevailing winds are from south to southeast during January through July and from northeast to east-northeast during September through December. Average wind velocity is 8.6 miles per hour (7.4 knots), but maximum velocities exceed 100 miles per hour during hurricanes. Hurricanes strike the Louisiana coast an average of 1.6 times per year (CEI 1972). The hurricane surge, which inundates low coastal lands, is the most destructive of the hurricane characteristics and accounts for three-fourths of the lives lost from hurricanes (Regional Planning Commission 1978). This surge is a product of meteorological, beach, and shore conditions. A higher surge will be produced if the hurricane passes perpendicular to shore, the velocity of movement is slow, or the storm's diameter is very large. Maximum storm surge heights experienced along this region of the Gulf Coast range between 10 and 23 feet. The parish has been affected by 11 major hurricanes from 1886 to the present (CEI 1972). The storms of 1901, 1947, 1956, 1965 (Betsy), and 1969 (Camille) had particularly severe impacts with extensive flooding both from storm-generated tides and excessive rainfall.

HYDROLOGY

The hydrologic regime of St. Bernard Parish involves the movement of fresh- and saltwater masses through the region as a result of the interactions between Mississippi River discharge, regional precipitation, winds, and tides. This present hydrologic regime is influenced by both natural and man-made factors. The basic natural hydrologic system is governed by the pattern of major abandoned distributary channels of the ancient Mississippi River delta complex (i.e., Bayous LaLoutre and Terre aux Boeufs), and interdistributary basin channels which serve to drain swamps and marshes into the estuarine lakes, bays, and Chandeleur Sound (Figure 2-7).

Under natural conditions, the Mississippi River flowed through the wetlands to the Gulf via the distributary channels. Rainfall and Mississippi River floodwaters flowed down the gentle slopes of the natural levees and slowly through the swamps and marshes as sheet flow and interdistributary basin channel flow. The wetland vegetation and the shallow, winding, interdistributary channels slowed the progress of this drainage, storing the freshwater for gradual release into the tide waters. This

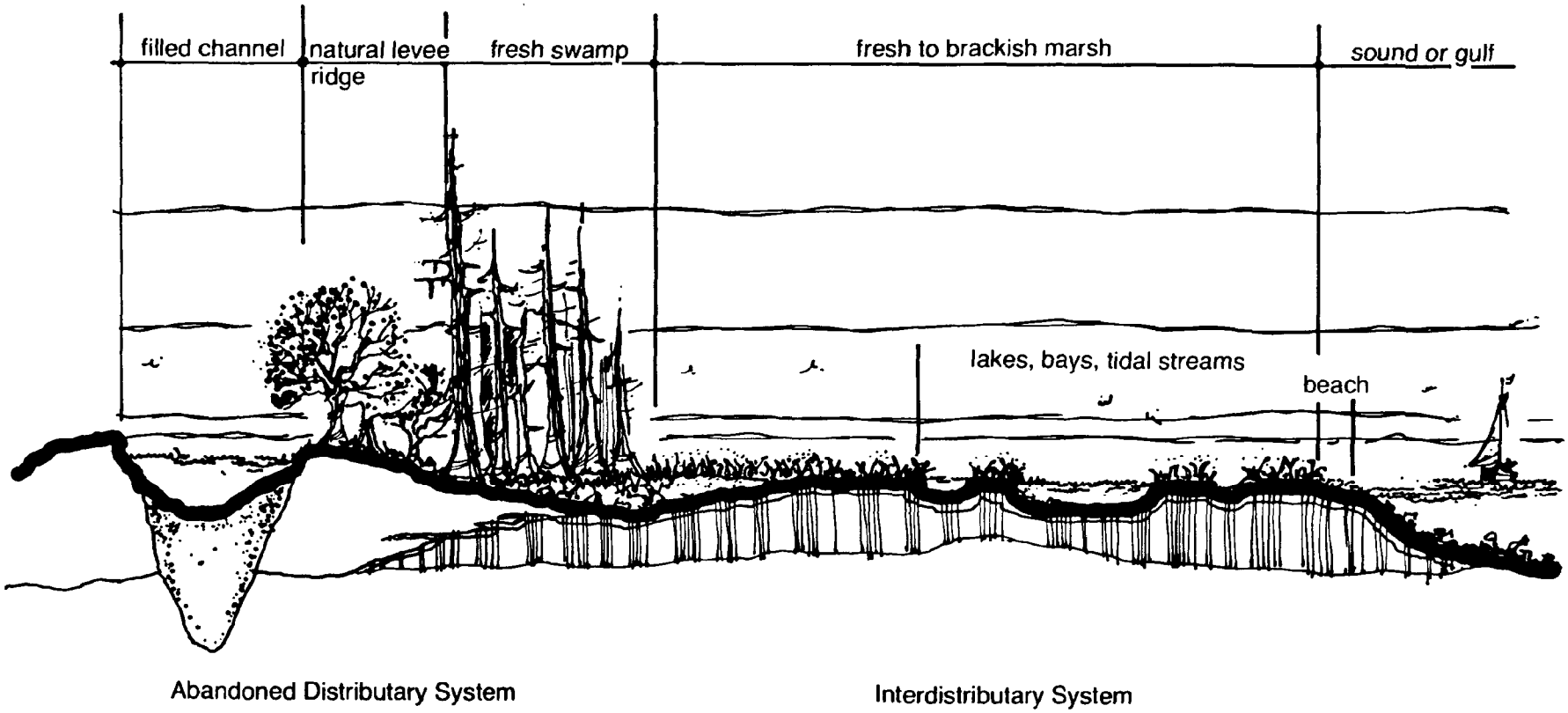


Figure 2-7. Components of the abandoned distributary and interdistributary systems in St. Bernard Parish (after CEI 1976).

situation contributed to a stable environment where water levels and salinity values changed very gradually with changing meteorological and tidal conditions.

During historic times, man-made factors have greatly altered the natural hydrologic regime. Leveeing of the Mississippi River halted the annual overbank flooding and a channelized drainage network within the leveed fastland area collected precipitation to be discharged into the wetlands at point sources (e.g., pumping stations and floodgates) along the Hurricane Protection Levees near the 40-arpent canal.

Man-made physical modifications of the wetlands also occurred within the recent historic period. Deeper-water canals and spoil banks appeared as a result of logging activity, drainage, and navigation improvement, and later for oil and gas well drilling access and pipelines. These modifications allowed surplus freshwater to pass more quickly from the point discharge sources into the estuarine water bodies. Spoil banks along the canals segmented the wetlands and hindered circulation. Greater water depths in the canals provided for greater tidal fluctuation and saltwater intrusion during dry periods. The MRGO, a 500- by 36-foot channel opened to navigation in 1963, has had a great impact on the hydrologic regime in most of the parish because it conducts a large mass of saline water from the Gulf to interior drainage channels year-round, and it creates greater fluctuations in tide levels.

Under these man-influenced conditions, the hydrologic circulatory system has shifted to reflect the competition between local runoff in the wetlands coupled with fastland discharge and meteorological and astronomical tides. The overall effect of these modifications has been the rapid alteration of a stable hydrologic situation into one experiencing a greater fluctuation of water levels and salinity values. The salinity regime within the wetlands is now dependent upon regional precipitation, occasional openings of the Bonnet Carre Spillway in St. Charles Parish, and more recently, the implementation of the Violet Freshwater Siphon. Instead of an annual pulse of freshwater, the hydrologic system now follows a pattern of freshwater "feast or famine" governed largely by precipitation rates (Gagliano et al. 1970).

The subsurface hydrology of St. Bernard Parish is influenced by three aquifers: 1) St. Bernard Delta "200-foot" sand, 2) the "700-foot" sand, and 3) the "1200-foot" sand (USACE 1975). Because of the pervasive saltwater intrusion, the parish contains little or no potable water except for occasional lenses of freshwater floating on saltwater (B & A I 1978a:6). The present salinity levels, tidal exchanges, and aquifers are shown in Figure 2-8.

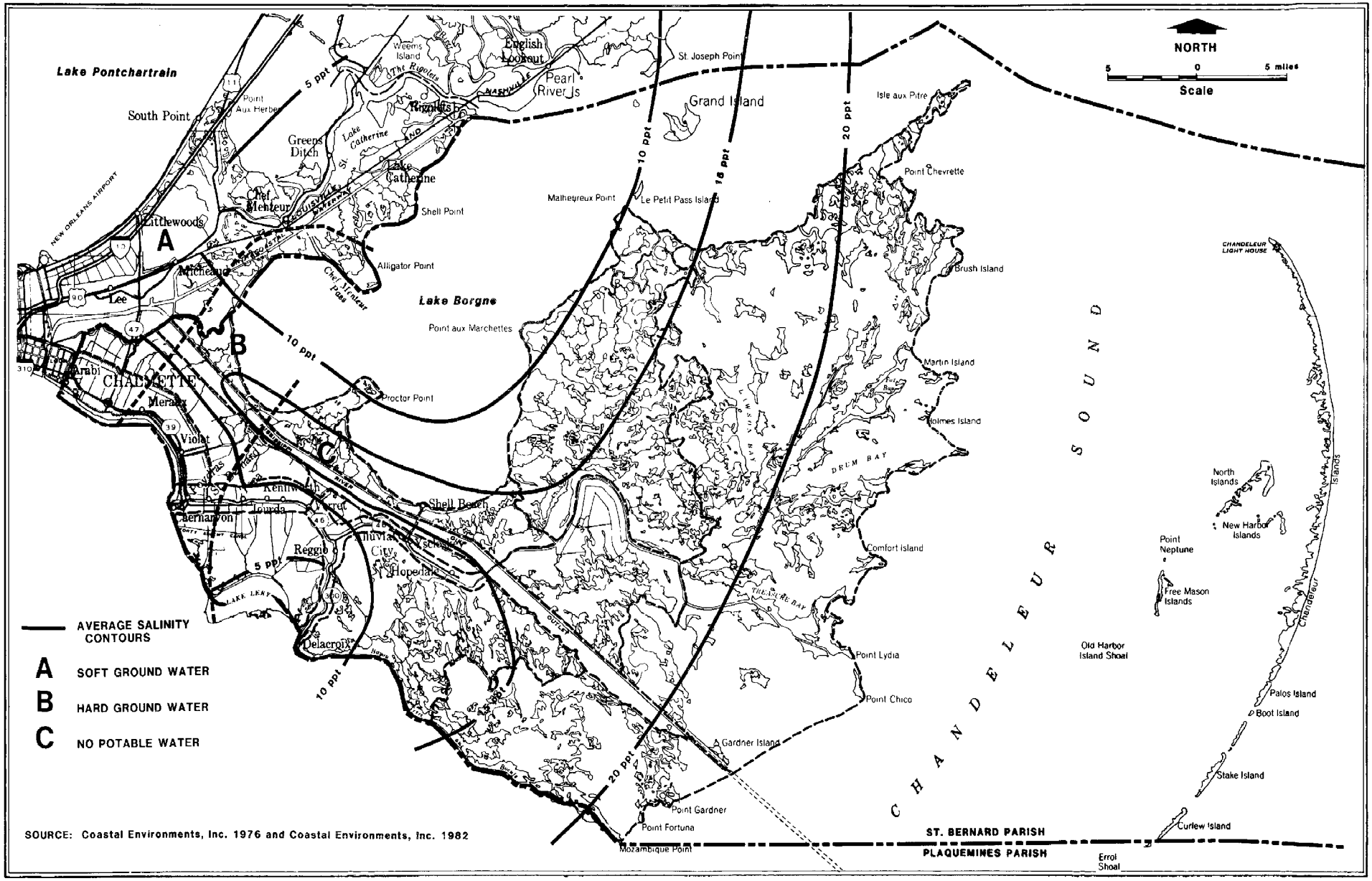


Figure 2-8. The hydrology and salinity conditions in St. Bernard Parish (after CEI 1976 and CEI 1982).

VEGETATION

The variety and abundance of vegetation series in St. Bernard Parish are closely associated with the topography, soils, salinity distribution, and humid sub-tropical climate (Figure 2-9) (Table 2-3). Along the highest, unaltered portions of the natural levees, limited stands of hardwood forests are still present; most of the original forests have been cleared for agriculture and urbanization. The best-drained areas of the natural levees typically support trees such as live oak, hickory, pecan, sweetgum, American elm, cottonwood, and green ash. On levee areas that are less well drained, the more common species are water oak, sycamore, and willow. Understory shrubbery on the natural levees is characterized by dwarf palmetto, blackberry, hawthorns, deciduous holly, waxmyrtle, and grasses such as switch cane and bermuda grass. Lower levees, which are subject to long periods of flooding, support only shrubs, grasses, and trees which are water-tolerant.

A distinctive group of plants occurs in freshwater swamps flanking the backslopes of the natural levees. The original stands of cypress forest are mostly gone because of the heavy logging which occurred around the turn of the century. The cypress forests which exist today vary considerably in condition; there are signs of deterioration due to subsidence and changes in the hydrologic regime, as well as saltwater intrusion. Typical species of trees found here are baldcypress, swamp red maple, water oak, and tupelogum. Typical understory vegetation includes dwarf palmetto, buttonbush, baccharis, and marsh elder. Among the grasses, paille fine, sawgrass, feather grass, and wiregrass are common.

Marsh areas cover most of the parish. The distribution of vegetation in the marshes is affected by salinity, elevation, and soil organic matter. The marshes in St. Bernard Parish are most commonly brackish or saline. These estuarine areas are covered with grasses and reeds, the principal sources of detritus and organic matter, vital elements in the biological productivity of this area of the coast. In brackish marshes, the dominant type of grass is wiregrass. Other types of grass, such as three-cornered grass, coco, and saltgrass, are also present. The predominant grass species in the salt marsh areas is oystergrass, followed by blackrush and saltgrass. In less significant quantities are wiregrass and other associated salt marsh species.

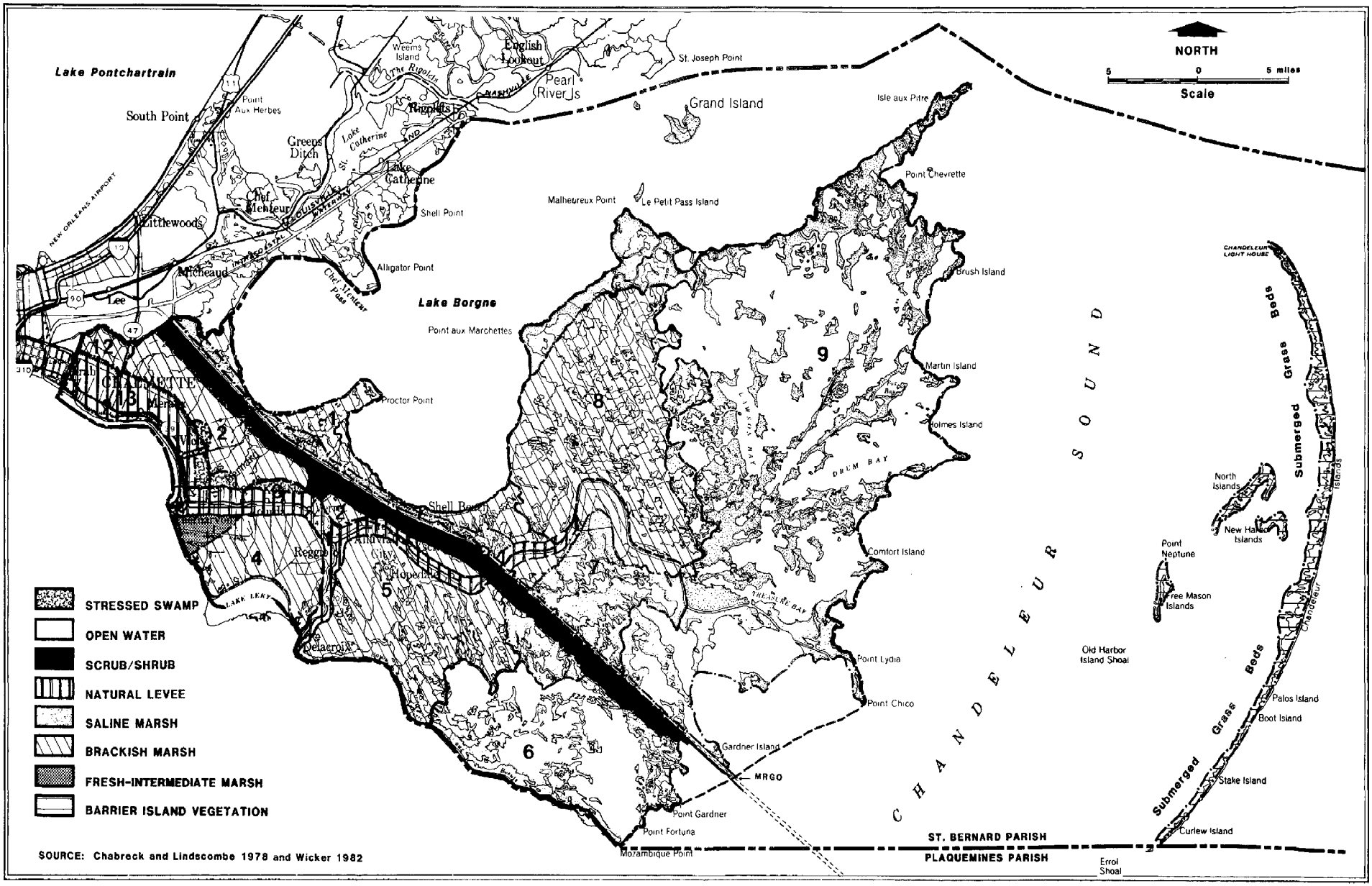


Figure 2-9. Disribution of vegetation associations in St. Bernard Parish (after Chabreck and Linscombe 1978 and Wicker et al. 1982).

Table 2-3. Vegetation of St. Bernard Parish.

COMMON NAME	SCIENTIFIC NAME
NATURAL LEVEE VEGETATION	
TREES - CANOPY	
America elm	Ulmus americana
Cottonwood	Populus deltoides
Hackberry	Celtis laevigata
Hickory	Carya spp.
Live oak	Quercus virginiana
Magnolia	Magnolia grandiflora
Overcup oak	Quercus lyrata
Pecan	Carya spp.
Sweetbay	Magnolia virginiana
Sweetgum	Liquidambar styraciflua
Sycamore	Platanus occidentalis
Water oak	Quercus nigra
Willow	Salix spp.
Willow oak	Quercus phellos
SHRUBS - UNDERSTORY	
Bermuda grass	Cynodon dactylon
Blackberry	Rubus spp.
Deciduous holly	Ilex decidua
Dwarf palmetto	Sabal minor
Elderberry	Sambucus canadensis
Hawthorn	Crataegus spp.
Persimmon	Diospyros virginiana
Switch cane	Arundinaria tecta
Waxmyrtle	Myrica cerifera
FRESH SWAMP	
Baldcypress	Taxodium distichum
Buttonbush	Cephalanthus occidentalis
Dwarf palmetto	Sabal minor
Feather grass	Panicum virgatum
Groundsel bush	Baccharis halimifolia
Paille fine	Panicum hemitomon
Sawgrass	Cladium jamaicense
Swamp elder	Iva frutescens
Swamp red maple	Acer rubrum Drummondii
Tupelogum	Nyssa aquatica
Water oak	Quercus nigra
Wiregrass	Spartina patens

Table 2-3. Vegetation of St. Bernard Parish (continued).

MARSH VEGETATION

FRESH-INTERMEDIATE MARSH

COMMON NAME	SCIENTIFIC NAME
Bulltongue	Sagittoria spp.
Bullwhip	Scirpus californicus
Deer pea	Vigna repens
Sawgrass	Cladium jamaicense
Wiregrass	Spartina patens

BRACKISH MARSH

Arrowhead	Sagittaria latifolia
Black rush	Juncus roemerianus
Coco	Scirpus robustus
Dwarf spikerush	Eleocharis parvula
Oystergrass	Spartina alterniflora
Saltgrass	Distichlis spicata
Three-cornered grass	Scirpus olneyi
Widgeongrass	Ruppia maritima
Wiregrass	Spartina patens

SALINE MARSH

Black mangrove	Avicennia germinans
Blackrush	Juncus roemerianus
Glasswort	Salicornia spp.
Oystergrass	Spartina alterniflora
Saltgrass	Distichlis spicata
Saltwort	Batis maritima
Wiregrass	Spartina patens

SPOIL AREAS

Baccharis	Baccharis halimifolia
Drummond red maple	Acer rubrum Drummondii
Goldenrod	Solidago spp.
Marsh elder	Iva frutescens
Pokeweed	Phytolocca americana
Roseau cane	Phragmites australis
Water oak	Quercus nigra
Wax myrtle	Myrica cerifera
Willow	Salix spp.
Wiregrass	Spartina patens

Table 2-3. Vegetation of St. Bernard Parish (concluded).

BARRIER ISLANDS

Baccharis	Baccharis halimifolia
Bitter panicum	Panicum amarum
Black mangrove	Avicennia germinans
Glasswort	Salicornia spp.
Sea oats	Uniola paniculata
Waxmyrtle	Myrica cerifera
Wiregrass	Spartina patens

SUBMERGENT GRASS BEDS

COMMON NAME	SCIENTIFIC NAME
Manateegrass	Cymodocea filiformis
Shoalgrass	Diplanthera spp.
Turtlegrass	Thalassia testudnium
Widgeongrass	Ruppia maritima
Wildcelery	Vallisneria americana

Source: CEI 1979

Spoil material has been deposited along the banks of man-made canals and natural channels that have been dredged. Spoil banks are higher than the elevation of the surrounding marsh. The vegetation found growing on the spoil is dependent upon the salinity of the water in the channel and the composition of the soils in the deposited material. Typically, the vegetation will consist of waxmyrtle, baccharis, willow, marsh elder, and herbaceous perennials.

Another type of vegetation community in St. Bernard Parish is that of the barrier islands (Chandeleur Islands) and beaches. The gulfward side of the Chandeleur Islands contains sand dunes, some of which have been stabilized by grasses, especially wiregrass and sea oats. Farther inland, where the older dunes are located, there exist dense communities of waxmyrtle and baccharis. The leeward side of the islands supports dense stands of oystergrass and black mangrove. The low-wave energy, shallow, clear waters behind the islands contain extensive areas of submerged grass beds. Figure 2-10, shows a typical cross-sectional view of the vegetation types and associated landforms within St. Bernard Parish.

WILDLIFE AND FISHERIES

St. Bernard is endowed with an extremely rich and diverse heritage of renewable wildlife and fisheries resources. However, recent ecological changes causing increased salinity levels and loss of valuable marshland have caused a drop from earlier levels of high productivity. Fur harvests have dropped drastically from their former, almost legendary, levels. These marshes were historically the most productive muskrat marshes in the state. Construction of the MRGO has had an overall adverse effect on wildlife and fisheries production, particularly fur, waterfowl, and oysters. The commercial fishing industry has been experiencing a long-term reduction in catch per effort, pounds per acre, and dollars per acre in recent years. This loss can be attributed to loss of low-salinity marshes which are essential to the development or reproduction of most commercial and sport fish and shellfish species. Although these environmental changes have been adverse, the parish still has an abundance of valuable wildlife and fisheries resources. Table 2-4 lists some of the mammals commonly found in the parish.

Table 2-5 lists some of the birds commonly found in St. Bernard Parish. The brackish and saline marshes of the parish provide habitat for thousands of wintering waterfowl. The best habitat is found in the Biloxi Wildlife Management Area between Lake Borgne

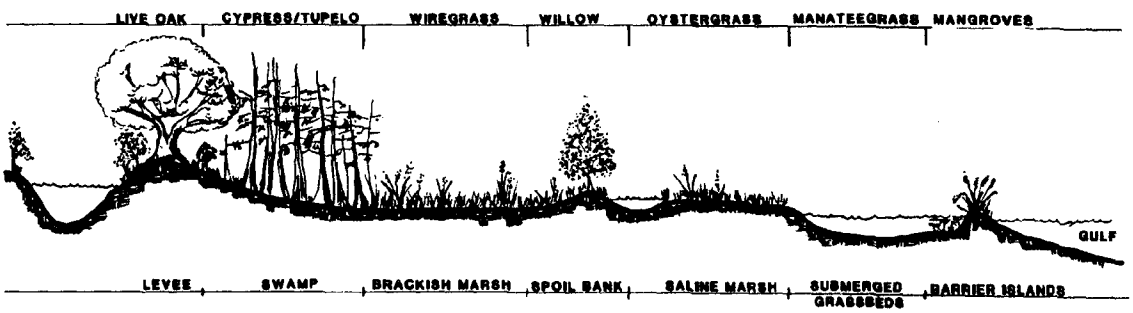


Figure 2-10. Cross section of the landforms in St. Bernard Parish and some of the common vegetation species found there.

Table 2-4. Mammals that Occur in St. Bernard Parish.

MAMMALS

COMMON NAME	SCIENTIFIC NAME
Bobcat	Lynx rufus
Brazilian free-tailed bat	Tadarida brasiliensis
Common muskrat	Ondata zibethicus
Cotton mouse	Peromyscus gossypinus
Eastern cottontail	Sylvilagus floridanus
Eastern wood rat	Neotoma floridana
Fox squirrel	Sciurus niger
Fulvous harvest house	Reithrodontomys fulvescens
Gray squirrel	Sciurus carolinensis
Hispid cotton rat	Sigmodon hispidus
Marsh rice rat	Oryzomys palustris
Nearctic river otter	Lutra canadensis
Nine-banded armadillo	Dasypus novemcinctus
North american mink	Mustela vison
Northern raccoon	Procyon lotor
Northern yellow bat	Lasiurus intermedius
Nutria	Myocastor coypus
Red bat	Lasiurus borealis
Seminole bat	Lasiurus seminolus
Southern flying squirrel	Glaucomys volans
Swamp rabbit	Sylvilagus acquaticus
White-tailed deer	Odocoileus virginianus
White-tailed mouse	Peromyscus leucopus
Virginia opossum	Didelphis virginiana

Source: Wicker et al. 1982.

Table 2-5. Birds of Common Occurrence in St. Bernard Parish.

BIRDS

COMMON NAME	SCIENTIFIC NAME
American Coot	Fulica americana
American kestrel	Falcu sparverius
American wigeon	Anas americana
American Woodcock	Philohela minor
Belted Kingfisher	Megaceryle alcyon
Blue-winged Teal	Anas discors
Bobwhite	Colinus virginianus
Canvasback	Aythya valisineria
Clapper Rail	Rallus longirostris
Gadwall	Annas strepera
Great Blue Heron	Ardea herodias
Great Egret	Cammerodius albus
Green Heron	Butorides virescens
Green-winged Teal	Anas carolinensis
Lesser Scaup	Aythya affinis
Little Blue Heron	Florida caerulea
Louisiana Heron	Hydanassa tricolor
Mallard	Anas platyrhynchos
Marsh Hawk	Circus cyaneus
Mississippi Kite	Ictinia Mississippiensis
Mottled Duck	Anas fulvigula
Mourning Dove	Zenaidura macroura
Pintail	Anas gaita
Red-shouldered Hawk	Buteo lineatus
Ring-necked Duck	Aytha collaris
Shoveler	Anas clypeata
Snow Goose	Chen caerulescens
Snowy Egret	Egretta thula
Virginia Rail	Rallus limicola
White Ibis	Eudocimus albus
Wilson's Snipe	Capella gallinago
Yellow Rail	Coturnicops noveboracensis

Source: Wicker et al. 1982 from Lowery 1974a, USCE 1974.

and Lawson Bay and in the marshes on Proctor Point at the southern end of Lake Borgne. Some of the plants which are attractive to various species of waterfowl found in the marshes of St. Bernard are widgeongrass, Walter's millet, three-cornered grass, coco, spikerush, and coontail.

Snow Geese are found in the marshes in great numbers during the winter, particularly along the islands on the edges of Chandeleur Sound. These geese feed on marsh grass, roots, and tubers and sometimes "eat out" an area of marsh causing shallow ponds to form.

There are numerous species of ducks which inhabit the marshes, mainly during the winter, although some are year-round residents. Teal breed here occasionally although the great majority are winter residents only. The Mottled Duck is the only duck which breeds in large numbers in the St. Bernard marshes. The Gadwall, also known as the Gray Duck, is a very common winter visitor. Pintails are a favorite game bird which winter in the marshes of the parish. Green-winged Teal are very common winter residents of the marshes. Blue-winged Teal migrate through to the south in late summer and fall. The Northern Shoveler, or spoonbill as it is known locally, arrives in the fall and stays through spring. The American Wigeon, or baldpate, is another winter resident. The loss of the parish's swamps and fresh marsh due to saltwater intrusion has led to a decline in the wood duck population. The Canvasback, and Redhead are usually uncommon winter residents but sometimes appears in great numbers, especially in Chandeleur Sound near the Chandeleur Islands. The Lesser Scaup, or dos gris, is a common winter resident. Hooded, Red-breasted, and American Mergansers are common winter residents, especially in Lake Borgne where they feed mainly on fish.

Clapper Rails are common marsh inhabitants in the brackish and saline marsh. Virginia Rails are primarily winter residents which do, however, occasionally remain to breed. The American Coot, or "poule d'eau," is a common winter resident in the lower salinity marshes, particularly where submergent vegetation is available.

St. Bernard provides excellent habitat for many species of seabirds, shorebirds, and wading birds. Its numerous marshy islands and the shell reefs and beaches of the Chandeleur Islands serve as nesting grounds and rookeries. Seabird colonies of Laughing Gulls; Least,Royal, and Sandwich Terns; Black Skimmers; and Willets are especially common on the Chandeleur Islands. Wading bird rookeries include colonies of Great Blue, Louisiana and Little Blue Herons; Yellow and Black-crowned Night

Herons; American, Common, Royal, and Sandwich Terns; Black Skimmers; and Willets are especially common on the Chandeleur Islands. Wading bird rookeries include colonies of Great Blue, Louisiana and Little Blue Herons; Yellow and Black-crowned Night Herons; American, Common, Snowy, and Cattle Egrets; and White-faced, White, and Glossy Ibises. Common loons are prevalent winter residents in Lake Borgne. Other winter residents include the Eared and Horned Grebes. The Pied-billed Grebe is abundant during winter months and also frequently breeds in the area. Large flocks of White Pelicans migrate through the marshes of the parish during the winter. The Chandeleur Islands contained one of the "natural" colonies of Brown Pelicans in the state. Since the dramatic die-off of the state's population and their subsequent reintroduction from Florida, they have been observed nesting here again. The Double-crested Cormorant is another common resident during winter.

St. Bernard Parish, historically, has had some of the best marsh in the state for furbearer production, particularly muskrat and nutria. Due to increasing salinity, the fur industry has suffered major setbacks. Fur production has suffered because of the loss of fresh marsh and swamp. Preferred vegetation of nutria include such freshwater species as alligatorweed, cattail, bullwhip, cutgrass, delta duck potato, and others. When found in brackish marshes, they feed on three-cornered grass, wiregrass, leafy three-square, and hogcane.

Muskrat, whose preferred habitat is brackish marsh supporting stands of three-cornered grass, are most common in the marsh around Lake Lery on the Delacroix Corporation lands. Management for muskrat involves establishing and maintaining stands of three-cornered grass. Three-cornered grass is a subclimax species which, in the normal successional pattern of plant succession, is replaced with wiregrass, the climax species of this habitat type. Burning is a common management tool which sets back the normal pattern and allows three-cornered grass to dominate. Muskrats often "eat out" an area of marsh if they are too abundant. This habit causes the marsh to open up into shallow ponds and is often detrimental in the long run.

Otter also contribute to the fur harvest of St. Bernard. Their pelts are the most valuable of the animals contributing to the commercial fur industry, however, they usually make up only a small percentage of the pelts taken. Their most productive habitats in St. Bernard are the intermediate to brackish marshes. Even in the best habitats, however, they are never found in great numbers. Raccoon is another animal which contributes to the fur harvest of St. Bernard. The pelts taken in this area, like those from other areas of coastal Louisiana, are not of the highest commercial value.

Their great numbers make them an important resource, nevertheless. Their preferred habitat is fresh marsh, however, they are relatively abundant in brackish marsh and along the natural levees. Preferred foods include crawfish, frogs, grasshoppers, and other animal matter; their diet also includes some plant material. Mink are another important resource of St. Bernard. The best mink pelts come from freshwater cypress swamps. Destruction of these areas has led to a decrease in the number of mink. The diet of mink consists of animal matter including fish, crawfish, frogs, rats, mice, and birds. Other furbearers of lesser importance are the Virginia opossum, striped skunk, eastern cottontail, and swamp rabbit.

Natural levees provide habitat for many species of animals and birds. They serve as the only high ground when flooding occurs. White-tailed deer inhabit these levees but are becoming less common as these areas decrease. Deer are browsers and feed on many species of plants. Acorns from the oaks on these levees supply the bulk of their winter diet. Many songbirds use these areas for nesting. Other species on the levees include the eastern cottontail, raccoon, and striped skunk.

Fishing, today, is an important way of life for many residents of St. Bernard. The estuarine unit of which St. Bernard is a major part ranks second in total harvest only to the Barataria Basin area while the state as a whole produces 27% of the fisheries tonnage of the entire United States. Despite the problems of saltwater intrusion, subsidence, and land loss, estuarine areas of the parish still serve as an important nursery ground for many species of fish and shellfish.

In the estuaries and offshore waters of St. Bernard, many species of commercial and sport fish and shellfish occur (Table 2-6), among the most important of which are Gulf menhaden,; white and brown shrimp; blue crab; speckled trout; red drum; black drum; spot; sand seatrout; southern flounder; Atlantic croaker; and oyster. The oyster beds in St. Bernard consist of public oyster seed grounds, which occur in higher salinity waters, and private oyster beds, leased by individuals from the state. Commercial fishing is a year-round activity for many residents of the eastern half of the St. Bernard Parish, and sport fishing is important for residents and visitors alike.

ENDANGERED AND THREATENED SPECIES

St. Bernard Parish was once within the range of a few species that are now considered to be threatened and endangered, i.e., the Bald Eagle (*Haliaeetus leucocephalus*), Perregrine Falcon (*Falco peregrinus tundrius*), Brown Pelican (*Pelecanus occidentalis*)

Table 2-6. Common Commercial Fish, Sport Fish, and Shellfish Found in the Waters of St. Bernard Parish.

FISHES

COMMON NAME	SCIENTIFIC NAME
Alligator gar	Lepisosteus spatula
Atlantic croaker	Micropogon undulatus
Black drum	Pogonias cromis
Gulf menhaden	Brevoortia patronus
Red drum (redfish)	Sciaenops ocellata
Sand sea trout	Cynoscion arenarius
Sheepshead	Archosargus probatocephalus
Southern flounder	Paralichthys lethostigma
Spotted seatrout	Cynoscion nebulosus
Striped mullet	Mugil cephalus

SHELLFISH

American oyster	Crassostrea virginica
Blue crab	Caleinectes sapidus
Brown shrimp	Penaeus aztecus
White shrimp	Penaeus setiferus

Source: For a more comprehensive inventory, including non-commercial fish and shellfish, refer to Wicker et al. 1982.

and Bachman's Warbler (Vermivora bachmarii). Of these species, only the Brown Pelican and the Peregrine Falcon reside in the parish today. The Brown Pelican disappeared from the parish in the early 1970s, but has been restocked by the Louisiana Department of Wildlife and Fisheries and now colonizes the Chandeleur Islands of Isle-a-Pitre and North Island. The American alligator (Alligator mississippiensis), which is also found in the parish in limited numbers, has been reclassified from endangered to threatened due to similarity of appearance (U.S. Department of Wildlife and Fisheries 1979). Because of the recent increased abundance of the alligator, a seasonal regulated harvest is now permitted under state law.

The coastal waters of the parish also contain a few species of whales and turtles that are classified as endangered. Some of these include the blue whale (Balaenoptera musculus), humpback whale, (Megaptera borealis), sperm whale (Physeter catodon), finback whale (Balaenoptera physalus), and the leatherback turtle (Dermochelys coriacea). The green turtle (Chelonia mydas) and the loggerhead turtle (Caretta caretta) are also found in the coastal waters and are considered threatened.

There are no reported sightings of endangered or threatened plant species in St. Bernard Parish (McFatter, n.d.).

The most recent references (FWS 1980, Guillory et al. 1980) list no fish or aquatic invertebrate in St. Bernard Parish as endangered or threatened.

CULTURAL RESOURCES

Historic Information

The parish was settled in 1718 when immigrants entered the region to develop indigo and sugarcane plantations. It received its name from the old ecclesiastical district of St. Bernard. During the French regime, St. Bernard was included in the District of New Orleans, one of the nine districts into which the province of Louisiana was first divided in 1723. After the cession of Louisiana to the United States in 1803, St. Bernard was in the New Orleans District. In 1807, when the Territorial Legislature divided the territory into 19 parishes, the parish of St. Bernard was created with the city of Chalmette as the parish seat.

Europeans first settled in the New Orleans area around 1700, and by the late 1800s, the population had reached about 120,000. The contributions of various cultures including French, Spanish (Islenos from the Canary Islands), British, and others give the area its character and their influence can be seen in the monuments, buildings, folklore, and historic place names. Acadians also settled in the parish, coming from Canada and from Santo Domingo in the Caribbean. The settlers were farmers, planters, and excellent trappers, and their influence is evident also in the folklore and food of the area. The French were the first settlers of the parish and most were farmers of indigo until cotton was introduced in 1740. From 1762 until 1803, the Spanish had control of Louisiana. On 20 December 1803, the territory of Louisiana was officially transferred to the United States. On 8 January 1815, the famous battle of New Orleans, where Andrew Jackson defeated the British forces, took place almost entirely in St. Bernard Parish. Near the battlefield, there is the "Four Oaks" commemorative site where it is said that the British General, Pakenham, died.

Many areas of the parish contain a number of sites commemorated by historical markers, including the St. Bernard Church and Cemetery, the sites of the former De La Ronde, Villere, and Contreras Plantations, and the Ducros Historical Museum. Future markers are planned to recognize the former sites of the Jummonville and Reggio Plantations. The Kenilworth Plantation, a private residence, was built in 1759 and is in excellent condition.

The U.S. National Cemetery near Chalmette was established in 1864. More than 14,000 soldiers and sailors from every part of the U.S. are interred here, although about half of the graves are unidentified. Two graves are those of men that died in the Battle of New Orleans. The cemetery is listed in the National Register of Historic Places. The parish also contains the site of the first stream sugar mill, and examples of the latest advances in the oil, gas, and manufacturing industries can also be found in this area.

After the Civil War (1861-1865), the economy of St. Bernard Parish began to change from the plantation type economy to small farms. About this time, the lumbering period began, and nearly all the virgin cypress forests were harvested from the area by the early 20th century.

Since the 1920s, St. Bernard Parish's character and economy have been changing gradually from rural/agricultural to urban/industrial. Urbanization of the most suitable parish lands on the natural levees has been almost total, and today the

marginal, low-lying areas are experiencing the increasing demands of urbanization, industrialization, and other development forces.

Archaeological Sites

St. Bernard Parish is rich in historic and cultural places as indicated by the number of sites shown in Figure 2-11. Since prehistoric times, man has found this coastal environment a very desirable place in which to live. Archaeological records show that the St. Bernard delta complex has been occupied by man at least as far back as 1740 B.C. Evidence of man can be found in the many Indian mounds and middens located throughout the parish.

The sites in Figure 2-11 represent cultures from the Poverty Point Period (1800-500 B.C.), the Tchefuncte and Marksville Periods (500 B.C. - A.D. 300), the Troyville and Coles Creek Periods (A.D. 300 - 1000), to the Mississippi Period and early historic times (A.D. 1000 - 1700) (Gagliano et al. 1978). These cultures provide a valuable record of the development of prehistoric man in the region and how he coped with the environmental conditions, used the natural resources, and structured his society.

Although there are about 100 archaeological sites in St. Bernard Parish, a complete archaeological survey of the parish would probably uncover many more (Wiseman et al. 1979). There are four sites listed for Orleans Parish that are on Lake Borgne, but the drowned portions of these sites are technically in St. Bernard Parish. None of these sites offer much in the way of salvage or recreational possibilities because they are completely wave-washed.

The archaeological sites fall into four different classes: earth mounds, shell mounds, shell middens, and beach deposits. The earth mounds are quite distinguishable in the landscape because they are elevated from the normally flat topography. These mounds were apparently built by the Indians as burial tumuli or temple foundations. The Magnolia Mound complex (Figure 2-12) near the Great Bend of Bayou La Loutre is a fine example of an earth mound complex. Numerous shell mounds and shell middens indicate early Indians occupied sites.

While earlier researchers made no distinction in the mapping of shell mounds and middens, the current practice is to identify these as separate archaeological types. Shell mounds are general shell accumulations similar in structure to the earth mounds. The shell middens are accumulations of sherds and shell and are commonly referred to

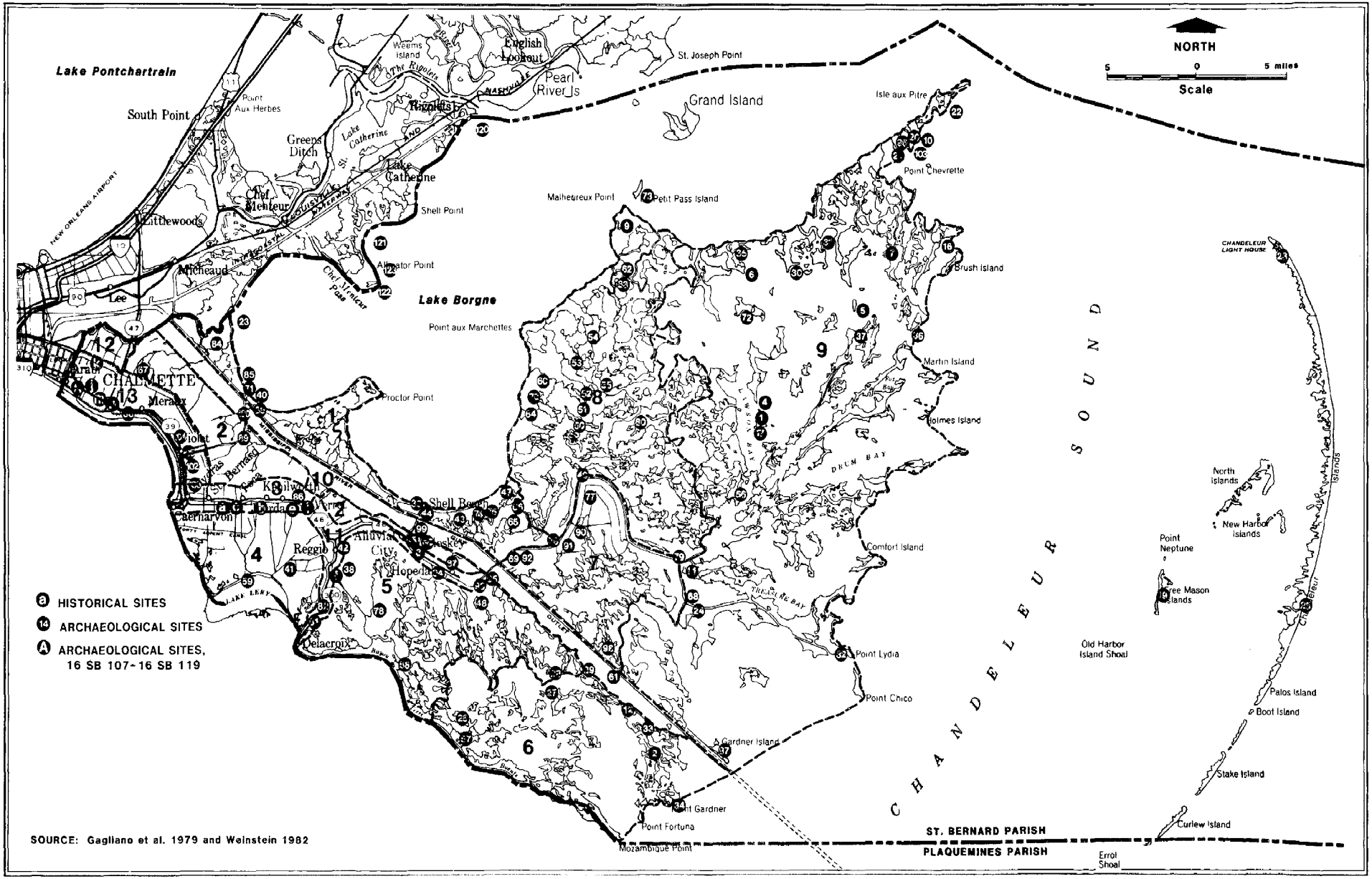


Figure 2-11. Cultural resources of St. Bernard Parish (after Gagliano et al. 1979 and Weinstein 1982, personal communication).

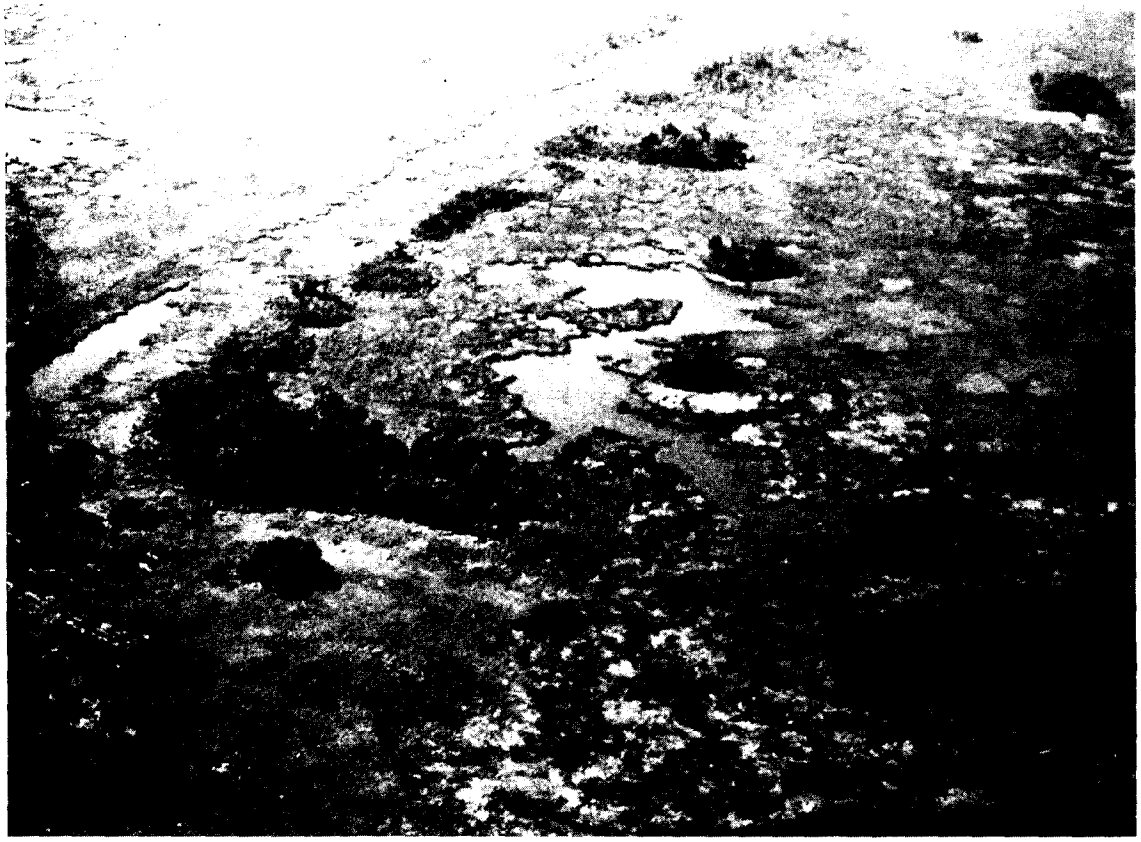


Figure 2-12. Magnolia Mound shell midden and mound complex (after Gagliano et al. 1982).

as trash deposits. The beach deposit sites are the remains of a shell midden or mound that has been naturally destroyed by wave action. Figure 2-13 illustrates the process of the natural destruction of these shell mounds and middens.

The recorded Indian sites in St. Bernard Parish are depicted in Table 2-7. The principal threats to these archaeological resources are subsidence, dredging, wave erosion, and vandalism. Four sites in St. Bernard Parish are completely undisturbed. For further reference or the changing status of these sites refer to the Culture Resources Survey of the Mississippi River-Gulf Outlet, Orleans and St. Bernard Parishes, Louisiana, by Wiseman et al. 1979.

Historical Sites

St. Bernard Parish has 16 historical sites. Such sites are distinguished because of their architecture, age, or rarity, or because they were the scene of an important event. Figure 2-11 shows the location of historical and National Register Sites in the parish while Table 2-8 lists the sites along with general information about each site.

National Register of Historic Places

There are presently three sites in St. Bernard Parish listed on the National Register of Historic Places. They are the Chalmette National Historical Park, Fort Proctor, and the Magnolia Mound Archaeological Site. The Chalmette National Historical Park includes most of the area where the Battle of New Orleans was fought and where Andrew Jackson defeated the British on January 8, 1815. Fort Proctor (16 SB 83) was built in 1856 to defend the City of New Orleans from an attack by British forces sailing through Lake Borgne. The fort represents a masterpiece of military construction for the time. The fort now stands almost completely surrounded by Lake Borgne waters because of shoreline erosion (Figure 2-14). The Magnolia Mound site (16 SB 49) is an extensive complex of clam middens and conical mounds of the Marksville period (0-400 A.D.) which surrounds a plaza with pyramidal mounds of the Mississippi period dating from A.D. 1000 to 1700. This site may have had a central junction in the cultural settlement of the two periods. A number of other prehistoric and historic sites and landmarks in St. Bernard, such as the powder magazine at Battery Bienvenue (16 SB 84) (Figure 2-15), are eligible for nomination to the National Register of Historic Places. Construction of this Battery began in 1825 (Gagliano et al. 1979). The structure was built to accommodate 23 artillery pieces and two mortars and to house 196 men.

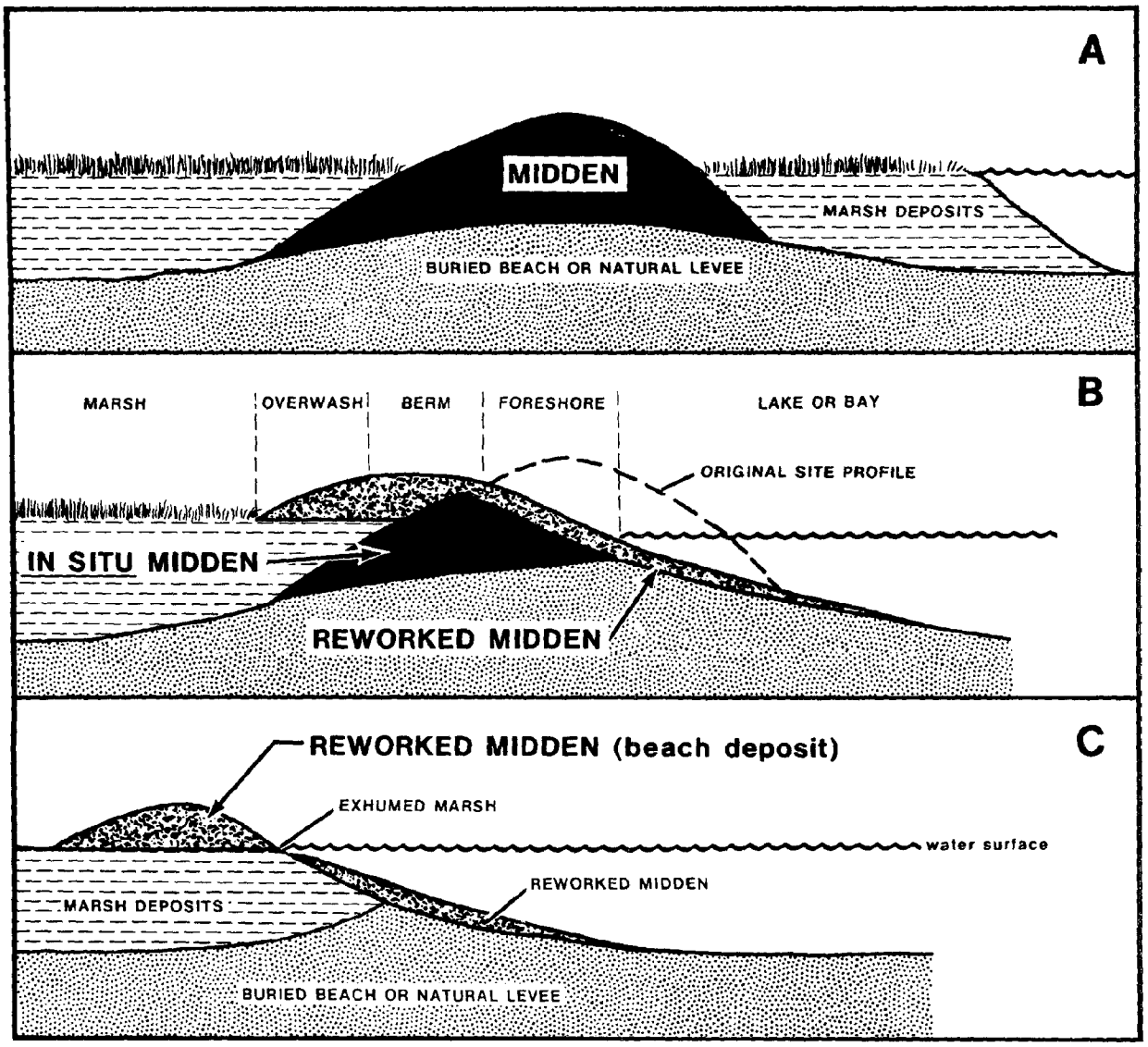


Figure 2-13. Progressive shoreline erosion of a coastal midden. The end product is a beach deposit (after Gagliano et al. 1979).

Table 2-7a. St. Bernard Parish Archaeological Sites with Reported Culture Periods and Phase Designations.

Map No.*	Site No.	Site Name	Culture Period	Phase
1	16 SB 1	Lawson Bay	Coles Creek Mississippi	Bayou Cutler Bayou Petre
2	16 SB 2	Machias Lake (Pass Fernandia)	Marksville Baytown Coles Creek	Magnolia Whitehall Bayou Cutler
3	16 SB 3	Same as 16 SB 2		
4	16 SB 4	Pirate Point	Coles Creek Mississippi	Bayou Cutler Bayou Petre
5	16 SB 5	Shell Island	Mississippi	Bayou Petre
6	16 SB 6	Shell Point	Baytown Coles Creek	Whitehall Bayou Cutler
7	16 SB 7	Northwest of Jack Williams Bay	Baytown Coles Creek Mississippi	Whitehall Bayou Cutler Bayou Petre
8	16 SB 8	Ysceloskey	Coles Creek Mississippi	Bayou Cutler Bayou Petre
9	16 SB 9	Malheureux Point	Coles Creek Mississippi	Bayou Cutler Bayou Petre
10	16 SB 10	Bayou Pierre	Coles Creek Mississippi	Bayou Cutler Bayou Petre
11	16 SB 11	Bayou Petre	Coles Creek Mississippi	Bayou Cutler Bayou Petre
12	16 SB 12	Mulatto Bayou (Lone Oak Mound)	Baytown Coles Creek Mississippi	Whitehall Bayou Cutler Bayou Petre
13	16 SB 13	Same as 16 SB 11		
14	16 SB 14	Site in Mississippi, not Louisiana		
15	16 SB 15	Same as 16 SB 23		
16	16 SB 16	Door Point	No Data	
17	16 SB 17	Flower Island	No Data	
18	16 SB 18	Same as 16 SB 12		
19	16 SB 19	Free Mason Island	No Data	
20	16 SB 20	Grand Pass I	Coles Creek Mississippi	Bayou Cutler Bayou Petre
21	16 SB 21	Grand Pass II	Coles Creek Mississippi	Bayou Cutler Bayou Petre
22	16 SB 22	Isle au Pitre	No Data	
23	16 SB 23	North Island	Marksville Mississippi	Labranche Bayou Petre
24	16 SB 24	Bayou Eloi	Coles Creek Mississippi	Bayou Cutler Bayou Petre
25	16 SB 25	South Island	Marksville Mississippi	? Bayou Petre
26	16 SB 26	Lake Jean Louis Robin	No Data	
27	16 SB 27	Grand Coquille Point I	No Data	
28	16 SB 28	Grand Coquille Point II	Marksville Baytown Coles Creek	Magnolia Whitehall Bayou Cutler
29	16 SB 29	Lake of the Second Trees I (Yucca Mound)	Mississippi	Bayou Petre

Table 2-7b. St. Bernard Parish Archaeological Sites with Reported Culture Periods and Phase Designations.

Map No.*	Site No.	Site Name	Culture Period	Phase
30	16 SB 30	Nigger Point	No Data	
31	16 SB 31	Johnson Bayou	Mississippi	Bayou Petre
32	16 SB 32	Twilight Harbor	Baytown Coles Creek	Whitehall Bayou Cutler
33	16 SB 33	Seven Dollar Bay	No Data	
34	16 SB 34	Point Gardner	No Data	
35	16 SB 35	Three Mile Bay	No Data	
36	16 SB 36	Elephant Point Pass	No Data	
37	16 SB 37	Kerchimbo Bay	No Data	
38	16 SB 38	Reggio I	No Data	
39	16 SB 39	Shell Beach Bayou	Marksville	?
40	16 SB 40	Dupre	Marksville Baytown Coles Creek Mississippi	? Whitehall Bayou Cutler Bayou Petre
41	16 SB 41	Kenilworth Canal	Coles Creek Mississippi	Bayou Cutler Bayou Petre
42	16 SB 42	Reggio II	No Data	
43	16 SB 43	Doulluts Canal	No Data	
44	16 SB 44	Shell Beach	Tchula Marksville Coles Creek Mississippi Historic	Pontchartrain Magnolia Bayou Cutler Bayou Petre 19th & 20th Centuries
45	16 SB 45	Bayou Yscloskey I	Coles Creek Mississippi	Bayou Cutler Medora
46	16 SB 46	Bayou Yscloskey II	No Data	
47	16 SB 47	Bayou St. Malo	Coles Creek Mississippi	Bayou Cutler Bayou Petre
48	16 SB 48	East Bayou	Baytown Coles Creek	Whitehall Bayou Cutler
49	16 SB 49	Magnolia Mound	Marksville Mississippi	Magnolia Bayou Petre
50	16 SB 50	Southwest of Cut-off Lagoon	Marksville Baytown Coles Creek	Magnolia Whitehall Bayou Cutler
51	16 SB 51	Northwest of Cut-off Lagoon	Marksville	Magnolia
52	16 SB 52	Shotgun Shell	No Data	
53	16 SB 53	Bayou Biloxi I	Marksville Coles Creek Mississippi	Magnolia Bayou Cutler Bayou Petre
54	16 SB 54	Lone Tree Hill	No Data	
55	16 SB 55	Bayou Biloxi II	No Data	
56	16 SB 56	Lake of the Mounds	No Data	
57	16 SB 57	Bottle Bayou	Coles Creek Mississippi	Bayou Cutler Bayou Petre
58	16 SB 58	Bayou Terre aux Boeufs II	Coles Creek Mississippi	Bayou Cutler Bayou Petre
59	16 SB 59	Eighty Arpent Canal	Coles Creek Mississippi	Bayou Cutler Bayou Petre

Table 2-7c. St. Bernard Parish Archaeological Sites with Reported Culture Periods and Phase Designations.

Map No.*	Site No.	Site Name	Culture Period	Phase
60	16 SB 60	Grand Bayou	No Data	
61	16 SB 61	Lake of the Second Trees II	Marksville Coles Creek	Magnolia Bayou Cutler
62	16 SB 62	Lake Borgne	Mississippi	Bayou Petre
63	16 SB 63	South of Lake Borgne	No Data	
64	16 SB 64	Cut-off Bayou	Marksvile Baytown Coles Creek	Magnolia Whiteshell Bayou Cutler
65	16 SB 65	Bayou Guyago	No Data	
66	16 SB 66	No Name	No Data	
67	16 SB 67	No Name	Mississippi	Medora(?)
68	16 SB 68	Bayou La Loutre Section 30	Coles Creek Mississippi	Bayou Cutler Bayou Petre
69	16 SB 69	Bayou La Loutre MRGO	Marksville Mississippi	Magnolia Bayou Petre
70	16 SB 70	Padre Bayou	Coles Creek Mississippi	Bayou Cutler Bayou Petre
71	16 SB 71	Lake Borgne Bayou Dupre	Coles Creek Mississippi Historic	Bayou Cutler Bayou Petre 19th Century
72	16 SB 72	Raccoon Island	Coles Creek Mississippi	Bayou Cutler Bayou Petre
73	16 SB 73	Le Petit Pass Island	No Data	
74	16 SB 74	Orange Mound	No Data	
75	16 SB 75	Northwest of Bayou Guyago	No Data	
76	16 SB 76	Bayou La Loutre Levee	No Data	
77	16 SB 77	Bayou La Loutre	Mississippi	Bayou Petre
78	16 SB 78	Garfish Point	No Data	
79	16 SB 79	Northeast of Joe Shiman Pass	No Data	
80	16 SB 80	Mussel Bayou	No Data	
81	16 SB 81	Bayou Lery	No Data	
82	16 SB 82	Northeast of Bayou Lery	No Data	
83	16 SB 83	Fort Proctor (Fort Beauregard)	Historic	19th Century
84	16 SB 84	Battery Bienvenue	Historic	19th Century
85	16 SB 85	Martello Castle	Historic	19th Century
86	16 SB 86	Kenilworth Plantation	Historic	19th Century
87	16 SB 87	Proctor Sugar Mill	Historic	19th Century
88	16 SB 88	De La Ronde Plantation	Historic	19th Century
89	16 SB 89	Lake Borgne Canal Redoubt	Historic	19th Century
90	16 SB 90	Bayou La Loutre Cemetery	Historic	19th Century
91	16 SB 91	Bayou La Loutre Homes	Historic	19th Century
92	16 SB 92	MRGO - Homes	Historic	19th Century
93	16 SB 93	Bayou Bernard Canal	Historic	19th Century
94	16 SB 94	Bakers Ditch	Historic	19th Century
95	16 SB 95	Pearstein	Historic	19th Century

Table 2-7d. St. Bernard Parish Archaeological Sites with Reported Culture Periods and Phase Designations.

Map No.*	Site No.	Site Name	Culture Period	Phase
96	16 SB 96	Grand Pass Midden	Coles Creek (?) Mississippi	Bayou Cutler (?) Bayou Petre
97	16 SB 97	Gardner Island	Coles Creek	Bayou Cutler
98	16 SB 98	Mosquito Inlet	Mississippi	Bayou Petre
99	16 SB 99	Shell Beach Railroad	Mississippi Historic	Bayou Petre 19th Century
100	16 SB 100	Horseshoe Bayou	No Data	No Data
101	16 SB 101	Number not assigned		
102	16 SB 102	Merits Plantation	Historic	18th Century 19th Century
103	16 SB 103	No Name	Coles Creek Mississippi	Bayou Cutler Bayou Petre
104	16 SB 104	No Name	Historic	19th Century
105	16 SB 105	Lake Borgne Canal Lock	Historic	19th Century
106	16 SB 106	No Name	Historic	20th Century
107	16 SB 107	No Name	Historic	19th Century
108	16 SB 108	No Name	Historic	20th Century
109	16 SB 109	No Name	Historic	20th Century
110	16 SB 110	No Name	Historic	19th Century
111	16 SB 111	No Name	Historic	19th Century
112	16 SB 112	No Name	Historic	19th Century
113	16 SB 113	No Name	Historic	20th Century
114	16 SB 114	No Name	Historic	20th Century
115	16 SB 115	No Name	Historic	19th Century
116	16 SB 116	No Name	Historic	19th Century
117	16 SB 117	No Name	Historic	20th Century
118	16 SB 118	No Name	Historic	20th Century
119	16 SB 119	Chateau des Fleur Plantation House (?)	Historic	19th Century
120	16 OR 13	Little Rigolets	No Data	No Data
121	16 OR 18	Alligator Point	Coles Creek	Bayou Cutler
122	16 OR 42	No Name	No Data	No Data
123	16 OR 43	No Name	No Data	No Data

* The map numbers in bold type correspond to the number in Figure 2-11 for the location of these sites.

Source: Gagliano et al. 1979, Weinstein 1982.

Table 2-8. Historic Sites in St. Bernard Parish.

MAP NO.	NAME	INFORMATION
9	Old St. Bernard Courthouse	Built around 1915.
b	Overseer's House of Sebastapol Plantation	Built approximately around 1830.
c	St. Bernard Cemetery	Earliest intact cemetery in the region, graves dating back to the 18th century.
d (86)	Kenilworth Plantation	Ground floor built in 1759 and used for a time as a Spanish military post. Additions where made to the house after 1800.
e	Contreras	Birthplace of P.G.T. Beauregard (1818-93).
f	Solis Plantation House	Ruins of an early modest plantation where sugar was first granulated in Louisiana on 1791.
g (83)	Fort Proctor (Fort Beauregard)	1856 ruins of a fort that was never completed, with the early use of metal I-beam and tie-rod construction.
h (87)	Proctor Sugarmill	Ruins of a plantation sugar refinery.
i (85)	Martello Castle	Remains of a fort built in 1829.
j	George Villere House	Built in the 1840s in the Greek Revival era.
k	LeBeau House	Built in 1850.
l	Ducros Museum	Artifacts from prehistoric Indians, the Battle of New Orleans, etc.
m	Chalmette National Historic Park	Include Rene Beauregard Plantation House built in 1832, Earthworks from the Battle of New Orleans in 1815 and Chalmette Monument.
n	Chalmette National Military Cemetery	Laid out in 1864, and contain graves of more than 14,000 Union soldiers, in which more that half are unknown.
o (88)	DeLaRonde Plantation	Site of the first encounter of the Battle of New Orleans and used as a hospital by the British.

Table 2-8. Historic Sites in St. Bernard Parish (concluded).

MAP NO.	NAME	INFORMATION
p (84)	Battery Bienvenue	Ruins of a fort begun in 1826 and rebuilt several times before abandoned after the Civil War.

Source: CEI 1978.

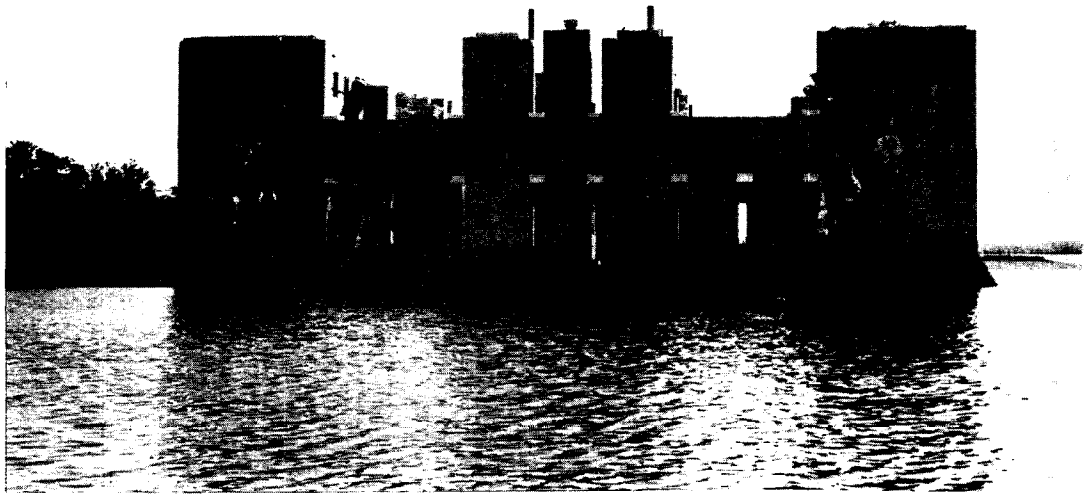


Figure 2-14. Northeast face of Fort Proctor. Notice that the outer wall has been reduced to rubble below the water line. View to the southwest. Date: 5/14/76 (after Gagliano et al. 1978).

Figure 2-15. Powder magazine at Battery Bienvenue, view to the east. Date: 6/10/76 (after Gagliano et al. 1978).

TRANSPORTATION

Early transportation corridors in St. Bernard Parish followed the major natural levees and deeper water channels. This dual land-water transportation system satisfied the needs of the parish with minimum disturbance to the natural environment. Today, most of the major land transportation corridors are still located on the higher grounds of the natural levees but have been expanded substantially to meet the growing needs of the parish.

Roadways

St. Bernard was one of the first parishes in Louisiana to construct permanent highways. This movement was launched in 1899 by Sebastien Roy, and the first paved highway extended from the Orleans Parish line to Paris Road in Chalmette. Major thoroughfares today are Judge Perez Drive (La. Highway 39), Paris Road (La. Highway 47-39), St. Bernard Highway (La. Highway 46-39), La. Highway 624, and La. Highway 300. Judge Perez Drive, St. Bernard Highway, and Paris Road are the primary routes servicing the urbanized area, and Judge Perez Drive is presently being extended eastward to Verret. La. Highway 39 (Judge Perez Highway) extends through Poydras and connects with La. Highway 46 which is the main route serving the leveed area. Beyond Reggio, La. 46 follows the natural ridge to Yscloskey and Shell Beach, with the route number changing to 624 for the segment between Yscloskey and Hopedale. Below Reggio, La. Highway 300 extends to Delacroix.

Waterways

The principal natural waterway serving St. Bernard Parish is the Mississippi River. It accommodates ocean-going ships at docks located in Chalmette at the Chalmette Slip; the Tenneco Crude Terminal Wharf; the Tenneco Wharf No. 4; and Exxon Company, USA, Chalmette Terminal Tank Dock. Ships may also dock at Murphy Oil Company Wharf in Meraux, Louisiana. The most significant man-made channel is the MRGO. It is considered to be economically less important than the Mississippi River in terms of number of users and tonnage carried. In addition to the MRGO, there are a number of man-made canals which cross the wetlands at various locations in St. Bernard Parish. These canals were primarily constructed for the exploration and extraction of petroleum and natural gas resources. The major natural bayous used for transportation into the marshes are Bayous La Loutre, Terre aux Boeufs, Bienvenue, St. Malo, and Biloxi.

Rail Service

The New Orleans Terminal Company and Louisiana Southern Railway Company (both under the Southern Railway System) serve St. Bernard Parish. The New Orleans Terminal Company transports goods from the Orleans-St. Bernard Parish line to Chalmette, including service to slip and dock facilities along this portion of the Mississippi. The Louisiana Southern runs from the Orleans-St. Bernard Parish line along the Mississippi River to the Plaquemines Parish line. There is an extension from Poydras Junction to Toca. These two railroads have daily service and direct connections with all other railroads operating in the New Orleans area.

Pipelines

There are numerous petroleum and natural gas pipelines located within St. Bernard. These facilities transport oil and gas to refineries and processing plants located within St. Bernard and to markets throughout the country.

Airports

There are no major airports in the parish but two exist in the surrounding areas (Figure 2-16) and serve the parish as well as the New Orleans metropolitan area. The New Orleans International Airport, constructed in the mid-forties, handles mainly passengers, mail, and cargo and provides national and international service. The New Orleans Lakefront Airport located just east of the Inner-Harbor Navigation Canal (IHNC) currently serves only non-scheduled commercial and private flights. At the present time, these airports are sufficient to handle the air traffic for the region.

LAND USE

The natural levees along the Mississippi River, Bayou Terre aux Boeufs, and Bayou La Loutre offer the most suitable land within the parish for development, and there exists a mixture of residential, commercial, agricultural, industrial, recreational, and transportational development concentrated along the corridors. Existing land use is shown in Figure 2-17 and land use acreages are shown in Table 2-9. The urbanized area (Unit 13 in B & A I 1979) in which an estimated 88% of the people in St. Bernard Parish reside, lies within the man-made flood protection levee system between Arabi and Poydras. The leveed areas extending from Poydras to Verret (the transition management unit [Unit 3 in B & A I 1979]) are slightly less densely developed, and the

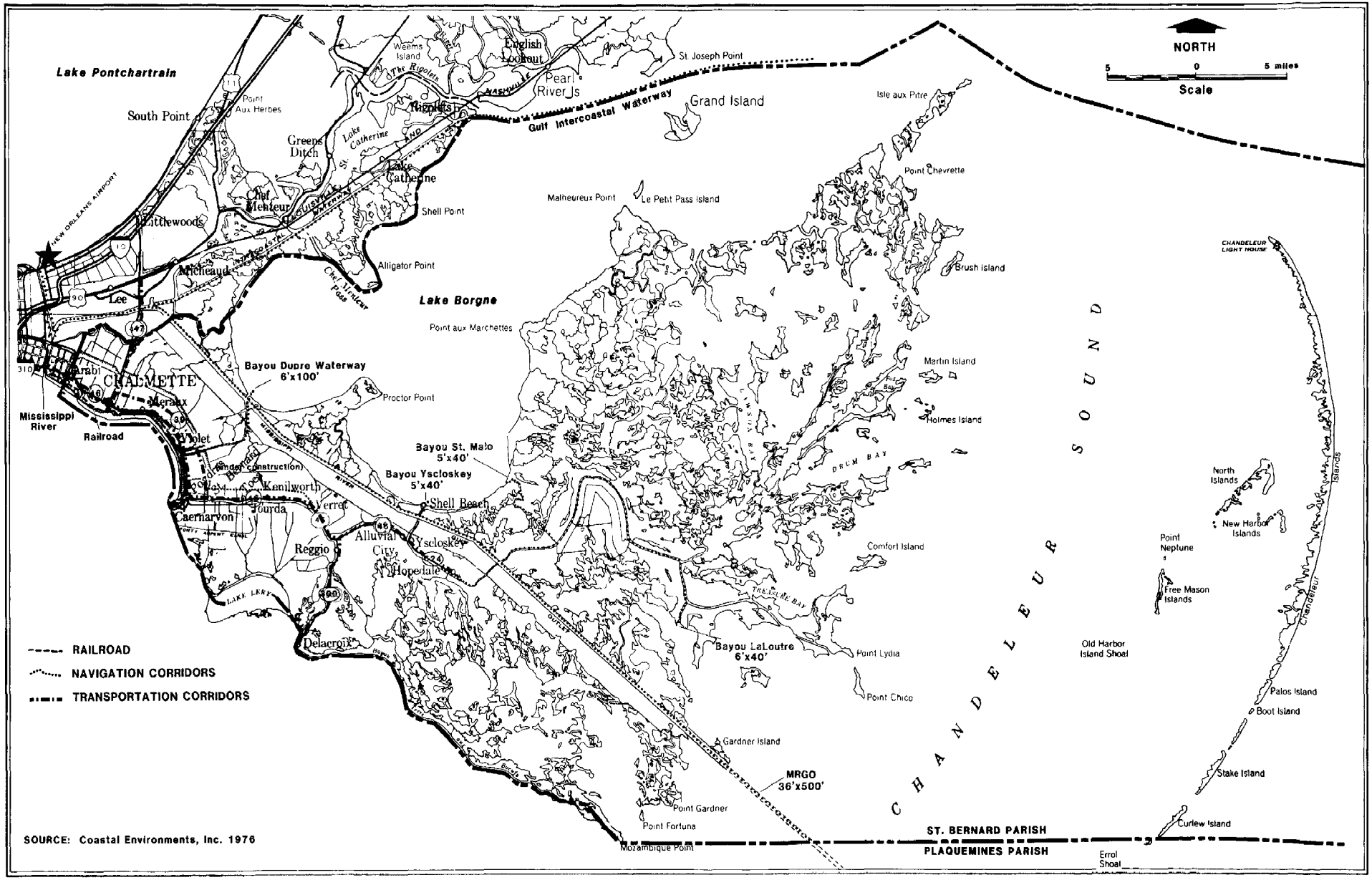


Figure 2-16. Existing transportation of St. Bernard Parish (after CEI 1976).

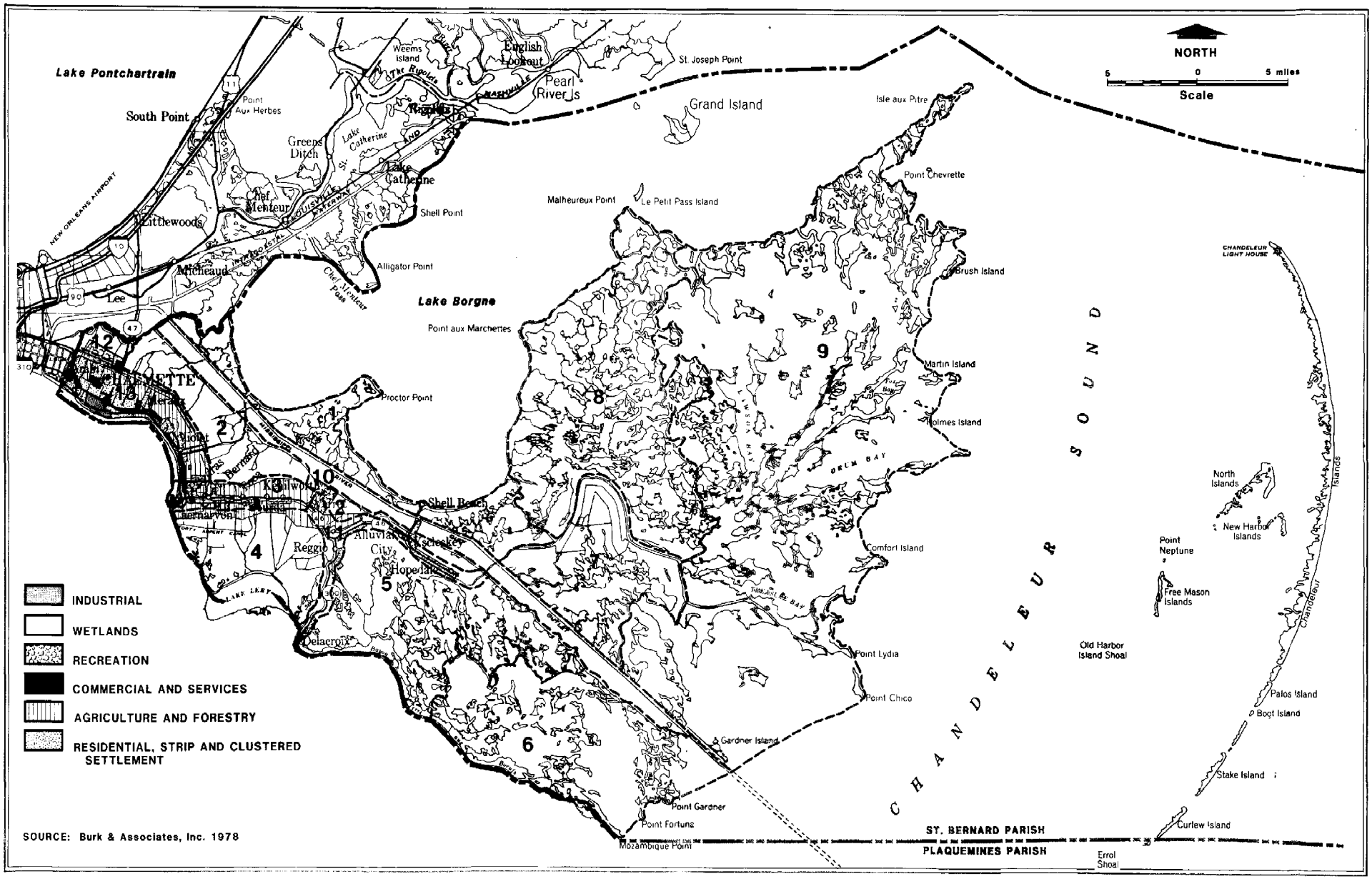


Figure 2-17. Existing land use map of St. Bernard Parish (after B & A I 1978b).

Table 2-9. Existing Land Use in St. Bernard Parish, Louisiana.

Land Use	Acres	Hectares
Urban Areas		
Residential	2,377	963
Commercial and Service	353	143
Industrial	482	195
Public/Semi-Public	249	101
Recreation and Parks	477	193
Open and Vacant	21,052	8,526
Other	3,999	1,620
Agricultural Areas		
Cropland and Pasture	402	163
Orchard and Grove	58	23
Other	6	2
Forest Lands		
Forest	6,701	2,714
Wetlands		
Swamp	5,860	2,373
Marsh	429,960	174,134

Source: B & A I 1979.

remainder of this transition zone extending south to Delacroix and southeast to Hopedale is the least developed of the natural levee corridor. Among the more important land use categories in the parish are the man-made systems which function to maintain a healthy environment, e.g., flood protection and drainage, solid waste disposal, sewage treatment, and utilities.

Flood Protection

Most of St. Bernard is a flood-prone area. The parish is most susceptible to storm surges from hurricane tidal action and the accompanying rainfall. In order to protect the development along the natural ridge areas, an artificial levee system was constructed. This system rings the area from Arabi to Verret and has historically defined the boundary between urban land and wetlands. The ridge areas outside the levee system from Verret to Delacroix and Hopedale are not protected by levees and thus, are still subjected to periodic tidal flooding.

The construction of the levee system required the installation of a drainage system. The area within the levees is, in effect, a giant saucer, and runoff must be channeled to drainage canals and then pumped over the levees. This system must constantly be maintained and improved to insure that water trapped within the area is removed quickly before it can accumulate and cause damage to life and property.

The levee - drainage system has created small areas of uninhabited and undrained areas of wetlands at the base of the levee system. The inducement of freshwater and the blockage of saltwater intrusion has created these zones which act as buffers between the adjacent brackish wetlands and ridge areas. These areas within the levees should be maintained. However, they do offer the possibility for future development when parish land needs become critical.

Solid Waste Disposal

Until the early 1970s, solid wastes were handled by incineration followed by landfilling. From a management standpoint, this is an ideal system. Incineration reduces waste volumes by 70 to 85 percent, landfill life span is greatly prolonged, and landfill site management is relatively simple and inexpensive.

Incineration, however, has one main drawback: air pollution. Incinerators constructed in the 1960s were made obsolete by particulate (smoke) control requirements established by the Air Pollution Control Act of 1972. Technology for controlling

particulates was not well developed at the time, and refitting of aging incinerators was an expensive proposition. Thus, incinerators in most parts of Louisiana were either completely abandoned or turned into transfer stations. St. Bernard's incinerator was abandoned and the parish has been relying exclusively on landfill ever since.

The Paris Road landfill is now used for disposal of all of the solid wastes generated in St. Bernard, with the exception of agricultural and industrial wastes. The Paris Road landfill site is leased from private land owners and operated by St. Bernard Parish Polic Jury. Municipal (household and small commercial) wastes are collected by the parish on a six day per week basis. To do this, the parish maintains a fleet of 16 vehicles and a full-time collection staff of over 40 employees.

St. Bernard Parish, in cooperation with the Louisiana Resource Recovery and Development Authority and Regional Planning Commission, has been pursuing the feasibility of a regional resource recovery facility to meet the future needs of solid waste management. The decision to proceed should be made by July, 1983.

Sewerage Treatment

Wastewater treatment in St. Bernard Parish is currently available in Management Unit 13 and in the Poydras Area of Management Unit 3 (B & A I 1979). Wastes are collected by a series of collection lines and lift stations and are transported to three treatment plants and two oxidation ponds. There, the wastes are treated and discharged into the drainage system or the Mississippi River.

The remainder of the inhabited area does not have major treatment facilities at the present time. These areas must rely on septic tanks or small package plants for waste water treatment.

Utilities

Electricity is supplied to the parish by the Louisiana Power and Light Company. The Louisiana Gas Company provides residential gas service to the urbanized leveed area (Management Units 13 and 3) and beyond the levee to a point approximately one mile

from the La. Highway 46 junction. The gas lines resume at Reggio and follow La. 300 to Delacroix and La. 46 to Shell Beach and Hopedale. The company anticipates that the existing facilities should be adequate to service the demands for the next ten to twenty years.

The water lines are maintained for Management Units 3 and 13 (the developed natural levee ridge area) by Water District Number 2. A 10-inch main line services the area between Poydras and Reggio, while a 4-inch line extends from Poydras to East Wood Manor. The area between Reggio and Delacroix is served by a 6-inch main line, and an 8-inch main line stretches between Reggio and Yscloskey. The communities of Shell Beach and Hopedale receive water through a 6-inch main line out of Yscloskey. Water District Number 1 services Arabi to the Violet Canal and has the only purification system in the parish. It sells purified water to Water District Number 2.

CHAPTER III: PRINCIPLE RESOURCES

INTRODUCTION

A knowledge of the parish's renewable and non-renewable resource base is essential in achieving development goals and management practices which lead to long-term benefits for the area. Renewable resources, such as shrimp, oysters, crabs, fish, agricultural products, and furs and hides can be utilized by the citizens and visitors of St. Bernard Parish in perpetuity if carefully managed. Non-renewable resources, such as oil, gas, and other minerals, contribute to the parish's economic base and provide a net benefit to the parish if handled wisely. Exploitation of non-renewable resources can negatively impact the renewable resources which can be depleted through unwise exploitation, bad management practices, or a change in the environment, such as pollution and saltwater intrusion, which affect resource productivity. In many instances, the cause of these changes can be traced directly or indirectly to man's activities in the wetlands. These activities often happen independently of each other, and their cumulative impacts are not taken into consideration. Overall goals, objectives, and effective management programs and implementation procedures may help to reestablish some of the renewable resources.

FISHING AND TRAPPING

The extensive marshlands of St. Bernard Parish are extremely productive for oysters, shrimp, crabs, and fish. The extensive marshes and bays with their varying salinity zones are responsible for Louisiana being the premier state in the annual production of fisheries and fur. The Louisiana marshes are among the largest and most productive prime nursery grounds in the world for over 100 species of estuarine-dependent fish and shellfish, many of which support the offshore fisheries industries. Some of these aquatic species require marsh environments during their entire life cycle; for others it is only important during some stages of their life cycle. Commercial fishermen concentrate on catching striped mullet, gulf menhaden, southern flounder, and sheepshead, while sportsmen take black drum, Atlantic croaker, red drum, sand seatrout, and southern flounder.

The largest acreage in private oyster leases in Louisiana is found in Plaquemines and St. Bernard Parishes. In 1978-79, the leased oyster grounds in St. Bernard Parish totaled 72,083 acres (Louisiana Department of Wildlife and Fisheries 1979). Increased salinities and changes in the environment have been detrimental to the area's historic

oyster reefs, and the extent of the nursery grounds has been diminished. Pollution from sewage discharge from urban areas has also been detrimental to oyster production because of the prohibition of harvesting oysters from polluted grounds. For location of existing oyster grounds refer to the section of this report on Potential Unique and Particular Areas. For a summary of the fisheries productivity of St. Bernard estuaries see Table 3-1.

The St. Bernard wetlands are also a valuable renewable resource in that they provide habitat to valuable furbearers. The principle fur-bearing animals found in this area are the common muskrat, the nutria, and the North American mink. The area surrounding Delacroix is an extremely important prime furbearer habitat, although its productivity has decreased in recent years. Rising salinities have diminished the low-salinity (fresh to intermediate) marsh habitat which is the most suitable habitat for fur-bearing animals.

EXTRACTIVE INDUSTRIES

St. Bernard Parish does not have as extensive oil and gas deposits as some parishes, but revenues from existing deposits do provide an important economic resource. Hydrocarbons (natural gas and oil), sand, and clay are the primary minerals produced in the parish, with hydrocarbons being the most valuable. Figure 3-1 illustrates the location of these mineral resources and the pipelines that transport the hydrocarbons from producing areas to user sources. Clay and sand mining are located at two sites within the urbanized area of the natural levee.

RECREATIONAL RESOURCES

Existing Recreation

The coastal environment of St. Bernard Parish is a good example of a sportsman's paradise. The potential for wetlands/water-based recreation is almost unlimited. The many waterways and their easy access provide an outlet for boating, trapping, fishing, and hunting activities in the wetlands. In addition to the numerous private camps and boat launches, there are 18 parish, state, and Federal parks and refuges (Table 3-2) and 16 commercial marinas in the parish (Figure 3-2).

The Biloxi Wildlife Management Area is the largest public wetland in the parish and offers tremendous hunting and fishing opportunities. The management area is located

Table 3-1. Commercial Fisheries Harvest for St. Bernard Parish Shown in Pounds and Value of Catch.

		1976	1977	1978	1979
Fish	Pounds	412,400	880,100	1,671,900	1,086,855
	Value	$ 130,718	$ 150,279	$ 170,775	$ 118,945
Crabs	Pounds	1,718,300	2,252,800	2,049,500	1,439,629
	Value	$ 322,232	$ 545,016	$ 447,993	$ 306,907
Shrimp	Pounds	2,122,700	2,048,500	2,394,500	1,840,115
	Value	$1,209,409	$1,102,599	$1,745,195	$4,245,656
Oysters	Pounds	1,618,500	1,560,900	1,252,000	921,041
	Value	$1,040,346	$1,282,261	$1,428,187	$1,100,282
TOTAL	**Pounds**	**5,871,900**	**6,742,300**	**6,241,100**	**5,287,640**
	Value	**$2,702,705**	**$3,080,155**	**$3,792,150**	**$5,771,790**

Source: U.S. Department of Commerce var. yrs.

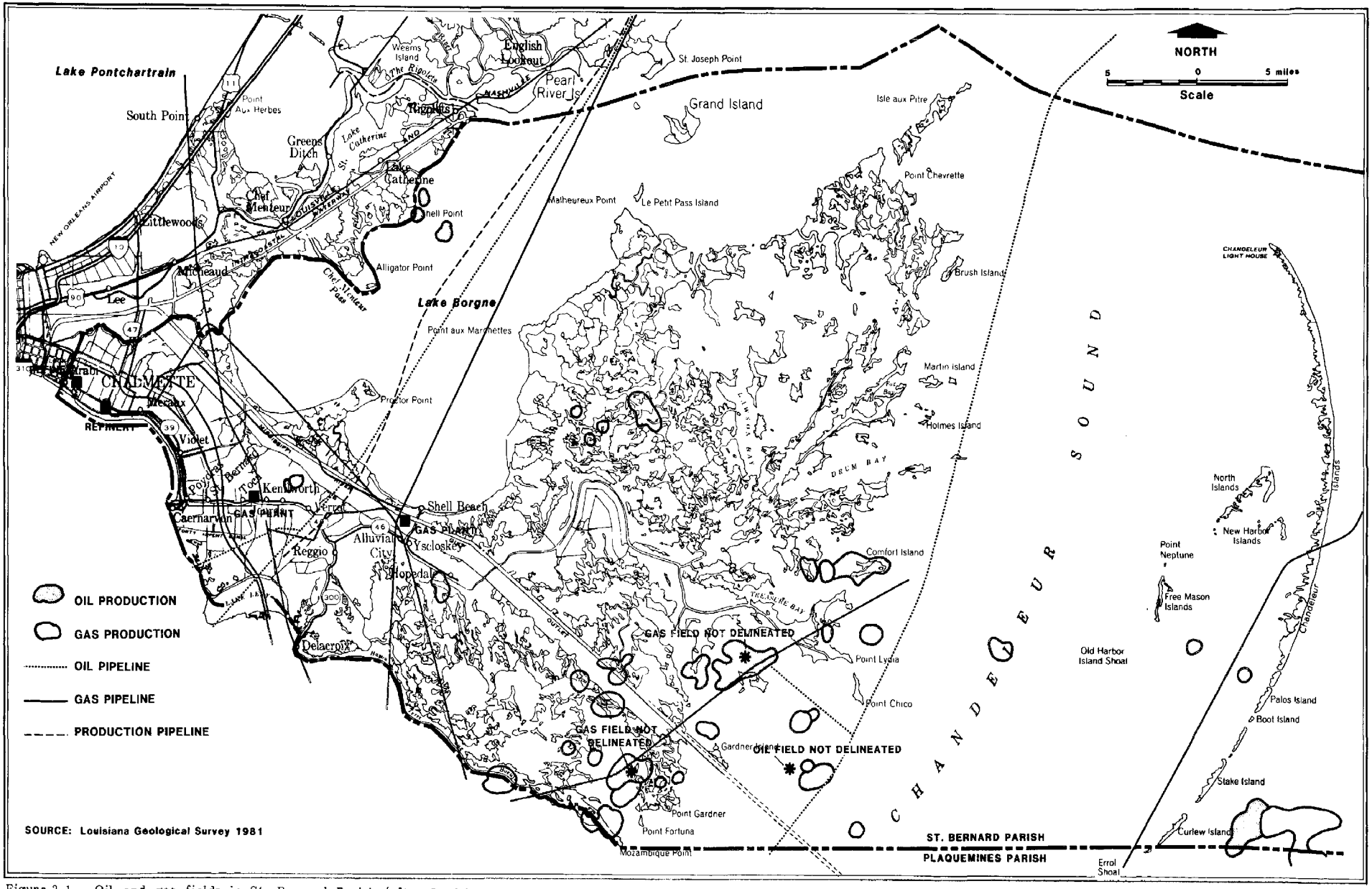


Figure 3-1. Oil and gas fields in St. Bernard Parish (after Louisiana Geological Survey 1981).

Table 3-2. Federal, State, and Parish Parks and Refuges.

MAP NO.	SITE	RESPONSIBILITY	ACREAGE
1	Chalmette Battlefield	Federal	130
2	Breton National Wildlife Refuge	Federal	7,512
3	Biloxi Game Management	State	39,583
4	St. Bernard State Park	State	358
5	Parc Chenier	Parish	17.8
6	Carolyn Park	Parish	2
7	Chalmette Vista Playground	Parish	2
8	Prosper Park	Parish	2
9	Violet Ball Field	Parish	2
10	Riverbend Playground	Parish	1
11	Patricia Park	Parish	1
12	Community Park	Parish	1
13	Versailles Delaronde Park	Parish	3.9
14	Rebel Park	Parish	2
15	Borngemouth Park	Parish	2
16	Kenilworth Park	Parish	1.5
17	Bucaneer Villa Park	Parish	3.83
18	Schneider Park	Parish	1
19	Reggio Marina	Commercial	.5
20	Chalmette Marina	Commercial	4
21	Rips Place	Commercial	.2
22	Molero's Marina	Commercial	1.5
23	Hopedale Grocery & Marina	Commercial	1
24	S & S Boat Marina	Commercial	1
25	R. Campo's Marina	Commercial	1
26	Al Campo Marina	Commercial	1.5
27	Roudy Melerine	Commercial	1
28	Gulf Outlet Marina	Commercial	1
29	Frank Campo	Commercial	1
30	Gagnon's Marina	Commercial	1
31	Ernest Melerine	Commercial	1
32	Mack Melerine	Commercial	1
33	End of World Marina	Commercial	1
34	Alponso's Marina	Commercial	1
35	Chalmette Trapshooters	Non-Profit	5
36	Verret Park	Parish	2.5
37	Val Riess Park	Parish	43
38	Heights Park	Parish	0.7
39	Our Lady of Lourdes	Parish	2
40	Goodwill Park	Parish	2.5

Source: Department of Culture, Recreation and Tourism 1977.

* Map number corresponds to recreational sites on Figure 3-2.

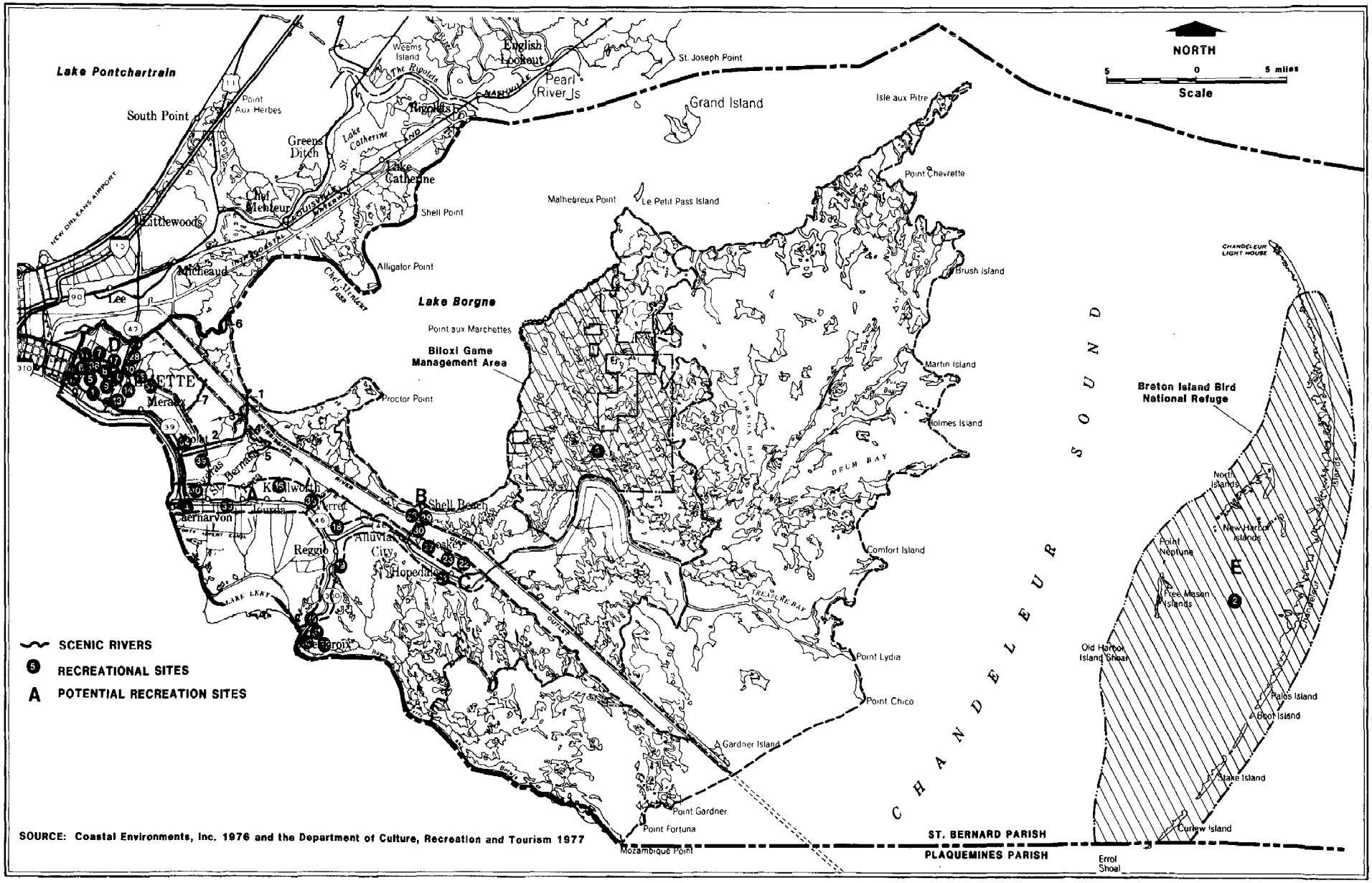


Figure 3-2. Recreational resources in St. Bernard Parish (after CEI 1976 and the Department of Culture, Recreation and Tourism 1977).

40 miles east of New Orleans and is accessible by boat from the commercial launches at Hopedale and Shell Beach. Species hunted in the area include rabbits, ducks, and geese, while nutria, mink, raccoon, and muskrat are trapped commercially. Large catches of crabs, shrimp, oysters, and fish are taken by both sport and commercial fishermen. The Chandeleur Islands, consisting of a 45-mile long barrier island complex 20 miles east and south of St. Bernard, has been designated as the Breton National Wildlife Refuge and is under Federal jurisdiction. These islands are an important nesting area for shore and aquatic bird species including the endangered Brown Pelican. The waters surrounding the island chain are also a vital spawning area for many crustaceans and fish.

There are numerous state and parish parks (including St. Bernard State Park, Park Chenier, Delaronde Park, and Bucaneer Villa Park) located on the natural levees of the parish. These parks provide baseball fields, tennis courts, picnic areas, and barbecue pits year-round for the parish residents and visitors.

Scenic Rivers

St. Bernard has seven designated scenic streams or bayous. Table 3-3 lists these streams, and their location is shown in Figure 3-2.

A natural or scenic river is a river, stream, or bayou that is in a free-flowing condition and has not been altered by channelization or realignment. A stream can also be classified as scenic if it has been altered, but contains native vegetation and has little or no man-made structures along its bank. The Lake Borgne Canal (or Violet Canal) is an example of such a scenic river that has been altered by dredging to improve navigation.

The Louisiana Department of Wildlife and Fisheries is the administrator of the scenic river system and serves to protect these streams from the effects of channelization, channel realignment, clearing and snagging projects, and reservoir construction projects. The scenic river system is designed to protect the overall ecology of the stream including the wildlife, vegetation, and hydrology. It is also designed to preserve the wilderness qualities, scenic beauty, archaeological resources, and other features of the stream or bayou. All of these streams are used for recreational activities such as boating, fishing, and canoeing.

Table 3-3. Designated Scenic Streams in St. Bernard Parish.

MAP NO.	NAME	LOCATION
1	Bayou Dupre	From the Lake Borgne Canal to Terre Beau Bayou
2	Lake Borgne Canal	From the Forty Arpent Canal to Bayou Dupre
3	Bashman Bayou	From its origin to Bayou Dupre
4	Terre Beau Bayou	From Bayou Dupre to the New Canal
5	Piroque Bayou	From Bayou Dupre to the New Canal
6	Bayou Bienvenue	From Bayou Villere to Lake Borgne
7	Bayou Chaperon	From the origin to its end

*Map numbers correspond to scenic rivers on Figure 3-2.

Source: Department of Culture, Recreation and Tourism 1977.

Scenic Sites

Scenic sites are those places that offer unusual vistas in the form of townscape and/or landscape. These sites can be stretches of marshes, wooded areas, architecture, or any attractive, aesthetically pleasing area. According to the Regional Planning Commission there are five scenic sites in St. Bernard Parish:

1. Roadway near Kenilworth Plantation
2. Toca
3. Docville Farm
4. Swamp behind Chalmette, Meraux, and Violet spreading toward the Gulf Outlet Canal
5. Cypress trees off Paris Road

There are, of course, countless other scenic areas, but they have no road access, only boat access.

Proposed Recreation Site

The Louisiana coast is very popular for recreation, especially activities such as boating, picnicking, swimming, camping, and water-skiing. Heavy use is the primary cause of crowding of many of the facilities, particularly beaches, campgrounds, and parks in close proximity to urban areas. Table 3-4 lists the proposed new or expanded recreational sites in St. Bernard Parish. These new sites include levees, battures, fishing piers, spoil bank areas, and beaches. The list identifies the recommended sites by name, describes the facilities proposed, and the corresponding map number locates the site in Figure 3-2.

Proposed Preservation and Restoration Areas

Burk and Associates, Inc. addressed and evaluated the areas that should be preserved and restored in their report: Potential Preservation and Restoration Areas in the Louisiana Wetlands (1977b). This study evaluates and rates 50 potential natural areas representing a cross section of all major physiographic types in coastal Louisiana. These areas were generally remote, relatively inaccessible, and show little or no physical alterations within historic times. Each of these sites has varying degrees of ecological, recreational, economic, or aesthetic value. The site evaluation of each of these areas consisted of the following criteria: naturalness, diversity, representativeness, unique ecological value, susceptibility to damage, degree of threat, aesthetic

Table 3-4. Potential Recreation Sites in St. Bernard Parish.

MAP NO.	SITE	PROPOSED USE OR FACILITY
A	La. 46	Scenic road, roadside parks, historical tours.
B	Fort Proctor	Picnicking, historical interpretation.
C	Hopedale - End of La. 46	Potential camping, picnicking and boat launching facilities at junction of MRGO and Bayou La Loutre.
D	Bayou Bienvenue Area	General recreational development.
E	Chandeleur Islands	Boat camping, surf fishing, bird watching.

Source: B & A I 1977a

*Map number corresponds to recreational sites on Figure 3-2

quality, recreational value, and educational and scientific value. These criteria were rated 1 through 10, then totaled. Those areas assigned the greatest number of points were considered to be the most important remaining natural coastal areas in Louisiana. Table 3-5 lists the four sites in St. Bernard Parish that are potential preservation areas.

In addition to consideration of potential preservation areas, a study was made of the potential restoration areas, especially those affected greatly by saltwater intrusion, erosion, and land loss. The most critical areas of shoreline erosion, land loss, and saltwater intrusion occur primarily in southeast Louisiana. Figure 3-3 contains the potential preservation and restoration areas in St. Bernard Parish. The most critical area is in the St. Bernard delta complex along the MRGO. The problems of erosion and saltwater intrusion possibly could be stopped through shoreline stabilization with rip-rap or sheet piling and a re-creation of eroded areas behind the shore protection structures. The southern shoreline of Lake Borgne is also undergoing shoreline retreat because of wave erosion. Beach nourishment and artificial reefs may be a solution to this problem. Another area for potential restoration is the "mainland coast" along Chandeleur Sound. Beach nourishment and marsh and dune re-vegetation are possible measures which can be used to retard erosion along these islands.

POTENTIAL UNIQUE AND PARTICULAR AREAS

The Louisiana coast possesses rich and diverse natural resources that have many unique features. The diverse habitats of the alluvial ridges, swamps, marshes, beaches, bays, and nearshore Gulf waters support extremely dynamic and productive biotic communities. In addition to supporting dense populations of commercially important species, the region provides critical habitat for several rare or endangered species. The marshes and bays in the coastal area are responsible for Louisiana being so productive. These potentially unique ecological features have been divided into zoological, botanical, and geological components. A unique ecological feature is defined as an area or a resource whose characteristics qualify it as one of the following: 1) a critical habitat for rare or endangered species, 2) an area of extremely high biological productivity, 3) a location of vital importance as a nesting, feeding, wintering, or spawning area for fish and wildlife, 4) a rare or unusual occurrence of a particular species near the limits of its ranges, 5) vital to the maintenance of a coastal ecological process, 6) a unique physiographic feature, or 7) an area of exceptional recreational value (B & A I 1976).

Table 3-5. Potential Preservation Sites in St. Bernard Parish.

MAP NO.	SITE	ACREAGE	**PRIORITY RANKING	CHARACTER AND DESCRIPTION
A	Proctor Point Marsh	9,181	11	An isolated brackish marsh, in generally good condition except along the southern end where it is being eroded by the MRGO. Excellent prime fish nursery ground and waterfowl habitat, also containing a wading bird rookery.
B	Bayous LaLoutre-St. Malo Alluvial Ridge Complex	4,912	10	Portion of the natural levee ridge of an abandoned Mississippi River distributary channel and an important natural barrier to saltwater intrusion. Magnolia Mound Indian Site and several other archaeological sites are present on this live oak and palmetto vegetated ridge.
C	Biloxi Marsh	260,790	4	Part of Biloxi Wildlife Management area and essentially a wilderness area. Excellent fisheries nursery grounds, furbearer habitat, and oyster production area.
D	Chandeleur Islands	44,922	3	Barrier islands consisting of beach, dunes, mangrove, and saline marsh with submergent grass beds on the eastward side. Part of the Breton Island National Bird Refuge and an extremely important nesting area for a variety of seabirds, waterfowl, and the endangered loggerhead sea turtle. Also important spawning area for many fish and crustaceans, and a popular surf fishing area.

* Map Numbers Correspond to Areas in Figure 3-3.
** Priority Ranking in a Total of 50 Potential Areas.

Source: B & A I 1977b

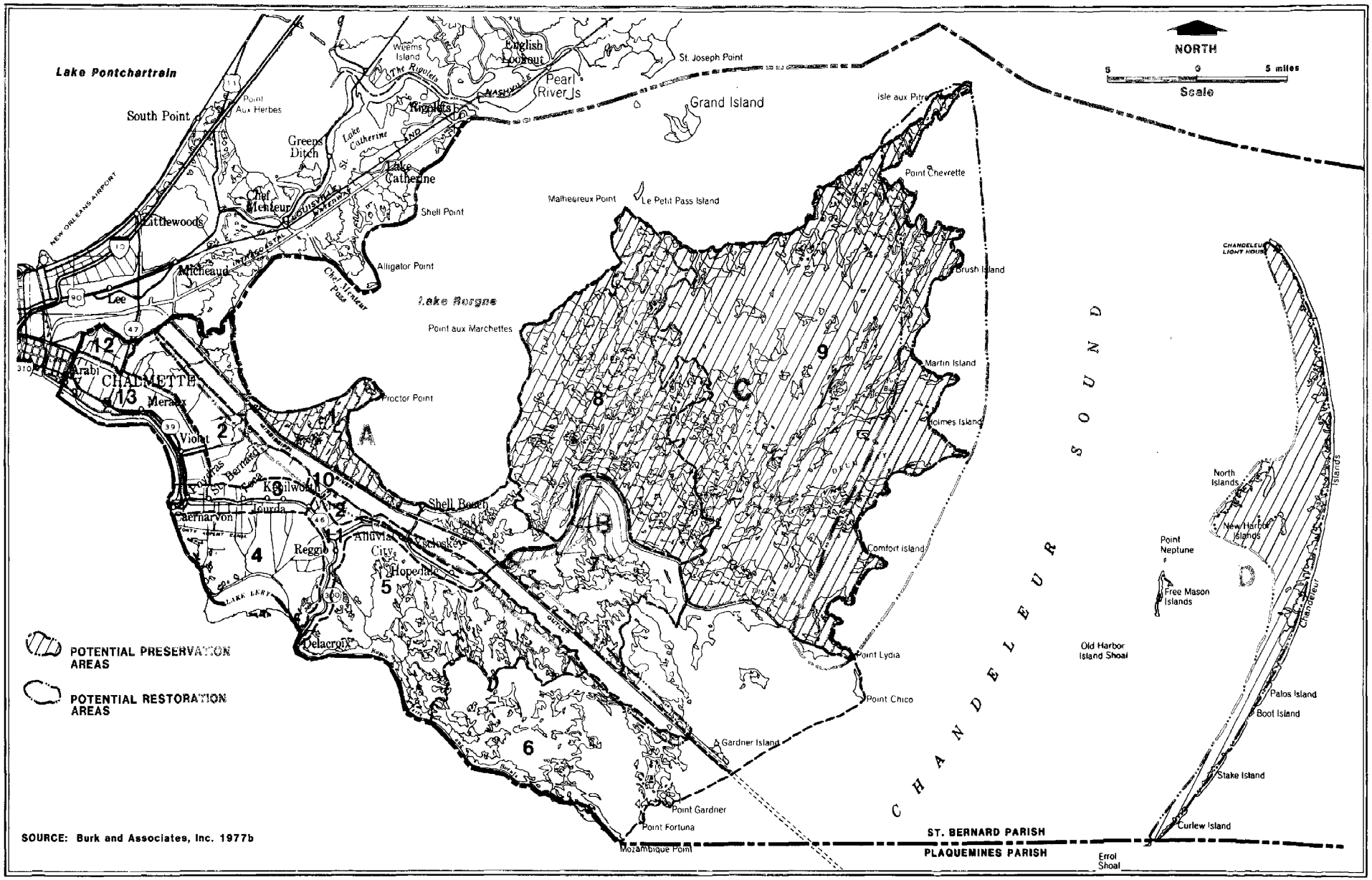


Figure 3-3. Potential preservation and restoration areas in St. Bernard Parish (after B & A I 1977b).

In addition to unique features, particular areas of concern may also be identified as areas requiring special management procedures. An area which qualifies can be nominated and classified as a Special Area using the procedure described in Chapter VII, and special management plans can be developed for the area. In considering areas which may qualify, the following potential sites or features should be considered (Figure 3-4).

1. Chandeleur Islands (Barrier Islands and Beaches)
2. Freshwater Diversion Areas
    1. Caernarvon
    2. Violet Siphon
3. Fort Proctor
4. Magnolia Mound
5. Seabird Colonies and Wading Bird Rookeries
6. Development Corridor
7. Pipeline Corridor
8. Critical Areas of Shoreline Erosion
9. Submerged Grass beds
10. Deep Migratory Passes
11. Oyster Grounds
12. Prime Furbearer Marsh
13. Forested Ridges
14. Waterfowl Concentration Areas

RESOURCE USE CONFLICTS

There are a number of resource use conflicts within the parish. Conflicts develop, generally, between users who wish to change the natural landscape in order to pursue their activities and users who wish the landscape (i.e., habitat) to remain in a natural or barely altered condition. The former users are usually developers (including residential, commercial, and industrial interests), shipping and transportation interests, and the oil and gas industry. The latter users are sport and commercial fishermen, trappers, and those having recreational interests. Both categories of users are necessary in today's economic and social order, and, their conflicts can be minimized by wise coastal planning and management. One of the goals of the St. Bernard CMP, as contained in the ordinance, is "...minimization of adverse effects of one resource use upon another...", and this goal is set in a general framework of balancing development and conservation. This is a clear directive to the CMP to provide conflict resolution to users and to mitigate impacts. The following discussion

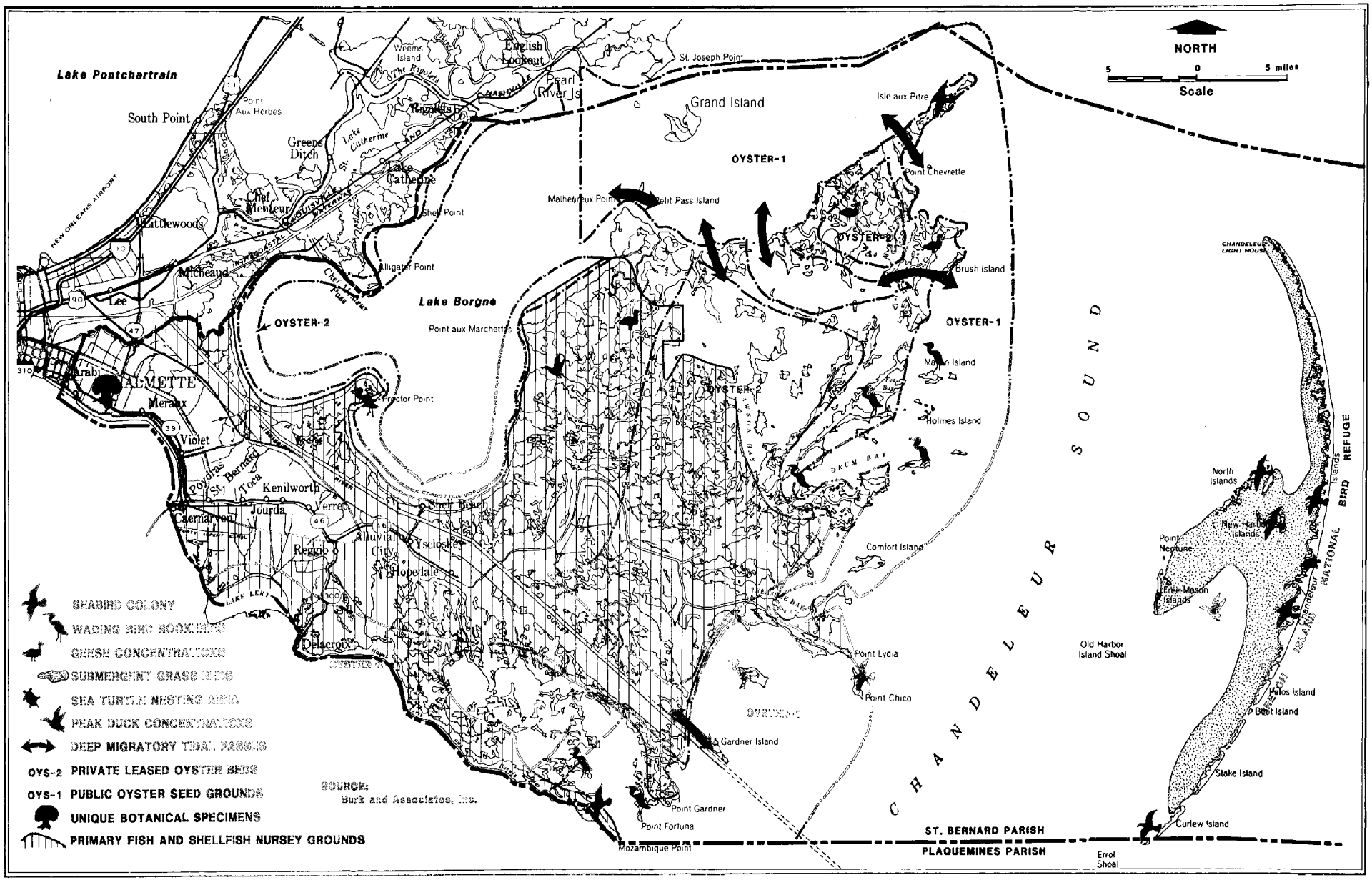


Figure 3-4. Potential unique and particular areas in St. Bernard Parish (after B & A I 1979).

briefly outlines the nature of resource user and natural habitat maintenance conflicts in St. Bernard Parish.

The Petroleum Industry

St. Bernard Parish lands contain considerable amounts of oil and gas reserves which have been under development for a number of years. Evidence of these extraction activities is available in the form of the many rig cuts, pipeline canals, drilling rigs, and other hardware. Canal dredging for access to new areas to be drilled and for pipelines has caused salinity intrusion and primary and secondary land loss. Seismic operations have occasionally caused oyster and other wildlife mortalities. Spills of oil, drilling muds, and other chemicals sometimes impact habitat and especially affect those species unable to move, such as oysters. Pipes and other hardware lost or abandoned in water bodies have become snags for fishermen's nets and are responsible for fishermen suffering economic loss. These are some of the examples of conflicts which occur in the wetlands of the parish.

Navigation

Navigation and waterborne commerce are major financial interests operating in St. Bernard Parish, especially along the Mississippi River and the MRGO. The Port of New Orleans, one of the busiest ports in the country, and its spinoff industries situated near the parish, are major employers for the area. However, the MRGO, completed in 1963, has contributed to substantial saltwater intrusion into the St. Bernard Parish wetlands and Lakes Borgne and Pontchartrain. The canal is continuously widening at an alarming rate through erosion, thereby further contributing to land loss in the parish. A partial solution to the saltwater intrusion problem lies in the diversion of Mississippi River water into parish wetland areas to dilute and retard intrusion of saline waters. However, the commitment of the waters of the Mississippi River to navigation uses, as evidenced by the proposed deep draft channel, may hinder other uses of the river water. These conflicts are much in evidence along the MRGO and the Mississippi River but are also felt in most parish wetlands.

Development

The landforms of the parish are dominated by a pattern of higher lands (natural levees) along existing and abandoned channels of the Mississippi River with lower wetlands (interdistributary basins) between the levee ridges. Development has concentrated

along these ridges, and higher lands available for new development are becoming increasingly scarce. Consequently, development of the lower, marginal, flood-prone lands on the backslope of the natural levees is occuring along the wetland/ridge interface adjacent to already developed areas. Wetlands near the base of the levees are being reclaimed and developed, and as developable habitat dwindles, flooding increases, thereby prompting a call for even more levees and pumps.

Water Quality

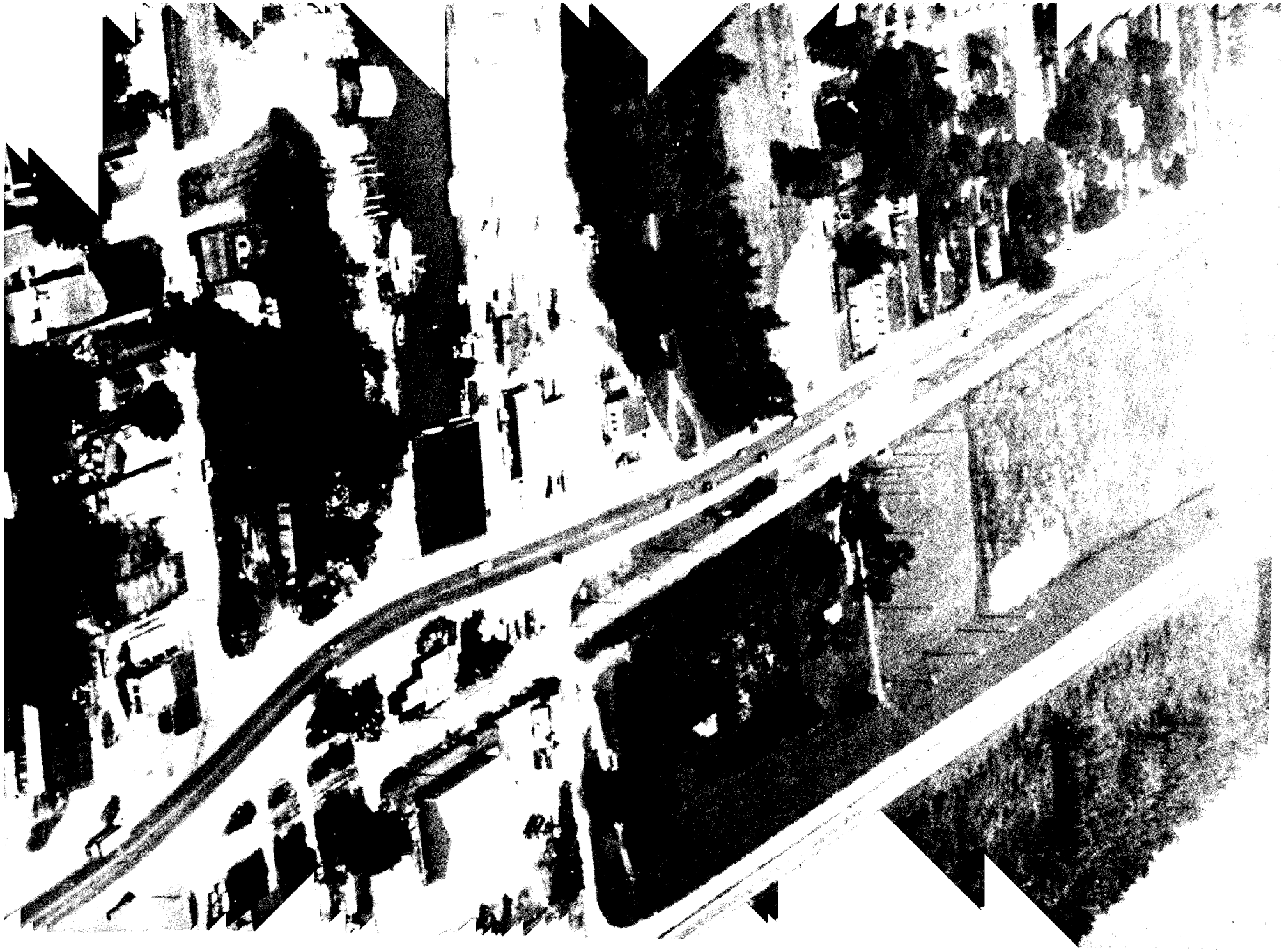
As urbanization encroaches on lowlands, sewage and storm runoff cause pollution problems in the adjacent backswamps, marshes, and estuarine water bodies. Water quality in the Mississippi River is of concern because clean Mississippi River water is needed for freshwater diversion into the wetlands. Because oysters tend to accumulate coliforms, an indicator of sewage pollution, polluted diversion waters can cause the periodic closure of oyster beds by the Department of Health and Human Resources when standard coliform levels are exceeded.

Space Conflicts

Because there is little ridge land available, the competition for it is intense, especially in the lower reaches of the parish where the ridges are already narrow but becoming narrower because of subsidence and erosion. Transportation networks (roads) compete for space with recreational usage, including marinas. This conflict for space is especially evident along the levee ridge from Reggio to Delacroix.

Conflict Resolution

Resolution of the conflicts described above is a major goal of the CMP. The performance standards, goals, and procedures described in Chapter VII are designed to provide a measure of resolution to the conflicts and to insure that one user does not unnecessarily impact or hinder other users.



CHAPTER IV: SOCIOECONOMIC CONSIDERATIONS

POPULATION CHARACTERISTICS

St. Bernard Parish has been developing rapidly over the last thirty years. As the population changed, so did the land use and economic base of the parish. With the increase in population, there came a need for more developable land, houses, and services. The population doubled in size during the 1950-60 period, and in 1960-1970 increased by 59%. There has been an additional population increase of 25.2% during 1970-1980. Table 4-1 summarizes the past, present, and projected future population of St. Bernard Parish.

At the present time, the 1980 census shows that the population is 64, 097, with 94.9% white and 3.7% black. Most of the population is concentrated on the high levee ridges of Management Unit 13 (the Urbanized Area) and Management Unit 3 (the Lower Urbanized Levee). The character of Management Unit 13 is an extension of the New Orleans Metropolitan area to the northwest with a number of parish residents commuting there for employment, education, and cultural services. The remainder of the population resides in Management Unit 3, stretching from Poydras to Verret and from Verret to Hopedale and Delacroix (Management Unit 11 - Semi Urbanized Levee). Unit 3 still retains some of its rural characteristics and has potential for further development because of its leveed vacant land areas. Over the years, the character of these management units has changed slowly from rural to urban. In 1950, 24% of the population was urban and 76% rural. By 1980, the population changed to 94% urban and 6% rural (B & A I 1979). This change in Units 3 and 13 is attributable to the limited extent of high ground in the parish. Because the demand for land suitable for development is great but the availability limited, the population of St. Bernard will increase in density in the developed area.

ECONOMIC CHARACTERISTICS AND PROJECTED EMPLOYMENT

As the population and population density increased, the nature of the economic base of the parish changed. Agriculture and fishing, which had been the basis of the economy in St. Bernard Parish from early times, began to be replaced by economics associated with oil and gas production. The new economic base for the parish includes shipping, manufacturing, residential development, and chemical and petroleum production. This type of development requires large tracts of land which must come from areas previously utilized by the agricultural, fishing, and trapping interests.

Table 4-1. Post, Present, and Projected Population of St. Bernard Parish.

1950	1960	1970	1980	1990	2000
11,087	32,186	51,185	64,097	80,054 (projected)	92,260 (projected)

Source: Segal et al. 1976

Table 4-2 shows the average employment by industry from 1969-1970. The manufacturing and trade industry employs nearly 55% of the people in the parish. The major industrial employers are Kaiser Aluminum, Amstar, Murphy Oil Company, and Tenneco Oil Company, which are all located in the Urbanized Levee Management Unit (13). The Semi-Urbanized Management Unit (3) supports the Shell Oil Gas Processing Plant, Union Texas Petroleum Gas Processing Plant, and Southern Natural Gas Company Operation Plant. Although the percentage and total number of workers in the manufacturing and trade industries have decreased slightly in the last few years, these industries are still important to the parish's overall economy. The number and acreages of farms have also decreased, but the agricultural income has increased. This income is derived from livestock, truck farming, and horticulture speciality farms. The fisheries industry, like the agricultural industry, is still an integral and vital part of the economic base of St. Bernard. The published employment figures for this industry are misleading, due to the fact that most of the commercial fishing is done "in season" or on a part-time basis, and is, therefore, not incorporated into the employment statistics.

The projected employment in St. Bernard Parish for the year 1995 is shown in Table 4-3. These projections were derived by performing a linear regression analysis on the historical employment data available from the Parish Data Bank, Ruston, Louisiana (B & A I 1978a). It was found that this method indicated high correlations in some areas like government, finance, services, and trade, while the others did not achieve reliable correlations. Adjustments were made in the manufacturing, mining, trade, agricultural, and construction sectors to compensate for the unreliable estimates. The projected mining employment was reassigned to manufacturing based on the fact that energy reserves are decreasing and those people would probably seek employment in the expanding manufacturing field. Other adjustments were also made in the agriculture and construction areas, due to the fact that in the construction industry employment fluctuates, whereas in the agriculture sector, employment was expected to stabilize. All other employment sectors were based on the linear regression analysis.

FUTURE LAND USE NEEDS AND REQUIREMENTS

The existing land use of St. Bernard Parish was presented in Chapter II. Results of studies pertaining to the future land use needs and requirements are derived from the Regional Planning Commission (1978a), B & A I (1978a), and Segal et al. (1976). Recommended land use standards are shown on Table 4-4. It is recommended that the

Table 4-2. Average Employment by Industry for St. Bernard Parish.

Year	Total	Manufacturing	Mining	Construction	Trade	Transportation	Finance	Services	Government
1969	7475	4161	147	334	1906	295	202	430	*
1970	7503	4234	148	410	1754	316	201	441	*
1971	7385	4026	121	603	1587	351	211	487	*
1972	8079	3887	264	801	1703	359	247	651	168
1973	8212	4233	169	784	1422	415	260	737	189
1974	8622	4445	131	779	1554	424	280	814	196
1975	9240	4214	153	740	2181	660	365	652	105
1976	10425	4547	135	949	2533	664	346	1183	68
1977	11579	5005	137	891	3124	710	360	1253	100
1978	13428	5253	192	907	2189	983	374	2918	610
1979	13948	5167	174	982	2490	993	408	2936	740

*No data available

Source: Office of State Planning 1982

Table 4-3. Projected 1995 Establishment Based Employment - St. Bernard Parish, Louisiana.

Agriculture	30****	Trade	3,487***
Government	3,624	Construction	726**
Transportation	723	Mining	300*
Finance	319	Manufacturing	5,000*
Services	1,573	Total	15,781

* Adjusted

** Averaged

*** Average Employment Projection

**** Estimated

Source: B & A I 1978a

Table 4-4. Land Use Standards for St. Bernard Parish.

Residential	99 acres/1,000 population
Commercial	5 acres/1,000 population
Industrial	.2 acres/manufacturing employee
Recreation & Cultural	5 acres/1,000 population
Public/Semi-Public	1.5 acres/1,000 population

Source: B & A I 1979

residential acreage be approximately 99 acres/1,000 persons (B & A I 1976), based on a projection of 3.2 persons per household for 1995 (Segal et al. 1976). Commercial acreage should be approximately 5 acres/1,000 persons and industry needs 0.2 acre/manufacturing employers. The recommended land use standard for recreation is 5 acres/1,000 population for recreation and is based on the regional average for existing acreage of parks. The American Public Health Association (1960) recommends that 1.6 acres of land be allotted for each 1,000 people for public and semi-public use, with the majority of the land being used for schools and the remainder for general community facilities such as streets, sewer lines, and power lines.

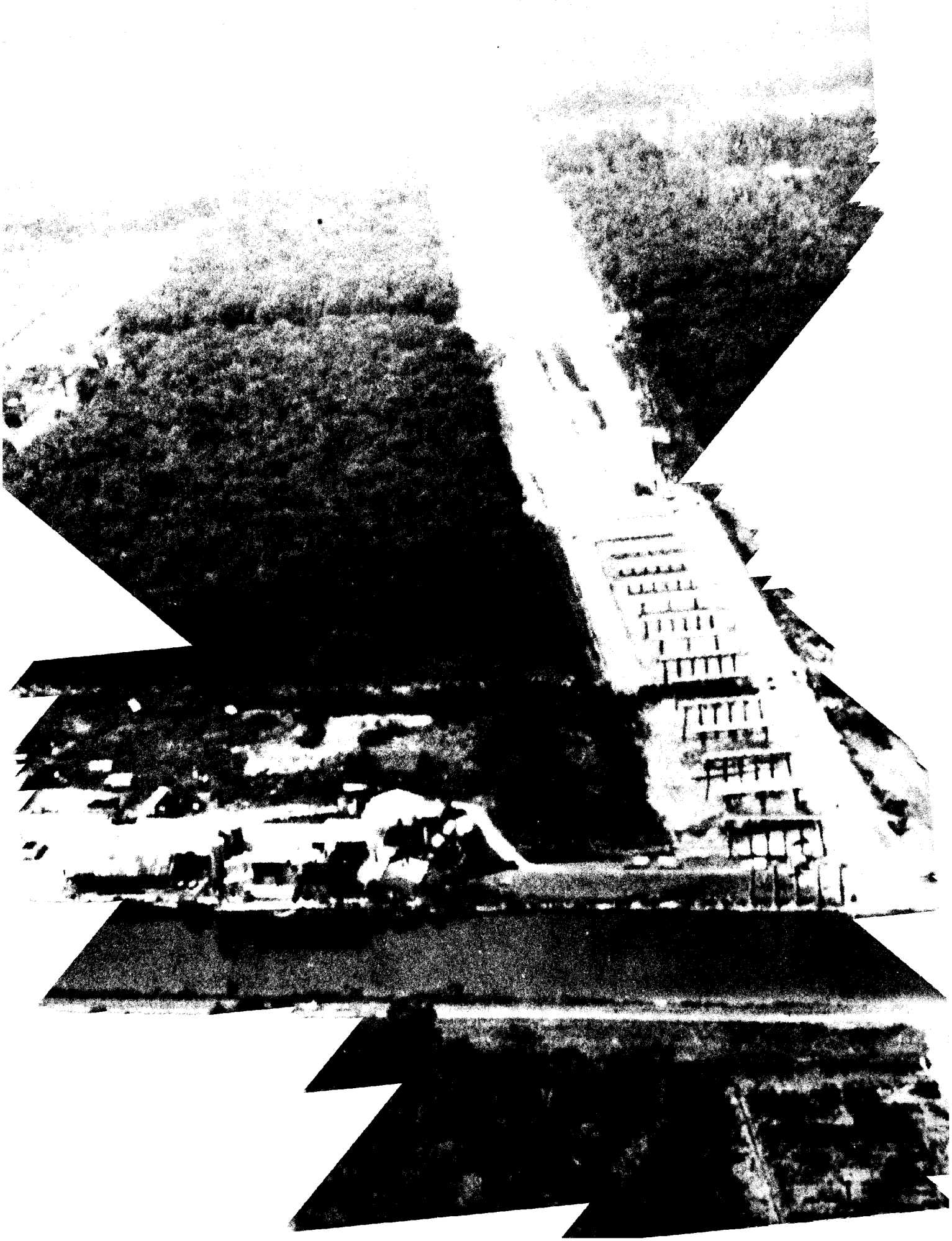
PROJECTED LAND USE

The Regional Planning Commission for Jefferson, Orleans, St. Bernard, and St. Tammany Parishes has completed a comprehensive regional plan which has been technically designated as the "Managed Growth Plan" (Regional Planning Commission 1978). This "Managed Growth Plan," with an implementation target for the year 1995, assumes that growth can be "allocated" so that increased and decreased densities may occur at various places within the region. Selective development of new areas of the member parishes are encouraged, as is the revitalization of older urban centers. It is anticipated that St. Bernard will receive some of its future development from the expansion of the New Orleans area eastward along St. Bernard highways. The development that is expected to occur is generally in accord with the parish's natural environment. The 1995 projections for the type and areal extent of specific land use purposes are shown in Table 4-5.

Table 4-5. Categories of Projected Land Acreage Representing the Existing Cordoned Areas for St. Bernard Parish.

LAND USE	ACREAGE
Low Density Residential	2,304
Medium Density Residential	523
High Density Residential	157
Public and Semi-Public	356
Parks & Recreation	842
Commercial	857
Industrial	1,508
Vacant	2,593
Streets	3,020

Source: Regional Planning Commission 1978



CHAPTER V: ENVIRONMENTAL ISSUES

ENVIRONMENTAL PROBLEMS

The coastal wetlands of St. Bernard are a dynamic system undergoing constant change, due to a combination of natural processes and man-made actions. The environment is experiencing rapid modification which, if left unchecked, will destroy the productive, resource-rich wetlands and affect the economic, cultural, and natural habitat values of the parish. Statewide, saltwater intrusion, subsidence, and erosion are resulting in an increasing rate of wetlands land loss (Figure 5-1). Between 1955 and 1978, St. Bernard Parish lost approximately 27,800 acres of land through shoreline erosion, canal dredging, flooding of impounded areas and abandoned reclamation sites, and breakup and flooding of former freshwater swamps and marshes (Wicker 1981). Major environmental problems which must be addressed with a coastal management program are saltwater intrusion, erosion, subsidence, and flooding.

Saltwater Intrusion

Salinity changes (especially saltwater intrusion into former low salinity to freshwater habitats) may be attributed to subsidence, erosion, navigation channels and pipeline canals and, perhaps most importantly, the cessation of periodic flooding of the wetlands by the Mississippi River. Saltwater intrusion, especially into deep, freshwater swamps and marshes, accelerates wetland erosion because it destroys the salt-intolerant plants, and salt-tolerant plants are either slow or are unable to colonize these deeper-water, organic habitats. Wave and tidal action on these unconsolidated, unvegetated flats wash away the soil. As these processes continue, they create larger areas of open water which are susceptible to the influence of Gulf tidal waters, thereby increasing flushing action and erosion, as well as permitting saltwater to progress further inland.

Channelization alters marsh salinities by disrupting sheet flow over the marsh, accelerating the removal of freshwater and providing direct linear routes for saltwater intrusion. Sheetflow, the gradual overland flow of water that distributes nutrients and flushes out detritus, is very important to the maintenance of marsh productivity. Man-made channels are straight, deep, disrupt sheetflow, and prevent freshwater from reaching the outer portions of a marsh. These canals accelerate the loss of freshwater from upper marsh areas. On the flood tide, and during periods of drought, saltwater is

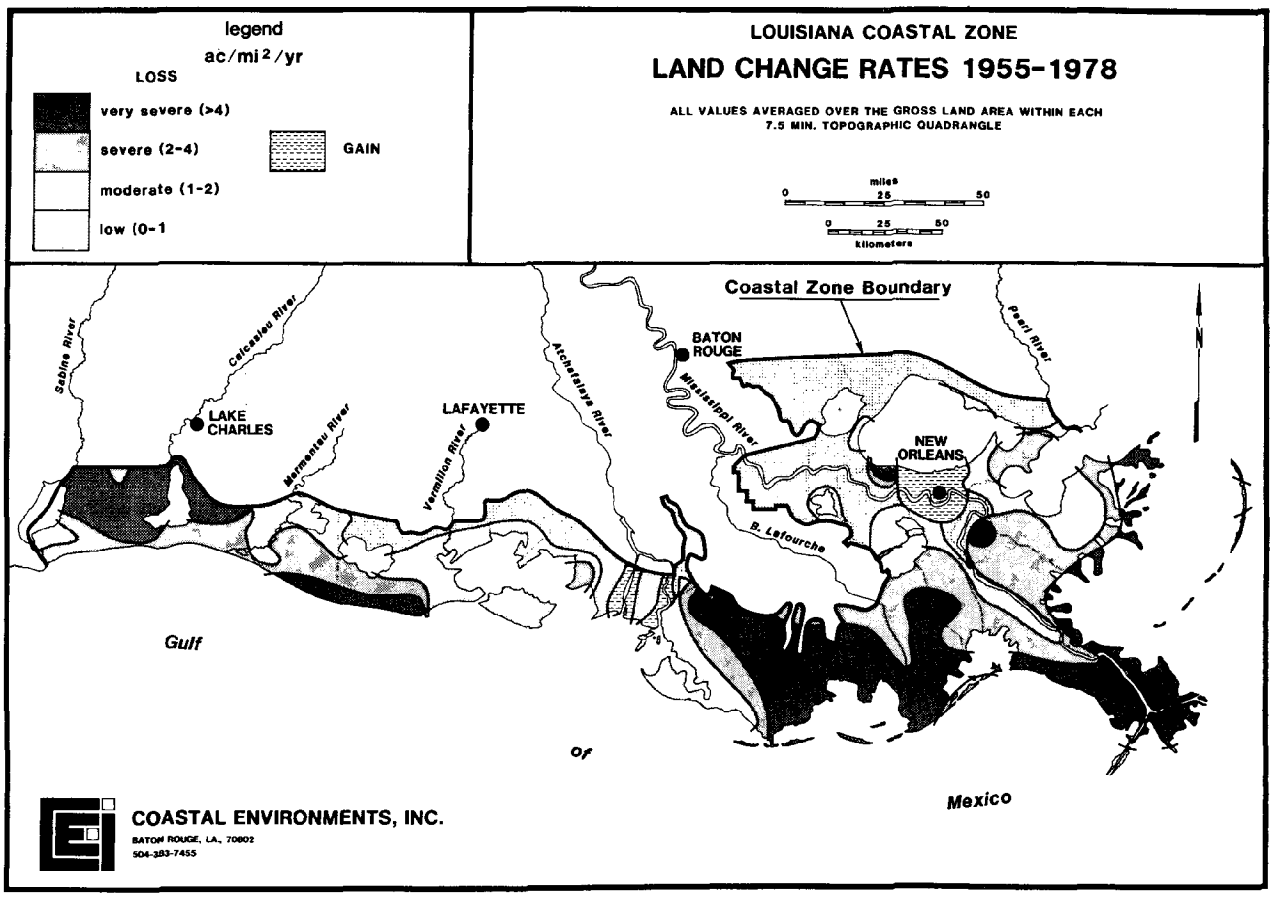


Figure 5-1. Land loss in the Louisiana coastal zone, 1955-1978 (after Gagliano et al. 1981).

returned to the marsh in exchange for the freshwater that is absent or that was short-circuited out of the area through the canals.

The MRGO is by far the largest man-made channel in St. Bernard Parish. Salinities along its course went up immediately in 1963, the first year of operation. Data collected by the U.S. Army Corps of Engineers reveals a threefold increase in salinities along the MRGO since its opening. This saltwater intrusion has caused the formerly fresh and intermediate marsh between Lake Borgne and the East Hurricane Protection Levee (along the 40-Arpent Canal) to become brackish to saline, and all freshwater swamps outside the protection levees are either dead or dying.

Another factor responsible for saltwater intrusion is the decreased flow of freshwater to the wetlands. Prior to the extensive construction of levees on the banks of the Mississippi River, river floods deposited nutrients and sediments in the marsh and produced large zones of low-salinity waters due to the mixing of river and Gulf waters. Construction of the levee system began in 1717, and proceeded gradually until 1880. Levee construction was accelerated from that time until the 1930s. There is evidence of a gradual increase in salinities concomitant with extension of the levee system. As salinities increased, the oyster-producing zone moved landward. This landward migration of the oyster-producing zone is not due to an intolerance of Gulf-strength salinities by oysters but, rather, is a response to increased predation by oyster drills and diseases in waters having salinities greater than 15 ppt. Oysters are a convenient indicator species for a discussion of the effects of increasing salinities because they are immobile organisms, but these effects are not limited to oysters. Other mobile fish and shellfish have shifted their zones of abundance according to their salinity preferences. In the long run, the increasing salinities have decreased the acres of prime low-salinity nursery grounds.

As higher salinities have moved inland, the boundary between brackish and saline marsh types has shifted landward. In the period from 1941 to 1968, this shift of higher salinities was reported to have moved inland from 2 to 5 miles (U.S. Army Corps of Engineers 1974). Between 1955 and 1978, St. Bernard Parish lost approximately 20,200 acres of fresh marsh, 10,300 acres of non-fresh marsh, and 5900 acres of swamp (Wicker 1981). Expansion of the salt marsh has resulted in a decrease of habitat for waterfowl and furbearers. The two most important furbearing animals, nutria and muskrat, prefer to feed on plants that grow in marshes having lower salinity.

Erosion

Land loss due to erosion and subsidence is accelerating as the number and size of water bodies increase. Major natural erosive forces in St. Bernard are wind-generated waves and violent storms, especially hurricanes; while the man-made erosive forces include canal and borrow pit construction and ship-generated waves. Wind-generated waves continuously erode the shorelines of Lake Borgne, Chandeleur Sound, the Chandeleur Islands, and other large, interior water bodies such as Lake Lery. However, the greatest amount of shoreline erosion can occur in a very short time when these exposed areas are subjected to hurricane-generated waves. Hurricanes are especially destructive to the marsh environment when their wind-generated waves scour interior marsh ponds and "eatouts" and floodwaters flush out the organic debris leaving deeper water bodies and a broken marsh surface.

Ship-generated waves, along with strong tidal currents, are probably the primary causes of bank erosion along the MRGO. Studies by coastal engineers have shown that the greatest destruction in confined channels is caused by large, fast-moving, ocean-going vessels. However, even the slowest moving ocean-going vessels create waves which violently lash the canal bank and adjacent marshlands. This erosive action removes the marsh substrate by flushing out surface materials and by causing large sections of the bank to cave into the deep channel. A further discussion of this problem and the impact of the MRGO on adjacent wetlands can be found in St. Bernard Parish: A Study in Wetland Management (Wicker et al. 1982).

Subsidence

Subsidence (sinking of a portion of the earth's surface) is a pervasive process in coastal Louisiana and results from the loading of deltaic deposits onto the continental shelf, downwarping along the Gulf Coast Geosyncline, and compaction of newly deposited sediments (i.e., natural levees). Natural and man-made levees tend to subside into less dense marsh deposits and are sometimes found buried beneath marsh level. The natural levees of Bayou Terre aux Boeufs below Delacroix have subsided noticeably even within the twentieth century. Coupled with the land subsidence processes is a gradual rise in sea level (tide gauge records indicate about one foot in the last century). In the absence of sediment input (i.e., Mississippi River alluvium) to offset the subsidence processes, the natural levee ridges will be lowered to marsh level and the existing marshes will sink below sea level.

Localized subsidence associated with reclamation of wetland habitats for agriculture or development is a problem in the parish for all but the highly inorganic (mineral) natural levee soils. Figure 5-2 illustrates the subsidence potential of St. Bernard Parish soils and can be a useful guide to the economic and engineering problems associated with wetland reclamation.

Subsidence potential refers to the maximum possible loss of surface elevation after a soil with organic or semi-fluid mineral layer is artificially drained and dried. After drainage and air drying, the organic layers in most soils lose more than half of their original volume in the first one to three years. The loss of groundwater buoyancy, consolidation, and compaction account for the initial subsidence. The lowering of soil surface levels will continue at a uniform rate after the initial subsidence due to the biochemical oxidation of organic materials. This subsidence will continue at a rate of up to one inch or more a year until the water table or mineral material is reached. The soils with semifluid mineral layers and without organic layers have a potential for subsidence due to consolidation and loss of water after drainage, but have little or no subsidence after drying. The five major categories of soil subsidence potential are as follows:

1) NONE - Soils that have no subsidence potential. These include mineral soils that contain no organic or semifluid mineral layers.

2) LOW - Soils that have a subsidence potential range of 0 to 3 inches when drained. These include mineral soils with firm subsoils and thin mucky or semifluid clayey surface layers.

3) MODERATE - Soils that have a subsidence potential when drained of 3 to 16 inches. These include soils that contain thick, semifluid minerals layers and soils that contain organic layers with a total thickness of less than 16 inches.

4) HIGH - These are soils with a subsidence potential of 16 to 51 inches when drained. These include soils that contain organic layers with a total thickness ranging from 16 to 51 inches.

5) VERY HIGH - Soils with a subsidence potential when drained of 51 inches or greater. These include soils that contain organic layers of more than 51 inches.

There is a close correlation between soil types and soil subsidence potential and consequently land loss. Those areas with organic soils and a very high soil subsidence potential will have a high potential for land loss.

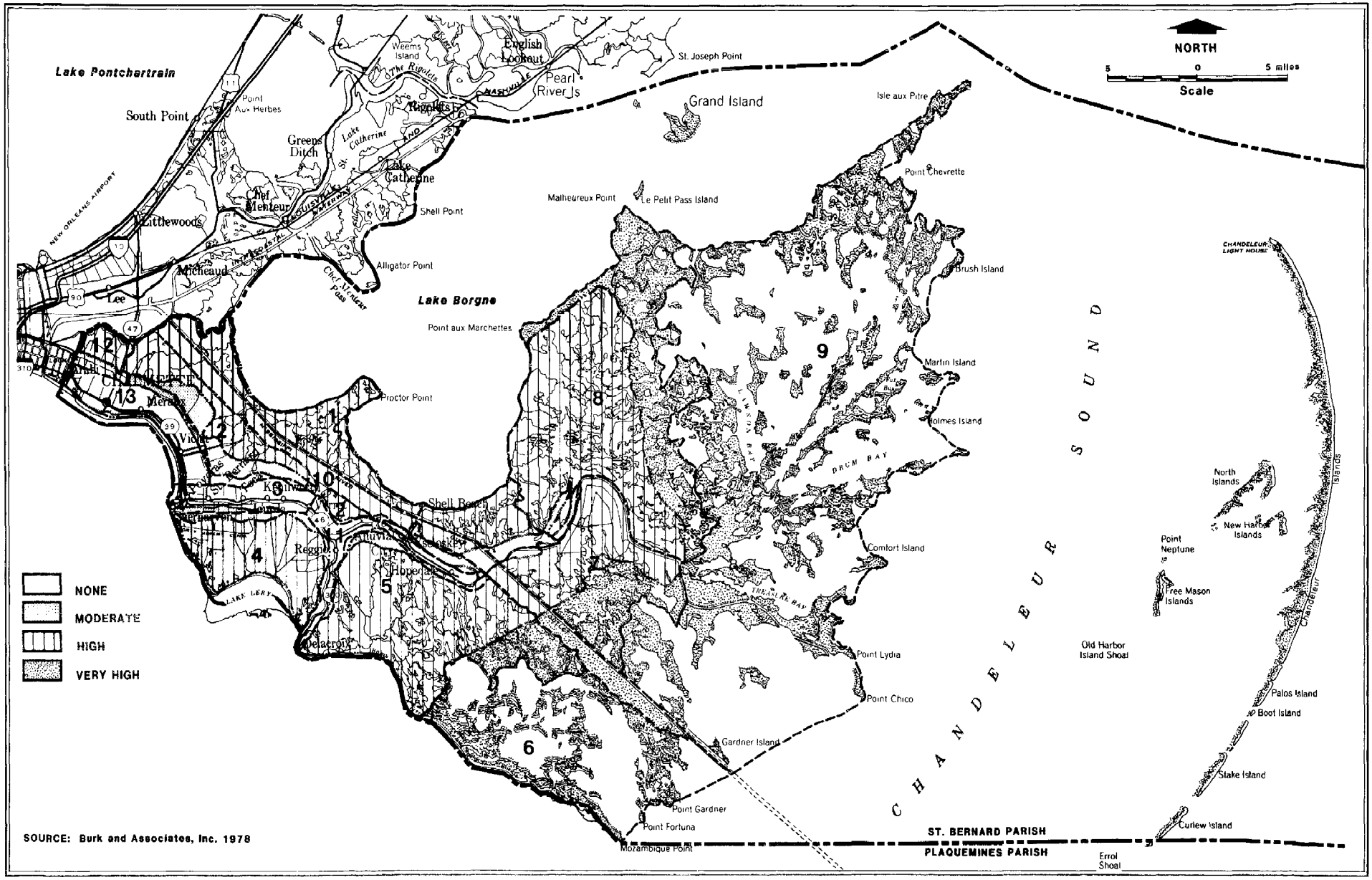


Figure 5-2. Subsidence and land loss potential in St. Bernard Parish (after B & A I 1978).

Flooding

Another major environmental problem confronting St. Bernard Parish is the constant threat of flooding. Figure 5-3 shows the flood-prone areas of the parish indicating that almost 98% of the area is susceptible to flooding.

Flooding can occur in nearly all of St. Bernard Parish because of its low elevation and proximity to the Gulf of Mexico. Flooding occurs primarily as a result of hurricane tidal surge entering from the Gulf and excessive rainfall that accompanies hurricanes and severe thunderstorms. Preservation of wetlands can lessen the impact of flooding in two ways. First, the wetlands can function as a buffer to storm surge by dampening the force of the hurricane-generated waves. Second, wetlands inside the base of the storm protection levees can serve as holding basins, or reservoirs, for water collecting inside the leveed fastlands either from hurricane surges overtopping the levees or from excessive rainfall.

Theoretically, the protection levees, drainage canals, and pumping systems are designed to protect lives and property inside the levees from flooding. However, there is always the possibility that this system can not effectively function under the most severe flood-generating conditions, and the presence of a wetland buffer zone between developed areas and the Gulf of Mexico can offer an added measure of protection. For this reason, it is essential that a viable marsh habitat be maintained outside the levees and a healthy swamp-bottomland hardwood forest be preserved inside the base of the protection levees in the low-lying (near sea-level) areas (Wicker et al. 1982, Roberts 1980).

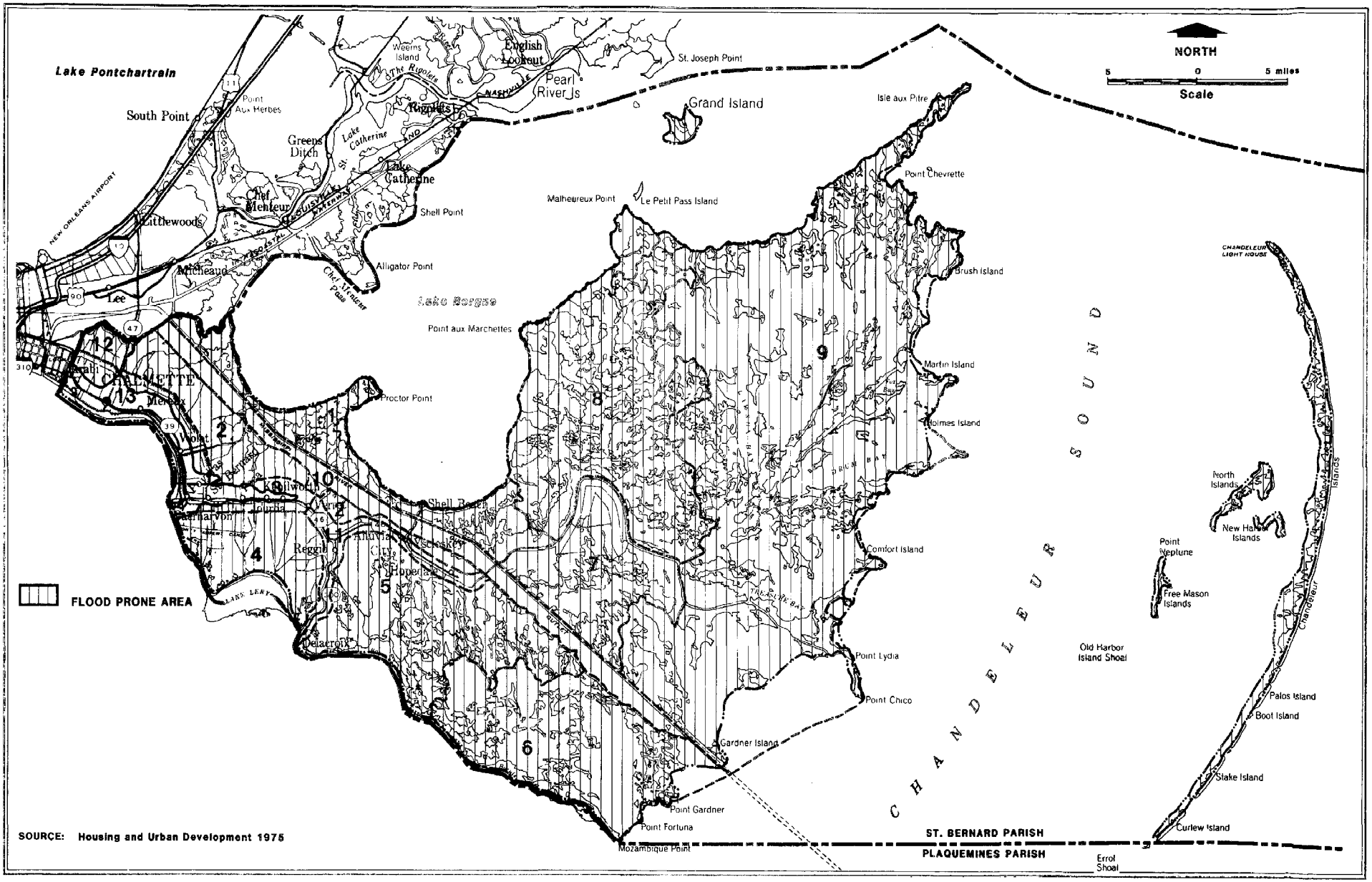


Figure 5-3. Flood-prone areas in St. Bernard Parish (after Department of Housing and Urban Development (1975).

CHAPTER VI: GOALS, POLICIES AND MANAGEMENT UNITS

The Coastal Management Program for St. Bernard was developed in response to a set of established goals. The goals were derived from St. Bernard's Statement of Policy as contained in the ordinance.

STATEMENT OF POLICY

The Parish of St. Bernard is part of both an environmentally sensitive, resource-rich coastal area and an important, developmentally oriented urban core. With these factors in mind, the parish declares the following as its policy toward management of its coastal resources:

1. To promote the health, safety, convenience, and general welfare of the inhabitants of the parish of St. Bernard.
2. To bring about the coordinated, efficient, and economical development of the parish.
3. To protect, develop and, where feasible, restore and enhance parish resources.
4. To support and encourage multiple use of resources consistent with maintenance and enhancement of renewable resource management and productivity, with the need to provide for adequate economic growth and development, and with minimization of adverse effects of one resource use upon another without imposing undue restrictions on any user.
5. To develop and implement management programs which are based on consideration of the resources, environment, and needs of the people of St. Bernard Parish.
6. To establish goals and plans for St. Bernard Parish, based on economic, environmental, and social needs which will guide activity in conformance to this Statement of Policy.
7. To establish separate guidelines for wetlands which recognize that:

   a) The wetlands of St. Bernard Parish, although part of a larger estuarine ecosystem, stretching from Lake Maurepas to the Chandeleur Islands, consist of a series of distinct geographic units. These units have been combined into appropriate districts to facilitate management of these areas.

b) Individual permissible uses for each wetland management unit are based on a balance of economic, environmental, and social priorities and needs for each area.

c) The primary goal for future use of parish wetlands is to maintain them in their natural condition and to restore, when possible, those areas that have deteriorated due to natural and cultural factors. A major aspect of these restoration activities should be the preservation of the parish's archaeological and historical resources. Maximum utilization of the renewable and non-renewable resources of the wetlands is encouraged so long as high productivity is maintained and the ecological balance of the wetlands is not further disrupted.

MANAGEMENT GOALS

The management goals for St. Bernard's Coastal Zone were developed in an effort to achieve the aims of the Statement of Policy. In formulating the goals, factors relating to both the wetland and ridge areas were considered. The St. Bernard Coastal Management Program has the following goals:

1. Attain proper use of parish resources through a balance of conservation and development.
2. Identify areas with unique characteristics and develop methods to maintain them.
3. Determine the degree of development intensity suitable for all areas of the parish.
4. Enhance the biologically productive and physically protective aspects of the parish's wetland environment.
5. Enhance cultural and recreational opportunities in the parish by the development of ecologically sensitive facilities within the context of a comprehensive program.

PERMISSIBLE USES

Permissible uses are those uses which may be undertaken in each management unit, but which may be subject to permit requirements and conditions of the parish ordinance or the Cosatal Management Program.

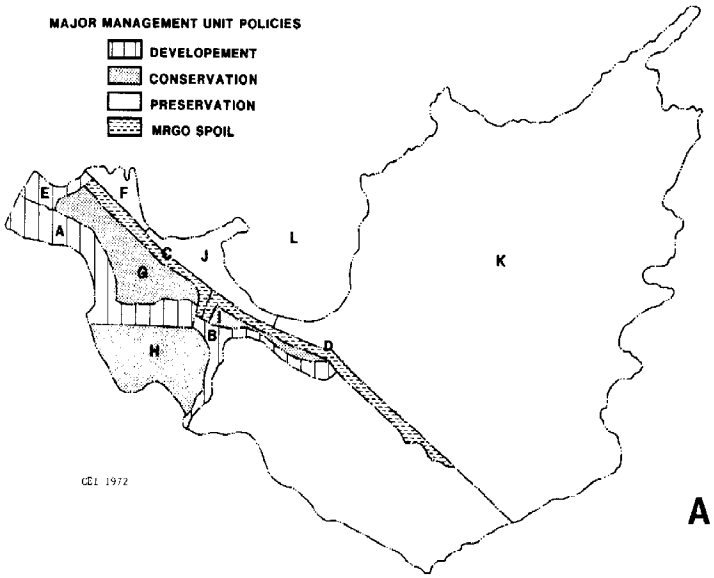
The policy and goals will be implemented through the issuance of Coastal Use Permits and other means. Coastal Use Permits will normally be required for local uses in all environmental management units except Unit 3, the Lower Urbanized Levee; Unit 11, the Semi-Urbanized Levee; and Unit 13, the Urbanized Area, if these uses have no direct or significant impact on coastal waters. In environmental Management Units 3, 11, and 13, uses are subject to existing parish zoning codes and ordinances.

MANAGEMENT UNITS

Introduction

There have been several major research efforts to document the environmental baseline conditions of St. Bernard Parish (CEI 1972), to devise an acceptable coastal zone management program (CEI 1976; B & A I 1978a; 1979), and to recommend wetland management measures to restore and retain habitat diversity and productivity (Wicker et al. 1982). In order to access environmental conditions and recommend structural and non-structural management measures, the parish was divided into management units according to the common physical or cultural features which characterize each unit. The number labels and boundaries of these management units vary slightly in the previously cited studies primarily because of the differences in scope of the individual reports (Figure 6-1). The management units (B & A I 1979) are discussed in the following section of this chapter. Table 6-1 is an environmental summary of each management unit.

A recently proposed Coastal Zone Management Plan for St. Bernard Parish (B & A I 1979) delineated 13 management units (see Figure 6-1 for explanation of discrepancy between units shown in the two B & A I [1978a, 1979] reports), which could be grouped into three major management unit categories; urbanized, transition, and wetland. The Urbanized Management Unit category (Unit 13) includes the leveed (between the Mississippi and hurricane protection levees) Mississippi River natural



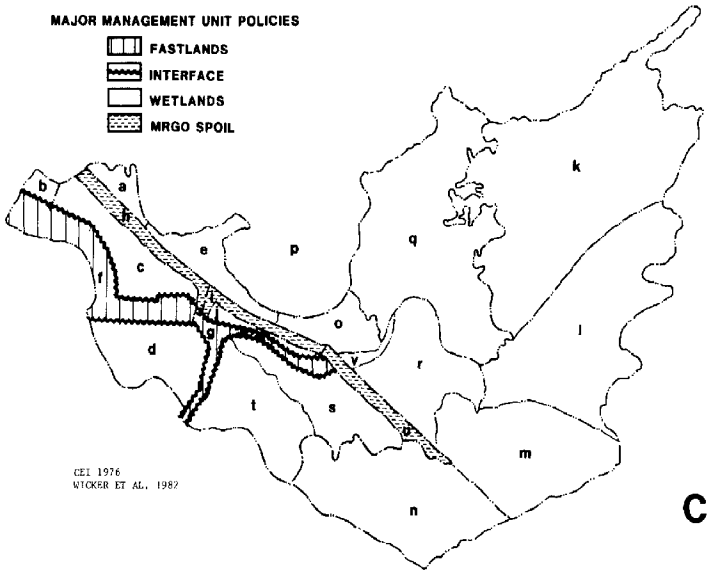
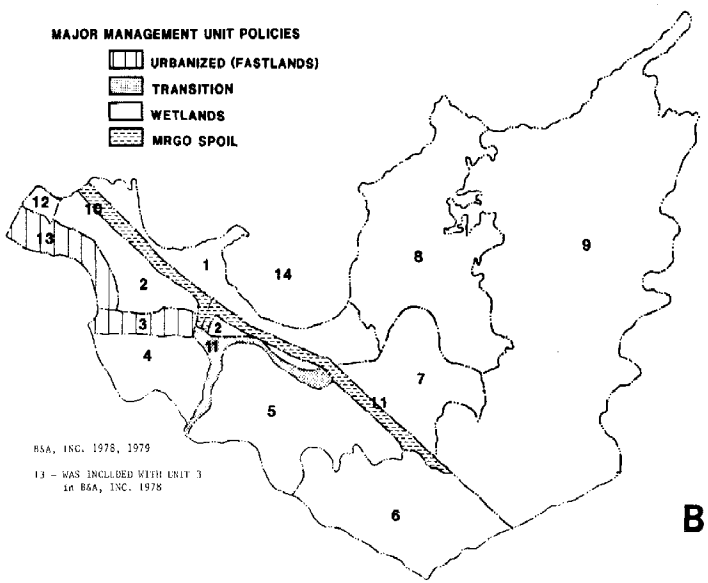


Figure 6-1. Names and locations of management units as presented in various studies of St. Bernard Parish.



CORRELATION OF MANAGEMENT UNITS AMONG VARIOUS MANAGEMENT STUDIES

MANAGEMENT UNITS IN CEI 1972	MANAGEMENT UNITS IN B & A, I 1978; 1979	MANAGEMENT UNITS IN CEI 1976, WICKER ET AL. 1982
†A. Urbanized Levee	†13. Unnamed[1]; Lower Urbanized Levee	#+f. Urbanized Levee
+B. Semi-Urbanized Levee	#11. Semi-Urbanized Levee	+g. Semi-Urbanized Levee
#C. Upper Spoil	*10. MRGO Spoil Area	+h. Upper Spoil
#D. Lower Spoil	*10. MRGO Spoil Area	+i. Lower Spoil (Now Middle Spoil)[3]
#D. Lower Spoil	*10. MRGO Spoil Area	#u. Lower Spoil
+E. Modified Wetland	*12. Modified Wetland	+b. Modified Wetland
#F. Bienvenue Marsh	*1. Bienvenue-Proctor Point Marsh	*a. Bienvenue Marsh
*J. Proctor Point Marsh	*1. Bienvenue-Proctor Point Marsh	#e. Proctor Point Marsh
#K. Undivided Saline Marsh	#1. Bienvenue-Proctor Point Marsh	*o. Lower Proctor Point Marsh
#G. Central Wetland	*2. Central Wetland	#*c. Central Wetland
#H. Lake Lery Marsh	*4. Lake Lery Marsh	#*d. Lake Lery Marsh
#I. La Loutre Wetland	*-. Unnamed[2]	#*j. La Loutre Wetland
*K. Undivided Saline Marsh	*5. Bayou Terre Aux Boeufs Wetland	#*s. Middle Bayou
*K. Undivided Saline Marsh	*5. Bayou Terre Aux Boeufs Wetland	#*t. Bayou Terre Aux Boeufs Wetland
*K. Undivided Saline Marsh	*6. Lake La Fortuna	*n. Lake La Fortuna
*K. Undivided Saline Marsh	*7. Lower La Loutre Wetland	*r. Lower La Loutre Wetland
*K. Undivided Saline Marsh	*7. Lower La Loutre Wetland	*v. Lower La Loutre Natural Levees and Spoil Banks
	*8. Biloxi Marsh	*q. Biloxi
	*9. Bay Boudreaux - Bay Eloi	*k. Bay Boudreaux
		*l. Christmas Camp Lake
		*m. Eloi Bay
*L. Unnamed Lake Area	*14. Unnamed Lake Area	*p. Lake Borgne
Proposed Utilization	Proposed Utilization	Proposed Utilization
+Development	+Urbanized (Fastlands)	+Fastlands
#Conservation	#Transition	#Interface
*Preservation	*Wetlands	*Wetlands

NOTE: [1]Unit 3 in B & A, I 1978 was subdivided into Units 3 and 13 in B & A, I 1979.
[2]Unit was not labeled in B & A, I 1978 but Labeled Unit 2 in B & A, I 1979.
[3]Lower spoil called Middle Spoil in CEI 1976

Table 6-1. Environmental Summary

PLANNING SUB-AREA	Soils	Vegetation	Elevation	Hydrology	Archaeological Historical Sites	Significant Ecological Features	Institutional	Fisheries Value	Trapping Value	Waterfowl Value	Shore-line Erosion	Saltwater Intrusion	Flood Vulner-ability	Soil Sub-sidence Potential	Public Ser-vices (roads, levees, etc.)	Other Pertinent Factors
1. Bienvenue-Proctor Point Marsh	Organic	Brackish marsh	0 to 1'	Tidal, MRGO, Lake Borgne	9 Archaeological 3 Historical	1 bird rookery, productive oyster beds in Lake Borgne	None	Very high	Moderate	Moderate to high	C	C	C	VH	None	Proctor Point marsh is a potential preservation area. Very high recreational potential.
2. Central Wetland	Organic	Brackish marsh, cypress swamp in poor condition	0 to 1'	Tidally drained, but greatly altered by MRGO spoil bank	3 Archaeological Historical	None	None	Low to moderate	Moderate	Low	L	M	M	M-VH	Roads Transmission Lines	Freshwater management area via Violet siphon project. Potential port development, potential impoundment area.
3. Lower Urbanized Levee (Poydras to Verret)	Primarily mineral clays & loams	Bottomland hard-woods & cypress swamp	1 to 5'	Drainage from ridge into 40 Arpent Canal	4 Historical	Bottomland hardwoods on ridge	Schools, churches, fire stations	None	Low	None	N	N	L	N	Inadequate	Inadequate levee protection, roads, and sewage treatment at the present time.
4. Lake Lery Marsh	Organic	Brackish marsh	0 to 1'	Tidal drainage through old drainage canals	4 Archaeological	Important trapping & waterfowl area	None	Moderate	High	High	M	M	C	VH	Transmission Lines	Primary impact area from future Caernarvon freshwater diversion project.
5. Bayou Terre aux Boeufs Wetland	Organic	Brackish marsh	0 to 1'	Primarily natural tidal drainage	9 Archaeological	Important shrimping area	None	Very high	High	High	M	C	C	VH	None	Area in great need or marsh management structures.
6. Lake LnFortune	Organic	Saline marsh	0 to 1'	Natural tidal drainage	6 Archaeological	3 bird rookeries, important shrimping & oyster area	None	Very high	Low	Moderate	C	C	C	H	None	Prime shrimp and oyster producing area.
7. Lower LaLoutre Wetland	Primarily organic	Brackish & saline marsh, dying oaks dying oaks on LaLoutre ridge	0 to 5'	Natural tidal drainage	3 Archaeological 3 Historical	LaLoutre ridge is important erosion & storm buffer, oyster area	None	Very high	Moderate	Moderate	C	C	C	VH	None	Area in great need of marsh management structures.
8. Biloxi Marsh	Organic	Brackish marsh	0 to 1'	Natural tidal drainage some semi-impoundment	16 Archaeological	Probably most stable and remote section of St. Bernard marsh left from waterfowl & fisheries standpoint	State Wildlife Management Area	Very high	High	Very high	M	M	C	VH	None	Extremely valuable marsh area for waterfowl, trapping and fishing.
9. Bay Boudreaux-Bay Eloi	Organic	Saline marsh	0 to 1'	Natural tidal drainage, large lakes & bays	22 Archaeological	Prime oyster area but decreasing in value, geese concentrations, excellent fishing, 7 known rookeries	None	Very high	Low	High	C	C	C	H	None	Formerly most productive oyster leases in Parish; area is essentially wilderness and has excellent fishing.
10. MRGO Spoil Area	Combination organic & mineral	Disturbed fresh marsh, shrubs, willow thickets	Variable 10-15' in places	Gravity drainage from land-locked spoil ponds	3 Archaeological	Good waterfowl & rabbit hunting in certain areas	None	None	High in areas	Moderate	M	L	M	M	None	Corps has spoil easement for spoil disposal.
11. Semi-Urbanized Levee	Primarily mineral	Hardwood forest along road, agriculture, brackish marsh very close to road	1 to 5'	Drainage from ridge to marsh through major bayous	2 Archaeological 3 Historical	Important saltwater & storm barrier	Schools, churches	None	Low	None	M	M	C	M-N	Roads, Transmission Lines	Natural levee is subsiding, saltwater intrusion killing many oaks along ridge.
12. Modified Wetland	Organic	Dead cypress swamp, brackish marsh in poor condition	0 to 1'	Greatly altered, drainage through drainage canals into Bayou Bienvenue	None	None	None	Low	Low	None to Low	N	L	M	VH	Road, Transmission Lines	Although area is of little ecological value, many technical & engineering problems would be involved if it were to be developed.
13. Urbanized Area	Primarily mineral clays	Cleared, some hardwood forest	1 to 10'	Forced drainage via pumping stations and drainage canals	4 Historical	None	Schools, churches fire stations	None	None	None	N/A	N/A	L	N	Roads, Transmission Lines	Area of intense development.

NOTE: All wetland areas are important fishery nursery areas. Those with salinities ranging from 5 to 15 ppt are most important.

Source: B & A I 1979

Shoreline Erosion
Saltwater Intrusion
Flood Vulnerability

C - Critical
M - Moderate
L - Low
N - None

Soil Subsidence Potential

VH - Very High
H - High
M - Moderate
L - Low
N - None

levee lands stretching southeastward from the St. Bernard-Orleans Parish boundary at Arabi to Poydras. The vast majority of this unit consists of commercial, residential and industrial developments. The southeastern portion of this unit contains a limited amount of acreage in low-lying bottomland hardwood forests situated near sea level inside and adjacent to the East Hurricane Protection Levee. However, this area is being rapidly cleared and drained for residential and commercial development in the wake of the southeastward extension of the Judge Perez Highway (a hurricane evacuation route for the lower portions of the parish) to Verret.

The Transition Management Unit category includes the leveed (between the East and West Hurricane Protection Levees) Bayou La Loutre ridge stretching eastward from Poydras to Verret (Unit 3) and the unleveed portions of the Bayou La Loutre ridge east of Verret and the Bayou Terre aux Boeufs ridge south of Verret (Unit 11). The portion of this unit between Poydras and Verret (Unit 3) really should be considered as part of the urbanized unit. It is protected from flooding by Hurricane Protection Levees and is undergoing rapid residential and commercial development, especially on the cleared, former agricultural lands, since the extension of the Judge Perez Highway to Verret. The low-lying (near sea level) portions of this unit at the base of the Mississippi River natural levee and adjacent to the hurricane protection levees consist of healthy fresh marshes and bottomland hardwoods on the west side of the La Loutre Ridge and stressed marshes and bottomland hardwoods (including baldcypress swamps) on the east side of the ridge. This latter area went from a fresh to an intermediate-to-brackish water environment when the hurricane floodgates were breached. With recent restoration of the gates, this area should return to a freshwater environment subject to impoundment and flooding during heavy rains. However, the entire unit (between the protection levees) is being rapidly developed and the long-term restoration of the interior (within the levees) wetlands is doubtful.

That portion of the transition management unit (also labeled semi-urbanized levee - Unit 11 [B & A I 1978a]) stretching east and south of Verret along the former Mississippi River distributary levees of Bayou LaLoutre and Bayou Terre aux Boeufs is very low-lying and unprotected by Hurricane Protection Levees from flooding from the southeast. While there is some linear small town development along the higher elevations of these natural levee ridges, subsidence has decreased the width and elevation of these levees in recent years. Plans for future, long-term development of these ridges must seriously evaluate the cost of preserving the developments against

storm surge and the natural degradational processes (i.e., subsidence and erosion) dominant in this portion of the abandoned Mississippi River-St. Bernard Delta Lobe.

In summary, it can be stated that the artificially leveed (by Mississippi River and East and West Hurricane Protection Levees) natural levee ridges of the Mississippi River and Bayou LaLoutre are the most suitable lands in the parish for development because of their elevation, flood protection measures and tranportation infrastructure. The natural levee ridges of eastern Bayou LaLoutre and Bayou Terre aux Boeufs have been developed largely by commercial fisheries, trapping, and petro-chemical interests, but they are not leveed and are therefore subject to flooding from hurricane storm surges. Future intensive development of this latter area should not be encouraged because of the continuing natural subsidence of the levee ridges and the tremendous costs of providing flood protection to such a narrow, low-lying, and exposed ridge community. Almost all urbanized and transition areas (leveed and unleveed natural levee ridges [Units 3, 11 and 13]) was considered suitable for development by CEI (1972) and were labeled as fastlands in the 1982 CEI study (Wicker et al. 1982).

It should be noted that the 1982 CEI study recommended that the low-lying, existing and former wetlands near sea level between the base of the natural levee ridges and the hurricane protection levees be considered as an interface or buffer zone between the urban/industrial fastlands and the productive/protective wetlands (Wicker et al. 1982). While these areas can be developed, they are subject to flooding during heavy rainfall because of their extremely low elevation, flat topography, and impounded nature. By leaving them in wetlands, they could serve as a buffer zone and be used to filter urban runoff before it is introduced to the wetlands and estuaries outside the protection levees. This buffer zone could also serve as a recreational area for urban inhabitants and increase habitat diversity by constituting the only freshwater environment in the parish likely to be maintained over the long term.

The wetlands of St. Bernard Parish constitute those lands outside of the hurricane protection levees, and extending away from the base of the natural levee ridges, excluding the MRGO spoil retainment areas (Unit 10 in B & A I 1979) southwest of the MRGO. Historically, the wetlands graded from saline marshes along the perimeter of the abandoned Mississippi River-St. Bernard Delta, to brackish-to-intermediate, and finally to fresh marshes in the interior portions of the parish adjacent to the cypress swamps located at the toe of the natural levee. Saltwater intrusion via canals,

abandoned Mississippi River distributaries, the MRGO, and eroding marshland channels has diminished the natural habitat diversity to the extent that there are virtually no freshwater marshes or cypress swamps in the parish and only very limited expanses of intermediate marsh. Most of the fresh-to-intermediate wetland environments occur inside the hurricane protection levees and in isolated wetland pockets between the natural levee ridges and spoil deposits. Some fresh to intermediate wetlands also occur in the poorly drained areas of the MRGO spoil between the spoil retention levees. Brackish marshes comprise the wetlands along the gulfward base of most of the hurricane protection levees and natural levees of the LaLoutre and Terre aux Boeufs. Large expanses of saline marsh are located gulfward of the brackish marshes and constitute the largest habitat category found in the parish other than open water. (For a more detailed discussion and maps of recent vegetation delineations in St. Bernard Parish see Chabreck and Linscombe 1978 and Wicker et al. 1982.) Table 2-1 illustrates the changes in habitat types in St. Bernard Parish between 1955/56 and 1978 (Wicker 1981). These data are derived from a synthesis of habitat areal measurements obtained from planimetering the habitat maps of the parish (Wicker 1980; Wicker et al. 1980).

Land loss (i.e., the conversion of land to water) in St. Bernard Parish between 1955/56 and 1978 amounted to approximately 27,800 acres. About 4800 acres of land (i.e., marshlands) were lost as a direct result of MRGO construction (B & A I 1979); approximately 1800 acres of land were lost because of other types of canal construction, borrow pits, and flooded impoundments; the remainder of the loss was a result of natural shoreline erosion along channels, ponds, lakes, canals, and barrier islands. This latter land loss occurred because of wave erosion and marsh breakup resulting from faunal (primarily muskrats and geese) eatouts, hurricanes, subsidence, and saltwater intrusion into freshwater swamps and marshes. Approximately 100 acres of bottomland hardwood forest and fresh-to-intermediate marsh will be destroyed during 1982 if borrow material is extracted southeast of Verret to elevate the West Hurricane Protection Levee between Verret and the Caernarvon canal (U.S. Army Corps of Engineers 1981). Leveed impoundments and saltwater intrusion in the northwestern portions of the parish also contributed to land loss as the fresh marsh and cypress swamps died in these areas.

The largest amount of land loss appears to be along the MRGO channel (variously labeled as F, J, K; 1, 7, 9; and a, e, o, v, r, m [see Figure 6-1]) because of shoreline

erosion associated with ship wakes in the Lake Lery unit (variously labeled as H, 4 and d) because of faunal eatouts and hurricane scour, and in the interior, formerly freshwater swamps and marshes (variously labeled as E, G, I; 12, 2, and b, c, j). Shoreline erosion also has been extensive along the Chandeleur Islands because of wave action. The same type of wave action coupled with natural subsidence (and/or sea level rise) has resulted in continuous shoreline erosion (usually on the shore exposed to dominant wind direction) in the gulfward, saline marshes. Finally, the easternmost portion of the Bayou LaLoutre ridge (variously labeled as 7 and v, r) has experienced limited amounts of land loss as abandoned reclamation areas were flooded by saline gulf waters between 1955/56 and 1978 (Wicker et al. 1980).

The wetlands of St. Bernard Parish are a valuable natural resource which will be restored to and/or maintained at their most productive level where possible, practical, and/or economically feasible. These wetlands perform a number of important functions. Through food chain production and provision of general habitat and nursery areas, they support Gulf Coast fisheries and a local trapping industry, as well as provide recreational opportunities for area residents and visitors. They partially shield the urban areas and the hurricane protection levee systems of St. Bernard Parish from wave erosion and hurricane storm surge, and they provide water treatment to improve the water quality of runoff from the urbanized natural levee ridges.

However, restoration of the easternmost wetlands (i.e., saline marshes) is not practical at this time because of their exposure to storm and marine erosional processes, natural subsidence and sea level rise and distance from a sediment input source. The better management strategy for these wetlands is to restrain future land loss related to canal dredging by prohibiting new canal dredging through wetlands where possible, or ameliorating the impact of new as well as existing canals by implementing canal bank erosion control measures.

The Chandeleur Islands are under Federal control as the Breton National Wildlife Refuge and are considered to be Federal lands. For management purposes, islands in Chandeleur Sound which are not part of the refuge are considered to be part of Management Unit 9. Land loss along the Chandeleur Barrier islands may be diminished by certain types of structural measures such as construction of sand fences,

revegetation of unvegetated flats and beach dunes, beach nourishment, and other types of shoreline protection structures. Prohibition of canal dredging within the island complex will also lessen land loss.

Wetlands north of the MRGO could be protected from future land loss by structural measures such as construction of a sheet pile barrier along the MRGO north shore and closure of most channels joining the MRGO. However, this is an expensive procedure and may not be feasible. Other land-loss preventive measures include beach nourishment and construction of buffering barrier islands along the Lake Borgne shoreline in areas of severe erosion. Deteriorating wetlands within this area can be restored via hydraulic filling of recently developed open water areas to mean sea level and revegetation of these sites. Artificial revegetation may be necessary where natural revegetation is not sufficiently rapid to prevent wash out of fill material.

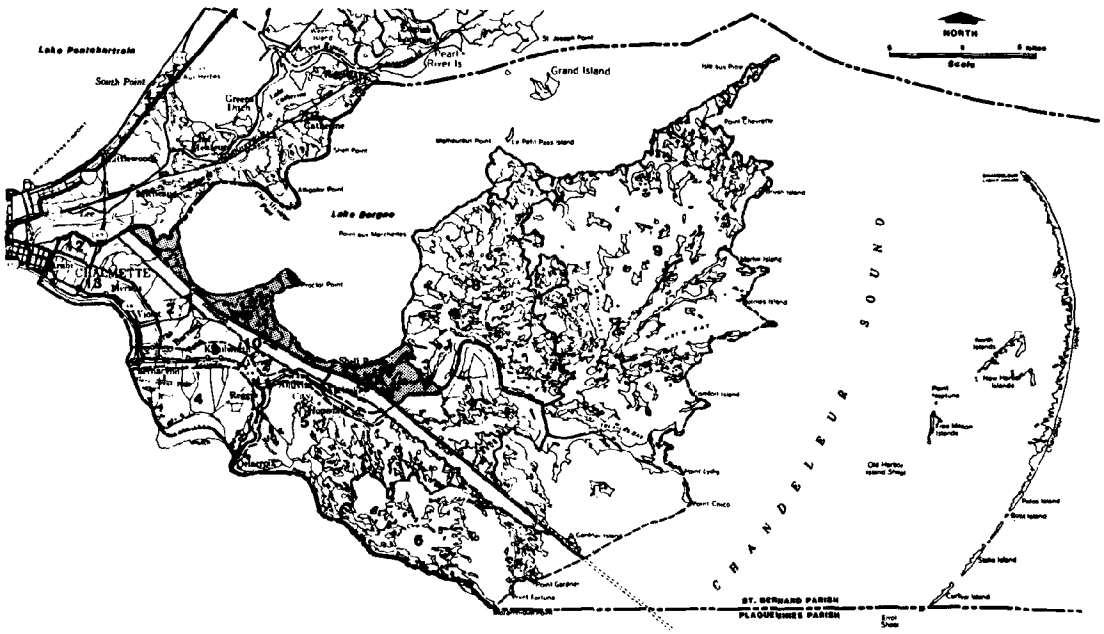
All of the wetlands north of the MRGO and southeastward of the Bayou Terre aux Boeufs ridge are brackish to saline and should be managed and maintained as such. Wetlands in the Lake Lery (Unit 4), Central Wetland (Unit 2), and LaLoutre Wetland (Unit 7) units previously contained fresh-to-intermediate marshes and cypress swamps and small expanses of bottomland hardwood forests near the levees. The present trend toward conversion of these wetlands to more saline marshes can be retarded by controlling water levels and salinity fluctuations through the constructive utilization of existing levee and spoil deposits, flap-gate and double flap-gate weirs and freshwater input. A more detailed discussion of wetland management for specific purposes is contained in the recently completed report: St. Bernard Parish: A Study in Wetland Management (Wicker et al. 1982). In areas where water levels and salinity regimes can be effectively controlled over a long period of time, it may be possible to reestablish and maintain fresh-to-intermediate wetlands. In other areas, an effective wetland management plan can establish a viable brackish-to-saline marsh habitat and retard the rate of land loss by establishing a more uniform vegetative cover.

The MRGO spoil bank (Unit 10) is contained within retention levees; the outer levee serving as a hurricane protection levee. Portions of the spoil are well drained, and natural succession toward upland or natural levee vegetation is occurring. Other portions of the levee are less well drained and attract waterfowl and aquatic furbearing animals such as otter and mink. While this area could add greatly to the habitat diversity of the St. Bernard Parish, its location adjacent to a major transportation corridor (i.e., MRGO) makes it a prime candidate for industrial development.

Discussion by Unit

MANAGEMENT UNIT 1 - BIENVENUE-PROCTOR POINT MARSH

Location Map



Geomorphology

This unit is part of the interdistributary marsh-estuary system which borders the south shore of Lake Borgne. Construction of the MRGO severed this unit from the expansive wetlands to the west, and it is now heavily influenced by marine processes associated with the MRGO and Lake Borgne.

Soils

The soils are basically organic peat and muck on the surface with slightly firm to semi-fluid gray clays on the bottom.

Vegetation and Wildlife

The brackish-to-saline marsh and estuary system provides habitat for crabs, shrimp, and a variety of fishes. The predominant vegetation is sedges and grasses, especially three-cornered grass, wiregrass, and saltgrass. The marsh area provides a suitable environment for fur-bearers such as nutria, raccoons, and muskrat, as well as for alligators and various birds and waterfowl.

Hydrology

Under natural conditions, tidal channels leading from Lake Borgne alternately flooded and drained the marsh. With the MRGO construction, the original drainage pattern changed drastically. The MRGO has cut through many of the existing tidal bayous, disrupting water circulation, increasing salinity, and creating great fluctuations in water levels.

Land Use

This area is in close proximity to the massive MRGO spoil area (Unit 10) and to the urbanized and transition areas (Units 3 and 11) in St. Bernard Parish. Its value as an estuarine nursery area is high, and it is rich in recreational potential. The marshlands in this unit are the first line of defense against storms and hurricanes coming across Lake Borgne.

Transportation

Ocean-going vessels use the MRGO stretching along the southwestern border of this management unit, while sport and commercial fishery vessels travel through Bayous Yscloskey, St. Malo, and LaLoutre.

Cultural Resources

There are eight prehistoric archaeological sites in this unit: Shell Beach Bayou, Bayou St. Malo, two mounds, three shell middens, and a combined shell mound and midden. Battery Bienvenue (16 SB 84), an historic site constructed in the nineteenth century on Bayou Bienvenue, is still also relatively intact. For further information on these sites, refer to the Cultural Resources section.

Unique Ecological Features

Privately leased oyster beds and primary fish and shellfish nursery grounds for blue crab, croaker, menhaden, and brown and white shrimp are located along the fringes of Lake Borgne. There is also a wading bird rookery consisting mostly of Herons, Egrets, Ibises, and Anhingas located on Bayou Grand below Proctor Point.

Environmental Considerations

This area has very high soil subsidence potential and is flood-prone. There is a critical amount of shoreline erosion along the MRGO and Lake Borgne, and salt-water intrusion via canals, bayous, and the MRGO.

Management Unit Goals

The management unit goals are based on the unique environmental characteristics of each unit. The goals for this unit are:

-- Maintain lakefront beach and marsh habitat with emphasis on maximizing use as fish nursery grounds.
-- Conserve natural habitats.
-- Restore southern section of marsh along MRGO.
-- Promote recreational and commercial fishing.
-- Protect existing wading bird rookeries.
-- Encourage habitat diversity and increased marsh productivity by supporting the Corps of Engineers' efforts to locate a major freshwater diversion structure in the vicinity of Bonnet Carre and utilizing the resultant freshwater.

Permissible Uses

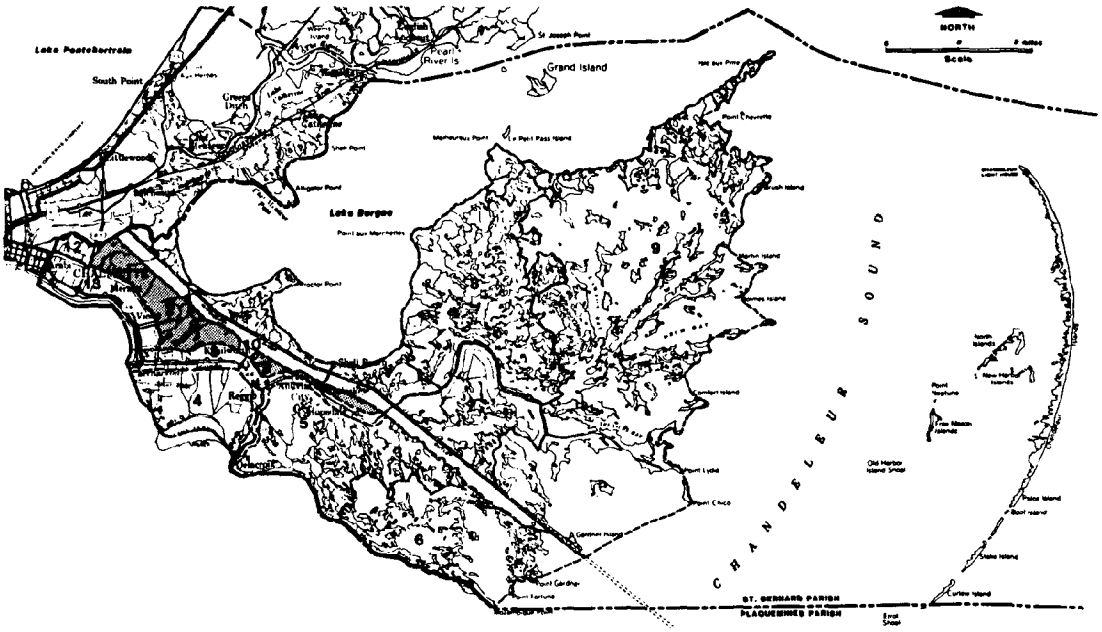
The permissible uses are those uses which may be undertaken in Management Unit 1, but which may require a permit pursuant to Federal, State or Local Regulations. The list is not all inclusive.

-- oil and gas pipelines*
-- trapping
-- waterfowl hunting
-- navigation and shipping
-- MRGO dredging*
-- boating
-- historic site restoration

*The activity may be disruptive and must be, to the maximum extent practicable, consistent with the Louisiana Coastal Resources Program.

MANAGEMENT UNIT 2 - CENTRAL WETLANDS

Location Map



Geomorphology

Unit 2, the Central Wetlands, constitutes the northern flanks of the Mississippi River and Bayou LaLoutre levees. It is located between the urbanized, semi-urbanized, and transition units (Units 3, 11,13) and the MRGO spoil area (Unit 10). Originally, this area was partially covered by cypress backswamp grading into fresh and intermediate marsh toward Lake Borgne. Since the construction of the MRGO, these wetlands have greatly deteriorated (become more saline and converted to open water) due to saltwater intrusion.

Soils

This area contains swamp soils which have organic matter from one to several feet deep overlying firm to semi-fluid clays. There are also marsh soils along the northern fringes of the unit which are characterized by the peat and muck associations.

Vegetation and Wildlife

Because this unit has been modified greatly, less than 13% of the cypress swamps are in good condition. The surviving cypress and bottomland hardwood forests are mainly inside the back hurricane protection levees where the water quality is now controlled. Swamp red maple, cypress, tupelogum, dwarf palmetto, swamp elder, and baccharis characterize the swamp. In the brackish marsh areas, wiregrass, saltgrass, and three-cornered grass are the dominant species. MRGO construction evoked changes in the wildlife composition of this area, most notably a decrease in the population of fur-bearing animals. While nutria, raccoon, and muskrat can still be found in this area, they are not as abundant as before the MRGO was dredged.

Hydrology

This area was once connected with Lake Borgne via shallow, sinuous tidal channels, but this drainage pattern has been modified greatly by man. The greatest modifier is the MRGO channel and spoil deposit area. At the present time, this unit has water exchange connections with Lake Borgne via the Lake Borgne Canal (Violet Canal)-Bayou Dupre, Bayou Bienvenue, and Bayou Yscloskey-Shell Beach Bayou. Freshwater reaches the unit from rainfall and point discharge sources located at the Violet Siphon and pumping station #4.

Land Use

This area is principally an estuarine nursery, fishing, and hunting area and a great source of recreational and cultural resources.

Transportation

Commercial and sport fishermen and trappers use the interior channels for fishing and reaching trapping areas. Larger vessels use the Lake Borgne Canal-Bayou Dupre channel and Bayou Bienvenue to reach marinas and unloading facilities.

Cultural Resources

There are three archaeological sites consisting of shell middens and mounds in this unit. There are two historic sites in the area. The Proctor Sugar Mill (16 SB 87), visible from the highway, was one of the first sugar mills in the state, but all that remains is the smoke stack. The Lake Borgne Canal Redoubt (16 SB 89) is reported to have been built by Andrew Jackson as part of a defense strategy for New Orleans.

Unique Ecological Features

This area is a primary fish and shellfish nursery ground for shrimp, crabs, and other fishes. This area has decreased in productivity since the building of the MRGO because of the increase in salinity.

Environmental Considerations

This management unit has been modified greatly by man's intervention, as well as by natural processes which have induced rapid deterioration of the wetlands. Drainage and pipeline canals are major man-made features which have modified substantially the hydrologic regime. Subsidence and flooding potential are very high in this area. Management goal objectives recognize both this unit's natural function as part of Lake Borgne's estuarine system and its potential socioeconomic function because of its location adjacent to the urbanized levee.

Management Unit Goals

The management unit goals are based on the unique environmental characteristics of each unit. The goals for this unit are:

-- Emphasize multiple-use management with possible controlled development from Paris Road to Violet Canal.
-- Emphasize conservation and limited development below Violet Canal.
-- Enhance productivity of brackish marsh by freshwater diversion through Violet Canal.
-- Water level management of suitable areas for enhancement of waterfowl and fishery resources.
-- Improve furbearer habitat.
-- Maintain existing cypress trees in a healthy condition.

Permissible Uses

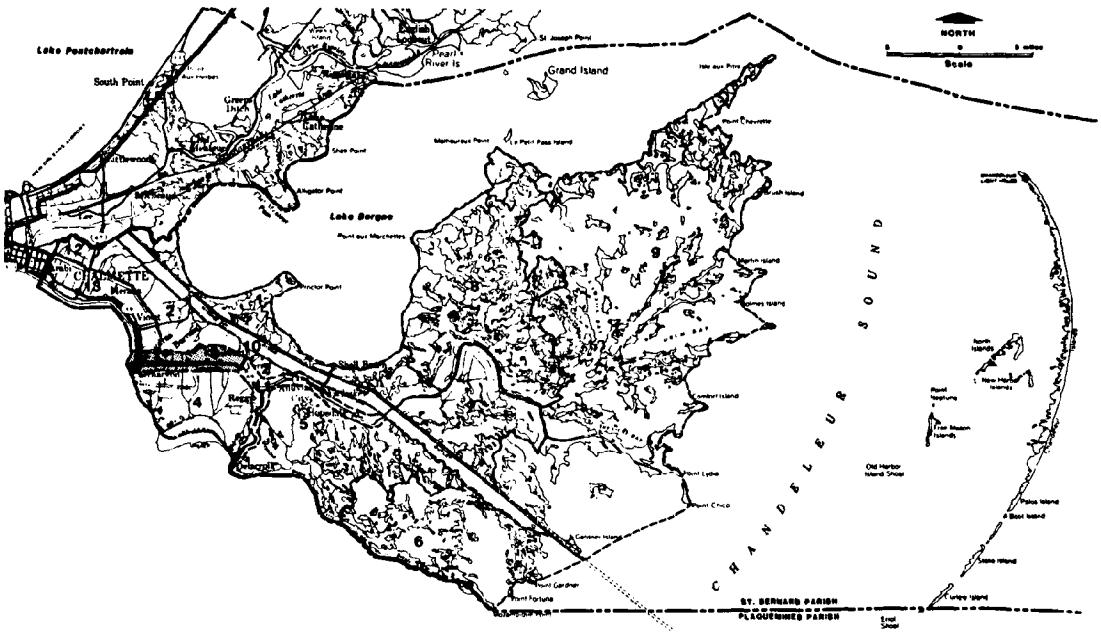
The permissible uses which may be undertaken in Management Unit 2 may require a permit pursuant to Federal, State or Local Regulations. The list is not all inclusive.

-- oil and gas pipelines*
-- oil and gas drill sites and exploration*
-- waterfowl hunting
-- boating
-- archaeological site preservation
-- recreational development
-- residential and commercial development in subunit one* (see Wicker et al. 1982, for location of subunit one)

*These uses may be disruptive and may require permits.

MANAGEMENT UNIT 3 - LOWER URBANIZED LEVEE

Location Map



Geomorphology

This unit is the natural levee ridge created by Bayou LaLoutre when it was a main distributary channel of the Mississippi River.

Soils

The soil is primarily the Commerce-Sharkey association. It has a silty clay loam surface and a gray clay subsoil.

Vegetation and Wildlife

This unit consists mainly of the natural levee vegetation association. Live oaks, pecan, and hickory grow on the higher elevations. In lower-lying, less well-drained areas, the more common species are water oak, sycamore, willow, wax myrtle, dwarf palmetto, and baldcypress.

Hydrology

The hydrology of this unit is characterized by the filled channel of Bayou LaLoutre, which is one of the Mississippi River's abandoned distributary systems. Man-made drainage canals convey runoff from the ridge to the 40-arpent canals where water is discharged from the unit via pumps and floodgates.

Cultural Resources

There are six historical sites in this unit and no known archaeological sites. The historical structures include Old St. Bernard Courthouse, Overseer's House of Sebastapol Plantation, St. Bernard Cemetery, Kenilworth Plantation, Contreras, and the Ducros Museum.

Land Use

This unit is not as densely populated as Unit 13, the urbanized area, but contains the same types of land uses. The land uses include: medium-density residential, commercial, industry, agriculture, recreation, and public facilities.

Transportation

The major arterial roads are Louisiana Hwy. 46 (St. Bernard Hwy) and Louisiana Hwy. 39 (Judge Perez Highway) which disect the unit. All other minor roads stem from these major highways.

Unique Ecological Features

The bend in the Mississippi River at Caernarvon offers a point source for freshwater diversion into the Lake Lery Marsh Unit. Because Unit 3 is among the highest elevated land in St. Bernard Parish, it serves as a prime development corridor for future growth in the parish.

Environmental Considerations

Subsidence is a problem in the low, less well-drained backslope areas of Unit 3. Flooding, mainly from intense rainfall, does occur frequently in some areas even though the unit is leveed and pumped. With urbanization there are also problems of waste disposal, sewage disposal, and water pollution.

Management Unit Goals

The goals, as follow, are based upon the environmental characteristics of the unit.

-- Promote low-density residential and supportive multiple-use development.
-- Establish transition zone between densely developed urban zone and lower ridge area by preserving remnant wetlands.

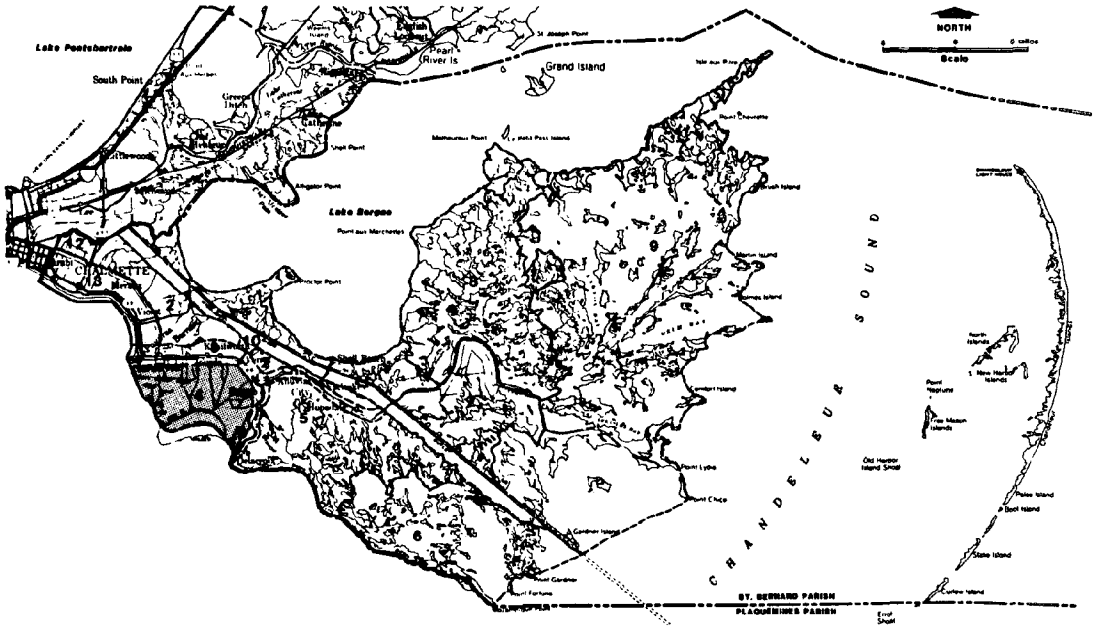
Permissible Uses

The permissible uses are those that may be undertaken in this unit, but which may require a permit pursuant to Federal, State or Local Regulations. The list is not all inclusive.

-- Medium-low-density residential
-- commercial and industrial development
-- conservation of forestlands
-- agriculture
-- archaeological and historic site preservation
-- transportation corridor development
-- utility corridor development
-- recreational development
-- waterfowl hunting and fur trapping

MANAGEMENT UNIT 4 - LAKE LERY MARSH

Location Map



Geomorphology

These marshlands developed as an interdistributary basin between the Mississippi River distributary channels during the St. Bernard Delta lobe growth. Bayou LaLoutre carried the main flow of the Mississippi River with Bayou Terre aux Boeufs serving as a significant distributary.

Soils

The soils are either peat or muck underlain by slightly firm to semi-fluid gray clays.

Vegetation and Wildlife

The marsh environment is rather homogeneous with the most abundant species being three-cornered grass and wiregrass. The estuarine water bodies provide nursery habitat for fish, crabs, oysters, and shrimp. Both commercial and game fish species inhabit this area along with wading birds, alligators, and other reptiles. Commercial fur-bearing animals such as muskrat, nutria, and raccoons are still abundant.

Hydrology

Lake Lery is the dominant water body in the unit. The natural drainage patterns of the marsh have been modified by drainage canals, pipeline canals, and flood protection levees.

Land Use

This area is used primarily for recreational hunting and commercial trapping. Commercial and recreational fishing, shrimping, oystering, and crabbing are also common to the unit.

Transportation

Because there are no roads in this unit, transportation routes are confined to water bodies. Commercial and sport vessels travel along Bayou Terre aux Boeufs, while sport and recreational boats use the interior navigable water bodies, including the Caernarvon Canal.

Cultural Resources

There are six archaeological sites in this unit, four are shell middens and two are reported to be earth mounds. These sites are associated with the former Mississippi River distributaries.

Unique Ecological Features

This management unit is a primary fish and shellfish nursery ground for shrimp, crabs, oysters, and fish. There are privately leased oyster grounds located along the northern and eastern shores of Lake Lery.

Environmental Considerations

Flooding and subsidence are major problems along with saltwater intrusion and land loss. Marsh loss is occurring at a rapid rate.

Management Unit Goals

The suggested goals are based upon the environmental characteristics of the unit, and are as follows:

-- Conserve natural habitats with emphasis on fur trapping, waterfowl hunting, and commercial fishing.
-- Restoration of wetlands by freshwater diversion and control of water and salinity regimes.
-- Effectively block all unnecessary canals and rig cuts and control water access.

Permissible Uses

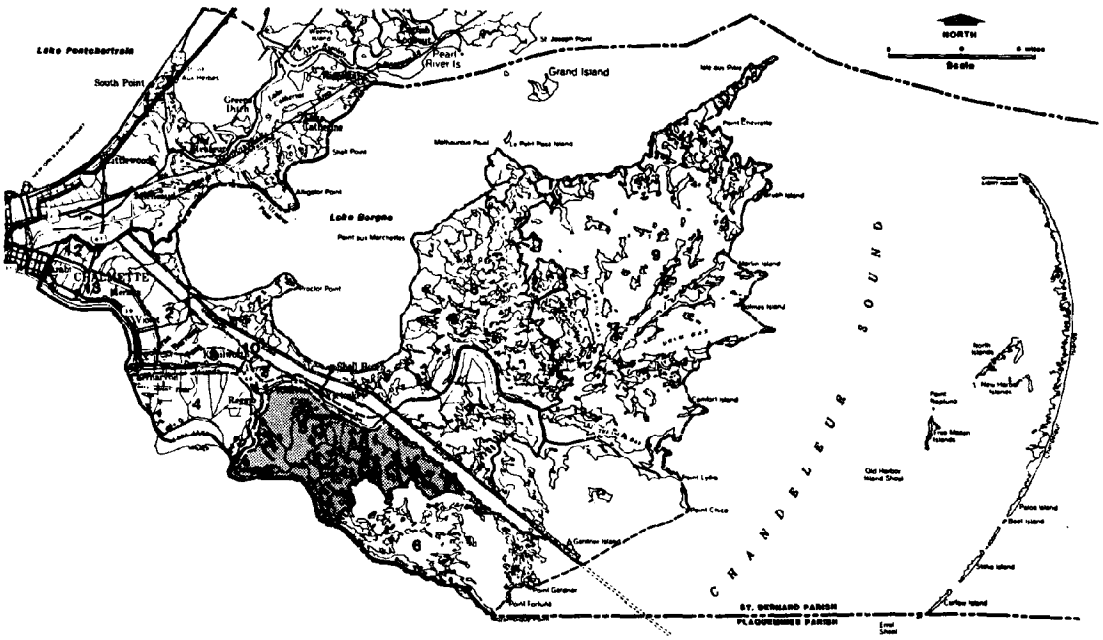
These uses may be undertaken, but may require a permit pursuant to Federal, State or Local Regulations. This list is a guide and not all inclusive.

-- trapping
-- waterfowl hunting
-- commercial fishing (shrimping, crabbing, etc.)
-- oil and gas pipelines*
-- archaeological site preservation
-- freshwater diversion site
-- boating

*These uses may be disruptive and may require permits.

MANAGEMENT UNIT 5 - BAYOU TERRE AUX BOEUFS WETLANDS

Location Map



Geomorphology

This unit is part of the low-lying estuarine marshes south of the Bayou LaLoutre and Bayou Terre aux Boeufs natural levees. The area was created through deltaic deposition of the Mississippi-St. Bernard Delta Lobe.

Soils

The soil is primarily organic peat and muck several feet deep, overlying slightly firm to semi-fluid gray clay.

Vegetation and Wildlife

The marshes of this unit are brackish to saline and consist of three-cornered grass, oystergrass, saltmarsh grass, wiregrass, and blackrush. Some of the common fish in this area are croaker, lined sole, spot, and spotted seatrout. Marsh clams, oysters, shrimp, and crabs are commonly found here. Waterfowl is abundant along with such fur-bearing animals as nutria, mink, and muskrat.

Hydrology

The hydrology of this unit is dominated by tidal processes with many tidal channels meandering through the marsh. Typical tidal bayous such as Middle Bayou serve the water exchange between the marshes and lakes.

Land Use

These marshes serve as a first line of defense against storms and hurricanes approaching from the Gulf. Oyster production, fisheries production, and harvesting, waterfowl hunting and trapping and recreational activities are the typical land uses of the area.

Transportation

Both sport and commercial fishing vessels use the navigable bayous and lakes. Bayou Terre aux Boeufs is the largest navigation corridor.

Cultural Resources

This unit includes nine archaeological sites consisting of mounds and shell middens. These sites are all eroding rapidly, subsiding, or have been damaged by dredging operations.

Unique Ecological Features

This area is a primary nursery ground for shrimp, crabs, and other species of aquatic organisms. There are also privately leased oyster grounds in this unit. Although the American alligator is widespread throughout the coastal area, peak concentrations

occur in the Delacroix Island area westward of this unit towards the Mississippi River and Plaquemines Parish.

Environmental Considerations

Marsh deterioration and land loss due to the processes of subsidence and erosion are major problems. Storms and hurricanes seem to have a major role in the erosional processes by opening marsh areas and enlarging lakes and ponds. These processes, in the absence of the former sediment deposition and land building processes, have contributed to land loss.

Management Unit Goals

The management goals based upon the unique environmental characteristics of the unit are:

-- Maintain brackish to saline marsh habitat.
-- Conserve natural habitats, especially waterfowl concentration areas.
-- Promote fishing (commercial and recreational) and hunting.
-- Reduce saltwater intrusion.
-- Restrict construction of pipeline and rig cut canals.
-- Maximize benefits from the proposed freshwater diversion structure at Caernarvon by retention of freshwater and controlled marsh management techniques.

Permissible Uses

Permissible uses are those uses which may be undertaken in this environmental management unit, but which may require a permit pursuant to Federal, State or Local Regulations. This list is not all inclusive.

-- trapping
-- waterfowl hunting
-- commercial fishing (shrimping, crabbing, oyster and fin fishing)
-- recreational fishing
-- oil and gas pipelines*

-- oil and gas drill sites and exploration*

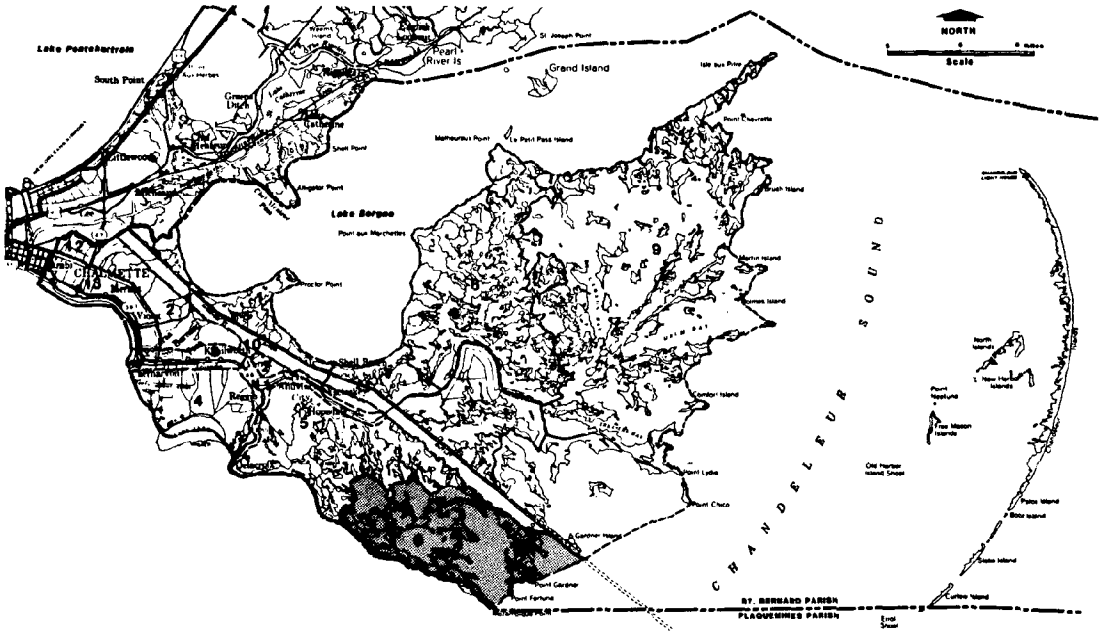
-- archaeological site preservation

-- boating

*These uses may be disruptive and may require permits.

MANAGEMENT UNIT 6 - LAKE LA FORTUNA

Location Map



Geomorphology

The management unit represents the distal portion of the Mississippi River-Bayou Terre aux Boeufs distributary system. Although much of the area is now submerged, there is still evidence of the channels and natural levees that were once predominant in the region.

Soils

The bottoms of the lakes and bays are characterized by submerged marsh soils, mud, and mussel shells. These marsh soils are composed primarily of organic clays, silty clays, and peat.

Vegetation and Wildlife

Oyster grass and saltmarsh grass are the dominant vegetation type of this saline marsh habitat. Many waterfowl and wading shorebirds are found in this area either as permanent inhabitants or transients. The most abundant wildlife are the saltwater fish and shellfish. Some of these species include: fringed flounder, spot, anchovy, spotted seatrout, menhaden, and oysters.

Hydrology

Tidal action dominates the hydrologic system of this environmental management unit. The large bodies of water, such as Lake Machias and Lake La Fortuna, act as a transitional areas between the inland marshes and Breton Sound. Salinity levels fluctuate between 10 and 20 parts per thousand, depending on the season and other factors (i.e., rainfall). Since the construction of the MRGO the salinity has increased, posing a threat to the natural oyster reefs and private oyster beds found in the area.

Land Use

This area is an estuarine nursery ground for fish and shellfish. It is also heavily utilized for recreational purposes. There are some oil and gas fields in the unit.

Transportation

There are no roads or railroads in this unit. Nautical transportation for ocean-going and commercial fishing vessels is along the MRGO channel.

Cultural Resources

There are six archaeological sites in this management unit, all of which are prehistoric. Site 16 SB 33 is sinking, while sites 16 SB 12 and 16 SB 34 are wave-washed middens, and three other sites are reworked beach deposits. An excellent example of a subsurface archaeological site in a wetland area is 16 SB 12, the Mulatto Bayou Site. A canal was dredged through the site exposing large quantities of materials, including human and animal skeletal remains, wooden implements, and pottery which dated back 1000 years.

Unique Ecological Features

There are two wading bird rookeries located here. One is located along the southwest shore of Lake Machias and the other is located near the Raccoon Island area. The more common birds at these rookeries are Herons, Egrets, Ibises, and Anhingas. The area is also a primary fish and shellfish nursery ground. Commercial oyster production is extensive in the unit. The MRGO is a deep migratory pass for many fish and shellfish entering from Breton Sound.

Environmental Considerations

The natural processes of subsidence and erosion have been accelerated by man-made processes. The MRGO has had significant effects, especially with regard to increased salinity levels. For a more complete study refer to MRGO Study, Environmental Considerations of an Expanded Mississippi River-Gulf Outlet (CEI 1973). Further channelization for pipeline canals and oil exploration have disected the marsh area, further exposing it to wind and wave attack. These channels contribute to the accelerated marsh deterioration and land loss.

Management Unit Goals

The management unit goals are based upon this unit's unique characteristics and are as follows:

-- Conserve natural habitats with emphasis on commercial and sport fishing.
-- Reduce marsh deterioration by restricting excavations and requiring backfilling of canals.
-- Reduce erosion by shoreline stabilization.
-- Utilize any freshwater from the proposed freshwater diversion structure at Caernarvon to lessen the salinity gradient and improve fishery productivity.

Permissible Uses

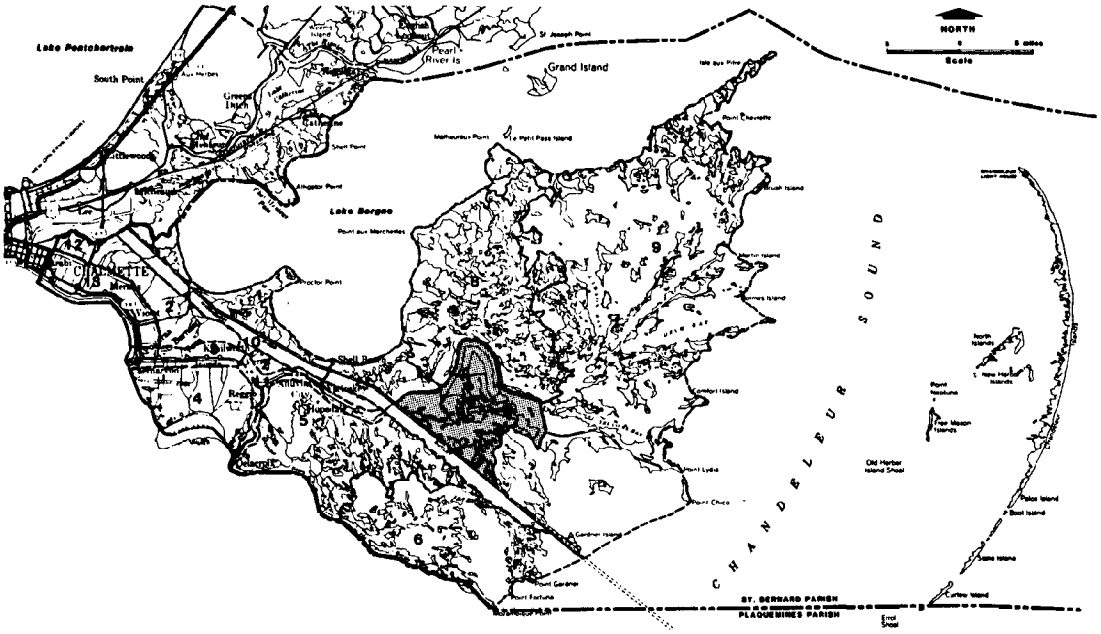
Permissible uses which may be carried out in this management unit, but which may require a permit pursuant to Federal, State or Local Regulations, are listed below. The list is not all inclusive.

-- commercial fishing (shrimping, crabbing, and fin fishing)
-- recreational fishing
-- public oyster seed grounds
-- private oyster leases
-- waterfowl hunting
-- oil and gas extraction*
-- oil and gas pipelines*
-- archaeological/historical site preservation
-- boating

*These uses may be disruptive and may require permits.

MANAGEMENT UNIT 7 - LOWER LA LOUTRE WETLANDS

Location Map



Geomorphology

This management unit includes the wetlands lying directly below the large bend in Bayou LaLoutre. Its origin and development are associated with the Mississippi River-St. Bernard Delta progradation processes. Since the abandonment of the old channel of Bayou LaLoutre by the Mississippi River, the deltaic plain has been tilting toward the east and subsiding. The subsidence and gradual invasion of marshes by saline Gulf waters are the dominant processes in this unit.

Soils

The surface soils are organic peats and mucks overlying slightly firm to semi-fluid silty clays and sands.

Vegetation and Wildlife

Brackish-to-saline marsh grasses dominate the area with three-cornered grass, oystergrass, saltmarsh grass, black rush, and wiregrass being the predominant species. Some of the fish species common to the unit are spot, croaker, menhaden, striped sole, and southern flounder. Shrimp, oysters, and marsh clams are also very common. Waterfowl, wading birds, and fur-bearing animals also occupy this environmental management unit.

Hydrology

When Bayou LaLoutre carried the major flow of the Mississippi River into this region it built the marshes of St. Bernard Parish outward toward the Gulf through distributary channel deposition. Today, the dominant hydrologic pattern is the tidal exchange between Lake Borgne and Chandeleur Sound, through sinuous channels and bayous.

Land Use

A large portion of this unit, along the Bayou La Loutre levees, was once used for agriculture, but due to saltwater intrusion, soil oxidation, and subsidence, it is no longer suitable for such use. The area is now largely an estuarine nursery ground with high recreational value.

Unique Ecological Features

Leased private oyster grounds are found in this area, in addition to the area being a primary fish and shellfish estuarine nursery ground.

Transportation

Commercial and sport fishing vessels travel the waters of Bayou LaLoutre, while smaller recreational boats use the shallow canals, lakes, and tidal channels.

Cultural Resources

Four archaeological sites are known to exist along the lower banks and in the associated wetlands. On the natural levees of lower Bayou LaLoutre there are six

sites. Three sites represent prehistoric occupation associated with ancient stream channels, while the two historic homes and cemetery site are representative of past settlers who located along the banks of Bayou LaLoutre.

Environmental Considerations

Man's impact upon this management unit can be seen clearly on aerial photographs. Canals for drainage purposes, transportation, and oil exploration have contributed to the problems of land loss, subsidence, and saltwater intrusion.

Management Unit Goals

The management unit goals are as follows:

-- Maintain brackish-to-saline marsh with emphasis on commercial and sport fishing.
-- Reduce erosion by shoreline stabilization along the north bank of the MRGO.
-- Limit construction of structures on natural levee ridges.
-- Maintain existing water control structures in pipeline canals to decrease saltwater intrusion.

Permissible Uses

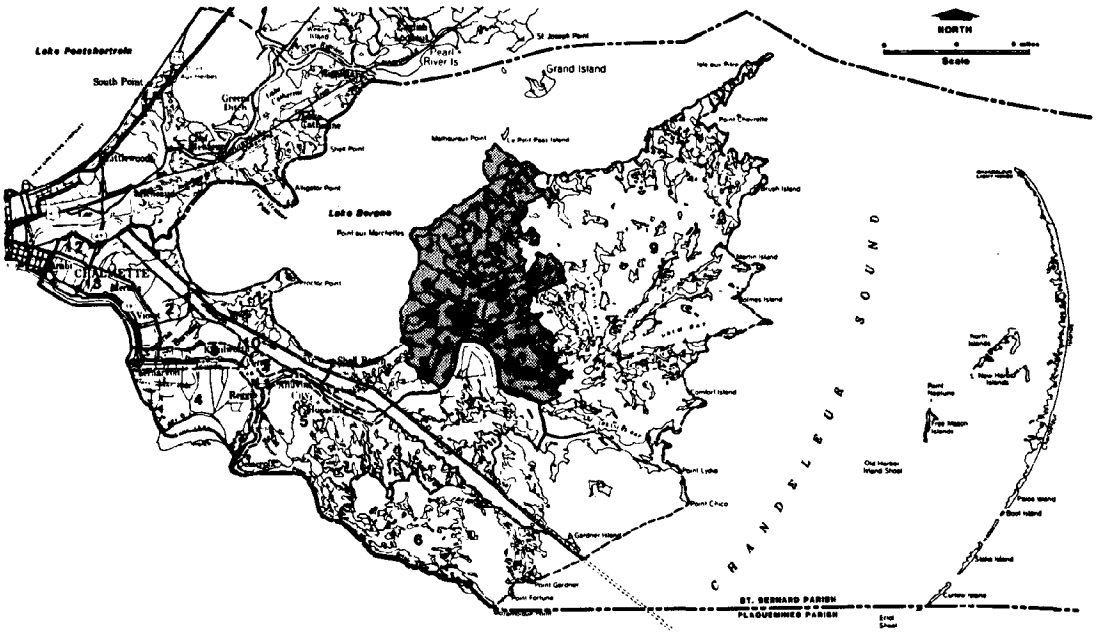
Permissible uses in this unit may require a permit pursuant to Federal, State or Local Regulations. This is not an all inclusive list.

-- hunting
-- recreational fishing
-- commercial fishing and shrimping
-- private oyster leases
-- MRGO navigation and shipping
-- oil pipelines*
-- boating
-- archaeological/historical site preservation

*These uses may be disruptive and may require permits.

MANAGEMENT UNIT 8 - BILOXI MARSH

Location Map



Geomorphology

This area was formed by delta deposition along the perimeter of the distributary channels of the Mississippi River-St. Bernard Delta Lobe. Erosional processes associated with the degradational cycle of this delta have diminished the area and uniformity of the marsh surface.

Soils

The soils of this unit are predominantly organic peats and mucks overlying slightly fluid to semi-fluid gray clays.

Vegetation and Wildlife

Brackish-to-saline marsh vegetation dominates this area. In the slightly brackish marshes, wiregrass is the dominant species, while in the saline marshes, oystergrass, blackrush, and wiregrass are the dominant species. Fish common to this unit include spotted seatrout, spot, Atlantic croaker, black drum, and red drum. Although fur-bearing animals are present in this unit, they are generally less abundant than in the lower salinity brackish marshes where three-cornered grass is dominant.

Hydrology

There are numerous intertidal bayous which convey estuarine waters through the marsh from Lake Borgne and Chandeleur Sound. The management unit also contains numerous estuarine lakes interconnected by tidal channels.

Land Use

Most of this unit is in the designated Biloxi Wildlife Management Area which offers commercial and recreational opportunities for fishing and hunting. Oyster leases are also abundant in the Biloxi Wildlife Management Area and along 14 miles of Lake Borgne shoreline. Clay which is used in the manufacturing of cement is another resource found in this unit, and the major source is found along Bayou St. Malo on the southeast side of Lake Borgne. Gas wells are also numerous in the unit.

Transportation

The dominant modes of transportation in this unit are the natural and man-made waterways which are used by both commercial and sport fishermen.

Cultural Resources

The 16 known archaeological sites found in this unit consist of shell middens, shell mounds, or earth mounds. Of all of the sites in this unit, only the Magnolia Mound Site is included in the National Register of Historic Places.

Unique Ecological Features

Le Petit Pass, located on the northern tip of this unit, is an important deep migratory pass for the many estuarine fish and shellfish larvae entering into Lake Borgne. The entire area is also a primary fish and shellfish estuarine nursery ground. Leased oyster grounds are located in Lake Borgne adjacent to this management unit. Peak geese and duck concentrations are found here during fall and winter because of the management of vegetation and water levels in the Biloxi Wildlife Management Area.

Environmental Considerations

This management unit is under continuous attack from marine forces. Water bodies are constantly enlarging, especially during severe hurricanes. Natural subsidence of the marsh surface is another major problem for this unit.

Management Unit Goals

The following suggested goals are based upon the unique environmental characteristics of the area:

-- Conserve natural habitats with emphasis on waterfowl management, fur trapping, and commercial fishing.
-- Regulate water levels through water control structures and diversion of freshwater.

Permissible Uses

Although this list is not all inclusive, the following permissible uses may be undertaken in the area, but may require a permit pursuant to Federal, State or Local Regulations.

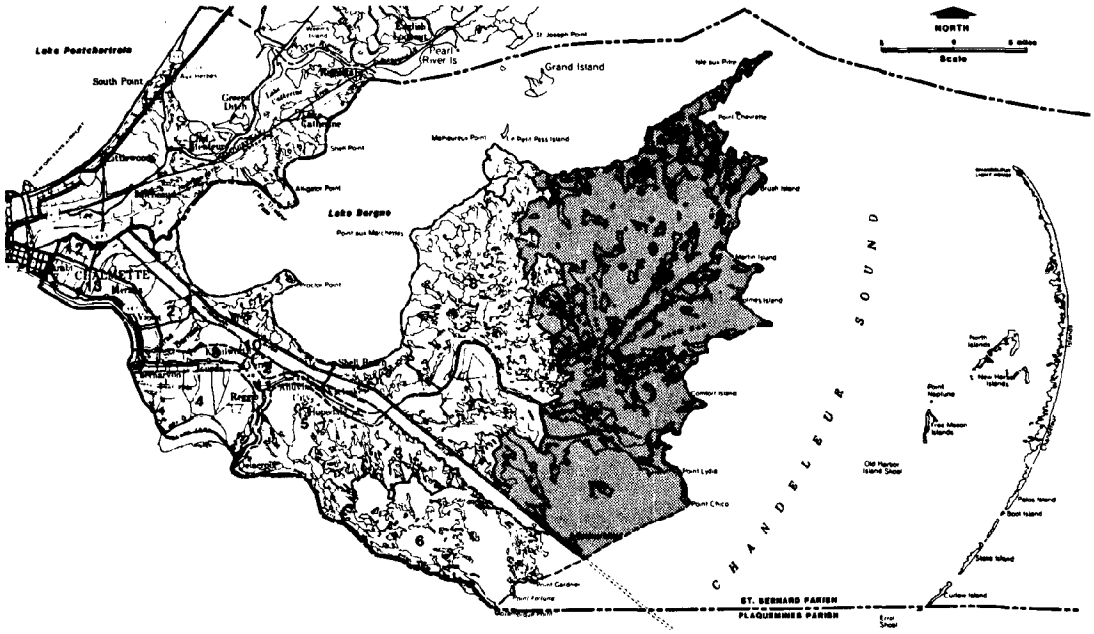
-- Biloxi Wildlife Management Area
-- waterfowl hunting
-- recreational fishing
-- fur trapping
-- oil and gas extraction*
-- boating

-- archaeological site preservation
-- commercial fishing (shrimping, crabbing)

*These uses may be disruptive and may require permits.

MANAGEMENT UNIT 9 - BAY BOUDREAUX - BAY ELOI

Location Map



Geomorphology

This unit is the outer perimeter of the Mississippi River-St. Bernard Delta Complex and is characterized by geomorphic features and patterns representative of a drowning marsh. Round lakes are eroding into open bays, and double row islands are all that remain to indicate the location of the old distributary channels.

Soils

The marsh areas are composed of organic clays, silty clays, and peats with fine sand underneath some areas. Shell reefs found here are mainly composed of oysters in a matrix of silt and clay.

Vegetation and Wildlife

In the saline marshes, oystergrass is the dominant vegetative species, but saltmarsh grass and blackrush are also present. On the large islands, usually on the Chandeleur Sound side, large expanses of black mangrove can be found. Many fish species are abundant in the area, including Atlantic croaker, red drum, black drum, spot, striped mullet, bay anchovies, menhaden, sand seatrout, and scaled sardines. Marsh clams, oysters, and large quantities of brown shrimp inhabitat this wetland environment.

Hydrology

One of the most interesting hydrologic features of this unit is the partially drowned or drowned remains of the natural levees of the old Bayou LaLoutre channel on both sides of Fishing Smack Bay. Tides dominate the hydrology of the whole region and what were once freshwater distributary channels are now estuarine tidal channels. These tidal channels and passes are often deeper than the 3-6 foot deep lakes and bays because they are subjected to more rapid currents and scouring action.

Land Use

Commercial oyster production, fishing, shrimping, and recreational activities make this unit a valuable estuarine management area.

Transportation

Commercial and sport fishing and trapping vessels use the deeper tidal channels, bays, and lakes to navigate through this unit.

Cultural Resources

There are numerous, prehistoric archaeological sites in this management unit including shell middens and wave-washed beach deposits. The fact that 25% of the unit's recorded sites has been obliterated by wave action is a strong indication that the untold numbers of sites that existed previously may have been inundated or washed away before the relatively recent days of archaeological site recordings (Gagliano et al. 1978).

Unique Ecological Features

This management unit has many distinct and important unique ecological features. There are two seabird colonies consisting mainly of gulls, terns, Black Skimmers, and Willets in this unit located on Point Chicot and Isle au Pitre. There are also five wading bird rookeries on the eastern side of this unit located on Mitchell Island, Martin Island, Conkey Cove, Anderson Point, and Island West of Deadman Point. Some wading birds which roost here are Herons, Ibises, Egrets, and Anhingas. There are also two areas of peak geese concentrations located east of Biloxi Wildlife Management Area near Turkey Bayou and Chino Bay. Deep passes in the unit (Deep Pass, Grand Pass, Three Mile Pass, and Nine Mile Pass) are important migratory pathways for many estuarine fish and shellfish larvae. There are many privately leased oyster beds and public seed grounds located throughout the management unit. North Island, Freemason Island, and New Harbor Island contain shorebird nesting colonies.

Environmental Considerations

Submergence of the wetlands (through subsidence and sea level rise) and erosion seems to be the predominant natural processes affecting the area. These natural processes are greatly accelerated by man-made processes and human modification of the environment. Many archaeological sites are being eroded or are already submerged. Higher salinity waters are moving inland as the land erodes, and the oyster grounds are threatened by oyster drill predation and disease which accompany the higher salinities.

Management Unit Goals

The following suggested management unit goals are based upon the unique environmental characteristics of the area:

-- Conserve natural habitats with emphasis on commercial and sport fishing and trapping.
-- Stabilize marsh and outer islands through shoreline stabilization.
-- Enhance wilderness character by limiting construction.
-- Prevent surface disruption by dredging on North Island, Freemason Island, and New Harbor Island.

-- Encourage potential for freshwater diversion and utilize the resulting freshwater to combat rapid erosion and saltwater intrusion.

Permissible Uses

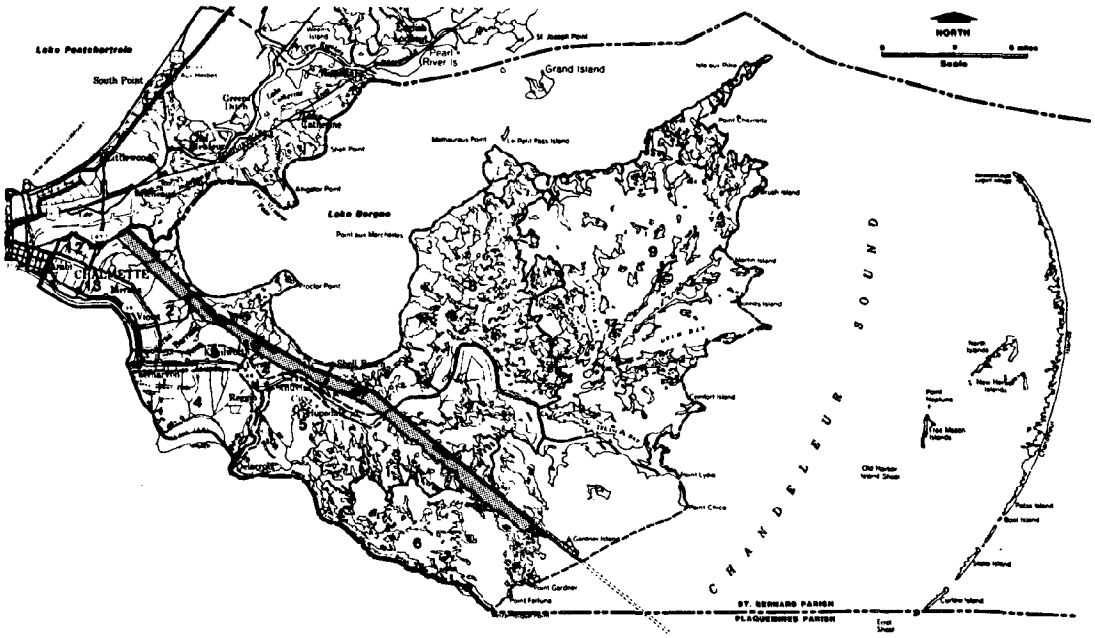
These permissible uses are not all inclusive. The uses in this unit may be undertaken but may require a permit pursuant to Federal, State or Local Regulations.

-- commercial fishing (shrimping, crabbing, Menhaden purse seining)
-- recreational fishing
-- public oyster seed grounds
-- private oyster leases
-- waterfowl hunting
-- oil and gas extraction*
-- oil and gas pipelines*
-- boating
-- MRGO navigation and shipping
-- archaeological, site preservation
-- oyster cultch transplants
-- trapping

*These uses may be disruptive and may require permits.

MANAGEMENT UNIT 10 - MRGO SPOIL AREA

Location Map



Geomorphology

This unit is a by-product of the dredging of the MRGO and subsequent spoil deposition.

Soils

The soils represent an inverse version of the surface and subsurface soils of an undisturbed geologic core. The spoil material is excavated from the 36-foot-deep MRGO channel and is composed of old interdistributary basin-fill and tidal flat clays. Underlying this spoil material are organic peats and mucks.

Vegetation and Wildife

Where there is no continuous spoil deposition for maintenance purposes, the spoil banks are being colonized by plant species characteristic of higher, better drained sites but tolerant to brackish water spray conditions. These include waxmyrtle, baccharis, willow, hackberry, and many herbaceous perennials and annuals.

Hydrology

This spoil bank has altered the natural drainage patterns and hydrologic regimes of the surface marsh areas through which it traverses. There are pockets of freshwater trapped on the spoil banks because of rainfall and poor drainage.

Land Use

At present, there is no land use occuring on the spoil except the natural succession of plants and the deposition of dredged materials. This area has a potential for recreational, commercial, and industrial land uses.

Transportation

There is no existing transportation system within the unit. The area has potential as a transportation corridor because the spoil is higher than the surrounding marsh and provides a more stable base for road construction.

Cultural Resources

In the middle section of the spoil unit, two sites, an earth mound and a shell midden, were reported prior to the construction of the MRGO. However, since that time, both sites have been buried under spoil, leaving no substantial trace of their existence. A portion of the Mulatto Bayou site is still distinguishable, but it was partially dredged during construction of the MRGO.

Unique Ecological Features

There are no designated special or unique ecological features in this environmental management unit.

Environmental Considerations

Subsidence and continual deposition associated with maintenance of the channel are the major problems concerning this spoil area. Because the subsurface soils consist of peats and mucks, the spoil areas are unstable and tend to flow laterally and subside under their own weight.

Management Unit Goals

The following suggested goals are based upon the unique characteristics of the spoil area:

-- Promote multiple-use recreational and commercial development.
-- Encourage bank stabilization.
-- Support marsh building projects by the creative use of spoil obtained during maintenance dredging.

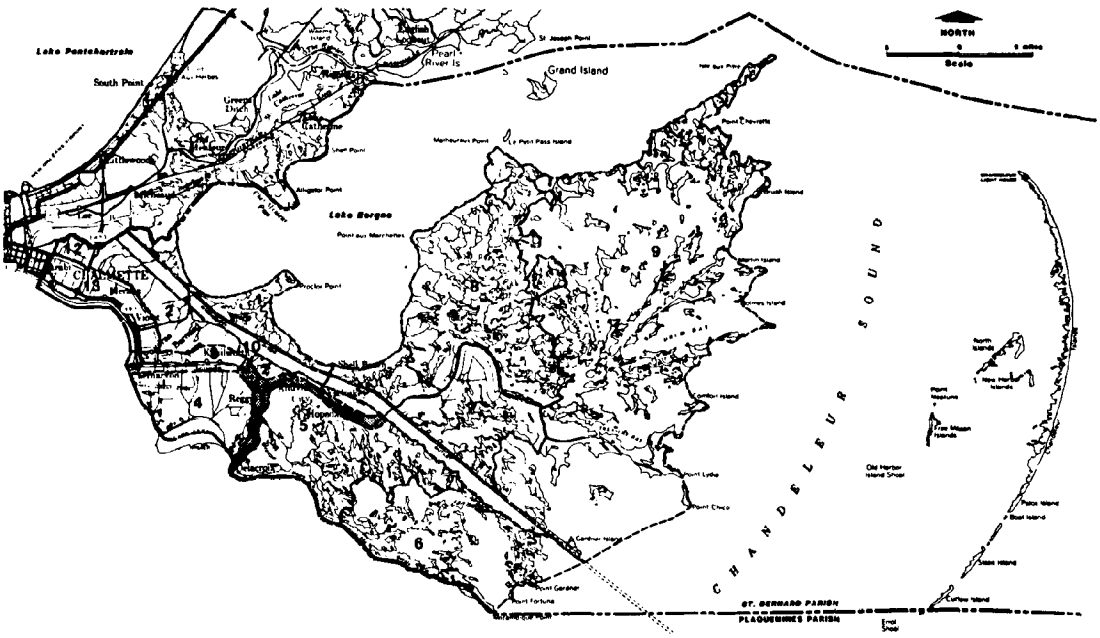
Permissible Uses

The permissible uses are those uses which may be undertaken in this unit but which may require a permit pursuant to Federal, State or Local Regulations. The list is not all inclusive.

-- hunting
-- oil and gas pipelines
-- oil and gas extraction
-- MRGO navigation and shipping
-- trapping
-- waterfowl hunting
-- archaeological site preservation
-- recreational and commercial development
-- port and industrial water dependent development

MANAGEMENT UNIT 11 - SEMI-URBANIZED LEVEE

Location Map



Geomorphology

This unit was once the distributary channel-levee complex of the Mississippi River which branched eastward and now forms the Bayou Terre aux Boeufs and Bayou LaLoutre natural levee-channel complexes.

Soils

The soils are primarily of the Commerce-Sharkey association. The area is mainly Sharkey soils with a dark gray clay surface and a gray clay subsoil.

Vegetation and Wildlife

The typical natural levee vegetation on the slightly lower, less well-drained ridges consist primarily of water oak, sycamore, and black willow. The understory shrubbery is characterized by dwarf palmetto, blackberry, elderberry, and deciduous holly.

Hydrology

The basic hydrologic structure of this unit is characterized by the old abandoned distributary channels of the Mississippi River. Both Bayou LaLoutre and Bayou Terre aux Boeufs once transported large amounts of fresh water and sediments to the delta front. Now, these channels are tidal streams possessing saltwater wedges during periods of low rainfall. Man-made canals drain the urbanized levee areas.

Cultural Resources

There are two existing historical sites and ten known archaeological sites in the unit. The two existing historic sites include the ruins of the Proctor Sugar Mill and the Solis Plantation House where sugar was first granulated in Louisiana. The 10 archaeological sites consist of shell mounds, earth mounds, and shell middens.

Land Use

The land uses in this area include low-density residential, commercial, and industrial development, agriculture, public facilities, and forested lands.

Transportation

There are two major roads in this unit: Louisiana Hwy. 300 (Delacroix Road) and the continuation of Hwy. 46 to Hopedale.

Unique Ecological Features

The forested oak ridges along Bayou LaLoutre are the unique ecological features of this semi-urbanized levee unit.

Environmental Considerations

The area is flood-prone. The natural levee ridges are slowly subsiding due to natural processes, and land loss is occurring at the base of the natural levees along the levee-flank depressions.

Management Unit Goals

The following management unit goals are based upon the characteristics of the environmental management unit:

-- Encourage residential and supportive structures comparable to existing development.
-- Promote continuation of "rural" charcter by discouraging large-scale developments.
-- Maintain area as transition zone between leveed area and wetlands.
-- Promote protection from saltwater intrusion through structural measures such as ring levees, dams, and flap gates in strategic locations.
-- Plan as a growth area for future development as demand warrants.

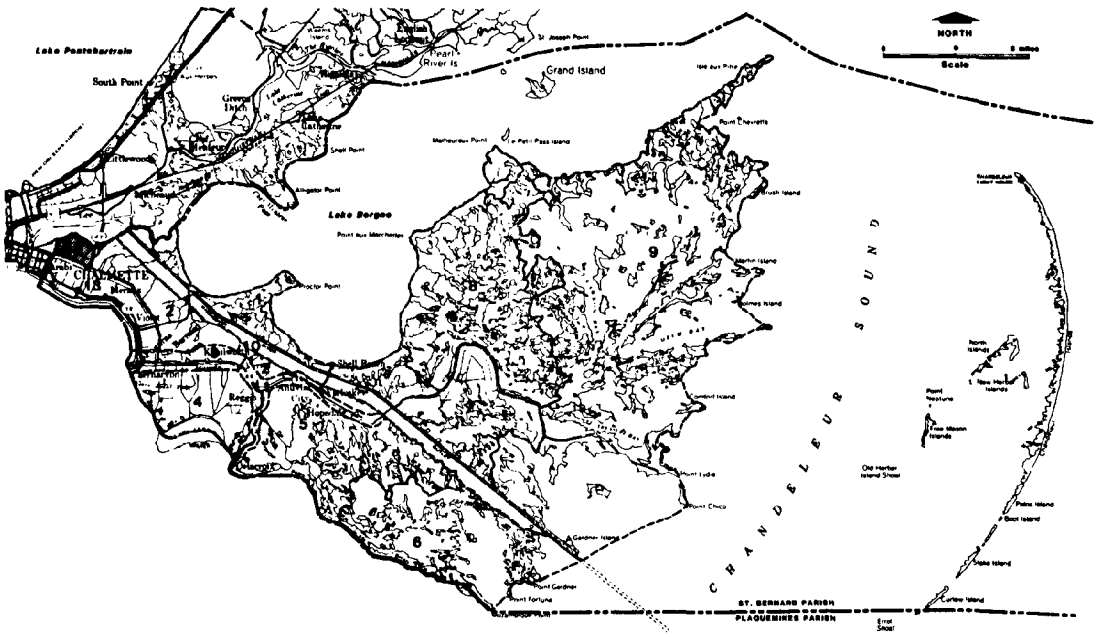
Permissible Uses

The permissible uses are uses that may be undertaken in this unit, but which may require a permit pursuant to Federal, State or Local Regulations. This list is not all inclusive.

-- archaeological and historical site preservation
-- commercial development
-- medium density housing
-- recreation
-- transportation corridor
-- utility corridor
-- agriculture

MANAGEMENT UNIT 12 -MODIFIED WETLAND

Location Map



Geomorphology

This area was originally a freshwater backswamp which developed in the upper distributary basin of the Mississippi River-St. Bernard Delta Lobe. It has been modified by leveeing and land filling and is no longer representative of a natural habitat.

Soils

The surface soils vary from organic peats and mucks to pumped-in sand fill. In some places, especially near Paris Road, the organic peats and mucks are 10 to 15 feet deep.

Vegetation and Wildlife

This unit was once a freshwater swamp and marsh environment, which served as a habitat for wildlife typical of a freshwater swamp. Modification by man changed this unit to the extent that it is now mostly open water of lower quality with some aquatic plants, and small flood-tolerant shrubs.

Hydrology

The hydrologic pattern has been modified greatly by drainage and filling activities and no longer functions as part of the natural hydrologic system. Water exchange through tidal channels was once active in this environment, but Bayou Bienvenue is now the only major tidal channel connecting this unit to Lake Borgne. Water flow has been impaired (i.e., impounded) thereby causing habitat deterioration and land loss in this unit.

Land Use

The natural resources have been greatly reduced because of human modifications. The high soil subsidence potential is a major constraint for intense development. The primary land use for this unit is landfill.

Transportation

One of the most important transportation arteries--Louisiana Hwy. 47 (Paris Road)--goes through this unit.

Cultural Resources

There are no known archaeological or historical sites in this unit.

Unique Ecological Features

There are no unique ecological features in this unit.

Environmental Considerations

Since the turn of the century, this unit has been slowly deteriorating as a result of human modifications, most of which are irreversible. The soils and subsurface conditions present severe constraints for future development.

Management Unit Goals

The following suggested management unit goals are based upon the unique environmental characteristic of the unit:

-- Maintain as buffer zone between other wetland zones and developed leveed areas.
-- Reserve for possible development if future need warrants.

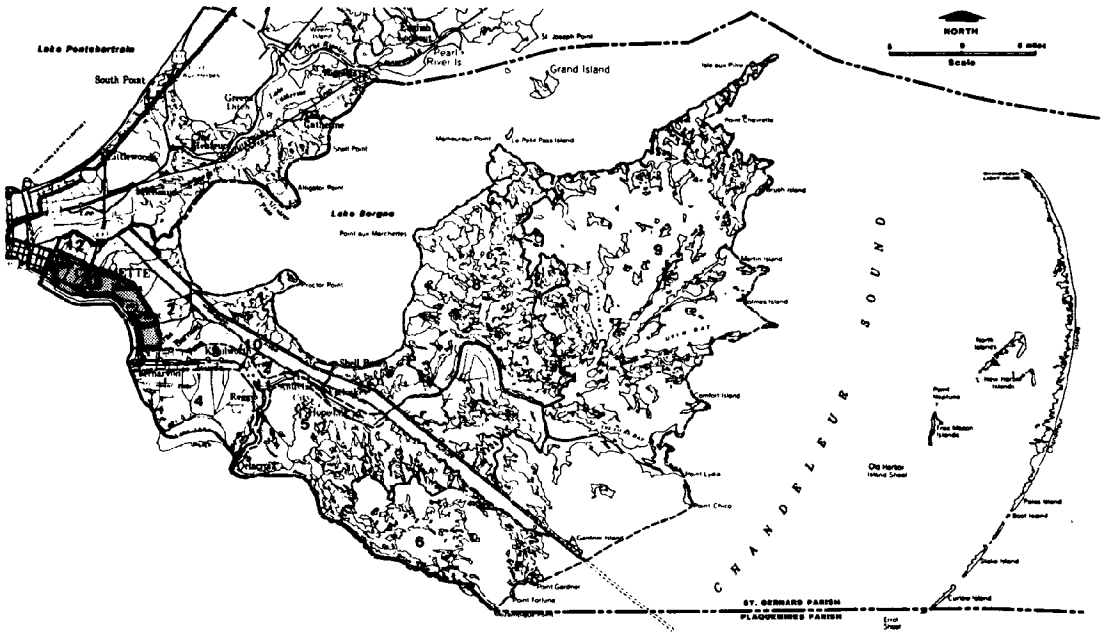
Permissible Uses

The permissible uses are those uses that may be undertaken in this management unit, but which may require a permit pursuant to Federal, State or Local Regulations. This list is not all inclusive.

-- landfill
-- urban runoff disposal
-- trapping
-- recreational fishing

MANAGEMENT UNIT 13 - URBANIZED AREA

Location Map



Geomorphology

This unit consists of the natural levee ridge of the Mississippi River. It was created during overbank flooding of the Mississippi River during St. Bernard delta progradation and during flood stage when layers of sediment were deposited adjacent to the main channel. Natural levee elevations approach 15 feet in the northern portion of the unit, but elevations and levee width decrease seaward.

Soils

The soils of this unit are primarily of the Commerce-Sharkey association. They consist mostly of a silt loam or silty clay loam surface and a silty clay loam subsoil.

Vegetation and Wildife

Most of the existing natural hardwood stands have been cleared for agriculture. The stands which remain are in the lower-lying, poorly drained toe of the natural levee and consist of trees such as live oak, pecan, American elm, hickory, and green ash. Fauna native to this habitat include deer, opossum, raccoon, and a variety of birds.

Hydrology

The basic hydrologic structure of this unit is the Mississippi River channel and natural and man-made channels draining the backslopes of the natural levee.

Cultural Resources

This unit contains four historical sites and 14 archaeological sites. The Chalmette National Military Cemetery, Chalmette National Park, LeBeau House, and George Villere House comprise the historic sites. Chalmette National Park is on the National Register of Historic Places. The 14 prehistoric sites consist of earth mounds, shell middens, and shell mounds.

Land Use

Unit 13 is the most densely populated of the three natural levee units (Units 3, 11, 13). Land use includes residential, commercial, industrial, and recreational developments, agriculture, and public facilities.

Transportation

The major artery traversing this area is St. Bernard Highway (Louisiana Hwy. 39) from Chalmette to Hopedale. Paris Road (Louisiana Hwy. 47) intersects Louisiana Hwy. 39 in Chalmette which is one of the major throughway connecting the parish to New Orleans.

Unique Ecological Features

The Violet Siphon, which is diverting Mississippi River waters into the deteriorating wetlands of Unit 2 (Central Wetlands), is contained in this unit. There are no unique areas in the unit.

Environmental Considerations

Sewage and waste disposal are the major problems facing the urbanized areas of this densely populated section of St. Bernard Parish. Portions of this management unit are subject to flooding during periodic heavy rainfall when the drainage canals and pumps can not remove water from the area quickly enough.

Management Unit Goals

The goals are based upon the environmental characteristics of the unit, and are as follows:

-- Promote urban development consistent with existing parish zoning ordinances and sound urban planning.

Permissible Uses

Permissible uses are those uses which may be undertaken in this unit. Under normal conditions these uses do not require a local coastal use permit. This list is not all inclusive.

-- high-density residential
-- industrial development
-- commercial development
-- agriculture
-- archaeological and historic preservation
-- transportation corridor

CHAPTER VII: PROGRAM ADMINISTRATION

INTRODUCTION

Administration of the St. Bernard Coastal Management Program will be the responsibility of the St. Bernard Parish Planning Commission. The Planning Commission staff will handle the daily business of administering the program including grant matters, developing and negotiating contracts, accounting for expenditures, and, in general, performing such duties as are necessary for the efficient implementation of the program.

Issuance of permits and field monitoring will be handled by the parish's Department of Safety and Permits. Additional monitoring will be conducted by the Planning Commission staff during the course of their normal duties. Monitoring will insure that permit conditions are being followed and that the conditions actually result in lowered adverse environmental impacts. The Planning Commission staff may recommend additional performance standards for the purpose of conditioning permits as their need becomes evident.

PERMIT ADMINISTRATION

General

Authority for the issuance of local Coastal Use Permits derives from the St. Bernard Parish Coastal Management Ordinance (hereinafter called "the Ordinance") (Appendix 1). The permit procedure as outlined in the Ordinance is illustrated in Figure 7-1.

Permits are required for uses of local concern (Table 7-1) which occur in areas defined as wetlands or in areas below the 5-foot contour (above mean sea level). Fastlands (lands completely leveed as of the effective date of the ordinance) are excluded from permit requirements. Activities in Management Units 3, 11, and 13 (urbanized natural levees) do not generally require permits, while activities in the other management units do generally require local use permits. If there is doubt about the need for a permit, Article 5 of the ordinance prevails.

The applicant will obtain the permit form and regulations from the Department of Safety and Permits (hereinafter called "the Department"). The standard U.S. Army

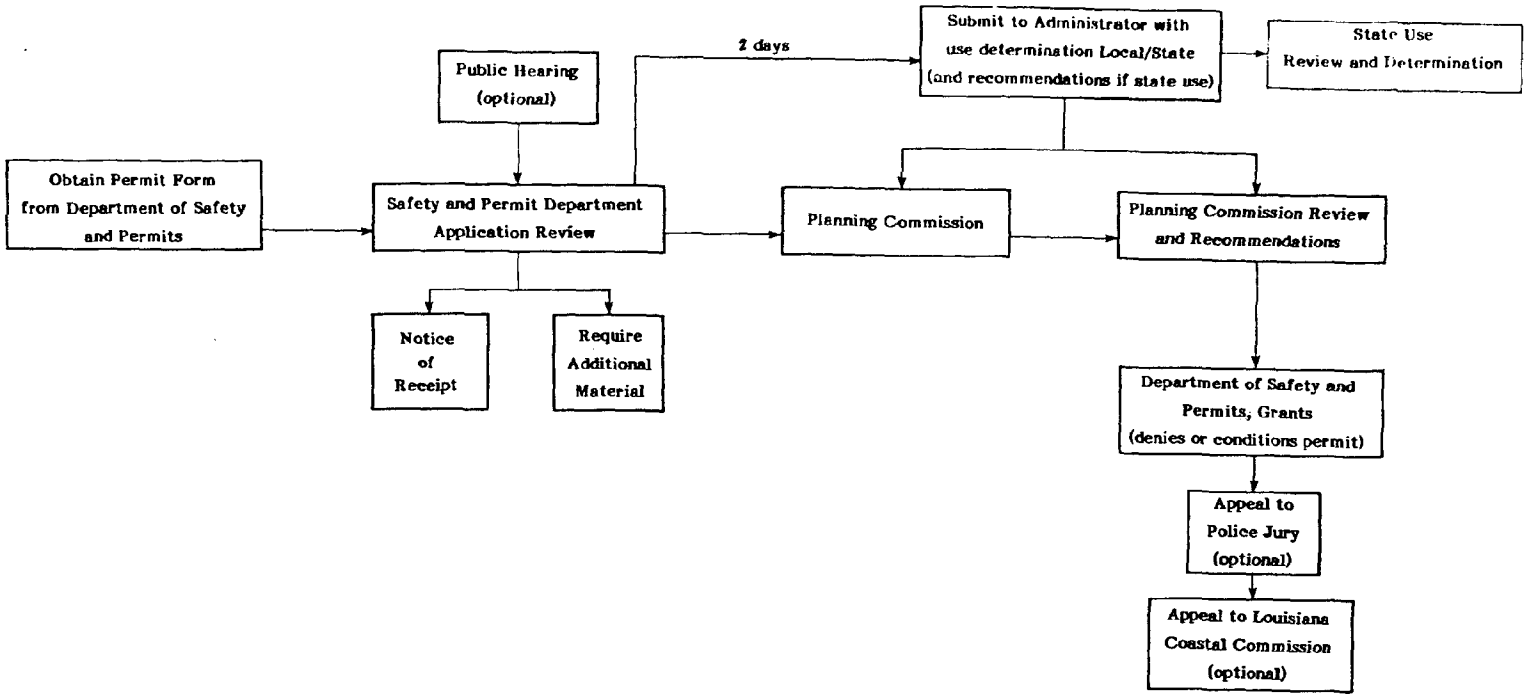


Figure 7-1. Permit flow chart.

TABLE 7-1 COASTAL USES REQUIRING A PERMIT

A coastal use permit shall be required for a coastal use of local concern, as defined in the State and Local Coastal Resources Management Act of 1978 (Act 361). Uses or activities occurring in areas 5 ft or more above mean sea level or in fastlands do not require a coastal use permit unless it can be shown that the use or activity has a direct and significant impact on coastal waters. Uses of local concern include, but are not limited to:

1) Privately funded projects which are not uses of state concern.
2) Publicly funded projects which are not uses of state concern.
3) Maintenance of uses of local concern.
4) Jetties or breakwaters.
5) Dredge or fill projects not intersecting more than 1 water body.
6) Bulkheads.
7) Piers.
8) Camps and cattlewalks.
9) Maintenance dredging.
10) Private water control structures less than $15,000 in cost.
11) Uses on cheniers, salt domes, or similar land forms.
12) Any other coastal uses which directly and significantly affect coastal waters, and are in need of coastal management but are not uses of state concern and which should be regulated primarily at the local level. The St. Bernard Parish Police Jury shall have the power to add other coastal uses to this list as recommended by the Department of Safety and Permits and the Planning Commission.

Corps of Engineer 404 permit form will be utilized. After submission to the Department, that office, in conjunction with the Planning Commission staff (hereinafter referred to as "staff") will review the application to determine if the use is one of local or state concern. Within two days of receipt of the permit application, the determination of state or local use and any available comments will be forwarded to the Administrator, Coastal Management Section, and the U.S. Army Corps of Engineers for their review. An interagency Memorandum of Understanding is being prepared to insure coordination of permit decisions. This will be required for concurrent decisions with the U.S. Army Corps of Engineers on applications for uses of local concern, such as dredge and fill projects in one water body.

Uses of Local Concern

If the use is of local concern, the staff will then conduct an environmental review of the permit application. The review will be subsequent to Article 6 of the ordinance and this program document and will insure that the activity represented by the permit is consistent with all pertinent parish policies, goals (including management unit goals), and performance standards. The staff recommendation is then forwarded to the Department. The Department shall then grant, deny, or grant with conditions, the permit application based on the Planning Commission staff recommendations.

The permit procedure is pursuant to Article 8 of the ordinance which specifies notice within 10 days, provides for a public hearing and notice, and specifies time limits for a decision. Notice of the decision and public inspection and review are further required within specified time limits (Figure 7-2). The applicant or any aggrieved party is eligible to appeal the Department's decision to the St. Bernard Parish Police Jury and subsequently, to the Louisiana Coastal Commission.

Uses of State Concern

If the use is one of state concern, as specified in Act 361 of the 1978 legislature (as amended), then the initial permit decision will be made by the Administrator, subject to appeal to the Louisiana Coastal Commission. The St. Bernard Parish Planning Commission staff may submit recommendations to the Administrator concerning a particular permit application. Adherence by the Administrator to the comments and this document will constitute a basis for consistency with the approved St. Bernard Coastal Management program as required by Act 361 of 1978, as amended. Uses of State concern include but are not limited to:

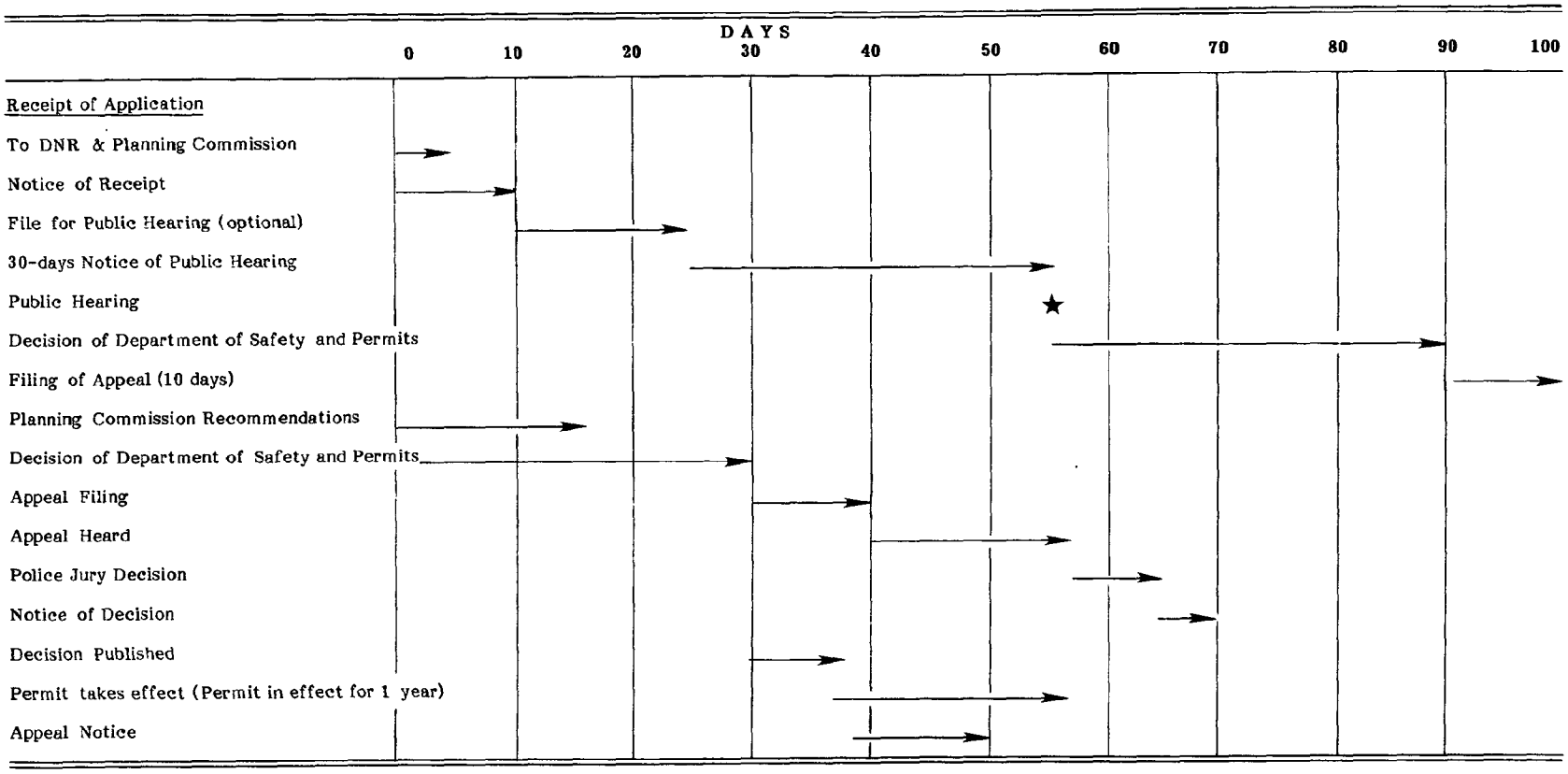


Figure 7-2. Permit time lines.

(a) Any dredge or fill activity which intersects with more than one water body.
(b) Projects involving use of state owned lands or water bottoms.
(c) State publicly funded projects.
(d) National Interest Projects
(e) Projects occurring in more than one parish.
(f) All mineral activities, including exploration for, and production of, oil, gas and other minerals, all dredge and fill uses associated therewith, and all other associated uses.
(g) All pipelines for the gathering, transportation or transmission of oil, gas and other minerals.
(h) Energy Facility siting and development.

Performance Standards for Uses of State and Local Concern

Performance standards are designed to minimize impacts and do not specifically prohibit activities. However, there may be instances where the impact cannot be sufficiently minimized to permit it to occur, for example, disruption of habitat which is critical to threatened or endangered species. Performance Standards of Uses of State Concern in addition to applicable Louisiana CMS Standards, are the preferred criteria St. Bernard Parish expects the State to consider in making decisions on permit applications for uses of State Concern. It is these standards that the staff will use when submitting their environmental review comments to the State on application for uses of State concern.

Pipeline Regulations

Pipeline Codes

In addition to the specific requirements set forth in this section, all plans, specifications, materials, and the installation of any pipeline for which a coastal use permit is required shall comply with the Uniform Standards Association Standard Code for Pressure Piping, U.S. AS B31.8 Code, in connection with gas pipelines, and U.S. AS B31.4 Code, relating to liquid petroleum transportation piping system, where applicable and such amendments thereto as are approved by the Police Jury of St. Bernard Parish. Should any provisions of said Code conflict with the requirements of this Section, the latter shall prevail. Any required excavation or dredging shall conform to the provisions of Dredging and Filling discussed below.

Road Crossings

Any pipelines layed under parish roads shall have an earth covering a minimum of three (3) feet deep. If excavations are required, they shall be tamped in 6-inch layers and backfilled. Pipelines constructed under hard-surfaced, parish-owned roads will be

encased where same is required under the U.S. AS Code referred to hereinabove. Adequate drainage shall be maintained at all times during the installation of pipelines. Markers will be installed to mark the location of all pipelines on parish-owned roads and rights-of-way or other public projects.

Water Crossing and Burial Depths

Pipelines crossing a drainage ditch, canal, bayou, lake, bay or sound under the jurisdiction of the Police Jury will be laid under the following specifications when water level is:

0.0 feet to six (6) feet	-6 feet of cover
six (6) feet to ten (10) feet	-4 feet of cover
ten (10) feet to ad infinitum	-3 feet of cover

Markers will be installed to mark the location of any such pipeline crossing in such a way as not to constitute a hazard to navigation.

In no event will a pipeline be layed in the bed of an existing natural waterway or drainage canal. Crossings of such waterways are permitted if pipelines are buried to the above specified depths.

Levee Crossings

Any pipeline which crosses a levee within the jurisdiction of the St. Bernard Parish Police Jury will be constructed in accordance with the latest applicable regulations and specifications of the Louisiana Department of Transportation and Development and the Lake Borgne Basin Levee Board.

Required Annual Inspections

The owner of any pipeline constructed hereunder will conduct an annual inspection as may be required under the U.S. AS Codes, and upon doing so, the owner will notify the Police Jury in writing that this inspection has been made and of the results of said inspection in writing.

Completion of work

All pipelines will be completed by returning the land crossed to as near its natural state as existed prior to construction. Where natural revegetation will occur with little or no erosion in the interim, it will be acceptable to utilize this method on

completion of said pipeline. Where pipelines are constructed in wetlands or other sensitive areas, the following wetlands regulations will apply.

Wetland Regulations

1) Pipelines will be sited to minimize disruption of wetlands. Existing pipeline corridors will be used where feasible. When pipeline canals must be dug, backfilling with dredged material is required to restore the marsh to as near its natural state as possible.

2) The push ditch or shove technique of laying pipeline is required. Exceptions to this policy should be granted only if the applicant shows that the pipe diameter is too large to be laid with the push ditch method. In this case, the floatation canal method will be allowed, but in all cases the width of the altered area is to be minimized.

3) Bulkheads composed of clam or oyster shell, rip-rap, wood piling, or concrete mats are required at all natural waterway crossings. Bulkheads must be constructed across pipeline canals at their junction with lake or bay shorelines or at navigable waterways. When constructed in the marsh, the length of the bulkhead extending into the marsh on either side of the canal must be at least one half the width of the canal. These bulkheads must be maintained and inspected annually. Repair work will be the responsibility of the corporation that initially constructed the bulkheads. The parish Police Jury will be notified at the time of inspection and will provide a parish inspector on maintenance inspections.

4) The parish has the perogative to suggest a different route for a proposed pipeline if the alignment crosses certain areas of the marsh where the parish does not wish to have pipelines laid. This may include beaches, barrier islands, oyster beds, submergent grass beds, prime waterfowl and furbearer marsh, archaeological or historical sites, endangered species' habitats, forested ridges, or other sensitive or unique areas of significant ecological value which the parish may identify. Whenever possible, canals should be constructed parallel, rather than perpendicular, to the direction of existing water flow and tidal drainage. Normal surface tidal flow will not be altered by any construction work referred to hereinabove. The Planning Commission will review all proposed pipeline routes upon submittal of the permit application and make recommendations to the Administrator with copies to the Police Jury.

5) Any oil spills or leaks must be cleaned up immediately by the corporation that laid the pipeline. Upon discovery of any oil leakage, the Department must be notified immediately.

6) All old pipe, lumber, machinery, or other equipment will be removed from the marsh when dredging is complete; junk and "hookers" that have become lodged in the bottom of waterways will be removed or clearly marked as navigational hazards.

7) Access to the pipeline during construction and maintenance activity will be limited to an area 100 feet on either side of said pipeline's centerline.

Drilling and Wellsite Development Standards

Directional drilling or the use of existing waterways are strongly encouraged by the parish as an alternative to dredging new rig access canals. Directional drilling should be used unless it can be shown by the applicant that it is not feasible due to geological or engineering constraints, or due to regulations governing proximity or placement of wells, enforced by any Federal or state regulatory agency.

Access to drillsites will be by the shortest possible route, except where said routes cause disruption, disturbance, or damage to wetlands within the parish, to flora or fauna, or to oyster leases or other pre-existing activities. In such cases, an alternate route may be used which minimizes the above noted disturbance or damage where possible, or, if acceptable to all parties, mitigating agreements may be made. Access will be at high tide to minimize dredging. Access by board road will be encouraged and is the preferred method of reaching drilling sites in wetlands.

Any dredging or filling required will be executed according to the policies of Dredging and Filling discussed below.

During operations at any wellsite within the parish, sewerage and refuse generated by the operation personnel will be stored until it can be transported to a state-regulated disposal facility. No sewerage, refuse, litter, or other foreign substance such as oil, cuttings, drilling fluids, etc. will be deposited, discharged, or otherwise placed in the wetlands or waters of the parish unless adequate treatment is provided according to the provisions of the state health code for such substances.

Board Road Conditions

1) Culverts will be placed where streams and sloughs are crossed by the roadway embankment and at other locations to promote or maintain sheet flows. The maximum spacing between culverts will be 500 feet. The openings of the culverts must be maintained so as to permit free flow of water.

2) Contents of mud pits and other drilling residues will be removed from the site and disposed of in a lawful manner when drilling operations have been completed.

3) Ring levees will be degraded by restoring the material with which they were built into the areas from which it was removed, and the area leveled to as near preproject conditions as practicable after mud pits have been cleaned.

4) Broken boards and other extraneous construction materials will be removed from the site when the road is abandoned by the permittee. All plastic sheeting will be removed from areas of the roadway from which the boards are removed.

5) No hydrocarbons, substances containing hydrocarbons, drilling mud, drilling cuttings, and toxic substances will be allowed to enter adjacent waterways and wetlands.

6) The road fill placed in wetlands will be degraded when the location is abandoned. The material will be deposited into the borrow areas or ditches, and the area restored to as near preproject conditions as practical using the material available in the road fill.

7) Should changes in the location or the section of the existing waterways, or in the generally prevailing conditions in the vicinity, be required by the public interest in the future, the applicant will make such changes in the project concerned or in the arrangement thereof as may be necessary to satisfactorily meet the situation and the permittee will bear the cost thereof.

Explanation. These board road conditions ensure that sheet flow and water circulation are maintained, and that toxic substances or pollutants are not allowed to enter into wetland habitats.

Dredging and Filling Standards

Dredging activity will be conducted in such a manner as to minimize the environmental impact of such products as sediment, spoils, or other discharges which may be created by said activity. Where it is impossible to avoid such impacts, mitigating agreements and procedures will be recommended which are agreeable to all parties involved, including but not limited to lease holders or landowners within the dredged or filled area, the applicant, and the St. Bernard Parish Police Jury and its authorized agents. Turbidity screens are required near oyster beds or in other areas if turbidity is deemed to be a problem.

Spoil banks and other fill will be constructed in such a manner as to permit revegetation and natural water flow patterns, to avoid impoundment of water, and in cases where deposit of dredged material must be made in open waters, to decrease water depths by no more than 0.5 feet unless new emergent land areas (i.e. artificially created wetlands) are created which do not impede normal currents nor create a navigational hazard.

Wherever permitted dredging in wetlands increases or facilitates saltwater intrusion, such dredged areas will be sealed, plugged, or otherwise restricted from such intrusion at the completion of operations serviced by the canal created. The parish may recommend that the dredged canal to be backfilled upon completion of operations to prevent loss of wetlands or eliminate a channel for saltwater intrusion.

Seismic Standards

Explosives: charges in excess of 50 pounds should not be used except pursuant to written authorization from the Police Jury. When requests for the use of such charges are needed, the size of charges to be used, and the depth at which they are to be suspended or buried should be included. Should multiple charges be used, the total amount of explosive should not exceed 50 pounds without the above information submitted to the Administrator.

The placing of explosive charges on the bottoms of the water body is prohibited. All charges not detonated in holes below the bottom must be suspended and detonated at a point not below a level midway between the surface of the water and the substratum underlying such water; or detonated above the surface of the water. No such charges should be detonated nearer than five (5) feet to the bottom of water bed.

The preferred policies of the preceeding paragraph will not apply to trial charges and charges for determining position and water speed; provided that such charges are not over 5 pounds, and not fired more often than absolutely necessary.

Minimum required depths of charges detonated in holes below the bottom or bed of the inland waters and in the Gulf of Mexico within the gulfward boundary of the State of Louisiana inside the Parish of St. Bernard as shown by Acts 32 and 33 of 1954, will be as follows:

5 pounds or less	20 feet below the bottom
Up to 20 pounds	40 feet below the bottom
Up to 30 pounds	50 feet below the bottom
Up to 40 pounds	60 feet below the bottom
Up to 50 pounds	70 feet below the bottom

No part of the charge will be above the minimum depth.

These minimum depths will not apply to trial charges and charges for determining condition of the weathering layer; provided that such charges are not over five (5) pounds and not fired more than absolutely necessary.

Pipe Standards

1) All pipe used in geophysical operations must be removed by the party using such pipe at least six (6) feet below the bottom or water bed before finally leaving the shotpoint. 2) All parties using pipe must have clearly stamped at each end of each joint the name or abbreviation of the name of the company using the pipe. 3) All pipes, buoys, and other markers used in connection with seismic work will be properly flagged in the daytime and lighted at night according to the navigation rules of the U.S. Engineers and Coast Guard.

Discharge and Transportation of Explosives

No explosives will be discharged within 1000 feet of a fishing boat operating in the lakes, bays, sounds, or other inland waters inside the coast line as designated and defined by the Federal Government Agents under applicable Acts of Congress, or within the gulfward boundary of the State of Louisiana, inside the parish of St. Bernard, as shown by Acts 32 and 33 of the 1954 Louisiana Legislature, without notice being given to such boat so that it may move from the area.

No shooting will be allowed in heavy fog due to danger to boats in close proximity.

The use, transportation, and storage of dynamite, caps, and any other type of explosives will be in accordance with all Federal, state, and parish regulations pertaining thereto.

Persistent gas and water spouts caused by drilling or shooting operations of seismic crews will be stopped by permittee as soon as possible after they occur.

No explosives will be discharged within 250 feet of any oyster reef or bed approved by the Director of the Wildlife and Fisheries Commission and the Chief of the Division of Oysters and Water Bottoms.

Marsh Buggy Operations

Marsh buggy operators must stay within a 200 feet right-of-way, 100 feet on either side of the shot line. Where possible, efforts will be made to avoid crossing land-locked marsh ponds where tracks would open ponds to tidal flow. Efforts should be made to minimize the number of traverses of a single path.

Protection of the Environment

Surveys are to be conducted by Seismic Personnel to provide maximum feasible protection to the environment except where mutually agreeable mitigating arrangement has been made for specific damages.

No explosives will be discharged in the vicinity of an active bird rookery or nesting area, nor within the perimeter of a feeding or nesting area of any other species which is considered endangered or threatened, without the prior written approval of the State DNR/CMS, Wildlife and Fisheries Department, National Marine Fisheries, and the U.S. Fish and Wildife Service. Copies of these approvals will be provided to the parish.

Operations should not disturb any natural or man-made channel or land ownership markers, and personal permission of each landowner or lessee on whose land a survey is planned, is required.

Survey crews are to remove all right-of-way or other markers of any kind, pipes, trash, litter, and any other foreign objects from the site of their operations upon completion of operations. Garbage, litter, and sewerage are to be stored according to the provisions of the health code of the State of Louisiana and regularly disposed of during operations at a State-inspected disposal site.

ENFORCEMENT AND MONITORING

General

The Department of Safety and Permits has primary authority under the ordinance for monitoring and enforcement of uses of local concern. Inspectors in the Department will inspect permitted operations to determine that the activity is being conducted in accordance with the permit and any conditions which may have been part of the permit. The Planning Commission staff will assist by reviewing activities encountered during the course of their normal duties. Observations will be reported to the Department for verification and enforcement.

The Department has the authority, under the Ordinance, to revoke or suspend permits and may order a permittee to cease all activities. Violations will be referred to the parish's District Attorney by either the Department or the Police Jury for prosecution.

Activities Above the 5-Foot Contour or in Fastlands

Under normal conditions, activities occurring at or above the 5-foot contour or in fastlands do not require a permit. However, if it can be demonstrated by the Planning Commission that the activity will have a direct and significant impact on areas which do require permits, such as wetlands or coastal waters, then a permit will be required. This demonstration will generally involve a showing that the impacts extend beyond the project site and are somehow carried to other areas. The carrier mechanism generally involves water, e.g., effluent from the project, or air, e.g., air emissions. Specific examples are the location of a major facility such as a power plant, a refinery or chemical plant in fastlands or above the 5-foot elevation which discharge effluents into the water or air which then impact wetlands or coastal waters. Runoff from residential areas located in fastlands would constitute another example.

IMPLEMENTATION

General

Although the permit procedure outlined above constitutes a major means of implementation of the goals and policies of the St. Bernard Coastal Management Program, there are other avenues which will be pursued by the Planning Commission and its staff.

Funding Uses

Foremost among these additional avenues is the use of coastal management funding for various activities designed to strengthen the program. These activities include, but are not limited to:

1. Studies and reports on various aspects of parish coastal management.
2. Interagency coordination, including the funding of personnel in other parish agencies, to implement portions of the program.
3. Agency personnel and public education.
4. Implementation of special area management plans.
5. Contract personnel, should the need for such expertise arise.
6. Staff in-house projects designed to improve an element of the program.
7. Routine staff administration.

Mitigation

An additional element of program implementation lies in the use of mitigation associated with permitted activities which may help to carry out the goals and policies of the parish. This will be especially important in special management areas and in wetlands. The principle of mitigation holds that if something of value, e.g., wetlands, is to be irrevocably harmed by an activity, then the sponsor of the project or activity should make restitution in an approximately equal amount. The restitution often takes the form of donated wetlands which are put in public ownership and managed to offset the loss. Other forms might involve requiring measures for better management of other wetlands.

Consistency

A final tool for implementation lies in the use of consistency (as contained in the state and Federal CZM Acts) to require that state and Federal activities and projects be

consistent with the goals and policies of the St. Bernard Parish Coastal Management Program. The review for consistency conducted by state and Federal agencies requires that this document, including all goals, policies, and standards, be considered by the agencies involved in project planning. This may require modification or mitigation as part of the project. It will, at a minimum, require notice to the Parish Planning Commission by the lead state or Federal agency as to how the project or activity has achieved consistency. If the project scope covers more than one parish, a copy of the consistency statement, submitted to the State, must be sent to the Parish.

SPECIAL AREAS

Introduction

Special Areas are defined by Act 361 (the State and Local Coastal Resources Management Act of 1978) in section 213.10 which states:

> Special areas are areas within the coastal zone which have unique and valuable characteristics requiring special management procedures. Special areas may include important geological formations, such as beaches, barrier islands, shell deposits, salt domes, or formations containing deposits of oil, gas or other minerals; historical or archaeological sites; corridors for transportation, industrialization or urbanization, areas subject to flooding, subsidence, salt water intrusion or the like; unique, scarce, fragile, vulnerable, highly productive or essential habitat for living resources; ports or other developments or facilities dependent upon access to water; recreational areas; freshwater storage areas; and such other areas as may be determined pursuant to this Section.

Guidelines promulgated pursuant to Act 361 provide that any person or government body can nominate a special area in the coastal zone providing that they show that the area has unique and valuable characteristics that require special management procedures. These rules provide for an administrative review of special management areas by the Administrator of the Coastal Resources Program. The Administrator may, after public hearings, determine whether or not to designate the area as a special area. The guidelines and priorities of uses adopted by the Administrator for a designated special management area must be sent to the Louisiana Coastal Commission which has sixty days in which to review them. In the event the Administrator and the Commission are unable to agree on a set of guidelines and priorities of uses for a designated special area, final resolution will be by the Governor.

An incentive for the designation of Special Areas lies in Section 213.10(E) of the Act which states:

> The Secretary is authorized to assist approved local programs and state and local agencies carrying out projects consistent with the guidelines, related to the management, development, preservation, or restoration of specific sites in the coastal zone or to the development of greater use and enjoyment of the resources of the coastal zone by financial, technical, or other means, including aid in obtaining federal funds.

St. Bernard Parish Designation Procedure

Any person may nominate an area for designation as a Special Area by sending to the Planning Commission a statement in writing giving the area to be nominated (with a map), the reasons for nomination, and how the area should be managed. The Planning Commission may, on its own initiative, nominate an area.

Upon receipt of a nomination the Planning Commission will determine if the area nominated;

a) is in the coastal zone;
b) has unique and valuable characteristics;
c) requires special management procedures different from the normal coastal management process; and
d) is to be managed for a purpose of regional, state, or national importance.

If items a) through d) above are fulfilled, the Planning Commission will compile or develop a concise statement containing:

a) A discussion of the area nominated; including, for example, its unique and valuable characteristics; its existing uses; the environmental setting; its history; and the surrounding area.
b) The reasons for the nomination; such as any problems needing correction, anticipated results, need for special management, and need for protection or development.
c) The social, economic, and environmental impacts of the nomination.
d) A map showing the area nominated.
e) The reasons why the area nominated was delineated as proposed and not greater or lesser in size or not in another location.
f) Proposed guidelines and procedures for management of the area, including priorities of uses.

g) An explanation of how and why the proposed management program would achieve the desired results.

h) How and why the designation of the area would be consistent with the state coastal management program and any affected local programs.

i) Why and how the designation would be in the best interest of the state.

The statement on the proposed special area, with nomination, will be sent to the Police Jury for their consideration. Notice of the Police Jury's consideration of the nomination will be published 10 days prior to the Police Jury meeting. If the nomination is approved by the Police Jury, it will be sent to the Administrator for his review pursuant to Special Area guidelines (Appendix C4 of the Louisiana Coastal Resources Program Final EIS).

Designated Areas

Portions of or all of three of the most seriously impacted wetland management units are hereby recommended to the Administrator for designation as Special Areas (Figure 7-3) subject to the condition that the parish provide the management program and be the management agency. The three units are: 1) Management Unit 2 (the Central Wetlands), but deleting subunit 1; 2) Management Unit 1 (Bienvenue-Proctor Point Marsh); and 3) Management Unit 4 (Lake Lery). These areas are recommended for designation due to existing impacts, their nearness to development, and their potential for restoration. Additionally, the Lake Lery management unit will be positively impacted by the Caernarvon freshwater diversion project which may require additions or changes to the management plan. Any such changes will be submitted to the Administrator for his approval.

The special management plans for these three units are contained in the report: St. Bernard Parish: A Study in Wetland Management (Wicker et al. 1982). The structural portions of the management plans will be implemented through grants, mitigation, or other means.

Highest priority uses for these three units are all non-destructive uses, such as fishing and trapping, while lowest priority are destructive uses such as dredging. A list of permissible uses for each unit is contained in Chapter VI of this report.

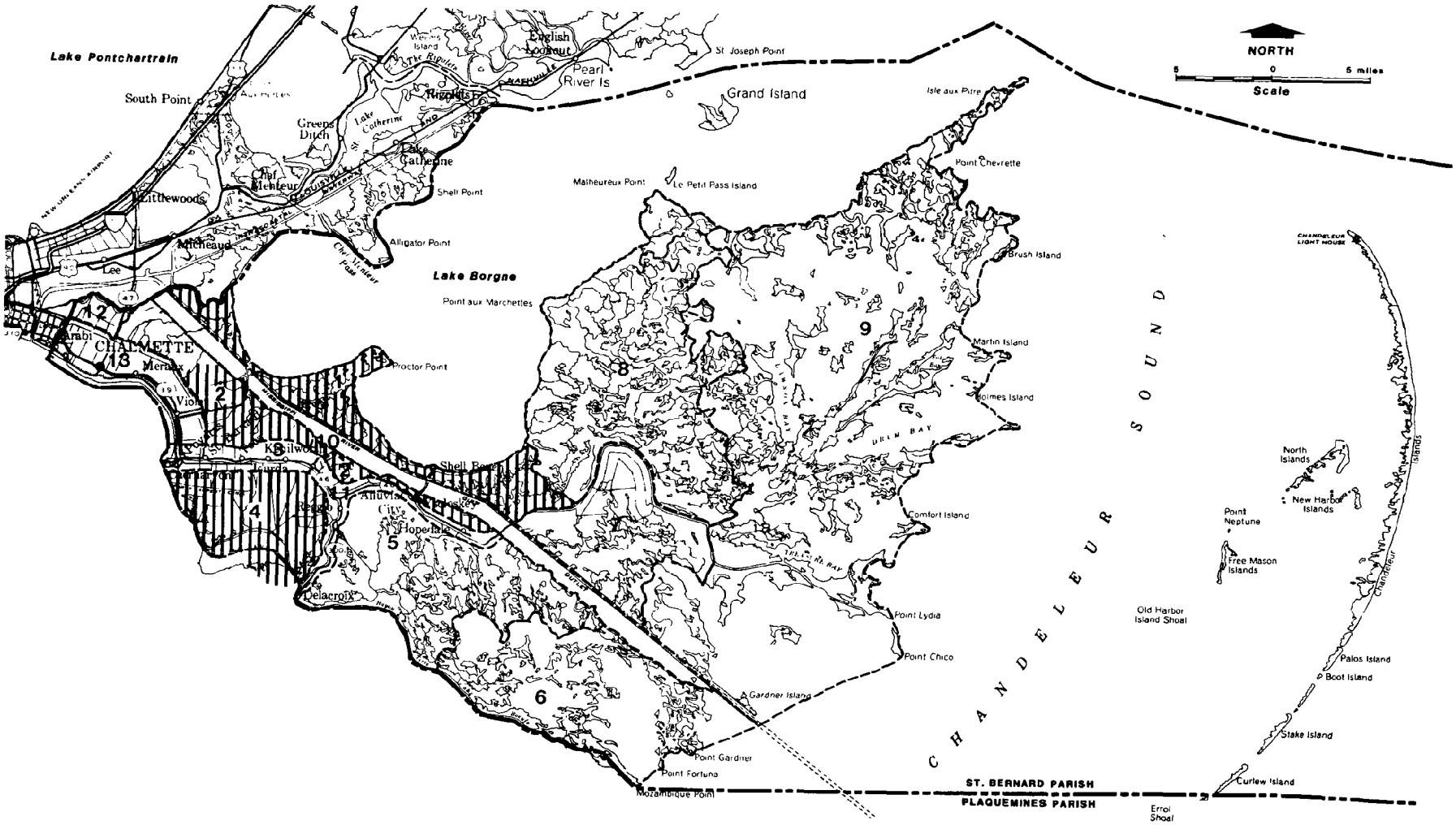


Figure 7-3. Areas recommended for designation as special areas.

PROCEDURES FOR THE CONSIDERATION OF USES OF GREATER THAN LOCAL BENEFIT OR IMPACTS

Introduction

Many activities and uses which occur in St. Bernard Parish are of a magnitude such that they are of interest and concern to regional, state, and Federal governmental entities. These activities have benefits or impacts which extend beyond parish boundaries and which may have overlapping local, regional, state, and/or Federal jurisdiction and responsibilities.

While parish governing bodies will require full consultation and consideration in the implementation of such uses and activities, they recognize other agency responsibilities and jurisdictions.

The uses being discussed here generally fall into three categories: national interest, state interest, and uses of regional benefit (URB).

National interests are expressed in congressional legislation and are thoroughly defined in Chapter VI of the Louisiana Coastal Resources Program (CRP) Final Environmental Impact Statement (EIS). They are generally expressed in terms of the affected resource and are:

1) Air and Water Quality
2) Wetlands and Endangered Species
3) Flood Plains and Barrier Islands
4) Historic and Cultural Resources
5) Fisheries and Other Living Marine Resources

Uses of state concern are clearly expressed in Act 361 of 1978, as amended, are contained in Section 213.5A(1) and generally include:

1) Uses of state concern: Those uses which directly and significantly affect coastal waters and which are in need of coastal management and which have impacts of greater than local significance or which significantly affect interests of regional, state, or national concern. Uses of state concern will include, but not be limited to:

    a) Any dredge or fill activity which intersects with more than one water body.
    b) Projects involving use of state owned lands or water bottoms.
    c) State publicly funded projects.

d) National interest projects.
e) Projects occurring in more than one parish.
f) All mineral activities, including exploration for, and production of, oil, gas, and other minerals, all dredge and fill uses associated therewith, and all other associated uses.
g) All pipelines for the gathering, transportation or transmission of oil, gas, and other minerals.
h) Energy facility siting and development.
i) Uses of local concern which may significantly affect interest of regional, state or national concern.

Uses of Regional Benefit are those which affect more than one parish or state and generally include:

1) Interstate natural gas transmission pipelines.
2) Major state or Federal transportation facilities such as highways and expressways.
3) Major state or Federal transportation facilities such as deepwater ports and navigation projects.
4) Public wildlife and fisheries management projects.
5) Public utility or cooperative energy generating plants.
6) State parks and beaches and other state-owned recreational facilities.

Requirements

Act 361 requires that local programs have "Special procedures and methods for considering uses within special areas, uses of greater than local benefit, and uses affecting the state and national interest" (Section 213.9C(3)(c). The purpose of the requirement can be traced to a goal of the Act "...to ensure that appropriate consideration is given to uses of regional, state, or national importance, energy facility siting and the national interest in coastal resources" (Section 213.8(c)(12). The requirement also has roots in the Federal Coastal Zone Management Act (CZMA) which states "Prior to granting approval, the Secretary will also find that the program provides...for a method of assuring that local land and water use regulations within the coastal zone do not unreasonably restrict or exclude land and water uses of regional benefit" (Section 306(e)(2).

The point of the exercise is to insure that local programs have procedures which give adequate consideration to regional, state, and Federal activities and not arbitrarily restrict such uses. This does not mean that local governments must acquiese to regional, state, or Federal entities, but rather that they give objective and comprehensive consideration to the proposed activities or use before arriving at a decision.

Procedures

In submitting its permit application, the sponsoring entity of a use or activity which purports to be a use of regional, state, or national interest or benefit will note that fact on the permit application. This will reserve the right of the sponsoring agency to make a formal presentation to the Planning Commission staff before it arrives at a recommendation. The Department of Safety and Permits will not issue the permit until the presentation, if requested by the sponsor, has been made. If the decision is adverse, the sponsor may appeal to the Police Jury and has the right to make a presentation. The sponsor may then appeal to the Louisiana Coastal Commission if it desires. This procedure insures a full and comprehensive hearing opportunity for the project and further insures that the project is not unreasonably restricted.

INTERAGENCY COORDINATION

During implementation a number of different approaches will be used to insure that affected agencies at the local, state, and Federal levels are kept informed of pertinent local activities and that their concerns are given adequate consideration. Activities of other agencies which require coastal use permits will be reviewed through the procedures discussed in Procedures for the Consideration of Uses of Greater than Local Benefit or Impacts above. However, it is the intent of the St. Bernard CMP to coordinate as early as possible in agency planning to insure that parish concerns are addressed at an early stage of project planning. In this manner, consistency of agency activities with the St. Bernard CMP will be much easier to achieve than if it is addressed late in the life of the project or not at all.

To achieve this goal of early coordination of multiagency jurisdictions and projects, the St. Bernard Parish Planning Commission hereby requests that all agencies undertaking activities which may affect or impact St. Bernard Parish notify the Commission of their intentions, uses, or projects, and actively involve the parish in agency planning. The St. Bernard Parish Planning Commission is on the Federal Regional Council's mailing list, receives the minutes of their meetings, and attends when they're held in New Orleans.

An integral part of the Coastal Management Program is the St. Bernard marsh management plan (Wicker et al. 1982), a strategy to arrest deterioration of the wetlands through structural and nonstructural measures. In the implementation of this project, the St. Bernard Parish Planning Commission will strive to solicit participation

from all appropriate federal, state, and local agencies. An example of this effort was demonstrated when the Planning Commission obtained the necessary permits for construction of three water-control structures in the central wetlands. Federal and state agencies, with respective areas of expertise, became actively involved. Discussions of potential problems resulted in a few design changes and the development of a pre- and post-contruction monitoring program. The St. Bernard Parish Planning Commission will supply quarterly reports to the Louisiana Department of Wildlife and Fisheries, U.S. Fish and Wildlife, and National Marine Fisheries Service. These will include continuous water level data and the results from a monthly sampling program. This procedure will be followed throughout this project and is an example of the type of agency coordination which works to the benefit of all.

In anticipation of the potential economic development activities of the St. Bernard Port, Harbor and Terminal District, a memorandum of understanding is also being prepared. Although the activities will fall under section 213.13 of Act 361 "Deep water port commissions and deep water port, harbor, and terminal districts, as defined in Article 6, Sections 43 and 44 of the Louisiana Constitution in 1974, shall not be required to obtain coastal use permits. Provided, however, that their activities shall be consistent to the maximum extent practicable with the state program and affected approved local programs." This memorandum will facilitate coordination during early planning stages and thereby achieve consistency requirements.

To insure that multiparish coordination occurs, memorandums of understanding are being executed with both the St. Tammany Parish Coastal Program and the City of New Orleans Coastal Program. This will formalize our commitment to discuss projects having multiparish impacts and will involve projects with uses of local concern or state concern, as well as those of regional and national interest. The St. Bernard Parish Planning Commission has reviewed the Coastal Zone Management Plan of both parishes. Staff will develop and maintain regular routine contacts in all three adjacent parishes including attending meetings in those parishes and inviting participation in St. Bernard deliberations.

In the consideration of permit applications determined to have multiparish environmental impacts, the Planning Commission staff also will notify and discuss appropriate recommendations with the Coastal Management Programs of the affected parishes. Any agreed upon recommendations will be incorporated into the environmental review submitted to the Department of Safety and Permits. Should it be decided that the project's potential impacts would be of concern to another governmental agency, their

advice will be solicited and their comments incorporated into the environmental review. This interagency coorporation will result in an increase in the quality of technical and scientific information available for the environmental assessment of a permit application.

The procedure described in Procedures for the Consideration of Uses of Greater than Local Benefit or Impacts above in this section will insure adequate consideration and coordination of projects or activities having regional, state, or national interest. It is, in essence, a coordination and information dissemination mechanism.

CHAPTER VIII: PUBLIC PARTICIPATION

PAST EFFORTS

St. Bernard Parish has been active in Coastal Resource Planning since the inception of the local program's component in late 1976. Since that time, an advisory committee composed of a balance of conservation and development interests has been in official existence and has met regularly in open session. Through this mechanism, the parish governing body has insured that all viewpoints are represented and heard. Indeed, the public participation efforts of the parish are a model of local involvement.

Numerous presentations to the Police Jury by the Planning Commission staff, consultants, state and local officials, and others in open session on coastal management matters over the years have made CZM a by-word in the parish. Grants, both Coastal Energy Impact Program (CEIP) and program development, have been widely publicized, and numerous technical reports have been completed and circulated. The Violet Siphon project received considerable publicity as a freshwater diversion model which other local governments could emulate in implementing projects requiring state, Federal, and local coordination. Planning commission staff members have made many presentations to schools, civic organizations, and other parish agencies as part of their work schedules. Newspapers in the parish have routinely carried coastal management-related activities in their pages further insuring that the word was spread.

These efforts by the parish, coupled with state level public participation endeavors, insure that adequate program exposure has occurred and that all interested parties have been afforded an opportunity to participate.

CITIZEN PARTICIPATION UNDER AN APPROVED LOCAL COASTAL MANAGEMENT PROGRAM

Citizen input into the CMP will be primarily through the Coastal Advisory Committee which will continue to function in its present format. The committee will be the initial public forum for planning activities, grant requests, and review of development plans as they relate to coastal management. The Planning Commission staff will present coastal-related planning and grant matters to the advisory committee for their advice and will incorporate their suggestions into coastal management activities as much as is feasible.

Other forms of public participation will involve notices and hearings pursuant to Article 8 of the ordinance and the appeal process (Article 12). In addition, the Planning Commission staff will report periodically to the Police Jury on progress under the CMP.

Additional public education and feedback will occur through presentations to groups within the parish by the Planning Commission staff and by distribution of materials and reports to all concerned citizens.

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AN ORDINANCE IMPLEMENTING THE ST. BERNARD PARISH COASTAL ZONE MANAGEMENT PLAN AND PROVIDING FOR THE REGULATION AND CONTROL OF COASTAL USES OF LOCAL CONCERN.

BE IT ORDAINED, by the St. Bernard Parish Police Jury, the governing authority of said Parish:

ARTICLE 1 - PURPOSE

SECTION 1: The St. Bernard Parish Coastal Zone Management Ordinance is hereby enacted. The purpose of this ordinance is to implement a Coastal Zone Management Plan that will maintain a balance between conservation and coastal use in St. Bernard Parish.

SECTION 2: This ordinance is adopted pursuant to the state and local Coastal Resources Management Act of 1978 (Act 361). This Act establishes the Louisiana Coastal Zone Management Program which allowed for a coastal use permitting system to be created at both state and parish levels of government. This ordinance establishes a coastal use permitting system for St. Bernard Parish.

SECTION 3: The Parish of St. Bernard does hereby certify that the Local Coastal Zone Management Plan adopted pursuant to La. R.S. 49:213, its guidelines, rules and regulations, is consistent with the Louisiana Coastal Rèsources Program, its policies and objectives, and that the Parish of St. Bernard Local Coastal Zone Management Plan shall be interpreted and administered consistently with such policies, objectives, and guidelines.

ARTICLE 2 - DEFINITIONS

SECTION 1: Coastal use of local concern - shall mean any use or activity within the coastal zone which has a direct and significant impact on coastal waters, but is not a use of state concern and should be regulated at the local level.

SECTION 2: Coastal Zone - shall mean that area defined in the State of Louisiana R.S. 49:213.4, as amended and 213.3(4) and includes all of St. Bernard Parish.

SECTION 3: Department of Safety and Permits - shall mean the local department responsible for receiving and ruling on Coastal use permit application.

SECTION 4: Environmental Review - shall be an analysis to determine if the proposed coastal use is consistent with:

1) achieving the management unit goals of the appropriate unit

2) achieving the overall management goals

3) the statement of policy

SECTION 5: Estuary - shall mean a semi-closed coastal body of water which has a free connection with the open sea within which freshwater measurably dilutes sea water.

SECTION 6: Aggrieved Party - shall mean any person adversely affected by any permit action taken pursuant to this ordinance.

SECTION 7: Management Goals - shall mean the goals developed from the statement of policy which shall assist the parish in developing a coastal zone management plan.

SECTION 8: Management Unit Goals - shall mean the goals for each unique management unit developed by working within the framework of the management goals and the statement of policy.

SECTION 9: Person - shall mean any individual, corporation, partnership, association, municipality or political subdivision of local or state government.

SECTION 10: Statement of Policy - shall mean the position of St. Bernard Parish regarding the management of its coastal resources, from which is formulated the management goals and management unit goals.

SECTION 11: Uses of State Concern - shall mean uses which directly and significantly affect coastal waters and which are in need of coastal management and which have impacts of greater than local significance or which significantly affect interests of regional, state or national concern.

SECTION 12: Variance - shall mean a modification of the literal provisions of this ordinance granted when strict enforcement of this ordinance would cause undue hardship owing to circumstances unique to the property on which the variance is sought. A variance shall not be granted except where is shown that:

1) exceptional or extraordinary circumstances exist, and

2) there will be no detriment to the coastal zone management plan or to neighboring landowner rights.

SECTION 13: Wetland - shall mean any low lands which are generally covered with measureable amounts of water, such as marshes, swamps, wet meadows, sloughs, and river overflow lands, and are capable of supporting characteristic wetland vegetation.

SECTION 14: Administrator - shall mean the administrator of the Coastal Management Section within the Louisiana Department of Natural Resources.

SECTION 15: Fastlands - are lands surrounded by publicly owned, maintained or otherwise validly existing levees, or natural formation, as of the effective date of this ordinance or as may be lawfully constructed in the future, which levees or natural formations would normally prevent activites, not to include the pumping of non-toxic water for drainage purposes, within the surrounded area from having direct and significant impacts on coastal waters.

ARTICLE 3 - POLICY

SECTION 1: The policy reasons for developing a coastal zone management plan for St. Bernard are:

1) To promote the health, safety, convenience and general welfare of the inhabitants of the Parish of St. Bernard.

2) To bring about the coordinated, efficient and economical development of the Parish.

3) To protect, develop, and, where feasible, restore and enhance its resources.

4) To support and encourage multiple use of resources consistent with maintenance and enhancement of renewable resource management and productivity; with the need to provide for adequate economic growth and development: and with minimization of adverse effects of one resource use upon another without imposing undue restrictions on any user.

5) To develop and implement management programs which are based on consideration of the resources, environment, and needs of the people of St. Bernard Parish.

6) To establish goals and plans for St. Bernard Parish, based on economic, environmental and social needs which will guide activity in conformance to this Statement of Policy.

7) To establish separate guidelines for wetlands which recognize that:

   a) The wetlands of St. Bernard Parish, although part of a larger estuarine ecosystem, strectching from Lake Maurepas to the Chandeleur Islands, consist of a series of distinct geographic units. These units have been combined into appropriate districts to facilitate management of these areas.

   b) Individual permissible uses for each wetland management unit are based on a balance of economic, environmental, and social priorities and needs for each area.

   c) The primary goal for future use of Parish wetlands is to maintain them in their natural condition and to restore, when possible, those areas that have deteriorated due to natural and cultural factors. A major aspect of these restoration activities should be the preservation of the Parish's archaeological and historical resources. Maximum utilization of the renewable and non-renewable resources of the wetlands is encouraged so long as high productivity is maintained and the ecological balance of the wetlands if not further disrupted.

ARTICLE 4 - MANAGEMENT GOALS

SECTION 1: The Management Goals for the Coastal Zone of St. Bernard are designed to achieve the policy aims. The management goals are:

1) Attain proper use of Parish resources through a balance of conservation and development.

2) Identify areas with unique characteristics and develop methods to maintain them.

3) Determine the degree of development intensity suitable for all areas of the Parish.

4) Enhance the biologically productive and physically protective aspects of the Parish's wetland environment,

5) Enhance cultural and recreational opportunities in the Parish by the development of ecologically sensitive facilities within the context of a comprehensive program.

ARTICLE 5 - COASTAL USES REQUIRING A PERMIT

SECTION 1: A coastal use permit shall be required for a coastal use of local concern, as defined in the State and Local Coastal Resources Management Act of 1978 (Act 361). Uses or activities occuring in areas 5 feet or more above mean sea level or in fastlands do not require a coastal use permit, unless it can be shown that the use or activity has a direct and significant impact on coastal waters. Uses of local concern include, but are not limited to:

1) Privately funded projects which are not uses of state concern,

2) Publicly funded projects which are not uses of State concern,

3) Maintenance of uses of local concern,

4) Jetties or breakwaters,

5) Dredge or fill projects not intersecting more than 1 water body,

6) Bulkheads,

7) Piers,

8) Camps and cattlewalks,

9) Maintenance dredging,

10) Private water control structures less than 15,000 in cost,

11) Uses on Cheniers, Salt domes, or similar land forms,

12) Any other coastal uses which directly and significantly affect coastal waters, and are in need of coastal management but are not uses of state concern and which should be regulated primarily at the local level. The St. Bernard Parish Police Jury shall have the power to add other coastal uses to this list as recommended by the Department of Safety and Permits and the Planning Commission.

ARTICLE 6: ADMINISTRATION

SECTION 1: Any person who intends to conduct an activity in the coastal zone that is a coastal use of local concern must first apply for a coastal use permit from the St. Bernard Parish Department of Safety and Permits.

SECTION 2: The Planning Commission of St. Bernard Parish shall conduct an environmental review of each application for a coastal use permit. In conducting the environmental review the Planning Commission or its staff shall:

1) determine whether or not the proposed coastal use is consistent with the goals and policies of the Coastal Zone Management Plan of St. Bernard.

2) Determine whether or not the proposed coastal use is consistent with the management unit goals of the unit where the coastal use will occur.

3) Based upon the effect of the proposed coastal use on the environment as determined by the policies, management goals and the appropriate management unit goal, the Planning Commission shall issue either a 1) favorable 2) unfavorable, or 3) favorable with modifications, environmental review to the Department of Safety and Permits.

SECTION 3: The Department of Safety and Permits shall grant, deny or grant with modifications the coastal use permit applications based on the environmental review by the Planning Commission and shall have the authority to monitor activites in the Parish to ensure that the terms and conditions of the permit are being carried

out and is enpowered under articles 13 and 14 to revoke or suspend permits and seek penalties.

ARTICLE 7: PROCEDURE FOR PERMIT APPLICATION

SECTION 1: The following procedure shall be followed in applying for a coastal use permit:

1) All applications shall be made on a form designated by the Department of Safety and Permits.

2) All applications shall be submitted to the St. Bernard Department of Safety and Permits.

3) All applications shall be accompanied by the following:

   a) The application fee, based on the estimated cost of the proposed coastal use as determined below:

Cost of Project	Fee
0-4,999.00	$20.00 (Twenty)
5,000 - 24,999.00	$50.00 (Fifty)
25,000 - 99,999.00	$100.00 (One Hundred)
100,000 - above	$500.00 (Five Hundred)

   b) Maps showing the location, size, and dimension of the real property used and access routes to be used.

   c) Copies of all applications, approvals and/or denials made concerning the coastal use by State or Federal agencies.

   d) A detailed description of the coastal use activity.

   e) An acceptable surety bond of $5,000 to ensure adjustment, alteration or removal should the Department of Safety and Permits determine it necessary may be required.

ARTICLE 8: PERMIT PROCEDURE - ADMINISTRATIVE ACTION

SECTION 1: Within two (2) working days of receipt of a coastal use permit application, the Department of Safety and Permits in conjunction with the Planning Commission staff shall:

1) Determine whether or not the proposed coastal use is one of state or local conern, and

2) Send this determination together with a copy of the application and all attachments to the Administrator of the Coastal Management Section within the Louisiana Department of Natural Resources.

SECTION 2: Within ten (10) days of receipt of a coastal use permit application, the Department of Safety and Permits shall publish notice of such application in the official journal of the Police Jury, stating the nature of the proposed coastal use, and estimated cost. The notice shall state that all interested persons may make comments or suggestions in writing concerning the application to the Department of Safety and Permits within twenty-five (25) days of this publication.

SECTION 3: A public hearing on a coastal use permit application shall be held if:

a) there is significant public opposition to a proposed coastal use or

b) it is requested by local or state government officials, or

c) ten (10) or more interested persons residing in the Parish make a written request for a public hearing within fifteen (15) days of the date of publication of the notice to the application.

SECTION 4: Public notice shall be given at least thirty (30) days in advance of a public hearing. Notice shall be given to all interested persons and shall contain the time, place, and nature of the hearing and the location of materials available for public inspection.

SECTION 5: The Department of Safety and Permits shall make a decision on the coastal use permit application within thirty (30) days from the receipt of the permit application unless a public hearing is held, in which case the decision shall be within ninety (90) days. The Department shall either grant, deny or grant with modifications the coastal use permit application. If the permit is denied or granted with modifications, the applicant shall be informed in writing of the reasons for this action.

SECTION 6: All decisions made pursuant to this ordinance shall be published in the official journal of the Police Jury within seven (7) days after said decision has been made, and all decisions shall be made a part of the official Police Jury Record.

SECTION 7: Permits issued under this Article shall take effect seven (7) days after issuance.

SECTION 8: The permittee shall notify the Department of Safety and Permit in writing within two (2) days of commencement of work and again two (2) days before completion of the project.

SECTION 9: Permits issued pursuant to this ordinance shall be available for public inspection during the business hours of the Department of Safety and Permits.

ARTICLE 9: TERM OF PERMIT

SECTION 1: A coastal use permit shall remain in effect for one (1) year from the effective date of the coastal use permit.

SECTION 2: The Department of Safety and Permits can grant a coastal use permit for a longer period of time, if conclusive evidence is shown that the coastal use will continue for more than a year under ordinary circumstances.

SECTION 3: A coastal use permit may be renewed for a period of time not to exceed the duration of the first issuance of the coastal use permit, as granted by the Department of Safety and Permits under Section 1 or Section 2. To receive a renewal the applicant must show:

1) that substantial progress is being made or

2) that events beyond his control have hampered the progress of the coastal use in order to receive a renewal of the coastal use permit.

ARTICLE 10: SPECIAL PERMIT

SECTION 1: The Department of Safety and Permits after consultation and written comment from the Planning Commission may issue a special permit in variance with the provisions of the Ordinance when it determines that a strict application of this Ordinance will cause undue hardship. Such permit shall not be issued unless the Department of Safety and Permits makes written findings that:

1) Exceptional or extraordinary circumstances or conditions apply to the subject property which do not apply to other properties within the coastal zone, and

2) The special permit will not be detrimental to the coastal zone management program and/or neighboring landowner rights.

SECTION 2: A permit issued under this section shall not take effect until fourteen (14) days after issuance thereof.

ARTICLE 11: EMERGENCY COASTAL USE PERMITS

SECTION 1: An emergency is a grave situation that poses an immediate danger to life, health or property. An emergency coastal use permit is usually for corrective action that cannot await one of the other permit processes.

SECTION 2: An application for an emergency coastal use permit may be made by letter (when possible) or by telephone or in person to the Department of Safety and Permits Office. The nature of the emergency and the proposed coastal use must be described.

SECTION 3: The Department of Safety and Permits shall determine if an emergency exists. If an emergency exists and the Planning Commission determines that the proposed coastal use is consistent with the policy and goals of the Coastal Zone Management Plan, an emergency coastal use permit shall be granted. The emergency coastal use permit shall remain in effect only as long as the Department of Safety and Permits determines an emergency situation exists.

SECTION 4: A coastal use permit application on an approved form must be filed with the Department of Safety and Permits within seven (7) working days of the approval of the emergency permit. Once an emergency situation terminates, the coastal use permit application is subject to the normal filing requirements and the normal environmental review based on the policies and management goals as stated in Articles 3, 4, and 5.

SECTION 5: The Department of Safety and Permits shall prepare a written report on all emergency coastal use permits issued. This report shall be submitted to the Police Jury and remain available for public inspection.

ARTICLE 12: APPEAL

SECTION 1: Any aggrieved party may appeal the decision of the Department of Safety and Permits concerning a coastal use permit. The appeals shall be made in writing to the St. Bernard Parish Police Jury within ten (10) days of the Department of Safety and Permits's decision. If a permit grant is appealed, the Police Jury may suspend the permit until the appeal has been decided.

SECTION 2: The appeal hearing shall be held within fifteen (15) days of the date of receipt of the appeal and notice of such appeal hearing shall be given by publication in the official journal of the Police Jury not less than five (5) days prior to the hearing.

SECTION 3: In all appeal hearings by the Police Jury the coastal use permit application shall be examined to determine if it is consistent with appropriate management unit goals and management goals. The coastal use shall also be examined in light of the

policy aims of the St. Bernard Coastal Zone Management Plan. The decision of the Department of Safety and Permits and the Planning Commission shall be regarded as prima facie correct, and the burden of establishing the contrary shall be on the appellant.

SECTION 4: The Police Jury shall decide an appeal within seven (7) days of the appeal hearing and notice of said decision shall be made by publication in the official journal of the Police Jury. The decision of the Police Jury including the Department of Safety and Permits decision as to whether the use is one of state or local concern, may be appealed to the Louisiana Coastal Commission.

ARTICLE 13: SUSPENSION, REVOCATION

SECTION 1: A permit shall be suspended for noncompliance or for violation of the permit and/or this ordinance. The permittee shall be notified of the suspension by the Department of Safety and Permits and the reasons for it, and be ordered to cease all activities authorized under the coastal use permit. The notice shall advise the permittee that he will be given ten (10) days from receipt of the notice to respond to the reasons given for the suspension.

SECTION 2: If the permittee fails to respond his coastal use permit shall be revoked and he shall be notified of the revocation.

SECTION 3: If the permittee responds to the suspension, the Department of Safety and Permits shall reinstate, modify, or revoke the permit within ten (10) days of receipt of the response. The permittee shall be notified of the action taken.

ARTICLE 14: PENALTIES

SECTION 1: A violation or a failure to comply with the provisions of this ordinance shall be punishable by a fine of not less than $500.00 dollars, or by imprisionment for not more than 90 days, or both.

SECTION 2: Each day a violation or a failure to comply occurs, a separate offense is committed.

SECTION 3: A person who violates or fails to comply with the provisions of this ordinance may be required to restore the affected areas to its condition prior to the illegal coastal use.

ARTICLE 15: SEVERABILITY

SECTION 1: This ordinance is severable. If any part is declared unconstitutional, the remainder of the ordinance shall not be affected.

ARTICLE 16: EFFECTIVE DATE

SECTION 1: This ordinance shall be effective thirty (30) days after approval of the St. Bernard Parish Coastal Management Program by the Louisiana Department of Natural Resources.

EXTRACT OF THE OFFICIAL PROCEEDINGS OF THE POLICE JURY OF THE PARISH OF ST. BERNARD, STATE OF LOUISIANA, TAKEN AT A REGULAR MEETING HELD AT CHALMETTE, LOUISIANA, IN THE POLICE JURY CHAMBERS ON TUESDAY OCTOBER 5, 1982 AT ELEVEN O'CLOCK A.M.

On motion of Mr. Henderson, seconded by Mr. Licciardi, it was moved to adopt the following Resolution:

RESOLUTION 122-82

WHEREAS, St. Bernard Parish and its residents have derived great benefit from the renewable resources of the Coastal Wetlands within the parish's boundaries since prehistoric times; and

WHEREAS, the impact of man's activities and natural forces have been demonstrated to be bringing about deleterious effect on said renewable resources when unmanaged; and

WHEREAS, the Parish Police Jury, being aware of the deterioration of the wetlands, has actively pursued and utilized Federal, State and Local monies to plan for and implement management activities beneficial to the parish wetlands since 1976; and

WHEREAS, a draft of the St. Bernard Parish Coastal Management Document was adopted as a Policy Statement by the Police Jury in 1979; and

WHEREAS, the State of Louisiana has had its Coastal Management Plan (as delineated by Act 361 of 1978 and amendments) approved by the Office of Coastal Zone Management pursuant to Federal statutes and guidelines of its resources; and

WHEREAS, the Parish Police Jury is desirous to fulfill its obligation to protect the health and welfare of its residents through wise multiple use management of its resources; and

WHEREAS, a revised draft document entitled the St. Bernard Parish Coastal Management Program Document has been prepared for the parish for submission to the administrator of the State Department of Natural Resoruces/Coastal Management Section for the purpose of obtaining and approved local programs, with all the benefits, authorities and obligations attached thereto; and

WHEREAS, said program document contains a policy, management goals and performance standards consistent with achieving protection and enhancement of the parish's wetlands and resources, securing health and welfare of the citizens of the parish, and permitting wise multiple use management of parish resources.

BE IT THEREFORE RESOLVED, to adopt said St. Bernard Parish Coastal Management Program Document as the Policy Statement of the St. Bernard Parish Police Jury, and further

BE IT RESOLVED, to implement said Local Management Program upon approval

BE IT RESOLVED, to transmit said document to the State Administrator along with all comments, responses and amendments as generated at and from the required hearings for that purpose, and finally

BE IT RESOLVED, to enjoin said Administrator to review and grant the Parish of St. Bernard approval of the Program Document as an approved local program consistent with Federal and State laws, regulations and guidelines promulgated for the purpose of establishing Local Coastal Zone Management plans, authorities, administrative guidelines, permissable uses and performance standards.

The above and foregoing having been submitted to a vote, the vote thereupon resulted as follows:

YEAS: MESSRS: Knobloch, Gorbaty, Ponstein, Munster, Licciardi, Landry and Henderson.

NAYS: None.

ABSENT: None.

NOT VOTING: MESSRS: Guillot, Gonzales, Cusimano, and Ponstein.

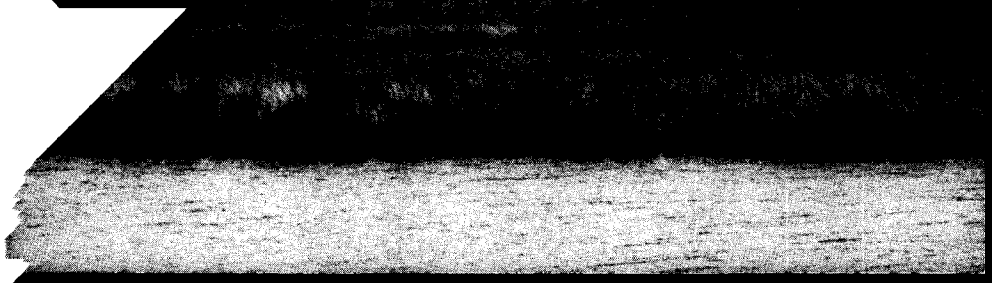
And the Resolution was declared adopted on the 5th day of October, 1982.

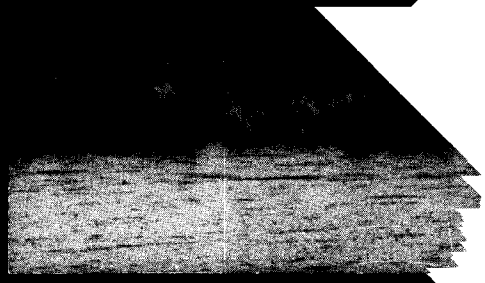
CERTIFICATE

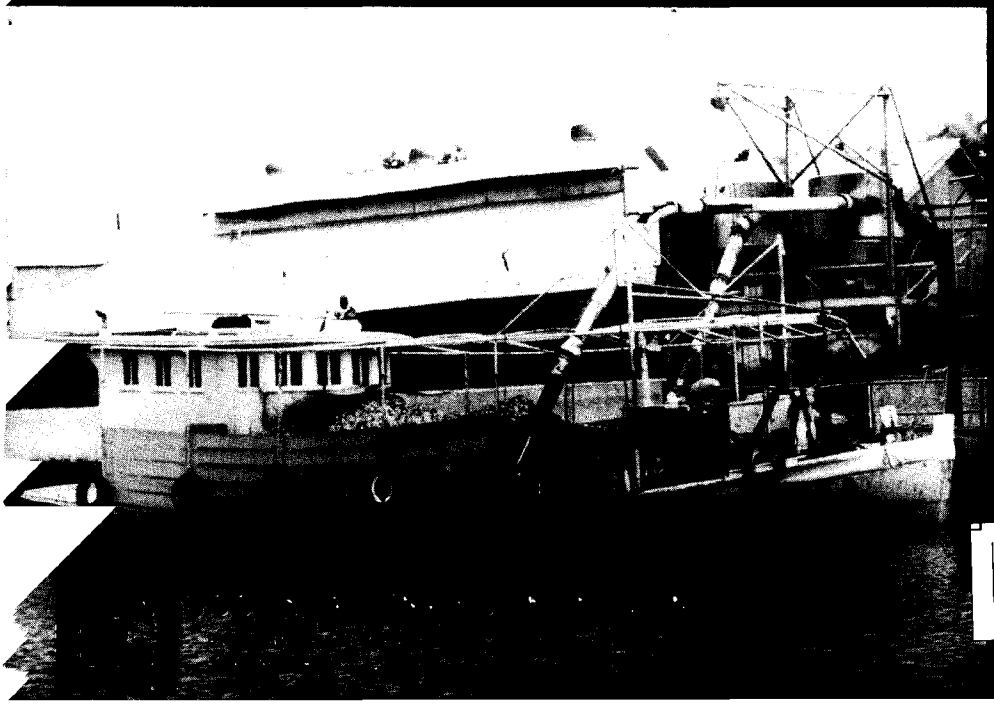
I HEREBY CERTIFY that the above and foregoing is a true and correct copy of a Resolution adopted at a regular meeting of the Police Jury held at Chalmette, Louisiana on the 5th day of October, 1982.

Witness my hand and the seal
of the Parish of St. Bernard
on the 5th day of October,
1982.

DAVID B. FARBER
SECRETARY TREASURER







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