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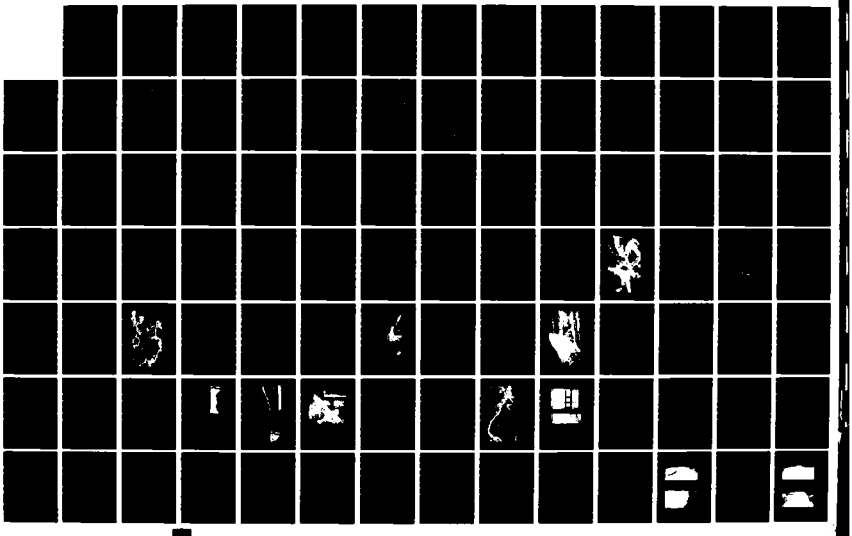

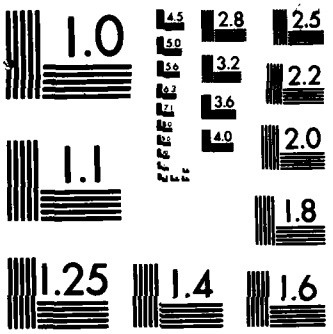

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Report No. PD-RC-83-02

CULTURAL RESOURCES SURVEY OF TERRESTRIAL AND OFF-SHORE LOCATIONS, LAKE PONTCHARTRAIN AND VICINITY HURRICANE PROTECTION PROJECT, LOUISIANA

New World Research, Inc.
P.O. Box 410
Pollock, Louisiana 71467

16 May 1983

Final Report for Period 21 May 1982 - 16 May 1983

Prepared for
Department of the Army
New Orleans District,
Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

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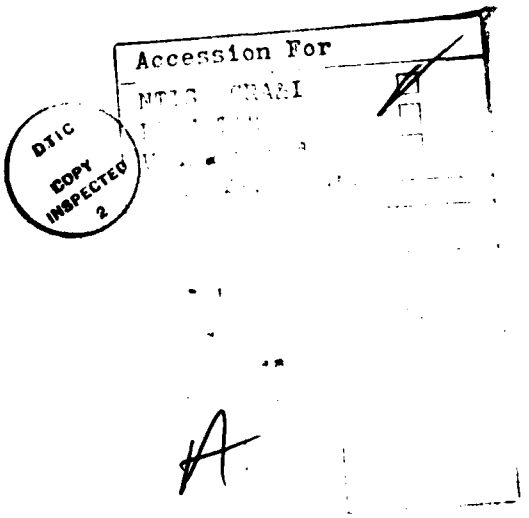
In the summer and early fall of 1982, New World Research Inc. conducted a cultural resources investigation of specific areas within the proposed Lake Pontchartrain and Vicinity Hurrican Protection project. The work was carried out for the Corps of Engineers, New Orleans District, and included both terrestrial survey and testing and off-shore inspection of two proposed borrow areas. A total of two isolated finds and three archaeological sites were identified by the survey and subsequently tested. Fifty-six standing structures and park area were recorded by the survey crew and evaluated by a consulting architect

20. Abstract

historian. The off-shore survey was accomplished by magnetometer and sub-bottom penetrator survey; only the former yielded successful results. Seven clusters of anomalies were singled out for possible further investigation in the borrow areas. None of the sites or structures were found to be eligible for the National Register of Historic Places.



PREFACE

New World Research, Inc. would like to thank several individuals whose consultations and assistance were greatly appreciated on this project:

Michael Stout Thomas Ryan William Muller	Department of the Army, Corps of Engineers, New Orleans District
Robert Smith	Robert Smith and Associates, Inc.
William Spencer	Southern Archaeological Research, Inc.
Ed Bailey	Lake Pontchartrain Levee Board
Eric Wolfe	Office of the Commander, Seventh Coast Guard District, Miami
Sheila Lamb	Librarian, Research, Coast Guard Academy Library, New London
John P. Lenzer	Summit Geoseismic Services, Inc.

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CHAPTER ONE

INTRODUCTION

From May, 1982 to October, 1982, New World Research, Inc. (NWR), undertook archaeological investigations of specific areas encompassed by the proposed Lake Pontchartrain and Vicinity Hurricane Protection (LPVHP) project (Figure 1). The work was carried out for the Department of the Army, Corps of Engineers, New Orleans District (COE), *under contract number* DACW29-82-C-0272.

LPVHP: PROJECT DESCRIPTION

The LPVHP project is authorized by Congress as part of the Flood Control Act of 1965. Its primary purpose is to "protect life and property in the Greater Metropolitan New Orleans area from hurricane surges" (Scope of Work:C-1).

As part of the environmental study of the impacts created by the LVPHP project, a cultural resources survey was required and had to include both terrestrial survey and off-shore magnetometer and sub-bottom inspection. This survey supplemented previous cultural resources studies of the LPVHP project conducted by the New Orleans District. Therefore, the study area comprises ony a portion of the total project area.

Prior to initiating any fieldwork, a background and literature search was carried out for preparation of a formal research design. Thus, the work conducted under contract number DACW29-82-C-0272 included several phases, each of which is briefly described below. In addition, since our research design and strategy were dependent upon the nature of the survey areas, this chapter describes the exact loca-

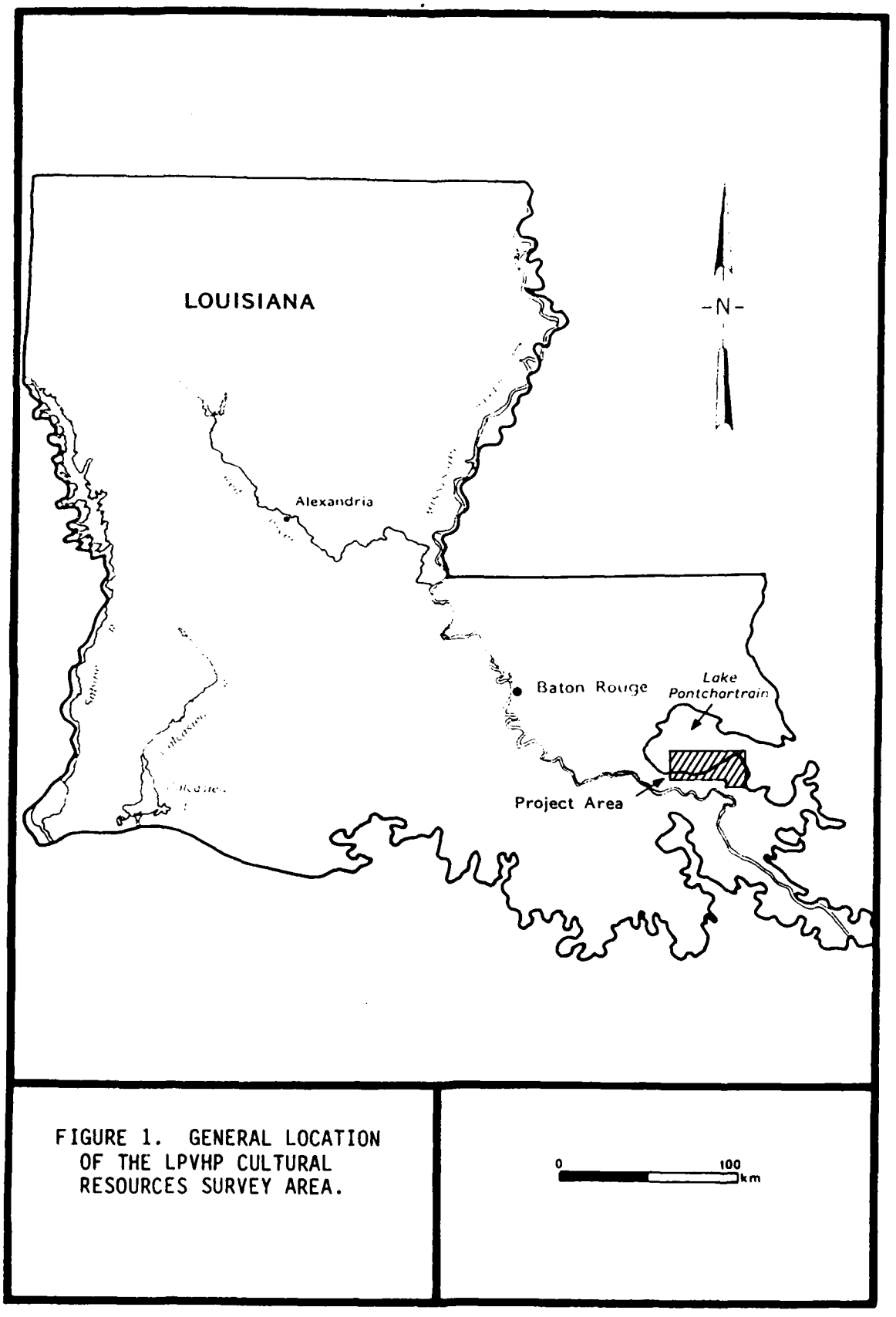

FIGURE 1. GENERAL LOCATION OF THE LPVHP CULTURAL RESOURCES SURVEY AREA.

tions inspected by both the off-shore and terrestrial work. These locational details will enable the reader to comprehend more thoroughly the orientation of our research. Details on precise methods, results and recommendations of each phase follow in the succeeding chapters of this report.

Phase I: Research Design Preparation

In order to develop a formal research design, a comprehensive background and literature search was completed by NWR. The review of documents, literature, and records was oriented to providing a research orientation for both the terrestrial and off-shore portions of the investigations. Broadly speaking, sources were investigated to obtain data on the geomorphology, environment, and culture history of the project area (see Table 1 for a complete listing of the sources consulted).

The information derived from this research was used to detail the status of knowledge in the project area and to raise research issues which we hoped might be addressed by the fieldwork. Concurrent with and subsequent to the second phase of work, the background study was continued to provide additional data to augment that derived from Phase I.

Phase II: Field Investigations

The field investigations consisted of four components: 1) a terrestrial, pedestrian survey of four alphabetically designated segments; 2) testing of up to three sites identified during the terrestrial survey; 3) an architectural evaluation of standing structures; and 4) an off-shore magnetometer and sub-bottom survey of two proposed borrow areas.

Terrestrial Survey

In August of 1982, NWR commenced field work on the terrestrial portion of the LPVHP cultural resources survey. The segments to be investigated along the artificial levee were situated in Orleans and Jefferson Parishes (Figure 2). The total length of the survey corridor is 36.8 mi (59.2 km), with the width of the corridor surveyed varying from segment to segment. The reason for the varying survey widths was the different construction methods and required levee heights proposed for different segments of the project. The segments are as follows:

A. New Orleans East-South Point to GIWW levee:
   Subsegment A-1: Pumping Station to Exit from GIWW-Approximately 2.5 mi x 500 ft (centered on levee crown)
   Subsegment A-2: GIWW to US90-Approximately 3.2 mi x 250 ft (centered on levee crown)
   Subsegment A-3: US90 to South Point-Approximately 5.3 mi x 200 ft (centered on levee crown)

TABLE 1. LIST OF SOURCES FOR RESEARCH DESIGN PRODUCTION

1. The Office of the State Archaeologist
   A. Site files for Jefferson and Orleans Parish
   B. Pertinent reports (including letter reports) by previous investigators
   C. A review of maps showing locations of known sites
   D. Information on known sites in the project area and immediate vicinity
   E. Information on resources within the project area and immediate vicinity that may be in the process of nomination or determination of eligibility for the State or National Register of Historic Places

2. U.S. Army Corps of Engineers, New Orleans District
   A. Cultural Resources
   B. Library--specifically Reports of the Chiefs of Engineers; and Reports by State Engineers
   C. Map Section for early maps of the project area
   D. Aids to Navigation

3. State of Louisiana, Office of State Parks and Office of Facility Planning

4. U.S. Coast Guard, Academy Library
   7th Coast Guard Ditrict, Environmental Branch

5. Lake Pontchartrain Levee Board

6. Libraries
   A. New World Research, Inc.
   B. Tulane University
   C. New Orleans Public Library
   D. University of New Orleans
   E. Louisiana State University

7. Historic New Orleans Collection

8. International Trade Mart

9. Lake Pontchartrain Causeway Commission

10. Bureau of Land Management

11. U.S. Geological Survey

12. The National Register of Historic Places and Updates

13. Courthouses in Jefferson and Orleans Parishes

14. Soil Conservation Service

15. Morgue files of the Daily Delta, Daily Picayune, and Times-Picayune (on file New Orleans Public Library)

16. Wetlands Research Center, LSU

17. Department of Wildlife and Fisheries

18. Louisiana Historical Quarterly

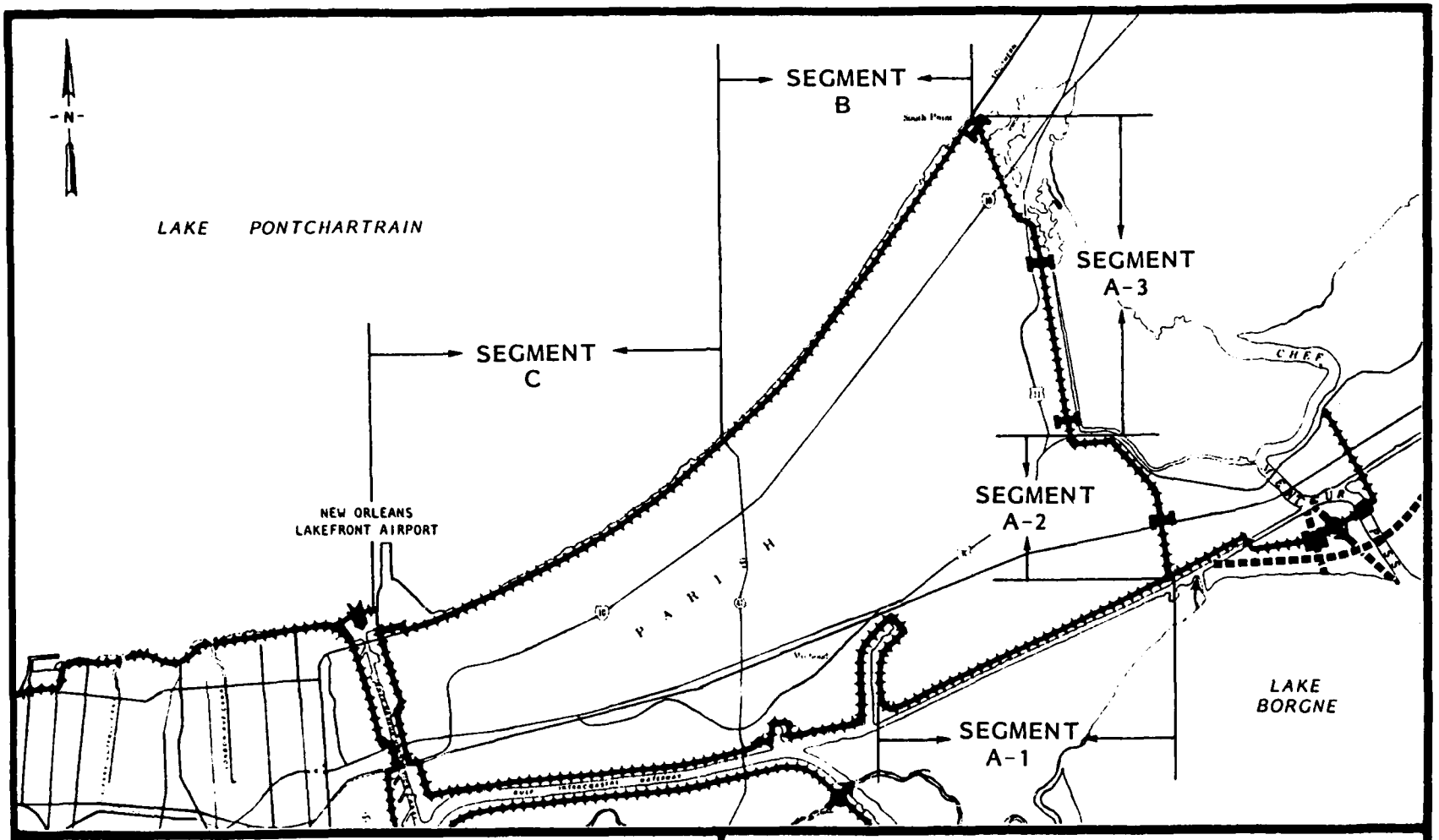

FIGURE 2. POSITION OF THE LPVHP TERRESTRIAL SURVEY CORRIDOR SHOWING SURVEY SEGMENTS.

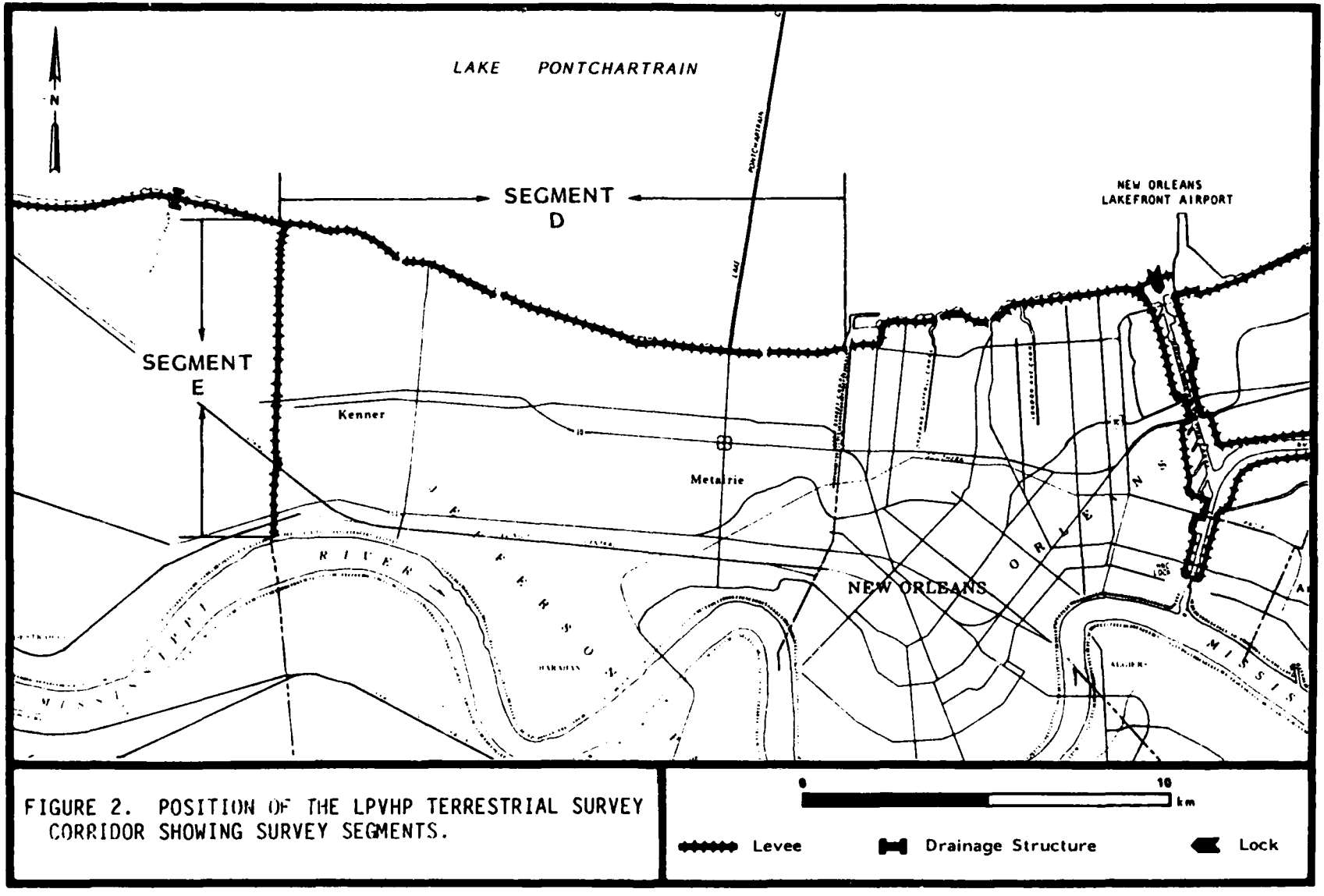

FIGURE 2. POSITION OF THE LPVHP TERRESTRIAL SURVEY CORRIDOR SHOWING SURVEY SEGMENTS.

B. New Orleans East Lakefront Levee-South Point to Paris Road: Approximately 6.2 mi x 400 ft (lake edge to 275 ft inland from levee crown)

C. Citrus Lakefront Levee-Paris Road to Lakefront Airport: Approximately 5 (per addendum) mi x 50 ft (lake edge to lakeside toe of Railroad embankment and offshore structures within 120 ft of lakeside toe of Railroad embankment). Offshore structures outside of the survey corridor were not included because the maximum possible construction impact area is 120 ft lakeward from the Railroad embankment.

D. Jefferson Lakefront Levee-17th Street Canal to Parish Line: Approximately 9.5 mi x 300 ft (lake edge to lakeside levee toe excluding standing structures adjacent to the 17th Street Canal).

E. Jefferson-St. Charles Parish Return Levee-Lake Pontchartrain to Mississippi River: Approximately 5.1 mi x 150 ft (centered on levee crown)

All of these segments were intensively surveyed with subsurface testing accomplished in all areas where surface visibility was poor or potential for buried surfaces might exist.

Site Testing

The survey located a total of five cultural occurrences. Two were isolated finds and the remaining three were previously recorded sites located along the present shoreline of Lake Pontchartrain. These sites, 16Or12, 16Or28 and 16Je4, were tested using some traditional techniques and a procedure specifically designed for sites where standard test pitting is not possible due to the high water table. Because of severe erosion, and in the case of one site, construction, none were found to be eligible for nomination to the National Register of Historic Places.

Architectural Survey

The architectural survey focussed on all standing structures located within the LPVHP survey corridor. A photographic and written record was made by the survey crew and evaluations were provided by our consulting architect historian, Robert Smith, on the basis of field visits and standing structure form review. In all, 56 standing structures were recorded and evaluated. None of the structures were determined to be eligible for the National Register.

Off-Shore Survey

Two proposed borrow areas were investigated by remote sensing equipment. The marine survey areas were located near the present shoreline of Lake Pontchartrain. One area was located near the south

shore between the St. Charles Parish-Jefferson Parish line and the Jefferson Parish-Orleans Parish line, approximately 1100 to 1500 m offshore (Figure 3). The area was 154 m wide. The other area was located east of I-10 near Slidell, Louisiana, on the north shore of Lake Pontchartrain, at Howze Beach, and included the northern margin of the Middle Ground shoal (Figure 4). These areas are specifically delineated as follows:

Jefferson Parish borrow area: UTM coordinates (Zone 15)

NW corner:	762 341 m. E 3328 185 m. N	SW corner:	762 341 m. E 3328 030 m. N
NE corner:	777 275 m. E 3325 399 m. N	SE corner:	777 275 m. E 3325 244 m. N

Howze Beach borrow area: UTM coordinates (Zone 16)

NW corner:	231 389 m. E 3344 851 m. N	SW corner:	230 962 m. E 3344 185 m. N
NE corner:	232 652 m. E 3343 992 m. N	SE corner:	232 226 m. E 3343 349 m. N

These two area were surveyed with remote sensing gear in order to determine the potential presence of cultural resources (e.g. shipwrecks) and to determine the sub-bottom potential for prehistoric site locales.

A number of anomalies and clusters of anomalies were identified. Only those which suggested patterns potentially related to cultural properties were recommended for consideration of further study.

Phase III: Analysis, Data Synthesis, and Report Production

In the final phase of work, all artifacts recovered from the terrestrial portion of the project were analyzed using state-of-the-art techniques. These materials included those recovered from both survey and site testing procedures.

Data synthesis was accomplished for both the terrestrial and offshore portions of the work. The objective of the data synthesis was to provide interpretations suitable to address the research issues raised by the background and literature review. In addition, recommendations on cultural property significance and LPVHP project impact were developed on the basis of data interpretations.

SUMMARY

These phases briefly discussed above constitute the outline of our work on this project. The results indicate the LPVHP will not adver-

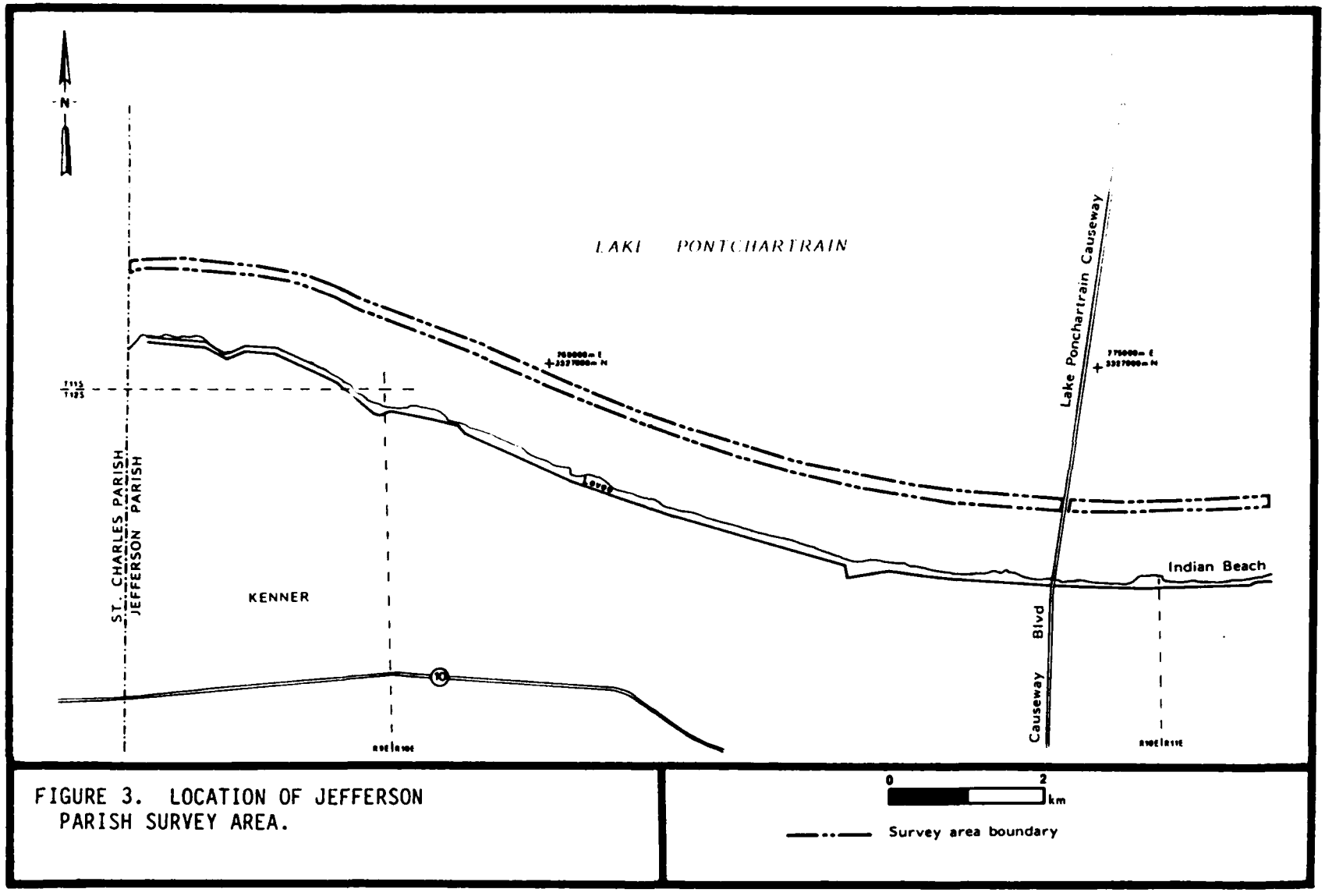

FIGURE 3. LOCATION OF JEFFERSON PARISH SURVEY AREA.

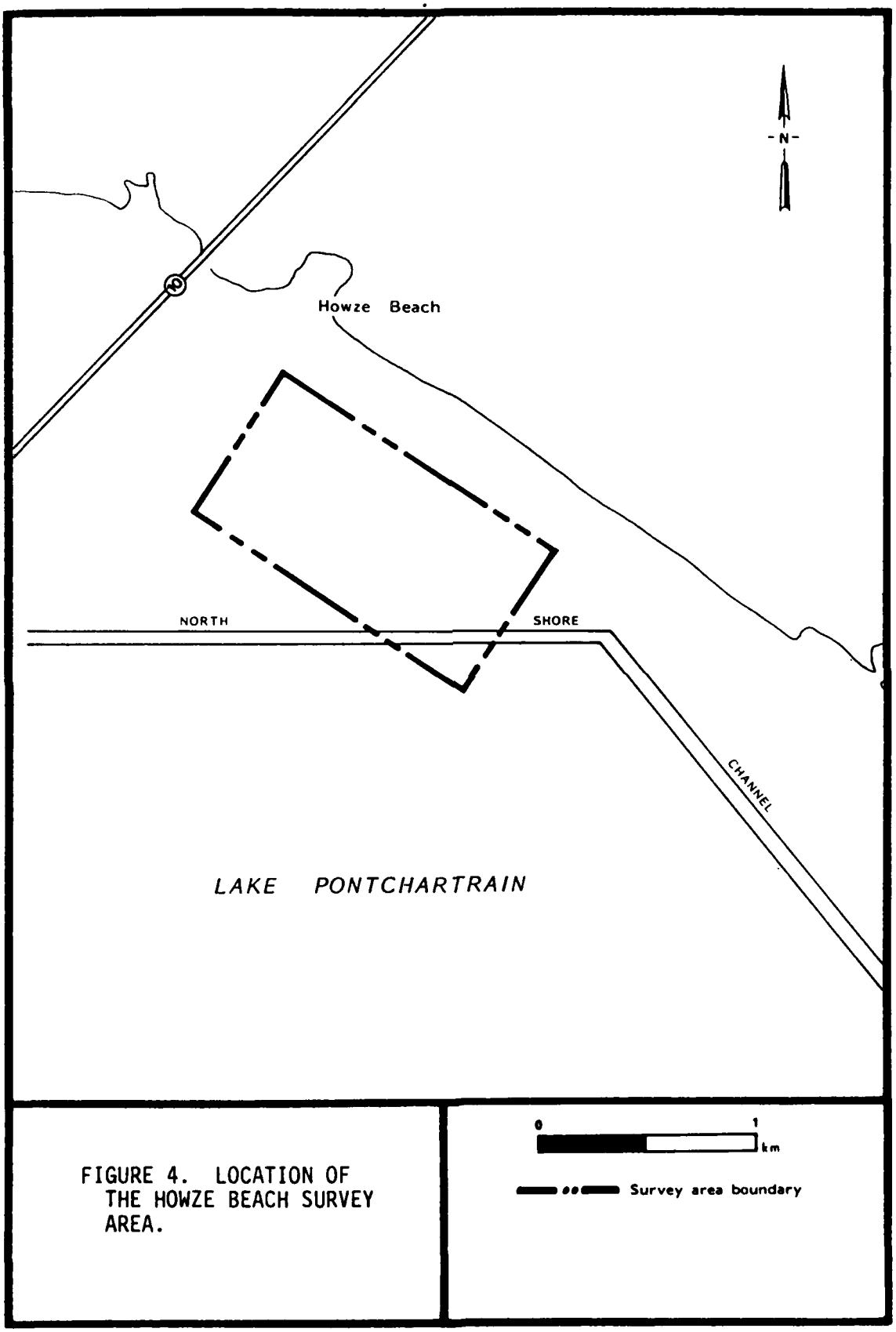

FIGURE 4. LOCATION OF THE HOWZE BEACH SURVEY AREA.

sely impact any National Register property or any properties which might be deemed potentially eligible. However, the off-shore portion did identify clusters of anomalies which were recommended for avoidance.

CHAPTER TWO

THE LAKE PONTCHARTRAIN BASIN IN ENVIRONMENTAL PERSPECTIVE

This chapter presents an overview of the geomorphology and ecology of the Lake Pontchartrain Basin with specific emphasis on topics pertinent to the present work plan. For both the geomorphology and ecology, attention is given to the implications of the data for cultural resource presence, particularly for the prehistoric periods.

GEOMORPHOLOGY

The Pontchartrain Basin lies within the Mississippi Alluvial Valley, bounded on the south and west by the present channel of the Mississippi River, on the north by a well-drained Pleistocene upland terrace formation and on the east by a series of relic barrier island beach trends and relic delta formations. Over half of the present basin is covered by large shallow lakes. The most westerly is Lake Maurepas. The central lake, measuring some 64 km east to west and 38 km north to south, is Lake Pontchartrain. To the east, the small Lake St. Catherine lies within a relic delta that separates Lake Pontchartrain from Lake Borgne, a large embayment that opens to the Gulf of Mexico. The whole basin is 129 km on its east/west axis and about 56 km on its north/south axis.

Most of the Pontchartrain Basin, as well as the rest of the deltaic plain of southern Louisiana, was formed by a series of five major delta complexes during the last 6,000 years (Frazier 1967). Of primary concern to the Pontchartrain Basin is the third in the

sequence, the St. Bernard delta complex. The St. Bernard delta complex is actually comprised of à set of delta lobes representing 200 to 1,500 year 'pulses' of delta building (Figure 5). The lobes are associated with a dendritic network of distributaries around which sediment is deposited. These distributary patterns are discernable on topographic maps and in aerial photographs, even after the lobe has ceased to be active.

Lake Pontchartrain was formed within the last 5000 years by the interaction of barrier trends and delta growth. Following the rise of sea level to its near present level subsequent to the end of the Pleistocene, the shore of the Gulf of Mexico was the edge of the Pleistocene prairie terrace, the present northern boundary of the Pontchartrain Basin. The eastern and southeastern limits of the basin were initially defined by a series of beach trends, sand spits or barrier islands. The western boundary was defined by sediments introduced by a series of delta lobes of the Mississippi River. This riverine sedimentation eventually covered the whole western, southern and eastern portions of the basin, burying all but two small areas of the barrier trend.

At present, there is disagreement as to exactly when the sequence of delta growth and barrier development occurred. The traditional and most widely accepted view is that of Saucier (1963). He states that the beginning of the Pontchartrain Basin was the formation of a barrier spit called the Pine Island Beach trend, extending southwest from the mouth of the Pearl River for a distance of 56 km conforming closely to the present southeastern shore of the lake (Saucier 1963:49-51). Radiocarbon dates cited by him for the formation of this spit range from 2350 B.C. to 3450 B.C.

After the barrier formed, sediments were introduced into the basin by the Mississippi River in the formation of the Cocodrie Delta between 1500 B.C. and 2000 B.C. These sediments eventually closed off the embayment created by the barrier spit and Lake Pontchartrain was formed, slightly smaller than the one at present (Saucier 1963:58).

The river abandoned the Cocodrie channel in favor of the Bayou Teche channel on the western edge of the alluvial valley by 1550 B.C. at which time the former delta began to deteriorate. Beaches of whole and broken shells of the brackish water clam, Rangia cuneata, formed around the edge of the expanding lake. The maximum extent of open water occurred between 650 B.C. and 850 B.C. While the lake was expanding to a conformation close to that of the present, the Gulf of Mexico encroached to within a few kilometers of the southeastern shore of the lake and an outlet formed near Rigolets (Saucier 1963:64-65).

Again, the Mississippi River shifted its course eastward forming the massive St. Bernard Delta system between 650 B.C. and 50 B.C. Most of the sediments from this St. Bernard Delta were deposited to

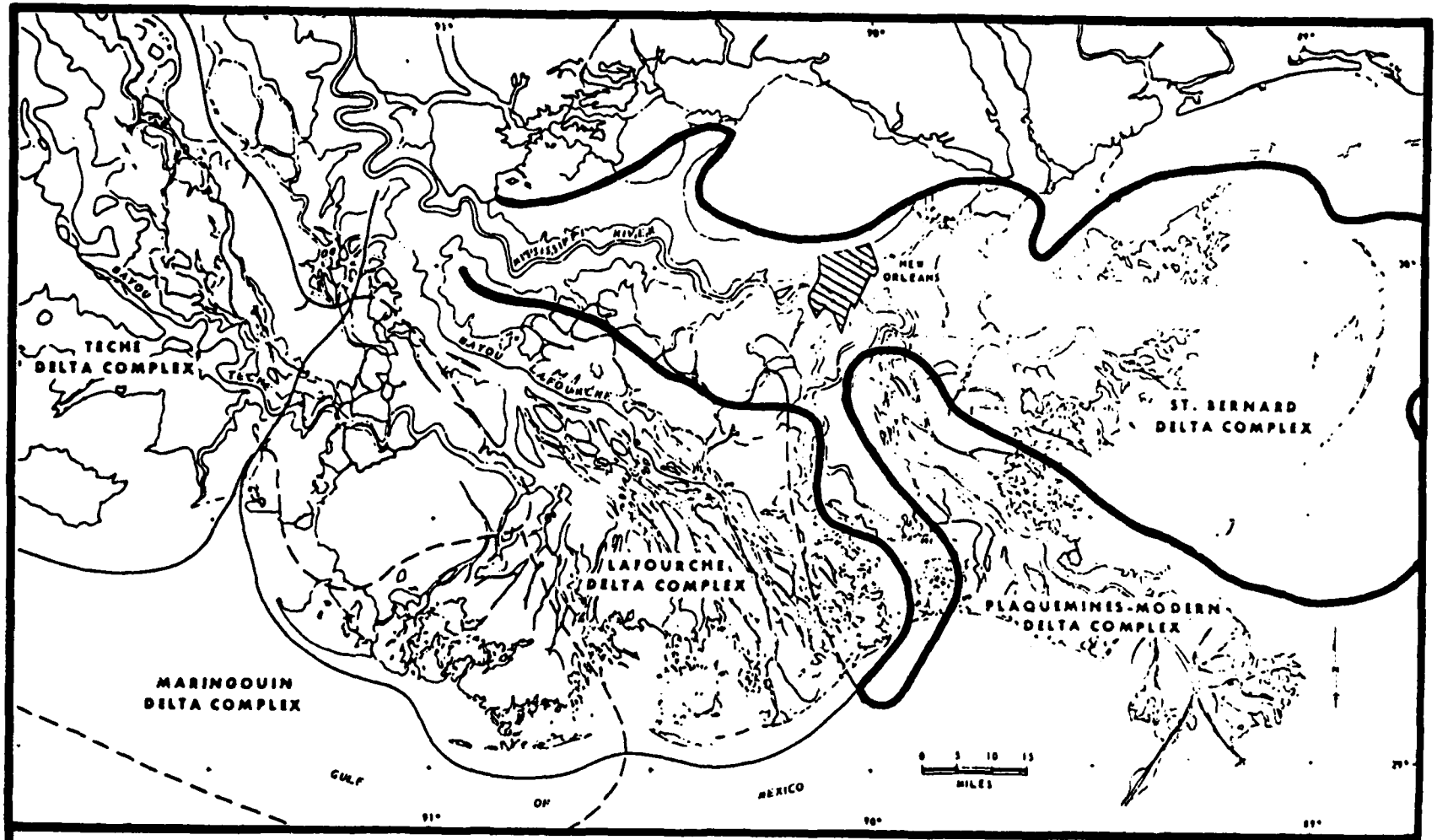

FIGURE 5. DELTA LOBES WHICH COMPRISE
ST. BERNARD DELTA COMPLEX.

the south and east of Lake Pontchartrain with only a small quantity carried by the Bayou Sauvage sub-system. This later sub-system received its flow from Metairie Bayou near the center of present day New Orleans, split with Unknown Bayou, and then continued east forming a number of sub-deltas in the eastern edge of the lake. It was Bayou Sauvage and its distributary fan, dated to about 250 B.C., that closed off the lake from the Gulf of Mexico, resulting in an influx of fresh water. This 'freshening' of the lake was hypothesized by Saucier to have caused an abandonment of Tchefuncte Period sites (Saucier 1963:72, 76).

Later work has revised Saucier's chronology (see Frazier 1967; Frazier and Osanik 1969; Gagliano and Van Beck 1970; Gagliano et al. 1973; Gagliano et al. 1978). But it is agreed by all researchers that Lake Pontchartrain was formed in a basin south of the Pleistocene prairie terrace. The eastern and southeastern shore conforms to one, or a series of sand barrier islands or shoals which were in place by 950 B.C. The present western and southwestern boundaries of the Pontchartrain Basin were established in their present position by the end of the first millenium B.C.

The growth of the St. Bernard delta, which constitutes the western and southwestern boundaries of the Pontchartrain Basin, was neither continuous nor uniform as the river was also building deltas at Bayou Teche and Bayou Lafourche. With the barrier formation restricting salt water intrusion from the east and the river building new land masses and introducing fresh water from the west, Lake Pontchartrain began as a brackish embayment. As the delta growth continued its eastward development, the bay eventually closed to become a brackish lake.

ECOLOGY

Today, the southern periphery of the basin is the focus of the New Orleans metropolitan area. Remaining areas of the basin are less modified by recent human activity and several typical wetland environments can still be found. Cypress-tupelo gum swamps predominate to the west. Fresh, brackish and salt marshes appear as one moves east toward the open waters of the Gulf. Well-defined floral successions can still be found relative to topographic disconformities. Well-drained levees, relic beaches, relic levee ridges and some elevated Indian sites exhibit a mixed oak/hackberry vegetation. These elevated zones are flanked, in order, by sycamore, willow, marsh elder, cypress swamp and a succession of marshes from fresh to salt.

The study area hosts a mild, sub-tropical climate with an average annual temperature of 20.3°C (68.5°F). The moderating effect of the Gulf and numerous water bodies of the coastal zone results in mild winters and a long growing season. The average low temperature in January, the coldest month, is 12.3°C (54.2°F); while in July, the hottest month, the average is 27.8°C (82.0°F). The growing season (number of days between the last freeze in spring and the first freeze

in fall) (0°C/32°F) is about 270 days (Kniffen 1968:22). Severe freezes are relatively rare, occurring about once every 10 years. The area receives high precipitation, averaging 116 cm per year.

The most severe environmental constraints are related to flooding. Under natural conditions, the entire coastal lowlands of southeastern Louisiana are affected by flooding from the Mississippi River about once every 2 years. River flooding generally occurs during late winter to spring (with peaks during May or June), raising water levels a meter or more in the lowlands.

Severe flooding and high velocity winds are associated with the passage of tropical storms or hurricanes. Winds that accompany these storms frequently exceed 160 km per hour in sustained gusts, and are even higher in local tornadoes which spin off from the storm. In addition to these severe effects, hurricanes may also produce torrential rains, which may cause local flooding. However, the most severe flooding and damage is caused by wind-generated tidal surge. When Hurricane Camille struck the coast of Mississippi in 1969, tidal surge of 7.5 m was reported to the east of the area, causing heavy property damage and loss of life within the immediate shore zone. Hurricane season lasts from June through November, but most occur during September.

The Lakes

Under normal conditions, the tides in both Lake Pontchartrain and Lake Borgne are diurnal ranging between about 15 and 30 cm, respectively. The Rigolets and Chef Menteur Pass have developed naturally deep and wide channels giving them adequate capacity for normal tidal flows and for discharge of tributary flow. But, the frequent, and often appreciable, changes in the water level of Lake Pontchartrain are not primarily caused by periodic tidal variations; nearly all result from variations in direction, force and duration of the wind.

During the winter, the wind is frequently from the north or northwest. Lake levels may average 30 to 60 cm lower than during the summer as water flows from the lakes into the Gulf. Abrupt changes in wind direction may cause rapid changes in lake level, even for winds as low as 3 km per hour. Easterly winds raise the water level in Mississippi Sound and Lake Borgne, producing an increase in flow through the passes and a subsequent rise in the level of Lake Pontchartrain, while the reverse occurs when the wind is from the west. A rise or fall of 15 cm in an hour has been observed on Lake Pontchartrain on several occasions.

Prairie Terrace

Under natural conditions, the Prairie Uplands were dominated by longleaf pine (Pinus palustris) forests with a distinctive understory of wire grass (Polygunum aviculare) and palmetto (Sabal minor). They probably supported a large population of deer, bear, small mammals,

birds and reptiles. The total biological resource that could be exploited by prehistoric peoples was relatively limited in comparison to the coastal wetlands and stream valleys.

The Prairie Terrace of southeastern Louisiana was characterized by flatwoods, including longleaf, shortleaf, loblolly, slash and spruce pine. The understory contained a variety of berries, vines and other usable plants, particularly in poorly-drained places where standing water occurred. Oak trees, black walnut, hickory and other nut-bearing trees occurred, particularly along margins of local drainage and near the coastal marshes, and were heavily utilized prehistorically. Faunal resources were diverse, including deer, bear and many small mammals.

The Prairie Terrace Uplands and stream bottoms provided a number of mineral resources that were otherwise locally unavailable to the aboriginal natives. Primary among these were chert gravel, which was extensively utilized for the manufacture of stone tools. Sandstone, hematite and dimonite, although less abundant, were also available.

Estuarine Environments

Estuarine environments are extremely productive and were probably the most important for the prehistoric residents of the area. Fresh water swamps host a wide variety of trees, shrubs and grasses. Among the trees, the dominant species are bald cypress and tupelo gum, but stands of swamp maple, bay and ash are also noted. Frequently, an undergrowth of marsh plants is found which includes pailletine, delta potato, cutgrass and common lizard tail (Gibson 1978).

The terrestrial environment of the swamps (and associated natural levees) supports extensive and diverse faunal communities. As many as 32 species of mammals are found in this region, as opposed to 14 in the fresh water marsh, 11 in the brackish marsh and eight in the saline marsh (Altschul 1978). Many of these mammals are small rodents, which are today of negligible economic importance. Of the other species, probably the most important to the prehistoric inhabitants was the white-tailed deer (Odocoileus virginianus). Other mammals of the swamp forest known to have been hunted prehistorically include red fox, gray fox, swamp rabbit and cottontail rabbit.

Among the amphibians and reptiles found in swamps are rattlesnakes, water moccasins, coral snakes, alligators, turtles and a variety of lizards and frogs. While a number of these reptiles were probably carefully avoided by the prehistoric inhabitants, it appears that turtles and alligators, at least, were actively sought.

While considered in this report as a single ecological unit, the marshlands are actually composed of three sub-units: 1) saline marshes; 2) brackish marshes; and 3) freshwater marshes. These sub-units tend to parallel the coast in an east/west direction, with the freshwater marshes to the north and the saline marshes to the south.

The boundaries between the three marsh types are not rigid, but are controlled by a variety of factors, including soil type, salinity, tide, elevation, drainage characteristics and soil pH.

The salt-water marsh does not support a diverse botanical community. Chabreck (1972) lists only 17 plant species in this zone, of which oyster grass is the most dominant. Other species include big and little cord grass, saltwort, glasswort, salt marsh grass, black rush, black mangrove, bulrushes, seashore paspalum, common reed and salt meadow grass.

The brackish marshes lie at upper reaches of the area of salt-water intrusion. There are no plant species that grow exclusively in this zone, although varieties of freshwater plants that can tolerate some degree of salinity and salt-water plants with a degree of tolerance for fresh water thrive in the area. Characteristic of the brackish marsh is wiregrass, which accounts for 55 percent of the total vegetation, though it is only one of 40 plant species in the zone (Chabreck 1972). Other species common to the brackish marsh include couch grass, three-corner grass, leafy three-square, big cord grass, sand rush and salt-marsh grass.

The freshwater marshes, associates with areas of high fresh water run-off and low salinity, are the most interior of the coastal marsh zones. This marsh type is commonly found along waterways, adjacent to the interface between the interior uplands and the coastal marshlands. Freshwater marshes support the widest diversity of plant life, including pailletine, common reed, cattail, bulrush, cut-grass and delta potato (Chabreck 1972).

While is is true that the prehistoric inhabitants of the area utilized the vegetative species available in the marshes, it appears that this habitat was mainly used as hunting and fishing grounds for the indigenous faunal species. The marshes support a faunal community primarily of sluggish-water lowland fish, small mammals, reptiles and fowl. While a number of distinct fish communities, such as shoreline salt-water fish and freshwater game fish, are found in different parts of the marshland, only a small number of different types of fish were sought be the prehistoric inhabitants of the deltaic plain, including gar (Lepisosteus sp.), catfish (Siluriformes) and bowfin (Amia calva). These species are all low-oxygen tolerant fish, and as such are available primarily during warm, low-water periods, when they congregate in the deeper parts of channels. These fish are relatively tolerant of changes in salinity, and thus are found throughout much of the marshland. Remains of gar, bowfin and catfish make up a large component of the faunal collections at most of the archaeological sites in the deltaic plain (Altschul 1978; Byrd 1976a; Springer 1973; Shenkel 1974).

Small, fur-bearing mammals are the most characteristic animal species of the marshlands, and presently include muskrat (Ondatra zibethica), nutria (Myocastor coypus), otter (Lutra canadensis), rac-

coon (Procyon lotor) and members of the weasel family (Mustelidae). Small animal remains have been identified at prehistoric sites throughout the deltaic plain (Altschul 1978; Byrd 1978; Springer 1973; Lowery 1974). Of these, the muskrat appears to have been the most important, and was extensively hunted, with remains being found at numerous Indian mound and midden sites.

As regards the distribution of these small fur-bearing mammals, muskrats are most abundant in the brackish marshes, while the nutria (imported from South America around 1939) predominates in the fresh marshes. Raccoons are also most abundant in fresh marshes, while mink and otter are equally distributed between fresh and brackish marshes.

The streams and lakes of the marshlands provide excellent habitats for a wide variety of waterfowl. Most of these birds are transient or only seasonal residents inhabiting the marshes during the winter. Among the types of marshland, the salt-water marsh supports the widest diversity of species, with the most common being members of the order Anseriformes (ducks and geese) or the order Ciconiiformes (herons and egrets) (cf. Lowery 1974).

The marshland supports diverse and abundant mollusk communities. Today, the most important shellfish are Crassostrea virginica (oysters), and Penaeous setiferus (white shrimp). Prehistorically, the brackish-water clam (Rangia cuneata) was heavily exploited, as evidenced by the numerous middens largely composed of this species' shell. Other shellfish whose habitats range from saline to freshwater (especially Unio sp.) were also utilized by the prehistoric inhabitants of the area (Gagliano et al. 1978). Shells provide important data on past changes in subsistence strategies, as these different mollusk species tolerate different levels of salinity.

IMPLICATIONS FOR PREHISTORIC SITE LOCATION

The Lake Bottom

As discussed before, the Lake Pontchartrain Basin is the result of deltaic lobe formation late in the Pleistocene. A seaward extension (progression) of the St. Bernard deltaic lobe sealed a portion of the inner continental shelf from the rest of the Gulf of Mexico. The south shore of the lake marks the general margin of this deltaic progression (Fisk 1944). This progression overlaps an older drainage system. Fisk (1944: Plate 3, Sheet 2) indicates alluvial deposition to an approximate depth of -200 ft MSL (Mean Sea Level) with an entrenched drainage system at this depth. This drainage system is part of the braided, ancestral Mississippi River, probably dating to ca. 30,000 B.P. (Fisk 1944) or 35,000 B.P. (Saucier 1968).

A geologic profile generated from borings of the St. Bernard deltaic offlap (e.g. that portion of the prodeltaic sediments that create any side of a deltaic lobe) just south of the study area indi-

cates a significant hiatal surface at the top of the weathered and eroded Pleistocene deposits approximately 50-60 ft below present surface (Frazier 1974:6). Proprietary sub-bottom data generated by the oil and gas industry in Lake Pontchartrain in the southwest portion of the Lake reveal a series of horizontal sediments with no indication of the strong reflective horizon associated with the subareal Pleistocene surface. This sub-bottom data penetrates to a depth of at least 75 ft BML (Below Mud Line). It should be noted that in the late 1800s a crevasse channel opened up from the Mississippi River into Lake Pontchartrain. The Bonnet Carre Crevasse was active for several years and offloaded from the river into the lake a tremendous amount of modern sediment. This incursion of unsorted sand and silt changed the character of the western end of the lake bottom from mostly silts to sand and interbedded silts.

Some channelization is present in the proprietary sub-bottom profile; however, no levees associated with the channels were noted. The channels were very shallow and difficult to follow due to the lack of classic differentiation in channel fill sediments. This lack of differentiation makes it probable that these channels are of sub-aqueous origin, perhaps from a crevasse splay (John P. Lenzer 1981, personal communication).

In 1871, soundings between Bayou St. John and the 'Rigolets' found the bottom to be of soft mud, whereas in the vicinity of the "Middle Ground" the bottom was found to be of stiff clay and sand (Report of the Chief of Engineers 1871). Nearer to shore and east of the Jefferson Parish Levee and Borrow areas, near the New Canal exit to the Lake, the 1882 Report of the Chief of Engineers reports finding shell, sand, and clay/sand parallel to the shore along the seven foot curve. Oil and gas industry data confirms the presence of sub-bottom shell deposits scattered throughout the lake.

Sea-level curves indicate a short, still stand at approximately 2,500 to 3,000 B.P. at a water depth of approximately -10 ft MSL (Frazier 1974:23). This raises the possibility that the shell banks reported at the seven foot curve are relict beaches. If these are beach deposits from a hiatus of a transgressive phase it is highly probable that they are restricted in distribution. These shell banks must be considered areas of high site probability.

Variability of Rangia

One ecological factor seems to override all others in this discussion of prehistoric occupation of the Pontchartrain Basin; the variability of the Rangia clam. Regardless of changes in culture content or affiliation, an economic focus on the brackish-water clam seems to have remained constant. Changes in settlement patterns over time, appear to closely correspond to the movement of brackish marshes.

There are two points in the cycle of a deltaic lake in which brackish marshes are formed. The first is during the development of

the system where the fresh water of the river encroaches upon the saline environment of the sea. The deltaic lake becomes brackish again when the river abandons the course and the delta begins to deteriorate by subsidence and erosion.

In the Pontchartrain Basin, this tendency is demonstrated by the apparent abandonment of the prehistoric sites about 100 B.C. when the growth of the St. Bernard Delta System created an influx of fresh water into the lake. Later, when the St. Bernard delta was abandoned and began to subside, salient levels in the lake again increased. Assuming this environmental scenario included a severe reduction in the availability of Rangia then there are a couple of primary implications for prehistoric settlement.

The area inhabitants during the Pontchartrain Phase Tchefuncte, just as some Marksville motifs were becoming popular, may have followed the brackish habitats south and southeast into the expanding St. Bernard Delta System. When the delta system was abandoned by the river and began to retreat, they retreated with it possibly to reoccupy sites upon which they had lived during the initial phase of delta growth. When this happened, the Rangia returned as did the people who were, by this time, in the Troyville Period.

Alternatively, the environmental shifts may have ushered in subsistence changes as the Marksville traits began to emerge over the Tchefuncte culture. In this case, many sites dating to the Marksville period may not be characterized by the shell middens so typical of other periods. Earth middens in the absence of dramatic mound construction or large permanent villages may simply have been missed by archaeologists so attuned to shell mound sites in the Pontchartrain Basin. Such sites may also be more subject to the effects of natural disturbance.

Natural Impacts

Any discussion of the nature and number of prehistoric resources in the Pontchartrain Basin must include some consideration of the rate of destruction and modification of the archaeological record in this area. The annual deposition of soil by active river systems and the subsequent subsidence of abandoned distributary networks have combined to bury most archaeological sites in the deltaic plain.

Numerous examples of completely or partially submerged or buried sites can be given. One of the more dramatic examples is the Linsley site in Orleans Parish (16Or40). The Linsley site was a small midden situated on a buried natural levee ridge of the Cocodrie delta lobe. Subsidence had reduced the base of the site to 6.5 ft (1.98 m) below mean sea level. The highest part of the midden was approximately five

ft (1.52 m) below the present surface and buried by peat deposits, so that no surface indication of its presence remained.[1]

A second example comes from the lower Atchafalaya Basin, where Gibson (1978) was able to locate only 35 sites, dating no earlier than the Troyville Period. In contrast, Neuman and Servello (1976) found 133 sites in a survey covering approximately the same area as the Atchafalaya Basin, but to the north of the prograding delta. This situation would not be so severe, if it were not compounded by an extremely high water table. The water is so close to the surface that excavations below 10 or 20 cm are generally impossible. The only method available to evaluate buried sites adequately is the use of deep cores (cf. Neuman 1976). But, this method is relatively expensive, demands specialized equipment, necessitates a large number of samples to be useful, and often produces mediocre results (cf. Gibson 1978).

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[1]Recent attempts to locate the Linsley site by NWR and consulting geomorphologists were conducted in conjunction with proposed construction by the Port of New Orleans. The results revealed no intact subsurface remains of the site exist at this time.

CHAPTER THREE

CULTURE HISTORY

This chapter explains the cultural record, both archaeological and historical for the study area in particular, and, where appropriate, the larger Lake Pontchartrain Basin in which it is contained.

PREHISTORIC OVERVIEW

This section of Chapter Three is divided into two parts, the first of which presents a summary of the prehistoric culture sequence as presently understood by the archaeological community working in the area. The second part seeks to evaluate the status of our knowledge.

Cultural Sequence

Although the prehistoric record for most of the Southeast begins with the Lithic Stage (pre-projectile point period and Paleo-Indian period), the geomorphological history of the Pontchartrain Basin is too recent to have hosted any intensive use of the region prior to the Late Archaic. Though Paleo-Indian and Early and Middle Archaic occupations have been identified in the deltaic plain (Gagliano 1968), in situ components have not been identified in the basin.

The earliest reported occupations in the study area date to the pre-Poverty Point Late Archaic (Gagliano n.d.:16). These Late Archaic sites are situated at the extreme eastern end of the basin, and are best classified as part of the Pearl River Late Archaic horizon. Sites are small shell middens which are characterized by the presence of both bone and lithic tools (Gagliano n.d.). Little work has been

done on Pearl River Late Archaic sites, but what information is available suggests that the sites are associated with old active shorelines of the embayment. A heavy reliance upon common oyster (Crassostrea) is indicated at the sites, which, through radiocarbon assays, have been dated to as early as 3515 B.C. (Gagliano and Saucier 1963).

The most complete subsistence and artifactual information for the Late Archaic is related to the Poverty Point manifestations in the basin. Poverty Point occupations were initially recognized by Ford and Quimby (1945). Data from Poverty Point localities in the basin, primarily the Bayou Jasmine, Linsley, and Garcia sites, were used to define the Late Archaic Bayou Jasmine and Garcia phases. These sites and phases are described below.

Between 1957 and 1960 highway and canal construction projects uncovered two Poverty Point sites buried beneath six to eight feet of marsh deposits. One was the Bayou Jasmine site, located at the western end of Lake Pontchartrain, while the second, the Linsley site was situated south of the Lake and west of Lake Borgne. Both were found in "association with buried distributary natural levees of the initial (4000 year old) Mississippi River subdelta that developed in the area" (Gagliano and Saucier 1963:321). Gagliano and Saucier (1963:321) reported both sites as small earth and Rangia shell middens "not exceeding 150 feet in greatest dimension and 2 to 3 feet in thickness".

At the Bayou Jasmine site surface collections taken from spoil piles produced large numbers of small animal bones, Poverty Point objects, and substantial numbers of Tchefuncte period sherds. The quantity of Poverty Point objects was unexpectedly high. Gagliano and Saucier (1963) postulated that the difference in the density of Poverty Point objects recovered at the various sites might be suggestive of either temporal or functional differences. Their conclusion however could not be substantiated because of the limited nature of their work.

The Bayou Jasmine site was more thoroughly investigated in the early 1970s by Louisiana State University, although at that time the excavations required shoring and the in situ Poverty Point component was never reached. Unfortunately, a report on these investigations was not completed.

Still, the site has intrigued professionals and amateurs alike. Using data from spoils observations, Duhe (1976) professed a hypothetical reconstruction of settlement seasonality at Bayou Jasmine during the Poverty Point Period. He suggested that the site was used during Poverty Point times as a seasonal camp with primary emphasis on fishing and hunting "...small semi-aquatic animals" (Duhe 1976). Based on the types of faunal remains, Duhe (1976) postulated that the occupation was primarily during the spring and summer. Large numbers of Poverty tools, and fish hooks were identified in the spoils. In addition, a very small number of stone tools, projectile points, and

groundstone were noted. Later occupations of the site dating to the Tchefuncte, Marksville, Coles Creek, and Plaquemine periods were also identified, and subsistence items recovered from those actual occupation levels indicated a continued reliance upon paludal resources through all occupation phases.

Gagliano and Saucier (1963) also noted a high number of Poverty Point objects at the Linsley site. An examination of the midden stratigraphy and fill resulted in the identification of Poverty Point objects, animal bone, and a single fibre-tempered sherd. The collection included higher percentages of melon-shaped and biconical forms than had been reported for either Poverty Point or Jaketown Poverty Point objects. The objects from Linsley also tended to be larger than those reported from either of the northern centers (Gagliano and Saucier 1963).

The basic composition of the midden was earth and shell, though around 30 percent of the midden matrix was a mottled mixture of ash, charcoal, and small animal bone fragments. The ash and charcoal was recovered from "three settings: 1) scattered throughout the earth and shell accumulation; 2) stratified in units up to a foot in thickness; and 3) within definable fire pits" (Gagliano and Saucier 1963:321). Radiocarbon dates were obtained on three samples of charcoal and one of Rangia shell (the principle shellfish species recovered in the midden). The dates suggested an occupation occurring about 1740 B.C., which Gagliano and Saucier (1963:326) indicated was well within the accepted general geologic chronology. An additional sample was taken from a peat and organic clay deposit beneath the distributary natural levee on which the site is located, and dated to 2090±140 B.C., thereby adding further confirmation to the general geomorphic chronology.

The Poverty Point materials evident at both the Bayou Jasmine and Linsley sites could be assigned to the Bayou Jasmine phase. This phase is characterized by the co-occurrence of large numbers of Poverty Point objects, bone tools, and occasional steatite vessel fragments. Other Poverty Point sites occur in the Lake Pontchartrain basin however which are not characterized by the same features. These include the Poverty Point sites described by Ford and Quimby (1945) at the eastern end of the basin that produced only small numbers of Poverty Point objects, and the Garcia site, which Gagliano and Saucier (1963) assigned to Poverty Point because of the characteristic microflint industry at the site. The latter site is considered the type site for the Garcia phase.

The Poverty Point occupations represent the first well-documented substantial occupation in the basin. The accumulated data suggest that these occupations focused on the exploitation of Rangia, fish, and small mammals. They all lack certain of the more spectacular Poverty Point characteristics, including mound/embankment construction and production of steatite vessels. Neither Bayou Jasmine nor Linsley yielded artifactual material which would, at this point, indicate full

participation by the occupants of the sites in the well-developed Poverty Point trade network (Duhe 1976). However, some lithic raw materials recovered from the Garcia site could only have been found in Arkansas, Missouri, the Appalachians and the Piedmont. The incidence of exotic raw material use at the site are quite high (Gagliano and Saucier 1963) and included the use of quartz crystals, novaculite, orthoquartzite, metamorphic rocks, magnetite, and hematite.

The earliest dense occupation of the Pontchartrain Basin dates to the Tchefuncte period. Czajkowski (1934) initially demonstrated the existence of this horizon in the region through his work at five sites immediately south of the eastern leg of the proposed project area. Designated 160r1 through 160r5, the sites were earth and Rangia middens. Regrettably his recovery and proveniencing techniques were not accurate, and Ford and Quimby (1945) combined the collections from the five sites (160r1-5) and viewed them as a single collection (Weinstein and Rivet 1978: 7). The collection served as the comparative base for the materials recovered by Ford and Quimby (1945) at Big Oak (160r6), Little Oak (160r7), and the Tchefuncte site.

The work of Ford and Quimby (1945) essentially defined the Tchefuncte period, in general, as well as characterized what became known as the Pontchartrain variant of Tchefuncte, in particular. Both the Tchefuncte period and Pontchartrain variant have been thoroughly summarized by Phillips et al. (1951), McIntire (1958), Saucier (1963), Ford (1969), and Phillips (1970).

In 1967 Gagliano formally described three phases of Tchefuncte for the coastal plain one of which is the *Pontchartrain* phase. Pontchartrain phase Tchefuncte sites are characterized by the presence of Tchefuncte Plain var. Mandeville, Tchefuncte Incised var. Sanders, Tchefuncte Stamped var. Tchefuncte, in addition to small numbers of Wheeler Plain and Punctated, and what Shenkel called Alexander Plain (1974).

In 1978 Weinstein and Rivet suggested a fourth phase based on the results of their work at Beau Mire (16An17) just outside the western boundary of the Pontchartrain Basin. Their comparison of diagnostics indicated that neither Bayou Jasmine (16SJB2) nor Bayou Trepagnier (16Sc10) sites in the west portion of the basin, contained Beau Mire phase components. Thus, they suggested that the Beau Mire phase does not extend into the Pontchartrain Basin despite its close proximity.

Based on Shenkel's excavations at Big Oak (160r6) and Little Oak (160r7), there are apparently two types of Tchefuncte sites, limited use shellfish procurement locations and villages (1974:37). The Pontchartrain phase sites appear in three physical settings within the basin: on margins of the Pleistocene terraces, on relict beaches, or on distributary natural levees in association with swamps and marshes (Gagliano and Saucier 1963:320). Each of these settings continue to be actively utilized in the later ceramic periods as well.

As was the case with the Poverty Point sites, Big Oak and Little Oak subsistence remains indicate an emphasis in resource procurement upon Rangia utilization, though the pattern of small mammal use also continues. Both Shenkel and other investigators (Byrd 1976) have indicated an increased utilization of deer and alligator in Tchefuncte phase sites over the preceding Late Archaic.

Though the floral data from both Big Oak and Little Oak were limited, Byrd (1976), in her analysis of the floral remains from Morton Shell Mound in Iberia Parish, identified the presence of squash or pumpkin seed (Cucurbita pepo), bottle gourd (Lagenaria), hackberry (Celtis), plum (Prunus), grape (Vitis), and persimmon (Diospyros). These species are known to have been present in the Pontchartrain Basin and it is reasonable to assume that similar floral constituents were probably also exploited by the Pontchartrain phase occupants.

In the opinion of Gibson (1978) the most applicable cultural sequence for the post-Tchefuncte occupations on the coastal plain, including the Pontchartrain Basin, is the Red River Mouth sequence defined by McIntire (1958) and Phillips (1970). Yet he qualifies the statement by noting that

> "...workers in the Louisiana coastal area are in unanimous agreement that the scheme is not entirely applicable to the coast for the following reasons: 1) the inability to distinguish Troyville and Coles Creek period on the basis of index pottery types; 2) the inseparability of Plaquemine and early historic complexes using constituent ceramic varieties; 3) the existence of exotic ceramic types, apparently resident to the Alabama-Florida area on some late prehistoric sites in the eastern delta region; and 4) the persistence of cultural manifestations which can only be termed Archaic (with pottery) until historic times in the chenier plain of western Louisiana" (Gibson 1978).

By early Marksville times, salinity levels in Lake Pontchartrain were greatly affected by an influx of fresh water. The population, dependent as ever on the brackish water Rangia clam may have responded to the environmental change by a move south along portions of the St. Bernard delta. Only limited small Marksville occupations have been found in the basin including the final component at Big Oak Island (Shenkel 1974; 1980) and another at Bayou Jasmine (Duhe 1976), so a shift in settlement location may explain apparent low site density.

The prehistoric population in the Basin is more evident around the beginning of the Troyville period. The limited excavation data suggest a continuation of the basic pattern of hunting-gathering-fishing throughout the ceramic stage. To a great extent this subsistence focus is due to the nature of the environment of the coastal plain with agriculture playing only a minor role in the subsistence

strategy. Faunal remains from Troyville sites such as Oak Chenier (16SMY49) and Bone Point (16SMY139) in the Atchafalya Basin show a continued dependence upon large fishes, aquatic reptiles (alligator, turtle), and small marsh mammals (Byrd 1976; Gibson 1978).

The ceramics indicative of the periods from Tchefuncte through Troyville form what Gibson (1978) has characterized as a ceramic continuum. By the Troyville period, the ceramic assemblage is dominated by Pontchartrain Check Stamped, and throughout the Coastal Plain there is an absence of Mulberry Creek Cordmarked which is common on northern Troyville sites. Also present in the assemblage are Marksville Stamped vars. Troyville and Manny, Marksville Incised vars. Yokena and Steele Bayou, Larto Red var. Larto, and Evansville Punctate var. Evansville.

Unlike other regions of Louisiana where there are definite breaks in the ceramic sequence after Troyville in south Louisiana these distributions break down. In part, this ceramic "fuzziness" is due to attempts to apply types and varieties formulated in the Lower Mississippi Valley to the delta. This problem is not new and over the years there have been a number of serious attempts to resolve it (Springer 1973; Gibson 1975a, 1975b, 1978; Altschul 1978).

One of the more recent attempts has been conducted by Davis (1981; Davis and Giardino 1980) using data recovered from the Sims site in St. Charles Parish (excavated 1978-present; Tulane University), the Bowie site in LaFourche Parish (excavated 1967-68; Tulane University), and two WPA excavated sites, Medora (Quimby 1951) and Bayou Goula (Quimby 1957). Davis postulated that the success of using ceramic comparison to obtain fine-scale chronological control decreases as social and demographic instability increases. He tested this hypothesis by first assuming that the patterns of indigenous population movements and displacements observed by the Europeans characterized occupation of the area since Coles Creek times. He then went on to demonstrate that the ceramic assemblages at these sites were consistent with a pattern of endemic social instability (see also Altschul 1978 for a different approach of demonstrating social instability along the Louisiana coast). Davis (1981) does not believe that the late prehistoric/ethnohistoric situation in the delta requires completely replacing the Lower Mississippi Valley system; only that researchers recognize its inherent limitations and compensate for them when dealing with issues needing fine-scale temporal control.

Discussion of the Status of Knowledge

The culture sequence is probably better developed than understood. Specifically, the minimal data on Late Archaic activity that preceded the rise of Poverty Point occupations leaves many questions about that period unanswered. For example, pre-Poverty Point Late Archaic occupations of any intensity appear to be located further east (Gagliano et al. 1979). Sites documented in the vicinity of our study area

(Table 2, discussed below) tend, when datable, to be later. Consequently, we have little idea of whether the Pontchartrain Basin hosted an indigenous pre-Poverty Point occupation or whether use of the Basin at that time was the incidental result of frequent expeditions.

Resolving this issue is very important in correctly interpreting the archaeological record and testing the applicability of the culture sequence. At this time, we have a very poor understanding of the development of the Poverty Point culture in the Basin, specifically the Bayou Jasmine phase. Since during the Late Archaic, the Basin was an open Gulf with barrier islands, it is probable that the appearance of Poverty Point peoples was the result of population influx. A question still remains, however, as to the origination point of these people.

For the periods intervening between Poverty Point and Coles Creek, the sequence appears to be better represented. Information on the different periods, however, does vary with Tchefuncte having the largest data base.

When we reached the Coles Creek period, problems with the applicability of the lower Mississippi Valley sequence arise once more. Although some researchers may have a few qualms in a strict application of the established sequence, we are inclined to agree with Davis' ideas about occupation in the delta from the Coles Creek period on. The Lower Mississippi Valley sequence, as developed for the mouth of the Red River may not be applicable if the Pontchartrain Basin was characterized by social instability. The question, then, is how to define instability and how to measure it with a reasonable level of confidence. For instance, if instability and transience was the case, what measures are required to modify the sequence to develop suitable phases for the Pontchartrain Basin.

Part of the problem with the status of archaeological knowledge at present may lie with the nature of work conducted. As is the case in most of the Southeast, large, systematic coverage of a particular area has not been undertaken. The optimal situation for obtaining information suitable to presenting a synthetic view of settlement is through intensive and systematic survey over a large area, followed up by controlled excavations.

In the Pontchartrain Basin, previous work appears to have taken one of two approaches. The first is the normative approach in which site data is simply interpreted in terms of the presently accepted. Questions of areal differences are not considered in depth and aberrancies are rarely perceived. The latter are too often explained by simply being 'different,' without any real attempt to understand the cultural implications of these differences. Davis' (1981) modal analysis represents a recent notable exception. By collapsing established ceramic varieties from the Lower Mississippi Valley into a ceramic classification based on modes, Davis (1981) was better able to

TABLE 2. ARCHAEOLOGICAL SITES LOCATED WITHIN ONE MILE OF THE CORRIDOR

Site #	Site Name	Physical Setting	Site Configuration	Site Size	Cultural Remains	Chrono Date
160r6	Big Oak Island (previous work by Czajkowski; partially excavated by Ford and Doran 1945; McIntire and Saucier 1952; Gagliano and Saucier 1957; Shenkel 1974; site on National Register)	East side of Rogers Lagoon on an island in the marsh	Cresent-shaped beach shell midden	7' x 60' x 300'	Rangia cuneata (see Ford 1945 for further information	C^{14}: Michigan (M234); 2200 ± 200 B.P.; on the basis of associated sherds dated to Tchefuncte and Marksville
160r7	Pine Island (also Little Oak Island); (previous investigations: Ford and Doran 1945; Mc ntire and Saucier 1955; excavations by McIntire 1952; unspecified work by Gagliano and Saucier 1957; Shenkel 1974; site on National Register)	Island or ridge in marsh	Slightly arcuate beach shell midden	none stated	Rangia	Tchefuncte; Marksville
160r9	Saint Charles Canal; (previous investigations: Ford and Doran 1945; Czajkowski and Ford; Saucier 1952; Saucier and Gagliano 1957)	Dredged shell ridge south of shore of Pontchartrain	Long east/west ridge cut by canal through west end	105' x 1200'	Rangia; no other artifacts	None
160r11	Dwyer Canal (Saucier and Gagliano 1957; reported by Czajkowski and Ford)	In marsh south of shore of Lake Pontchartrain	Horseshoe-shaped ridge	75' x 150'	Rangia; no collections	Possibly Tchefuncte; no reason on site record card for assignation

TABLE 2. ARCHAEOLOGICAL SITES LOCATED WITHIN ONE MILE OF THE CORRIDOR
(continued)

Site #	Site Name	Physical Setting	Site Configuration	Site Size	Cultural Remains	Chrono Date
160r12	South Point (previous investigations: McIntire 1952; Gagliano and Saucier 1957)	Marsh bank about 50' south of Lake (as of 1930s)	Unstated	Unstated	Rangia; several burials being affected by wave action; comment that a large collection exists; no further information	None stated
160r15	Hayne Blvd. and Paris Road (prevous investigations: Saucier and Gagliano 1957)	Beach ridge; some evidence that a small tidal bayou once entered the lake along east side of site	Ridge (partially destroyed by road and laying of a telephone cable)	Unstated	Sherds, shell (unspecified both)	None
160r19	Spanish Fort (investigated for 3 weeks in 1976 by UNO; also in 1930s by Historical Building Survey; also noted on site card is visit by Saucier 1952)	Grassy park area marked by cypress oak noted as on beach ridge	1808 for, plus shell midden	150 m EW x 300 m NS x 1.5 - 2.0 m	Rangia; also artifacts dating to 1700s French, earlier Spanish fort, 1808 American occupation, 19th century amusement park; cemetery association with French forts	1699 Indian; 1700s French; 1700/1800 Spanish; 1800s American
160r20	Citrus Canal (Gagliano and Saucier 1954; apparently visited location)	Sand and shell beach ridge on former shoreline of Lake; small bayou once adjacent or through site	Ridge (now destroyed)	Unstated	Rangia; no other collections	None
160r24	Seabrook (visited by Gagliano and Saucier 1951; Saucier 1953)	Beach ridges	Kitchen middens, now all partially destroyed or buried by Hayne Blvd. development	Total area: 100' x 1 mile	Rangia; no other data	None
160r25	Little Woods (reported by Saucier 1958)	Beach Ridge on Hayne Blvd.	Shell midden (disturbed by housing development)	Unstated	Rangia	None

TABLE 2. ARCHAEOLOGICAL SITES LOCATED WITHIN ONE MILE OF THE CORRIDOR
(continued)

Site #	Site Name	Physical Setting	Site Configuration	Site Size	Cultural Remains	Chrono Date
160r28	Little Woods (reported by Gagliano and Saucier 1957)	Natural sand beach	Shell midden (?)	Unstated	Rangia; small collection taken, no further information	None
160r36	Milneburg (reported to Gagliano and Saucier 1957 by Percy Viosca, Jr.	Shore of lake	Shell midden; destroyed after 1930s by filling and grading	Unstated	Assumed Rangia; no collections known	None
160r37	DeMontluzin Camp (reported 1959)	Natural levee ridge of Bayou Sauvage	Shell bank mostly destroyed or leveled by U.S. Highway 90	100' x 25/30'	Rangia; small collection; no other specifics	None
160r38	Orleans Protection Levee (reported in 1959)	Natural levee ridge of Bayou Sauvage	Unknown; shell and artifacts found on spoil bank; now buried or destroyed	Unknown	Rangia; small collection; no other specifics	None
160r39	Turtle Bayou (reported in 1959 by Andrew Bell; not visited)	Natural levee ridge of Turtle Bayou (?)	Small shell midden not exposed at surface; covered in 'debris and organic matter'	Unstated	Rangia	None
16Je4	Indian Beach (Saucier and Gagliano 1952; Regional Planning Commission 1969; Historical Site Inventory)	Either levee on channel from Bayou Metairie or shell bank	Shell midden (dredged almost completely in 1934; since that time, impacted from housing development; little left of site	Origin either 350 yards by 250 yards or on a 1849 map of New Orleans about 1/3 mile long	Rangia; historic artifacts; note indicates an extensive collection on repository at LSU	None
16Je5	Bayou Tchoupitoulas (Saucier and Gagliano 1952; possibly later work by Shenkel?)	Natural levee, district canal of Bayou Metairie	Small shell midden; in two sections: one to either side of filled channel of Old Bayou Tchoupitoulas (both sides now destroyed from road construction	Unstated	Rangia; historic artifacts; no other types mentioned but extensive collection at LSU	C^{14} date (Humble Oil Company 0-102); date of 1440 ± 100 B.P.

TABLE 2. ARCHAEOLOGICAL SITES LOCATED WITHIN ONE MILE OF THE CORRIDOR
(continued)

Site #	Site Name	Physical Setting	Site Configuration	Site Size	Cultural Remains	Chrono Date
16Je6	Bonnabel (large collection taken by Saucier in 1952; Shenkel provided update information to Planning Commission at some unspecified date)	Natural levee on a distributary canal of Bayou Metairie	Large shell midden and two shell mounds (mounds apparently contained numerous burials; site completely destroyed by subdivision)	Midden: 215' x 120'; Mounds: 3' high, 100'diameter	Rangia, other specifics of collection unstated	Site record states "probably inhabited by historic Indians"; justification for statement not given
16Je39	Montague (site card indicates that Saucier excavated at site: date 1952)	Natural levee	Small shell midden (completely destroyed in 1948 by house construction	50' x 100'; depth maximum 12 inches (?)	Rangia; historic artifacts noted	Site record states may be location of historic Tchoupitoulas Indian village; justification for statement not given
16Je40	West End (Saucier 1952)	Beach or actively forming ridge	Indications are that shell and artifacts are secondarily deposited from either 16Je4, 1 mile west, or 'new site at the yacht club' which is totally destroyed; notation on one site record indicates 'NOT A SITE.'	Unstated	Rangia; with some artifacts	None

interpret the data within an areal perspective rather than by simple extrapolation to a culture sequence with questionable areal applicability.

The second approach used in this area is the paleogeographic approach, fostered largely by the work of Saucier (1963) and the focus of many reports prepared by Coastal Environments, Inc. This approach seeks to explain settlement variation in light of environmental and geomorphic changes. Too often, however, the environmental reconstructions and geomorphic histories are so heavily emphasized that cultural stimuli are largely overlooked or not fully integrated into the data interpretations.

An example of this emphasis is found in the report by Gagliano et al. (1979) on five areas surveyed in conjunction with construction of the Lake Pontchartrain Hurricane Protection Barrier. Although the discussions of the environment and geomorphology are very thorough, when the cultural data are brought into the picture, the authors present a rather dismal view of archaeology in the Pontchartrain Basin.

> "The state of archeology in the Pontchartrain and the Eastern Delta Basin can be summed up as follows: Nearly 250 sites have been recorded. Of these, information on temporal assignment is readily available for fewer than half. [Possibly more information would be available if the collections were analyzed.] About 30% of the sites have been wholly or partially destroyed by recent human activities, and 40% by natural causes (probably more since the sites were last visited). About 68 known sites remain which might be worth excavating if they were reached in time (destruction is proceeding rapidly) and funds were available. These figures are instructive to those who might wonder why sweeping processual generalizations are not being made for coastal Louisiana" (Gagliano et al. 1979: 3-5-3-6).

Although we certainly concur with their points on disturbance (if not total destruction), the entire summary appears to dismiss too casually the record of work: there is no real attempt to look at what the available data are able to tell us. Though perhaps not within the scope of work for that particular project, such an attempt is sorely needed in this area to understand how the area differs chronologically and culturally from established sequences and the status quo of the Lower Mississippi Valley culture history.

A similar paleogeographic approach was used by Wiseman et al. (1979). Temporal variations in site frequency were interpreted as consequents of environmental shifts. For example, declining use of Rangia in the Early Marksville period is viewed as a coincident result

of the growth of Delta Lobe II and associated influx of fresh water into the area, the latter presenting a hostile habitat for growth of Rangia.

Although the Wiseman et al. (1979) presentation enabled the reader to relate settlement differences to environmental factors, there still appears to be an avoidance of dealing with cultural stimuli of any type. Site distribution and intensity of occupation is admittedly linked with the environment; however, we do not think that all cultural data can be interpreted or even related to geomorphic or environmental factors. For example, site spacing, site type distribution, variations in status, etc. are likely tied to cultural factors. For this reason, a better picture of prehistory in the Basin must seek to integrate both data sets.

A good example of what we feel is an attempt to view the data in such a way is that of Shenkel (1974) in his report on Big Oak Island. Considering environmental and landform change in light of the cultural remains enabled him to offer very reasonable suggestions of occupation during, in particular, the Tchefuncte period. For later periods, Shenkel returns to the basic paleogeographic approach by noting that that the Tchefuncte groups established an economic strategy (largely based on Rangia) which dictated settlement in the Basin from that time on. In particular, he notes that the environmental shifts which created flux in Rangia distribution likewise created fluctuation in human distribution, since this resource was of such obvious importance to the economic strategy. In other words, the absence of evidence of some sites is attributable to the absence at that time of the single most critical resource, Rangia.

The overwhelming number of coastal sites dominated by Rangia shell would tend to attest to this suggestion. But, again, few have tried to come to grips with how this change in Rangia availability would have affected cultural groups except to necessitate a shift in habitation loci. There is also the possibility of adaptation to different strategies, especially if ushered in at a time when new cultural traits (e.g. Marksville) were diffusing into the area. The likelihood of such shifts are further enhanced if there was an actual movement of peoples, not just traits, into the Basin.

These comments are neither a criticism nor a rejection of the various interpretive approaches. We are simply underscoring the need for more data on cultural events. With the rate of site destruction by natural and man-induced factors so rapid, many opportunities have already slipped away.

Implications of Known Sites in the Project Area Vicinity

Our background search of site data included not only a review of the literature, but a check on sites in or within proximity to the project corridor. Specifically, we plotted and obtained site forms on all those within one mile of the survey line. The prehistoric sites

are presented in Table 2 along with pertinent descriptive information.

As expected, the sites are characterized by shell middens. Reviewing the site form as well as Neuman's (1977) summary, we noted several discrepancies which may or may not be of significance. At 16Or4, Neuman states a chronological range of Tchefuncte through [to] the Mississippian period. Similarly, 16Or5 is listed by Neuman (1977) as dating Tchefuncte through [to] Mississippian. And, 16Or6 is listed as having a Coles Creek component.

Of the total sites plotted, six appeared either on the survey line or very close to it. These include 16Or12, 16Or15, 16Or24, 16Or28, 16Je4 and 16Je40. We felt that at least four of these might not be relocated by the survey crew since 16Or15, 16Or24 and 16Je4 appeared from the available data to have been destroyed or disturbed by modern construction; and, 16Je40's status as a site is in question. From this review, however, it was clear that 1) prehistoric occupations exist within the survey corridor and some evidence of sites should have been found, and, 2) shell remains would characterize the majority, if not all, of the cultural resources identified by the terrestrial work.

In terms of the off-shore portion of the work, the fact that so many of the known sites in the project corridor and general project area are located near the shore of Lake Pontchartrain, the recurrent effects of erosion on the shoreline may have obliterated terrestrial evidence of some sites. Thus, evidence of now eroded and submerged prehistoric remains might be found offshore. Also, if habitable features are located, they would present the potential for associated cultural activity.

HISTORIC OVERVIEW

For the purposes of this report, the historic period of the New Orleans area is considered to begin with the initial European exploratory ventures. Thus, aboriginal ethnohistorical information pertinent to the study is included within this portion of the report, and will serve as a precursor to an examination of European and EuroAmerican settlement in the project area.

Ethnohistory of the New Orleans Area

Within 20 years of LaSalle's voyage down the Mississippi River in 1682, the French colonial authorities in Louisiana were familiar with nearly all the Indian groups inhabiting the lower reaches of the Mississippi River. During this period, the Pontchartrain Basin served as the eastern loci of the Chitimacha (Swanton 1911; Hudson 1976; Gibson 1978; Gagliano et al. 1975; Altschul 1978). Several smaller tribal units, including the Bayougoula, Tangipahoa, Acolapissa, Washa, and Chawasha are known to have been present in the Basin, but little information is available on their respective cultures, and they were either amalgamated or had died out by the early 19th century.

For example, the Chawasha appear in the records when, in 1709, they sent 40 warriors on a punitive raid against the Chitamacha in revenge for the killing of the missionary, St. Cosme. In 1713 (or possibly in 1715) a 'peace envoy' of Natchez, Chickasaw and Yazoo, acting in the interests of the British slave traders, treacherously attacked the Chawasha, killing the chief and carrying off 11 prisoners (Swanton 1911:300-31; 1946:108). The Chawasha, then, moved to a village just above New Orleans, along the Mississippi River. It was this village that Governor Perrier allowed slaves to destroy in 1730 in order to ease the widespread panic of the French, fostered by the Natchez uprising of 1729. The remnants of the Chawasha were living with the Washa in 1739 near the post 'Les Allemands' on the left bank of the Mississippi River. The state of these two tribes steadily declined until they both disappeared near the close of the 18th century.

Unlike the Washa and the Chawasha, our knowledge of the Chitamacha is quite extensive. They first appear in the historic record in 1699 as one of four tribes with whom Iberville made an alliance. In 1702, St. Denis directed an expedition against the Chitamacha in order to procure slaves. Upon learning of this raid, Bienville ordered that the captives be returned, but LaHarpe claims that "these orders were badly executed" (Swanton 1911:338; 1946:120). In August 1706, the Taensa invited the Chitamacha to come and feast upon the corn of the Bayougoula, whom they had recently massacred. The Chitamacha that accepted were treacherously attacked, captured, and sold as slaves. Later in the year, a Chitamacha war party organized to avenge this attack came upon and killed the missionary St. Cosme, along with three French companions. When Bienville received word of this attack, he induced all the Indian nations along the Mississippi to declare war upon the Chitamacha. In 1707, a combined French and Indian force surprised and destroyed one of the Chitamacha villages.

During the ensuing years, the Chitamacha inflicted numerous wounds on the settlers along the Mississippi, who, in turn, captured and sold many of the Indians as slaves. Finally, in 1719, Bienville negotiated a peace with the Chitamacha. As part of the treaty, portions of the tribe relocated along the Mississippi River, between the present Louisiana towns of Donaldsonville and Plaquemine, where they stayed until they died out around 1940 (Swanton 1946:120). The part of the tribe which remained near present-day Morgan City was organized into two villages in 1784, one on Bayou Teche and the other on Bayou Lafourche. Both these villages declined in number until, in 1882, only a few survivors lived at Charenton on Bayou Teche. In that year, A.S. Gatschet (1882) collected linguistic and ethnographic material on the tribe. In 1907 and during several succeeding years, John Swanton (1911; 1946) obtained further notes on the Chitamacha customs and legends. Since then, Morris Swadish (1934; 1946) has done a more complete study of the Chitamacha language. In recent years, the population of the tribe has declined from a 1910 census of 69 to 51 in the 1930 census report (Swanton 1946:121).

Swanton (1952:203) characterized the Chitamacha as "the most powerful tribe of the northern Gulf Coast west of Florida in the United States territory." Their ability to hold off a combined force of French and all other Indian tribes of the Lower Mississippi Valley for 13 years speaks highly of their military prowess. The quality of their arts, especially basketry, was unequaled, and their products highly sought by both Europeans and Indian groups (Kniffen 1975:4; Gregory 1975).

Gatschet (1883) reports 15, while Swanton (1911) lists seventeen Chitamacha villages at the time of contact. No description of a Chitamacha village exists, but in can be reasonably assumed from data on neighboring Indian groups that each village was located on well-drained soil. Each town was probably centered around a plaza, which was bordered on two sides by earth mounds, one containing the temple and the other the chief's lodge (cf. Kniffen 1975:4; Swanton 1946:632-3). In the large villages, two buildings usually flanked the central plaza, the "bone house" was used during mortuary ceremonies and occupied continuously by an official known as the "buzzard picker" and the "dance house," utilized for religious ceremonies and important social functions (Gatschet 1883:8; Swanton 1911:350-52). These buildings formed the nucleus of the villages. Given the defensive requirements of the Chitamacha during much of the early contact period, it would not be surprising if this nucleus were surrounded by a stockade.

The dispersed pattern of the cultivated fields and their associated dwellings stands in marked contrast to the relatively fixed structure of the village center. It is possible that these fields and dwellings were located in clusters connected to the village center by footpaths. Scattered amongst these clusters, near the outer edge of the cultivated fields, were probably located the burial mounds of past chiefs. These agricultural villages of the Chitamacha must have covered a considerable area, for similar towns among the Bayougoula and Houma were said to be four leagues in extent and to contain up to five hundred inhabitants (Swanton 1946:639).

Horticulture was clearly an important aspect of the Chitamacha economy. At least three varieties of corn were grown, a white and yellow 'flint' corn, a black or blue 'popcorn' and a fine white 'flour corn' (Swanton 1911:346; Kniffen 1975:6). Gatschet (1883:4-5) states that they also grew sweet potatoes, but does not mention squash or beans. Besides domesticates, the Chitamacha economy depended upon hunting and gathering wild plants. Gatschet (1883:5) writes,

> "The women had to provide for the household by collecting pistaches, wild beans, a plant called kupinu and another called woman's potatoe (most likely wild potatoes), the seed of the pond lily, grains of the palmetto, the rhizoma of the common Sagittaria, and that of the Sagittaria with the large leafed, persimmons."

Swanton (1911:346) adds to this list wild berries, fruits, and seeds of several species of cane.

The most common animals hunted were deer and small mammals. Among the Natchez, short hunts took place after planting and before harvesting (Swanton 1911:67-73). The major hunting season was during fall and winter, at which time families moved to camps near the hunting grounds. Stalking, occasionally with a deer-head disguise, was the most common form of hunting, while snares and traps were used to capture small mammals. Nets and traps, supplemented by hook and line, were also used to catch fish in the bayous.

The seasonal economic activities of the Indians along the Gulf Coast established a well-defined annual cycle which may be applicable to the latter ceramic prehistoric periods. As soon as possible in early spring, fields were sown with a quick-ripening variety of corn. While they waited for the harvest, they probably fished for several species of fish that spawn during the spring. After harvesting the 'little corn' and planting the 'great corn,' a variety of short expeditions was probably undertaken to hunt, collect salt, or gather shellfish. Fall was the time of the harvest, followed by periods of feasting, celebration and warring. The coming of winter was marked by the long hunt, with most men and many families moving into the forests.

Historical Development of the New Orleans Area

In 1718, a decade after the French colonial officials realized the efficacy of establishing a permanent settlement near the mouth of the Mississippi, Bienville, then governor of French Louisiana, started to lay out New Orleans at a large crescent bend in the river, 90 miles from the delta. The town, named in honor of the Duke of Orleans, was slow in being consolidated. It was not until 1721 that systematic plans for the community were drafted by Adrieu de Pauger. The town was then laid out in a grid pattern and plans were made to enclose the settlement with a protective wall.

From these inauspicious beginnings, New Orleans became the capital and largest town of colonial Louisiana, and eventually the largest city of the American South. The city and its numerous satellite communities have now grown so extensive that development and building activities have long since expanded beyond the banks of the Mississippi and have reached the southern shores of Lake Pontchartrain, including the vicinity of the area to be impacted by this proposed work. Presented below is a very brief history of the development of New Orleans, especially as it relates to construction and settlement along the adjacent shores of Lake Pontchartrain and other outlying areas. In the section which follows this brief overview, a more detailed discussion of the history of the uses of Lake Pontchartrain are presented.

Pauger's "Nouvelle-Orleans" was soon considered large enough to serve as the capital of French Louisiana, and the transfer of the seat of government from Mobile was effected in 1722. By the following year, it was recorded that the Mississippi River town contained 100 houses, a church, several warehouses, and other miscellaneous buildings (Davis 1976:45), though the 1721 census suggests that the population was still relatively small (684 whites including French servants and 565 Negro and Indian slaves; Roberts 1946:39). Also during this period, four small forts were constructed at the corners of the rectangularly-shaped town; these forts were then connected by a low earthen wall (Figure 6).

Construction and settlement were not limited to what is today the "Vieux Carre." By the 1720s, small farms were being established both upstream and downstream of New Orleans. As early as the 1730s canal construction had begun along the West Bank in order to aid drainage and facilitate the reclamation of arable land (e.g. Dubreuil's Canal [Gardere Canal]; Swanson 1975:87-88).

The area west of the town, along the natural levee of the Mississippi was soon settled by Palatine and Swiss Germans, and shortly became known as the German Coast. Agricultural goods and the exploitation of natural resources formed the mainstay of the economy in these early years. Indigo, rice, tobacco, wheat, beans, cotton, myrtle-wax, corn, vegetables, pitch, tar, lumber, masts and sassafras are the most commonly cited items forming the bulk of the exports from New Orleans and environs (Swanson 1975:67; Roberts 1946:51).

Although a promising beginning was made in the settlement of the New Orleans area, the colonization effort was only partially successful during the French regime, probably due to at least three factors: Indians, disease, and lack of amenities. The first of the three limited development to the immediate vicinity or armed garrisons; the north shore of Lake Pontchartrain, for example, saw little settlement until after the 1781 arrival of Pierre Philippe de Marigny de Mandeville. Disease continued to play a significant role in the restricted growth of the region well into the 1800s, though constructions such as the Carondelet Canal (see following section) aided in the maintenance of at least a modicum of sanitary conditions. As for the final factor, the very richness of the exports from the region ultimately allowed for the import of goods considered critical to the continued well-being of the settlers. A 1747 manifest (Roberts 1947:52-53) indicates the following items imported into the New Orleans area:

352 barriques of wine, four to the ton
5 ancres (10 gal each) of brandy
200 barrels of flour
60 cases of soap
110 cases of molded candles
12 cases of brandied fruit
25 cases of caper, olives, and anchovies

FIGURE 6. DETAIL FROM CARTE PARTICULIERE DU FLEUVE ST. LOUIS, CA. 1723 (SPECIAL COLLECTIONS, TULANE UNIVERSITY LIBRARY).

50 ancres of salt pork, 28 to the ton
39 cases of olive oil
50 firkens of butter
22 barrels of goose thighs
10 large packs of linen paper
5 large packs of woolen cloth
2 hogsheads of hams
10 barrels of salt beef
2 hogsheads of trumery, glass beads, etc.
20 sacks of salt

Because of the factors mentioned above, not to mention European politics, by 1771, a few years after the transfer of Louisiana from France to Spain, New Orleans only contained a population of about 3,200 people. Not only had the town not expanded beyond the original earthen walls, but many blocks within the "Vieux Carre" remained unoccupied.

Above and below New Orleans, however, houses were scattered along the natural levee of the Mississippi, and an occasional settlement was situated along Bayou St. John, [on early maps rendered Bayou St. Jean], a small stream northwest of New Orleans that emptied into Lake Pontchartrain. There were still no settlements as such along the south shore of Lake Pontchartrain within the study area.

During the Spanish colonial administration, New Orleans and the Lower Mississippi settlements prospered as never before. By 1785, the capital of Louisiana had a population of 5,000 and similar census figures were established in the surrounding settlements: Tchoupitoulas District - 7,000; German Coast - 4,500; the coast south of New Orleans - 2,000 (Figure 7). New Orleans also underwent a face-lift; suffering from extensive fires in 1788 and 1794, the town was rebuilt in the Spanish colonial or Andalusian style. By the end of the Spanish colonial regime in 1803, New Orleans was a largely French-speaking town of 10,000 with a thoroughly Spanish facade.

Even by the beginning of the 19th century, there were no recorded settlements along the south shore of Lake Pontchartrain within the study area. A later English translation of a Spanish map dated to 1798, showing the New Orleans area between the Mississippi and Lake Pontchartrain, indicated that the south shore of the Lake and its immediate hinterland, consisted of cypress swamp. Fort St. John (16Or19), located at the mouth of Bayou St. John and at the northern terminus of the Bayou St. John road, is the only construction indicated on the Pontchartrain shore (Figure 8). Since this fort was located approximately where Wisner Boulevard intersects with Robert E. Lee Boulevard, the possible remains of this fort are outside of the study area.

After the Louisiana Purchase in 1803, New Orleans and its surrounding communities became increasingly American in culture and composition, as Anglo settlers moved into the area in greater numbers.

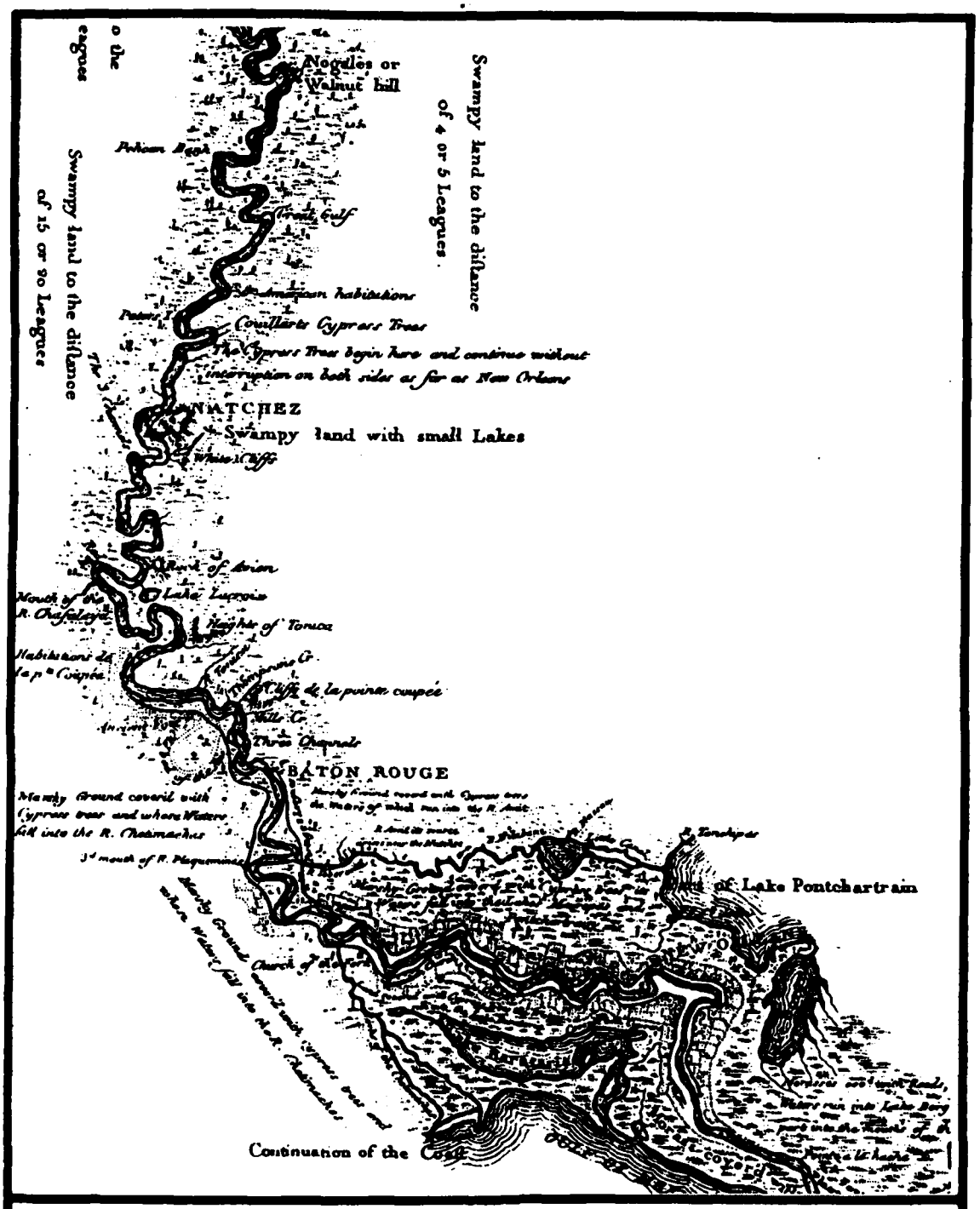

FIGURE 7. DETAIL FROM "MAP OF THE COURSE OF THE MISSISSIPPI FROM MISSOURI AND THE COUNTRY OF THE ILLINOIS TO THE MOUTH OF THIS RIVER", 1796.

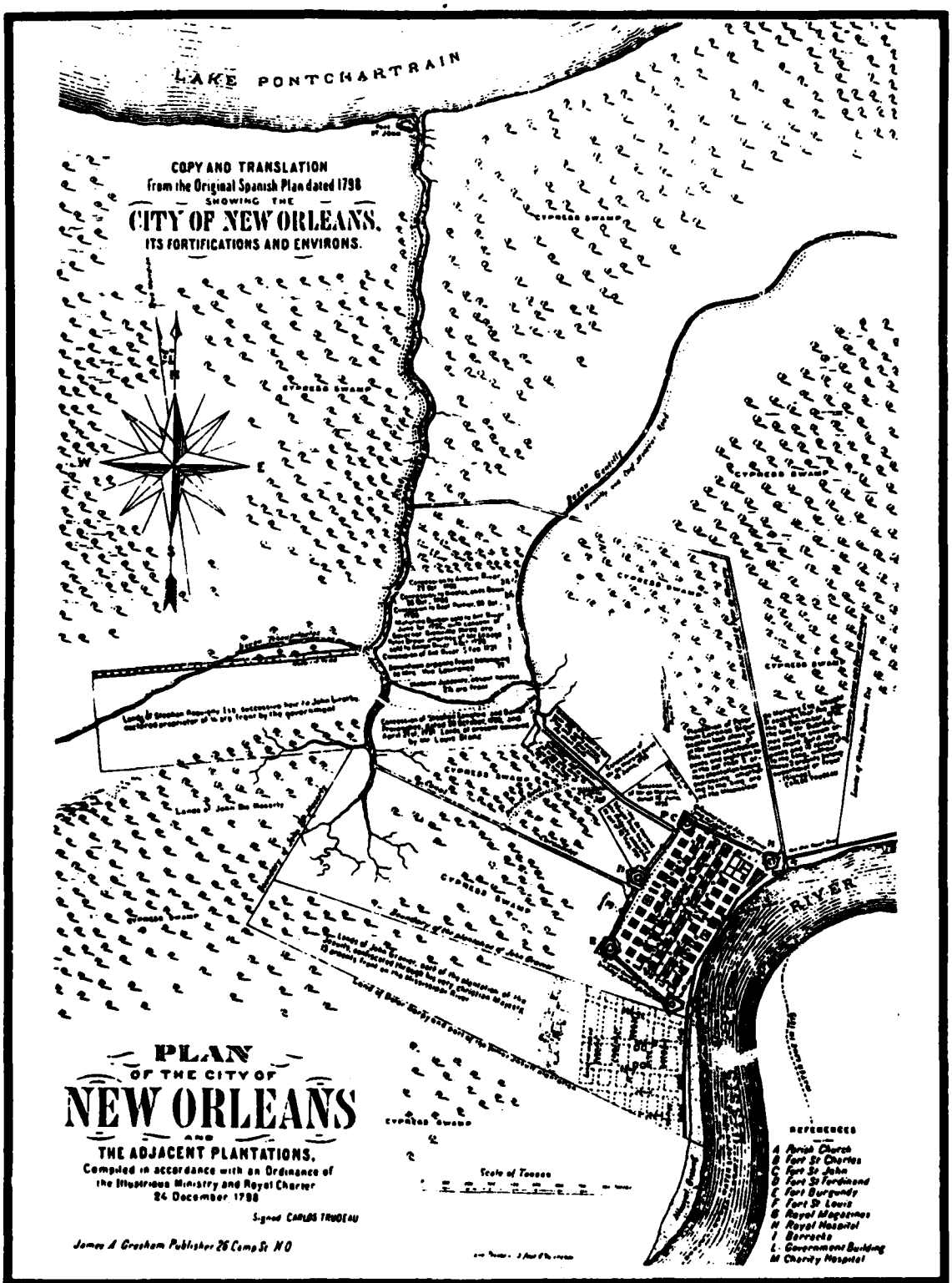

FIGURE 8. ENGLISH TRANSLATION OF 1789 SPANISH MAP OF NEW ORLEANS AREA.

By the time of the War of 1812, there were about 12,000 people in New Orleans alone. A United States military map of the New Orleans area prepared for that war showed "Maiterie" (Metairie) for the first time, as well as more extensive settlements along the Mississippi River (Figure 9). The map also indicated some isolated settlements along Bayous St. John and Gentilly. There were still no discernable settlements along that part of the Lake Pontchartrain shore within our study area.

Although New Orleans was the scene of conflict during the closing stages of the War of 1812, there is no indication that the project area was in any way directly affected. General Jackson fought British General Pakenham at Chalmette four miles east of the "Vieux Carre," and the preliminary naval engagement of December 14, 1814 occurred on Lake Borgne. After the Battle of Lake Borgne, the British barged their troops to the vicinity of Chalmette via Bayous Bienvenue and Mazant (Wiseman et al. 1979:3-14), located about seven miles (11.2 km) south-southwest of the project area. No naval conflicts or landings were known to have occurred on Lake Pontchartrain.

As a consequence of the attack on New Orleans, Simon Bernard, a French military architect, was commissioned by Congress to conduct a survey of vulnerable coastal approaches, and recommend the optimal locations for fortification adequate to repel future foreign attacks. Bernard began his survey in 1817, and within two decades, two major forts (Fort Pike and McComb) and a series of lighthouses were constructed along the two primary entrances to Lake Pontchartrain: Chef Menteur and the Rigolets.

Bernard was not the first to realize the importance of guarding the Lake Pontchartrain access to New Orleans and the Mississippi Valley. In the 18th century, the French erected a small fortification, Fort Petites Coquilles, named for a small shell mound that it displaced, along Rigolets (Gagliano et al. 1979:24). The American Fort Pike, erected a century later in about the same area, was a much more imposing construction. Both Forts Pike and McComb were built of brick and were largely complete by the end of the 1820s. Serving as satellite structures to these large fortifications, were the Tower Dupre, a redoubt located at the mouth of Bayou Dupre on Lake Borgne, and at least two lighthouses on the Rigolets: the Point Coquilles lighthouse and the one on Rabbit Island. There is even evidence of a local military road associated with Fort Pike. An 1828 map attributed to Delafield shows a road extending along the southeast edge of Lake Pontchartrain, along Isle aux Pines, to "Petites Coquilles." The presence of this road is confirmed by other documentary sources (Roberts 1946).

By 1840, the population of New Orleans surpassed 100,000, making New Orleans a very large city by the definition of the time. A Louisiana map dated to 1838 indicated that Fort St. John was still in existence (Figure 10). Two early railroads, the New Orleans and Nashville Railroad and the Pontchartrain Railroad connected New

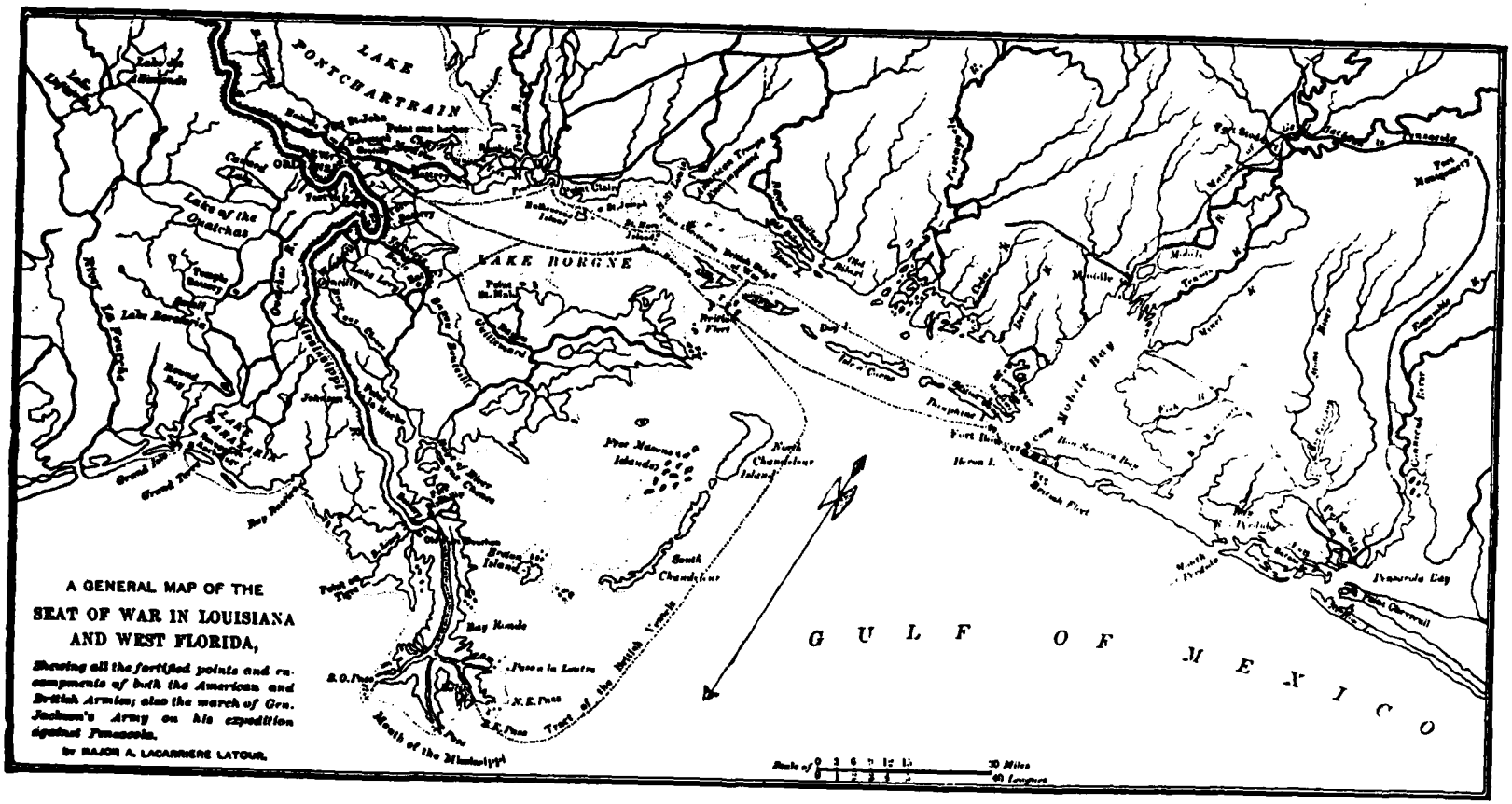

FIGURE 9. WAR OF 1812-ERA MAP, SHOWING NEW ORLEANS AND COASTAL APPROACHES.

FIGURE 10. DETAIL FROM AN 1838 MAP OF LOUISIANA.

Orleans with settlements north of Lake Pontchartrain by skirting the lake to the west and New Orleans with the harbor facilities at Milneburg, respectively (Pritchard 1947:1128-1130, 1117-1122).

Although the proposed levee construction will intersect with the old N.O. and N. Railroad line somewhere west of present-day Metairie, it is unlikely that remains of the old line will be discernable since most of the track was placed on wooden trestles above the marsh (Swanson 1975:98), and much of it was removed for the construction of the Mexican Gulf Railroad Company line to Proctorville in 1845 (Pritchard 1947:1131).

Associated with the N.O. and N. Railroad were at least three abortive attempts at the establishment of shore communities. The 1838 map shows one, a community designated "Dublin," located near the middle of the Jefferson Parish lake shore. Two other developments, Bath #1 (near present-day Bonnabel Blvd.) and Prairie Cottage (near the intersection of Causeway Blvd. with the Lake) (Swanson 1975:134) were planned resorts. All three collapsed when the New Orleans and Nashville Railroad was declared insolvent and its assets assumed by the state in 1844 (Swanson 1975:98).

The Pontchartrain Railroad serviced the harbor facilities at Milneburg, and it continued to operate into the 20th century. A further discussion of the Pontchartrain Railroad is presented in the following section, in addition to detail on the Bernard de Marigny ferry service from Mandeville to Milneburg initiated in 1834. It must be kept in mind that development along the south shore of Lake Pontchartrain in the years prior to the Civil War was intrinsically linked with agriculture and commerce. In order to handle ever increasing commerce, for example, between 1831 and 1835 the "Banking Canal" (soon to be called the New Basin Canal) was completed to relieve traffic on the Bayou St. John/Carondelet Canal and Milneburg/Pontchartrain Railroad links, and to offer competition to both.

On the eve of the Civil War, the city of New Orleans had almost doubled in population, reaching a figure of 170,000 by 1860. By this time, more extensive development had occurred along the south shore of Lake Pontchartrain. An 1849 map of the New Orleans area, showing the flood damage from the Sauve Crevasse, indicates that the area adjacent to Lake Pontchartrain consisted of cypress swamp, with the immediate shore area itself bordered with sea marsh reeds (Figure 11). A shell bank (now 16Je4) is indicated on the lake's shore at the mouth of Indian Bayou, about one mile west of the Jefferson/Orleans Parish line. Within Orleans Parish itself, there were the three pier-like constructions or jetties at West End (New Basin Canal), Spanish Fort (Bayou St. John/Carondelet Canal), and Milneburg (see following section).

Another map, dated to the 1850s and showing Louisiana as well as the environs of New Orleans, indicates a community (Lakeport) on

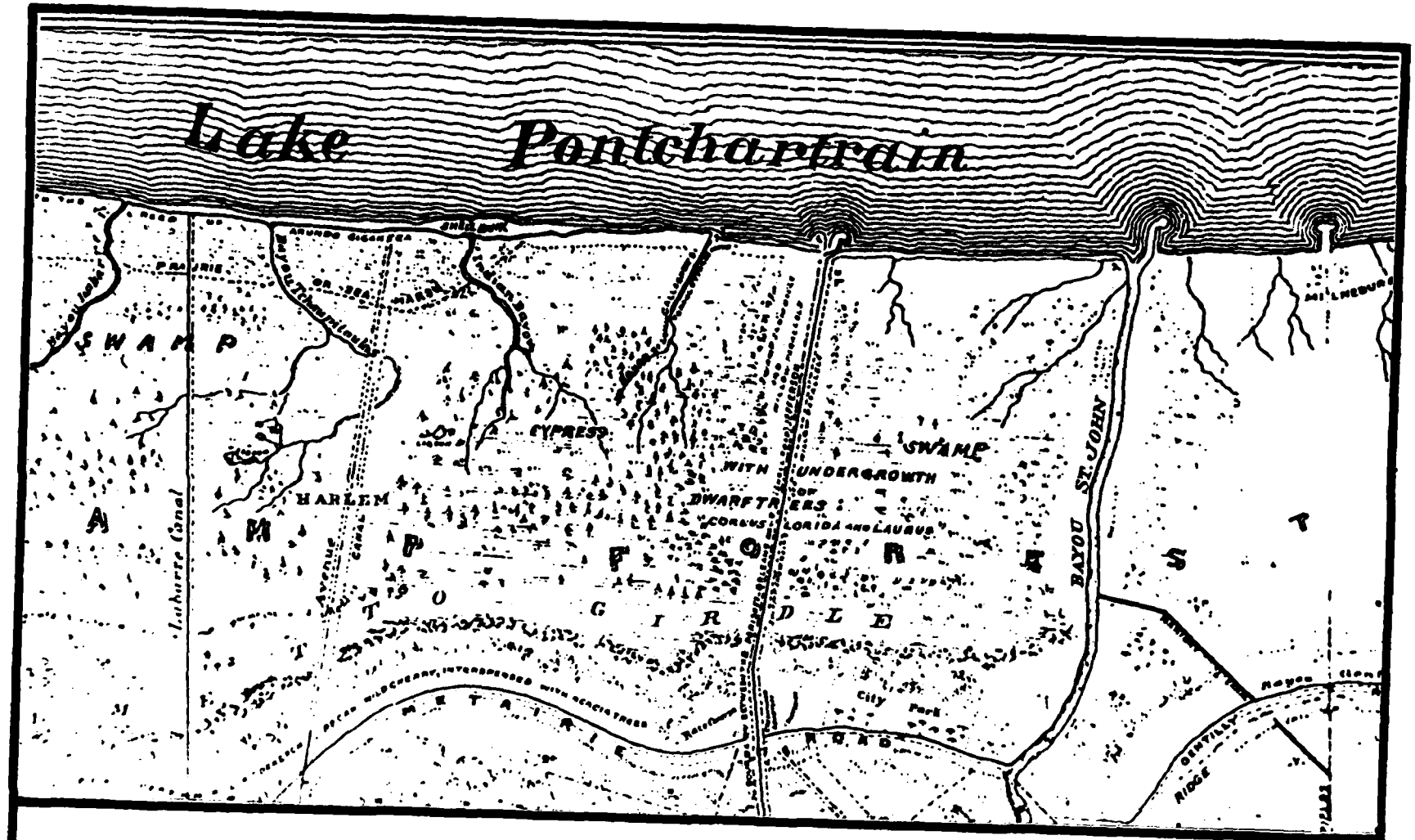

FIGURE 11. DETAIL FROM 1849 SAUVE'S CREVASSE MAP OF NEW ORLEANS AREA.

the shores of Lake Pontchartrain; the map also indicates a rail line between the community and New Orleans (probably the 1851 Jefferson and Lake Pontchartrain Railroad; Swanson 1975:132).

These interesting developments are further illuminated by detailed military maps prepared by the U.S. War Department in the course of the Civil War. On one map, entitled 'Approaches to New Orleans,' prepared for General Banks (Davis et al. 1978), a number of changes are indicated along the south shore of the lake (Figure 12). By this time, the N.O. and N. Railroad has long been abandoned and dismantled, but a new line (New Orleans, Jackson and Great Northern Railroad) operated around Lake Pontchartrain further to the south.

Together with a new north/south line, other transportation facilities are apparent: two railroad spurs from New Orleans (Pontchartrain Railroad and Jefferson and Lake Pontchartrain Railroad) and their railroad piers jutting out onto the lake; two developed water courses (Bayou St. John and New Canal) with their associated roads, piers, and lighthouses; and a number of shoreline structures adjacent to each of these rail spurs and waterways. The largest of these clusterings of buildings is around the Pontchartrain Railroad pier, but the "Lakeport" of the 1850s map appears to correspond to the clustering of buildings around the Jefferson and Lake Pontchartrain Railroad spur (Swanson 1975:132).

Most of these construction sites are not in our study area. Only perhaps the remains of the Jefferson and Lake Pontchartrain Railroad, pier and associated structures (Lakeport) fall within the shoreline area to be studied.

West of the Jefferson and Pontchartrain railspur, and within that portion of the lake shore to be studied, the military map shows four lakeshore structures, in the vicinity of Bayou Tchoupitoulas, remains of which might be recovered. Other than these constructions, the lakeshore appears as an undifferentiated cypress swamp or marsh.

Significant Civil War military activity does not appear to have taken place along the south shore of Lake Pontchartrain. The Confederate militia camps in Jefferson Parish were located on the natural levee of the Mississippi, and after the fall of New Orleans to the Federals in April 1862, the Union land defenses for the city stretched only from the River to Bayou Metairie (Swanson 1975:93-4).

Armed encounters were also scarce in east Orleans Parish. Although the forts and associated constructions were largely in place by the outbreak of the Civil War, neither Forts Pike nor McComb saw action in that conflict. When a Federal expedition was sent against New Orleans in April of 1862, it fought its way past Forts Jackson and St. Philip along the Mississippi River. Forts Pike and McComb were peaceably abandoned by the Confederates after the Union Forces were well-entrenched in the lower Mississippi Valley.

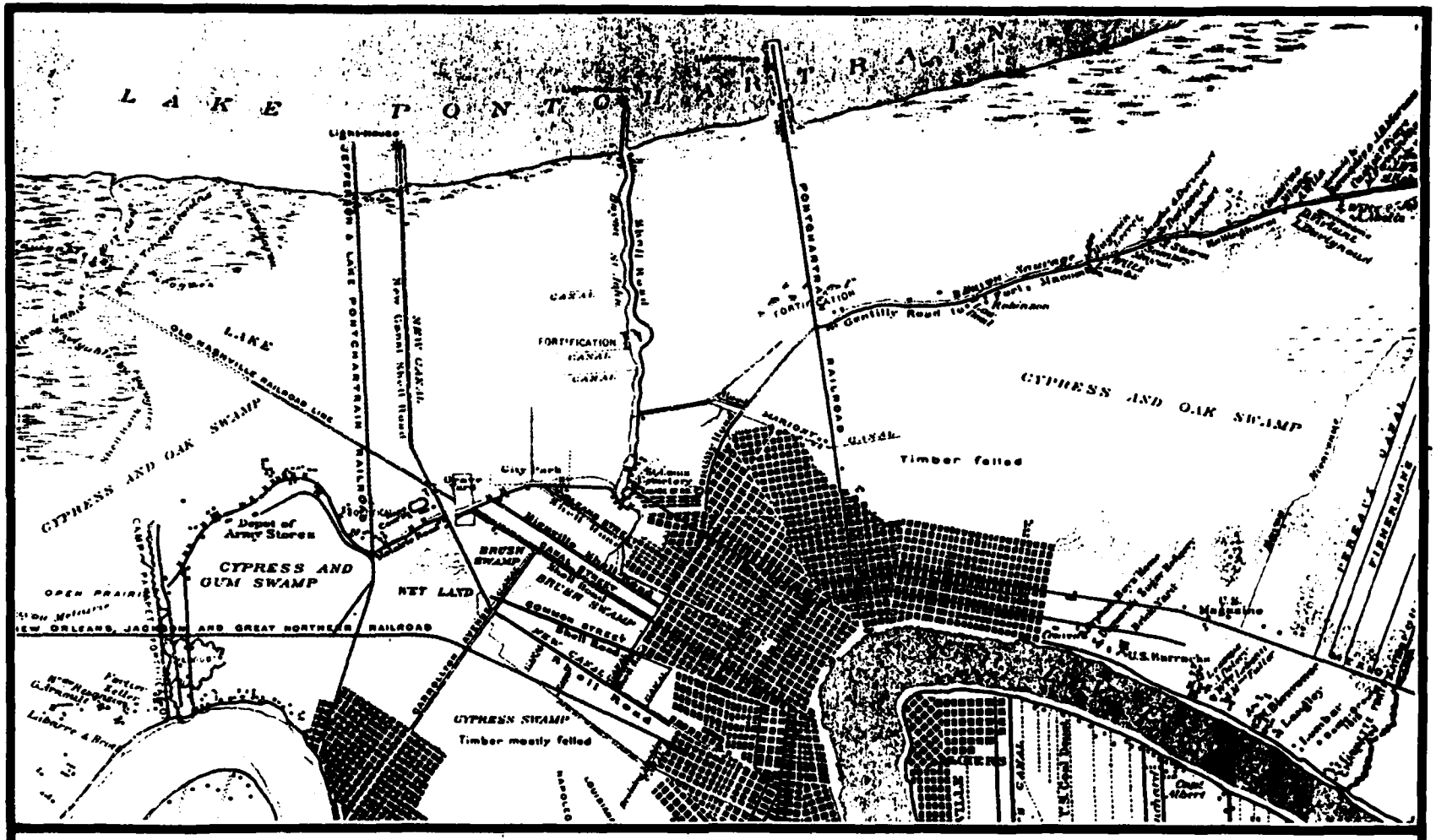

FIGURE 12. DETAIL FROM CIVIL WAR-ERA MAP OF NEW ORLEANS AREA (DAVIS ET AL. 1978).

The technological innovations that made wooden fighting ships obsolete, also marked the obsolescence of exposed brick fortifications. By 1890, both Forts Pike and McComb were abandoned as military installations.

The south shore of Lake Pontchartrain developed into a resort area after the 1880s. By the turn of the century, West End (the west shore of Orleans Parish) and the adjoining East End (Bucktown) of Jefferson Parish became known for amusement and local jazz. They also became areas reknown for summer camps of all descriptions, most of which were situated on piers jutting out onto the lake. During the 1920s, these pier camps extended in an almost unbroken line from Bucktown to Little Woods, a distance of about 13 mi, and some of the establishments were quite luxurious. By the end of the 1920s, land reclamation between the Jefferson/Orleans Parish Line and what is now the New Orleans Lakefront Airport obliterated the pier camps and original settlements associated with West End, Spanish Fort and Milneburg. According to a 1931 map of the New Orleans environs, the shore of Lake Pontchartrain had been pushed out over a half-mile in that vicinity.

At present, about 105 pier camps are located along Hayne Boulevard, east of the Lakefront Airport, and another 40 camps are situated in Little Woods, now the eastern extreme of urbanized New Orleans (Kent 1981: 8).

The south shore of Lake Pontchartrain was not the only portion of the project area exposed to development in the 19th and 20th centuries. We have previously examined the military exploitation of east Orleans Parish in the vicinity of the Rigolets and Chef Menteur. Although a series of forts, lighthouses and even military roads were constructed in the area, this exploitation was not immediately followed by extensive settlement.

The earliest recorded settlement in east Orleans Parish, aside from the French fortifications at Petites Coquilles, was a plantation along Chef Menteur awarded to St. Maxent by the terms of a royal land grant dated to 1764 (Gagliano et al. 1979:3-21, 41). Although portions of the area to be surveyed runs across land that was formerly part of the St. Maxent plantation, cultural material dating to that era is unlikely to be found since the vast majority of the plantation remained marsh and was not improved.

It was not until the end of the 19th century that extensive economic exploitation, much less settlement, was possible in east Orleans Parish. Extensive settlement is predicated on adequate transportation and drainage, and the marshlands of east Orleans Parish were largely inaccessible until the coming of railroads and roads. After the Civil War, a railroad was laid connecting New Orleans and the Mississippi Gulf Coast. The track extended along Pine Island beach and the natural levee of Bayou Sauvage, and was bridged at Chef Menteur and the Rigolets. Originally known as the Mobile, New Orleans and Texas Railroad, it is still in operation today as the Louisville

and Nashville Railroad. It was after the inauguration of this railroad that the first tentative network of settlements appeared in east Orleans Parish along the more elevated natural levees and other high ground. This is in agreement with the historic settlement patterns discerned in the vicinity of the Mississippi River/Gulf of Mexico outlet construction south of our present project area (Wiseman et al. 1979), where settlement was not documented until the mid-to late 1800s.

Modern paved roads did not follow the railroads until the late 1920s/early 1930s. The first modern road connected New Orleans with the Mississippi Gulf Coast area via the Watson/Williams Toll Road, built by a private firm over Rigolets. Governor Huey Long constructed a toll-free state road and bridge system between the city and the Mississippi Gulf Coast area, which crossed Rigolets near Fort Pike (Gagliano et al. 1979:3-40, 42). After the implementation of the road system, settlement in the eastern portion of the project area quickened. Devoted primarily to recreational functions, frame houses on wooden pilings became a rather common sight in eastern Orleans Parish.

Largely concomitant with the economic and residential development of the Lake Pontchartrain shore, east Orleans Parish, and other unspecified portions of the project area, was the erection of artificial levees to protect the low-lying areas of the city from seasonal storms and hurricanes. Long a standard practice along the New Orleans river front, extensive artificial levees were not required along the shores of Lake Pontchartrain as long as the area remained unexploited and unsettled. The earliest dike or "guard bank" along the lake is depicted on an 1827 map of the Pontchartrain shore area (Figure 13). The guard bank extended on either side of the Milneburg jetty and canal, and after a short distance to the east, extends inland to a point half-way between the lane and Bayou Gentilly.

From this modest beginning, levees were constructed around the rapidly-growing city and its suburbs, with the comprehensive system of levees constantly being extended outwards as the city grew. The present levee system upon which this survey is based, was constructed in the 1950s and 1960s, and at least in east Orleans Parish, was in place by 1967.

Implications of the Known Site Data-The Terrestrial Survey

According to site records kept by the Louisiana Division of Archaeology and Historic Preservation, Baton Rouge, there are only two historic sites (16Je6 and 16Je39) located within a mile of the area scheduled for impact. Both are located about a mile from the existing Lake Pontchartrain levee, and neither are well-documented historically. The only well-documented and recorded historic site located along the south shore of Lake Pontchartrain is Fort St. John or 'Spanish Fort' (16Or19), and this site, located between West End and the Lakefront Airport, is not in our study area.

FIGURE 13. DETAIL FROM 1827 MAP OF SOUTH SHORE OF LAKE PONTCHARTRAIN.

16JE39: The site is located immediately east of Bonnabel Boulevard, about one mile (1.6 km) south of Lake Pontchartrain shore. It is situated on the natural levee of old Indian Bayou, a stream that has been completely altered. This site, also referred to as the Montague Site, is a small shell midden (Rangia cuneata). Two possibilities have been offered explaining the occurrence of the shell midden. One is that the shell is the result of drainage ditch spoil from canals that were dug in the area in the early 1900s. Another is that the shell might mark the site of a historic Tchoupitoulas Indian village, documented to have been in this area. The second possibility is strengthened by the presence of historic material found in the vicinity of the site. 16Je39 was completely destroyed in 1948 when a house was constructed on top of the midden.

16Je6: This site also referred to as the Bonnabel site, consists of one large shell midden and two small shell mounds, and is located about three-quarters of a mile (1.2 km) south of Lake Pontchartrain and about 600 ft (548 m) west of Bonnabel Canal. The site is situated on a natural levee, and is only about a block from 16Je39, discussed above. It is postulated that the site, apparently a mass burial, was exploited by historic Indians. Confirmation, however, was hampered by disturbance due to treasure-seekers, and at present the site has been completely destroyed by the building of a subdivision.

16Or19: Also known as Spanish Fort, this site is located just north of Robert E. Lee Boulevard and just west of Bayou St. John. It is over two miles (3.2 km) from the closest area to be studied. It is discussed here because of its importance to the historical development of the south shore of Lake Pontchartrain.

The most visible remains of the site consist of remnants of an 1808 brick fort (Fort St. John), underlain by subsurface remains of an earlier Spanish fort and two 18th century French forts and a cemetery. The site also includes a 19th century hotel and amusement park. The site has been subjected to two separate programs of archaeological testing: the first, conducted in the 1930s by the New Orleans Historic Buildings Survey; and the second, an excavation program conducted by the University of New Orleans in 1976.

Navigational History of Lake Pontchartrain

Lake Pontchartrain "...has an area of about 600 square miles and is a fine body of navigable water, being singularly free from natural obstructions to navigation, such as shoals and reefs" (House Document 881, 1908:2). The role which the lake has played in the economic and social development of the New Orleans area has been substantial, yet to a great extent that role is unsynthesized. The focus of research endeavors in the region has been upon New Orleans proper and the Mississippi River.

This is not to imply that data concerning the lake is lacking. A wealth of information is to be found in such diverse sources as the

Reports of the Chief of Engineers, the Reports of the Board of State Engineers of the state of Louisiana, the Louisiana Quarterly, and the Times-Picyune, and at such agencies as the Lake Pontchartrain Levee Board, the Eighth District U.S. Coast Guard, the Causeway Commission, and the New Orleans District, Corps of Engineers. The following discussion focuses on a history of the uses, and in certain instance abuses, to which the lake has been subjected. The data forming the basis of the discussion have been abstracted from the sources named above, and references found in the libraries of NWR, Louisiana State University at Baton Rouge, Tulane University, the University of New Orleans, the Historic New Orleans Collection, and the New Orleans Public Library.

In 1699, Pierre le Moyne, Sieur d'Iberville, accompanied by his brother Jean Baptiste le Moyne, Sieur de Bienville and Chevalier de Surgeres began his fateful journey through the delta country of southern Louisiana. Iberville must be credited with the original discovery of Lake Pontchartrain by Europeans, though some scholars feel that Tonti, during his search for LaSalle, might have encountered the lake (Roberts 1946:20-21). While Iberville's examination of the lake was cursory at best, he was sufficiently impressed by both Lake Pontchartrain and Lake Maurepas to name them both in honor of the family of the then-present French Minister of Marine and his eldest son, Louis de Phelypeaux, Comte de Pontchartrain, and Jerome de Phelypeaux, Comte de Maurepas.

Circumstances precluded intensive investigation of both lakes during this initial reconnaissance, however in 1700, under the directions of Jerome de Phelypeaux, who had become Minister of Marine after his father's resignation, Iberville dispatched his brother, Bienville, to the Lake Pontchartrain area. He was accompanied by Andre Penicaut, whose journal provides one of the earliest descriptions of the lake (Roberts 1946:25):

> "...The stream we had met with [the Rigolets] communicated with this place. Four leagues further on we detected a large lake, which M. de Bienville styled Pontchartrain. This is about 28 leagues in circumference and seven wide. It embrochure, at the entrance is a quarter of a league from one side to the other.
>
> Both sides of the pass, or entrance, are covered with shells, and in such quantity that they form an elevation, which was the reason it was called Pointe-aux-Coquilles. When one has passed through this channel, you perceive on looking ahead at a distance of a league and a half to the left a projection of land called Pointe-aux-Herbes, where the boats were placed under shelter; because in this place [Lake Pontchartrain] the water is shallow, and in

> heavy gales canoes are sometimes lost there. Six leagues further on is a small river called by the Indians Choupicatcha, which the French afterward called Orleans, or Bayou St. Jean [sic]."

In 1718, Bienville crossed the waters of Lake Pontchartrain and sailed up Bayou St. John toward the present location of New Orleans (House Document 963, Appendix A Statement of the Progressive Union of New Orleans, 15 October 1912:12). The inhibition to navigation up the Mississippi Delta by the "...clogging, oozy masses of mud" (Lowery 1964:233) demanded that access to New Orleans be gained via Lake Pontchartrain. Though such talented French engineers as Adrien de Pauger and Le Blond de la Tour proposed schemes to circumvent the obstacles (Lowery 1964:238) in the Mississippi, for the duration of the French and Spanish control of New Orleans the lake served as the primary access to the city.

Bienville felt as early as the 1700 trip with Penicaut that the high ground adjacent to the Mississippi River, and backed by Bayou St. John would be the perfect location for a settlement. Yet, because of French politics, it was not until 1718 that his plan was implemented. Because access was so limited via the Mississippi River route, the focus of attention with regard to supplying the infant town and defending it was placed upon the access afforded by Bayou St. John to the waters of Lake Pontchartrain. Even though portage was involved once the supplies reached the head of the Bayou, Bienville considered this only a limited detriment.

New Orleans had a population of 1249 in 1721 (see preceding discussion of the history of New Orleans); the population was engaged primarily in three occupations, agricultural production, commerce, and the military. In order to meet the supply needs of both the town and surrounding countryside, and finance its continued growth, it was imperative that trade between New Orleans, other Gulf and Caribbean ports, and Europe continue unimpeded. Though shipping records for the early years of the colony are historically inadequate, there is little doubt that a significant amount of traffic plied their routes across Lake Pontchartrain to the Bayou St. John.

The importance of the Lake Pontchartrain access routes in supplying the needs of New Orleans can be seen during the British blockade of the Seven Years War in 1756. Within six months, New Orleans was suffering from a lack of imported goods, and exports were literally rotting in the warehouses (Roberts 1946; Surry 1916). Though attempts were made to run the blockades, and in at least one instance they were successful (Roberts 1946:69), for the duration of the war New Orleans continued to be impacted, and the majority of the traffic on the lake was local.

The situation was not improved by the resolution of the war. Under the terms of the treaty, Lake Pontchartrain was literally cut in

half. Article Seven of the 1763 treaty states in part:

> "it is agreed that, for the future the limits between the possessions of his Most Christian Majesty and those of his Britannic Majesty in that part of the world shall be irrevocably fixed by a line drawn along the middle of the River Mississippi, from its source to the River Iberville [the Manchac and the Amite], and from thence by a line in the middle of that stream and of the Lakes Maurepas and Pontchartrain to the sea..." (Roberts 1946:71)

The impact of this division fell upon the French administrators who were legally under Spanish control. Under the Family Compact of 1762, the French had ceded their territory to the Spanish, who following the Treaty of 1763, managed to ignore their responsibilities for the next 6.5 years. The administration of the Isle of Orleans, the only part of the Pontchartrain Basin still technically in French/Spanish hands was left to French colonial officials who were apparently receiving orders from both Paris and Madrid (Roberts 1946; Surry 1916).

The English in the meantime were attempting to circumvent the tenets of Article Seven. By 1764, George Johnstone, the Governor of British West Florida, indicated that

> "The passage by the Iberville [i.e. Bayou Manchac and that part of the Amite River which completes the connection with Lake Maurepas] to the Mississippi is now so opened and cleared by Captain Campbell that it may be depended on as a fact that vessels of six feet water may pass from Lake Pontchartrain through this channel as soon as the Mississippi rises...The advantages...besides keeping so material a passage open and protecting the navigation in this passage, will be the securing of our possessions on the north of that channel and rendering New Orleans dependent on us [the British] for all things instead of our being dependent on New Orleans." (Roberts 1946:75-76)

Campbell's channel was never operationalized, though the British did establish a fort (Bute) at Point Iberville (now Manchac). The journal of Captain Henry Gordon indicates that by 1766, traffic had resumed to pre-war capabilities on the lake, though the British and French/Spanish continued to argue about jurisdiction. At least three schooners are known to have been transporting tar (Roberts 1946:77)

and rice exports were growing. The British could not accomplish total control of the lake and its commerce, and they were further stymied in their efforts by increasing traffic in contraband.

It is unclear what would have ensued had not the American colonies decided to break with Britain in 1776. The British, in control of northern Lake Pontchartrain, Manchac (Fort Bute), Baton Rouge, and Natchez, had maintained their hold on Lake Pontchartrain with the frigate West Florida (Roberts 1946:97). Though the Spanish governor of New Orleans, Bernardo de Galvez, was openly sympathetic to the American cause, he could do little to blatantly thwart British actions until Spain sided with France and the Americans under the conditions of the 1778 Treaty of Amity and Commerce.

By September 21, 1779, troops under the command of Galvez had taken Fort Bute and the British garrison at Baton Rouge. The English commander surrendered Natchez as well. Three British galleys and a brig were captured at Galveztown (near Iberville Passage) and two British cutters with supplies from Pensacola were taken in Lake Pontchartrain (Roberts 1946:97). The high point of all engagements on the lake came with the match between the West Florida and a refitted sloop called the Morris.

The West Florida, as noted above a frigate, carried five guns, including a 9.5 pounder. William Pickles, an American adventurer, outfitted the Morris with 2.5 pound guns and a select crew. Roberts (1946:97-98) supplies the remainder of the details:

> "Overhauling the West Florida, Pickles ordered her to surrender. The English captain, Paine, laughed at him. Shots were exchanged simultaneously. Pickles ran in close, boarded the enemy and subdued her in hand-to-hand combat. Four Britishers were killed, including the captain. On the American side, Pickles reported that he had lost only one: 'Brown Traitor to our Cause swimd [sic] ashore.'"

The Spanish retook West Florida, including all of Louisiana, under the Treaty of 1783. Within the next decade the population of New Orleans grew considerably, and the outline of the city and the surrounding countryside was significantly altered. The disasterous fires of 1788 and 1794 permanently changed the skyline of New Orleans. Though the British had successfully attempted settlement of the north shore of Lake Pontchartrain, it was not until 1781 with the establishment of Fountainbleau (near present-day Mandeville) by Pierre Philippe de Marigny de Mandeville, that major development occurred.

To the north of the city, the increasing demands placed upon the wharves at Bayou St. John argued for easier access to the city. Roberts states that contemporary accounts (1946:102) show 10 to 15 vessels, usually under Spanish, American, or French registry, at the

Bayou St. John wharves at once, and as many as 50 at the Mississippi River wharves.

By 1792, Baron de Carondelet, governor of Spanish West Florida and Louisiana announced his intentions to

> "...dig a canal, [which] would rid New Orleans of the stagnating ponds...[and which would] become a convenient canal, navigable for schooners... facilitating intercourse between the opposite side of the lakes, Mobile and Pensacola, with New Orleans." (Martin 1975:263).

The canal's original dimensions were eight feet wide by six feet deep and it was completed, with conscripted slave labor, by the end of 1796. The canal ran in an essentially straight line from "...Rampart Street proper, out about 3 miles to Hagen Avenue, there joining Bayou St. John" (House Document 963, Appendix A Statement of the Progressive Union of New Orleans, 1912:12), following the present-day route of Lafitte Avenue. Although the original purposes for the canal were two-fold, drainage and access, by 1801 John Pintard noted that "...this highly useful work is daily filling up by the filth of the city to which it serves as a common sewer & no endeavours are used to cleanse it or keep it in repair" (Sterling 1951:224).

Despite this evaluation of the condition of the canal, it served as the major access route from the commercial center of New Orleans to Bayou St. John and thence to Lake Pontchartrain. The Spanish and French maintained a military garrison at the mouth of Bayou St. John, and wharves were present along both the Canal and Bayou, though apparently they did not reach into the lake (Martin 1975; Kendall 1922).

Shallow draft vessels had to be operated both on the Lake and through the bayous. The shallowness of the lake, only four to six feet within 400 feet of the south shore line (Map Plan and Profiles Annexed to the Report on a Canal Destined to Connect the Mississippi River and Lake Pontchartrain, March 1st, 1827, on file at Tulane University Library, the Louisiana Collection), precluded the use by the colonists of deep-draft topsail schooners or foretopsail schooners.

Pilotboats (pailebot), falouches ("New Orleans luggers"), and bateaus were the most common vessel types in use, and would continue in popular use into the 20th century (Faye n.d.:123). Though in 1812, the steamboat New Orleans docked on the Mississippi River at New Orleans, it was not until February, 1819, that a steam schooner, the Maid of Orleans, was able to maneuver to the Bayou St. John/Carondelet wharves.

These vessels plied trade from New Orleans, via the Carondelet Canal/Bayou St. John access route, across Lake Pontchartrain to Gulf

ports such as Pensacola and Mobile. Martin (1975:312) indicates that in 1802 some 500 round-trips were made between New Orleans and the south shore of Lake Pontchartrain. Out-bound commerce was almost exclusively raw, unprocessed goods (cotton, sugar or indigo, cattle, raw timber, sand, and shell) while in-bound goods included lumber, coal, domestic articles, agricultural and blacksmithing materials.

With the exception of Spanish Fort, at the mouth of Bayou St. John, development along the south shore of the lake was minimal. Early maps of the area show unbroken expanses of cypress swamps (Carte Particuliere Du Fleuve St. Louis, c. 1723, on file Tulane University, the Louisiana Collection; Figure 6). By 1809, however, Alexander Milne established a small settlement east of Bayou St. John (Kendall 1922), which would become the settlement of Milneburg (also spelled Milneburgh: Sketch of the Pontchartrain Harbor and Breakwater, Wagner and McGuigan's Lithograph, 30 October 1853, on file Historic New Orleans Collection; Figure 14).

Alexander Milne, who arrived in New Orleans in 1776, may have done more to retard development along the south shore of the lake than any single individual. Through a series of shrewd land deals, by the early years of the 19th century, he was in sole possession of a strip of land which stretched for 21 miles from "...a point west of New Orleans in Jefferson Parish all the way to the Rigolets" (Roberts 1946:239). It was not until Milne sold land for the Pontchartrain Railroad route, station and wharf complex in 1830 that his hold was broken (Prichard 1947:1118).

The development along the south shore was hindered both by Milne and by the very nature of the environment, yet developmental schemes abounded in the early decades of the 19th century. In 1827 detailed plans were submitted to both the City and the State of Louisiana for the construction of a canal from Milneburg to the Mississippi River (Map Plan and Profiles 1827; Figure 13). The plan was never implemented, however, and there is some indication that the Pontchartrain Railroad was constructed in place of the canal (Prichard 1947).

In 1832 and 1833 developers proposed extensive housing projects between Spanish Fort and Milneburg (Development of the City of New Orleans, 1832-1833, Maps LD-524, on file Lake Pontchartrain Levee Board, New Orleans - Attachment 1; Figure 15). Again, however, the plans did not come to fruition.

Although the developmental plans for the south shore were not successful at this early date, the commercial traffic on the Lake increased significantly in volume. The Bayou St. John/Carondelet Canal transportation route could not handle the amount of commerce, and in 1830 the first of the additions to the commercial transportation routes was made along the south shore, the Pontchartrain Railroad. The railroad was founded by the Pontchartrain Railroad Company who was authorized under the 26 January 1830 act of the Louisiana legislature (Prichard 1947:1118). The legislature gave the

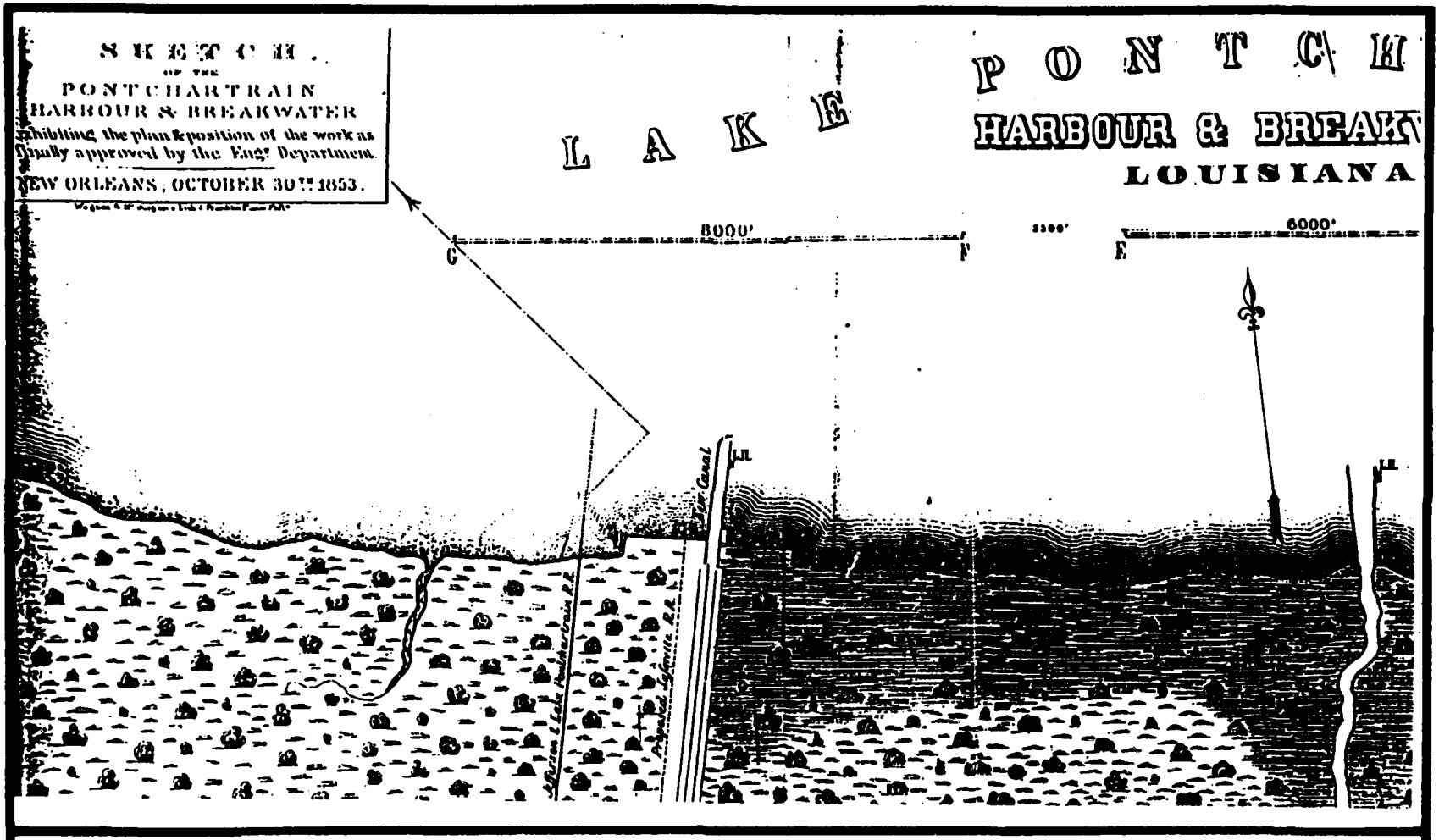

FIGURE 14. 1853 SKETCH OF LAKE PONTCHARTRAIN HARBOR AND BREAKWATER (EASTERN PORTION OF MAP CONTINUED ON NEXT PAGE)(HISTORIC NEW ORLEANS COLLECTION).

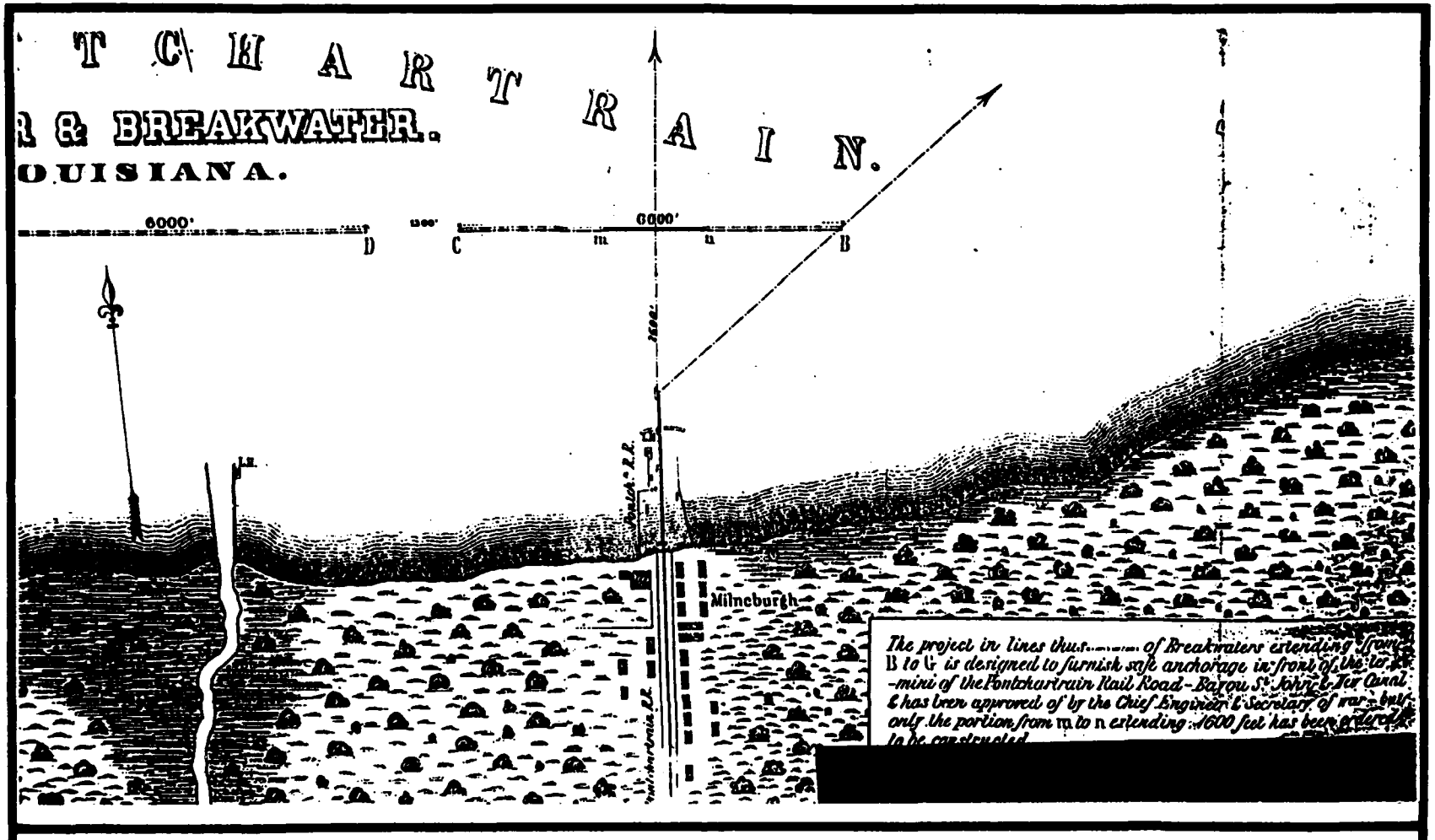

FIGURE 14. CONTINUATION

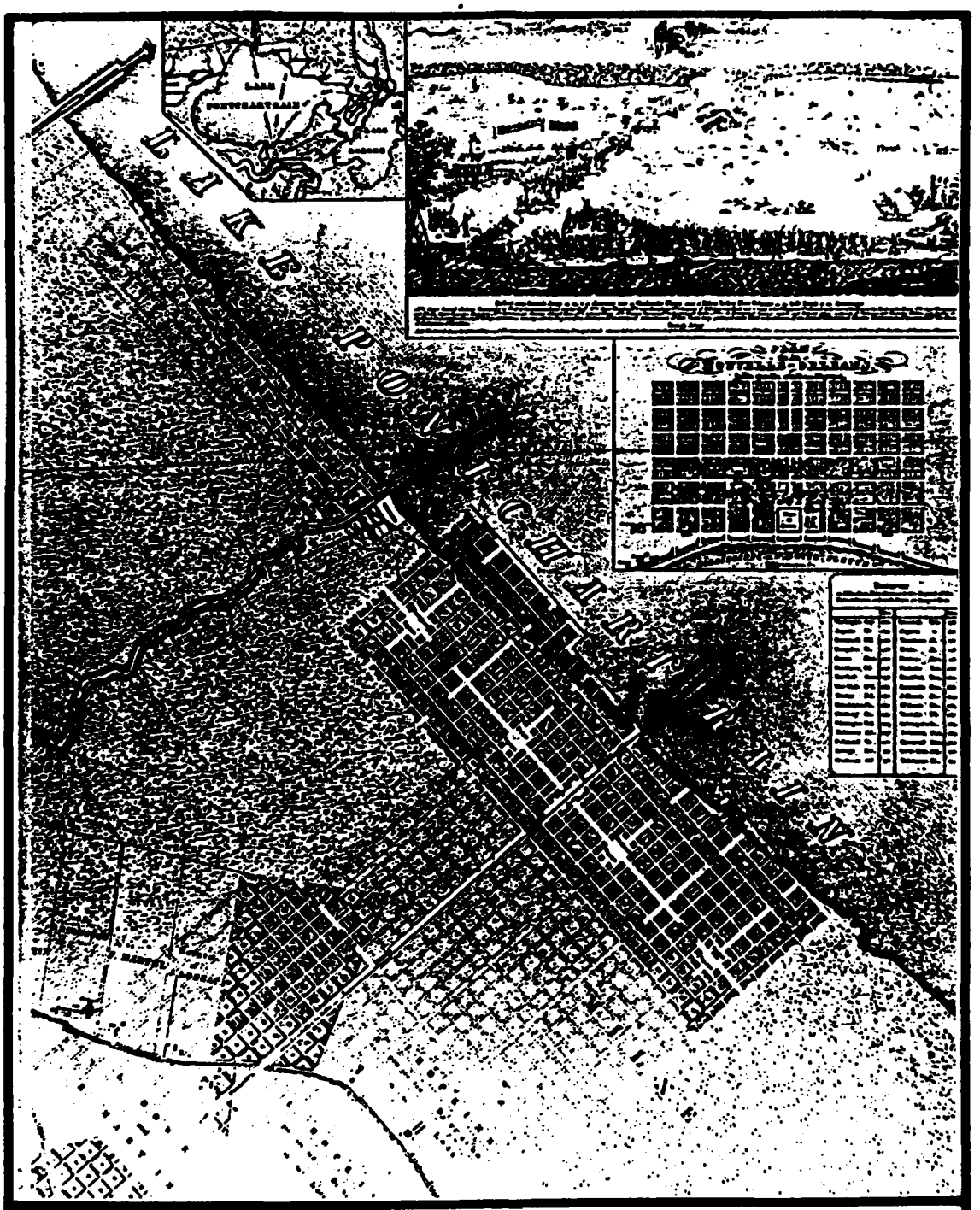

FIGURE 15. DETAIL OF 1834 MAP SHOWING PROPOSED PONTCHARTRAIN SHORE DEVELOPMENT IN VICINITY OF MILNEBURG (HISTORIC NEW ORLEANS COLLECTION).

company "exclusive right and privilege of constructing and using a railroad leading to and from the city of New Orleans, its fauxburghs, and the incorporated limits thereof, to and from Lake Pontchartrain," (Pinchard 1947:1118) for a period of 25 years.

Apparently, over the course of the next two years, the company made abortive attempts to deepen the mouth of Bayou St. John, attempts which were unsuccessful (Report of the Chief of Engineers 1882:1391). The company's Special Report on a Company Circular, August 1832 (as cited in Roberts 1946:236) indicates

> "The causes which have led to the great increased expenditure of the undertaking have mainly arisen from the difficulties and loss experienced in constructing the harbors in the lake. The formation of a basin in the open sea or lake should be the work of the Nation rather than the company..."

Not until 1853 was a significant alteration made to the off-shore complexes off Milneburg (See below; House Document 881, 1908:3).

Despite the addition of the Pontchartrain Railroad, the amount of commercial traffic was still too great in volume. Between 1831 and 1835 the New Basin Canal [also called the Banking Canal and the New Orleans Canal] had been completed with monies from primarily the State of Louisiana, though private investors apparently were also involved (Kendall 1922; Diagram Showing the Inundated District, Sauve's Crevasse, May 3, 1849, on file Tulane University Library, the Louisiana Collection, Figure 11; Sketch of the Pontchartrain Harbor and Breakwater 1853, on file Historic New Orleans Collection, Figure 14; Swanson 1975:132; Roberts 1946).

A detailed account of the construction history of the New Basin Canal was not located during the background review for this project, and the early years of use of the canal remains undocumented. It is also unclear from reviewed data the disposition of two other transportation routes marked on the 1849 Diagram Showing the Inundated District, Sauve's Crevasse (Figure 11). The first, in the vicinity of present-day Bucktown, is marked "Bayou St. Louis/Gallagher's to haul cypress." The lower, inland portion of the Bayou, with three feeder channels, terminates at a straight, canal-like feature which continues to the lake. It is this straight channel which is marked by the notation "Gallagher's to haul cypress."

The second feature is the Labarre Canal shown on the map as between Bayou Tchaupitoulas and Bayou Labarre. This canal is of exceptional interest, for it connects Lake Pontchartrain to the Mississippi River. No later map of the south shore shows a canal in the position marked for the Labarre Canal on the 1849 map; an 1863 map prepared for military purposes (Map No. 9, Northern Shore of Lake Pontchartrain, February 1863, on file New Orleans District, Corps of Engineers;

Figure 16) does not illustrate a canal in the Labarre area. In fact, no Reports of the Chief Engineers makes mention of this supposed connecting link, and it can only be assumed that the Labarre Canal as shown on the 1849 map was never constructed.

By the 1840s, then, at least three well-documented wharf complexes were present along the south shore of Lake Pontchartrain; the West End/New Basin Canal, the Bayou St. John/Carondelet Canal, and Milneburg. No later than 1853, a fourth complex had developed to the west of New Basin Canal (Figure 14). The Seventeenth Street Canal, and its companion Jefferson and Lake pontchartrain Railroad (Swanson 1975:132) provided additional facilities.

The increasing traffic on the lake and the commercial demands on New Orleans not only resulted in additions like the Seventeenth Street Canal, but necessitated the implementation of safety procedures and at least the consideration of several plans for the development of safe harbors. As early as the 1830s, not only were the smaller sailing vessels, and barges in operation, but several steamboats as well. Included in the latter were: Long Branch, Star of the West, William T. Barry, Plough Boy, Tangipahoa, Otto, and Watchman. The latter two vessels made weekly roundtrips between Milneburg and Mobile (Roberts 1946:245). By the late 1830s, the steamboat Merchant was plying the lake and the Gulf Coast, while the steamers Alabama and Giraffe were servicing such local ports as Madisonville, Louisburg, Mandeville, Covington, Bay St. Louis, Pass Christian, and Pascagoula at least once a week (Roberts 1946:246).

By 1853, an extensive breakwater was proposed offshore from west of West End to east of Milneburg (Sketch of the Pontchartrain Harbor and Breakwater 1853; Figure 17), in order to provide a partially protected safe harbor for these and other vessels. Only a 1500 ft section (Report of the Chief of Engineers 1882:1392) at the 12-ft contour off the shore at Milneburg was completed, however, primarily to protect "vessels landing at the [Lake Pontchartrain] railroad wharf at that place" (House Document 881, 1908:3).

The breakwater was constructed of wooden piles, with square timber "...bolted on a slope, the outer edge of which was 2 feet under water, and the inner edge 5 feet above water..." (Report of the Chief of Engineers 1882:1392). The top of the breakwater washed off during the winter of 1856-1857, and throughout the latter years of the 19th century pilings and other constructional elements proved a hindrance to navigation (House Document 881, 1908:3).

Aids to navigation for traffic along the south shore had, prior to the 1820s, been minimal. By 1827, however, two lighthouses had been constructed, one at the mouth of Bayou St. John and the other at Milneburg. A third was in place at New Basin Canal/West End by 1853. Of these three, two (Milneburg and New Basin Canal) are still extant, though only the New Basin Canal Lighthouse is still an active installation (Eighth District, U.S. Coast Guard). House Document 881

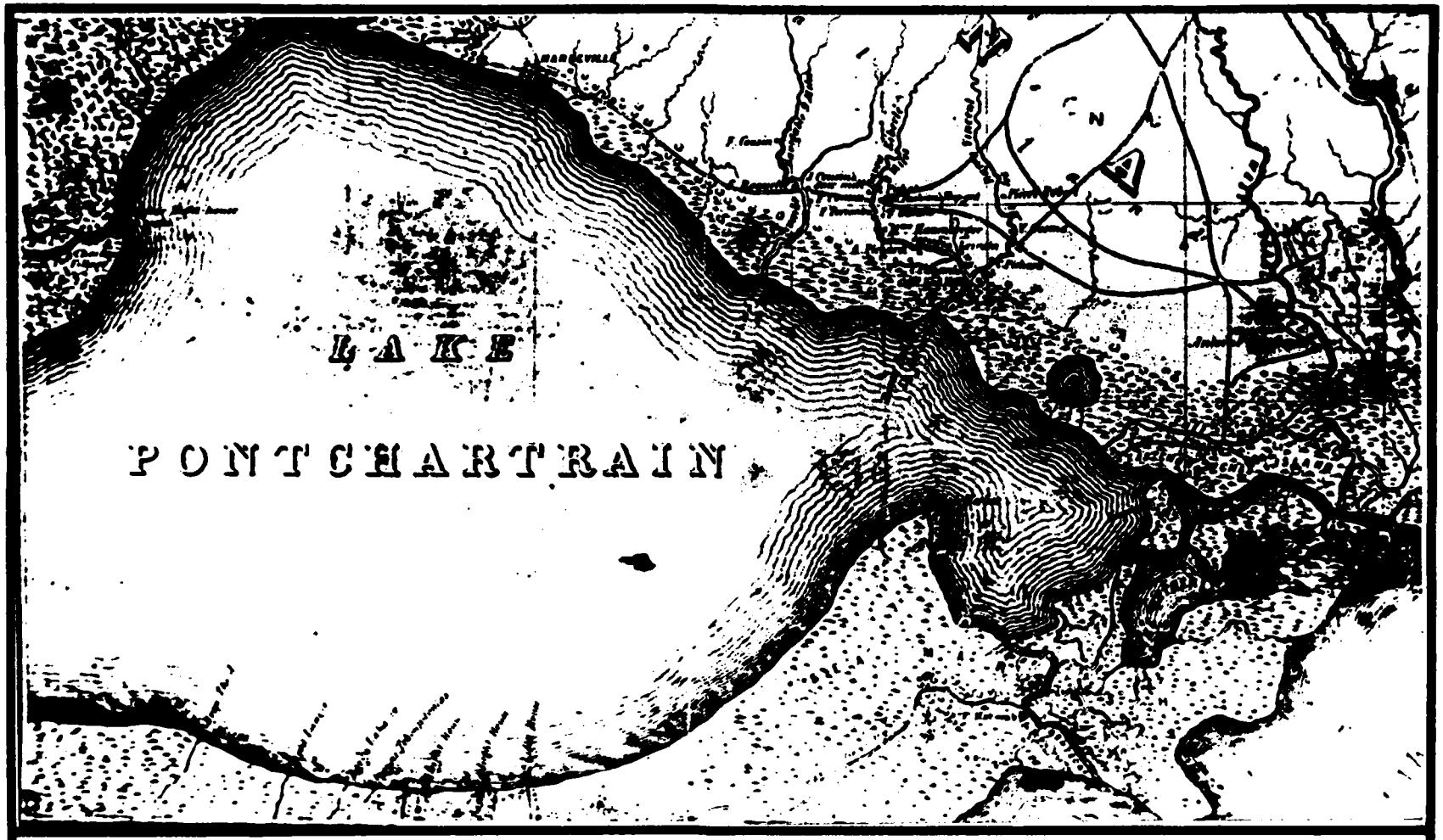

FIGURE 16. 1863 MAP OF NORTH SHORE
OF LAKE PONTCHARTRAIN.

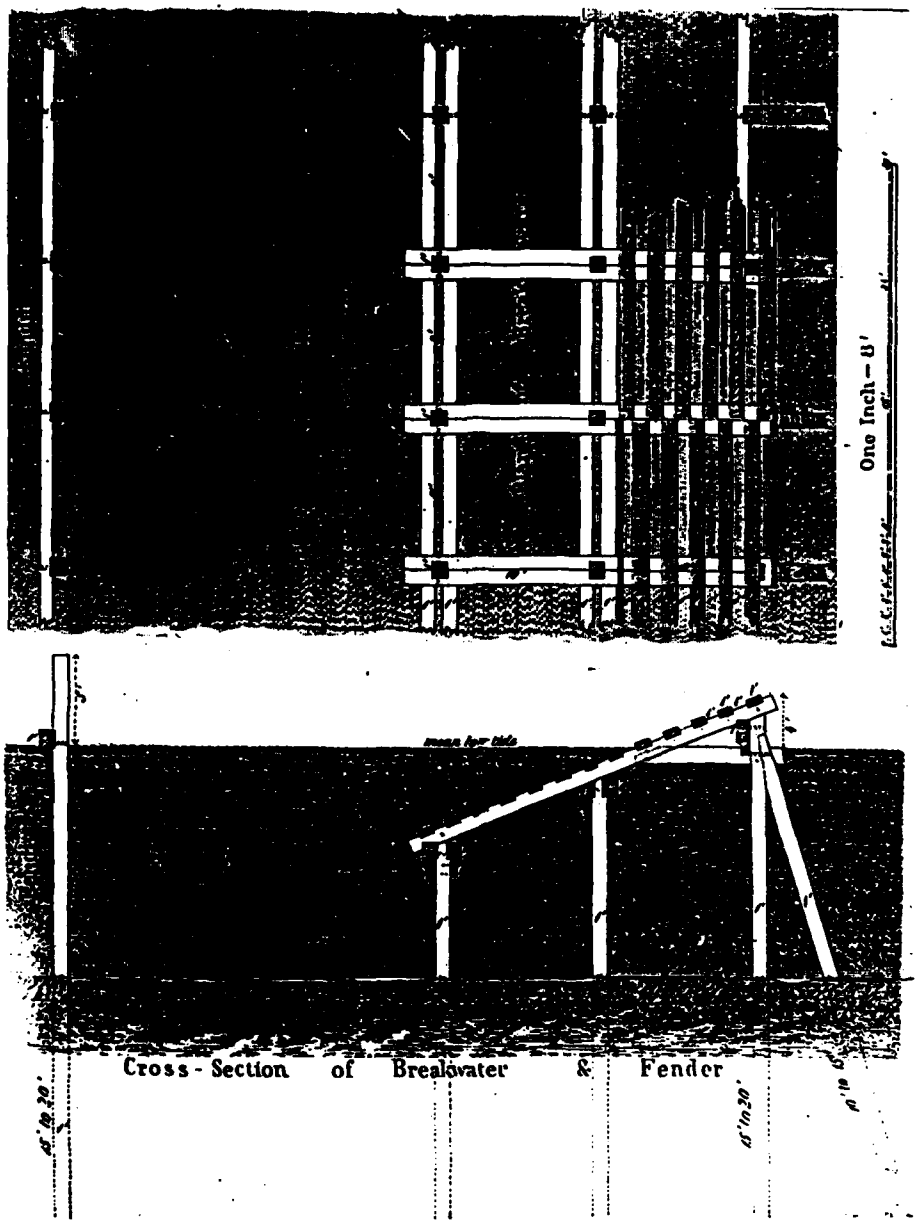

FIGURE 17. 1853 BREAKWATER PROPOSED FOR THE VICINITY OF MILNEBURG. DETAIL FROM SKETCH OF THE PONTCHARTRAIN HARBOR AND BREAKWATER (HISTORIC NEW ORLEANS COLLECTION).

(1908:2) indicates that by that year seven lighthouses were in operation around the lake, and that "numerous beacons maintained by the United States" were present across the lake.

These aids to navigation were essential to the safe passage of vessels across the lake. While the lake, as noted earlier, was devoid of shoals and reefs, natural features such as the shallows associated with the "Middle Grounds" were a hindrance to navigation. In addition, the decayed breakwater at Milneburg and so-called "deadheads" (saw logs partially sunken in the lake) were definite hazards. Jurisdiction over safe passage across the lake apparently fell to the U.S. Army Corps of Engineers for several of their Reports of the Chief of Engineers (1871, 1877, 1882, 1893, 1913) refer to plans for removal or modification of these obstacles.

Two of these plans are of special interest, for they refer to modifications either adjacent to the Jefferson Parish Lakefront Levee and Jefferson Parish Borrow Area or in the Howze Beach Borrow Area. The former concerns plans for the construction of a breakwater in the vicinity of the New Basin Canal/West End.

The construction of a major breakwater stretching from West End east past Milneburg had been originally proposed in 1853, with the only section completed being that off Milneburg. In 1873, the Orleans Levee Board proposed an elaborate plan of embankments, pumping machinery, locks, harbors, and rail and shell roads (Plan of Proposed Improvements for the Lake Shore Front of the City of New Orleans , April 1873, on file Lake Pontchartrain Levee Board Map LD-801 - Attachment 2) off the existing shoreline.

Only a single section of the breakwater was completed. It extended from a drainage canal approximately 2000 ft west of New Basin Canal, along the one-foot curve, and terminated at the west end of the Canal. The remainder of the plans were never implemented, and by 1882 the U.S. Army Corps of Engineers was completing a survey "For a Breakwater in Lake Pontchartrain, in the vicinity of New Canal Outlet, Near New Orleans, To Serve as a Harbor of Refuge" (Report of the Chief of Engineers 1882:1390-1393).

The construction of the breakwater was called for under the River and Harbor Act of 3 March 1879, and its construction was considered a matter of "very considerable importance" (Report of the Chief of Engineers 1882:1390) because the "southern shore of Lake Pontchartrain has no harbors except the mouths of the canals, into which vessels can run for refuge" (Op. cit.).

The report of H.C. Collins, Assistant Engineer, details the need for such a breakwater and at one point he makes the following observations:

> A breakwater to form a "harbor of refuge" and at the same time a safe harbor for the lake commerce

> of New Orleans should be made out as the 10-foot curve at least, and it is far more necessary now than it was at the time of the survey, as the railroad bridge across the lake will soon cut off the only shelter on the south side of the lake which has ever been available in a hard blow from northwest, that under the lee of Pointe-aux-Herbes.
>
> The commerce of the lake is now mostly schooners, in wood, charcoal, lumber, and brick trade, and a few steamers which carry passengers to the watering places on the north side of the lake...
> (Report of the Chief of Engineers 1882:1392-1393).

Amos Stickney, Major of Engineers, concurred with Collins' evaluation and recommended the construction of two sections of breakwater, both approximately 4,000 ft in length, parallel to the shore. The first was to be situated about 2,000 ft out from the New Basin Canal, while the second was to be situated 1,500 ft off of Bayou St. John. For reasons which are unclear, no action was taken on their recommendations, and by late 1892 some 300 schooner owners had petitioned Congress for the construction of the breakwater (Letter to Mr. Robert S. Day, Report of the Chief of Engineers 1893:1843).

Actions continued to be delayed, though improvements were made to the existing breakwater off the New Basin Canal. As late as 1914 (House Document 963, 1914:7) officials were still noting that "...there is no...harbor on the south shore of Lake Pontchartrain for a stretch of 40 miles, except the New Basin Canal, for which a toll is charged at the very entrance."

Part of the reason for the delay in development may have been jurisdiction. It is obvious from Mr. Day's letter of 1892 that storms such as the one on 5 May 1891 had sunk vessels in proximity to the mouth of New Basin Canal, and that officials in several agencies were concerned about the lack of protection for vessels using Lake Pontchartrain. There appeared, however, to be active debate as to who was responsible for improvements. For example, the State of Louisiana had transferred jurisdiction over Bayou St. John/Carondelet Canal to the Carondelet Canal and Navigation Co. in 1858. The lease was to last until 1908. By 1910, the question of responsibility was in the hands of the courts, with arguments over who held rights to ingress and egress, and who was liable for repairs and improvements both at the mouth of the Bayou and along its extent and that of the Canal.

A similar situation was in operation with the New Basin Canal. Originally the canal had been under the jurisdiction of the State of Louisiana. They however relinquished control over the canal to the New Basin Canal and Shell Road, though in 1888, under Act 144, the State resumed jurisdiction to be administered by a Board of Control for the New Basin Canal and Shell Road (Report of the Board of State

Engineers of the State of Louisiana April 20, 1898 to April 20, 1900:4).

The resolution of the various dispositions is not critical to this discussion. What is critical at this point is the fact that despite several attempts, no "harbor of refuge" was in place along the south shore of Lake Pontchartrain, from the early decades of the last century through the first three decades of this century. Reports indicate that vessels were lost in both the vicinities of Milneburg and New Basin Canal, and it is the latter which is critical to the present study.

The exact locations of the various sinkings have not been documented, and only general locations are suggested. The Delta Daily (March 14, 1860) indicates that the steamboat Judge Porter burnt and sank off Milneburg. Captain Horace Lawson Hunley's initial submarine, the Pioneer, was purposely sunk off of Bayou St. John to escape its capture by Farragut in 1862, but it was subsequently raised after the Civil War (Roberts 1946:258-259). Roberts indicates that between 1879 and 1921, 40 sinkings and other serious accidents, occurred on Lake Pontchartrain and Maurepas (1946:270) but provides little other information. The accounts of the Delta Daily, Daily Picayune, and Times-Picayune examined provide little additional information.

In the case of the second Corps of Engineers plan, that to clear passage through the "Middle Ground," the resolution is more easily summarized. As early as 1871 (Report of the Chief of Engineers 1871: 524), the U.S. Army Corps of Engineers had explored the possibilities of channelization through the "Middle Ground," situated at the eastern end of Lake Pontchartrain. In the 1890 Report of the Chief of Engineers (cited in House Document 176, 1913:5) a 10-foot deep channel, four miles long was proposed. The estimated cost of the dredging alone was $95,000.00, while a proposed revetment was estimated at $180,000.00. The plan was reviewed unfavorably, and the matter was not referred to again until 1913, when House Document 176, 63d Congress, 1st Session, was prepared in support of a proposal to create a channel through the "Middle Ground."

The report summarized the need for such a channel, presenting support documentation in the form of letters from such commercial enterprises as the Houlton Lumber Co., Houltonville, La., the Jahnke Navigation Co., of New Orleans, and the Salem Brick and Lumber Company. In the letter from the Jahnke Navigation Co., the notation is made that

> "It is a common occurrence to see barges and packets hard and fast on these Middle Grounds during the months of January, February, and March, and very often we have been delayed with our barges five and six days, waiting for the change of tide" (House Document 176, 1913:6).

The report reviewed several alternatives, and concluded that "...the locality is worthy of improvement by the United States, and he [the district officer] submits a plan providing for a channel 8-feet deep at mean low water and 150 feet bottom width via route A-B" (House Document 176, 1913:2). Route A-B was considered the best of the three routes evaluated; its path went from the Rigolets to the north draw of the New Orleans and Northeastern Railroad bridge over the lake.

The Act of August 8, 1917 provided for the dredging and marking of the channel, with a series of lights and buoys (Report of the Chief of Engineers 1920:944). According to House Document 652, 66th Congress, 2d Session (1921:1070) the channel was operational by that year, and was in use by shipyards at Madisonville and Slidell. As far as can be determined, the channel referred to above crosses the extreme southeastern corner of the Howze Beach borrow location. It should be noted that no reference to vessels down in the channel was located, but the number of vessels which appear to have been "beached" on the "Middle Grounds" through the years apparently is substantial. Most of these, as the reference to the Jahnke Navigation Co. letter (1913) would indicate, were temporarily stranded, awaiting a change in tide in order to float off the shallows.

The uses of the lake have been predominantly commercial, and the majority of the actions taken through the years, be it the development of access canals, breakwaters, or channels, have been proposed in order to insure the continuation of commerce on the lake, While initially the majority of in-coming commerce was geared to meeting the domestic and supply requirements of the City of New Orleans, it is apparent from a review of such sources as Kendall (1922), and the Reports of the Chiefs of Engineers, that by the latter years of the last century, the majority of traffic was engaged in the movement of raw materials.

By 1921, for example, 41 percent of the cargoes transported across the lake consisted of logs and lumber, while another 21 percent were sand (House Document 652, 1921:1070). Other items included brick, charcoal, gravel, and miscellaneous merchandise (op. cit.). Vessels used to transport the materials included the aforementioned "New Orleans luggers," shallow draft schooners, steam tugboats, and steamboats, including stern-wheelers. The draft on all these boats was between four and seven feet (House Document 652, 1921:1070; Report of the Chiefs of Engineers 1920:946; House Document 881, 1908).

It is apparent that the range of vessels utilized on the lake was restricted by the physical parameters of the lake configuration. In the early years, specialized vessels such as the falouches and bateaus were utilized; by the middle of the 19th century shallow draft schooners, and larger vessels were more common. The aforementioned range of vessel types present in 1921 is reflective of the types of traffic common on the lake following the Civil War.

In sum, the historic documentation has revealed intensive and extensive use of the lake. Vessels have been sunk, with cargo doubtlessly scattered over the lake floor in the vicinity of the shipwrecks. Given the types of cargo carried on Lake Pontchartrain, however, many would not be identifiable or retrievable (e.g., indigo, sand or gravel). Other constructions, such as partial breakwaters and old pier camps, etc. appear on early maps or are referenced in documents reviewed. Evidence of these may be present. The anomalies identified during the off-shore work will be interpreted in light of background data on possible historic associations.

CHAPTER FOUR

RESEARCH DESIGN

The background research conducted during Phase I of this project formed the basis for raising several research issues that could potentially be addressed by the terrestrial and off-shore surveys. These issues are divided between the issues pertinent to prehistoric occupations and those pertinent to the historic period.

PREHISTORIC ISSUES

In the previous chapter we have presented an evaluative picture of what is known or hypothesized about the prehistory of the Lake Pontchartrain Basin. What is clear from our discussion and others of our colleagues (cf. Gagliano et al. 1979) is that much of the prehistoric record in this area remains unclear. The issues will continue to draw attention until they can receive more clarification by excavation data. This project, including both terrestrial and off-shore inspection with the former being comprised of survey and testing, provided a potentially valuable opportunity to gather substantive data to address some of the gaps in the cultural record.

To interpret the regional implications of the prehistoric data, however, specific questions had to be asked regarding each site identified and investigated by the work. Toward this end, four were raised.

First, the sites must be placed within a chronological framework. Given the cultural record, we had several assumptions as to what

periods would be represented in the project area. They were as follows:

1. Pre-Poverty Point components will probably not be located, though evidence of isolated finds dating to the earlier periods may be present.

2. We would expect the best represented components to date to the Tchefuncte period.

3. Marksville components will not be well represented, if present at all.

4. Baytown-Coles Creek sites should be present, but not as well represented as Tchefuncte.

5. Mississippian components will not be well represented, but where found will not reflect settlement shifts from the preceding periods.

Second, we were interested in determining site function to the extent the artifactual inventory would allow. Function, though subjective to some extent, can be assessed by the types of activities represented by artifact types. For example, bone, shell, and/or lithics can be used to assess the proportion of maintenance and manufacturing activities conducted at a site. These data are useful if one operates on a preconceptual basis of the relationship of different site types to artifact types. Generally speaking, archaeologists tend to view residential base camps as reflecting a wide range of activities, including both manufacture and maintenance. The latter is represented by a wide ceramic inventory, presence of finished tools and variety to the range of finished tools. Manufacture is represented by the by-products of production (e.g., flakes, roughouts, cores).

These data, in conjuction with the presence or absence of features, frequently provide insight into functional nature of prehistoric sites. Based on the previously recorded sites, we anticipated one of two types might be present in the project area. These included residential bases and shell-collection stations.

Third, when the site data are adequate in terms of overall number, site classifications can be developed which permit interpretation of locational patterns evident within a settlement systems. Within the Lake Pontchartrain Basin, the locations of prehistoric sites are closely linked with geomorphic events. Basically, most prehistoric sites have been found on one of three geomorphic features. These include primary levees of the Mississippi River, secondary levees built up by distributary channels, and stable beach ridges. In particular, there appears to have been a preference for settling such elevated locales when they offered access to a range of resources (frequently overlooking marshes) and access to fresh water sources.

With these considerations in mind, the survey corridor hosts a number of areas that offer greater potential for the discovery of previously unrecorded prehistoric sites. In the eastern portion of the study area, the segments from the pumping station, east to the GIWW, and north to South Point, crosses several high probability locales. First, any area of high ground visible on topographic maps was viewed as a potentially habitable zone. An example is the high ground noted around Bayou Sauvage(Chef Menteur 7.5' quad). Also potentially sensitive areas were where the corridor crosses in proximity to Bayou Gentilly, Bayou Thomas, and Bayou Lagoon (Chef Menteur, North Shore, and South Point 7.5' quads). Finally, where the levee crosses now abandoned distributary channels, prehistoric site probability was also viewed as high.

From South Point to Little Woods community, very little development has occurred. The absence of development was our best insurance that *in situ* components, if present, would be found in this area. Because of our caveat on fresh water availability, we expected the areas of greatest site liklihood to be where small fresh water streams empty into Lake Pontchartrain. One example is a small stream near Black Bayou Lagoon (Little Woods 7.5' quad) located near the project area. Also, although not noted on geomorphic reconstructions, any areas of relict beach ridges or distributary levees had a high site potential.

The remainder of the segments had all experienced disturbance that we felt would render them less likely locations of prehistoric sites. The exception to this would only be as the survey extends toward the Mississippi River Levee in the final segment.

Fourth, we hoped to be able to offer some interpretations on the cultural dynamics of the study zone. What sorts of changes in site location, function, etc. occurred through time? Depending upon the integrity of the remains and the extent of component multiplicity, we sought to determine if a site evidenced shifts in economic focus or range of activities to name two concerns. Such data is often difficult to obtain on the survey level, but with the addition of testing to this program of work, we felt the possibility of isolating temporal variability might exist.

Viewing the specific site data in a holistic, synthetic manner was the ultimate research orientation for prehistoric occupation. Data from a single site adds to the archaeological record, but data from a number of sites is required to clarify many of the issues that still remain unresolved in the Pontchartrain Basin. To the extent possible, we were oriented toward viewing our site data in light of broad, interpretive issues such as whether settlement shifts occurred during the Marksville period as a response to changing *Rangia* habitats. Another area of interest was the degree to which Baytown, Coles Creek and Mississippian materials represent divergence from the Lower Mississippi Valley culture sequence. The degree to which our data would have regional implications depended upon the frequency and integrity of sites investigated.

The issues presented above for the prehistoric period relate predominantly to those that would be located by the terrestrial portion of the work. The off-shore investigations are also concerned with prehistoric site location to the extent that landforms suitable for having hosted such occupations may be identified.

Based on the geomorphic information available from other areas of Lake Pontchartrain the possibilities of locating prehistoric sites in the offshore borrow localities will be directed to identifying four types of geomorphic features which can be reasonably be expected to be found in the borrow areas and located with the proposed equipment. As shell middens constitute a significant portion of coastal sites these should be considered to be of primary importance. First, shell banks are reported as early as 1882 and shell deposits have been located during recent oil and gas industry activity. These are identifiable as strong, non-penetrable reflectors.

Second, beach ridges are primary geomorphic features for prehistoric sites often forming the only high ground in the area. Beach ridges are identifiable on a sub-bottom profile as a cross-stratified deposition with extensive plastic differentiation. Finally, subareal erosion and deposition of reworked material in a channel are shown as differential reflection due to the different particle size and generally a good indicator that the channel is either the result of subareal erosion or near shore environment. These channel features are associated with levee development and are high probability areas for locating prehistoric sites.

No primary sub-bottom data of the borrow areas could be located. It should be understood that the types of relict geomorphic features discussed may exist in the borrow areas as they have been found in other portions of Lake Pontchartrain and the geomorphic features are known on land to have yielded prehistoric materials.

HISTORIC ISSUES

Due to the preordained location of our survey over a long and varied area covering terrain as diverse as uninhabited swamp and urban development, the nature of our formal research design is rather constricted. Furthermore, the various segments of the line to be surveyed have been subjected to differing amounts of disturbance. For these reasons, we feel that a general treatment of research issues sensitive to the various conditions and disturbances pertinent to each segment of the line is better method of understanding and interpreting cultural resources within the project area than a series of formally stated hypotheses.

In this manner, we propose to examine the cultural resources that can be expected in each segment of the line, based on that area's past history of development and disturbance. For this discussion, the line has been divided into seven segments, numbered consecutively in a

counter-clockwise direction from the pumping station just east of the National Aeronautics and Space Administration (NASA) complex in the southeast, to the Mississippi River levee between St. Charles and Jefferson Parishes in the southwest.

Segment 1

This segment extends approximately 2.5 miles from the pumping station about three miles east of the NASA complex, along the existing Gulf Intracoastal Waterway (GIWW), to a point where the existing levee angles almost due north.

Prior to the creation of the GIWW, this area was uninhabited, and, except for occasional fishing forays, unexploited. The area has also been severely disturbed, especially that area between the GIWW and the existing levee. Historic culture material is expected only in the vicinity of Bayou Gentilly, which has been severed by the GIWW and the levee. The quantity of any such historic material will probably be very limited.

Segment 2

This segment extends approximately 3.2 miles from the GIWW to U.S. Highway 90. The southern half of this segment extends through marshland, and will probably contain little, if any, significant historic material. The northern half parallels Bayou Sauvage and is, thus, adjacent to occasional late 19th century and 20th century house and recreational sites. This area has, however, been disturbed not only by the construction of the levee, but also by the laying of Highway 90, which extends between Bayou Sauvage and the levee. Cultural materials found in this area may serve to better date these houses, but probably will not serve as the data necessary to provide a better understanding of their social character.

Segment 3

This portion of the line extends about 5.3 miles from U.S. Highway 90 to South Point on Lake Pontchartrain. Bayou Sauvage, in the extreme south, is the only existing natural channel that is crossed by the levee along this segment. Except for the artificial Irish Bayou Canal, the course to be surveyed extends through uninhabited marshland. Historic culture material may be encountered in the vicinity of Irish Bayou Canal, but it will probably be modern.

Segment 4

This segment of the line runs from South Point to the community of Little Woods. Although the Pontchartrain shore has not been greatly disturbed in this area, historic settlement has been very limited, geographically and temporally. Only in the vicinity of Little Woods, where there are approximately 40 pier camps still in existence, can one expect to find a substantial amount of historic cultural material.

We anticipate that this historic material will essentially date to the late 19th and early 20th centuries.

Segment 5

This portion of the line extends from Little Woods to the New Orleans Lakefront Airport. In this segment, the area to be surveyed consists of the shoreline between the lake and the lakeside toe of the railroad embankment. The most significant of the historic sites to be found in this segment are existing and ruined pier camps that extend into the lake along Hayne Boulevard in an almost unbroken line. Such significant cultural remains will probably date to the late 19th and early 20th centuries; there is no indication from earlier maps of any extensive historic activities or settlements before that time.

Segment 6

This segment extends from the Jefferson/Orleans Parish line to the St. Charles/Jefferson line, and encompasses the entire lakeshore of Jefferson Parish. Most of the relatively early (early 19th century) historic cultural material that could be recovered from the south Pontchartrain shore, would be located between the Lakefront Airport and West End, which is a segment not scheduled for survey. However, the Jefferson Parish shore, immediately to the west, should offer some cultural materials of a similar nature, even if not in the same quantity. Evidence might be found of "Dublin," possibly a resort or camp, indicated on an 1840s map of Louisiana and discussed briefly in the historical development of the New Orleans area. In the 1920s, pier camps were also located at Bucktown, at the eastern extreme of the segment, and although these camps no longer appear on local maps, evidence of their existence will probably be recovered during the survey. Also, due to the proximity of this segment to 16Je6 and 16Je39, the recovery of historic Indian, possibly Tchoupitoulas, remains, cannot be discounted. In other words, of all the segments examined so far, we would expect the oldest historical material from Segment 6.

Segment 7

This segment extends along the St. Charles/Jefferson Parish line from Lake Pontchartrain to the Mississippi River levee. There is a relatively high potential for recovering historic material in this segment, especially in the vicinity of the Mississippi River. However, due to the artificial canal immediately to the west of the levee, undisturbed cultural material should only be expected from that portion of the survey corridor east of the levee. Since the Lower Mississippi Valley has been the locus of settlement since the opening decades of the 18th century, the recovery of cultural material of almost three centuries date is a distinct possibility.

The known archaeological sites with historic components within the various segments are summarized on Table 2 (Chapter 3).

Discussion of Historic Issues

Much of the area to be surveyed is not situated in areas likely to yield historic materials, much less historic sites. Those areas that are presently characterized as undeveloped marshlands, were almost surely uninhabited marshlands in earlier historic times. With the exception of possible historic Indian remains, the oldest historic material to be expected would have to come from the vicinity of the Mississippi River, on or near the natural levee. On the Pontchartrain shoreline, "Spanish Fort" (16Or19) or Fort St. John in the earliest historic structure identifiable from historic 18th century and early 19th century maps. With the exception of the ephemeral "Dublin" community of the 1840s, the earliest known permanent settlements were the pier camps found in the 1920s from Bucktown to Little Woods. These camps, started in the late 19th century, are still popular today, even though their heyday is past.

Implications for the Off-Shore Investigations

In the case of prehistoric sites, it has been postulated that relict geomorphic forms may host remnants of prehistoric sites subsequently submerged. The historic data suggest that two classes of historic sites may be present in the off-shore borrow locations; remnants of historic structures (e.g. channel cuts) and sunken vessels. Each of these will be discussed in turn.

The historic background investigations indicate that from the founding of Spanish Fort, the south shore of Lake Pontchartrain has served a critical role in the development of New Orleans. By the mid-19th century, the triad formed by West End/New Canal, Spanish Fort/Bayou St. John/Carondelet Canal, and Milneburg, served as focal points in the transfer of merchandise to and from New Orleans. The importance of these locations to the continued economic growth of New Orleans is seen in several Corps of Engineers plans for the development of harbors of refuge, the abortive 1853-54 breakwater off of Milneburg, and the continued modification and improvement witnessed at the mouths of both New Canal and Bayou St. John.

As important as the canals and the wharves at Milneburg were to the transportation of goods and people, of equal concern, especially in the post-Civil War era of deeper draft vessels and the development of the north shore lumber industries, was easy, or more specifically relatively unencumbered, access through the "Middle Grounds." The Corps of Engineers entertained two pleas, the first authorized under the River and Harbor Act of 19 September 1890 (Report of the Chief of Engineers 1891) and the second under the River and Harbor Act of 25 June 1910 (Report of the Chief of Engineers 1917). The work authorized under the former was never instituted, following an unfavorable review of the design; however, the latter, following Channel A-B, was completed in 1917 (See Chapter Three). The channel apparently crosses the southeastern corner of the Howze Beach borrow locality, and it would be likely that indications of the chan-

nelization would be apparent on both the magnetometer and sub-bottom profile data.

With regard to the Jefferson Parish borrow location, there is no indication in the historic record that similar channelization was necessary to ensure safe passage of vessels. Secondly, there is only limited data to suggest that vessel traffic was common along the south shore of Lake Pontchartrain in proximity to the Jefferson Parish location. The 1849 Diagram Showing the Inundated District, Sauve's Crevasse (See Figure 11) contains the notation "Bayou St. Louis/Gallagher's to haul cypress," which, by implication, would indicate that vessels plied at least the upper portion of the Bayou, presumably moved along the shoreline probably in the direction of one of the three wharf complexes to the east. The 1873 Plan of Proposed Improvements for the Lake Shore Front of the City of New Orleans (on file Lake Pontchartrain Levee Board Map LD-801) resulted in the completion of only a small section of the proposed modifications. The single portion of the breakwater completed began about 2000 ft west of the New Basin Canal and terminated at the west end of the canal. Its location would place it just outside of the eastern boundary of the Jefferson Parish borrow location.

Direct documentation of sunken vessels within either of the borrow locations was not located during the background phase of the work. Historic documentation does however suggest that vessels did sink in the vicinity of the New Basin Canal, and that numerous vessels ran aground in the Howze Beach borrow location (See Chapter Three). The possibility must be entertained that evidence of vessel sinkings, either purposeful or unintentional, will be located in the Jefferson Beach borrow location. With regard to the Howze Beach location, it would seem from the historic data that the likelihood of vessels sunk in the area would be minimal, if for no other reason than the shallowness of the water. Obversely, it would not seem unlikely that cargo might have been off-loaded from stranded vessels in an effort to lighten loads. Either the cargos themselves (e.g. shell, though probably not timber, sand, or certain of the other perishables commonly transported) or cargo containers (if metal) might leave a signature.

CHAPTER FIVE

FIELD INVESTIGATIONS

Since the current study included several components to the field investigations, each component is discussed separately beginning with the terrestrial portion of the work.

TERRESTRIAL STUDY

Survey

Procedures

The survey adhered to a general standard for fieldwork, being accomplished by archaeologists examining the area along transects separated by 15 m. Throughout the survey corridor, the surface was inspected in those areas where it was not obscured by vegetation. Where the surface was obscured, as was the case with most of the construction right-of-way, shovel pits were excavated at 15 m intervals. Whenever possible, shovel pits were excavated to a depth of 40 cm below the surface and covered an area of roughly 40 cm by 40 cm. The stratigraphy revealed by these shovel tests was examined at regular intervals, and representative profiles of the strata were compiled whenever marked stratigraphic change was encountered or where strata changes might have signaled the need for profiling. Profiles were all recorded using standard soils terminology and Munsell color designations.

Screening the backdirt from shovel pits did not prove efficacious, due to the wet and clayey nature of most of the soil within the project area. Instead, the soil was carefully trowelled or shovel chopped as a means for artifact recovery. This technique worked quite well. Hand augering with an Oakfield auger was conducted at irregular intervals along the survey corridor in those areas suspected of containing buried surfaces associated with significant cultural deposits.

As a supplement to our description of the survey techniques, we feel it important to document at this point the precise manner in which each of the survey segments was inspected. As was mentioned earlier, the survey corridor width varied along the length of the construction right-of-way. In order to have a clear understanding of the methods employed and the thoroughness of the coverage, we have detailed variations by discussing each segment separately below. The segments are listed in counterclockwise order as they are discussed in both the scope-of-work and the proposal.

Segment A-1: (Pumping Station to exit from GIWW) 2.5 mi x 500 ft centered on the levee crown.

The survey corridor was reduced to about 300 ft (or about 90 m) with the subtraction of the levee itself and part of the canal located between the levee and the GIWW. One person walked the GIWW side of the levee, while the remaining three crew members traversed the opposite side.

This area has been completely stripped of vegetation (Figure 18) and is the scene of extensive construction and sludge pumping operations. Surface inspection was conducted in this segment wherever standing water and liquified mud were not impediments to the survey.

Segment A-2: (GIWW to US 90) 3.2 mi x 250 ft, centered on levee crown.

Since the levee occupies approximately 100 ft of the total width, the crew was left to physically survey 150 ft, or 60 m. Thus, two crew members were positioned on either side of the levee to provide adequate coverage.

This segment of the survey corridor is covered with secondary growth and early forest, clearly requiring shovel pitting.

Segment A-3: (US 90 to South Point) 5.3 mi x 200 ft, centered on the levee crown.

Without the levee, there are only 100 ft (30 m) remaining to be surveyed, or about 15 m on each side of the levee. This portion was surveyed with one person placed on each side.

FIGURE 18. SEGMENT A-1 SHOWING AREAS EXPOSED BY CONSTRUCTION

FIGURE 19. SEGMENT B AFTER DISKING - VICINITY OF KNOWN SITE 16OR28.

The vegetation in this portion is less woody, especially on the east side of the levee. Still, secondary growth is thick, and the surface could not be discerned. Shovel pitting was required.

Segment B: (New Orleans East Lakefront Levee, or South Point to Paris Road) 6.2 mi x about 400 ft, or from the lake edge to 275 ft inland from the levee crown.

The railroad embankment, levee and the Little Woods Canal occupy at least 175 ft, so that the total width of the corridor is about 200 - 225 ft. Since the greatest portion of the corridor to be surveyed was on the inland side of the levee, three crew members were deployed there to provide adequate coverage. The remaining crew member walked along the lake shore. In those portions of the shoreline that were too wide to be covered by a single person, subsequent trips were made by the entire crew to inspect more adequately for cultural resources.

The inland portion of the survey corridor was marked by secondary growth and shovel pitting was necessitated. It was only after the completion of this segment of the survey that city employees bulldozed the vegetation and disked the area preparatory to seeding this side of the levee for grass (Figure 19). On the other side of the levee, the shore for most of this segment has eroded to the reinforced toe of the railroad embankment. In these eroded areas only a cursory inspection of the shoreline was effected. Otherwise, natural shorelines were inspected, and shovel pits were placed in the wooded areas between the shore and the railroad embankment toe.

This segment also contained standing structures which were recorded and photographed as an augment to the pedestrian survey.

Segment C: (Citrus Lakefront Levee, or Paris Road to the New Orleans Lakefront Airport) 6.1 mi x 50 ft, or the lake edge to lakeside toe of railroad embankment.

The natural shoreline was inspected for cultural remains. As an ancillary portion to this part of the survey, standing structure forms were also completed for those constructions situated within 120 ft of the railroad embankment toe. Such structures included pier camps (Figures 20 and 21) as well as the ruined constructions found at the now abandoned Lincoln Beach.

Segment D: (Jefferson Lakefront Levee, or 17th Street Canal to the parish line) 9.5 mi x 300 ft, or lake edge to lakeside levee toe.

Although on paper there are about 300 ft (90 m) to be surveyed in this segment, in reality the total is very much reduced. Linear park now occupies almost the entire length of this segment and its constructions have impacted most of the area between the levee and the lake shore. With a few exceptions, the lake shore itself has been

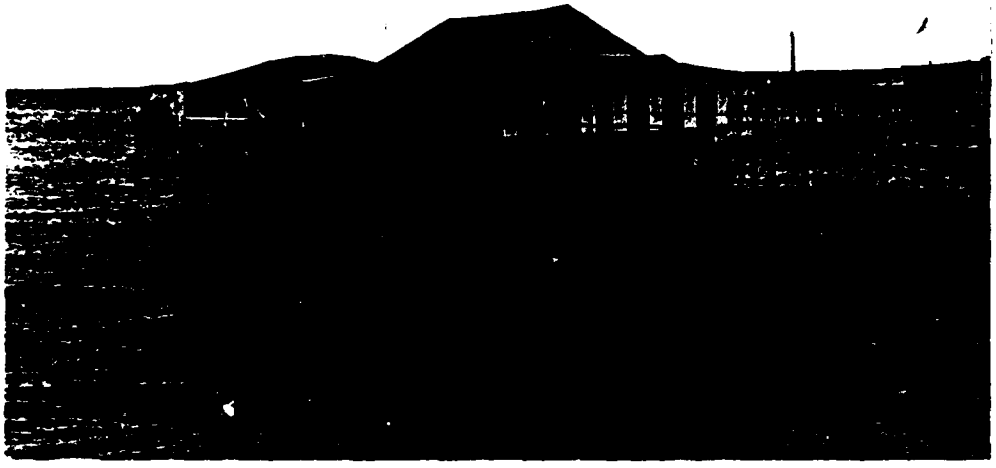

FIGURE 20. STRUCTURE C-22, PIER CAMP.

FIGURE 21. STRUCTURE C-2, "TWO BEE'S" PIER CAMP.

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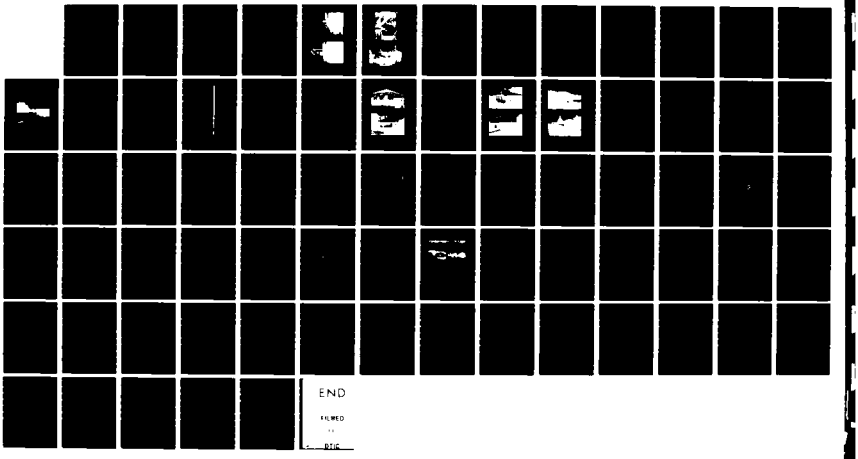

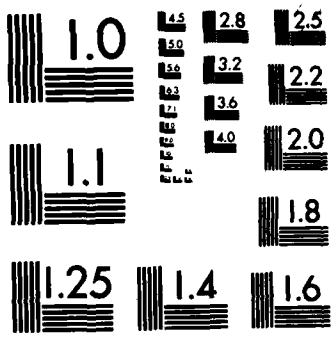

macadamized to hinder beach erosion. On the first level terracing up from the lake, another paved stretch has been devoted to a pedestrian and bike way. This segment was surveyed with two people: one along the shoreline and the other in and among the rocks for suitable places to subsurface test.

Segment E: (Jefferson/St. Charles Parish Return Levee, or from Lake Pontchartrain to the Mississippi River artificial levee) 5.1 mi x 150 ft, centered on the levee crown.

Minus the width of the levee, this survey corridor is actually about 75 ft (22 m) wide. This leaves about 11 m to be surveyed on each side of the levee. This segment was then examined by surveyors walking one to a side.

The St. Charles Parish side of the levee was heavily vegetated with secondary growth. The Jefferson Parish side was grassy. Neither side offered surface visibility and, thus, shovel pits were required.

Results

Using those survey techniques outlined above, a total of five cultural occurrences were located. Two of these occurrences were isolated finds, and the remaining three are previously recorded sites located along the shoreline of Lake Pontchartrain: 160r12, 160r28, and 16Je4. Although these sites and isolated finds will be discussed in greater detail below, they have been placed into general groupings on the basis of artifact assemblages.

Prehistoric	Isolated Find 2 160r12 160r28 16Je4
Historic	Isolated Find 1 16Je4

In our research design, we had detailed six previously recorded sites that appeared to lie within or near the survey corridor: 160r12, 160r15, 160r24, 160r28, 16Je4, and 16Je40. Of these six, we noted that the available information suggested that 160r15, 160r24, and 16Je4 might now be destroyed and that 16Je40 might not even be a site. Our results compare favorably with the predictions. 160r12 and 160r28 were relocated and evidence of 16Je4 was found. There was no evidence of the other sites in or near their reported locations along the sur-

vey corridor so we feel confident that they are either misplotted or they have, as we suggested, been obliterated.

The isolated finds (Figure 22) were thoroughly inspected for any additional cultural manifestations, but none were found. At Isolated Find 1 we recovered 10 pieces of wire without further cultural association. At Isolated Find 2, a single piece of burned clay was recovered.

Since only three sites were encountered, it was these three that were scheduled for testing. The procedures for testing and the results of the testing are summarized below.

Site Testing

Procedures

In our proposal, we had planned a testing program that included a minimum of two 2 m x 2 m test pits to be placed at sites "where standard excavation is appropriate." Backhoe excavations were also considered as an alternative to locate buried deposits.

Unfortunately, the environmental setting and the impact of recent construction (in the case of 16Je4) made it infeasible to conduct any of the recommended testing procedures on the three sites proposed for testing (see site settings presented below). As an alternative, it was decided, after consultation between Dr. Prentice M. Thomas and the COE, that the three sites would be tested with an alternative approach which would be able to provide stratigraphic information to a depth of between 1.5 m and 2 m.

Toward this end, a hand-driven bailing device and casting tube was used at each of the sites. Most of the bailer holes were made with a small bore bailer, 1.75 inches in diameter. A larger-sized bailer (2.5 inches in diameter) was also used to make sure that bailer size did not in some way affect the results of the subsurface testing. One archaeologist can easily conduct these tests, drawing samples at specified locations (Figures 23-26). The precise interval for testing at each site was determined on the basis of artifactual material and site configuration.

At 160r12, tests were made along transects perpendicular to the shoreline and spaced at 50 m intervals. These transects enabled us to test both the marsh and the adjacent portion of Lake Pontchartrain. It had originally been decided to test with the bailer every 15 m along each transect; however, this interval between testing was later increased to transects spaced 100 m apart, with bailer borings taken every 25 m. This regime was augmented with bailer testings placed judgementally along the intervening transects.

At 160r28, the transects along which bailer borings were placed were determined judgementally, due to the interference to the testing

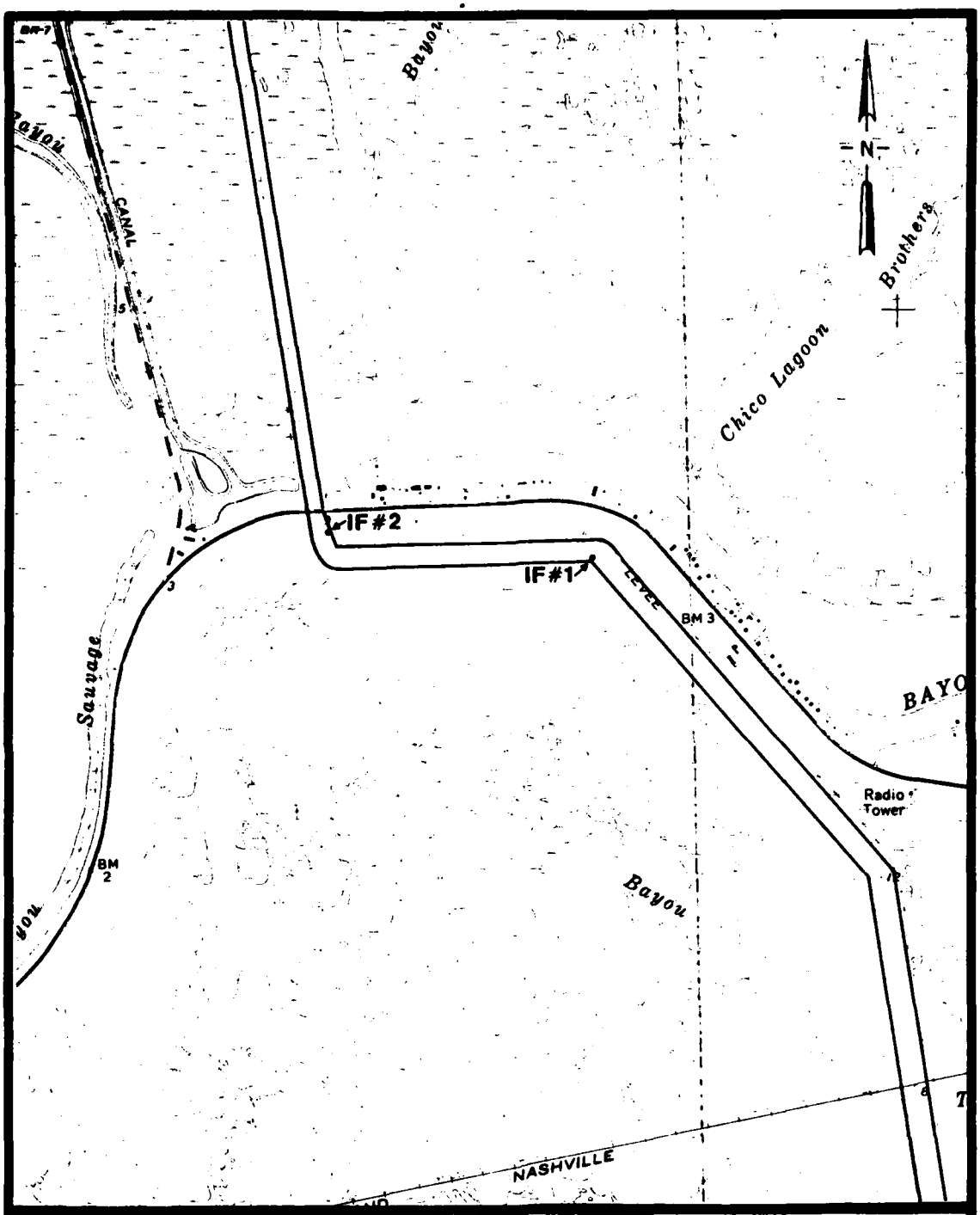

FIGURE 22. LOCATION OF LPVHP ISOLATED FINDS 1 AND 2 (Chef Menteur 7.5 minute USGS quadrangle map).

FIGURE 23. INITIAL STEP IN TESTING PROCEDURE WITH BAILER AND CASTING TUBE.

FIGURE 24. SINKING THE BAILER.

FIGURE 25. REMOVING THE SOIL SAMPLE.

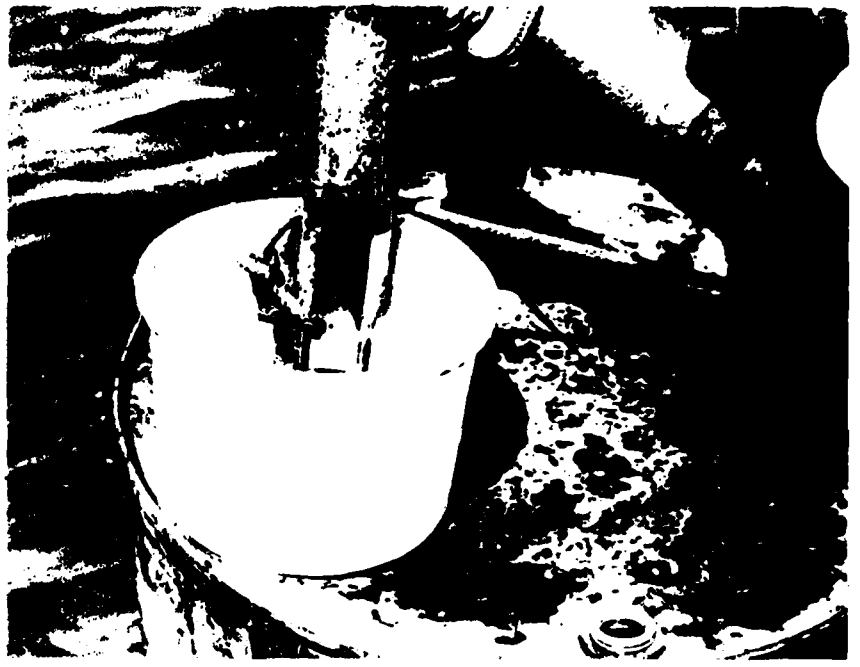

FIGURE 26. VIEW OF EQUIPMENT AFTER REMOVAL OF THE SOIL SAMPLE.

posed by extant and ruined pier camps. An effort was made to place bailer transects at each of the sherd "concentrations" located along the beach. Extra shovel pits, attaining a depth of 40 cm to 50 cm were also sunk in the interior portions of the site that could not be tested adequately with a bailer.

At 16Je4, only off-shore testing was possible due to the high level of disturbance found along the shore. Two transects were run at this site; a total of four bailer holes was sunk.

Results

Although depths of between 1.5 m and 2 m were attained at all three sites by using the bailer to test for possibly significant subsurface remains, no culturally significant material, or even strata indicative of culturally significant deposits were encountered. There was no evidence of in situ materials or midden strata; also, no indications of features or even suspicious stratification were found.

It is clear that the sites, particularly 160r12 which yielded a large artifact sample, might once have been highly worthy of National Register nomination; they are not at present. Still, some information can be obtained from their study based on the results of this work. Brief summaries of these sites appear below.

160r12: This site was a previously recorded extensive sherd scattering along a natural beach of Lake Pontchartrain just southwest of South Point (Figures 27 and 28). A total of 231 ceramics were recovered from the site (Table 3). The artifact distribution was found to extend about 650 m along the length of the beach. The beach itself was lined with Rangia shells, with many shells and sherds pushed by tide and waves up onto the marsh grass that is found immediately behind the beach. The marsh and tidal flats located behind the beach, have a width of about 100 m or the distance between the beach and the railroad embankment toe.

This site has been documented by McIntire (1958) and Gagliano and Saucier (1957). No information that exists on the site has assigned a chronological date to its occupations. Our data clarify the chronological position somewhat, but not as much as hoped because of the heavily eroded condition of most of the ceramics. Of the total ceramic collection from the survey, the majority were body sherds characterized by clay temper with minor sand inclusions. This paste type could date anywhere from the Baytown period onward (Phillips 1970). Minor variations in paste included three sherds with shell inclusions, a strong Mississippian trait. Also, three sherds exhibited a convoluted clay paste reminiscent of Tchefuncte types.

The artifact collection also included 14 pieces of bone, a projectile point, three pieces of burned clay, one whole shell (Noetia sp.), three pieces of metal, one piece of historic whiteware, and one green bottle fragment. The projectile point closely resembles a Carrollton

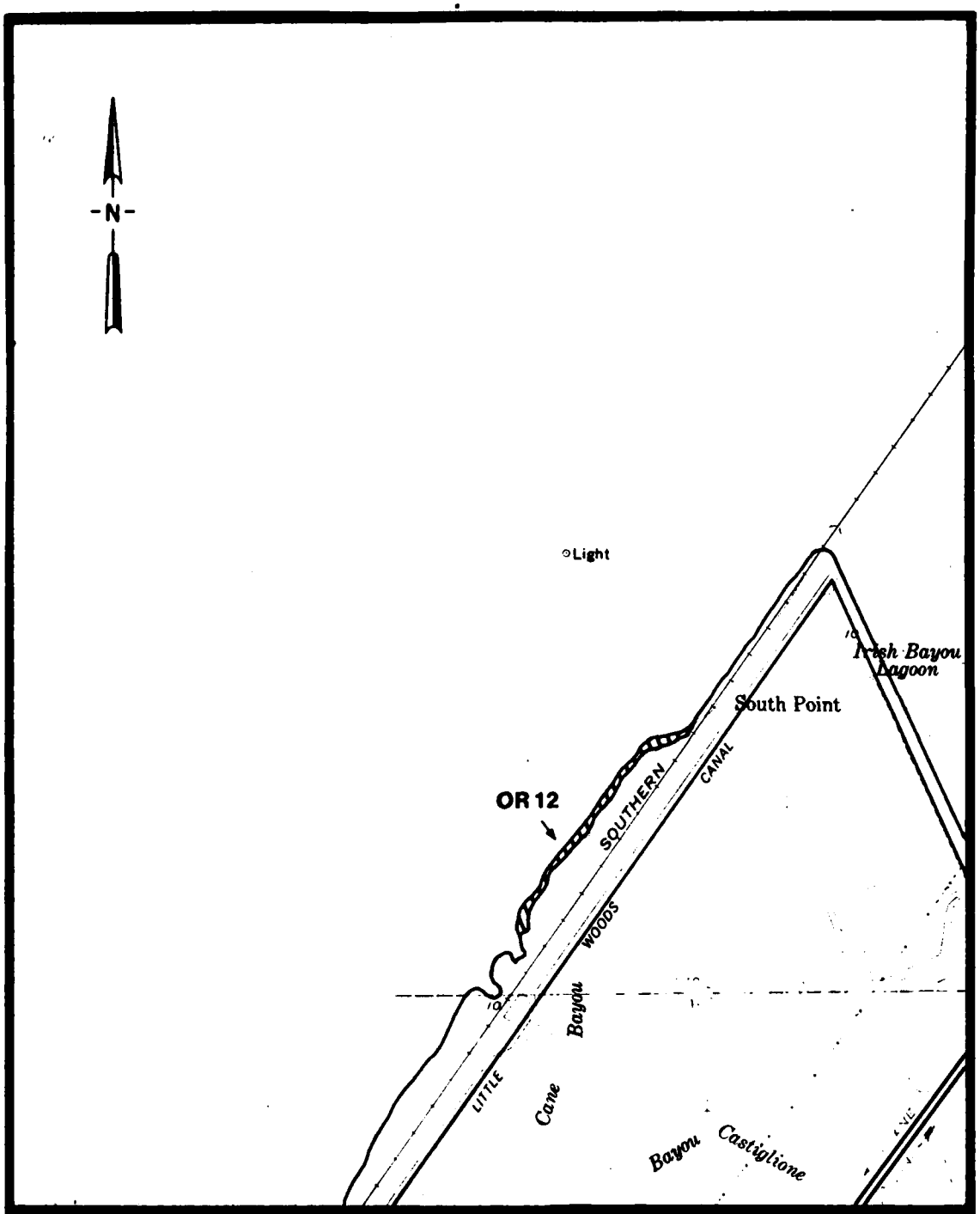

FIGURE 27. LOCATION OF 16OR12 (South Point 7.5 minute USGS quadrangle map).

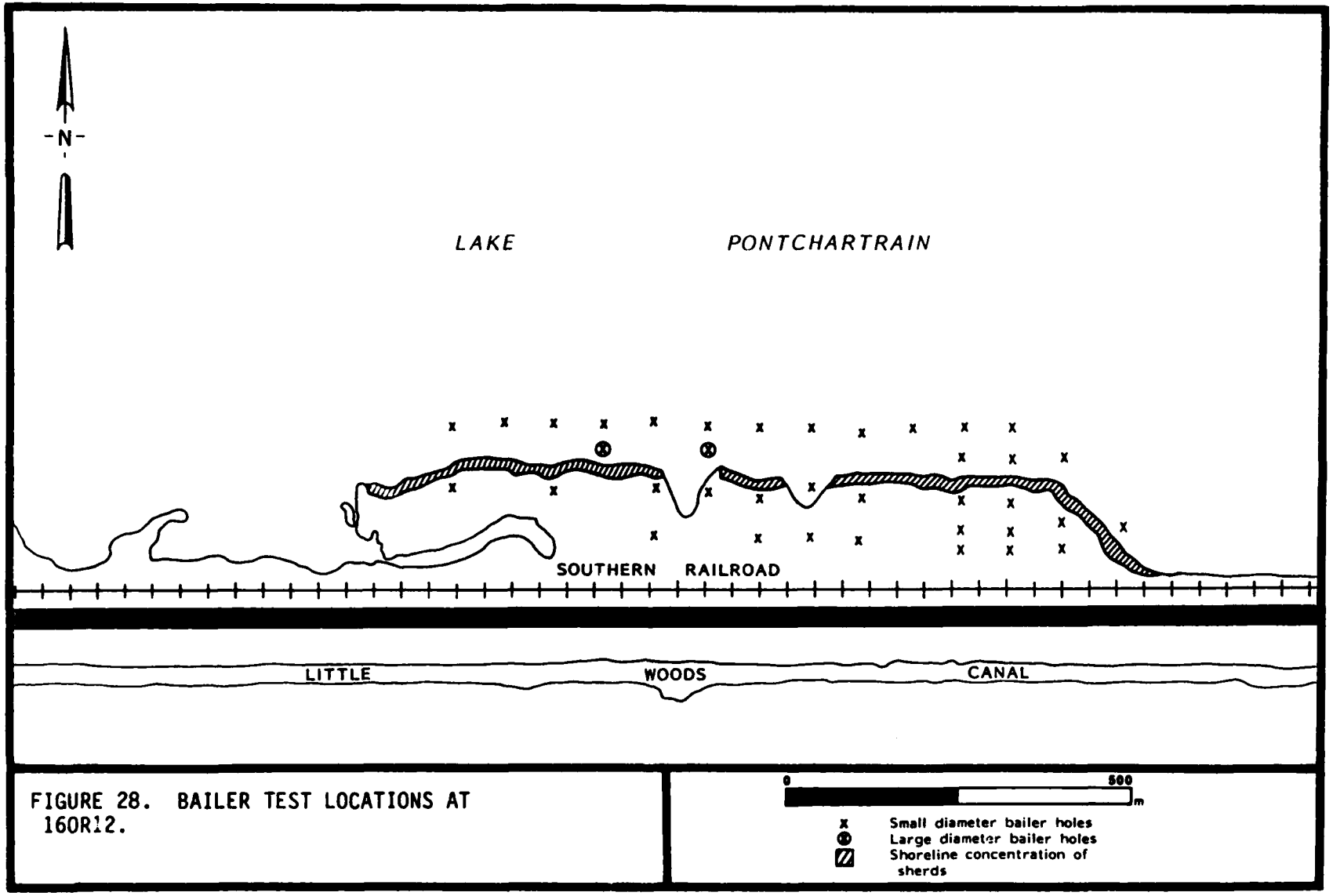

FIGURE 28. BAILER TEST LOCATIONS AT 16OR12.

TABLE 3. LPVHP PROJECT SITE AND ISOLATED FIND ARTIFACT SUMMARIES

TYPES	PROVENIENCE														
	160r12					160r28						16Je4			
	East Surface	West Surface	Extreme West Surf.	General Surface	Subtotal	Concentrations A	B	C	D	E	Subtotal	General Surface	Isolated Find #1	Isolated Find #2	TOTAL
Ceramics															
Plain Body															
Clay w/ minor sand	21	82	7	72	182	3	4	8	6	10	31	6			219
Clay		2		1	3										3
Clay w/ convoluted paste				3	3										3
Sand		1	1	2	4										4
Shell		1			1										1
Plain Base															
Clay w/ minor sand				1	1										1
w/ tetrapods				2	2										2
Plain Rim															
Clay w/ minor sand		9	2	4	15							1			16
Sand				1	1										1
Shell				1	1										1
Decorated Body															
Clay w/ minor sand															
Incised		2			2										2
Punctated		1		1	2										2
Check stamped				1	1										1
Decorated Rim															
Clay w/ minor sand															
incised ext. line	1	3	4	1	9				1		1				10
punctate(top)		1			1										1
node w/ body punctation				1	1										1
Shell															
incised ext. line		1		1	2										2

TABLE 3. LPVHP PROJECT SITE AND ISOLATED FIND ARTIFACT SUMMARIES
(continued)

	PROVENIENCE														
			160r12			160r28						16Je4			
	East Surface	West Surface	Extreme West Surf.	General Surface	Subtotal	Concentrations A	B	C	D	E	Subtotal	General Surface	Isolated Find #1	Isolated Find #2	TOTAL
TYPES															
Chipped Stone															
Projectile Points									1		1				1
Gary Large															1
Carrollton-like				1	1										1
Flake, primary									1		1				1
Cobble, chert									1		1				
Burned Clay		2	1		3	2				1	3			1	7
Bone	3	2		9	14							1			15
Historic															
Metal															3
pieces	3				3								10		10
wire															
Ceramic, whiteware		1			1										1
Glass, green															1
bottle frag.				1	1										1
Gun Flint												1			
TOTAL					255						38	9	10	1	313

point, which is generally dated to the Archaic.

160r28: This site, documented by Gagliano and Saucier (1957), is located in and among the pier camps of Little Woods (Figures 29 and 30). It consists of widely scattered prehistoric sherds, the density of which is much lower than that of 160r12. The sherds are distributed along 1.4 km of the shore and were arbitrarily bunched into Concentrations A through E, due to occasional "thickenings" in the sherd density (Figure 31). The portion of the beach between the shore and the railroad embankment toe were intermittently marked by stands of live oak. These vicinities were both surface inspected and shovel tested for significant cultural resources. No such resources were indicated as a result of these examinations.

A total of 31 plain body sherds were recovered by the investigators (Table 3). They are characterized by the same paste and temper discussed for the majority of the sherds at 160r12. One rimsherd did bear an incision. A projectile point was also recovered from this site and looks similar to a Gary Large. Other artifacts included a single primary flake, one chert cobble, and three pieces of burned clay.

Again, the major component of this site appears to date somewhere between the Baytown period and the early Mississippian period; however, unlike 160r12, no shell tempered ceramics were found. The Gary Large is similar to specimens found by NWR in central Louisiana (Thomas et al. 1982; Thomas et al. 1980). These were associated with late Woodland components. Given the rather ubiquitous nature of Gary points, this single example does not constitute a strong diagnostic.

16Je4: This previously recorded site, located on the shore of Lake Pontchartrain between the 17th Street Canal and the Lake Pontchartrain Causeway (Figures 32 and 33), has suffered significant erosion since it was first recorded in 1952 by Saucier and Gagliano. In fact, the natural beach is completely gone, and the site is now indicated only by the limited number of artifacts that have washed up onto the sloped and asphalted "sea wall."

Only nine items were recovered from this site, seven of which were clay tempered (with minor sand) ceramics (Table 3). Also present was a single example of a gun flint and one fragment of unmodified bone.

While the gun flint would indicate at least a post-contact component at the site, little else can be said about the possible occupations. The survey and testing indicated that the site has been virtually destroyed by both natural and man-related factors.

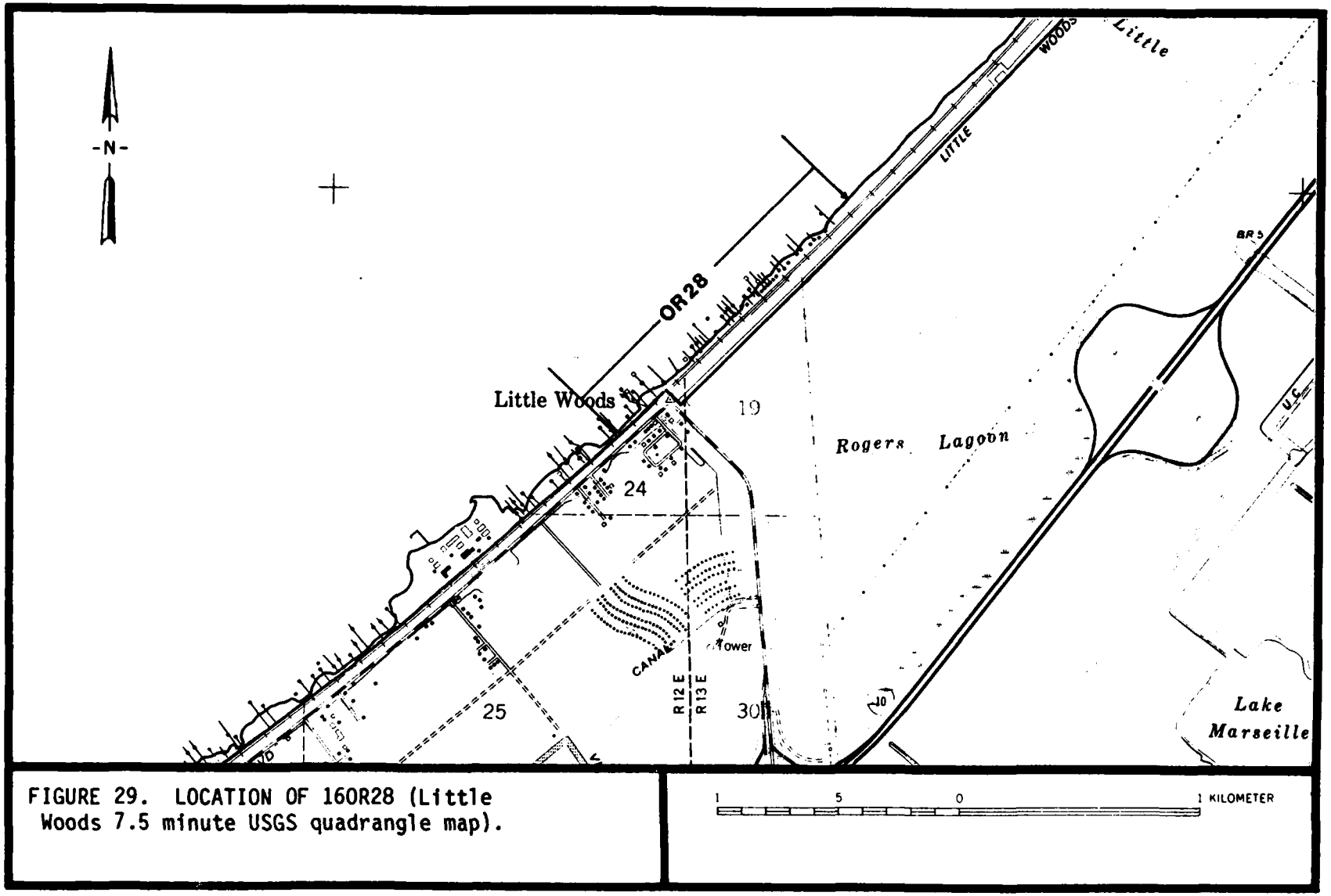

FIGURE 29. LOCATION OF 16OR28 (Little Woods 7.5 minute USGS quadrangle map).

FIGURE 30. VIEW OF 16OR28 SITE AREA, LOOKING WEST

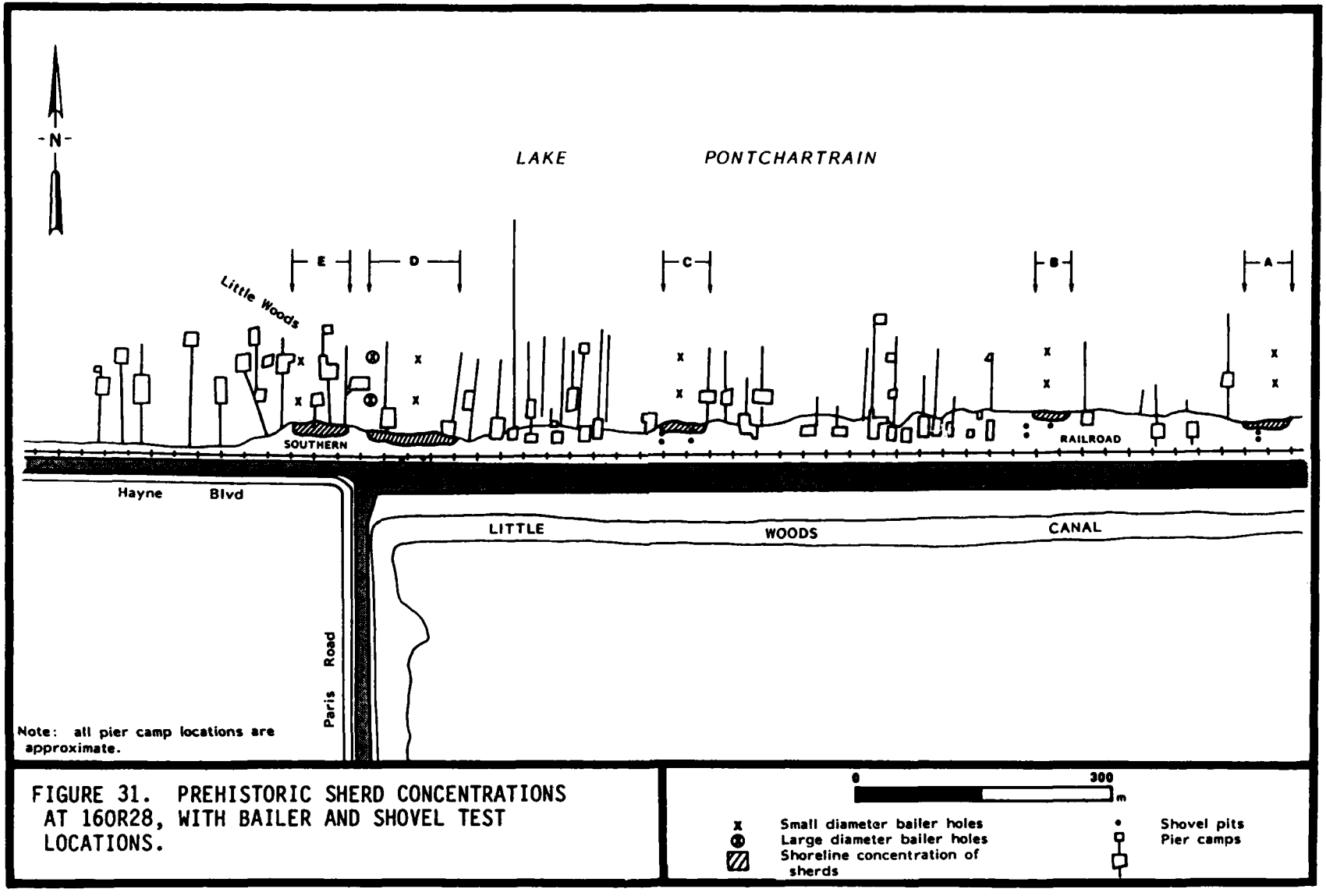

FIGURE 31. PREHISTORIC SHERD CONCENTRATIONS AT 16OR28, WITH BAILER AND SHOVEL TEST LOCATIONS.

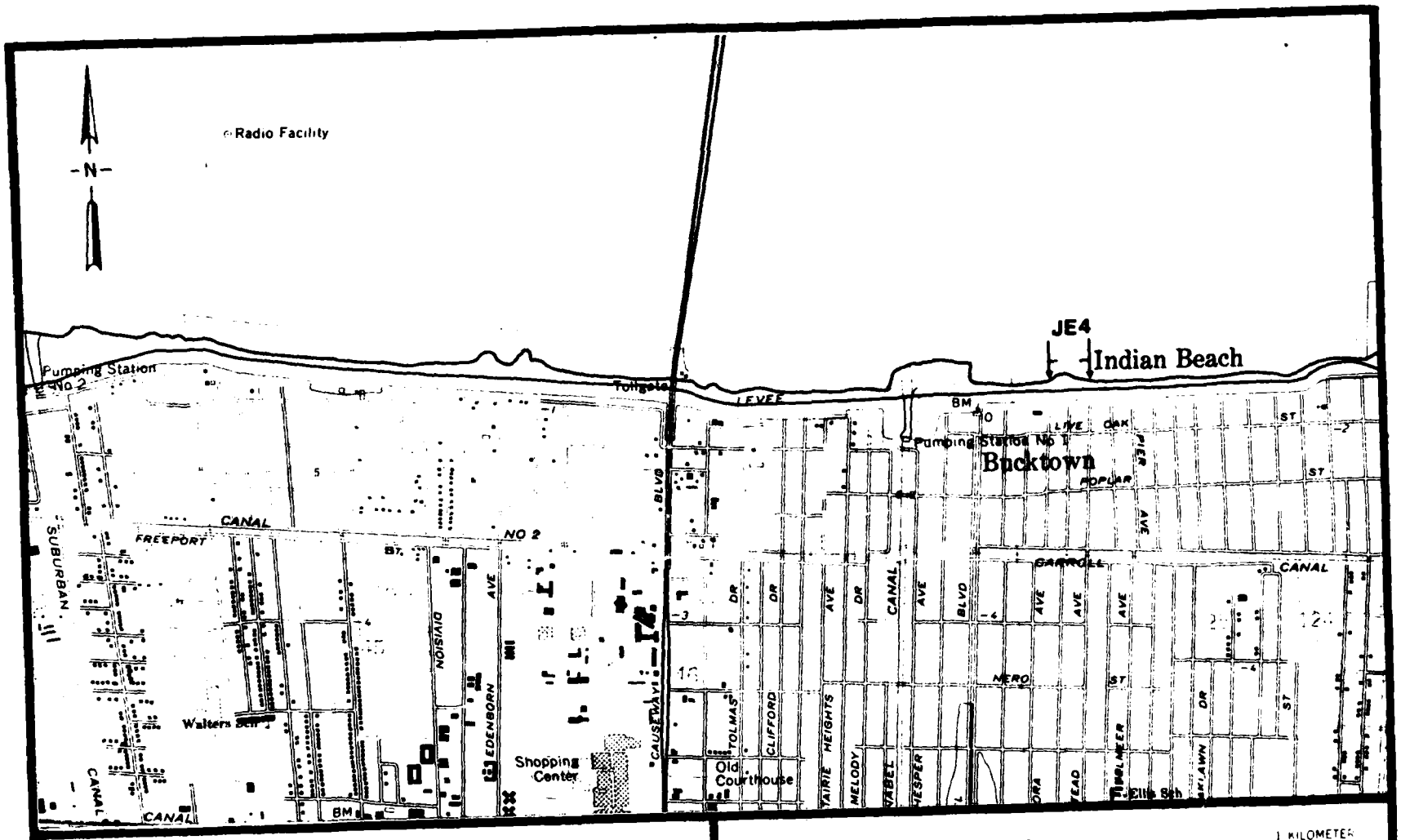

FIGURE 32. LOCATION OF 16JE4 (Indian Beach 7.5 minute USGS quadrangle map).

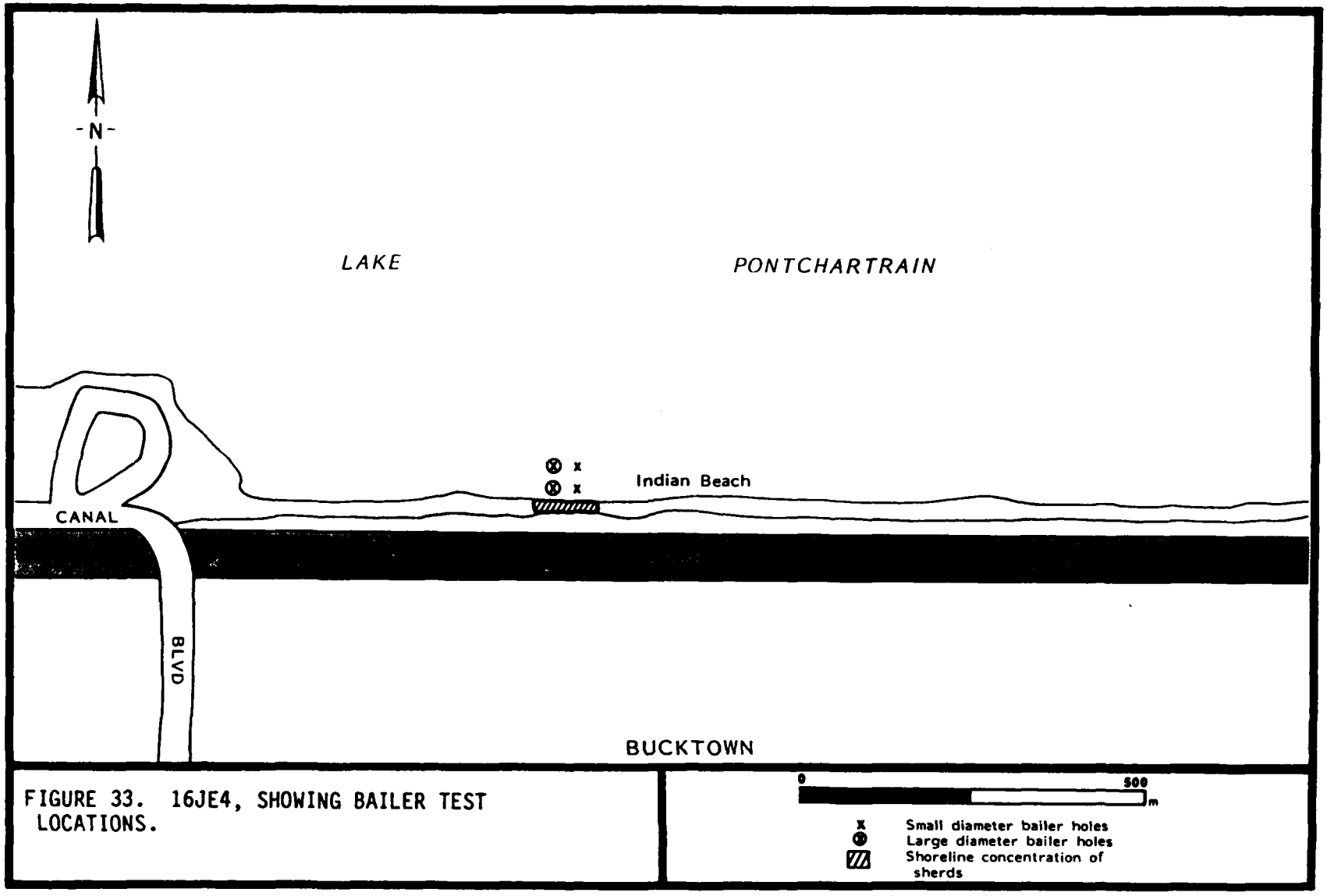

FIGURE 33. 16JE4, SHOWING BAILER TEST LOCATIONS.

Architectural Survey

Procedures

The architectural survey was conducted in two parts. The archaeological survey crew documented and photographed all standing structures (N=56) within the corridor. Each structure was subsequently inspected by Robert Smith, our subcontractor for architectural evaluations. His evaluation included field visits to each of the structures, augmented by a review of the photographs and standing structure forms.

Results

The standing structures covered by this project were located in either one of two contiguous area identified in this report. The first, Segment B, is located along the south shore of Lake Pontchartrain between South Point and Paris Road. The second, Segment C , is found along the shore between Paris Road and the New Orleans Lakefron Airport. In Section B, all structures locasted within or partially within the area between the shoreline and the Southern Railroad, were examined for architecural significance. The only standiong structures within this area were located in the Little Woods community, a compact linear string of camps and dwellings stretching along the shore from Paris Road to about one kilometer northeast. In Section C, the structures are more thinly scattered the entire distance between Paris Road and the Lakefront Airport. Here, only those structures located wholly or partially within 120 ft of the lakeshore railroad embankment toe were inspected in the course of this project.

There are at present about 40 pier camps and other structures in Little Woods, and about 105 along side Haynes Boulevard (Covering the same area as Segment C; Kent 1981:8). In the course of this project, a total of 56 standing structures, or 38.6 percent, were examined.

In addition to the pier camps and other structures found in Segments B and C, and "architectural" and scenic evaluation was also made of a small curio park, located in Section D of the terrestrial survey. This park, located on the shore of Lake Pontchartrain not far from state site 16Je4, was put together by an interested private citizen.

The primary goal of the standing stucture survey was to evaluate constructions located within the project area for eligibility to the National Register of Historic Places. In order to properly evaluate the historic properties within the project area, the criteria and guidelines established for eligibility must be reiterated and examined:

1. A property's National Register significance must be established in one or more of the following areas: history,

architecture, archaeology, and culture.

2. A significant property can be a: district, site, building, structure, or object.
3. A significant property must possess integrity of location, design, setting, materials, workmanship, feeling, and association. It must also meet one or more of the following conditions:
   A. A significant property must be associated with events that have made a significant contribution to the pattern of our national history, or associated with the lives of persons important to our past.
   B. A significant property must possess distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
   C. A significant property must yield or be likely to yield information important in prehistory or history.
4. In most instances, cemeteries, birthplaces, or graves of historic figures, properties owned by religious institutions, structures that have been removed from their original locations, reconstructed historic buildings, commemorative properties, and properties that have achieved significance within the past 50 years, are not considered eligible for the National Register. Exceptions to this guideline are permissable only in the following instances:
   A. If a religious property derives its significance from architectural or artistic or historical distinction.
   B. If a transplanted structure is significant primarily for architectural value or is the most important structure associated with an historic person or event.
   C. If a birthplace or grave of an historic person is the only remaining site or construction associated with his life.
   D. If a cemetery is made significant by the graves of important persons, by the cemetery's own age, distinctive design features, or association with historic events.

In order to address adequately the National Register significance of the standing structures located within the project area, the pier camps and other dwellings along the south shore of Lake Pontchartrain will be discussed as two groups, Segments B and C. This division is justified by the different types of communities found in each section. In Segment B, which roughly corresponds to Little Woods, a series of pier camps is augmented by other, much more stable constructions that undoubtedly serve as permanent or semi-permanent dwellings (e.g. Structures B-2 and B-4; Figures 34 and 35). These more permanent constructions are possible because they are secured on a relatively wide stretch of land between the railroad and the lake in this portion of Segment B. Alternatively, Segment C has very little land between

FIGURE 34. STRUCTURE B-2.

FIGURE 35. STRUCTURE B-4.

the railroad and the lake, and as a result contains only pier camps. The only exception to his statement is the artificially built-up area around Lincoln Beach.

Segment B

Most of the remaining structures located in Little Woods are temporary constructions built in the bungalow style common to the late 1940s and 1950s. This date is corroborated by an examination of the building materials, all of which were common to that time period: tar paper, asphalt shingles. With one exception, none of the constructions appear to be 50 years or more years old. None in any way merits inclusion into the National Register.

The only structure in Segment B that is at least a half-century old is a beach cottage referred to as "Seven Sisters" (Figures 36 and 37). This particular property appears to have been, at one time, a two bay single frame shotgun, which apparently prior to the obvious alterations, had a gallery with turned wood balusters and ornamental wood trim. This is typical of structures in the Faubourg Marigny district and the Vieux-Carre area of New Orleans. This would be a late Victorian structure, possibly dating to the late 1880s.

Segment C

With possibly the exception of C-18, none of the shoreline constructions along Hayne Boulevard is either a permanent dwelling or 50 years of age. As was the case in Segment B, most of the standing structures are pier camps located on pilings over water, and fit the bungalow style popular in the decade after the second World War. Most of the constructions are in very poor repair, and a great many are presently abandoned. The numerous abandoned pilings found between existing structures indicates that there were at one point a great many more pier camps along Hayne Boulevard than are currently standing.

C-18 (Figures 38 and 39) is located on one of the rare tongues of land jutting into the lake from the railroad embankment. It is presently inhabited and is at least semi-permanently occupied. It is also possibly older than 50 years. It is not, however, in any way unique in either setting or historical association.

Lincoln Beach is an artificially extended area that was created as a segregated black beach on the 1950s. Its demise came with the advent of integration in the 1960s. Now largely abandoned, the development is marked by the remnants of pools, bathhouses, and large pavilions (C-8 - C-11).

Summation

It is our opinion that none of the standing structures located in either Segment B or C qualifies or will ever qualify for the National

FIGURE 36. VIEW OF "SEVEN SISTERS," FROM THE SOUTHWEST.

FIGURE 37. VIEW OF "SEVEN SISTERS," FROM THE SOUTHEAST.

FIGURE 38. VIEW OF C-18, FROM THE EAST.

FIGURE 39. VIEW OF C-18, FROM THE SOUTH.

Register of Historic Places, as the criteria for the National Register eligibility is presently outlined. We also feel that "Walter's Park," an unofficial arrangement of driftwood and flotsam collected from Lake Pontchartrain and located in Segment D of the terrestrial survey does not meet the criteria established for National Register eligibility. This should not imply, however, that these constructions should be dismissed out of hand, or recklessly destroyed. The pier camps on Lake Pontchartrain are all that remain of a way of life unique to New Orleans in the days when long distance transportation was not cheap and recreation had to be taken close to home.

OFF-SHORE INVESTIGATIONS

Introduction

The use of remote sensing instrumentation to locate unknown cultural features has many aspects. Aerial photography and infra-red video-scan have been utilized successfully to locate and identify terrestrial cultural features for a number of years (Lyons and Mathien 1980). Terrestrial investigations have also been cited for occasional use of magnetometers or, in a more limited level, resistivity hardware. However, the use of seismic and magnetic instruments to locate cultural features in a nautical setting is a relatively new field.

Unrelated to the management of cultural resources, off-shore seismic and magnetic surveys have been conducted by the oil and gas industry for some time in order to locate drilling hazards. Most of these searches take place offshore over the inundated continental shelf in water depths over 30 ft. Similar use of these types of remote sensing gear have been made in conjunction with engineering plans. In this regard, the surveys are designed to identify hazardous obstacles prior to construction.

It has only been within the last decade that the off-shore use of remote sensing has emerged as a component of cultural resources management (Lenihan 1977; Arnold 1978; Pearson et al. 1981; Cockrell 1975 personal communication). The obvious goal of this work is to provide a cost-effective means of assessing resource probability in areas scheduled for impact, but unsuited to traditional terrestrial archaeological techniques. The value of remote sensing is that some understanding of anomalies or clusters of anomalies that might represent cultural resources is obtained prior to a physical underwater examination. On the basis of the remote sensing results, a determination as to the need for further underwater investigation can be made.

This field of cultural resource management has focussed principally on investigations over open bodies of water such as the Gulf (Gagliano et al. 1976) or in large river systems (Watts 1976; Saltus 1977, 1982; GSRI 1975). Although the standard equipment remains generally the same for either setting, the interpretations of data may differ. For example, in off-shore areas, such as over the con-

tinental shelf, recorded anomalies may be in the 5-15 gamma range because of the scatter of shipwreck materials during storms or over long periods of time. Settling and rapid siltation in a river system may ensure better preservation of intact cultural remains. Therefore, in the latter situation, a recorded gamma value may be in excess of 20.

In a lake setting, scatter of materials is still a possibility, although rapid siltation can occur in an event such as the spill of the Bonnet Carre crevasse in Lake Pontchartrain. Still, the gamma ranges are more comparable to open water. However, surveys conducted in shallow lacustrine settings are very few in number. Some work at Isle Royale (Murphy 1982, personal communication) has been undertaken and there has been an effort to utilize the side-scan sonar in Lake Champlain (Klein 1980, personal communication). These were not, however, shallow water investigations. We know of no other cultural resource study utilizing a magnetometer and sub-bottom profiler, conducted in water as shallow as that of Lake Pontchartrain.

The nature of the proton precession magnetometer poses some data interpretation problems when used in extremely shallow water. The following discussion is a simplified explanation of how the proton magnetometer operates. The proton precession magnetometer measures the current magnetic field of the earth at which the sensor occupies at that moment. This is done by passing a charge of electricity through a conductor which causes protons to align themselves around the core of the sensor. As the protons are aligned around the sensor core, they generate a small electrical charge, which is proportional to the total intensity of the current magnetic field at that point in space and time. The result is a measurement of the magnetic field at that point.

An anomaly is a change in that field. The way the proton precession magnetometer works means that large scale anomalies in shallow water may represent smaller objects than would anomalies of the same scale recorded in, for example, 50 ft of water (Grant and West 1965). With the sensor close to the lake floor, scale problems arise with interpreting anomaly duration, or magnetic moment. The factor of distance affects the duration an object is recorded as an anomaly by the magnetometer. In order to solve this problem, the peak magnetic deflection was assumed to be the point at which the object is closest to the sensor.

Sensor attitude change can be a major problem in shallow water. Since the magnetic moment may be of long duration, and very intense, short-duration , intense anomalies may be either objects or attitude changes. Since vector addition or subtraction is cumulative, what may appear as an anomaly on the analogue record may also result from a change in the attitude, i.e. a change in vector direction, of the sensor while protons are precessing. The magnetometer would record this change as an anomaly.

Magnetometer Survey

Procedures

An Odom Sea Mag VIII, with a sensitivity of one gamma and read cycle of twice-a-second was used to locate ferruginous materials within the survey area at or near the lake floor. A stable background of 50,780 gammas at solar noon was recorded during the survey. This background is used to compute the intensity of the anomalies listed in Tables 4 through 10 (which follow by appropriate section). By using a common denominator, it is possible to compare mono- and di-pole anomalies directly. Background noise, due to residual magnetism in the lake sediments and to changes in the attitude of the magnetometer sensor in relationship to the magnetic poles, resulted in artificially recorded anomalies that fluctuated between $\pm$ two gammas to $\pm$ five gammas, primarily depending on the lake conditions.

Reference stations for horizontal control were established at known points, USGS benchmarks, and the coordinates for the beach marks converted from the Lambert grid system to the Universal Transverse Mercator (UTM) grid system. Ranges from the reference stations to each corner of the survey areas were calculated. These points were then located and buoys placed to mark the limits of the survey area. Unfortunately, due to the heavy boat traffic on the lake, the buoys did not remain where placed for more than a day or two. After replacing the buoys twice, the survey team was sufficiently familiar with the location of the survey area so as to be able to use deadreckoning procedures on landmarks when running the survey lanes. The landmarks included production platforms and airline radar towers, the latter at either end of the survey area (for discussion of the use of off-shore landmarks, see Arnold 1976).

Survey lanes were run at irregular intervals due to the absence of a computerized vessel track plotter. However, when survey lanes were discovered to be divergent, they were filled in with short lanes. Survey lanes were roughly east-west at the Jefferson Parish borrow area, and north-south at the Howze Beach borrow area.

Results

The magnetometer data acquired during this survey indicates the presence of a large number of ferric objects in the survey areas. Whether individual distortion (anomalies) in the ambient magnetic field are the result of cultural material or residual magnetism can not be heuristically determined with remote sensing gear. Recent sediments contain some ferric materials (Saucier 1963). As a residual magnetism is not routinely determined, and is generally of a very low intensity, often less than 0.5 gammas all anomalies noted in the magnetometer records are ascribed to non-geological phenomena.

The magnetic signature of a shipwreck is generally some large scale and many small scale anomalies recorded in a definable area, a

pattern as it were. Sometimes shipwrecks also result in an overall change in the ambient (current) field, i.e., a change in the background level of the magnetic field over an area. In the opinion of some researchers (William Spencer 1983, personal communication), single point anomalies are not indicative of a shipwreck, especially when survey lanes are as closely spaced as on the current survey.

There were 575 anomalies noted in the records of the Jefferson Parish borrow area. Of these, 484 were determined to be the result of sensor attitude changes, i.e. they were five gammas of less, and were all considered as background noises. There were 42 anomalies, ranging from 12 gammas to 100 gammas that were considered to be single, pinpoint anomalies and were not considered to represent a potential significant cultural source. The remaining 49 anomalies represent objects that apparently form clusters, and are deemed to be potential cultural resources.

There were 791 anomalies noted in the magnetometer records of the Howze Beach borrow area. Of these, 630 were determined to be the result of sensor attitude changes, as described above. There were 77 anomalies ranging from 8 gammas to 100 gammas, that were considered to be single, pinpoint sources, and are not considered to represent a potential significant cultural resource. The remaining 84 anomalies represent objects that apparently form clusters, and may represent a potential cultural resource.

Unless very accurate historic documentation is available, it is impossible to determine the cultural material that causes an anomaly. An educated guess may be hazarded, based on experience; however, until an object causing the anomaly is recovered, the guess can only remain that. In order to determine if the survey area contains any anomalies, or cluster of anomalies, that may represent a shipwreck or some other cultural property, the survey lines must be plotted (postplot) and then the anomalies plotted on the postplot. Intensity of the anomaly is represented by contour lines, much the same way as relief is indicated on a topographic map. The anomalies may then be evaluated as to their possible origin.

For example, shallow water shipwrecks are rarely represented by a single anomaly, as deep water wrecks may be (Watt 1976; Saltus 1982). This is due to the disturbance factor discussed above. In a situation where the objects are separated from the sensor by a considerable distance, the resulting record will show only those objects of sufficient magnetic mass to project a disturbance into the field read by the precessing protons. Obviously, small objects will not project sufficient disturbance of the field very far. On the other hand, in shallow water, the sensor is very close to the bottom, and will record disturbances in the field that were not physically available to it in a deeper water situation. For example, one ton of iron will induce an anomaly in the ambient field of one gamma at 100 ft. In shallow water, one pound of iron at 10 ft will induce an anomaly of 20 gammas.

Therefore, it is clusters or groupings of anomalies, both on a single survey line and across lines that may indicate potential shipwrecks in a survey area. Single anomalies, however long the duration or intensity of the disturbance, are not considered as potential shipwreck indicators in this report (duration is determined by how long the magnetometer sensor continues in the magnetic field distortion created by a ferris object).

Theoretical considerations aside, there must be some basis to render a viable decision on the cultural resource potential of the anomalies located. To consider all anomalies to be of equal cultural potential would render the results of the survey useless as a management tool.

The anomalies grouped as clusters in the following discussions are done so rather arbitrarily, particularly at Howze Beach. Unfortunately, there is not available any less subjective mechanism other than the experience of the marine survey archaeologist, to provide the basis for grouping anomalies as clusters.

The linear aspect of the Jefferson Parish borrow area (Area A) tends to separate clusters of anomalies, perhaps artificially since other anomalies may exist outside the survey area that would extend the areal extent of the clusters. Since this is a cultural resources management survey, however, only the anomalies located in the area to be affected need be considered. The Howze Beach borrow area (Area B) presents a more complicated interpretive problem. More area in all directions around each anomaly was surveyed, providing more anomaly data; therefore, the clusters tend not only to be larger, but also their boundaries are less starkly drawn. It is acknowledged that some anomalies not included in a cluster may represent objects that should be included in one or the other clusters. With anomalies, however, more remote from the "core" (that area where anomalies are more closely spaced or of greater amplitude) of a cluster, without firsthand knowledge derived from physically inspecting the cause of the anomaly in question, it is not possible, with confidence, to assign the anomaly to a particular cluster.

Jefferson Parish: Four clusters of anomalies located in the Jefferson Parish borrow area are singled out for discussion (Figure 40).

Cluster IA: This anomaly cluster consists of 12 anomalies (Nos. 1-2, 4, 6-9, 11-15) with an intensity above the ambient background of 15 gammas or more, and three anomalies (Nos. 3, 5, 10) with an intensity of above the ambient background of 5-14 gammas (Table 4). Anomalies smaller than five gammas are attributed to background noise, although they may actually represent a ferrous object. The duration of the single largest anomaly was 40 sec, with an intensity of +100 gammas. Distance of the sensor above the bottom was 1.82 m (6 ft).

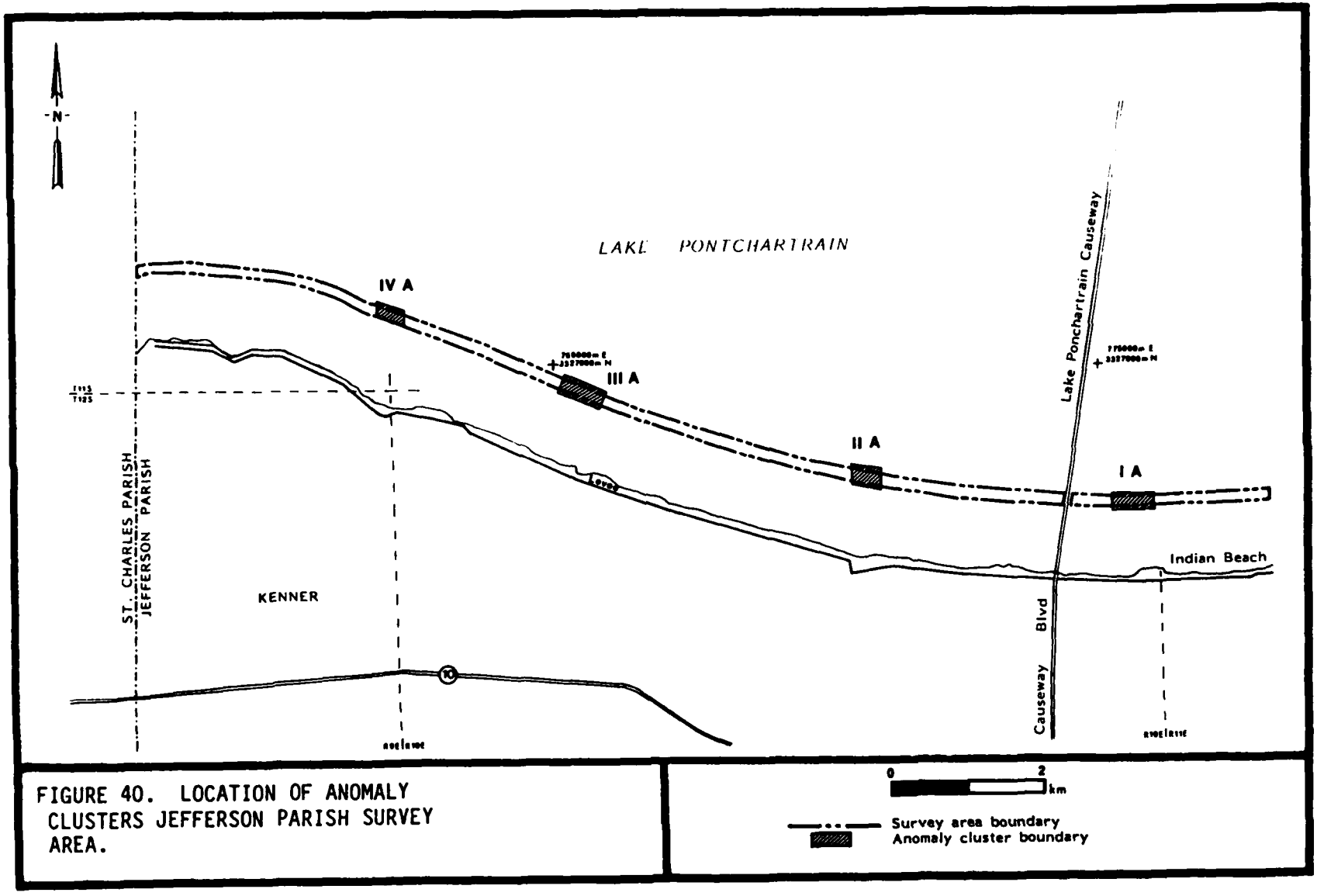

FIGURE 40. LOCATION OF ANOMALY CLUSTERS JEFFERSON PARISH SURVEY AREA.

TABLE 4. CLUSTER IA

Anomaly #	(Zone 15) UTM Coordinates Northing	Easting	Gamma Intensity	Anomaly Strength (in gammas)
1	3325168	775281	50880	+100
2	3325167	775425	50765	- 15
3	3325167	775285	50792	+ 12
4	3325267	775225	50797	+ 17
5	3325266	775205	50785	+ 5
6	3325268	775150	50851	+ 71
7	3325196	775241	50881	+100
8	3325197	775187	50799	+ 19
9	3325299	775252	50805	+ 25
10	3325297	775190	50786	+ 6
11	3325300	775323	50858	+ 78
12	3325229	775235	50880	+100
13	3325230	775255	50801	+ 21
14	3325229	775280	50840	+ 60
15	3325230	775296	50812	+ 32

This cluster of anomalies covers an area 154 m north-south by 173 m east-west (Figure 41), with a magnetic peak of 100 gammas in three places that represent the magnetic highs. The magnetic low is represented by a -15 gamma reading.

The anomalies apparently extend south of the survey area in a continuous belt to the reported location of a ferry, sunk sometime prior to 1947. According to informant information (Sidney Patrick, personal communication) the hulk was blown up prior to the original levee construction in 1949. While documentation on the levee construction was located (Times-Picayune August 1, 1949) no direct reference to the destruction of the ferry was found, though several sources document the ferries that plied the waters of Lake Pontchartrain beginning in the 1830s (Roberts 1946, Swanson 1975). These ferries were in continuous operation, except for the first two years of the Civil War, until the completion of the Lake Pontchartrain Causeway (Jefferson Parish Planning Commission 1966). They operated primarily between West End/New Basin Canal and Madisonville, and Milneburg and Mandeville. It is possible that anomaly Cluster IA represents material from the destroyed ferry located to the south of the cluster location. This cluster is also located less than 500 m from the causeway. Another possible origin is that the anomalies represent debris from causeway construction.

Cluster IIA: This cluster of anomalies yielded three short duration (6-9 seconds), high intensity anomalies (Nos. 1-3), and five longer duration (28-42 seconds), lower intensity anomalies (Nos. 1-8; Table 5). The three high intensity anomalies all left remarkably similar signatures on the analog recorder, and probably represent a pipeline from the pumping station directly south. (Parenthetically we note that Jefferson Parish officials indicate that this is most likely the case since they have several pipelines in the area.) The remaining five anomalies are attributed to discrete ferruginous objects. Subsequent review of sub-bottom data reveals a trench filled with unconsolidated sediments.

The anomaly cluster covers an area 154 m north-south, the north-south width of the survey area, and 254 m east-west (Figure 42). The trench noted in the sub-bottom data is approximately 250 m wide. The magnetic peak is +150 gammas, with a magnetic low of -10 gammas.

The three anomalies suspected to represent a pipeline cover a linear distance of 86.14 m north of the south boundary and a magnetic width of 32 seconds duration. Subsequent north-south survey lines over this cluster confirmed that the three anomalies (Nos. 1-3) are indeed one continuous anomaly and do probably represent a pipeline.

Cluster IIIA: This cluster is composed to two distinct types of anomaly signatures (Table 6). Similar to Cluster IIA, there are four short duration, high intensity anomalies (Nos. 1-4) with signatures similar to each other and to the short duration, high intensity anomalies in Cluster IIA which are attributed to the pipeline. These

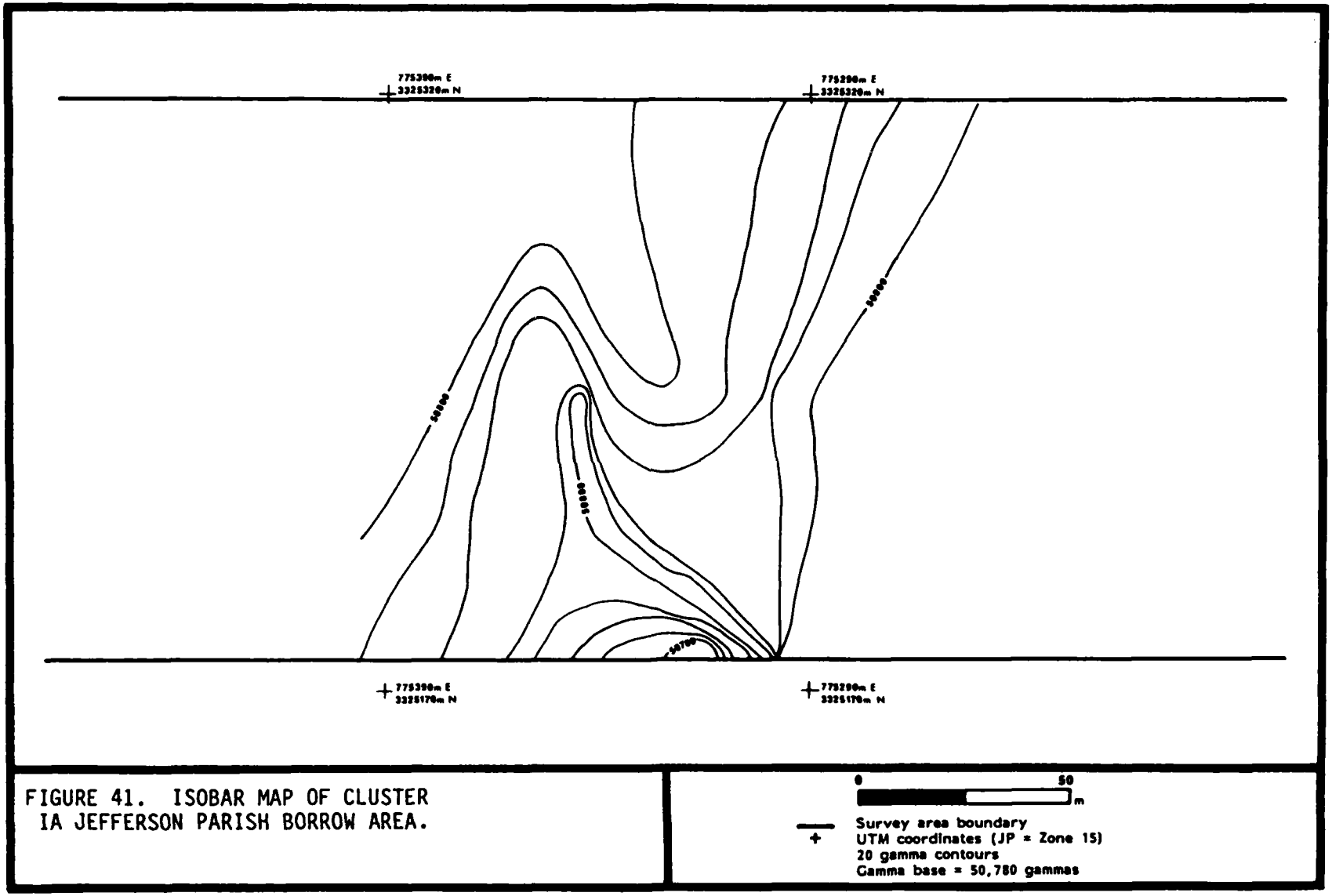

FIGURE 41. ISOBAR MAP OF CLUSTER IA JEFFERSON PARISH BORROW AREA.

TABLE 5. CLUSTER IIA

Anomaly #	(Zone 15) UTM Coordinates Northing	Easting	Gamma Intensity	Anomaly Strength (in gammas)
1	3325408	771992	50880+	+100
2	3325448	772001	50880+	+100
3	3325493	772006	50880+	+100
4	3325502	771950	50860	+ 80
5	3325534	771957	50930	+150
6	3325549	771955	50900	+120
7	3325513	772040	50915	+135
8	3325511	772154	50770	- 10

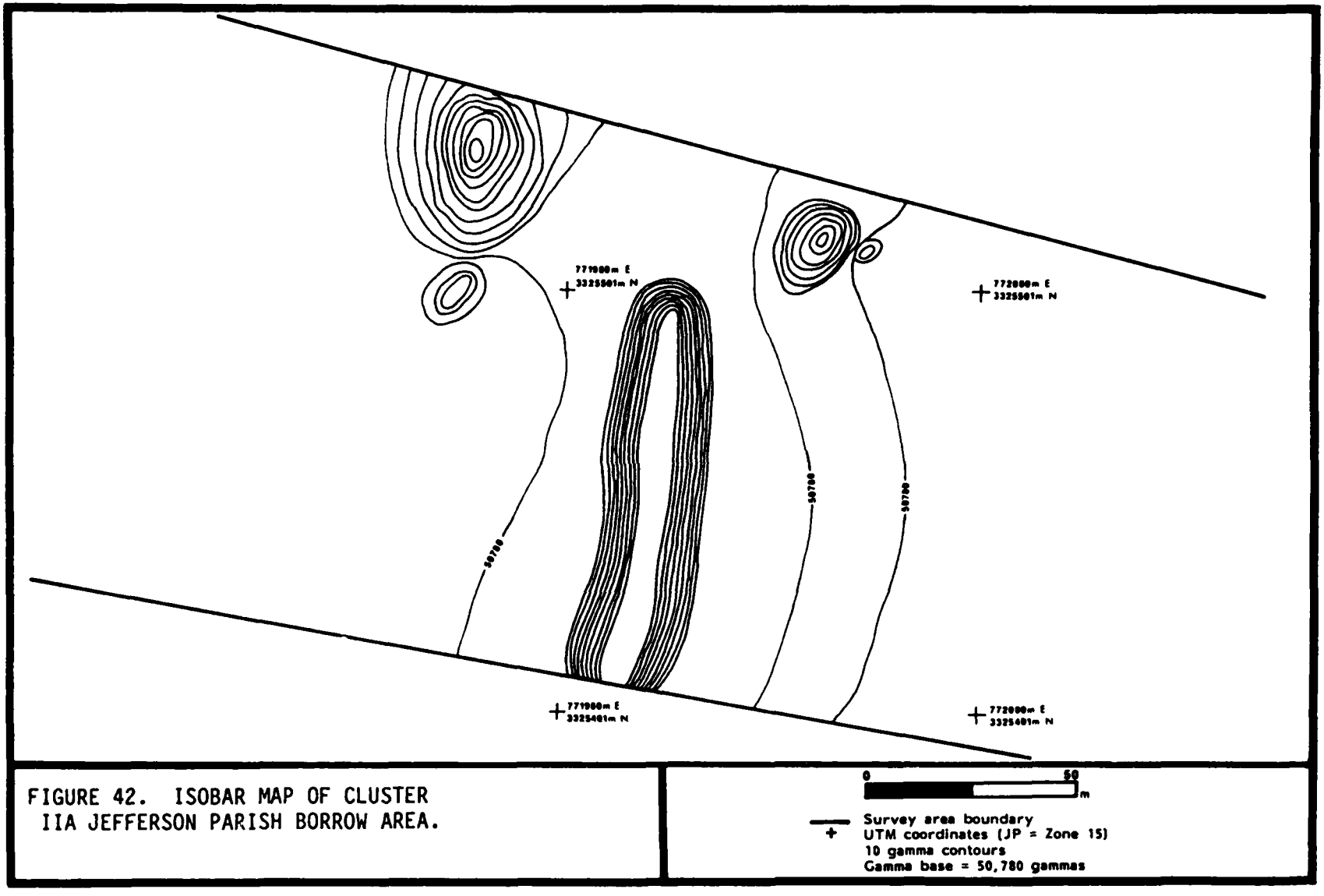

FIGURE 42. ISOBAR MAP OF CLUSTER IIA JEFFERSON PARISH BORROW AREA.

TABLE 6. CLUSTER IIIA

Anomaly #	(Zone 15) UTM Coordinates Northing	Easting	Gamma Intensity	Anomaly Strength (in gammas)
1	3326677	767741	50880+	+100
2	3326645	767718	50880+	+100
3	3326609	767701	50880+	+100
4	3326562	767685	50880+	+100
5	3326607	767769	50880+	+100
6	3326639	767787	50862	+ 82
7	3326641	767760	50840	+ 60
8	3326670	768061	50798	+ 18
9	3326717	767746	50792	+ 12
10	3326667	767830	50800	+ 20
11	3326659	767926	50790	+ 10
12	3326652	768013	50810	+ 30
13	3326651	767034	50812	+ 32
14	3326652	767041	50800	+ 20
15	3326650	768050	50775	- 5

are also located directly north of a pumping station. The ten remaining anomalies (Nos. 5-15) in this cluster are again associated with a trench filled with unconsolidated sediment. These anomalies are attributed to discrete ferruginous objects.

The cluster covers an area 154 m north-south by 376 m east-west (Figure 43). The four anomalies thought to represent a pipeline cover an area north of the southern area boundary for 85 m and have a magnetic width of 31 seconds duration. The magnetic peak is +100 gammas and the magnetic low of -5 gammas.

Cluster IVA: This cluster of anomalies, although located off a pumping station also, does not have the distinctive anomalies noted with Clusters IIA and IIIA. The eleven anomalies in this cluster are all low intensity, short duration records (Table 7).

The cluster covers an area 154 m north-south by 74 m east-west (Figure 44). This cluster is the most compact for the number of anomalies located. There are no records of a ship having been lost in the vicinity of this cluster; however, the close spacing of the anomalies, with a tendency to "track," that is pattern, makes this a very interesting cluster.

Howze Beach: Three large clusters of anomalies were noted in the Howze Beach Borrow area after the anomalies were noted on the postplot (Figure 45). The presence of a dredged ship channel in the southeast corner of the area possibly accounts for the large number of anomalies in that area.

Cluster IB: This cluster is located on the eastern edge of the survey area and contains 30 anomalies inside the survey area (Table 8). This cluster is closest to the ship channel.

The cluster is approximately 497 m north-south by 40 m east-west at the southern margin of the survey area to 240 m east-west at the northern margin of the survey area (Figure 46). The magnetic high is +100 gammas and a magnetic low of +12 gammas. The duration of the anomalies tend to be short, indicating that the object causing the anomaly, while having a relatively high induced magnetism, are at a distance, possibly well below the existing bottom of the sensor.

Since the historic records do not indicate the precise locations where ships went aground in this "Middle Grounds" area, it is not possible to determine, at this time, if the objects creating the anomalies in this cluster are artifacts or modern debris.

Cluster IIB: This cluster is in the northwest corner of the area and contains 25 anomalies (Table 9) inside the survey area. This cluster is located south and east of a pumping station, and approximately 1.5 km north of the ship channel.

The cluster covers an area 450 m north-south by 350 m east-west (Figure 47). The largest magnetic peak was +86 gammas and the lowest

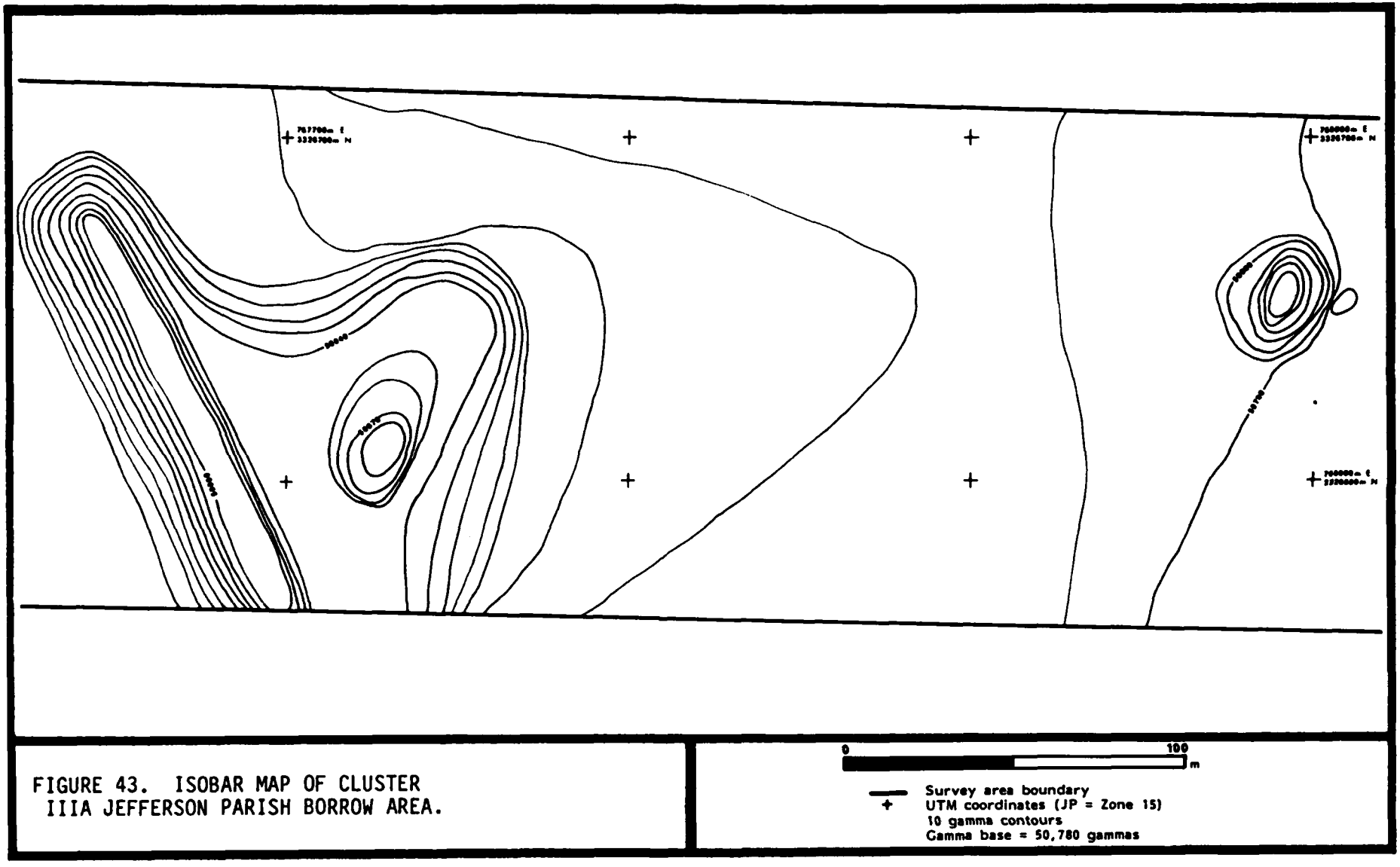

FIGURE 43. ISOBAR MAP OF CLUSTER IIIA JEFFERSON PARISH BORROW AREA.

TABLE 7. CLUSTER IVA

Anomaly #	(Zone 15) UTM Coordinates Northing	Easting	Gamma Intensity	Anomaly Strength (in gammas)
1	3327829	765370	50802	+ 22
2	3327801	765365	50804	+ 24
3	3327788	765361	50792	+ 12
4	3327757	765378	50792	+ 12
5	3327824	765405	50787	+ 7
6	3327816	765435	50789	+ 9
7	3327794	765406	50798	+ 18
8	3327791	765425	50786	+ 6
9	3327778	765402	50804	+ 24
10	3327746	765416	50834	+ 54
11	3327709	765417	50802	+ 22

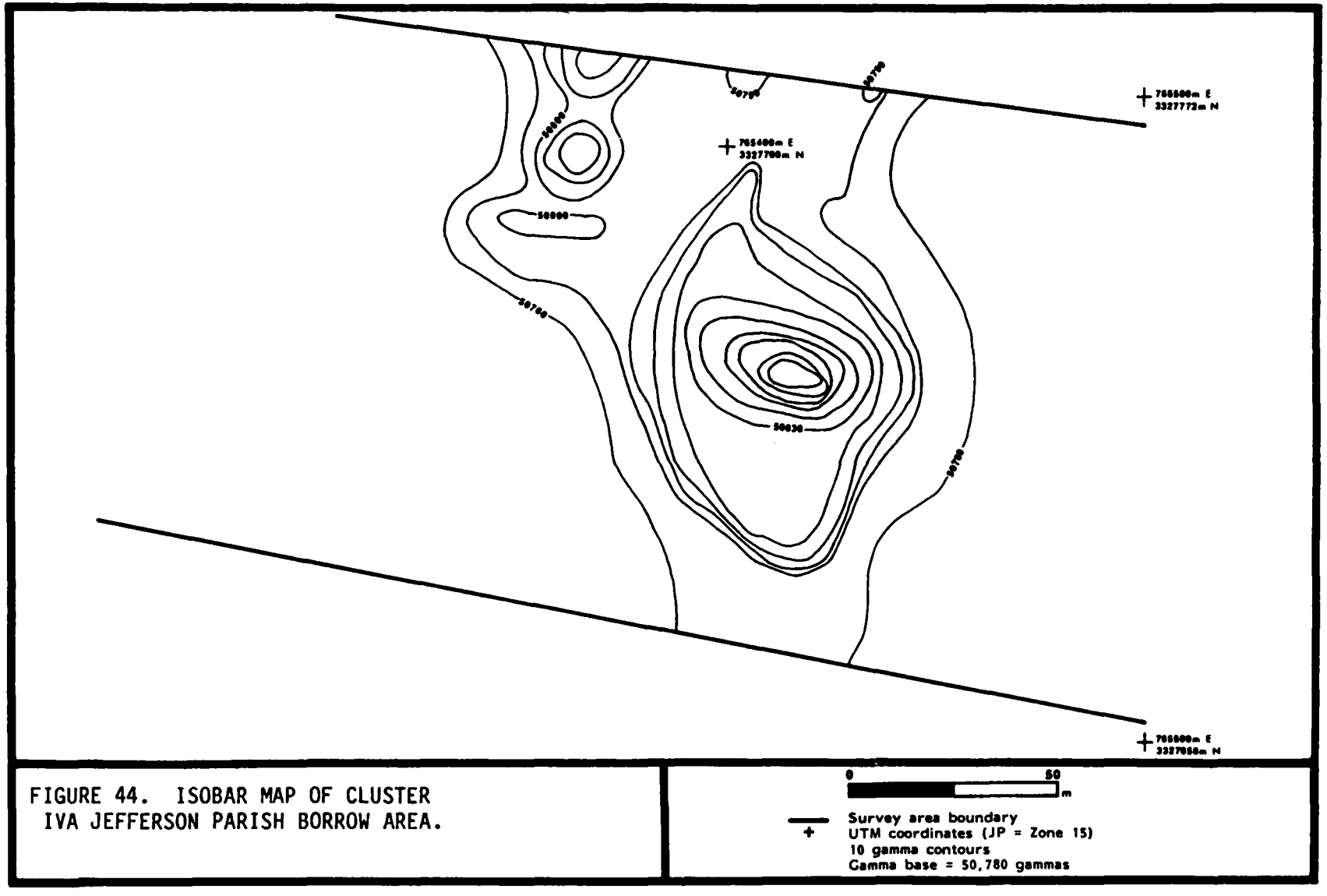

FIGURE 44. ISOBAR MAP OF CLUSTER IVA JEFFERSON PARISH BORROW AREA.

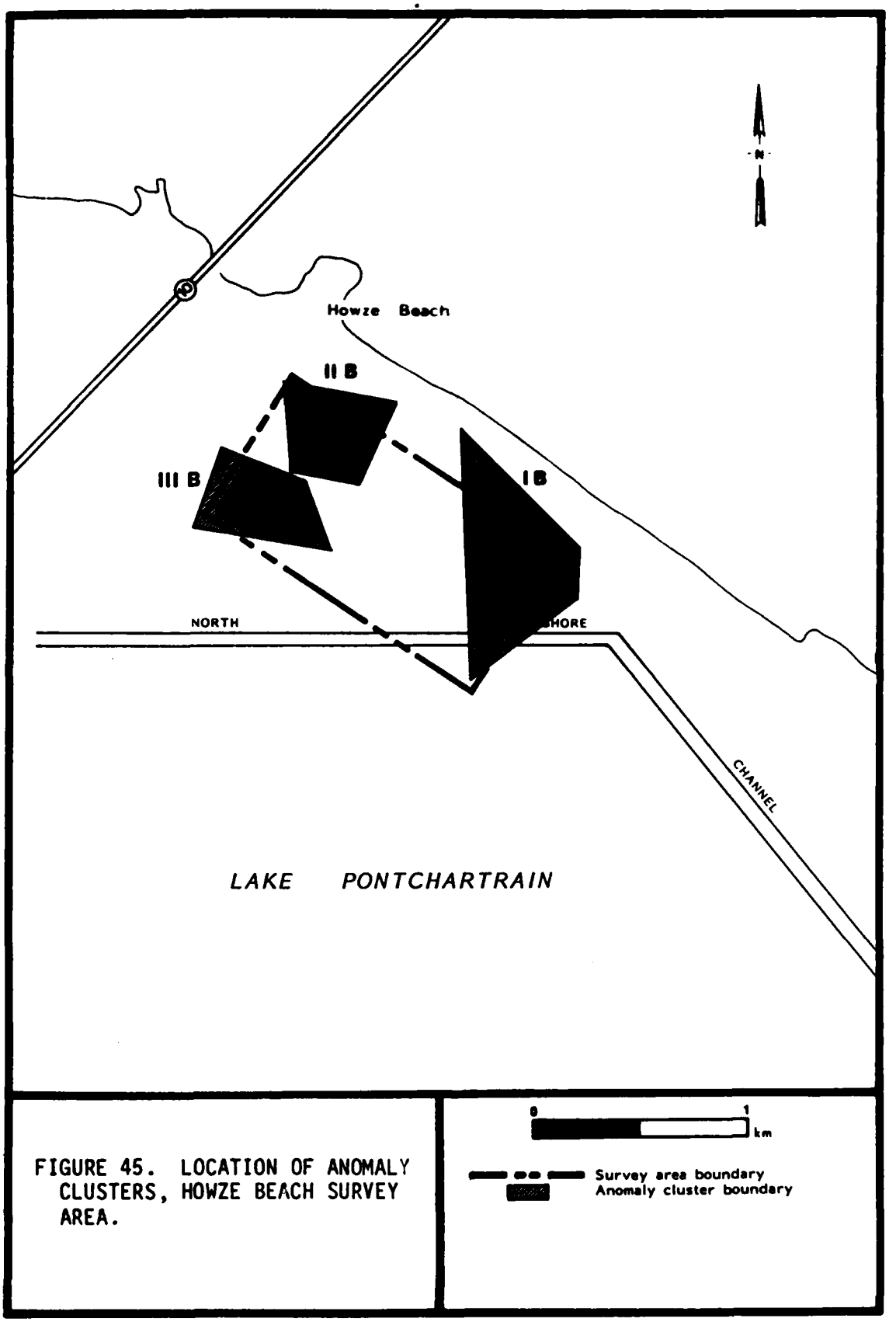

FIGURE 45. LOCATION OF ANOMALY CLUSTERS, HOWZE BEACH SURVEY AREA.

TABLE 8. CLUSTER IB

Anomaly #	UTM Coordinates (Zone 16) Northing	Easting	Gamma Intensity	Anomaly Strength (in gammas)
1	3343887	232580	50813	+ 33
2	3343908	232585	50840	+ 60
3	3343892	232585	50880	+100
4	3343856	232544	50838	+ 58
5	3344004	232564	50817	+ 37
6	3343844	232528	50807	+ 27
7	3343742	232472	50899	+ 19
8	3343778	232480	50834	+ 54
9	3343805	232478	50818	+ 38
10	3343815	232478	50808	+ 28
11	33433969	232504	50814	+ 34
12	3343692	232426	50794	+ 14
13	3343736	232418	50854	+ 74
14	3343901	232428	50813	+ 33
15	3343583	232364	50838	+ 58
16	3343743	232386	50800	+ 20
17	3343968	232408	50880	+100
18	3344000	232412	50796	+ 16
19	3343528	232328	50824	+ 44
20	3343611	232332	50831	+ 51
21	3343772	232344	50798	+ 18
22	3344025	232362	50837	+ 57
23	3343488	232248	50797	+ 17
24	3343536	232254	50855	+ 75
25	3343595	232254	50797	+ 17
26	3343812	232266	50801	+ 21
27	3343860	232268	50837	+ 57
28	3343936	232380	50802	+ 22
29	3343684	232200	50793	+ 13
30	3343961	232218	50792	+ 12

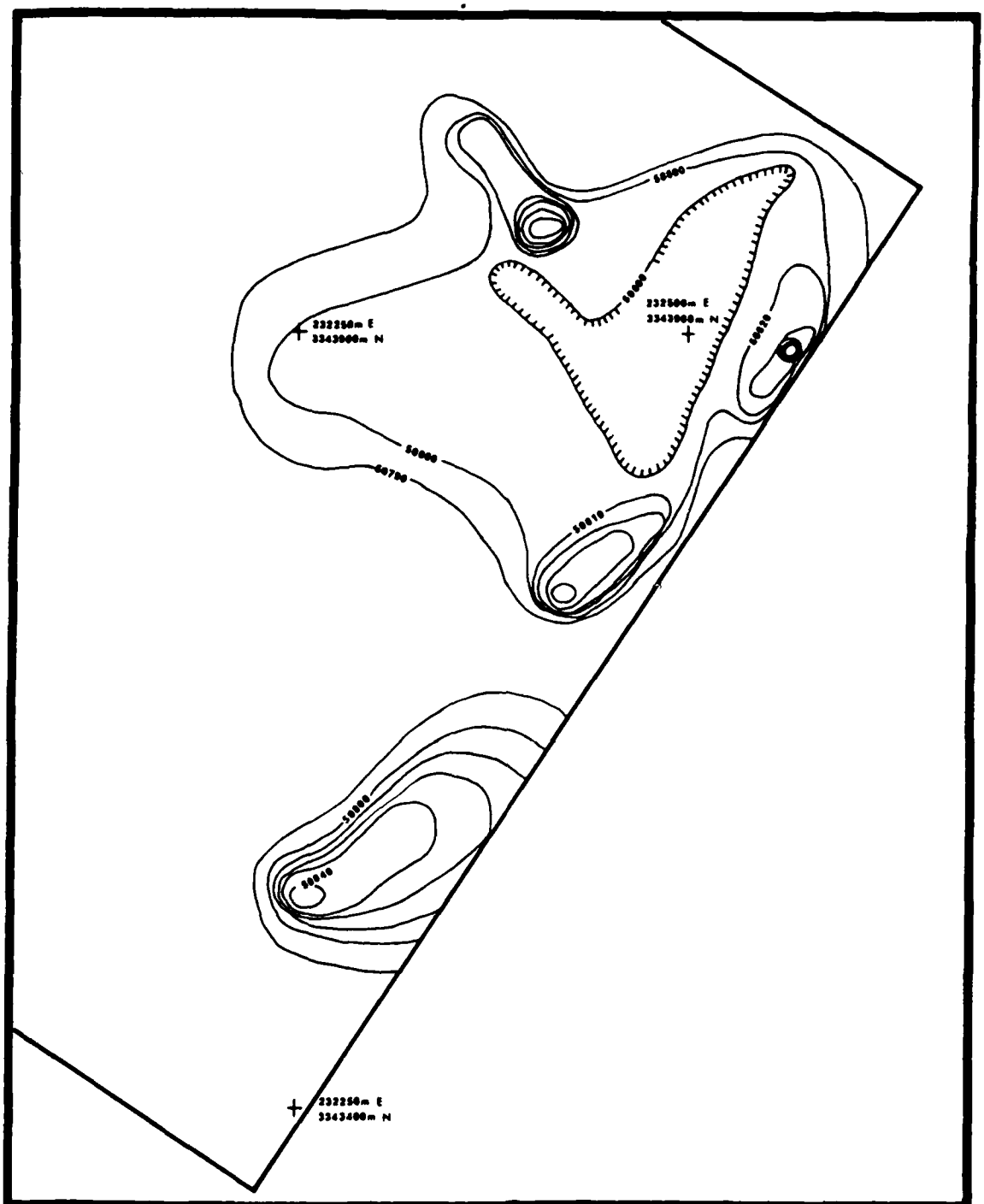

FIGURE 46. ISOBAR MAP OF CLUSTER IB HOWZE BEACH BORROW AREA.

TABLE 9. CLUSTER IIB

Anomaly #	(Zone 16) UTM Coordinates Northing	Easting	Gamma Intensity	Anomaly Strength (in gammas)
1	3344570	231771	50824	+ 44
2	3344615	231688	50866	+ 86
3	3344631	231684	50860	+ 80
4	3344435	231628	50813	+ 33
5	3344478	231610	50820	+ 40
6	3344485	231618	50817	+ 37
7	3344530	231618	50789	+ 9
8	3344590	231620	50836	+ 56
9	3344639	231624	50790	+ 10
10	3344699	231626	50794	+ 14
11	3344739	231629	50818	+ 38
12	3344459	231595	50792	+ 12
13	3344495	231595	50854	+ 74
14	3344631	231599	50789	+ 9
15	3344724	231600	50820	+ 40
16	3344780	231602	50796	+ 16
17	3344791	231603	50836	+ 56
18	3344494	231536	50789	+ 9
19	3344618	231544	50816	+ 36
20	3344558	231492	50789	+ 9
21	3344590	231500	50792	+ 12
22	3344670	231511	50797	+ 17
23	3344743	231508	50788	+ 8
24	3344823	231503	50791	+ 11
25	3344675	231452	50796	+ 16

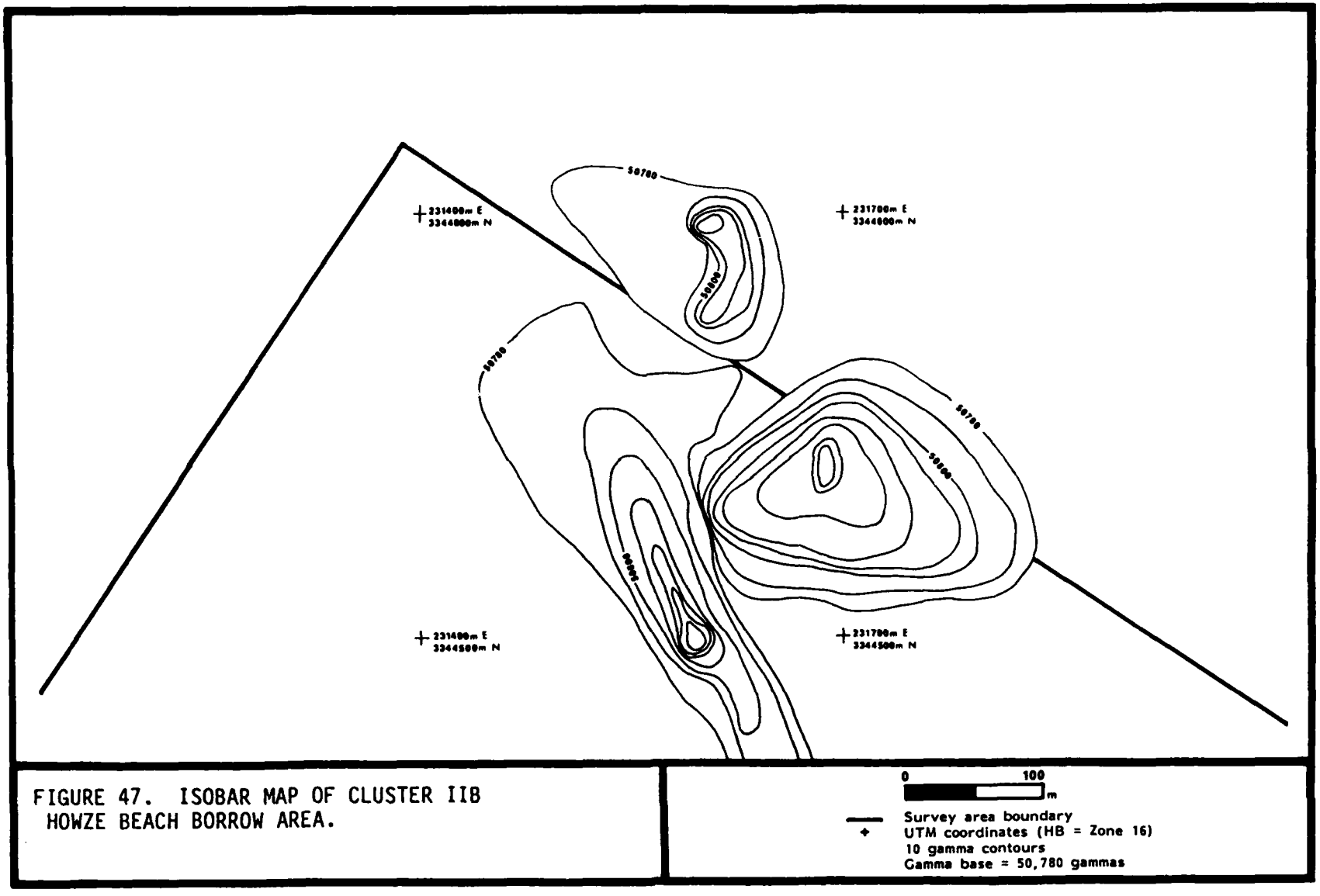

FIGURE 47. ISOBAR MAP OF CLUSTER IIB HOWZE BEACH BORROW AREA.

was +8 gammas. No sub-bottom data was collected due to the extremely shallow water, so it is not possible to determine if a trench exists in the bottom as off the pumping stations in the Jefferson Parish borrow areas.

Here, again lacking the precise locations of points where ships went aground, it is not possible currently to determine if the source(s) of the anomalies is historic or modern.

Cluster IIIB: This cluster is located in the southeast corner of the survey area and contains 29 anomalies (Table 10). It is located south of the on-shore pumping station.

This cluster extends over an area that is approximately 257 m north-south and 321 m east-west (Figure 48). The largest magnetic peak is +100 gammas and the lowest is +8 gammas. As with the other two clusters, imprecise historic records do not allow the assignment of the source of anomalies to either historic or modern categories.

Sub-bottom Survey

Procedures

The sub-bottom data were acquired utilizing a 3.5 - 7.0 kHz variable output seismic transmitter-receiver with a narrow beam, two degree, marine transducer. The analog data were recorded on an EPC 3200 recorder. Horizontal control was maintained with a Motorola Mini-Ranger III microwave range range positioning system. Horizontal control data were printed out automatically at fixed intervals, in this case, three minutes. The mini-ranger has an accuracy of $\pm$ one meter.

Reference stations for horizontal control were the same as those used for the magnetometer portion of the work. Initially, at Jefferson Beach, the sub-bottom profilers were operated on separate lines because of operational problems in operating a sub-bottom profiler in extremely shallow water. At first, we encountered some difficulty in maintaining the sub-bottom profiler mount attached to the boat hull at the speed necessary to tow the magnetometer sensor. A stronger mount was constructed and that problem overcame soon after project initiation.

Results

Jefferson Parish: The sub-bottom data from the Jefferson Parish borrow area are of marginal usefulness due to the difficulties attendent in gathering this type of data in shallow water. Penetration of coarser grained sub-bottom sediments was minimal due to the low output power necessary in shallow water. Penetration may have been increased slightly by increasing transmit power; however, the increase in return noise would have obliterated more of the near surface sediments. Increased power would not have materially helped in acquiring better signal penetration. The noise level in shallow water sub-bottom data

TABLE 10. CLUSTER IIIB

Anomaly #	(Zone 16) UTM Coordinates Northing	Easting	Gamma Intensity	Anomaly Strength (in gammas)
1	3344113	231450	50865	+ 85
2	3344121	231450	50858	+ 78
3	3344142	231448	50793	+ 13
4	3344142	231373	50804	+ 24
5	3344318	231366	50880	+100
6	3344324	231368	50789	+ 9
7	3344339	231370	50830	+ 50
8	3344134	231343	50880	+100
9	3344170	231322	50808	+ 28
10	3344222	231318	50808	+ 28
11	3344354	231326	50812	+ 32
12	3344258	231284	50795	+ 15
13	3344354	231282	50842	+ 62
14	3344150	231250	50880	+100
15	3344162	231249	50798	+ 18
16	3344246	231246	50880	+100
17	3344314	231244	50880	+100
18	3344254	231222	50880	+100
19	3344330	231206	50880	+100
20	3344166	231163	50807	+ 27
21	3344190	231171	50876	+ 96
22	3344306	231167	50876	+ 96
23	3344218	231118	50846	+ 66
24	3344270	231126	50868	+ 88
25	3344270	231133	50868	+ 88
26	3344186	231075	50800	+ 20
27	3344354	231094	50848	+ 68
28	3344286	231054	50788	+ 8
29	3344350	231052	50801	+ 21

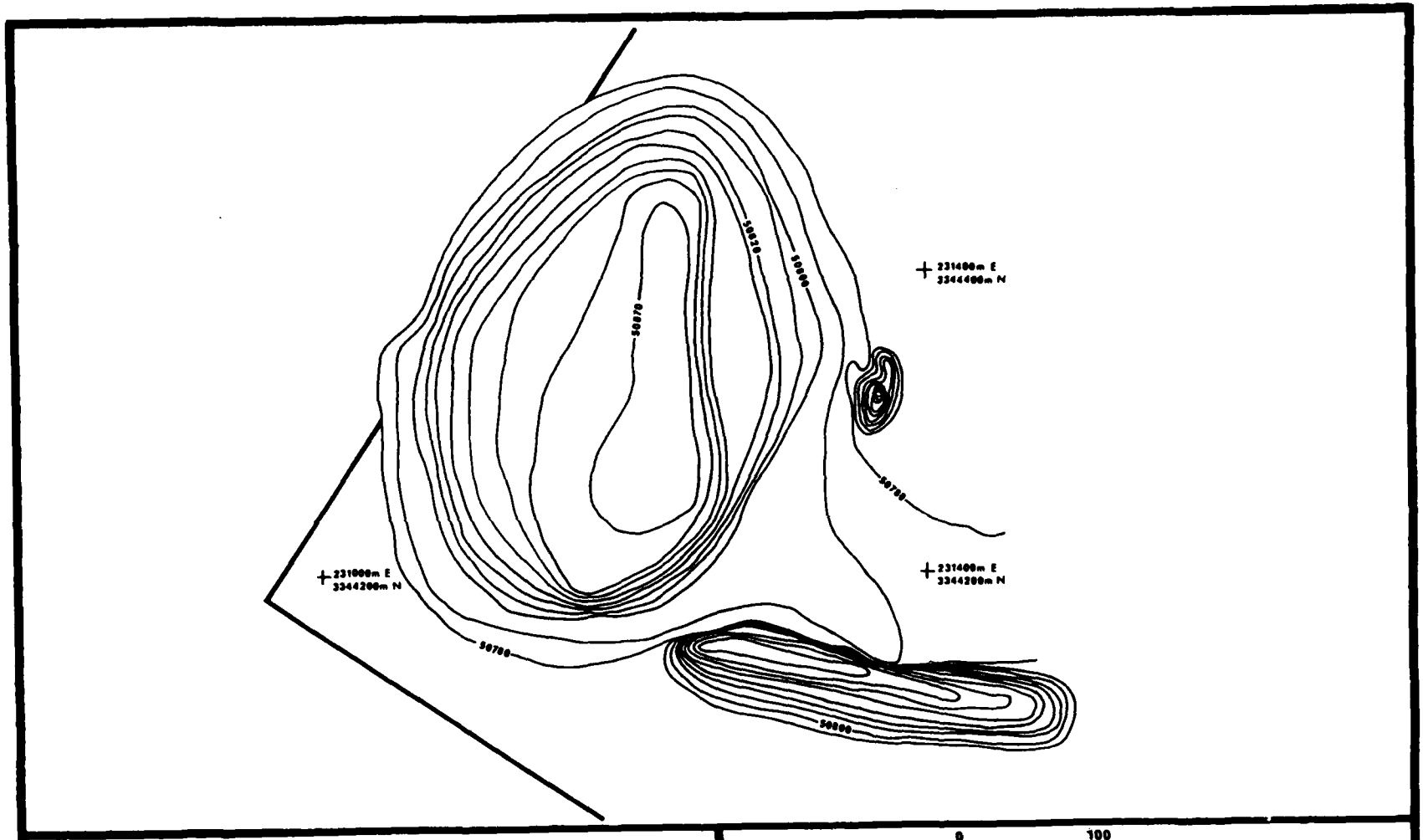

FIGURE 48. ISOBAR MAP OF CLUSTER IIIB
HOWZE BEACH BORROW AREA.

is due to the crystal still ringing from the transmitted pulse as the return signal arrives back at the transducer.

As can be seen in Figures 49 and 50, penetration of the sub-bottom sediment was approximately seven to nine feet BML (Below Mud Line). Penetration of the sub-bottom sediment was stopped by a coarse-grained strata, which is probably very gaseous. This strata apparently corresponds to a strata of interbedded silt and sand illustrated on the 1925 maps located at the Lake Pontchartrain Levee Board (Board of Levee Commissioners of the Orleans Levee District Map Series LD-403, on file Lake Pontchartrain Levee Board; Attachment 4).

The sediment directly above the sand strata appears to be uniformly fine grained. There appears to be a significant amount of biogenic interporal gas dissolved in this sediment. The sediment appears to be deposited in a single horizontal strata, typical of a sub-aqueous depositional environment.

Howze Beach: The collection of sub-bottom data was attempted at the Howze Beach borrow area, however due to the extreme shallowness of the water, the transducer was raised to within four feet of the surface. As can be seen in Figure 50, the crystal is ringing continuously, preventing the reception of a clear signal. Data collection was terminated when the transducer hit bottom.

SUMMARY

The data derived from each study within the two survey portions of the project required synthesis and interpretation to accomplish three goals: 1) evaluation of our data in light of the research issues; 2) the development of recommendations on the potential significance of cultural resources; and 3) the assessment of the degree of project impact on cultural resources and the development of recommendations as to the direction, if needed, of future work.

The following chapter documents the extent to which we were successful in addressing the research issues. The last chapter of this report is devoted to an evaluation of significance and recommendations.

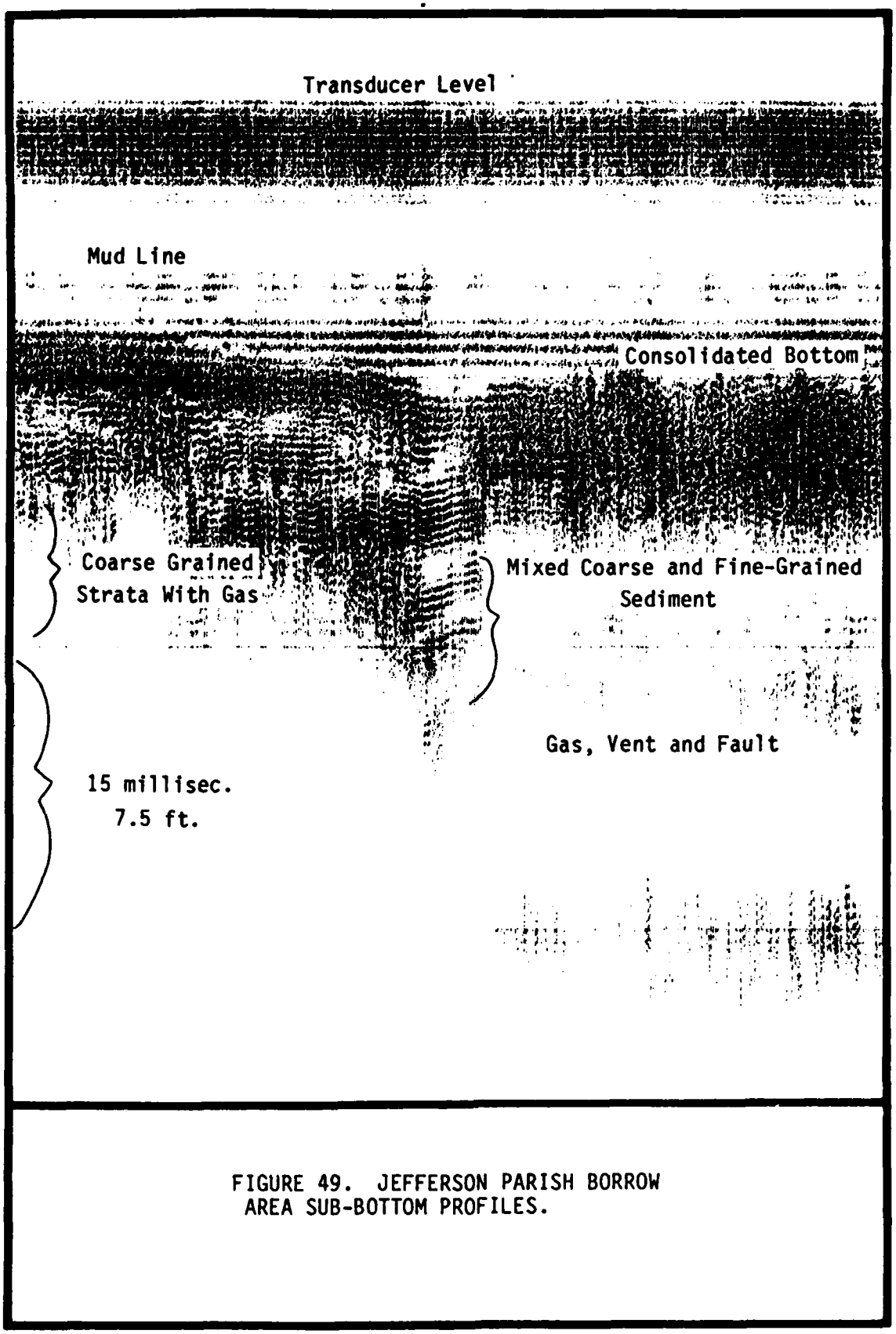

FIGURE 49. JEFFERSON PARISH BORROW AREA SUB-BOTTOM PROFILES.

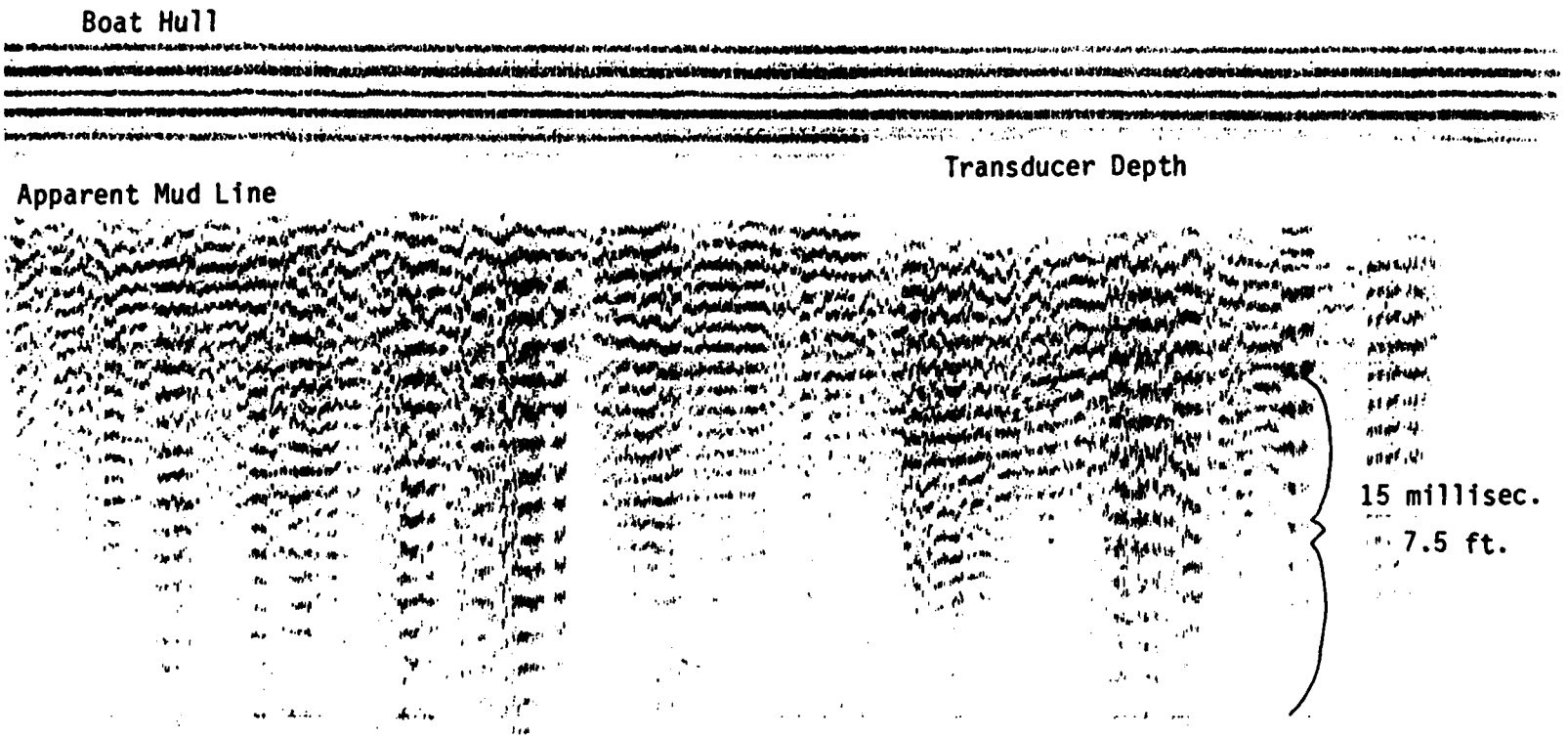

FIGURE 50. HOWZE BEACH BORROW AREA SUB-BOTTOM PROFILE.

CHAPTER SIX

CONCLUSIONS: RESEARCH IMPLICATIONS OF THE DATA

Research issues for both prehistory and history were raised in Chapter Four. These are addressed in this chapter utilizing data from the terrestrial and off-shore surveys.

PREHISTORIC IMPLICATIONS OF THE DATA

Extant evidence of prehistoric occupations along the south shore of Lake Pontchartrain appears to be very limited. The record of previously known sites combined with our data from testing do indicate the survey corridor once played host to activity from at least the Tchefuncte period through the Mississippian period. The data are, however, inadequate to offer more than cursory interpretations of these occupations.

Specific Site Questions

Specific questions to be addressed by the data were as follows:

1. Chronological placement of the sites
2. Functional assessment of the sites
3. Site location
4. Assessment of temporal change at the sites

Chronology

Chronological placement at the sites investigated relied predominantly on the ceramic inventory. The most extensive collection was that recovered from 16Or12, which included 231 sherds. The collection was dominated by plain body sherds, most of which were badly eroded. Clay temper with minor sand inclusions was the most frequent paste attribute observed at 16Or12, suggesting a chronological placement in the Baytown, Coles Creek or early Mississippian periods. The remaining sites yielded smaller ceramic collections, but all were characteristically similar to the dominant clay tempered sherds from 16Or12. Thus, we must conclude that these two sites, 16Or28 and 16Je4 likewise date to one or any of the periods noted above.

The only evidence of earlier or later occupations was found at 16Or12, where three probable Tchefuncte sherds indicate some activity during that period. Additionally, three shell-tempered Mississippian sherds were recovered from this site, pointing to some later activity as well.

In light of the culture historical perspective taken by most researchers in this area, the minimal indication of activity during the Tchefuncte period is quite surprising. We would have expected more substantial evidence of Tchefuncte occupation. The absence of Marksville materials, however, fits rather nicely with previous scholars' arguments that during that period the prehistoric inhabitants migrated away from the shore of Lake Pontchartrain to follow the southern migration pattern of Rangia to more brackish water environments. Although our data certainly do not lend themselves to assessing whether the stimulus for movement was indeed the changing availability of Rangia, the absence of any indications of Marksville ceramics do add support to a decrease in activity along the shore during this period.

Gagliano et al. (1978) noted an increase in site density in the general project area during the Baytown-Coles Creek periods. Our data, though disparate from others in terms of Tchefuncte, are in agreement regarding the later Woodland periods. These same authors also suggest that by Mississippian times, previously occupied sites continue to witness prehistoric activity, but the incidence of new sites is low. Thus, either a decrease in population or a centralization of the populace (perhaps because of a shift in the economic focus to at least limited agriculture) took place. We cannot assess which of these reasons for more limited Mississippian sites is correct; however, activity during that period is very weak at the three sites we investigated with only one showing any manifestation of well-developed Missisippian ceramic styles. We will return to this point later in the discussion.

Site Function

We can only hypothesize on the nature of site function because of the erosion and other disturbance these properties have already felt.

All exhibit, as was expected, shell accumulations. Whether the sites functioned as shell-collection camps or whether they were more substantial in terms of function, we cannot say for sure. Given the rate of destruction in this area and the amount of materials collected from 16Or12, that site might have been some type of residential base. Since most researchers agree that the Rangia remained a crucial element to the subsistence strategy throughout prehistoric occupation of the Basin, the occurrence of shell remains does not necessarily indicate specialized function. Site 16Or12 may differ from the others in being a residential base or it may simply be better preserved, thus the extant artifacts are more extensive in number.

Lithics are underrepresented at all sites and bone or shell tools are absent, so we have no idea what types of manufacturing or maintenance activities might have taken place. The two projectile points, one each found at 16Or12 and 16Or28, are insufficient to provide functional interpretations. Neither of these points could be securely dated to a particular period in prehistory so they may or may not be related to the primary occupation at the sites. The presence of quantities of ceramics is often equated with the prehistoric presence of females and certainly with the frequencies from 16Or12 this was likely the case.

In a purely hypothetical sense, we tend to believe all of the sites functioned as some type of residence base. They may have differed in size and intensity, but in light of the previous impacts to integrity, it is probable that they were more extensive in remains prior to suffering the effects of erosion and, in the case of 16Je4, construction.

Site Location

One of our goals in this project was an assessment of site location patterns. Since we were successful in locating no new sites and can offer no substantive comments to correct locations of previously recorded sites, this aspect of research remains unfulfilled.

Temporal Change

Temporal change cannot even be addressed for 16Je4 and 16Je28. With the exception of the single Carrollton-like point at the latter, both appear to date to the late Woodland Baytown-Coles Creek (possibly Early Mississippian) periods. None of the ceramics provide any indications of temporal variability.

General Discussion of the Data

The paucity of interpretive data from the prehistoric site investigations is somewhat disappointing from an academic viewpoint. As discussed in Chapter Three, there are a number of unresolved issues regarding the prehistory of the Basin and we had strongly hoped that a project which included both survey and testing would be an ideal

opportunity to add clarification to at least some aspects of these issues.

Only peripherally, and with certain hesitancy, can we address a couple of issues. First, we return again to the absence of Marksville materials. Our failure to recover any single diagnostic of this period leads us to concur with colleagues who argue for abandonment of the shore areas by Marksville groups. Gagliano et al. (1979:5-19) report only a few small shell middens on the north shore of the lake and minor components at 16Or4 during this period. In contrast, several well-developed Marksville components were found by their Pearl River survey on the eastern side of the Pearl River mouth. The transience of Rangia created by the increased influx of fresh water into Lake Pontchartrain during the period coupled with the low site incidence support the proposition that Marksville groups sought out new environmental settings for habitation. These settings were likely the most advantageous loci for Rangia gathering.

The second issue discussed here is Davis' modal concept and the applicability of the Lower Mississippi Valley sequence. By far the majority of ceramics recovered by our work were too eroded to apply any type of modal approach to analysis. However, just looking at paste and temper, those dated to the Baytown-Coles Creek periods seem in line with the established type descriptions (Phillips 1970). Likewise, the Tchefuncte sherds exhibit the thick, convoluted paste typical of the period. Although Gagliano et al. (1979:5-22) noted that the Mississippian culture in the Pearl River mouth was well represented by ceramics most appropriately assigned to the Bayou Petre phase, they point out the phase remains to be well-defined in the area. Similarly, the only firm evidence of Mississippian ceramics we recovered were the three shell-tempered sherds from 16Or28. These also conform to the late Mississippian Bayou Petre phase and require no modal analysis to confirm their date.

Our data produced no ceramic anomalies that would indicate the need for modal analysis in lieu of applying established types. Our data, however, are inadequate to resolve the possible need for such an approach, particularly in terms of how ceramic variance from the Lower Valley might be interpreted in regard to social stability or instability. We feel this should remain a concern of future work.

Implications of the Off-Shore Data

The location of prehistoric sites in marine situations has been a subject of controversy among archaeologists for several years. Some believe that prehistoric sites are located offshore and are discoverable utilizing high frequency sub-bottom profilers (Ruppe 1977; Spencer and Lenzer 1977). Others believed that disturbance of the sub-aerially modified sediments during marine transgression would have disturbed the sites to the point that all contextual data would be gone (Clausen 1978; Gagliano 1980). In addition, those that approach off-shore prehistoric site location with caution also point out that

where such sites may be present, their small size may render their location by a sub-bottom profiler impossible (Clausen 1978; Gagliano 1980; Arnold 1977, personal communication).

A geologic section of the St. Bernard delta complex extending generally southward toward the present Gulf of Mexico indicates a delta front deposit directly below a significant hiatal surface, approximately 25 ft below sea level. A distributary mouth bar deposit of silty sand and silty clay disconformably overlay the delta front deposit. These are progradational deltaic deposits; they represent a period of sub-aquaeous delta building. Immediately above the bar deposits are undifferentiated deposits of humic muck and clayey peat (Frazier 1974:6).

The geologic section shown on the 1925 Orleans Levee Board map (Map LD-403) shows, in less detail, essentially the same sequence. The section illustrates a strata of undifferentiated silts and sands underlain by a silty-sand. The undifferentiated silts and sands are noted to contain a high organic content. These equate with the humic clays in the first section. The silty-sands are equated with the distributary mouth bar deposits. It would seem that the depositional sequence is the same on both the north and south shores of the lake, as deltaic sequence is the result of sea level changes (Frazier 1967).

The sub-bottom data generated did not penetrate the undifferentiated silts and sands, which appear to be sub-aquaeous in depositional origin. These strata would not have supported prehistoric occupation.

HISTORIC IMPLICATIONS OF THE DATA

No historic artifact scatters with or without structural associations were identified by the terrestrial survey. Therefore, the terrestrial investigations have no implications for historic interpretations of the Pontchartrain Basin, except for an assessment of the standing architecture which is discussed in the following chapter.

The magnetometer survey data can be viewed in terms of their historical implications, but within the hypothetical realm only.

Of the two areas surveyed, the Howze Beach borrow area had the greatest possibility, based on historic documentation, of locating historic shipwrecks and associated maritime materials. Entrance to Lake Pontchartrain through the Rigolets and across the "Middle Ground" shoals was one of the early ship routes to New Orleans. Historic records, as late as 1913, indicate that this shoal posed navigation problem. Ships aground on the shoal would attempt to extricate themselves by offloading cargo and ballast. Of the types of cargo expected, inward bound cargos, primarily manufactured goods (see Chapter Three) would generate anomalies of sufficient amplitude to

register on the magnetometer. Outward bound cargo of raw materials would probably not generate a sufficient magnetic disturbance to register. There were no reported engineering projects, with the exception of a dredged ship channel, in the survey area. Due to the lack of specific references regarding ship's locations aground on the shoals, it is not possible to evaluate the origin of the anomalies at the Howze Beach borrow area.

Historic documents indicate less ship traffic in the Jefferson Parish borrow area. The major engineering projects proposed in the 19th century were breakwaters to create artificial harbors. Although two such breakwaters were eventually constructed, both are east of the survey area. Lack of a protected anchorage was a continuing problem along the south shore of the lake. Historic documents record that storms did indeed sink ships, generally around the mouth of the canals (See Chapter Three). Here again, lack of specific locations for these and other reported sinkings hinders assigning origin to the anomalies, although it is possible, as at Howze Beach, that the clusters of anomalies are the result of shipwrecks or maritime related materials. The possibility that the anomalies are the result of modern debris cannot of course be overlooked. Three of the clusters are located off Jefferson Parish pumping stations, while the fourth is located near several oil and gas installations and a power line.

CHAPTER SEVEN

RECOMMENDATIONS

The recommendations for this project fall in four areas: 1) the significance of archaeological sites and standing structures investigated by the terrestrial survey and architectural evaluation; 2) the potential significance of anomalies detected by the magnetometer survey; 3) the potential implications for prehistoric site location of the sub-bottom data; and 4) an assessment of project impact on all of the above. Each area of recommendations is discussed separately.

SITE AND STANDING STRUCTURE SIGNIFICANCE

Archaeological Sites

Three archaeological sites were inventoried by the survey and subsequently tested. All three, 16Or12, 16Or28, and 16Or4, were previously recorded and documented in the files of the State Archeologist, Louisiana Department of Culture Recreation and Tourism.

Testing and evaluation of these sites revealed no evidence of intact cultural deposits. No midden, features or subsurface materials were found in the testing. Of the three sites, 16Or12 was certainly the most extensive in terms of artifactual material recovered. Although over 200 ceramics were picked up at the site, most were in a severely eroded state. The remaining two sites, 16Or28 and 16Je4, both yielded much smaller artifact collections.

It was generally agreed upon by the authors of this report that the sites were probably once very significant in terms of National Register of Historic Places criteria. At present, however, the effects of natural disturbance and, in the case of 16Je4, construction, have combined to dramatically impact site integrity in all three instances. We cannot, in the face of these impacts, offer an evaluation of significance. In order to be significant in terms of National Register criteria, a site must be clearly shown to advance the knowledge of prehistory. None of these sites, as presently preserved, can meet that criteria.

Standing Structures

The architectural discussion in Chapter Five has already detailed extensively our evaluations of the standing structures. To briefly reiterate, all standing structures were found in Segments B and C, and a scenic evaluation was made of small curio park in Segment D.

None of the standing structures evaluated were found to meet the criteria for eligibility established by the National Register of Historic Places. Each was studied in terms of National, State, Regional, Local, and Part-of-the-Scene significance. Although the pier camps, in particular, are certainly characteristic of New Orleans and south Louisiana, in general, they are not unique and many have undergone modification. In addition, most of the structures do not even meet the age criteria of 50 or more years for eligibility.

There are two exceptions to the age criteria. One of these, a beach cottage referred to as "Seven Sisters," is more than one-half century old. At one time, the property appears to have been a two bay single frame shotgun, which had a gallery with turned wood balusters and ornamental wood trim. Although typical of the style found in the Fauxbourg-Marigny district and the Vieux-Carre area of New Orleans, the structure has been altered since its original construction. These alterations have impacted structural integrity, rendering the cottage ineligible in its current state.

In Segment C, a fishing camp identified in the field as C-18, may be older than 50 years. Although it appears to meet the age requirement for eligibility, its architectural style is not unique and fails to exhibit the integrity crucial to National Register status.

The only non-standing structure evaluated as part of this portion of the work is "Walter's Park," an unofficial arrangement of driftwood and flotsam found in Segment D. Although this is a pleasant setting, put together by concerned residents, it does not qualify for an evaluation of significance.

In sum, none of the standing structures or the curio park were evaluated as being significant in terms of eligibility to the National Register of Historic Places. However, as pointed out in Chapter Five, this evaluation of nonsignificance does not imply that any of these

locales should be carelessly ignored in LPVHP planning. This point will be discussed more under the Project Impacts section of this chapter.

ANOMALY SIGNIFICANCE

Four clusters of anomalies in the Jefferson Parish study area and three at Howze beach were singled out for discussion in Chapter Five. We lack direct documentation of any historic association with the anomaly clusters, but this section does attempt to postulate possible origin of the anomalies to the best of our ability.

Jefferson Parish

Cluster IA in Jefferson Parish is located near the reported sinking of a ferry during the late 1940s. This cluster could be associated with debris from the ferry since it does continue to extend south, outside the borrow area, toward the ferry sinking location. Another possibility is that it is associated with debris from causeway construction since it is less than 500 m to the east of that overpass.

Cluster IIA includes three short duration, high intensity anomalies that most likely represent a pipeline. The other five anomalies in this cluster are discrete ferruginous objects that may be associated debris in a trench of unconsolidated sediments located by the sub-bottom data.

Cluster IIIA again has four anomalies which may represent a pipeline. Another ten anomalies, like the five discussed for Cluster IIA, are discrete ferruginous objects, possibly associated with the trench.

Cluster IVA revealed anomalies with a tendency to pattern, suggesting the possibility of historic association. We have no records of a ship going down in this area, but the possibility should not be dismissed.

Howze Beach

Cluster IB is close to the ship channel and could represent an historic association with a shipwreck or a ship having gone aground. We do not know at this point.

Cluster IIB is located south and east of a pumping station. If a trench, such as that in Jefferson Parish, is located off the pumping station, these anomalies may represent associated trench debris. Association with artifacts of historic origin and significance (e.g., shipwrecks) is also a possibility.

Cluster IIIB presents the same situation as the other clusters at Howze Beach. It may represent modern debris, but just as likely could be in an historic association.

Howze Beach revealed the most anomalies with the greatest possibility of being the remnants of cultural events such as shipwrecks of the two off-shore areas studied.

SUB-BOTTOM POTENTIAL

To the depth penetrated by the sub-bottom profiler, there is no evidence of sub-aerial deposition potentially associated with now submerged prehistoric resources. As discussed in the preceding chapter, there is some disagreement over the degree to which prehistoric sites, if present, might be detected. Still, we must consider what possibility exists that any such deposits are situated within the off-shore impact areas.

The sub-bottom profile at Jefferson Beach did not penetrate the sub-aqueous gray sand strata noted also on Attachment 1. However, in consultation with the COE and the Louisiana State Historic Preservation Officer, it was agreed that additional investigation (e.g., coring) is unnecessary, due to the improbability of submerged archaeological sites in the proposed borrow area.

At Howze Beach, the noise created by trying to penetrate in such shallow water renders the sub-bottom inspection useless for interpreting associated site potential.

PROJECT IMPACT

Although the three prehistoric sites investigated by the project do not meet criteria of eligibility for the National Register, we have evaluated each in terms of proposed project impact. The work proposed by the COE for levee improvement will have limited impact on all three sites. All are located on the beach shore and none were found to extend inland from the beach itself. At 16Or12, approximately 100 m of marsh separates the largest deposits of shell and sherds from the railroad embankment. This should be more than an adequate buffer between what remains of that site and any proposed levee construction or improvement.

Much the same situation holds true for 16Or28. Here, although there is no marsh behind the beach [rather a ribbon of sandy soil often marked by live oaks] there was no indication of significant cultural deposits between the beach and the railroad embankment. In contrast, however, there is very little buffer between any proposed construction on the levee and 16Je4. But there is protection provided to the site by the asphalt covering adjacent to the shore.

In terms of the standing structures and curio park, project impacts are more difficult to assess because of two factors. First, the pier camps and many of the buildings are associated with the tra-

ditional lifeways of New Orleans citizens. These structures, the pier camps in particular, should not be carelessly ignored in construction plans. If they can be preserved, all attempts should be made to do so.

The second factor is a demographic concern. Many of these structures are still in use, at least on a seasonal basis. Therefore, the impact to the owners or tenants should be a major consideration in LPVHP planning. As archaeologists, we cannot offer an evaluation on this impact.

In terms of the anomalies identified by the off-shore magnetometer study, four clusters in Jefferson Parish and three at Howze Beach were singled out for discussion. In a preceding section of this chapter, we have offered some suggestions of potential cultural association and significance, but in the absence of accurate documentation, our evaluations are tentative. Although the use of side-scan sonar has been discussed as an approach to determining better their possible significance, we do not feel this will provide the data suitable to replace 'hands-on' examination by diving. Since 'hands-on' underwater examination can be quite costly, we would recommend the LPVHP project avoid the areas of the clusters. To this end, Tables 11 and 12 list the UTM coordinates for areas of avoidance.

Finally, we do not feel the borrow activities will adversely affect prehistoric sites that may be submerged in Lake Pontchartrain.

CLOSING COMMENTS

This concludes our discussion of recommendations on NWR's assessment of a portion of the LPVHP project. Several closing comments, however, are necessary. First, the standing structures inventoried on this project included only those within the area of proposed impact as outlined by the scope of work. Other structures, particularly some off-shore camps, are found in the general area, but unless these were specifically within the survey corridor, they were not considered by our work. Second, although the survey area is in close proximity to Bucktown, it does not include this community. Thus, no consideration was given to Bucktown other than a brief mention earlier in the report.

TABLE 11. BOUNDARIES OF AVOIDANCE AREAS:
JEFFERSON PARISH BORROW AREA

Cluster IA

NE Corner:	3325300 m. N 775525 m. E	NW Corner:	3325300 m. N 775050 m. E
SE Corner:	3325167 m. N 775525 m. E	SW Corner:	3325167 m. N 775050 m. E

Cluster IIA

NE Corner:	3325593 m. N 772254 m. E	NW Corner:	3325593 m. N 771850 m. E
SE Corner:	3325308 m. N 772254 m. E	SW Corner:	3325308 m. N 771850 m. E

Cluster IIIA

NE Corner:	3326817 m. N 768150 m. E	NW Corner:	3326817 m. N 767585 m. E
SE Corner:	3326462 m. N 768150 m. E	SW Corner:	3326462 m. N 767585 m. E

Cluster IVA

NE Corner:	3327929 m. N 765535 m. E	NW Corner:	3327929 m. N 765261 m. E
SE Corner:	3327609 m. N 765535 m. E	SW Corner:	3327609 m. N 765261 m. E

TABLE 12. BOUNDARIES OF AVOIDANCE AREAS:
HOWZE BEACH BORROW AREA

CLUSTER IB

NE CORNER:	3344008 m. N 232685 m. E	NW Corner:	3344601 m. N 232168 m. E
SE Corner:	3343787 m. N 232680 m. E	SW Corner:	3343388 m. N 232200 m. E

CLUSTER IIB

NE Corner:	3344715 m. N 231871 m. E	NW Corner:	3344825 m. N 231352 m. E
SE Corner:	3344335 m. N 231728 m. E	SW Corner:	3344394 m. N 231436 m. E

Cluster IIIB

NE Corner:	3344359 m. N 231470 m. E	NW Corner:	3344500 m. N 231033 m. E
SE Corner:	3344013 m. N 231550 m. E	SW Corner:	3344135 m. N 230900 m. E

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