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U.S. Army Corps
of Engineers
New Orleans District

REMOTE-SENSING SURVEY OF THE ATCHAFALAYA BASIN MAIN CHANNEL, ATCHAFALAYA CHANNEL TRAINING PROJECT, STS. MARTIN AND MARY PARISHES, LOUISIANA

FINAL REPORT

November 1991

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A remote sensing survey was conducted at several study areas along the lower Atchafalaya Basin Main Channel and in Bayou Shafter. Diving and test excavations were conducted on a small number of selected targets. No significant cultural remains were found along the Atchafalaya Basin Main Channel, but a number of partial and complete watercraft were found in Bayou Shaffer. Some of these watercraft represent potentially significant cultural resources. Recommendations for the treatment of vessel remains found in Bayou Shaffer are provided.

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DEPARTMENT OF THE ARMY
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December 4, 1990

REPLY TO
ATTENTION OF

Planning Division
Environmental Analysis Branch

To The Reader,

This cultural resources effort was designed, funded, and guided by the U.S. Army Corps of Engineers, New Orleans District as part of our cultural resources management program. The effort documented in this report was a remote sensing survey of the Atchafalaya River Channel Training, a feature of the Atchafalaya Basin, Louisiana Project.

We concur with the Contractor's recommendation that no further work is warranted along the Atchafalaya River portions of the study area. We also concur with the recommendations regarding resources along Bayou Shaffer. Due to project design changes, however, none of the Bayou Shaffer areas will be affected by the project. Therefore, no further cultural resource investigations are planned.

Michael E. Stout
Technical Representative

Edwin A. Lyon, Ph.D.
Authorized Representative
of the Contracting Officer

for Robert A. Burson, Jr.
R. H. Schroeder, Jr.
Chief, Planning Division

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CHAPTER 1: INTRODUCTION

This report presents the results of remote-sensing surveys and exploratory diving operations conducted at several locations in the lower Atchafalaya Basin region in St. Martin and St. Mary Parishes, Louisiana. The study areas consist of several locations along the Atchafalaya River Main Channel, both above and below Morgan City, plus areas along Bayou Shaffer (Figure 1). All of these areas are to be affected by channel training projects which are features of the multipurpose, comprehensive Atchafalaya Basin Floodway System developed by the New Orleans District, U.S. Army Corps of Engineers. The purpose of the channel training is to simulate the development of natural ridges along banklines, thus confining low to average flows to the Atchafalaya Basin Main Channel. The project is designed to accelerate the development of the main channel and reduce the amount of overbank deposition. Elements of the overall project will include the construction of ridges by hydraulic fill along both sides of the Atchafalaya Basin Main Channel, the closure of several openings, the construction of rock weirs, excavation of a diversion channel at Hog Island and corresponding interior drainage improvements, and closure of Bayou Shaffer.

The Atchafalaya Basin and the Atchafalaya River area below Morgan City are characterized by numerous rivers, streams, lakes, and ponds. Transportation and commerce in this region have always depended largely upon watercraft (see Pearson et al. 1989). There is no doubt that aboriginal populations of the region depended upon dugout canoes in their travels through and across the area. Later in time, European craft such as bateaus, skiffs, luggers, and, eventually, steamboats plied the waters of the area. The Atchafalaya River at present-day Morgan City became the gateway to boat travel up Bayou Teche and into the Atchafalaya Basin. Today the Atchafalaya River and numerous associated waterways continue to be an important commercial transportation route, and the smaller streams and lakes of the area are used extensively by fishermen, trappers, and visitors. Over its period of use, untold numbers of watercraft have been lost in the Atchafalaya Basin and adjacent waterways and the present study was implemented by the New Orleans District to determine whether shipwreck remains existed that would be impacted by the proposed construction activities.

The locations of each of the areas to be surveyed are shown in Figure 1. The total area covered by the survey of these locations represents approximately 2275 acres. Each area is briefly described below.

Above Morgan City. Two study areas are located along the Atchafalaya Main Channel above Morgan City. In these areas, hydraulic fill is to be removed and used to construct low ridges along the left descending bank of the channel. The two areas are:

1. An area from Atchafalaya River mile 99.6 to 111.0 along the left descending bankline and extending from the bankline to the -20ft NGVD contour line on the left descending side, to include a minimum survey corridor 450 ft in width.

2. A corridor extending 800 ft from the left descending bank between Atchafalaya River mile 111.0 and 114.0.

Below Morgan City. Several areas are located below Morgan City. The channel training projects in these areas will involve the construction of ridges with hydraulic fill on the right descending bank along the Atchafalaya Main Channel between river miles 122 and 129.2, plus the closure of Bayou Shaffer. The specific locations of these project areas are:

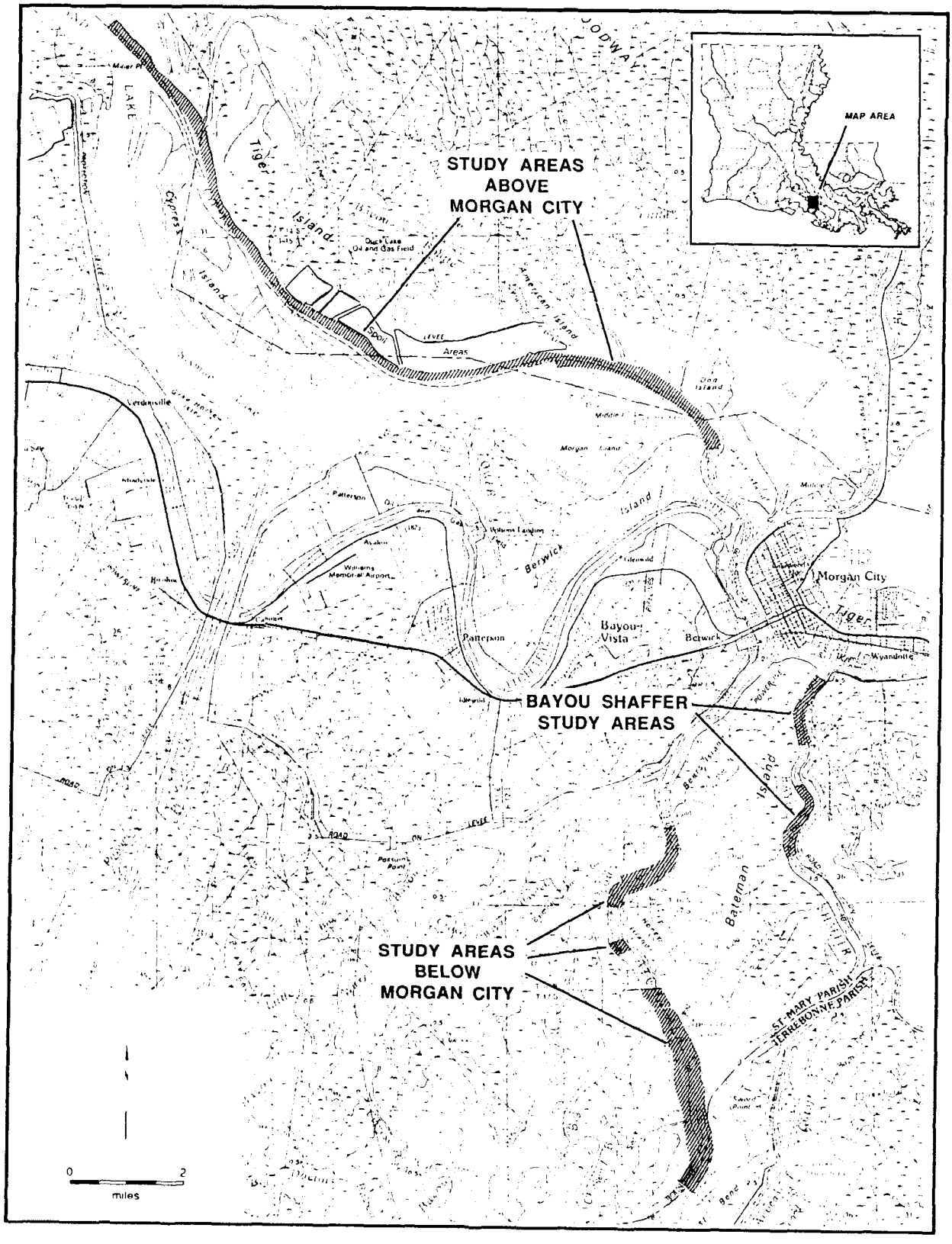

Figure 1. Locations of the study areas.

1. The entire Atchafalaya River channel from river mile 122 to 123.8.

2. The entire Atchafalaya River channel at river mile 125.

3. An area extending from Atchafalaya River mile 125.8 to 129.2 and stretching from the right descending bank to the -10 ft NGVD contour on the left descending bank.

4. Two alternative closure sites in Bayou Shaffer, each approximately 1 mi in length and 700 ft in width.

The primary instruments used in the remote-sensing survey were the proton precession magnetometer and the side-scan sonar. In the last decade, these instruments have become standard elements in the array of equipment used in searching for shipwrecks. Details on this equipment and the conduct and results of the study are provided in later sections of this report. In conjunction with the remote-sensing survey, an assessment of the geological history and shipwreck potential of each of the project areas was made. This information provided a background against which the results of the remote-sensing data could be interpreted. Interpretation relied, therefore, on the historical information available on vessel losses in each of the study areas and on the impacts that post-wreck, natural, as well as man-induced, activities may have had on wrecks in these areas. Identification and evaluations of these impacts were derived, in part, from assumptions about various effects that these forces would have on a wreck since actual accounts concerning post-wreck alterations in the region are rare. Interpretation of remote-sensing data also drew upon the available literature on similar shipwreck surveys. Each of these factors is fully discussed in the following chapters.

The data developed in this study are meant primarily to provide the New Orleans District with information on the cultural resources potential of these project areas. In addition, it is hoped that the information presented here will serve as a contribution to the broader realm of the District's overall management of cultural resources. This study is intended also to provide a useful contribution to the body of literature available on the use of remote-sensing in the search for boat wrecks.

Acknowledgements

The authors wish to acknowledge several people who helped bring this project to completion. Edwin Lyon served as Authorized Representative of the Contracting Officer for the New Orleans District, U.S. Army Corps of Engineers, and Michael Stout acted as Technical Representative. The field crews during the field survey included the authors, Charles Pearson and Allen Saltus, Jr., plus Allen Saltus, III, John Merryman, Bryan Guevin, Shelby Duay, Carey Coxe, and Jonathan Decker. Diving was conducted by Charles Pearson, Allen Saltus, Jr., and Bryan Guevin. Several residents of St. Mary Parish graciously provided information on the area's history and its boats. These included Mrs. Catherine Dilsaver and Mrs. Betty Guarisco, of the St. Mary Parish Library Archives, who graciously opened the files of the Archives to us; Mr. Roland Stansbury, who provided information on the Civil War period; Mr. and Mrs. George Adams, Sr., George Adams Jr., and Jessie Adams, who provided information on life and boat use along Bayou Shaffer and Bateman Island; and Curtis Leonard, who provided information on old boats and boat building in Morgan City. Curtis Latiolais drafted the figures for this report. All of these individuals are thanked for their efforts.

CHAPTER 2: NATURAL AND HISTORICAL SETTINGS

Geological History

The project areas lie within Atchafalaya Basin in the Mississippi River Deltaic Plain, a region composed of a thick wedge of fluvial sediments formed as the Mississippi River and its ancestral courses shifted positions across this region over the past 8000 years or so. The sediments of the deltaic plain result specifically from a sequence of delta building and abandonment under a condition of continuing subsidence (Fisk 1952; Frazier 1967). The developmental history of the deltaic plain has been well studied (e.g., Fisk 1952; Fisk and McFarlan 1955; Frazier 1967), and the geological and geomorphological processes responsible for the evolution of the Atchafalaya Basin are generally well known (see Smith et al. 1986). The recent history of the development of the lower Atchafalaya Basin is of concern in this study and is briefly discussed here.

The study areas fall within or immediately adjacent to the lower Atchafalaya Basin, the largest overflow swamp in North America. The basin is a large, shallow depression bounded by present and former Mississippi River courses. To the east are the present course of the Mississippi and the relict, Bayou Lafourche course. Bayou Lafourche apparently began to capture flow from the Mississippi River about 2000 years BP and reached its peak flow about 1500 years BP (Weinstein and Gagliano 1985:Fig. 1). To the west of the basin is Bayou Teche, a relict course of the Mississippi River that was occupied by the Mississippi from about 5800 to 3900 years BP and subsequently by the Red River until about 1800 or 1900 years ago (Kelley 1988:15). Specifically speaking, the natural levees of Bayous Teche and Boeuf at the Morgan City locale mark the southern boundary of the Atchafalaya Basin, such that the study areas located below this point actually fall outside of the basin proper (see Figure 1). However, the geological history, natural setting, and historical background of all of the study areas are similar and in many respects can be related to the Atchafalaya Basin as a whole. Therefore, when the term Atchafalaya Basin is used here, it is meant to include all of the study areas.

Measuring 45 mi wide and 120 mi long, the Atchafalaya Basin trends in a generally north to south direction, extending from above Krotz Springs, Louisiana, in the north to Morgan City, Louisiana, in the south. The basin consists primarily of swamps and numerous shallow lakes. Land surfaces in the region are flat and elevations range from 0 to 15 m, though most are generally less than 5 m. The upper, modern surface deposits of the Atchafalaya Basin are underlain by thick strata of sediments laid down by fluvial processes during the past 8000 to 10,000 years. These underlying deposits consist of two major units: a basal unit, known as the substratum, and an overlying unit known as the topstratum (Smith et al. 1986:41). The basal unit consists of coarse sands and gravels deposited during rising seas after the last Pleistocene glaciation, while the topstratum consists predominantly of sandy clay, silty clay, clay, and peat facies in backswamp, lacustrine, and lacustrine delta environments (Krinitzsky 1970; Krinitzsky and Smith 1969). The stratigraphic and lithologic evidence reveals that the basin was occupied by shallow lakes and backswamps throughout most of the Holocene (Smith et al. 1986:42).

The present physiography of the Atchafalaya Basin is largely the result of three events that have taken place in the last 2000 years (Smith et al. 1986:44), although significant changes have occurred just within the past 100 years. The first of these was the closure of the southeastern end of the Atchafalaya Basin by the Lafourche deltaic system. This occurred about 1500 to 2000 years ago when the natural levees of the Little Bayou Black-Bayou du Large distributary intersected those of the Mississippi-Teche (Bayou Black) near the present-day city of Houma. The levees of these distributaries formed a dam which impounded the

water coming into the basin from the north. Over a period of several hundred years, an extensive, shallow lake system was created in the southern portion of the basin, until, eventually, the impounded waters topped and cut through the natural levees of the Teche course at the locations of the present communities of Patterson and Morgan City.

During its early history, the system of lakes in the lower Atchafalaya Basin was quite expansive. Using archaeological site data and historical cartographic sources, Smith et al. (1986:45) found that the maximum up-basin extent of the prehistoric lake boundary was at Upper Grand River, about 45 mi above Morgan City. Lakes continued to cover much of the lower portion of the basin into the twentieth century. Figure 2 presents an excerpt from an 1829 map depicting the amount of open water in the lower basin at that time. Figure 3 presents a detail from an 1884 map of the area showing almost the same amount of open water, suggesting little loss of open-water habitat in the lower basin during the nineteenth century. Lakes in the lower basin area include Lake Fausse Point, Grand Lake, Six Mile Lake, and Lake Palourde.

Quite different processes were active in the northern part of the basin during this period. Along the active river channels, periodic overbank flow and crevassing resulted in the transmission of sediments into the interdistributary basin, gradually raising the elevations of the land surface. Natural levees, channel fill, and backswamps dominated the landscape (Castille et al. 1989:14).

The second event to significantly influence the development of the modern Atchafalaya Basin occurred approximately 500 years ago. At that time a shift in the course of the Mississippi River at Turnbull Island, about 50 mi above Baton Rouge, resulted in a change in position of the mouth of the Red River so that the Atchafalaya River became a distributary of the Mississippi. Continued and increasing flow into the newly formed Atchafalaya from the Mississippi soon established it as a significant distributary, eventually producing increased flow and sedimentation into the adjacent lowlands of the Atchafalaya Basin.

The final factors leading to the formation of the modern Atchafalaya Basin consisted of a series of man-produced activities undertaken since the third decade of the nineteenth century. These various activities have been directed, primarily, at improving the navigability of various streams in the Atchafalaya Basin and at flood control. These include the clearing of a large log raft at the head of the Atchafalaya River and dredging in the upper parts of the river beginning in 1839 to accommodate commercial navigation; the establishment of the basin as a flood control project in 1928, and the subsequent construction of guide levees and water control and navigation structures; the construction of levees; dredging; and, in 1963, construction of the Old River Control Structure. This structure has served to regulate flow into the basin at 30% of the Mississippi River discharge, and, also, is intended to prevent capture of the Mississippi River flow down the Atchafalaya Basin.

As a result of these changes, sedimentation within the restricted, artificial flood basin has dramatically increased. The increased sedimentation is rapidly converting the basin from a predominantly swamp and lake environment to an increasingly terrestrial one. Prior to about 1930, the zone of most rapid sedimentation and land formation was in the upper and middle basin, north of Grand Lake. However, since that time the portion of the lower basin between Grand Lake and Morgan City has undergone extensive changes, experiencing massive filling in a relatively short period of time. Progressively migrating downstream, the zone of sedimentation formed a substantial lacustrine delta in Grand Lake by 1930 (Fisk 1952), and, by 1951, approximately one half of Grand Lake had been filled and numerous islands had developed in Six Mile Lake. By 1975 an estimated 85% of the lake system in the lower basin had been filled, as shown in Figure 4. The extent of filling is apparent when comparing the size of Grand Lake through much of the nineteenth century, as shown in Figures 2 and 3, with

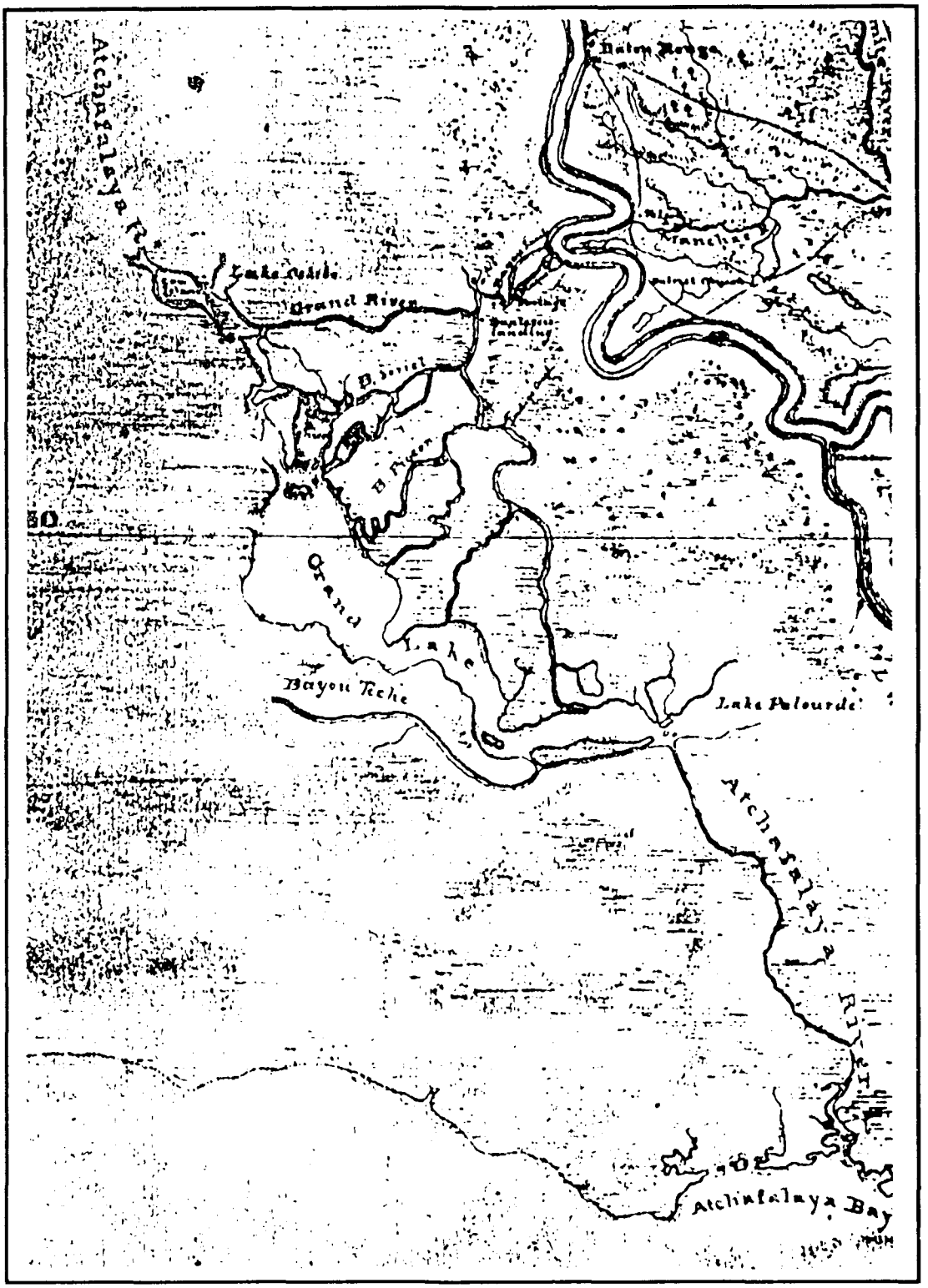

Figure 2. Detail of 1829 map showing lake conditions in the lower Atchafalaya Basin (source: Swift 1829).

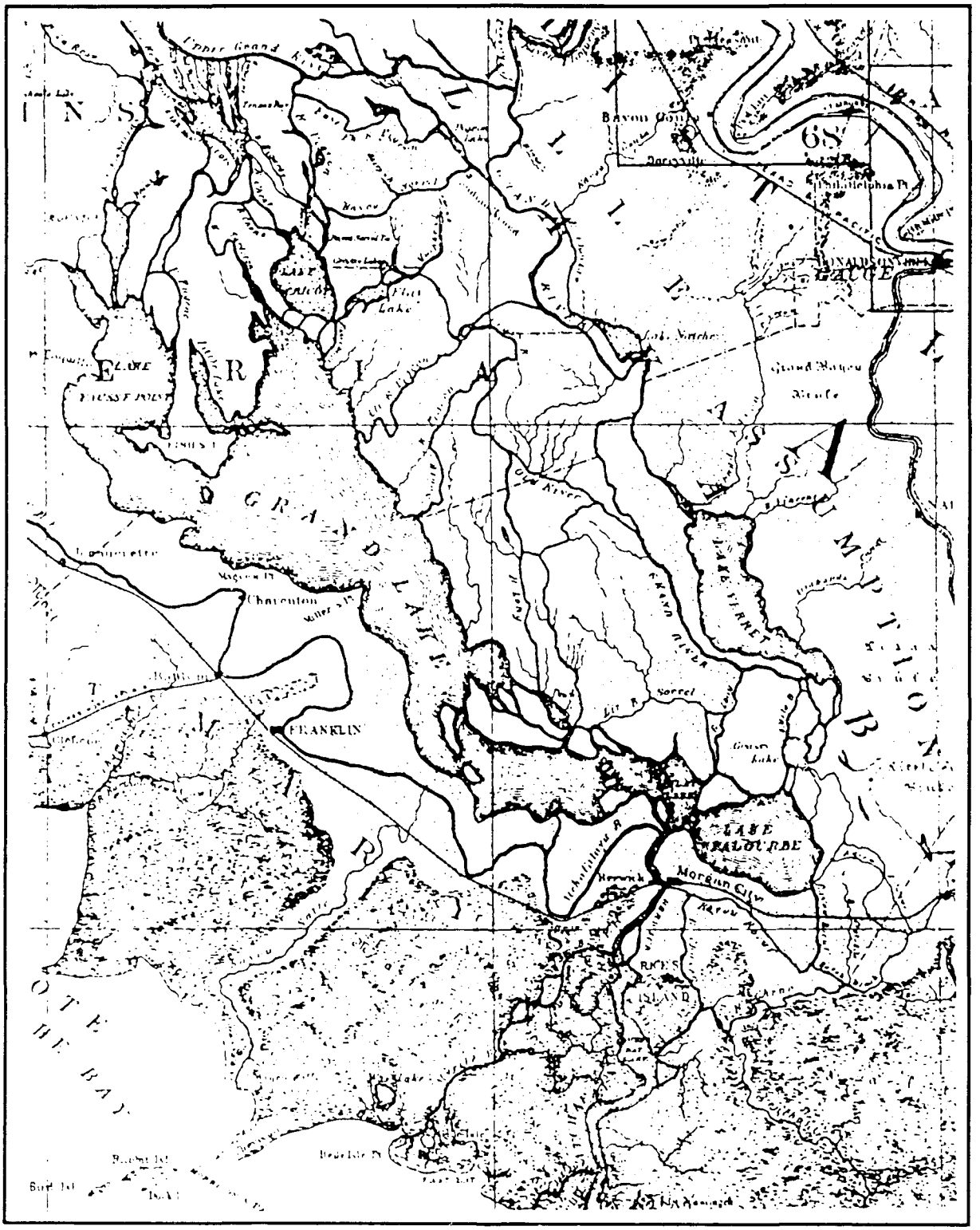

Figure 3. Detail of 1884 map showing lake conditions in the lower Atchafalaya Basin (source: Mississippi River Commission 1884).

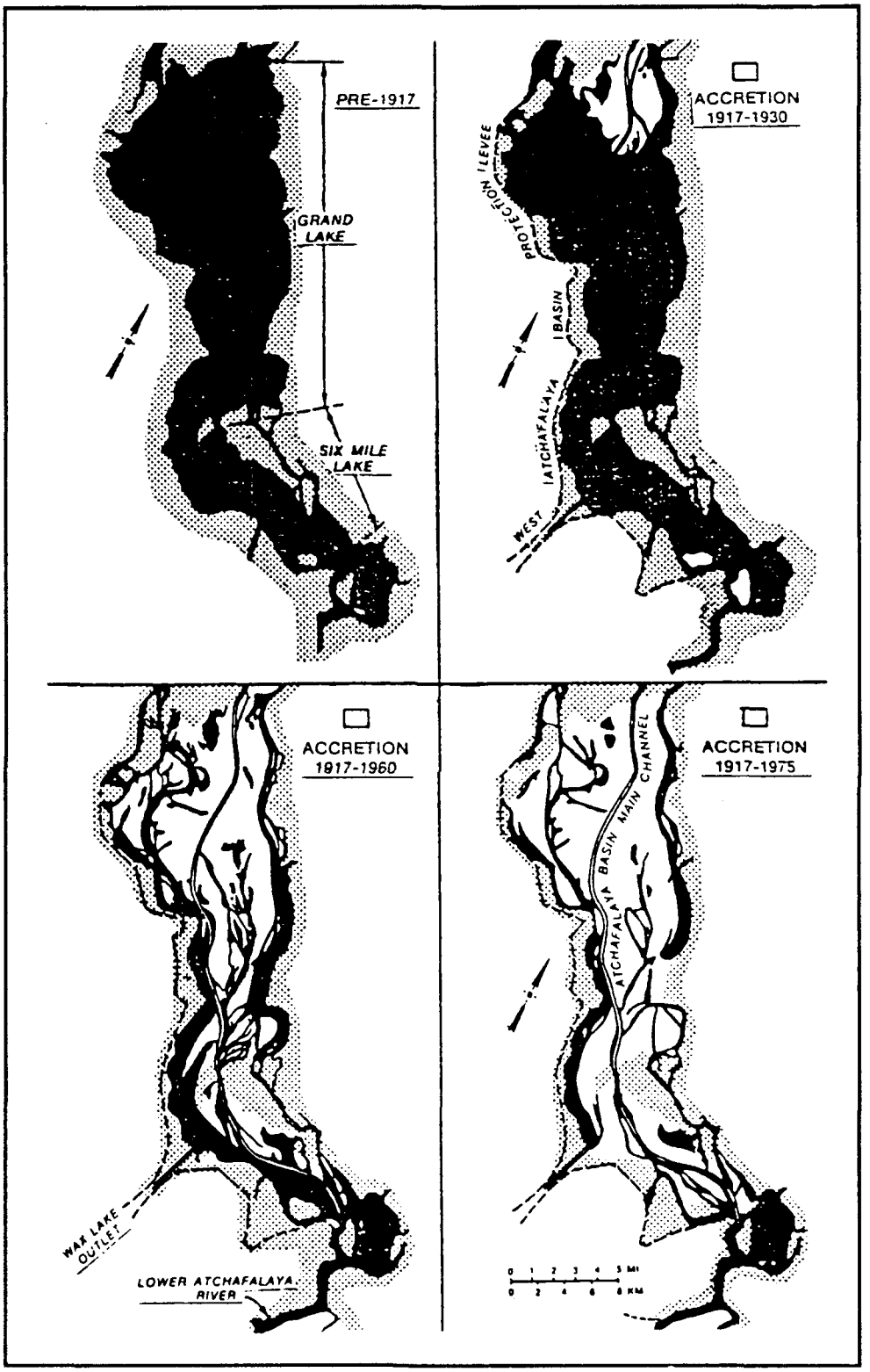

Figure 4. Sequence of filling of Grand and Six Mile lakes (source: Smith et al. 1986).

the post-1900 changes shown in Figure 4. It is estimated that complete filling of Grand and Six Mile Lakes is likely by the year 2000 (Smith et al. 1986:54).

To maintain the navigability of the Atchafalaya and to improve the discharge capability of the river, the Corps of Engineers began a dredging program in the basin in 1932. Between 1932 and 1940, a channel was dredged through the developing deltaic area in the middle and lower basin. Dredging was commenced in the upper basin in 1938, plus improvements were instituted in the area of the junction of the Red, Old, and Atchafalaya Rivers (U.S. Army Corps of Engineers 1982:A-16). In 1954, a program was begun to accelerate the maturation of the Atchafalaya River through increasing its cross-sectional area to 100,000 square feet. This program involved increasing confinement of flows to the main channel by closure of distributary streams, dredging of the main channel, and placement of dredged material along river banks (U.S. Army Corps of Engineers 1982:A-16). This program of work was discontinued in 1968; however, since that time the channel cross-section has increased at certain locations. However, below River Mile 100, which includes most of the areas examined in this study, little confinement had been achieved and the average channel area as of the late 1980s was only about 38,000 square feet (U.S. Army Corps of Engineers 1982:A-16, Table A-4-7).

The two study areas located along the Atchafalaya Basin Main Channel above Morgan City have been most affected by the recent physiographic changes occurring in the basin. Figure 5 presents a sequence of bankline locations since 1838 and information on infilling for the two upper study areas. In the nineteenth century these two study areas fell within Grand Lake, at that time the largest lake in the basin. The distinction of the lower part of Grand Lake as Six Mile Lake seems to have occurred during the early years of this century, probably as Grand Lake began to fill. There is no specific hydrographic information from Grand Lake for the early period; however, in general, it was relatively shallow. John Landreth, who was involved in a survey of timber resources along the lower Atchafalaya Basin area for the United States government in 1818 and 1819, provides some useful information on the character of the region at that time (Newton 1985). During his travels across Grand Lake, Landreth commonly noted water depths. Generally, he indicated that the lake was on the order of 6 to 10 ft deep and his deepest measurement, made near the middle of Grand Lake, was 21 ft (Newton 1985:31).

Since the early years of this century, and particularly since the early 1940s, massive sedimentation and filling has occurred in the vicinity of these two areas. This change is depicted in Figure 5. For most of their lengths, the study areas fall within what had once been portions of shallow lakes. It is only in the area of Cypress Island Pass (located on the east side of Cypress Island) and just above American Pass that the study areas lie near landforms that are older than 50 years (Figure 5). Also shown in Figure 5 is the route of the navigation channel used in the period of the 1930s through 1950s (Fisk 1952). As can be seen, much of the area of this former navigation channel has since been infilled and incorporated into made land. The present navigation channel, the Atchafalaya Main Channel, follows the major course of the river in this area. This is a maintained channel whose existence is related as much to human activities as to natural processes.

Further information on the dramatic changes occurring in the morphology of the lower Atchafalaya River above Morgan City can be found in a series of cross-sections provided in Latimer and Schweizer (1951). Two cross-sections falling in the vicinity of the project areas above Morgan City are shown in Figure 6. These sections show that significant amounts of sedimentation have occurred in the vicinity of the main channel since 1917. Even more dramatic, however, is the clear demonstration that the modern channel (i.e., 1974 channel) is significantly deeper than it was prior to dredging in the 1960s. This dredging, plus the other projects undertaken to confine the flow to the main channel, have acted to maintain, as well as

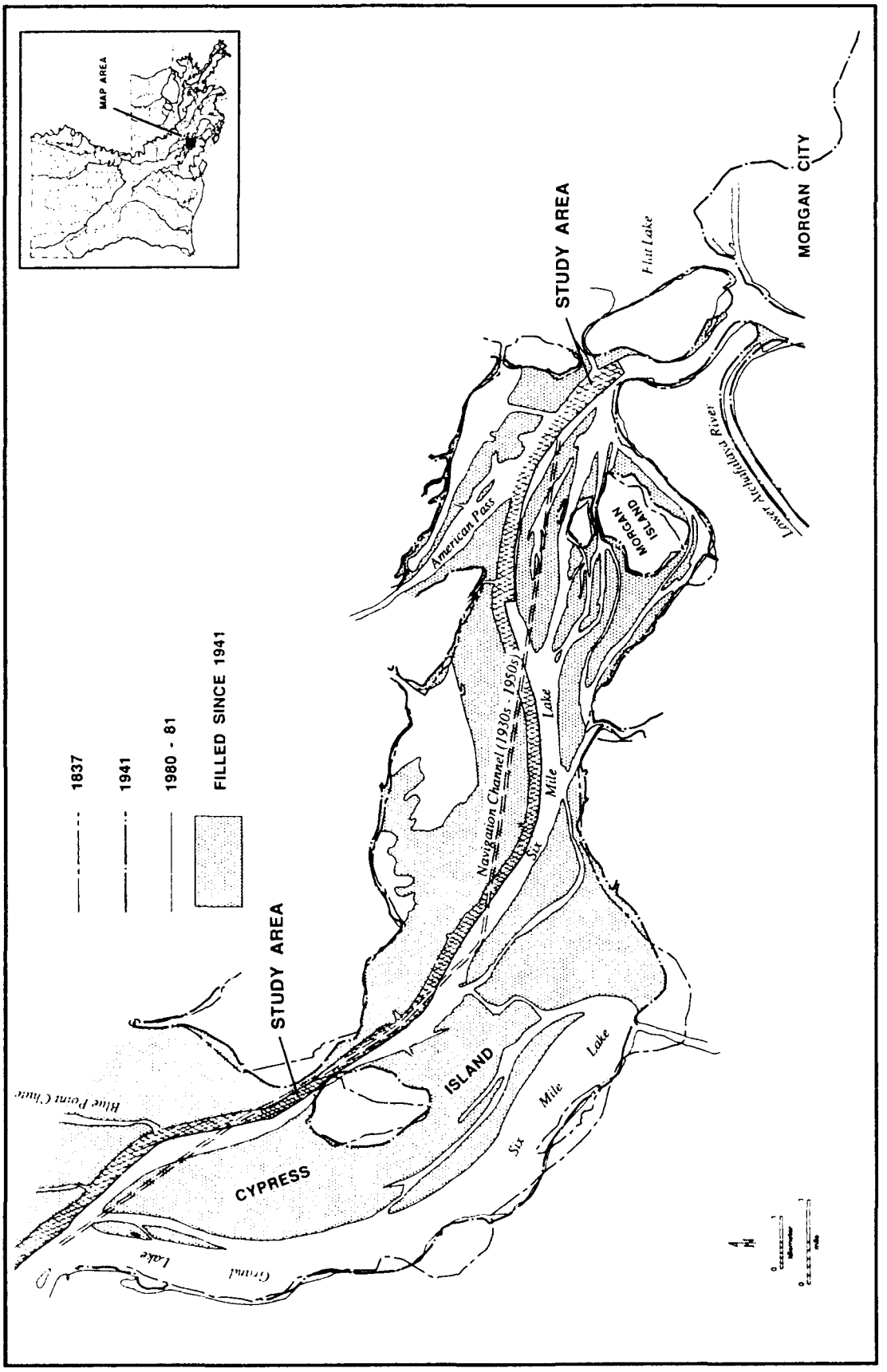

Figure 5. Physiographic changes in the study areas located above Morgan City.

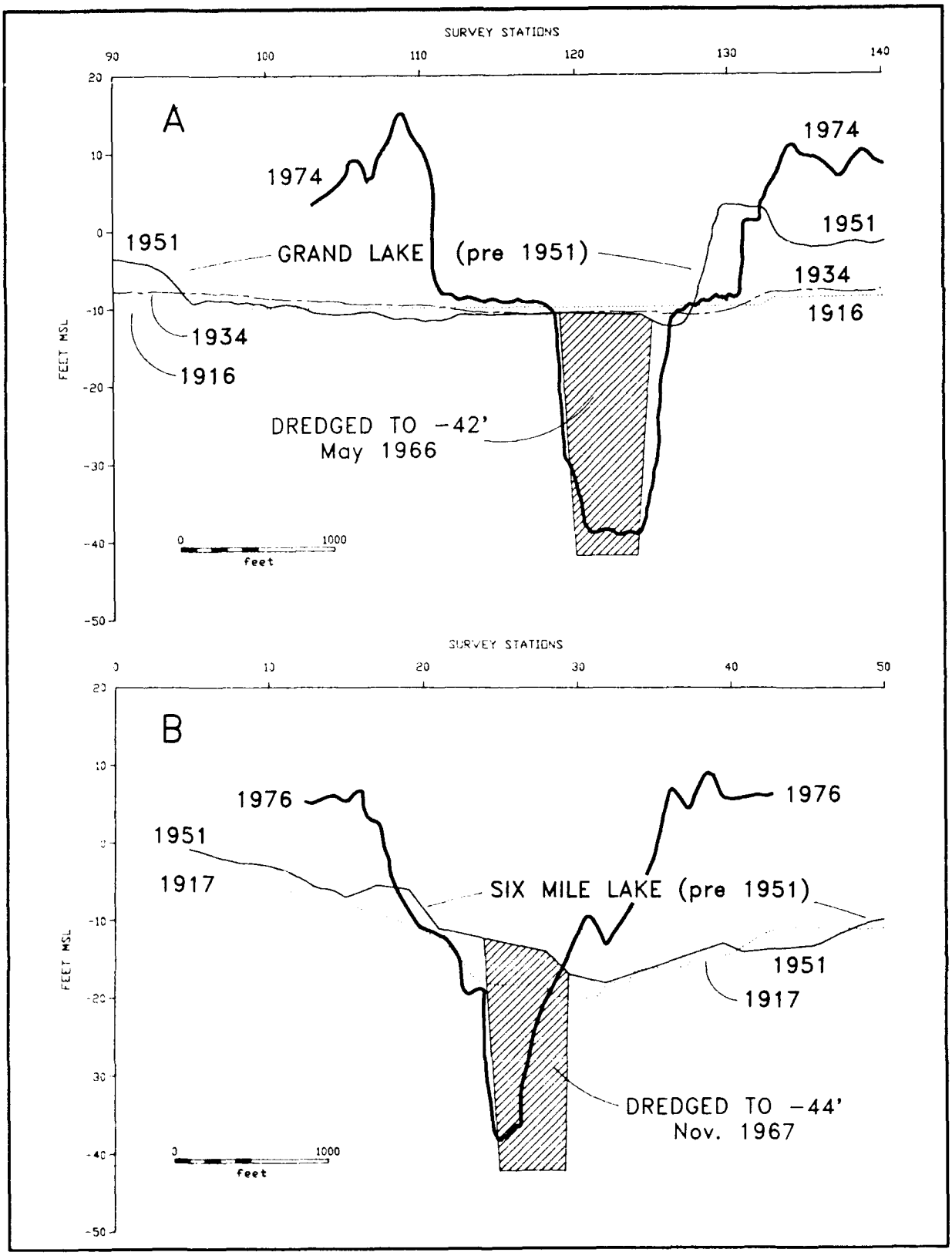

Figure 6. Cross sections taken across the Atchafalaya Main Channel in the vicinity of the study areas located above Morgan City. A. Near River Mile 102; B. near River Mile 108 (source: Latimer and Schweizer 1951).

create, a deep channel. For example, near River Mile 102, the 1974 channel was almost 30 ft deeper than it had been prior to 1934 (see Figure 6,A).

This assessment of the physiographic and geomorphic histories of the vicinities of the two project areas is important because it has a bearing on both the navigation history and the shipwreck potential of the areas. These factors are discussed in more detail later in this report; however, here it can be noted that most of the area surveyed above Morgan City encompasses locations that until fairly recently were shallow-water lakes. There is no evidence that the entire lengths of the designated study areas correspond closely to historic navigation routes. Available information on nineteenth-century navigation does indicate that a principal water route across Grand Lake passed through Cypress Island Pass and Stouts Pass and that American Bayou and American Pass (or Grand Pass as it is sometimes called) were traveled by, at least, small boats. Since an early period American Pass has served as a water route to Bayous Sorrel and Boutte and on into the interior of the Atchafalaya Basin. American Pass has apparently never been a major route for commerce, and the vessels using this stream probably consisted mainly of pirogues, bateaus, and, possibly, small luggers, and more recently a variety of small motorized boats. (Abbot 1863; Pearson et al. 1989; Pearson and Saltus 1989:14). Presumably, the wreck potential of these study areas are high only where they correspond to former navigation routes and/or where they include or are adjacent to older landforms where landings, docks, or other watercraft-related activities may have been concentrated.

Further, as graphically demonstrated in Figure 6, the present maintained navigation channel in this area is much deeper than it was prior to the 1950s. Thus, there is a fairly high probability that vessels lost within the bounds of the present channel have been disturbed or removed by dredging or by the significant increase in the channel's flow.

Figure 7 provides information on bankline changes and infilling that has occurred in the study areas located below Morgan City. Modern (1980) and 1935 bankline information are shown. Bankline data from the plat maps of the 1830s were examined, but numerous inaccuracies in these maps made it impossible to accurately correlate them with more modern information. Sedimentation rates below Morgan City are much lower than in the basin proper above the city. As can be seen along Bayou Shaffer, channel changes have been slight in this century, and other map data indicate that the present course of the bayou pretty much follows the nineteenth-century course. The course of the Atchafalaya River below Morgan City, also, has been relatively stable such that the three study areas here fall primarily within the nineteenth century course.

Historical Background

Over the past several years, there have been a number of studies that provide information on prehistoric and historic settlement and use of the Atchafalaya Basin and vicinity. Of primary concern to the present research are those that provide information on boat use and the history of navigation in the region and on the known or probable occurrence of sunken vessels. Probably the best synthesis on human history in the basin is found in Jon Gibson's work (Gibson 1982). Other studies resulting from cultural resources management projects provide information on the history of the basin and the surrounding area (e.g., Castille et al. 1989; Goodwin et al. 1985a, 1985b, 1986; and Kelley 1988). In addition, a large literature is available dealing with the Acadians of south Louisiana. Of particular pertinence are the works that deal with Acadian life in the Atchafalaya Basin (e.g., Comeaux 1972, 1978; Conrad 1978; and Knipmeyer 1956). Details on the human history of the Atchafalaya Basin can be found in the works referenced above. Pearson et al. (1989) provide specific information on the history of navigation and on boat losses in the region, and several other works include discussions of

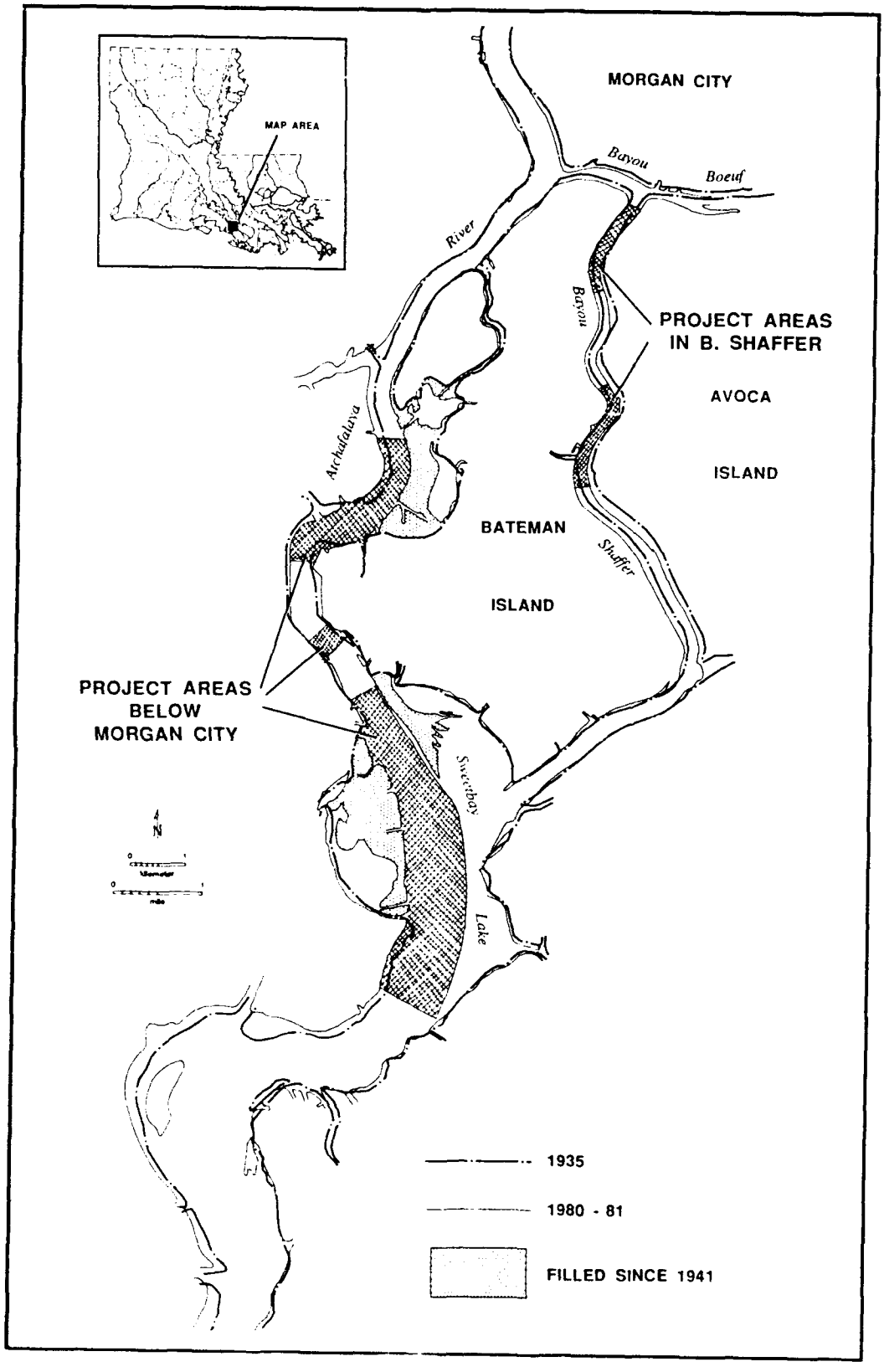

Figure 7. Physiographic changes in the study areas located below Morgan City.

watercraft and navigation in the Atchafalaya Basin area, particularly Castille et al. (1989) and Goodwin et al. (1984, 1985a, and 1986). Recently, Pearson and Saltus (1989) conducted a remote-sensing survey and diving project at Blue Point Chute and American Pass, two locations along the Atchafalaya Main Channel above Morgan City, both of which fall within the study areas considered in this project. Many of the field techniques used in that study were applied in the present research.

In the following sections, a brief discussion of the history of the region is given with an emphasis on the use of watercraft in the area. This background serves to identify the potential that the study areas have for containing the remains of boat wrecks. More detailed information on the cultural histories of the region can be found in the studies referenced above.

Navigation History

The Prehistoric Period

Because of its wet and swampy nature, most of the Atchafalaya Basin has always been inhospitable to human settlement. The archaeological record indicates that much of the prehistoric settlement of the region was confined to the fringes of the basin and to a few areas of high ground (primarily natural levees) within the interior (Gibson 1982). The Atchafalaya Basin is, however, a rich ecosystem and there is no doubt that prehistoric populations utilized it extensively for hunting, fishing, and collecting. Access into and across the basin would have been entirely dependent upon water transportation. Many well-established water routes were in use by the native inhabitants of the basin area when Europeans first arrived. Use of these waterways certainly extended well into the past. All of the available historical evidence indicates that the watercraft used by aboriginal groups in Louisiana was the dugout canoe or, as it came to be called by the French, the *pirogue*. These canoes were made from single logs, usually cypress, and, based upon the few examples known from Louisiana, were often up to 30 ft or more in length (Pearson et al. 1989). Over millennia of use in the Atchafalaya Basin, there is no doubt that many of these canoes were lost or abandoned and remain buried and preserved in the anaerobic environment produced by the thick sediments of the area.

Colonial Period, 1700 to 1803

Intrusion into the lower Atchafalaya Basin region by Europeans began with the French during the early decades of the eighteenth century. Initial French activity in the region was undertaken by parties of exploration and later by traders and hunters, many involved with the indigenous populations, who in the lower Atchafalaya Basin were primarily the Chitimacha Indians. The earliest permanent European settlement in the Atchafalaya Basin consisted of *vacheries* or cattle ranches, many of them located on the Teche ridge, at the western periphery. These settlements occurred after the Spanish acquisition of Louisiana in 1763. The Spanish interest in exploiting the colony's rich agricultural potential was expressed in liberal immigration and land granting policies. In 1765 the *Poste de Attakapas* (present-day St. Martinville) was established by Acadian refugees who had begun to arrive in the area in the late 1750s. This settlement was the center for what was called Attakapas District, originally comprised of present-day St. Martin, Iberia, St. Mary, Lafayette, and Vermilion Parishes. Later, in 1778, a small settlement was established at New Iberia, and throughout the Spanish period (1763-1803) immigration into the area continued and settlement along the natural levees of Bayou Teche and Bayou Boeuf grew and expanded. The first census of the Attakapas District, made in 1770, recorded 166 whites and 33 slaves, indicating the still sparse settlement in the region (Goodwin et al. 1985a:34). These early settlers were primarily subsistence farmers or cattle ranchers, and many certainly visited the adjacent Atchafalaya Basin swamps as trappers, hunters, and fishermen, and also to extract cypress and live oak timber.

The earliest European settler in the Morgan City-Berwick area was apparently Thomas Berwick, a surveyor of the Attakapas District. Berwick had conducted surveys in the region in the 1790s and subsequently settled on Tiger Island, the location of present-day Morgan City (Goodwin et al. 1985b:34). One of Berwick's sons, Joseph, settled across Berwick Bay on the site presently occupied by the town of Berwick.

The waterways of the Atchafalaya Basin also provided transportation routes eastward to the Mississippi River and Bayou Lafourche. In the eighteenth century there were two main routes into the region. Both entered the eastern side of the basin, through Bayou Plaquemine, a distributary of the Mississippi River (Gibson 1982:110-111). The northern route "followed Bayou Plaquemine to Bayou Grosse Tete and then along Grand River, Atchafalaya River, and Bayou Courtableau to Bayou Teche at Port Barre" (Gibson 1982:110-111). By the 1860s, the upper Grand River route had apparently become choked by log rafts, forcing travelers to shift southward, bypassing Grand River in favor of a longer route through Bayou Sorrel, Lake Chicot, Bayou Chene, and Bayou La Rompe to the upper Atchafalaya River (Castille et al. 1989:38). Those traveling the southern access either followed Grand River southward through Bayou Long to enter the Teche near Morgan City or traveled down Bayou Sorrel to Chicot Bay entering into the northern end of Grand Lake. From there this route continued across the lake to the Lower Atchafalaya River and on into Bayou Teche near present-day Patterson (Gibson 1982:110-111; Graham and Tanner 1834; Prichard et al. 1945). Case (1973:30-34) reports that flatboats were traveling this latter route to the lower Teche as early as 1795. These flatboats carried merchandise as well as settlers and their property into the region. The importance of Bayou Plaquemine as the main connecting artery to the Mississippi is indicated by the fact that as early as 1770 attempts were made to clear and deepen the waterway as an aid to navigation (Comeaux 1972:9).

Several other minor routes also were in use. One used Bayou Pigeon to cross the interior of the basin and one connected the Lower Atchafalaya River to Grand River through Lake Palourde. During this very early period, travel into the Atchafalaya Basin via the Atchafalaya River from the Gulf of Mexico occurred, but it was not until later that this approach became important, particularly, for larger vessels traveling to and from New Orleans and other ports on the Gulf coast and overseas.

A variety of small boats plied these waterways in the eighteenth and into the nineteenth century. Some of these types continued in use until recent times. The European settlers quickly adopted the dugout canoe of the Indians, and the pirogue became probably the most common watercraft. Other types of boats that came into use were the *chaland*, *esquif*, and *bateau*. The *chaland* is a rectangular, flat-bottomed boat, normally only 10 to 14 ft long. This boat was most often used as a ferry or for transporting bulky loads for short distances (Knipmeyer 1956) (Figure 8). The *esquif*, or skiff, is flat-bottomed with a pointed bow and blunt stern (Figure 8). Skiffs were propelled by sails and/or oars. Knipmeyer (1956:167) indicates that the skiff became more popular through time as the use of the pirogue declined. The term *bateau* actually can refer to several types of vessels. The eighteenth-century bateau was a flat-bottomed boat, tapered at both bow and stern, which was used as a cargo carrier. Bateaux ranged from 12 ft in length to greater than 80 ft; however, most were from 20 to 40 ft long. The bateau could be rowed, poled, or sailed. Large bateaus were used on the Mississippi River beginning in the eighteenth century, while smaller ones were employed on the lesser streams of south Louisiana (Pearson et al. 1989:95). It is certain that some of these cargo bateaus were used on the waters of the Atchafalaya Basin.

As presently used, the term bateau also refers to a large, flat-bottomed boat with a blunt bow and stern. These craft are usually over 15 ft long, 5 ft wide and sheered forward. Sometimes, the deck of bateaus are partially planked to provide a working space. This type of boat is still occasionally used in the Atchafalaya Basin.

Figure 8. Nineteenth-century drawing showing flatboat (chaland) used as a ferry at Morgan City, a typical river skiff (esquif), and a schooner (source: Waud 1866 in Comeaux 1972:8).

The common characteristics of all of these vessels are that they are shallow draft, relatively small and tend to be flat-bottomed. These attributes were, and continue to be, ideally suited for the shallow and often narrow waterways found in the region.

Antebellum Period, 1804-1861

In 1803, Louisiana was transferred from Spain back to France as the political situation changed with the ascendency of Napoleon. France's economic and political situation forced her to abandon much of her New World holdings and in 1804 she sold her immense Louisiana colony to the United States for $15 million. The transfer of ownership initially had little effect on the inhabitants of the Atchafalaya District. However, beginning in the first decades of the nineteenth century there was a shift in the economic base of the region, leading to the development of a plantation economy. Technological improvements in the cultivation and processing of cotton and sugar led to their rapid acceptance as the primary commercial crops throughout southern Louisiana. Initially, the principal cash crops were cotton, indigo, and sugar cane. The production of indigo soon ended because of insect blights and economic problems. By the 1830s sugar cane had become the dominant crop, stimulated by the development and perfection of the sugar refining process in the late 1700s.

Many of the sugar planters who flocked to the Attakapas District in the 1820s and 1830s were Anglo-American immigrants, attracted by cheap, available land and anticipated high returns on sugar. Many of these new residents, unlike most of the local small farmers, had access to substantial capital; a necessity in establishing a sugar plantation because of the

high costs for land and slaves, grinding and processing equipment, and sugar house (Taylor 1976). Gradually, as the new American planters began to profit from their investments and expand their holdings, the wealthier Creole landowners began to shift to sugar production. By 1828 there were 99 sugar plantations in the Attakapas District, increasing to 162 the following year (Sitterson 1953:25) and during the years preceding the Civil War, sugar cultivation had spread to almost all of the arable land in the area.

Settlement on Avoca Island, just across Bayou Boeuf from Morgan City and bounding the eastern side of Bayou Shaffer, seems to have begun in the early years of the nineteenth century. The surveyor Landreth reports a "small settlement of white people [,] John Henry a Dutchman and Alexander Grosure a Frenchman" on the eastern end of Avoca Island in 1819 (Newton 1985:64; Kelley 1988:31). James Leander Cathcart, who lead the 1818-1819 timber survey expedition of which John Landreth was a member, noted that the western portion of "Cowpen" (Avoca) Island was claimed by a Mr. Rice who lived across Bayou Shaffer on what is now Bateman Island (Prichard et al. 1945:792). Samuel Rice, who apparently settled the land during the late-eighteenth century, located his habitation on the northern end of the island, facing onto Berwick Bay and Bayou Boeuf (Kelley 1988:39). Bateman Island appears as Rice's Island on many nineteenth-century maps.

In 1825, Samuel Rice sold his Cowpen Island (Avoca Island) property to William Washington Wofford, Sr., a native of South Carolina (Kelley 1988:39). Wofford established a sugar plantation on the natural levees along the northern end of Avoca Island, placing his residence, sugar house, and quarters at the northwestern corner of the island, at the juncture of Bayou Shaffer and Bayou Boeuf. No doubt landings and sugar docks were located along the banks of both bayous in this area. In 1901, Wofford's Avoca Island plantation was acquired by Captain John Newton Pharr, one of the largest sugar planters in the area (Kelley 1988:43). Pharr was also involved in the lumber and shipping businesses and came to own several steamboats that plied the waters of the area.

The important communities along Bayou Teche at this time were St. Martinville, New Iberia, and Franklin. The interior of the Atchafalaya Basin began to be settled as early as the 1840s. During this period, small plantations were established around Bayou Chene (Gibson 1982:124), and by 1845 agriculture had begun along Bayous Pigeon and Sorrel, and Grand River (Comeaux 1972:15).

With the development of the plantation economy, access to the major markets in New Orleans became increasingly important and that access was by water. The importance of travel by water in the region is emphasized in statements by C.C. Robin, who traveled through the region in 1805. He noted:

> People in this country are so accustomed to travel by water that the generic term "voiture" [standard French for "carriage"] is always applied to a boat. If a Louisianian says to you "I brought my voiture"; "Can I give you a lift in my voiture"; he is referring to his pirogue or skiff as a Parisian using the same word would mean his coach [in Gibson 1982:114].

About 1810 the Attakapas Canal was dug, providing access from Bayou Lafourche to Lake Verret and, thus, to the lower Atchafalaya Basin and the area of Bayou Teche to the west (Prichard, Kniffen and Brown 1945:757). James Leander Cathcart, who lead the 1818-1819 timber survey expedition of which John Landreth was a member, provides some unique descriptions of the types of water transport in use in the region at that time. In January of 1819 he noted in reference to the area of present-day Morgan City:

> . . . the flats (so call'd) used at this ferry, are form'd of two large canoes, on which is a platform for houses, the price of carriage for a man and horse is 12 dollars, and for black cattle 1.50 cs per head they cross the lake to the canal which runs into Lake Verrett from Lafourche a distance of 30 miles, and from thence passengers proceed to Donaldsonville, and take passage in steam boats that pass either up or down the Mississippi, at the rate of $12^1/_2$ cts per mile. The flats or double canoes, row with two or more oars, and sail when the wind is fair, the rudder is on one canoe only, the pilot sits on the platform, and steers with a yoke and lines, as he would a gid or wherry [Prichard, Kniffen and Brown 1945:796].

Cathcart's fellow traveler, John Landreth, while on Bayou Teche in March of 1819 reported that:

> . . . now the western waters are high there is a constant passing of boats loaded with the produce of the country for the New Orleans Market Sugar and cotton &c a number of what they call keel boats pass Franklin every day down the Teche carrying from one hundred to three hundred bales of cotton each these boats are generally rowed by Eight ten and twelve oars and a man to steer [Newton 1985:124].

Keelboats were used not only on the Teche, but also on the cross-basin journeys, especially during the early-nineteenth century, prior to the introduction of steamboats. During his travels across the Atchafalaya Basin, Cathcart noted a spot on Lake Natchez where "keelboats which draw less water than ours are frequently detain'd aground for 8 & 10 days" (Prichard et al. 1945:760). Castille et al. (1989:Appendix B) record 21 keelboats registered in the Atchafalaya-Bayou Teche region between 1805 and 1820. Most of these boats were built in cities like Pittsburgh or Cincinnati along the Ohio River, or along the Cumberland River in Tennessee. These keelboats were quite large, averaging about 90 ft in length, 13 ft in breadth, and 30 to 35 tons in burden. A few keelboats were locally-built, and these tended to be smaller, measuring about 60 ft long (Castille et al. 1989:Appendix B).

Prior to the establishment of Brashear City (present-day Morgan City) in the 1850s, the town of Franklin on the lower Bayou Teche was the principal "deep water" port in the area. The town was a considerable distance from the Gulf. However, deep-water access could be obtained by the Atchafalaya River and the lower stretches of Bayou Teche. Large ocean-going sailing ships called at Franklin from all over the world to unload manufactured goods and foodstuffs and to take aboard the sugar, cotton, lumber, and other commodities of the region. For example, on December 6, 1845, the Franklin newspaper *The Planters Banner and Louisiana Agriculturist* notes several vessels that had arrived and departed during the week. The list consisted of the following:

Arrived

Schooner, *Gen Patterson*, Captain Wells, Philadelphia
Schooner, *Florence*, Captain Smith (no port of origin)
Brig, *Abby Amelia*, Captain Colburn, Kingston, Jamaica
Schooner, *Alido*, Captain Usher, Breston, R.I.

Departed

Schooner, *Gen. Clinch*, Captain Ratcliff, Richmond, Virginia
Schooner, *Patriot*, Captain Purchase, New York
Brig, *Abby Amelia*, Captain Colburn, New York
Schooner, *Alido*, Captain Usher, Charleston

These large sailing vessels were confined to the lower reaches of the Atchafalaya River and Bayou Teche. Most were too large to enter the Atchafalaya Basin or venture up the Teche beyond Franklin.

Steamboats seem to have reached the Atchafalaya Basin in about 1819; one of the first in use was the 103-ton *Louisianais,* constructed in New Orleans. This boat was employed mainly as a cattle ferryboat. By 1820 the Attakapas Steamboat Company was operating the 295-ton steamer *Teche* between New Iberia and New Orleans (Goodwin et al. 1985b:184). Another early boat was the *Volcano*, a 217-ton steamer used as a cattle boat. In 1825, Captain Robert Curry brought the small, 48-ton *Louisville* through Bayou Plaquemine, across the Atchafalaya Basin to the town of Franklin on Bayou Teche (*Planters Banner* 4/27/1848, in Gibson 1982:116). Later steamers followed the route established by Curry. By 1827, clearing of Bayou Sorrel and Lake Chicot for navigation had begun. Steamboat navigation in the Atchafalaya Basin proper was seasonal; largely dependent upon high water. Fortunately, high water occurred during the winter and spring, when agricultural products (mainly sugar and cotton) were ready for market. Bayou Teche was usually navigable year-round and steamers could sail as far as New Iberia, which eventually developed into an inland center for water transportation (Gibson 1982:116).

Although most early steamboats were registered in New Orleans, at least two were registered in the region prior to 1820: the *Teche* in Franklin and the *Henderson* in Henderson. The *Teche*, owned by the fledgling Attakapas Steamboat Company was built in New Orleans in 1820, one of the earliest steamboats built in that city. She measured 295 ft long and reportedly had a draft of 10 ft (Work Projects Administration [hereafter cited WPA] 1941:Vol 3:124). This deep draft was not unusual for very early steamboats, which were built along the lines of oceangoing vessels, but it would certainly have limited the *Teche* to operation in only the deepest waters of the Atchafalaya Basin and Teche region. The *Henderson*, built in Cincinnati, Ohio, in 1818, is somewhat anomalous because its hailing port was located along the northwestern edge of the Atchafalaya Basin, in an area which was not noted for substantial economic activity prior to 1820. This fact, plus the presence of three separate Bayou Portages along the western margin of the Atchafalaya Basin, suggests that planters and merchants of the Teche region were seeking alternate routes for getting their goods across the Atchafalaya Basin. Throughout the nineteenth century most goods originating in the Teche region were transported across the basin via routes through either Franklin or Morgan City at the south end or through Washington at the north end.

Advertisements for steamboats in nineteenth-century newspapers often note that boats to the "Attakapas" were "light draught" and able to run during the low-water season. Typical are the following advertisements from the October 18, 1845 edition of *The Planters Banner*:

> New Orleans and Attakapas Regular Packet, The New, light draft and fast running, double engine steamer Judge McLean, M.W. Hinkle, Master, will run during the ensuing season as a regular weekly Packet between New Orleans and Attakapas. This boat is well adapted for the trade being of very light draft (only 26 inches light,) having fine accommodations and running fast. She stands as high in the Insurance offices as any boat. She will commence running, via the Atchafalaya about the 10th of November, if Plaquemine should not be open so soon.
>
> ---
>
> Summer Arrangement. Attakapas Packet, between New Orleans & St. Martinville. The Light Draught, Substantial Steamboat Waverly, J.V. Singer, Master, Will run as a regular packet, during the season, via the Plaquemine and Atchafalaya, leaving New Orleans every Sunday morning, at Ten o'clock,

> A.M., and St. Martinville every Tuesday, at One o'clock P.M., landing freight and passengers at all intermediate landings. . . . The Waverly being of light draft, will remain in the trade and be able to run the whole season, during low water. A share of patronage is expected.

As one of the the advertisement notes, the *Judge McLean* would take the sea route from New Orleans, through the Gulf and up the Atchafalaya River, if necessary. Many of these early steamers were fairly small and not adapted to travel in open Gulf waters, thus they preferred the inland routes across the basin. By the 1840s, however, steamers were commonly traveling to the Attakapas region by the sea route. For example, also included in the October 18, 1845, edition of *The Planters Banner* was the following advertisement for the steamer *Belle of Attakapas*:

> New Orleans and Attakapas Packet, The substantial and well known steamer Belle of Attakapas, Captain C. Johnson, having been thoroughly repaired, and refitted, will run, on the sea route as a regular packet throughout the season, between New Orleans and New Iberia, taking freight and passengers for all intermediate landings on the Teche, Atchafalaya & Bayou Boeuf.

In addition to agricultural products and passengers, livestock became an important commodity in the steamboat traffic in the Atchafalaya Basin. Large numbers of cattle were raised in the prairie lands of western Louisiana, driven to the points on the western side of the basin and transported across to Bayou Plaquemine (Duperier 1979:59-60, in Gibson 1982:117). Additionally, cattle were driven to Berwick, carried by ferry across Berwick Bay to Brashear City (Morgan City), and then driven along elevated natural ridges toward New Orleans.

Documentation on the cross-basin steamer trade can be found in nineteenth-century records of commercial establishments in the Plaquemine area, as well as along Bayou Teche. For example, the register of the steamboat *Trader* and bills of lading for Iberville Parish merchant John L. Pointer offer significant evidence on the nature of the trade between Plaquemine and the Bayou Teche region during the 1840s (Louisiana and Mississippi Valley Collections, Louisiana State University: John Pointer Papers; S.B. *Trader* Register). Between 1841 and 1843, the *Trader* made frequent trips between Bayou Teche and Plaquemine visiting such towns as Franklin, New Iberia, St. Martinville, Opelousas, Indian Village (along Bayou Plaquemine), and Plaquemine. The types of cargo carried on two typical trips are listed in Table 1.

The *Trader* carried merchandise and supplies from the Mississippi River into the Atchafalaya Basin and Teche region, and on the return she carried out agricultural products such as sugar and cotton for sale at commercial centers, particularly New Orleans. Pointer shipped goods to the Teche region via other steamers too, including the *Alexander Gordon*, *William Woods*, and *Panola*. These vessels were typical of the types of boats operating in the region prior to the Civil War. They tended to be relatively small, usually measuring less than 150 ft long and displacing less than 200 tons. For example, the *Alexander Gordon* was a small steamboat of 65 tons, 76 ft, 5 in long, 17 ft wide, with a 5 ft, 5 in hold. This vessel had two boilers and one "chimney" (stack). The owners were Louis and Felix Forstall of New Orleans (WPA 1941:Vol 3:6). The *Panola* was a larger vessel, displacing 136 tons and measuring 123 ft long and 24 ft wide. Her draft was 5 ft. The *Panola* was owned by Willis Main and George Haygood of New Orleans (WPA 1941:Vol 3:167).

Other pre-Civil War steamers traveling the cross-basin routes and the sea route to the region included the *St. Mary*, *Judge McLean*, *St. Helena*, *Frankland*, *Belle-Isle*, *Sarank*, *Billow*, *Waverly*, *Oreline*, *Correo*, *Mondiana*, *Banner of Attakapas*, *Grey Eagle*, *John*

Table 1. Record of Trips 3€ and 39 Made in 1841 by the Steamboat *Trader*.

Trip No. 36 To Grosse Tete. Feb 22, 1841

Name	No.	Item	Cost
Isaac Erwin			
	1	Hogshead sugar	
	14	Barrels sundrys	
	3	Logs	
	10	Plows	
	11	Boxes	
	4	Iron ploughs	
		Madam Passage	($)24
		Servant Passage	16
Miles Briston			
	7	Barrels sundrys	4
Hotard			
	3	Boxes	2
	3	Packages	2
	1	Barrel	4
	1	Barouche	24
	2	Horses	24
		Passage	24
Harrison			
	1	Sack salt	4
Dickinson			
	1	Bale bagging	4
Leftwich			
		Mad Turner Passage	24
M Herrington			
	1	Pair boats	2
	6	Peaces of bulk pork	
Daniel Mills			
	1	Barrel	4
James Grice			
	1	Book case	
	1	Table	
		Passage	24
P Guilseau			
	2	Barrels lime	4

(Source: Steamboat *Trader* register, Louisiana and Lower Mississippi Valley Collections, Louisiana State University Libraries)

Trip No. 39 to Grosse Tete. Feb. 25, 1841

Name	No.	Item	Cost
Batey			
		Passage for two	24
	3	Kegs of nails	2
	1	Package	2
T. Lelland			
	1/2	Box tobacco	2
	2	Buckets	2
	1	Keg of nails	2
	1	Keg of tar(?)	2
	1	Bag salt	4
	1	Grind stone	2
	11	Pots	1
	1	Pair of (?) irons	2
	2	Ploughs	3
	1	Cross cut saw	2
	1	Bake oven	2
	1	Bundle axe handles	2
	1	Barrel of flour	5
	6	Boxes measuring 110 ft 5 c per foot	
C A Edward			
	6	Barrels of pork	4
	5	Ploughs	3
Du Rose			
	1	Clock	4
	1	Barrel	4
	1	Do hams	4
	1	Do pork	4
	1	Plough	3
	2	Bundle of trees	4
	1	Bundle of hames	2
	1	Barrel	4
James Lee			
	4	Ploughs	3
	1	Barrel	5
	1	Box sundrys	4
Du Duncan			
		Passage for three	24
C H Dickinson			
		Passage	24
	1	Plough up and down	4
A J Leftwich			
		Passage his sister	24
T Weatherby			
		Passage up & down	24
		Balance due to date	2
C H Dickinson			
		Freight on cotton 5 bales	12
C Breaux			
		Freight on cotton 7 bales	12
M Smith			
		Freight on cotton 129 bales	12

Morrisett, Star, Bayou Boeuf, Vesta, and Houma (*The Planters Banner*, various years). Information on some of these and other boats of the period is provided in Table 2. Waybills from two vessels are shown in Figure 9.

Some of these steamers were apparently involved almost exclusively in the New Orleans-Attakapas trade, while others also operated in other "trades" on other rivers. The number involved in regular service to the Attakapas region fluctuated from year to year. For instance, *The Planters Banner* noted on May 6, 1847, that only three steamers were in the trade at that time. These were the *St. Mary, Judge McLean*, and *St. Helena*. Later in that year, the paper reported that the steamer *Vesta* had replaced the *St. Mary* (*Planters Banner*, October 21, 1847).

As shown in Table 2, most of the steamers serving the Atchafalaya Basin and Attakapas area were built in towns along the Ohio River, the nation's center for steamboat construction. However, many were ordered built expressly for the Attakapas trade and were designed for the conditions encountered there. An example, was the the steamer *Correo* built in New Albany,

Table 2. Examples Of Steamboats Sailing The Atchafalaya Basin Before The Civil War

Vessel Name	Date Built	Type	Place Built	Burden (tons)	Length (ft)	Beam (ft)	Depth (ft)
Alexander Gordon	1837	SB	Cincinnati, Oh	65 2/95	76'4"	17'3"	5'4"
Alice W. Glaze	1853	ST	Louisville, Ky	161 1/95	108	30'9"	5'5"
Aline	1858	ST	Jeffersonville, In	175 4/95	119	30	5'5"
Anna	1849	SW	New Albany, In	83			
Anna	1849	SW	Elizabeth, Pa	156			
Anna Perrett	1857	ST	Jeffersonville, In	172 8/95	130	32	4'5"
Banner of Attakapas	1848	SW	Lake Chicot, La	208			
Bayou Bouef	1847	ST	Bayou Boeuf	104 4/95	117	22	4
Belle-Isle	1846	SW	Cincinnati, Oh	219 68/95	156'2"	26'9"	5'7"
Bertrand	1846	SB	Wheeling, Va	148 2/95	164	24	3'11"
Billow	1847	SW	Louisville, Ky	206			
Bois d'Arc	1843	SB		182			
Buckey	1837	SB		170			
Cinderalla	1837	SB		125			
Correo	1847	SB	New Albany, In	89 53/95	103	20'8"	4'8"
E.A. Ogden	1847	SW	Cincinnati, Oh	249 52/95	126	29	7'6"
Elmira	1858	ST	Pittsburgh, Pa	139 5/95	125	27	4'5"
Frankland	1844	SB	Knoxville, Tn	96 5/95	137'8"	18	4'2"
Galenian	1834	SB		133			
Grey Eagle	1849	SB	Cincinnati, Oh	159 75/95	146	23	5
Henderson	1818	SB	Cincinnati, Oh	123 2/95	113'6"	18'5"	6'2"
Houma	1848	ST	New Albany, In	55 75/95	97	14	4'3"
Huron	1851	SB		168			
Ingomar	1858	ST	Wheeling, Va.	?	133	23	4
John Morrisett	1849	SW	Jeffersonville, In	391 55/95	188'8"	31	8
Judge McLean	1844	SB	Louiseville, Ky	138 57/95	144	21	4'9"
Mondiana	1847	SW	St. Louis, Mo	152 50/95	154	23	4'6"
Monticello	1829	SB		94			
Opelousas	1852	SB	New Albany, In	100 8/95	102	22	4'6"
Ophelia	1850	SB	New Albany, In	289 1/95	165'3"	28'5"	6'5"
Oreline	1844	SB	St. Mary Parish, La	61 27/95	95	19	3'8"
Panola	1839	SB	Cincinnati, Oh	136 4/95	123	24	5
Patrick Henry	1840	SB	Cincinnati, Oh	161 6/95	144	21	5'7"
Rio Grande	1846	SW	Jeffersonville, In	166	149'8"	24'5"	4'8"
Rufus Putnam	1822	SB		68			
Sarank	1846	SW	Elizabethtown, Pa	198			
St. Helena	1846	SW	Elizabeth, Pa	124 54/95	143	22	4'2"
St. Mary	1844	SB	Cincinnati, Oh	183 3/95	153	24	5'3"
Star	1840	SB	New Albany, In	420 81/95	158'8"	27	11"(?)
Sultan	1845	SB		125			
Sunbeam	1857	SB		167			
Swan	1836	SB		112			
Teche	1820	SB	New Orleans, La	295 6/95	126'4"	25	10
Trader	1851	SW	Louisville, Ky	40			
Vesta	1845	SB	New Albany, In	92 80/95	117	21	4
Water Witch	1831	SB		120			
Waverly	1841	SB	Cincinnati, Oh	126 26/95	142'6"	21	4'6"

SB = Steamboat; ST = Sternwheeler; SW = Sidewheeler

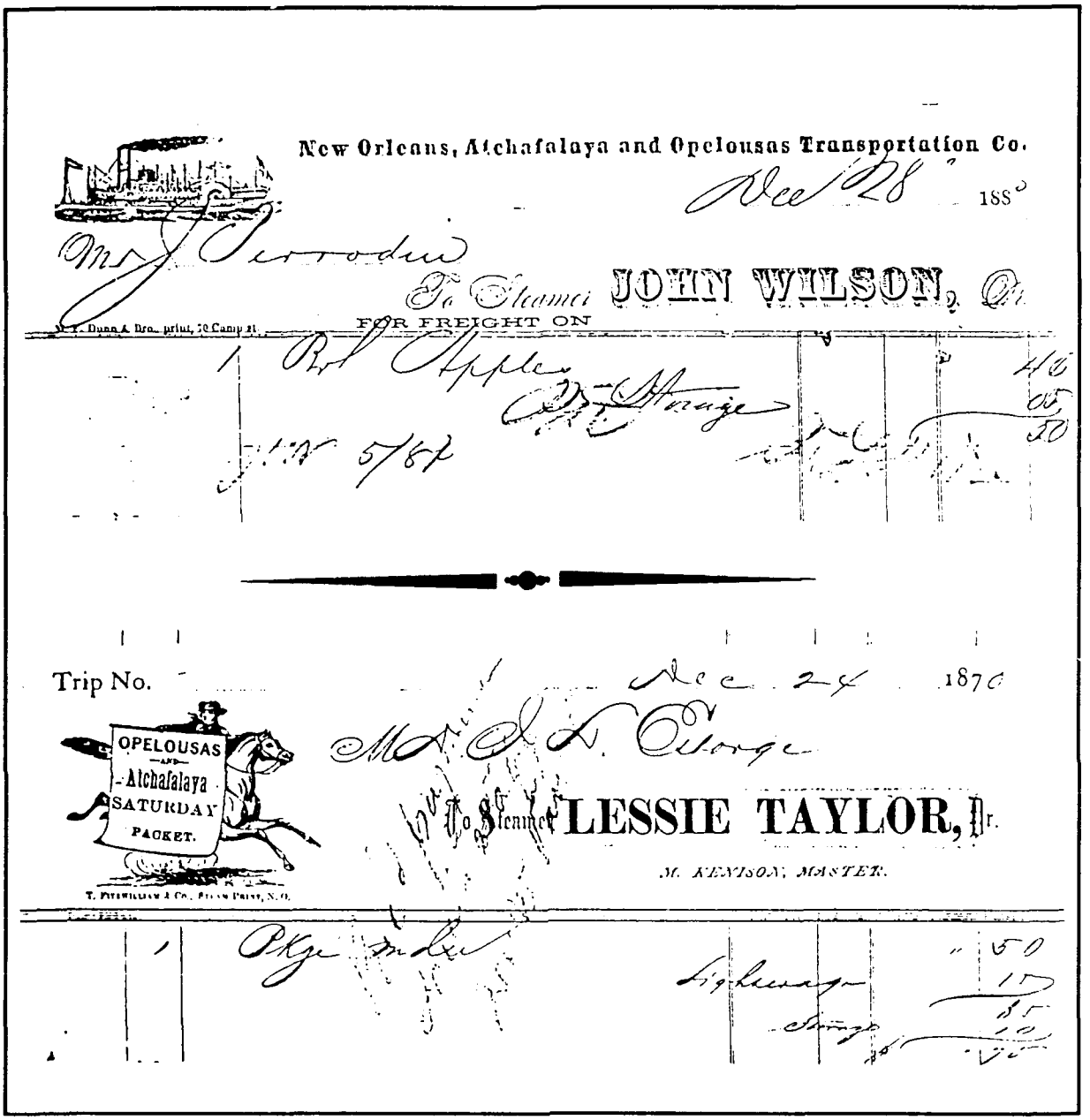

Figure 9. Waybills for the steamers *John Wilson* and *Lessie Taylor* (courtesy of Louisiana and Lower Mississippi Valley Collections, Louisiana State University Libraries).

Indiana, in 1847. The *Planters Banner* for October 21, 1847, contained the following advertisement for the *Correo*:

> The fine new steamer CORREO, J. Hohnston, Master, Will leave the Indian Village on Thursdays, at ten A.M., for St. Martinville; returning leaves St. Martinville on Saturday at six A.M. Passengers by this route will arrive in New Orleans on Sunday evening. The Correo is entirely new, built expressly for this trade, is of light draft, runs fast - her cabins in staterooms, and no expense

> has been spared to render her safe and comfortable. In crossing the lakes this boat will meet with no detention.--Passengers and shippers may rely on strict punctuality. For further information apply on board.

Steamboat travel in the Atchafalaya region, as elsewhere, could be hazardous. Boilers could explode or bottoms could be punctured by snags. Of the boats listed in Table 2, the *Bertrand* was lost on January 17, 1850, in Bayou Sorrel with a load of 250 hogsheads of sugar and just two weeks later the *Grey Eagle* was lost in Grand River with a "heavy cargo" of sugar (*Planters Banner* January 1850).

In 1857 the New Orleans, Opelousas and Great Western Railroad was completed from Algiers on the Mississippi River to the east bank of the Atchafalaya River at Berwick Bay. At the termination of the railroad, the town of Brashear City, later to become Morgan City, developed. This railroad began to seriously compete with cross-basin trade, and waterborne commerce within the Atchafalaya Basin began to decline after the Civil War.

The Civil War, 1861-1865

Louisiana seceded from the Union in 1861 and joined the Confederate States of America. New Orleans and Baton Rouge were occupied by Federal forces early in the war and became staging areas for expeditions into more remote portions of the state. Later, Confederate and Union forces both vied for the strategic location of Berwick Bay and Brashear City. Recognizing its strategic importance as the entrance to Atchafalaya Bay and the Attakapas region, the Confederate government constructed several fortifications in the Berwick Bay area. Two of these were Forts Berwick and Chene. Fort Berwick was built in July 1861 on the north bank of Little Wax Bayou at its juncture with the Atchafalaya River. It was designed to prevent access, through Wax Bayou, to the marshes to the west and to the southern edge of the Teche ridge. The Fort consisted of:

> An earthen fort, quadrilateral in shape with parapets five feet high on three sides, the rear being protected by palisades about seven feet high, loopholed for musketry, the whole was surrounded by a moat six feet wide in front and three feet in rear. On the front face two 24-pdr pivot guns were mounted which commanded the outlet of Wax Bayou [Casey 1983:24].

The New Orleans newspaper, the T*imes Picayune*, announced in its edition of November 21, 1861, that the steamer *A.H. Seger*, under the command of Captain R.H. Kerr, was departing for "Forts Berwick and Chene." It is probable that this represents the movement of troops and supplies to the two forts. Fort Berwick was abandoned in April 1862 after the fall of New Orleans. Most, if not all, of Fort Berwick has been destroyed by the construction of the Intracoastal Waterway and a public boat launch facility.

Fort Chene was another small earthwork situated at the junction of bayous Chene and Shaffer, along the southwestern edge of Avoca Island (Casey 1983:44). This fort, constructed in 1861, contained a small, central barracks area protected by an outer ditch around the earthworks (Casey 1983:44). The entrance to Bayou Chene reportedly was closed by a stockade. The armament at Fort Chene consisted, at various times, of two 24-pound pivot guns, one rifled 32-pounder, and four 24-pounders (Casey 1983:44). Like Fort Berwick, Fort Chene was abandoned in April 1862, after the fall of New Orleans. Some embankments remain at the location of Fort Chene, which may be remnants of the old fort. However, these features could be related to borrowing activities that have been conducted at this location in the recent past.

During the war there was a considerable amount of naval activity in the area around Brashear City, and along the lower Atchafalaya River and Bayou Teche. Some of this activity spilled over into the waterways of the Atchafalaya Basin. In October 1862, several Union gunboats were moved to Berwick Bay intending to cut off the retreat of Confederate forces from the Mississippi River near Donaldsonville (Raphael 1976:42-45). The fleet, consisting of the *Estrella*, *Calhoun*, *Kinsman*, and *Diana*, all under the command of Lieutenant Commander Thomas M. Buchanan, was delayed by low water and did not reach the Atchafalaya until October 30, after the Confederate forces under General Alfred Mouton, had escaped to the west across the river and up Bayou Teche (Raphael 1976:46-47). On November 2, 1862, Federal troops under the command of Brigadier General Godfrey Weitzel landed at Brashear City with the objective of holding the mouth of the Atchafalaya River. While the gunboats patrolled the Atchafalaya River and Bayou Teche, the Union troops built additional fortifications at Brashear City. Figure 10 shows a map of Union earthworks and minor forts as drawn in 1865 by Captain P. Harris of the U.S. Corps of Topographical Engineers. Fortifications shown include Fort Brashear (later named Fort Star), shown at the western edge of the city; Fort Buchanan, opposite the mouth of Bayou Teche; a water battery on Berwick Bay; and a redoubt located north of the railroad near the center of the town (Casey 1983:32-33; Kelley 1988:32). Embankments, including two redans, were built to connect the principal earthworks within the city (Casey 1983:33).

Confederate forces, under the command of General Richard "Dick" Taylor, son of President Zachary Taylor, were positioned along the Teche, west of Brashear City. To prevent Union gunboats from moving up the Teche, Taylor's forces placed several obstructions in the bayou. Just above Cornay's Bridge they sunk the steamer *Flycatcher* and a schooner loaded with bricks, plus live oak trees were cut down and thrown into the bayou (Raphael 1976:56). On November 3, Buchanan moved his gunboats up the Teche to the obstructions, above which lay fortifications being built by the Confederates, plus the gunboat *Cotton*. The Union gunboats and the *Cotton* exchanged fire, but the Federal barrage was ineffective and Buchanan withdrew.

In January 1863, General Weitzel decided to make an all-out attempt to eliminate the *Cotton*. On the 13th, his four gunboats accompanied by "seven regiments of infantry, four full batteries of artillery, with six extra pieces, and two companies of cavalry," moved up the Teche (Raphael 1976:68). The *Kinsman* was damaged by a torpedo and was forced downstream and out of action. The *Cotton* was seriously damaged and many of her crew were killed or wounded. The following night she was set afire and scuttled crossways in the Teche to create an additional obstruction (Pearson et al. 1989:207).

Not long after this engagement, on February 23, the *Kinsman* struck a snag while moving up the Atchafalaya. She made it back to Brashear City, but sank despite efforts to try to pull her ashore. A sunken vessel recently discovered in the Atchafalaya River just below Morgan City may be the remains of the *Kinsman* (Mike Davis, personal communication 1990).

In early April of 1863, a large Union force under the command of General Nathaniel Banks was gathering around Brashear City with the intention of moving against the Confederate forces of General Richard Taylor at Fort Bisland, located several miles above on Bayou Teche. One element of the Federal strategy involved boating troops across Grand Lake to its western shore where they landed and crossed overland to Bayou Teche (Official Records of the Union and Confederate Armies 1882:294). Eventually the southern forces were forced to retreat up the Teche; however, several vessels were lost or scuttled in Bayou Teche during the course of the engagement (Pearson et al. 1989:207).

A brief naval engagement did take place on Grand Lake during these activities. The Confederate ram *Queen of the West* (formerly a Federal vessel) accompanied by two troop

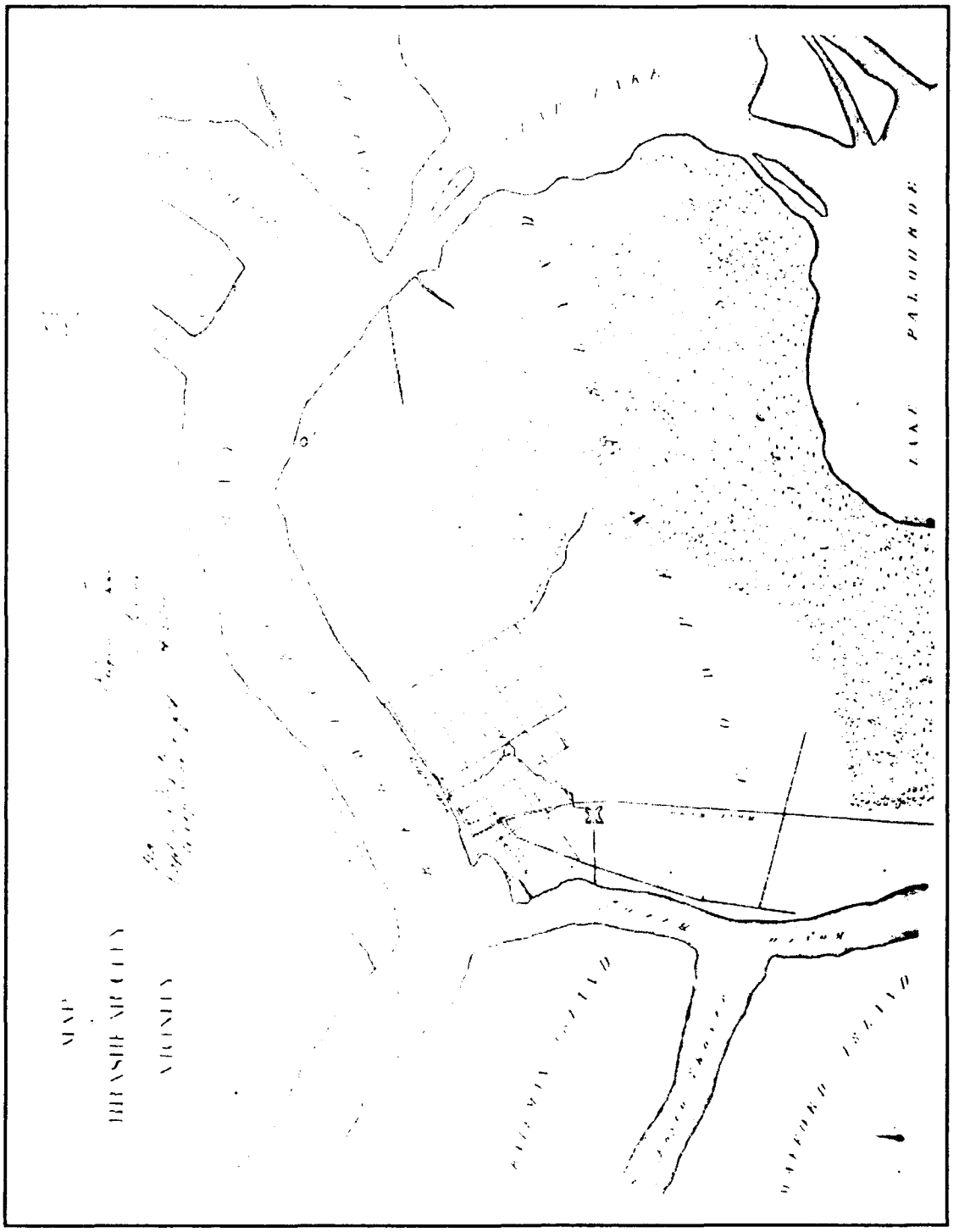

Figure 10. Union military installations and earthworks at Brashear City and vicinity (source: Harris 1865, reproduced in Casey 1983:Pl. 47).

transports, the *Grand Duke* and the *Mary T.*, had been dispatched from Butte La Rose with reinforcements to strengthen Taylor's force at Fort Bisland. (Scharf [1977] indicates that the *Queen of The West* was accompanied by only one vessel, the *Minna Simmons*). The Confederate flotilla was sighted on April 13 by Union naval forces consisting of three gunboats -- the *Calhoun*, the *Estrella* and the *Arizona*. The *Calhoun* fired on the *Queen of the West*, hitting a steam line and setting her on fire. Soon after, she exploded and sank in Grand Lake with an estimated loss of 40 persons (Scharf 1977:363). The Confederate transports escaped to Butte La Rose. With the retreat of most of Taylor's forces from the region, four Union gunboats, the *Calhoun*, the *Estrella*, the *Arizona*, and the *Clifton*, steamed up the Atchafalaya Basin and were able to capture Fort Burton at Butte La Rose on April 19, and three days later they captured the Confederate steamer *Ellen* on Bayou Courtableau (Winters 1963:234).

Later, in June 1863, with Union attentions directed toward the capture of Port Hudson on the Mississippi River, General Taylor initiated a plan to retake the lower Teche, Atchafalaya, and Lafourche regions. Part of this plan included moving troops by boat across the Atchafalaya River and down the east side of the Atchafalaya Basin to capture Brashear City. Simultaneously, troops were to move down the Teche. Those moving down Bayou Teche, under command of Major Hunter, were loaded into a flotilla of small boats when they reached the lower Teche. This flotilla, consisting of 53 skiffs, pirogues, and bateaus, and known as the "Mosquito Fleet," passed down the Teche, through the Lower Atchafalaya River at Patterson, across the lower end of Grand Lake to Lake Palourde from where they could attack Brashear City from the north (Raphael 1976:167-168). The Confederate forces were able to retake the city.

In September, Federal forces initiated a major campaign to retake the lower Atchafalaya region and to move on to the west to invade Texas. Known as the Great Texas Overland Expedition, forces recaptured Brashear City, moved up to the Teche, and on to Opelousas near where the expedition was halted. Low water on the streams of the Atchafalaya Basin inhibited shipment of supplies to Union forces, and eventually they were forced to retreat under harassment by Rebel troops. Union forces withdrew to the Teche and spent the winter of 1863 at New Iberia and St. Martinville. The following Spring, Union forces attempted to move into Texas via the Red River but were unsuccessful and withdrew back to the Mississippi River. This also resulted in the removal of most Federal troops from the Atchafalaya Basin region.

A Confederate map of St. Mary Parish, completed in 1864 after the withdrawal across Berwick Bay provides a considerable amount of information on settlement in the region. Shown as Figure 11, this map provides information on settlement along the Atchafalaya River and Bayou Shaffer, which is pertinent to the present study. "Woffords" settlement is shown at the northwestern tip of Avoca Island, representing the location of the buildings associated with William W. Wofford's Plantation. Farther down Bayou Shaffer, on the west bank in Sections 26 and 35 structures, also given the name "Wofford," are shown. These are buildings associated with other sugar plantation property owned by Wofford on Bateman Island (Kelley 1988).

Post Civil War

A period of social disruption and economic stagnation followed the Civil War. Agriculture within the Atchafalaya Basin area had essentially ceased during the war (Comeaux 1972:17) and with it commercial water traffic in the region. The economy slowly began to recover, and by the early 1870s, navigation of the Atchafalaya area was again considered necessary, as indicated by a survey of the Atchafalaya River by the Army Engineers in 1873-1874. That survey noted that the river provided a relatively deep channel, averaging over 20 ft deep, for most of the distance between the Red River and Berwick Bay (at Morgan City), although numerous shallow shoals did occur. Many small feeder channels were noted along

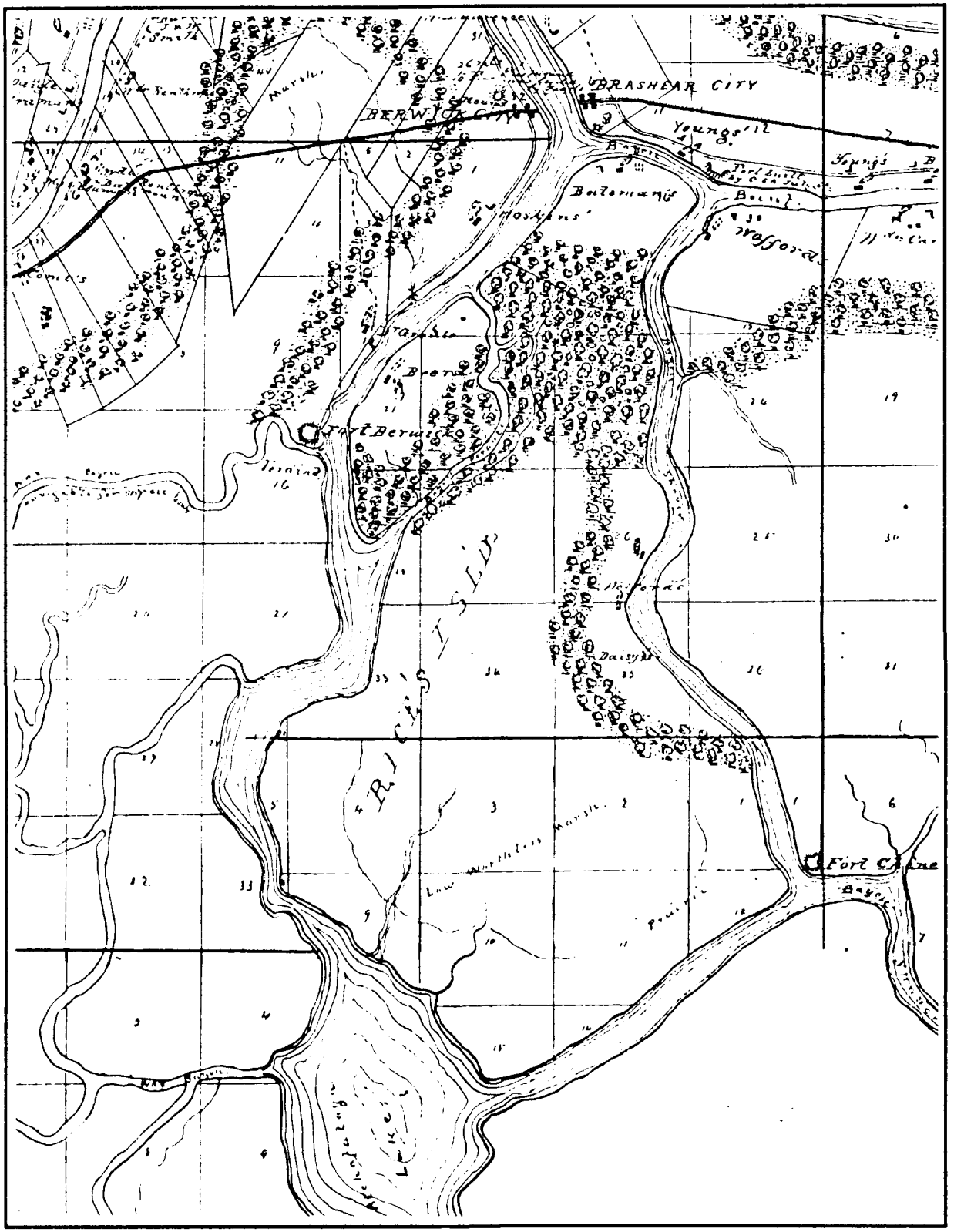

Figure 11. Excerpt from a Civil War-period map of St. Mary Parish showing the locations of structures in the vicinity of the study areas along Bayou Shaffer (source: Confederate States of America 1864).

the length of the Atchafalaya River; however, their navigation was often dependent upon water stage and rafting (Annual Report of the Chief of Engineers, U.S. Army Corps of Engineers [hereafter cited ARCE] 1874). That report presented the following information on commerce on the waterways of the basin:

> The products of the Atchafalaya country are cotton, sugar, molasses, moss, lumber, staves and shingles. The cotton is all grown above the Courtableau and is sent to New Orleans by the two steamers that run to Washington, or the one that makes a ten-day trip to the Teche country.
>
> The lumber and staves are rafted down to Brashear and the Teche, seven small steamers being engaged in this trade.
>
> Flat-boats and broad-horns from Indiana and Ohio bring down hoop-poles, flour, bacon and provisions, for sale on the Teche, generally taking the route by Grand River, Seventh Tensas, Jake's and Rigaby's Bayous, making as short a run over Chicot and Grand Lake as possible, and keeping as near to the left bank as the depth will permit, in order to find shelter in the bayous in case of wind. United States contractors for live-oak have a depot at the one hundred and thirty-fourth mile, on Berwick's Bay, where they collect large supplies of this valuable material from points as far above as the Bayou Chene, and ship by schooner [ARCE 1874:771-774].

Franklin continued to serve as a port, but began to decline in importance as Brashear City began to capture the regional trade. In the late 1860s Franklin still contained at least two shipyards. One was Smardon's Shipyards and the other was the Trainer & Hanson yard, which was prepared to "Build or Repair Steamboats, Vessels, Flats or Floating Bridges at short notice" (*The Planters Banner*, June 16, 1869).

In 1869 entrepreneur Charles Morgan purchased the bankrupt New Orleans, Opelousas, and Great Western Railroad, and renamed it Morgan's Louisiana and Texas Railroad. Morgan also purchased a fleet of steamships, which, in conjunction with his railroad, streamlined transportation, commerce, and communication with the west. Passengers and freight were carried by railroad to its terminus at Brashear City where Morgan's ships were waiting to carry them to western ports such as Galveston and Houston (Goodwin and Selby 1984:32). Morgan also ran coasting vessels between New Orleans and ports to the east, such as Mobile and Pensacola. By 1871, the Morgan Steamship line included the following "low pressure" iron steamships: *W.G. Hewes, St. Mary, Alabama, Matagorda, L.W. Harris, Agnes, Morgan, City of Norfolk, Austin, Harlan, Clinton, Josephin, Whitney,* and *Hutchinson.* (*The Planters Banner*, February 1, 1871).

Initially, the entrance up the Atchafalaya River to Brashear City allowed only shallow-draft vessels, but in 1871, Morgan initiated the dredging of a ship channel from the Gulf through the lower Atchafalaya River in order to facilitate his steamship line. This channel, known as "Morgan's Ditch," was 6 mi long, over 100 ft wide and 10 ft deep. By 1873, 17 Morgan Line vessels were calling at Brashear City, and Congress made it a Port of Entry. In the same year, the Louisiana legislature, in recognition of the tremendous importance of Charles Morgan' endeavors, changed the name of Brashear City to Morgan City (Goodwin and Selby 1984:33).

As a result of Charles Morgan's improvements, the town of Morgan City experienced a significant increase in maritime activity. In 1876, a significant percentage of the St. Mary Parish sugar and molasses production was carried from Morgan City in schooners and ships bound for ports on the Atlantic coast such as Charleston and New York. Live oak timber from

nearby Federal timber reserves were carried out of the port to Navy yards throughout the country (Goodwin and Selby 1984:33). Wharf and docking facilities developed or expanded along the Morgan City waterfront.

The Attakapas Mail Transportation Company was another steamboat line running vessels between Brashear City and other points in the Attakapas region. In 1869, the company advertised the steamers *Warren Belle* and *Anna E.*, noting that these boats would leave Brashear City daily on the "arrival of the cars from New Orleans," referring to the arrival of Morgan's train (*The Planters Banner* June 16, 1869). These boats sailed as far north as Washington, Louisiana, and the cost of passage from New Orleans to Washington was $12.50. Later, the Attakapas Mail Transportation Company added the steamer *Minnie Avery* to their line.

John Newton Pharr also operated his steamship line out of Morgan City. Known as the Pharr Line, or the Pharr Daily Line, he held a contract to carry mail between Morgan City and New Iberia (Kelley 1988:43). In 1870, the following advertisement for one of his boats, the sternwheeler *Mattie*, appeared in the *Attakapas Register*:

> Regular Morgan City and Bayou Vermillion Packet, Built by Captain J.N. Pharr expressly for the Bayou Vermillion trade. Will leave Morgan City every Monday on the arrival of the cars, and returns every Friday. Good passenger accommodation [*Attakapas Register* October 20, 1870].

Other boats in the Pharr Line were the sternwheeler *Mary Lewis* and the sidewheeler *Rene McCredy* (Kelley 1988:43). One of Pharr's sons Eugene Albertus Pharr, became involved in the boat business in the late-nineteenth century. He was president and part owner of the Patterson Shipyard Company in Patterson, Louisiana. This company built a number of steamers, including the *Sewanee*, *Millie W.*, *F.B. Williams*, *E.A. Pharr*, *J.N. Pharr*, *Jennie Louise* and *Hoo Hoo* (*Baton Rouge Advocate* 1907). Most of these vessels were involved in local business and trade, particularly the lumber industry.

In 1882, the first railroad bridge across Berwick Bay was constructed and train service between New Orleans and Texas was initiated early in 1883 (Goodwin and Selby 1984:35). The construction of the bridge signaled the beginning of the end of Morgan City's role as a major transshipment port. An 1888 Army Engineers report records this decline, noting that shipping activity out of Morgan City included:

> . . . two Morgan Line Steam-ships, one running to Texas ports about once in ten days, and one to Mexico once in two weeks; 25 schooners, and 30 luggers and sloops passing in and out an unknown number of times [ARCE 1889:1510].

In the 1880s E.A. Pharr and F.B. Williams, prominent in the cypress lumber business, helped form the Atchafalaya Bay Ship Channel Company with the aim of dredging a new channel through Atchafalaya Bay to increase shipping into Morgan City. In 1907 the project was finally completed providing a channel 15 ft deep and 100 ft wide from the Atchafalaya to the Gulf (*Baton Rouge Advocate* 1907).

Coal barges continued to carry their cargo downstream to Morgan City and Bayou Teche, and cypress logs from the Atchafalaya Swamp were shipped and floated across the basin to lumber mills along the Lower Atchafalaya River. Numerous advertisements for coal appear in the local newspapers, coal having become an important fuel in the many sugar houses in the region. Small channels in the basin, such as Bayou La Rompe and Bayou Little Tensas,

which had been important for boat travel in the nineteenth century, were rarely utilized for commerce in the twentieth century.

Although the water routes across the Atchafalaya Basin were cheaper during the nineteenth century, shippers preferred to use the railroad because of its speed. By 1885, the Morgan Railroad accounted for 90% of the commerce between the Teche country and New Orleans (Pearson et al. 1989:263). By that year, only one boat, the steamer *New Iberia*, made regular trips between Bayou Teche and New Orleans (ARCE 1885:1439). Despite the competition from railroads, the Teche region commerce continued to be serviced by a few small steamboats well into the twentieth century. Two examples of early-twentieth-century vessels are the *F.M. Owens* (Figure 12) and the *J.E. Trudeau* (Figure 13). The last steamboat to operate on Bayou Teche was the *Amy Hewes* which was used primarily as a logging boat to haul rafts of cypress logs out of the Atchafalaya Basin to local sawmills. The *Amy Hewes* ceased operating in 1943 (Goodwin et al. 1985b:188).

The completion of the railroad bridge at Morgan City provided easy railroad access to markets toward the east and west and stimulated the growth of the oyster industry. Soon, large numbers of sailing luggers operated out of Morgan City, involved in fishing and oystering. Several oyster factories opened in the city and their products were shipped out by the railroad to New Orleans and Texas and beyond. In 1887, the Lehmann family oyster factory shucked

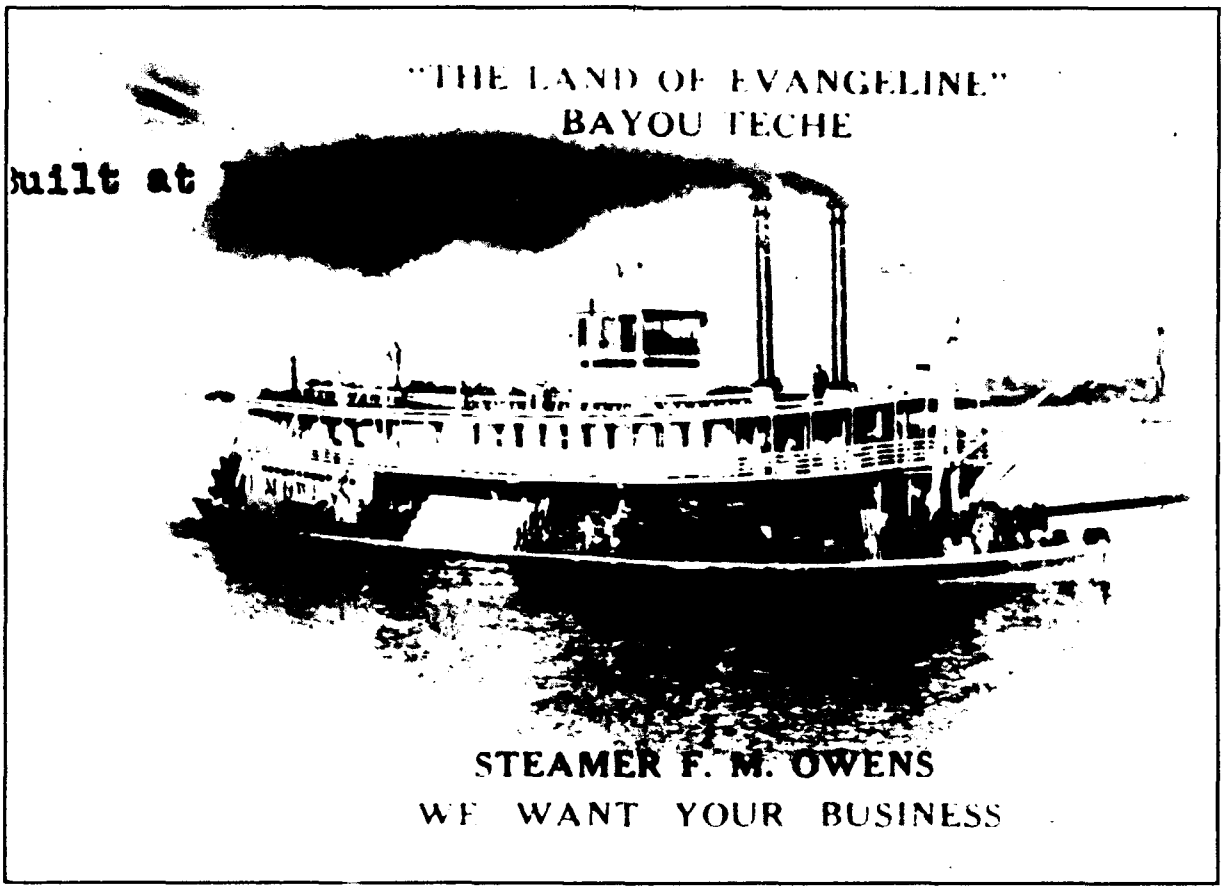

Figure 12. Steamboat *F.M. Owens* (courtesy of Louisiana and Lower Mississippi Valley Collections, Louisiana State University Libraries).

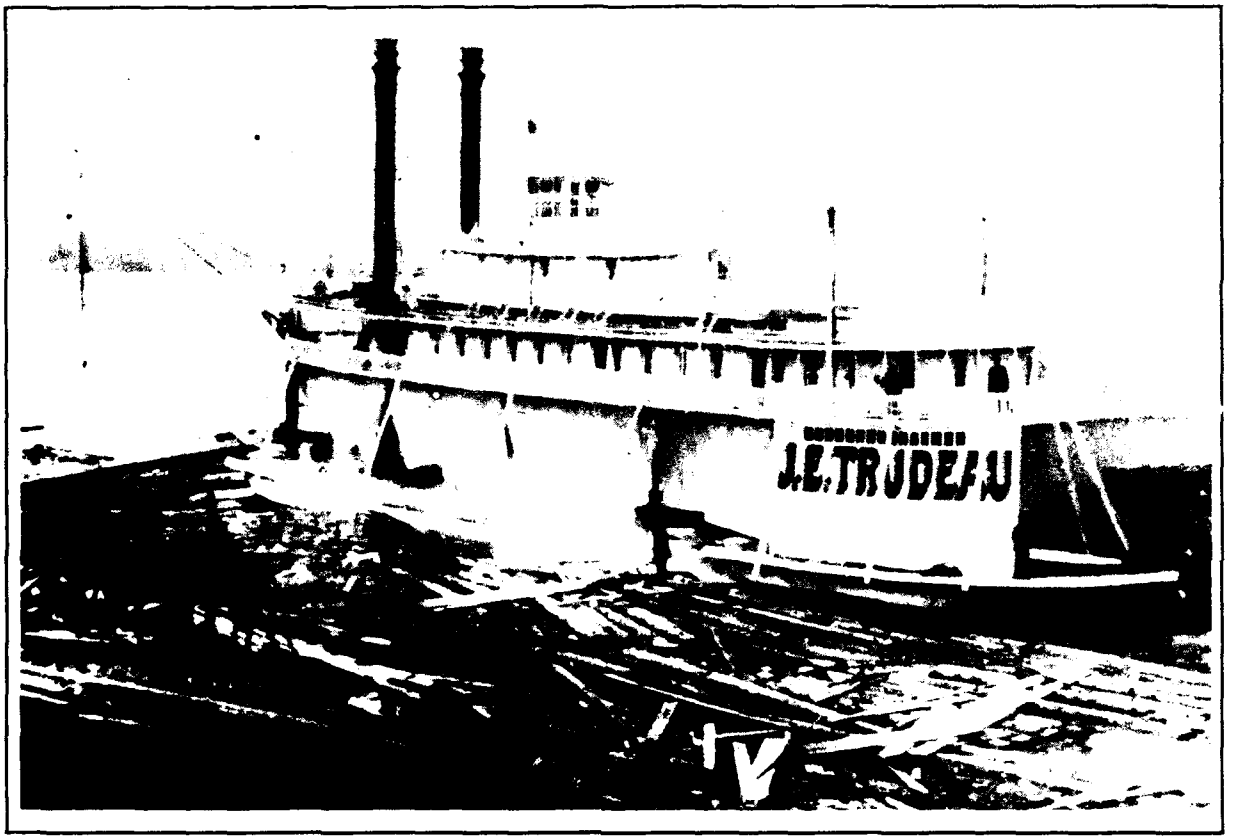

Figure 13. Steamboat *J.E. Trudeau* (courtesy of Louisiana and Lower Mississippi Valley Collections, Louisiana State University Libraries).

and shipped an average of 300,000 oysters per week, and the Wells, Fargo & Co. reported that between September 1, 1886, and May 1, 1887, 13,571,428 oysters were shipped from Morgan City (Goodwin and Selby 1984:36).

Since the 1930s commercial traffic in the interior of the Atchafalaya Basin has been confined primarily to the navigation channels built or maintained by the Corps of Engineers. In addition, as in the past, small wooden craft such as pirogues, skiffs, and bateaus continued to be used by the area's numerous hunters, trappers, and fishermen. More recently, commercially-built aluminum or fiberglass hulls have almost entirely replaced wood in the construction of these small craft.

Shipwreck Potential of the Study Areas

The potential for any of the study areas containing shipwreck remains is related to: (1) the history of vessel use and loss in the area, and (2) the impacts which natural and man-induced forces have had on any wrecks since their loss. The previous discussions on the geology of the region and its history of watercraft use provides a beginning point for assessing the shipwreck potential of each of the study areas. Added to this is information on historically documented boat wrecks in these areas in the available literature. Information on shipwrecks in the area have been synthesized in Pearson et al. (1989). They indicate that 11 wrecks are recorded in Grand and Six Mile Lakes, 30 wrecks are reported in the Lower Atchafalaya River

and none are reported in Bayou Shaffer. Specific information on the locations of most of these wrecks is generally lacking.

Areas Above Morgan City

As discussed earlier, prior to about 1950, both of the study areas located above Morgan City fell within the boundaries of Grand Lake and/or Six Mile Lake (see Figure 5). Grand Lake served as part of the normal route for shallow-draft boats and steamers traveling up and down the basin, but specific correlation between commonly followed historic navigation routes and the study areas seems to occur only in Cypress Island Pass, in the area just above American Pass, and at the southern end of the lower study area where it enters Stouts Pass (see Figure 5). Additionally, historic boat landings and/or docks may have existed along the eastern bankline of Cypress Island Pass, which is encompassed within one of the study areas. However, no documentation of these types of structures or associated activities has been found. In these three portions of the study areas, the potential for shipwrecks is increased slightly over the relatively low potential anticipated for the majority of the area covered by the two locales.

One of the wrecks recorded for Grand Lake was the Confederate steamer *Queen of the West*, sunk by Union shells in April of 1863. The *Queen of the West* reportedly sank near Miller Point, just across the river from the extreme northern end of the upper study area. She was identified at this location in an 1874 Army Engineer survey (ARCE 1874:774); however, in 1895 the remains of the boat were, reportedly, completely removed (ARCE 1896:1520). The 1874 survey also recorded the remains of another vessel, the steamer *Thompson*, sunk near Cypress Island (ARCE 1874:774). The specific location of the loss of the *Thompson* is unknown, but it may have been in the vicinity of the study areas. Pearson et al. (1989) report two other boats as having been lost in the vicinity of Cypress Island Pass. These were the *Daniel Boone*, lost in 1879 and the *Margaret*, which reportedly foundered on Grand Lake in a gale in 1877. Little else is known about these vessels. The *Margaret* was reportedly a total loss and, given her value of $400, she is likely to have been a small sailing vessel rather than a steamer (Works Progress Administration 1938:223). The vessel, *Jim*, was reported blown ashore at Stouts Pass, near the lower end of the surveyed area, in 1879. This vessel was recorded as a total loss and her value was $250, again suggesting a small boat, probably a sailing vessel (Works Progress Administration 1938:175). As is discussed later, no evidence of these, or the other wrecks reported in the area of Grand and Six Mile Lakes, were found during the field survey.

The process most likely to have influenced the preservation of shipwreck remains in the two study areas above Morgan City has been sedimentation. As noted earlier, extensive infilling has occurred, and continues to occur, in these areas. Almost any amount of burial would aid in the preservation of shipwreck remains. The silt and clay sediments that are filling the area would produce a low-oxygen environment, inhibiting decay of wood and other organic remains. Water depths in the areas surveyed, except within the actual dredged channel, are not significantly different from what they were in the nineteenth century. This suggests that wreck remains in these areas, if they are incorporated in sediments that predate the 1960s dredging of the navigation channel, are likely to be deeply buried.

Offsetting the processes of preservation have been factors that can contribute to the destruction of shipwrecks. Probably foremost among these in the study region have been the activities associated with channel maintenance, particularly dredging. As discussed earlier, wrecks lost within the confines of the maintained channel would very likely have been impacted by dredging undertaken since the 1950s, because the dredging depths have been greater than the depths of the lakes and channels during the historic period. However, no

reports that sunken wrecks had been encountered by past dredging activity was located during this study. Other factors, such as erosion brought about by natural or man-induced processes, and decay, brought about by periodic or continual exposure to air, would also contribute to the destruction of shipwreck remains.

The available historical and geological information indicates that there is a generally low probability of shipwreck occurrence in the two study areas above Morgan City. While it is known that historic navigation routes crossed Grand Lake, vessel losses in these areas would have been chance occurrences. There are no indications that hazards, such as snags, bars, etc., which could have caused sinkings, were common in the vicinity of the study areas. Saltus (1985) has demonstrated that shipwrecks accumulate at landing areas through both loss and abandonment. There is a possibility that landings were located in the vicinity of Cypress Island Pass, and the chances for boat losses in that area are slightly increased over the remaining portions of the study areas.

Study Areas Below Morgan City

The lower Atchafalaya River has served as a major navigation route between the Gulf and the Atchafalaya Basin region throughout most of the historic period. Vessel traffic through the three study areas can be considered to have been high, increasing the probability of shipwreck occurrence. Most of the reported vessel losses in this area are for the area immediately adjacent to present-day Morgan City (i.e., Brashear City) or Berwick, an area not included in the areas surveyed. Among the vessels reportedly lost at or very near Morgan City, were the sidewheel packet *Major Aubry*, snagged "near Berwick" in 1858; the *U.S.S. Kinsman*, a sidewheel gunboat which sunk in February 1863; the *Jennie Louise*, a sternwheel towboat which burned and sunk "near Berwick" in 1913, and the *Fidget* and *Restless*, two tugs which in 1884 collided with one another and the railroad bridge at Berwick and sank (Pearson et al. 1989). Pearson et al. (1989) provide no information on boat wrecks which can definitely be said to fall within the bounds of the study areas below Morgan City.

There is no evidence that historic settlement occurred along the banks of the river at the three study areas, primarily because the banks are low and marshy. It is unlikely that permanent landings or other docking facilities existed. However, small semi-permanent camps used by fishermen and hunters were scattered along the banks of the river, and boats lost or abandoned at these locales certainly may exist.

The geological evidence indicates that the channel position has been relatively stable for the three study areas along the Atchafalaya River below Morgan City (see Figure 7). Some amount of infilling has occurred, primarily in Sweetbay and Bateman Lakes and in the shallow water along the river banks. Cross-sectional data for the river in these areas indicate no consistent pattern within the main part of the channel. In some areas the channel has deepened. In other areas it has shallowed; in fact, some of this change seems to be seasonal rather than long-term. Portions of the channel are quite deep and river flow is rapid. These conditions would tend to break up and scatter vessels lost in the main channel itself.

The combined historical and geological information suggests that there is a low to medium probability that sunken vessels, primarily small craft, exist near the banks of the river in these three study areas. There is a good chance that these vessels have become covered and encapsulated in sediments which have acted to preserve them. The conditions for shipwreck occurrence and preservation within the main channel of the river, however, are considered low. Additionally, activities related to oil and gas extraction have been extensive and widespread along the river, and the banks are strewn with pumping facilities, well heads, pipelines, discarded pipe and equipment, etc. These types of ferrous items are picked up by the

magnetometer and, essentially, can override and obscure a signal produced by a shipwreck. These difficulties in data interpretation are more fully discussed later in this report.

Bankline changes along Bayou Shaffer, also, have been slight (see Figure 7). Sedimentation and bar development on the outside of some bends has occurred, although it appears as if the average depth of the bayou has changed little in the historic period. In terms of shipwreck potential, the most important factor has been the long history of settlement along the banks of the bayou. As noted earlier, Wofford's sugar plantation was located on the eastern side of the bayou at the northern end of the upper study area, and he also had a sugar plantation on Bateman Island, near the lower end of the lower study area (see Figures 7 and 11). Both of these locations had landings on Bayou Shaffer. Settlement and use of these locales, plus several other locations along Bayou Shaffer, continued well into the present century (Gibson 1978; Kelley 1988). Characteristically, as a result of both accidental loss and purposeful abandonment, sunken boats tend to be concentrated at waterside activity areas such as docks and landings. Although Pearson et al. (1989) do not report any historic boat wrecks in Bayou Shaffer, the long history of use of the bayou for landings, coupled with a minimal amount of physical change from natural and human sources, suggest that the two study areas in the bayou have a relatively high probability of containing boat wrecks. As will be seen later in this report, this proved to be true.

CHAPTER 3: REMOTE-SENSING SURVEY

Introduction

The use of remote-sensing technology in the search for shipwrecks has become an increasingly common aspect of underwater archaeology in recent years. As a result, there has developed a relatively comprehensive archaeological literature on the application and utility of the remote-sensing instruments used in this study, the magnetometer, the side-scan sonar, and the fathometer. The magnetometer has been the most commonly used of these three. The principles of how magnetometers work and their early application to marine archaeology were reported by Breiner and MacNaughton (1965). Pioneering work to plot the distribution of segments of a specific marine wreck as an interpretive aid was done by Clausen off the east coast of Florida (Clausen 1966). Since that time, many researchers have contributed to the growing body of data involving the use of magnetics to locate shipwrecks (e.g., Green 1970; Hays and Herrin 1970; and Arnold and Clausen 1975).

The use of side-scan sonar in underwater archaeological research is increasing, although it tends to be less commonly used than the magnetometer. Side-scan sonar has been used for many years in cultural resources and hazard surveys conducted relative to mineral leases on the Gulf of Mexico Outer Continental Shelf. In addition, it has been employed in several cultural resources projects in southern Louisiana. These are noted below.

A number of projects have been undertaken that have dealt, primarily, with watercraft or shipwrecks in south Louisiana. These have included historical overviews of navigation history and vessel use, evaluations and enumerations of shipwrecks, remote-sensing surveys and archaeological investigations of specific wrecks. The historical overviews have included a compilation of shipwrecks along the Mississippi from Cairo to Head of Passes (Gulf South Research Institute [hereafter cited GSRI] 1973) and a more detailed evaluation and identification of wrecks along the Mississippi River below Baton Rouge (Detro et al. 1979). Recently, Pearson et al. (1989) have compiled a history of waterborne commerce and navigation for the area of the New Orleans District that includes a compilation of shipwrecks and assessments concerning the nature and potential of shipwreck remains within the confines of the district.

Several remote-sensing surveys, designed primarily to locate shipwrecks, have been conducted along stretches of the Mississippi River below New Orleans. In 1982-1983 the Corps of Engineers conducted remote-sensing (magnetometer) surveys at several locations along the lower parts of the river (United States Army Corps of Engineers [hereafter cited USACE] 1983). Twenty magnetic anomalies were recorded, although none were physically examined or verified. Magnetometer and side-scan sonar survey has been conducted in the lower Mississippi River in the vicinity of Forts St. Philip and Jackson (Saltus 1983a). The purpose of this study was to locate vessels known to have been lost in the area during the Civil War. A number of magnetic anomalies were recorded and diving was conducted at eight locations. Most proved to be modern debris; however, one may represent the remains of the CSS *Warrior,* a converted, three-masted, propeller-driven towboat.

Additional magnetic survey has been conducted in the Mississippi River between the communities of Buras and Venice (Saltus 1984). Eighty-eight magnetic anomalies were recorded in this study and several were examined by probing. None were identified as shipwrecks. The Corps of Engineers conducted a remote-sensing survey within a 30-mi-stretch of the Mississippi below the Head of Passes (Muller 1985). A number of magnetic anomalies and side-scan targets were recorded but none were examined further.

In January of 1984 the Corps of Engineers conducted a magnetometer survey of a proposed offshore borrow area off Fort Livingston in Barataria Bay, Jefferson Parish. Several magnetic anomalies were recorded, but none were identified through physical examination (Stout 1984).

In 1983 the New Orleans District conducted a magnetometer survey of a 6.75-mi-long portion of Bayou Grand Caillou in Terrebonne Parish (Flayharty and Muller 1983). During this boat survey, 69 exposed watercraft sites were identified and 6 were deemed potentially eligible for inclusion in the National Register of Historic Places. In addition, numerous magnetic anomalies were recorded; however, none were investigated further.

Several magnetometer surveys have been undertaken along the southern shores of Lake Pontchartrain (New World Research 1983; Stout 1985a, 1985b). One of these led to the discovery of a sunken vessel, presumed to be a schooner or schooner barge. This wreck was deemed potentially eligible for nomination to the National Register (Stout 1985a).

Among the most productive of the remote-sensing studies undertaken in south Louisiana has been the work of Allen Saltus (1985, 1986, 1988). This research has involved magnetometer surveys of several rivers flowing into Lakes Maurepas and Pontchartrain in southeastern Louisiana. These surveys have recorded a number of magnetic anomalies and subsequent diving has located a number of sunken vessels or portions of vessels.

The Red River in Louisiana has been the subject of a number of magnetometer surveys, both terrestrial and riverine, intended primarily to locate historic steamboat wrecks. These include two studies by Gulf South Research Institute (GSRI 1975, 1980), which together located over 900 magnetic anomalies, some of which are presumed to be related to shipwreck remains. Neither of these studies included physical examination and identification of the sources of anomalies. In 1980 Rone Engineers, Inc., conducted a study involving the relocation and identification of several of the previously recorded magnetic anomalies on the Red River (Rone Engineers, Inc. 1982). That study employed divers in an effort to identify sources of anomalies. The divers failed to find any obvious remains of shipwrecks. In 1980 and 1981 Coastal Environments, Inc., conducted a terrestrial magnetometer survey at 17 proposed construction locations along and adjacent to the Red River channel (Pearson et al. 1982). These areas were selected, in part, because some represented former locations of the Red River channel -- a recognition that the river's movement has been extensive and that historic shipwrecks may be located outside of the confines of the present-day channel. This survey identified 98 distinct magnetic anomalies. Subsequent examination of several of these anomalies verified and identified the sources of some (Saltus 1983b, Whelan and Pearson 1983). None proved to be the remains of historic shipwrecks.

Only one sunken shipwreck in Louisiana has received extensive archaeological examination. This was the wreck of the *El Nuevo Constante*, a Spanish merchantman that sank off the coast of Cameron Parish in 1766 (Pearson et al. 1981). This wreck also produced one of the few good side-scan sonar images of an early wreck in the northern Gulf of Mexico. An intensive structural and historical study has been undertaken of the *M.V. Fox*, a small lugger-like boat found onshore in LaRose, Louisiana (Goodwin et al. 1984), and the remains of a wooden barge or flat found along the Morgan City docks have been excavated and documented (Goodwin and Selby 1984).

Recently, the New Orleans District funded a remote-sensing survey of two project areas along the Atchafalaya Main Channel above Morgan City (Pearson and Saltus 1989). A number of magnetic anomalies were recorded and attempts were made to identify a sample of them through diving. None of the magnetic sources were located, and it was concluded that most of the magnetics recorded were produced by small objects resulting from relatively recent fishing

or boating activities. A number of historical and archaeological studies do provide information on navigation, boat use and shipwrecks in the Atchafalaya Basin/Bayou Teche region (e.g., Castille et al 1989; Gibson 1982; Goodwin et al. 1985a, 1986; Goodwin and Selby 1984; Kelley 1988; Pearson et al. 1989).

Remote-sensing Survey and Data Interpretation

Magnetometer

Interpretation of data collected by remote-sensing instruments is not always straight forward, and, generally, relies on a combination of sound scientific knowledge and practical experience. This is particularly true of the magnetometer, which produces data that can be processed, manipulated, and displayed in a variety of ways to arrive at a variety of interpretations and conclusions. Therefore, a brief discussion of magnetometer survey and anomaly interpretation is presented.

Magnetic surveying involves the measurement of the earth's magnetic field intensity (measured in "gammas") using an instrument known as a magnetometer. The present study is concerned with the application of magnetometers in the search for shipwrecks and details on the physics and mechanics of magnetometers are not discussed here and can be found elsewhere (e.g., Aitken 1958 and Breiner 1973). An assortment of objects and materials, including buried archaeological features, cause localized disturbances, or "anomalies," in the earth's magnetic field that can be detected with a magnetometer. In terms of physical structure, archaeological objects typically found by magnetic search can be divided into three groups: (1) iron and other ferrous materials; (2) burned features such as fire hearths, kilns, daub, brick, etc.; and (3) unfired features such as wall trenches, ditches, walls, storage pits, etc. The first category of items is most easily identified since ferrous objects cause significant magnetic disturbances. The other two classes of items tend to be less easily detected. The objects of concern in this study, sunken boats, are variable in detectability because of differences in size, mode of construction, amount of iron on them, etc. We must assume that larger vessels that contain large amounts of ferrous metal, such as steamboats, will be much easier to detect than will small boats, such as wooden skiffs, flats, etc. It must be recognized, therefore, that these latter types of boats might easily go undetected in a magnetometer survey. In the present study, the side-scan sonar was used to aid in the identification of objects also recorded by the magnetometer, but it also was used specifically to locate small wooden craft which produce a minimal or undetectable magnetic signature. This was considered imperative in view of the long history of use of these craft in the region.

Magnetic signatures (anomalies) can be characterized by two nonexclusive factors: strength (intensity) and shape, both of which are dependent upon a variety of factors related to anomaly source characteristics, including the size, shape and mass of the source object, its magnetic susceptibility, its distance from the point of measurement and the magnetic properties of the surrounding soil. Magnetic anomalies caused by a single-source ferrous object typically produce a positive-negative anomaly pair known as a dipole. The dipole is usually oriented along the axis of magnetization, with the negative anomaly falling nearest the north pole of the source object. The positive anomaly reading is commonly of greater intensity than is the negative. Historic shipwreck remains, because they generally contain numerous ferrous objects, most commonly will produce a magnetic signature composed of a cluster or group of dipoles and monopoles. This class of signature is particularly apparent when the wreck remains are scattered and dispersed.

Anomalies of archaeological interest can vary from several hundred gammas or more, to less than one gamma, depending upon the characteristics of the source and its distance from the point of measurement. As a rule, the strength of the anomaly is proportional to the inverse

cube of the distance between the source and the point of measurement. Because of this rapid drop-off in anomaly strength, objects near the sensor are more likely to produce marked variations in magnetic intensity than are more distant objects. A variety of techniques have been developed to estimate anomaly depth (distance from sensor), all of which express varying degrees of error (Breiner 1973).

Even though a considerable body of magnetic signature data for shipwrecks is now available, it is impossible to positively associate any specific signature with a shipwreck or any other feature. The variations in the iron content, condition, and distribution of a shipwreck all influence the intensity and configuration of the anomaly produced. In general, however, the magnetic signature of larger watercraft, or portions of watercraft, are large in area, range from moderate to high intensity (>50 gammas) at distances of 20 ft or so, and may or may not be complex in nature. A complex signature is one that exhibits a cluster of small dipoles and/or monopoles rather than a single dipole or monopole. It should be recognized that complexity is partially dependent upon distance from the source. A magnetic anomaly recorded when the sensor is close to a shipwreck may exhibit a complex configuration because individual ferrous objects are detected; however, at a greater distance the signature may resemble a single dipole because the entire wreck is being recorded as a single-source object. Table 3 provides

Table 3. Magnetic Data For Various Sources.

Object	Size of Object	Magnetic Intensity in Gammas	Area (at 10 gamma contour level)	Sensor Distance (Feet)
Single Objects				
Engine camshaft	20 ft x 2 in	45	45 x 50 feet	15
Cast iron soil pipe	10 ft long, 100 lbs	1407	45 x 65 feet	4
Iron anvil	150 lbs.	598	26 x 26 feet	4
Iron kettle	22 in diameter	200	23 x 23 feet	4
Iron anchort	6-foot-long shaft	30	80 x 270 feet	16
Multiple Objects				
Pipe and bucket	8 ft x 1 in	250	60 x 50 feet	5
Cable and chain	5 ft	30	50 x 40 feet	15
Burn pile, charcoal	8 ft x 3 in	20	40 x 30 feet	5
Scattered ferrous metal	14 ft x 3 ft x 0.8 ft	100	110 x 90	15
Shipwrecks				
Wooden, coastal sailing trader	90 x 20	35	250 x 150	16
Wooden steamer "Lotawanna"	180 x 47	310	350 x 300	12
Wooden steamer "Spray"	140 x 90	520	160 X 210 feet	10
55-ft long, wooden schooner "James Stockton"	55 x 19	80	90 X 130 feet	8
126-ft long, wooden ship "El Nuevo Constante"	126 x 26	65	150 X 250 feet	20
150 ft long, Civil War ironclad "CSS Tuscaloosa"	150 x 40	4000	200 x 300 feet	20
Segment of modern shrimp boat	27 x 5	350	90 x 50	3
Gasoline sternwheeler	50 x 10	450	140 x 200	8
1840s tow boat	65 x 13	110	110 x 60	12

information on magnetic signatures produced by a variety of identified sources. These data suggest that at a distance of 20 ft or less watercraft of moderate size are likely to produce a magnetic anomaly (this may be a complex signature, i.e., a cluster of dipoles and/or monopoles) greater than 80 or 90 ft across the smallest dimension and have an intensity of greater than about 50 gammas. While recognizing that a considerable amount of variability does occur, this information establishes a beginning point for the identification of the sources of magnetic anomalies in the two project areas.

Side-Scan Sonar

Side-scan sonar produces a visual image derived from sound waves sent through the water and reflected back to a sensor. Interpretation of side-scan records is fairly straightforward, because, generally, dense objects are good reflectors and produce a darker image on the record. The difficulties in interpretation arise from the fact that the visual portrayal of an object, such as a shipwreck, is dependent upon a number of variables such as the target's condition and configuration, the site-specific environment, and the angle and distance from which the record is obtained. Side-scan sonar has minimal penetrating power, such that buried objects, particularly in a hard reflecting medium, such as sand, cannot be detected. The side-scan sonar records obtained in this study were generally very good, although the constantly changing water depth and bottom configuration required almost constant tuning and adjustment of the instrument.

Fathometer

The fathometer, using acoustic energy, records water depth and can, as in this study, provide a hard copy track of the river bottom. Water depth information is particularly important in interpreting magnetometer data because of the sensitivity of the magnetometer to distance from the source object. In addition, by providing information on the configuration of the river bottom, the fathometer can often reveal bottom features that may be indicative of the presence of buried watercraft remains (e.g., bottom scours) or it may record watercraft remains themselves if they protrude above the bottom.

Survey Methodology and Results

The field portions of this project were conducted in three phases. The initial phase consisted of systematic remote-sensing survey of the entirety of each of the study areas via linear transects spaced 150 ft apart. The second phase of examination consisted of detailed survey of a number of targets selected in the field as potential shipwreck remains. The final phase of field investigation involved the physical examination (including diving) of several selected targets.

In order to achieve comparability of the data collected from all of the study areas, the same instruments and general survey methodology was applied to each. However, as is discussed below, specific survey techniques, such as direction of survey lines, had to be tailored to the conditions found in each study area. The survey vessel used during the two phases of survey was a 21-ft, aluminum boat powered by a 50-horsepower outboard engine. The magnetometer used was a Geometrics model 806 proton precession magnetometer with a Soltec VP-6723S strip chart recorder. A Klein 500 KHz side-scan sonar was used and bathymetric data were obtained with a King model 1060 recording fathometer. A King Loran-C model LC 8002 was used for positioning control during the initial phase of survey. The Loran-C was interfaced with the fathometer permitting recordation of position fixes ("shot points") on the bathymetric record. The magnetometer sensor was mounted on an aluminum pole extended 6 ft forward of the survey vessel and 24 in above the water. The sensor was located 10 ft forward of the Loran-C antenna and the fathometer transducer was mounted on

the stern 10 ft aft of this antenna. Prior to each day's survey, tests were run to insure that the sensor was beyond the magnetic influence of the survey boat.

The Loran system used during the initial phase of survey was, as noted, interfaced with the fathometer such that latitude/longitude or time/distance readings were automatically printed as positioning control points or on the fathometer record as they were recorded by the Loran system. Simultaneously, positioning points were hand recorded on the magnetometer records. The locations of survey lines, plus the exact positions (latitude/longitude) of their starting and ending points were developed prior to going into the field. These data were programmed into the Loran and served to navigate the boat along transects.

The intent of using the Loran system was to eliminated the need to continually reestablish shore-based control stations during the survey just to maintain line-of-sight contact with the survey vessel. This would have been a time-consuming process considering the length and configuration of the various study areas. To some extent, the configuration, water conditions, amount of boat traffic, etc., in the study areas dictated the placement of the survey transects. In the study areas above Morgan City and in Bayou Shaffer, coverage was obtained by running transects parallel to the river, an approach intended for all of the areas examined. However, the extremely strong current found in the Atchafalaya River below Morgan City made it difficult to maintain a course when running directly against or with the current. In the study areas located here, some survey transects were run at an angle to the river's flow. In addition, low water prevented the survey vessel from covering some areas close to banklines and other shallow-water areas. This was particularly true in some portions of Sweetbay Lake along the Atchafalaya River below Morgan City.

The Loran-C system ideally has an accuracy of something on the order of ± 20 to 25 ft, although its accuracy varies over geographic space. In order to assess the accuracy of the Loran system in the study area, readings were periodically taken at easily identified locations and these readings were compared against one another over time and against the known latitude and longitude of the location. It was found that the Loran readings taken at these points were consistent over time, although the coordinates provided by the Loran were often off by as much as 100 ft from the actual geographic coordinates of the check point. When the survey line data were subsequently plotted after the survey, it was a simple matter to shift the Loran data such that appropriate Loran positioning points matched their corresponding check points. When this was done, it was found that all other survey line segments and positioning points fit closely, suggesting a fairly high degree of accuracy in the survey; certainly an accuracy adequate for the type of survey conducted here.

It should be noted that while the Loran-C system seems to be useable in the lower Atchafalaya region and in coastal Louisiana in general, it is not necessarily useful everywhere. For example, the authors recently (August 1991) conducted a similar survey along the lower Lavaca River on the central Texas coast and found that the Loran did not give accurate readings. This variability is apparently due to the configuration of Loran transmitter stations, suggesting that the reliability and utility of the Loran system has to be checked and verified for each situation.

The magnetometer was operated on a 100-gamma scale and readings were taken every 1 second. A boat speed of about 4 mi per hour was maintained during the survey, resulting in a magnetic reading approximately every 6 ft. An effort was made to obtain positioning points every 100 ft or so along each line.

The side-scan sonar sensor was lowered over the bow of the vessel to a depth of 3 ft below the surface. Because the sensor was under water, great care had to be taken to avoid hitting any of the numerous fallen trees, snags, submerged logs, shallow sand bars, etc.,

which occur along much of the area surveyed. In light of this, the side-scan sonar survey was conducted separately from the magnetometer survey, although the same positioning system (Loran) was used to insure compatibility.

For the detailed survey of selected targets the positioning system used was a Hewlitt/Packard Total Station. This system uses a 20-second theodolite which measures the azimuth variation from a known point and an infrared EDM that measures the distance from the instrument to a set of mirrors carried in the survey vessel. Distance is measured to the nearest tenth of a foot in the tracking mode, with an accuracy of ± .02 ft for each 1000 ft of distance. The theodolite was placed at points on the shore that would give optimum line-of-sight over the area to be surveyed. The positions of these on-shore stations were accurately established relative to Corps of Engineers survey control points found at each of the study areas. For most of the detailed survey, only the magnetometer and fathometer were used. The shallow water or underwater obstructions (e.g., trees, logs, etc.) found at most target areas prevented the use of the side-scan sonar.

Four individuals were included in the survey crew. Two persons worked in the boat, one operated the magnetometer and fathometer and annotated the records; the other steered the boat. During the detailed survey of selected targets, two individuals were on shore operating the theodolite, while two were in the survey boat. The results of the remote-sensing surveys of each of the study areas are discussed below.

Study Areas Above Morgan City

Two study areas are located along the Atchafalaya Main Channel above Morgan City. One extends from river mile 109.5 to mile 114.0 and includes an area from the left descending bank out 800 ft (see Figure 5). The other (upper) study area extends from river mile 99.6 to mile 109.5 and includes an area from the left descending bank out to a water depth of -20 NGVD or 450 ft (see Figure 5). Initial survey coverage of this area took three days and an additional day and a half was required to conduct the side-scan sonar survey.

Seventy-seven magnetic anomalies were recorded in these two areas and several side-scan targets were noted. Table 4 provides a list of these magnetic anomalies giving information on location along survey lines, magnetic intensity, size, characteristics, and water depth.

Table 4. Magnetic Anomalies Recorded in the Study Areas Above Morgan City.

Anomaly Number	Deflection (Gammas)	Character	Length (ft)	Width (ft)	Water Depth (ft)	Line Number	Shot Point Location
1	40	D	250	200	15	2 ;4	2.5-3;3.0
2	70	D	250	200	18	2;3;4	4.2;3.5-4;5-5.5
3	23	D	150	-	13	1	3.5-4
4	50	D	280	-	14	1	5.2-6.2
5	20	D	130	-	14	1	6.7-7.2
6	60	M	300	250	15	1;3	8-9;10-10.4
7	80	D	80	-	11	1	14.2-14.4
8	40	M	60	180	10	1;3	15-15.3;11.4-11.6
9	80	D	160	-	13	1	20.8-21.5
10	50	M	220	-	24	4	6-7.5

Table 4. Continued

Anomaly Number	Deflection (Gammas)	Character	Length (ft)	Width (ft)	Water Depth (ft)	Line Number	Shot Point Location
11	30	D	140	-	16	3	3.8-4.2
12	40	M	70	-	14	3	15
13	20	M	50	-	14	3	17.2
14	20	D	80	-	30	2	24-24.4
15	40	D	100	-	18	2	21
16	1720	D	1100	200	11	1;2	4.6-5.9;4.6-5.9
17	213	D	220	-	38	3	14.8-16
18	180	D	220	220	12	2;3	2.5-3.0;13.9-14.2
19	213	D	250	-	12	3	12-12.5
20	38	D	300	-	27	3	3.2-3.8
21	65	D	300	100	18.4	2;3	7-10.2;12.5-12.75
22	50	-	150	60	19	2;3	3.8-4.2;15.0
23	30	M	100	-	25	2;3	2-2.3;16.2-16.4
24	20	M	60	-	12	3	16.8-16.9
25	20	D	300	-	13	1	5.75-6.2
26	20	M	300	-	22	1	11-11.5
27	20	M	150	-	12	3	5.5-4
28	20	M	130	-	14	3	3-3.25
29	30	D	200	-	10	2	7.3-8
30	20	D	250	-	10	2	6-6.6
31	60	D	120	-	7	3	12.75-12.9
32	40	D	140	-	7	2	4.5-4.75
33	1930	D	400	300	4-14	All	-
34	40	D	130	-	30	2	6.25-7.7
35	30	D	550	-	14	1	24.4-24.6
36	10	M	70	-	13	2	22.4-22.5
37	30	M	150	-	17	1	11.75-12
38	50	M	200	-	12	2	17.5-18
39	100	D	200	-	17	1	13
40	30	M	150	-	16	1	13.75-14
41	30	D	200	-	7	2	14.7-15.2
42	80	M	100	-	6	2	13.5-13.8
43	40	D	110	-	6	2	12.5-12.8
44	20	D	90	-	10	3	16.7
45	50	M	150	200	6	2;3	9.3-9.6;18.75-19
46	30	M	130	-	22	7	21-21.1
47	20	M	80	-	13	3	21.5
48	30	D	200	-	8	2	5.9-6.4
49	20	M	70	-	21	1	24.25
50	20	M	300	-	13	2	2.2-2.6
51	50	M	160	-	14/20	1;5	28;7.5-8
52	90	D	600	300	27/27-30	6;8	23.3-26.5;27.7-30.2
53	10	M	80	-	12	2	2
54	30	D	250	150	25	7	9

Table 4. Concluded.

Anomaly Number	Deflection (Gammas)	Character	Length (ft)	Width (ft)	Water Depth (ft)	Line Number	Shot Point Location
55	80	D	400	200	10/14	21	4.5-18.;8-20.5
56	80	D	600	500	21/20/19	7;8;9	14-15.5;17-19;13.7-15
57	20	D	100	100	14	1	18.1
58	-	-	600	300	18-15/21	5;6;7	20.5-21.4;11.3-13.8;18.6-19.5
59	20	M	300	100	20/19	7;8	18;12.5-13.5
60	10	M	70	-	18	8	5-5.4
61	10	M	70	-	27	3	4
62	-	-	-	-	30	9	26.6
63	50	M	150	100	10	2	4-5
64	50	M	50	-	12	2	2.3
65	20	D	65	-	17	1	32.5-33.7
66	80	D	300	200	13	6;4	2-2,2-3
67	100	D	600	-	12	6	6-8
68	30	D	300	300	16/30	4;8	8-8.5;10-11
69	30	M	180	-	34	7	14-15
70	80	M	60	-	36	1	12
71	30	D	570	-	26/25	4;6	13.5-15.7;13-15
72	30	M	100	-	7	2	14
73	60	D	200	100	34/7	1;2	6-7.5;15-16
74	40	D	150	-	26	6	16-16.3
75	20	D	160	-	34	7	7
76	40	D	440	150	20	7;5	3-4;2.5-4
77	20	M	300	-	24	4	1.25-1.75

Notes: D = Dipole; M = Monopole; C = Complex

Figures 14 through 22 provide detailed information on the survey, including the locations of survey lines, shot points, recorded magnetic anomalies, and pertinent topographic information and cultural features. Corps of Engineers survey station locations also are shown. The locations of all anomalies and side-scan sonar targets recorded during the survey also are provided on accompanying blue-line project maps.

Only one of the sonar targets in this area was originally selected as possible wreckage. This feature, which also produced a very large magnetic anomaly, was located at about river mile 107 in 3 to 15 ft of water. After being reported a hazard to navigation, this target, shown in Figure 23, was investigated for the New Orleans District by Acadian Divers and Salvage Corp. of Lafayette, Louisiana, subsequent to CEI's initial survey of this area. The objects proved to be a pile of several metal barge hatch covers, apparently lost or purposefully dumped into the river. Other cultural material such as hoop nets and crab traps also commonly appeared on side-scan records (Figure 24). The side-scan sonar, in conjunction with the fathometer, was also very useful in interpreting river bottom topography and local bottom conditions. With these instruments features such as sand waves and ripples, clay ledges, stumps, trees, and log jams could be easily distinguished. This type of river bottom information is of use in evaluating the potential for the occurrence, condition, and discovery of boat wrecks in specific areas. For example, in some areas extensive expanses of large sand waves were recorded.

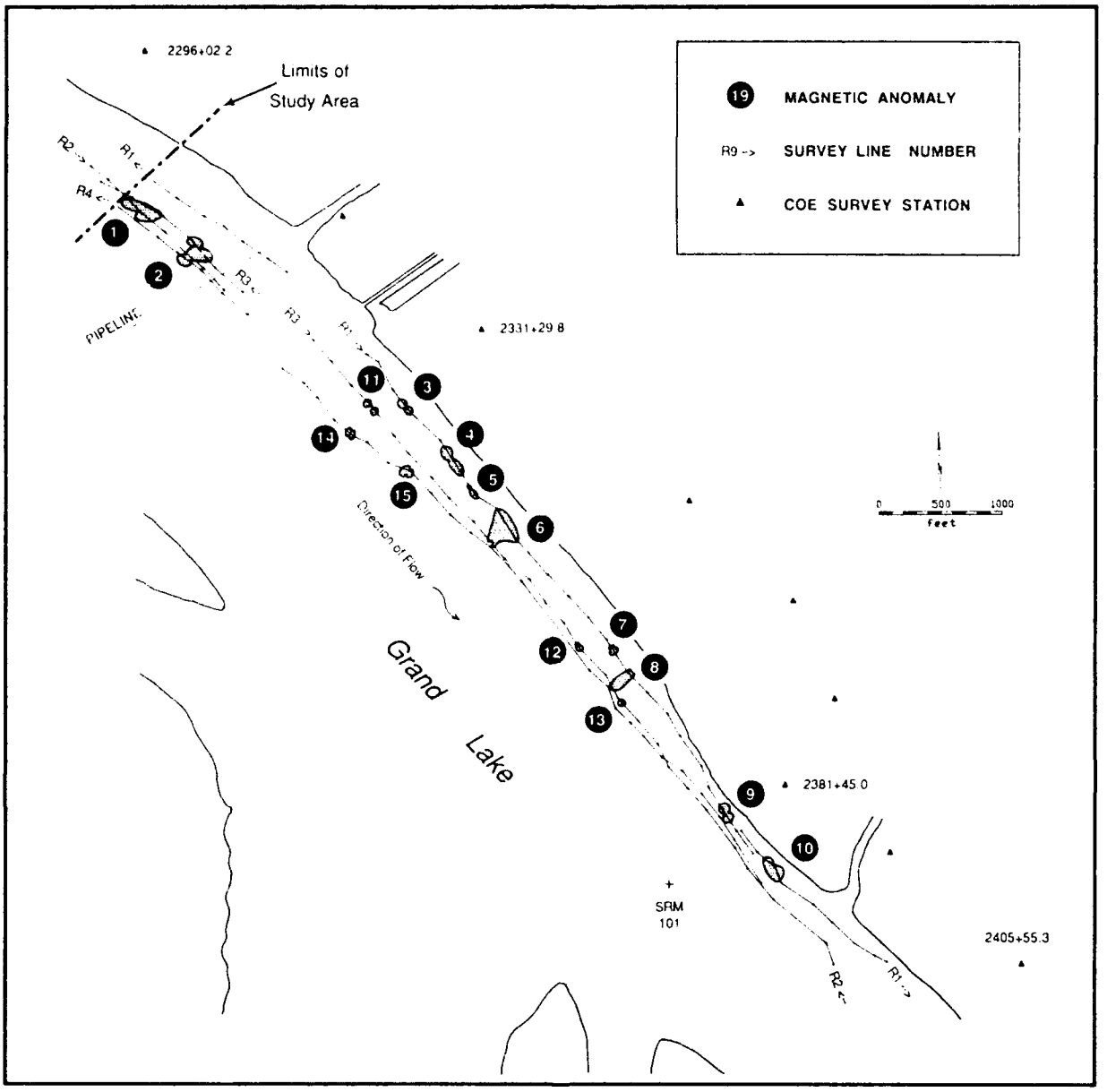

Figure 14. Survey data from the vicinity of River Mile 101, study areas above Morgan City.

The movement of these sand waves would affect the condition and extent of burial of cultural material on the bottom. Presumably, when an object settles to the bottom and rests on the top of one of these sand waves it not only will work its way into the sand, but will continue to settle further as the sand wave passes, ending up in/or below the lowest wave trough. This process easily could remove an object from detection by side-scan sonar, although it may still be recorded by magnetometer. In fact, during the study, several magnetic anomalies were recorded in the vicinity of these areas of sand waves, but few correlative sand-scan sonar images were seen.

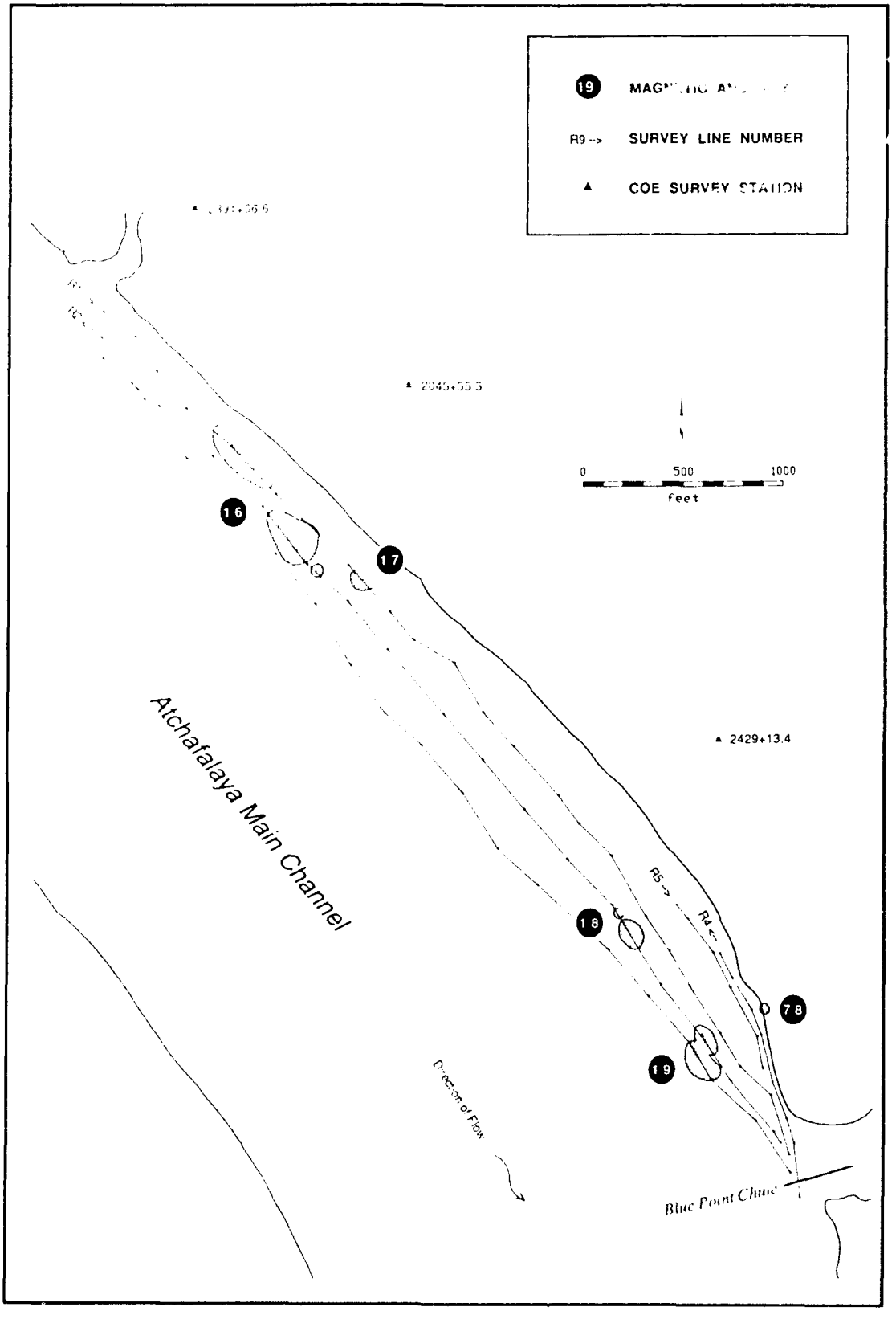

Figure 15. Survey data from the vicinity of Blue Point Chute at River Mile 102, study areas above Morgan City.

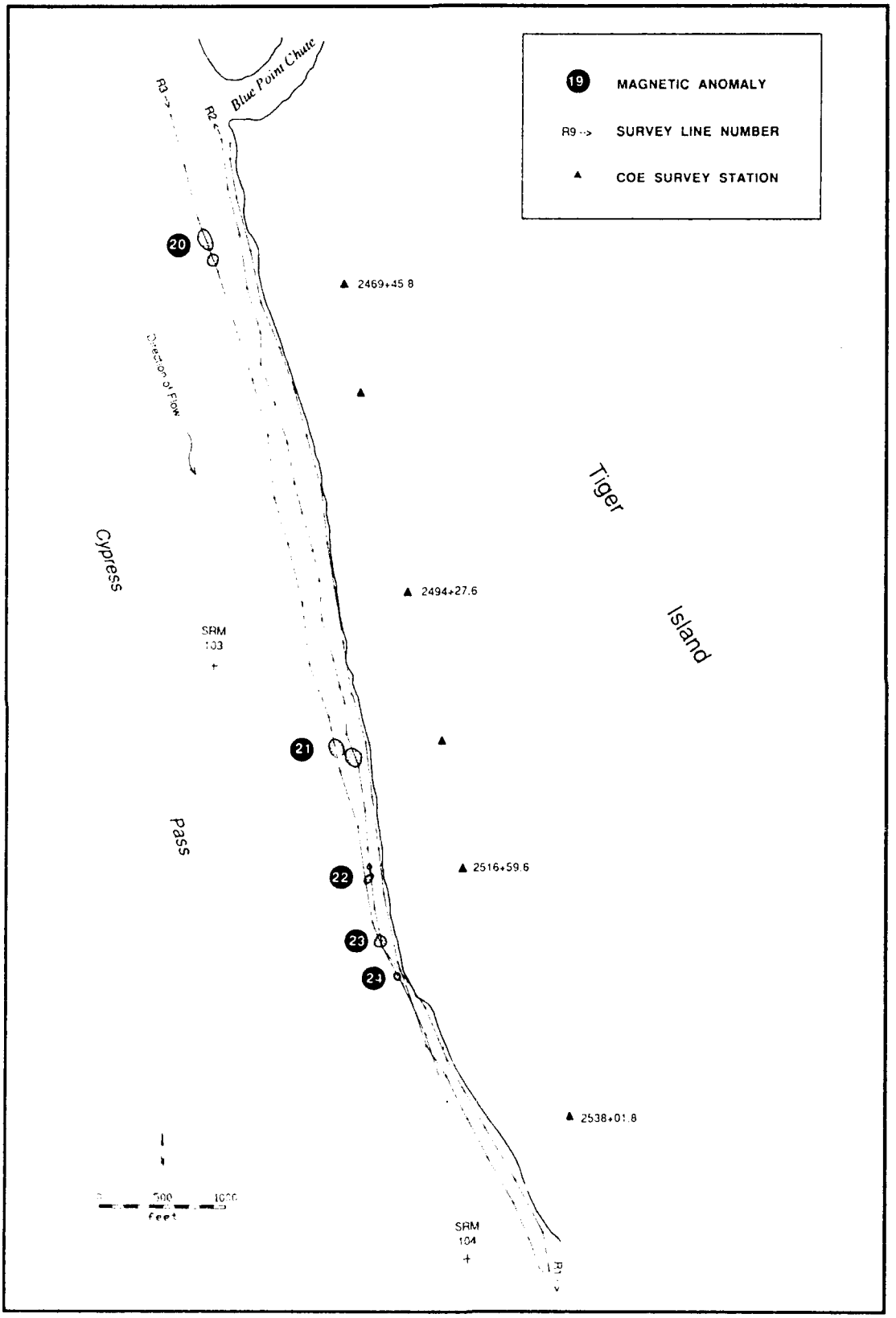

Figure 16. Survey data from the vicinity of River Mile 103, study areas above Morgan City.

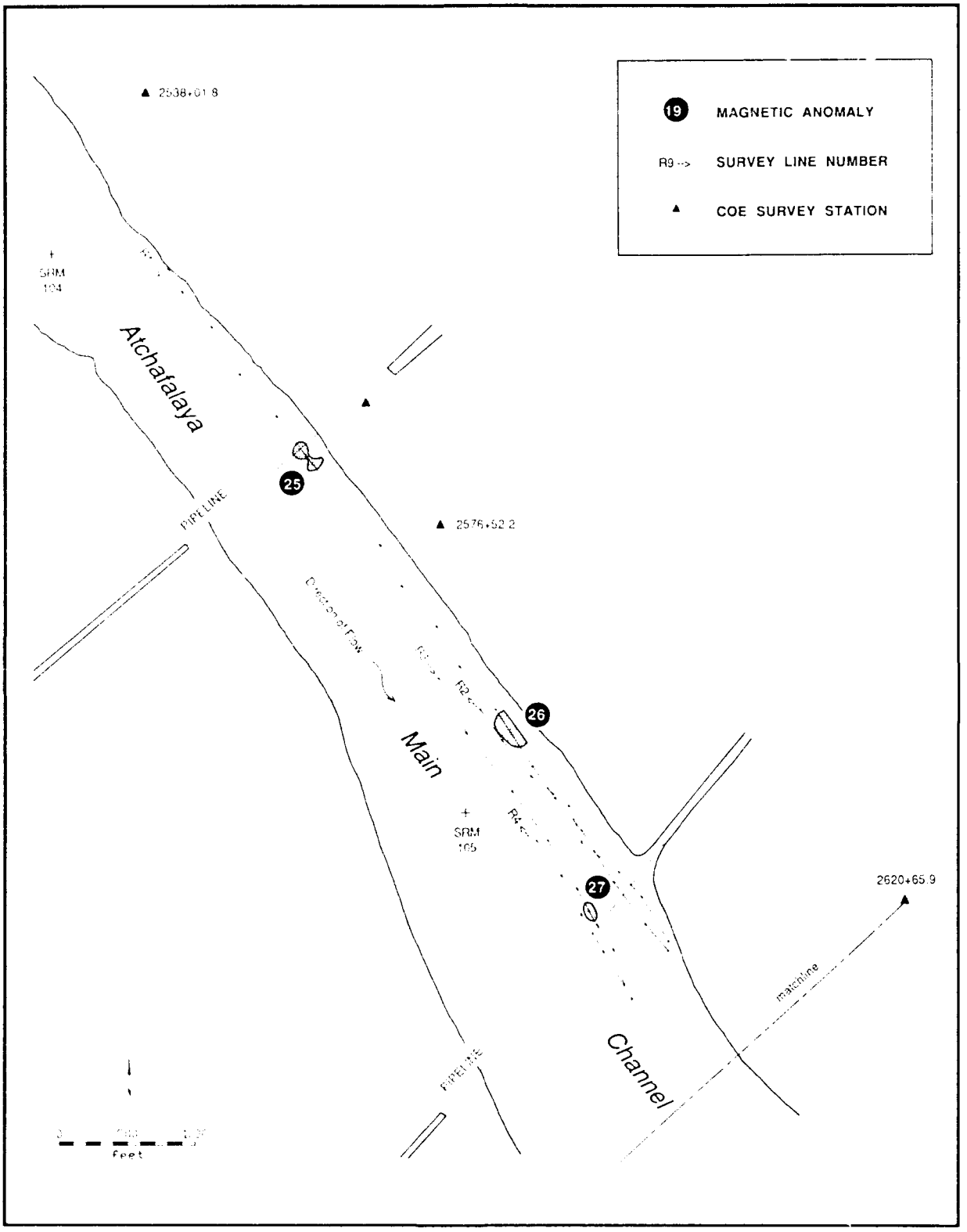

Figure 17. Survey data from the vicinity of River Miles 104 to 105, study areas above Morgan City.

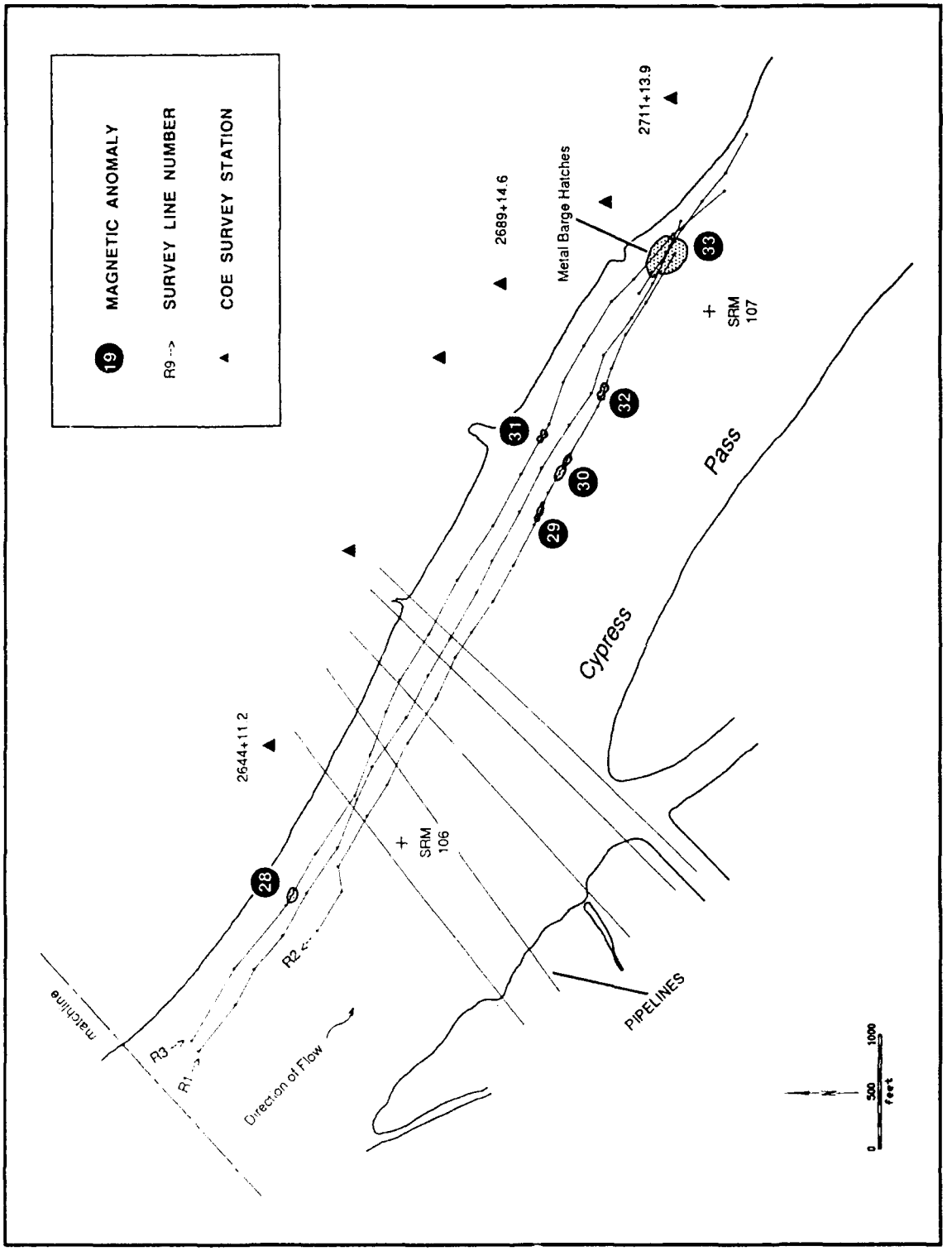

Figure 18. Survey data from the vicinity of River Miles 106 to 107, study areas above Morgan City.

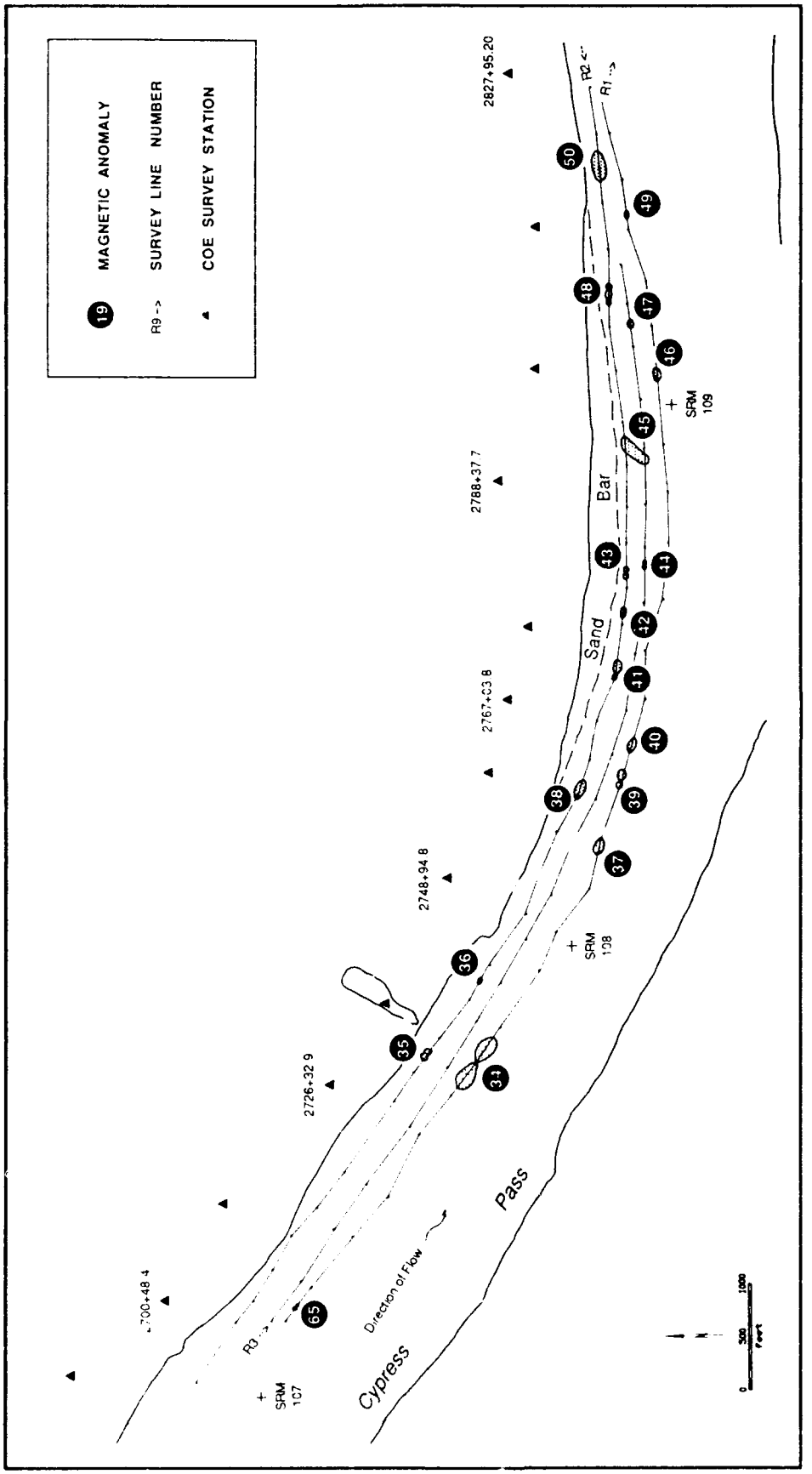

Figure 19. Survey data from the vicinity of River Miles 107 to 109, study areas above Morgan City.

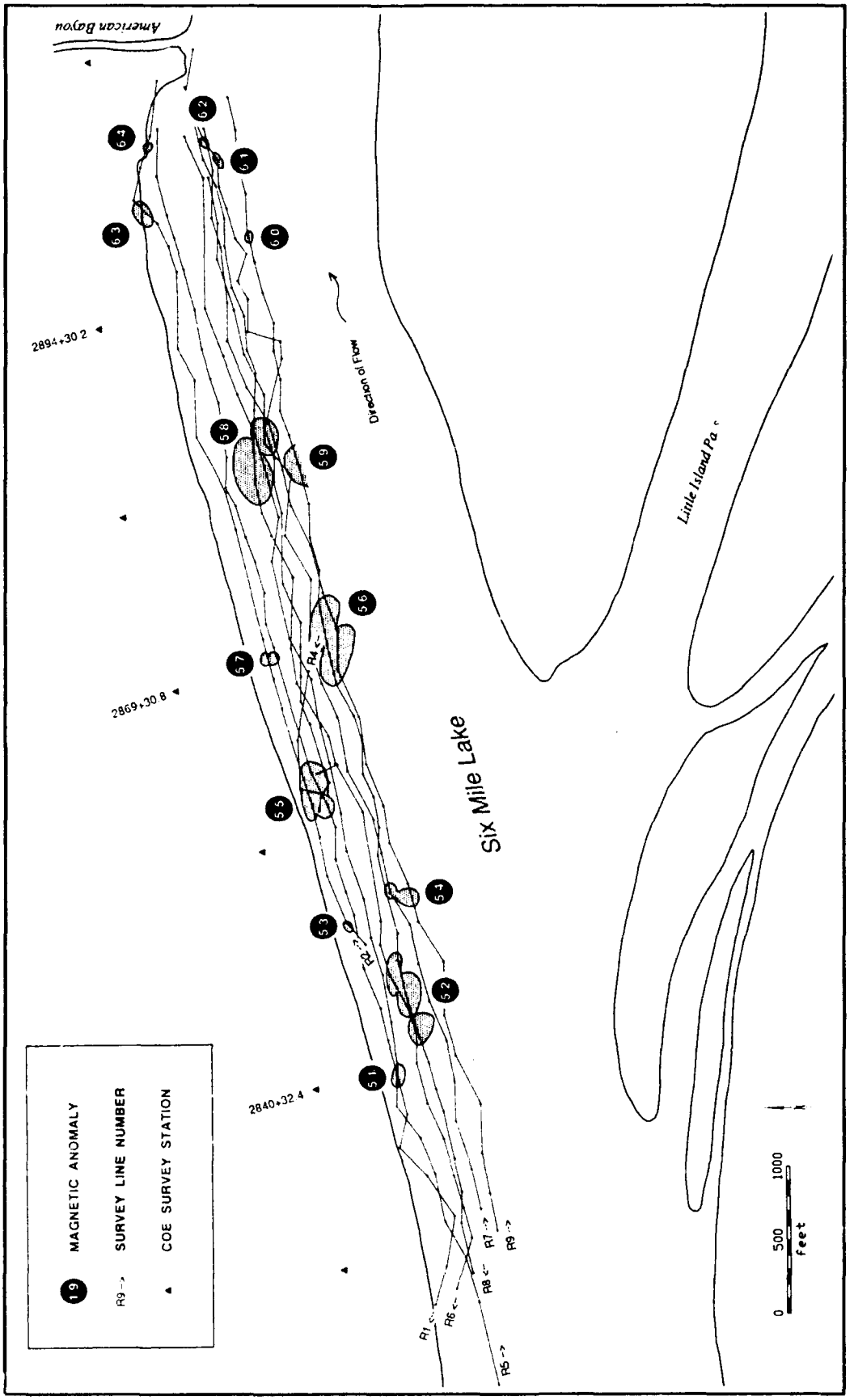

Figure 20. Survey data from the vicinity of River Mile 110, study areas above Morgan City.

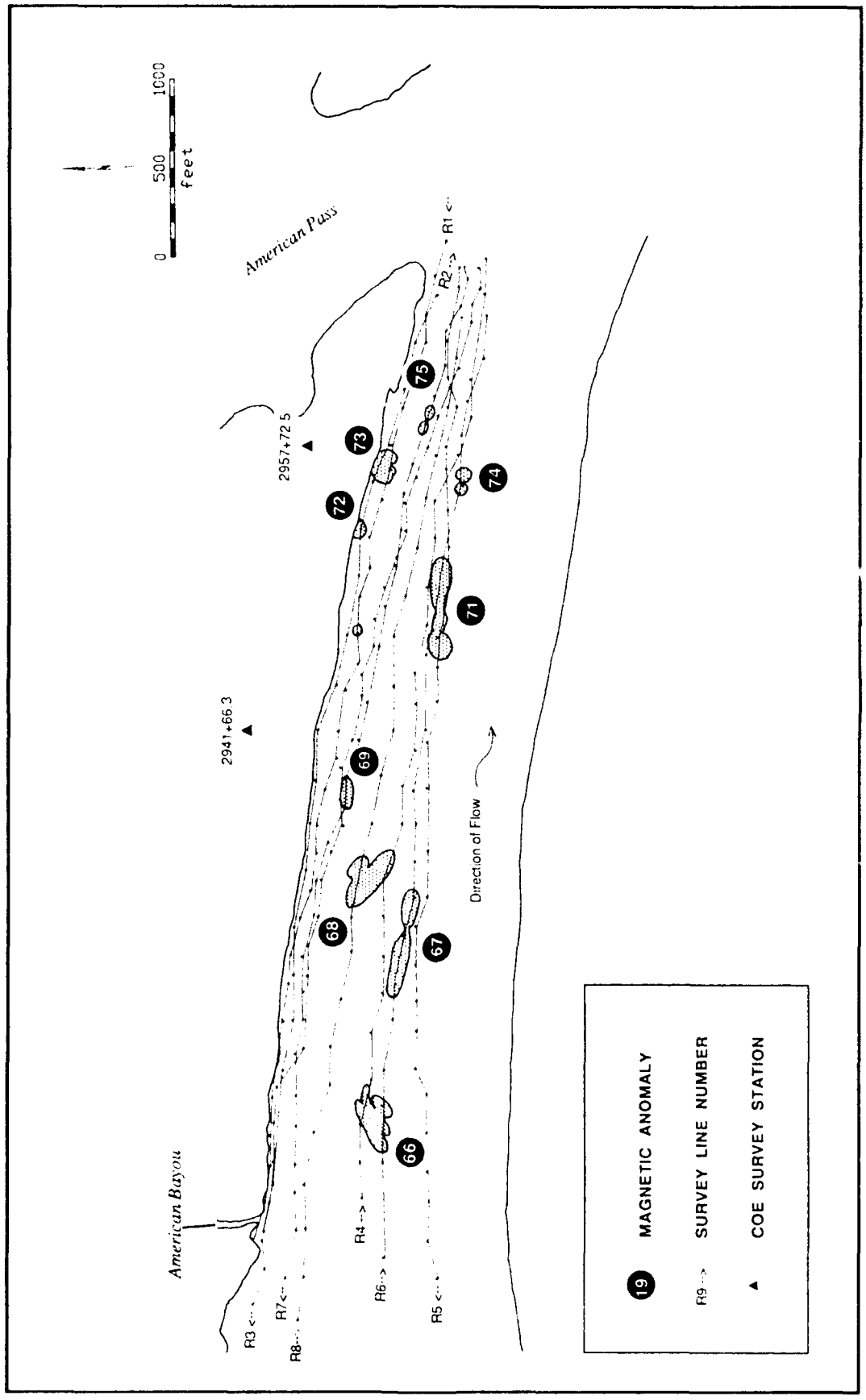

Figure 21. Survey data from the vicinity of American Pass at River Mile 112, study areas above Morgan City.

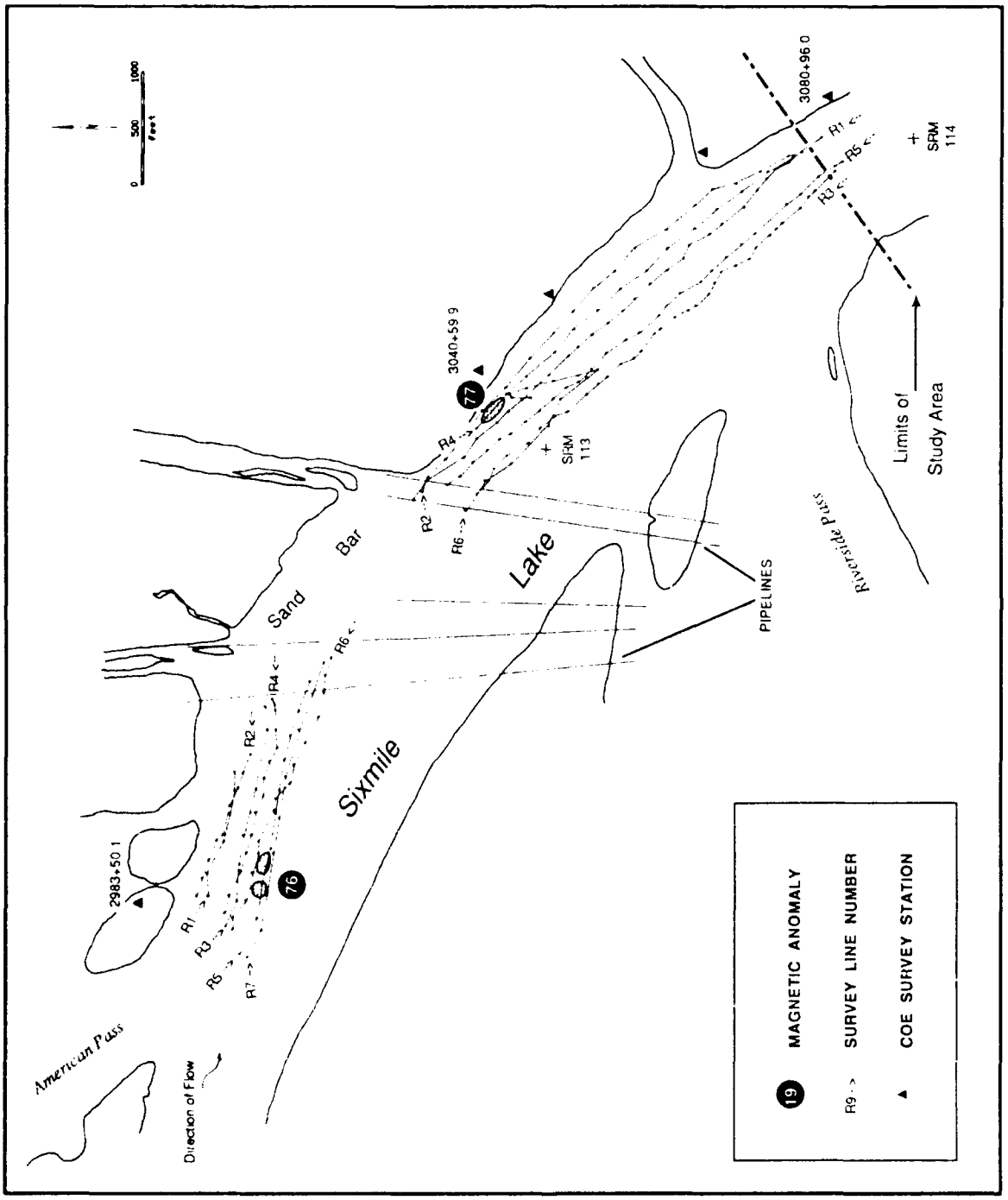

Figure 22. Survey data from the vicinity of Riverside Pass at River Mile 112 to 114, study areas above Morgan City.

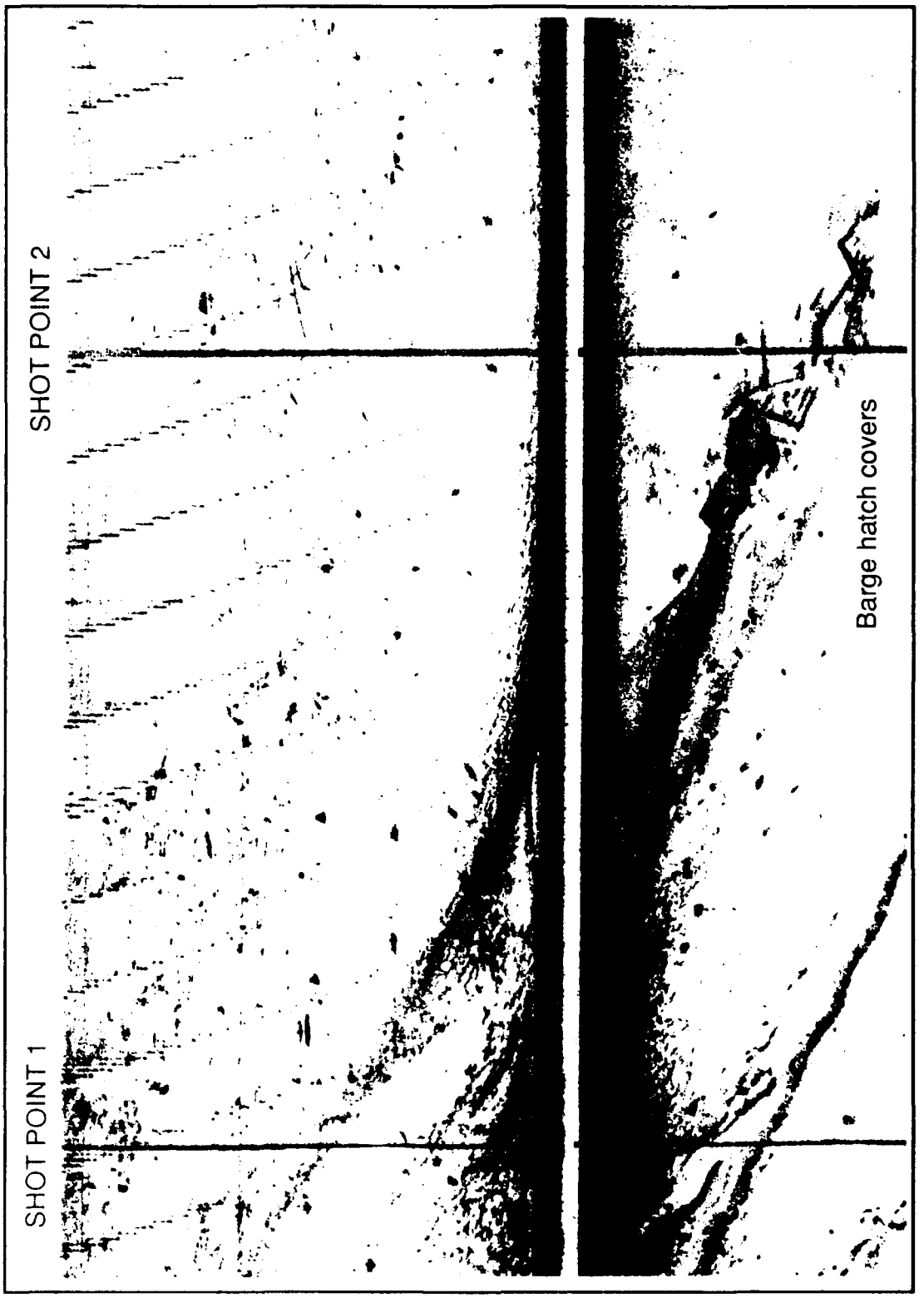

Figure 23. Side-scan sonar image of modern barge hatch covers in the Atchafalaya Main Channel at about River Mile 107.

Study Areas Below Morgan City

Bayou Shaffer

Two sections in the northern portion of Bayou Shaffer were surveyed (see Figure 7). Each of these areas measured about 1 mi in length. The side-scan sonar and initial magnetometer surveys of these areas each took one day to complete.

The upper area in Bayou Shaffer contains an inordinate amount of highly magnetic modern cultural material. This includes numerous pipelines concentrated in basically three wide crossings in the upper half of this study area, electrical transmission lines at the northern end of the study area, and a metal barge mooring area that extends along the west bank of the bayou in the middle to lower end of the study area. These conditions rendered much of the magnetic data collected useless. Only one magnetic anomaly was recorded within the bounds of the study area, but a large magnetic anomaly and the side-scan sonar image of a possible sunken barge were recorded on the west bank of the bayou, just below the bounds of the study area (Table 5, Figure 24). Additionally, a second possible sunken barge was identified on the side-scan sonar records further down the bayou and well outside of the study area.

The lower study area in Bayou Shaffer is relatively free of the large amounts of modern cultural material found in the upper area. The major exceptions are a rock revetment located on the east bank, near the center of the study area, and a pipeline which crosses near the upper end (Figure 25). Seven magnetic anomalies were recorded in this study area, although one of these, Anomaly 3, is well outside of the area's boundaries (Figure 25). The magnetics produced by the pipeline are not included in this tabulation. Several side-scan sonar targets were identified, these included one sunken boat (16 SMY 58), a dock area at what is known as the Adams Site (16 SMY 55), and several objects in the vicinity of Anomaly 6 (Figure 25).

Table 5. Magnetic Anomalies Recorded in the Bayou Shaffer Study Areas, Below Morgan City.

Anomaly Number	Deflection (Gammas)	Character	Length (ft)	Width (ft)	Water Depth (ft)	Location	
						Line Number	Shot Point
1	40	D	500	100	8	1;5	6-7;9-10
2	300	C	1000	300	15	4;5	27-29;1-3
3	60	M	150	-	15	1	1
4	569	D	450	100	20	1;5	10-13;3-6
5	20	M	200	-	4	1	15-16
6	160	M	400	75	8	1;5	17-19;9-10
7	370	D	300	150	10	3	7-9
8	53	D	800	75	10	3;4	12-16;17-19
9	1217	spike	350	200	25	1;2;5	32;8;27-28

Notes: D = Dipole; M = Monopole; C = Complex

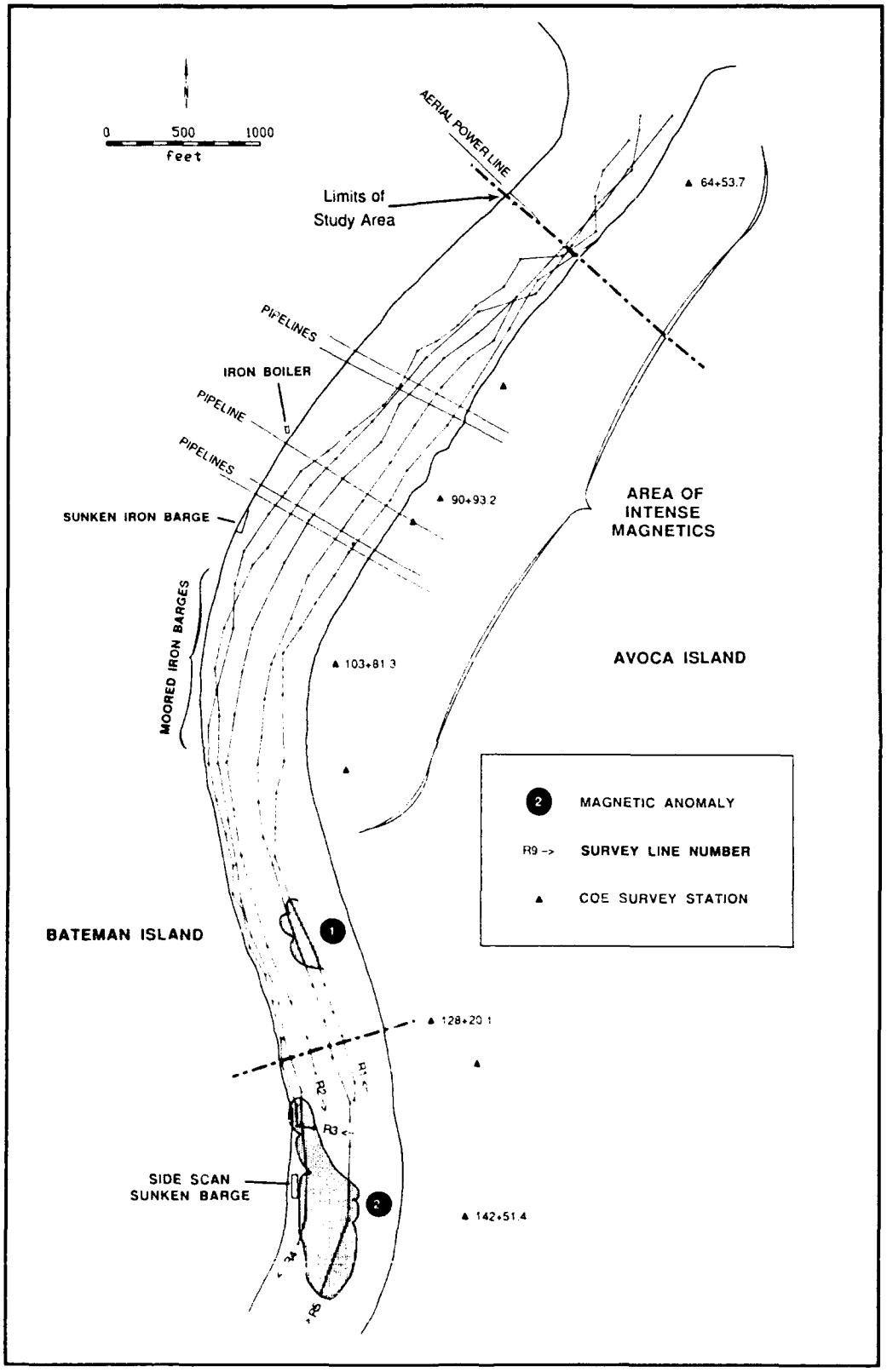

Figure 24. Survey data from the upper Bayou Shaffer study area.

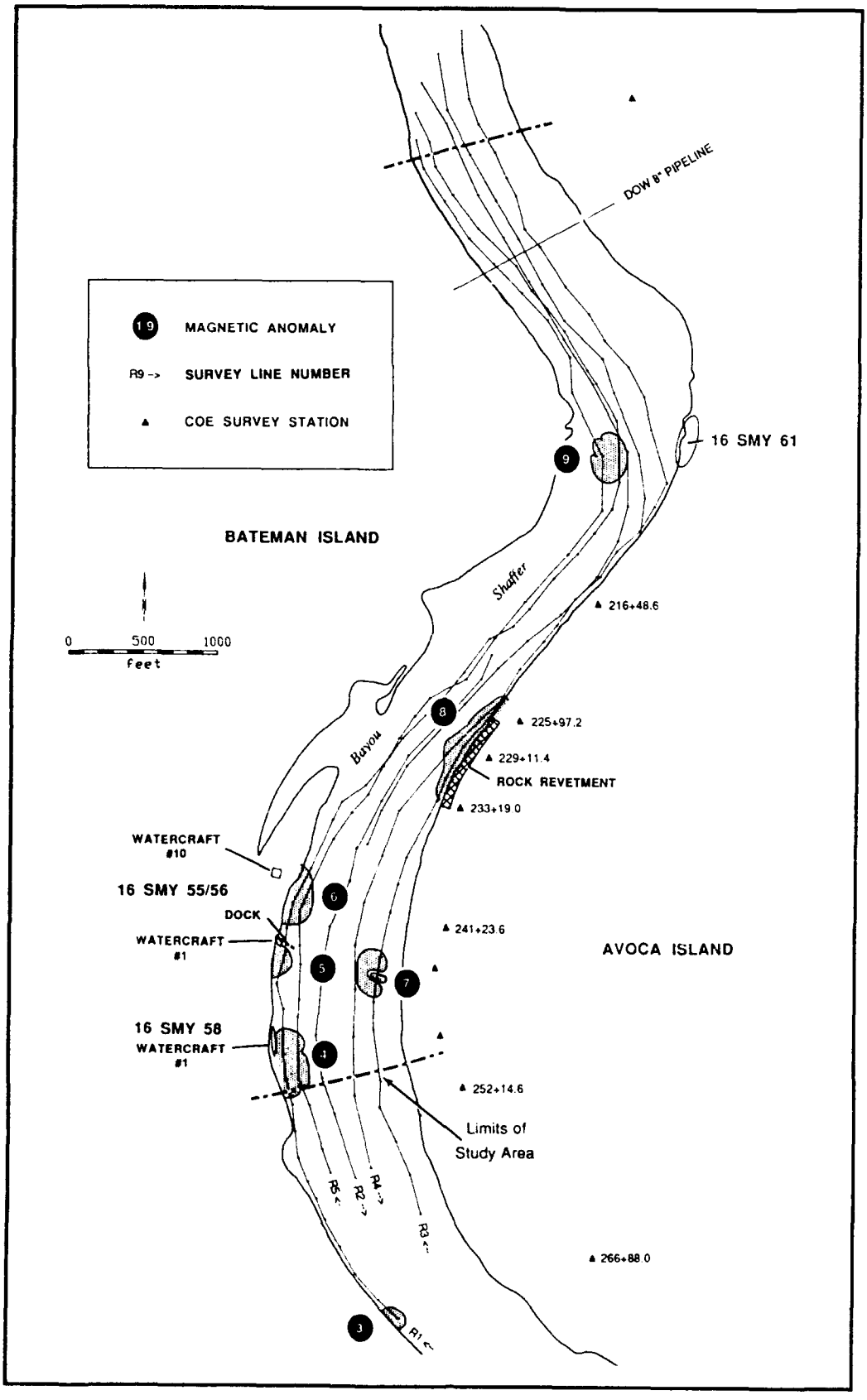

Figure 25. Survey data from the lower Bayou Shaffer study area.

Atchafalaya River Below Morgan City

Three study areas were examined in the Atchafalaya River below Morgan City (see Figure 6). Of all of the areas examined, survey in these areas proved the most difficult. During the side-scan sonar survey of this area, water levels were very low, making it difficult to obtain coverage in some shallow-water areas. In addition, there is a considerable amount of crew boat traffic along this segment of the Atchafalaya River, which made the survey both difficult and dangerous. Survey lines had to be continually terminated as boats passed, meaning that many lines had to be restarted and/or rerun. During portions of the magnetometer survey of these areas the river was extremely high, and the strong current, coupled with the continuing crew boat problem, added to the difficulties of conducting the survey. The magnetic survey took seven days to perform; one day was required for the side-scan sonar survey.

Twenty magnetic anomalies were recorded in these areas (Table 6) and no significant cultural features were identified on the side-scan records. Survey data for these three areas are provided in Figures 26 through 28. The unevenness of many of the survey lines is a product of the difficult navigation conditions encountered during the conduct of the survey. One interesting natural feature identified by side-scan in the upper area consisted of a submerged field of cypress stumps in growth position in 50 to 65 ft of water. Fathometer and side-scan records indicate that many of these stumps rise some 3 to 6 ft off the river bottom.

Table 6. Magnetic Anomalies Recorded Along the Atchafalaya River Below Morgan City

Anomaly Number	Deflection (Gammas)	Character	Length (ft)	Width (ft)	Water Depth (ft)	Location	
						Line Number	Shot Point
1	60	M	250	-	10	37	30-31
2	110	D	300	150	14	8;10	2-4;1-2
3	28	M	300	-	64	3	18-19
4	20	D	250	-	68	3	9 - 11
5	24	D	80	0	24	1	4
6	30	M	400	-	58	23	3 - 5
7	150	D	400	500	28	26;26;27;28	7-9;3-5;9-11;3-5
8	70	D	250	300	18	33;37	8;5
9	85	D	200	500	10	27;29	3-4;2-3
10	95	D	200	350	12	13;14	8-10;9-11
11	50	D	300	400	6	14	8-5,
12	170	D	150	250	10	5;12	1-3;8-9
13	150	D	300	-	20	2	31-33
14	230	D	1600	700	28	7;8;9	7-10;59-64;22-23
15	50	M	200	100	18	7;8	11-12;54-56
16	80	D	1200	200	11	2;3	20-21;16-17
17	58	D	400	100	50	8;10	33-35;3-4
18	48	M	140	-	4	3;4	36-37;8-9
19	100	D	100	-	4	3	43
20	140	M	200	100	49	8;10	6-7;3

Notes: D = Dipole; M = Monopole; C = Complex

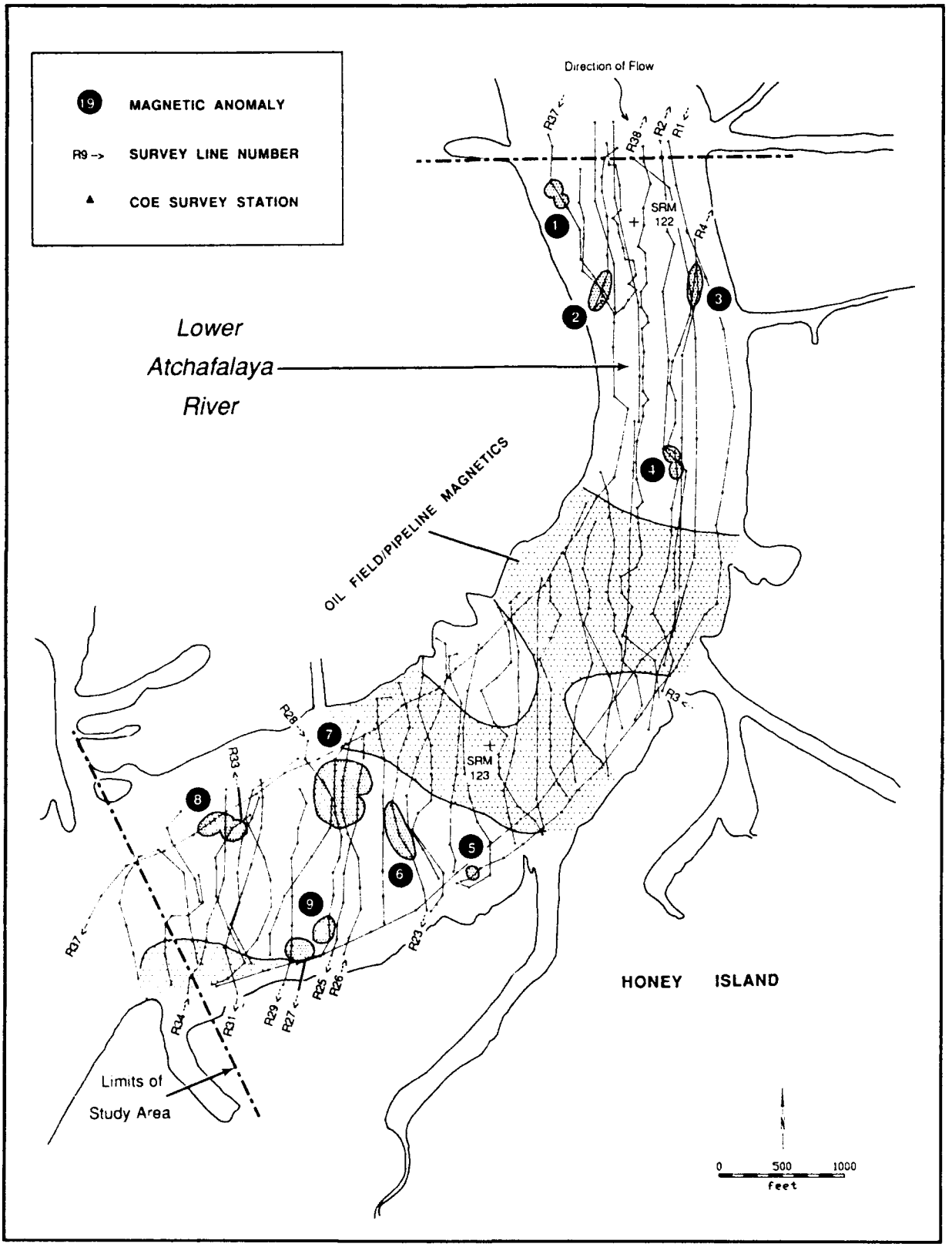

Figure 26. Survey data from the Atchafalaya River in the vicinity of River Miles 122 to 124, study areas below Morgan City.

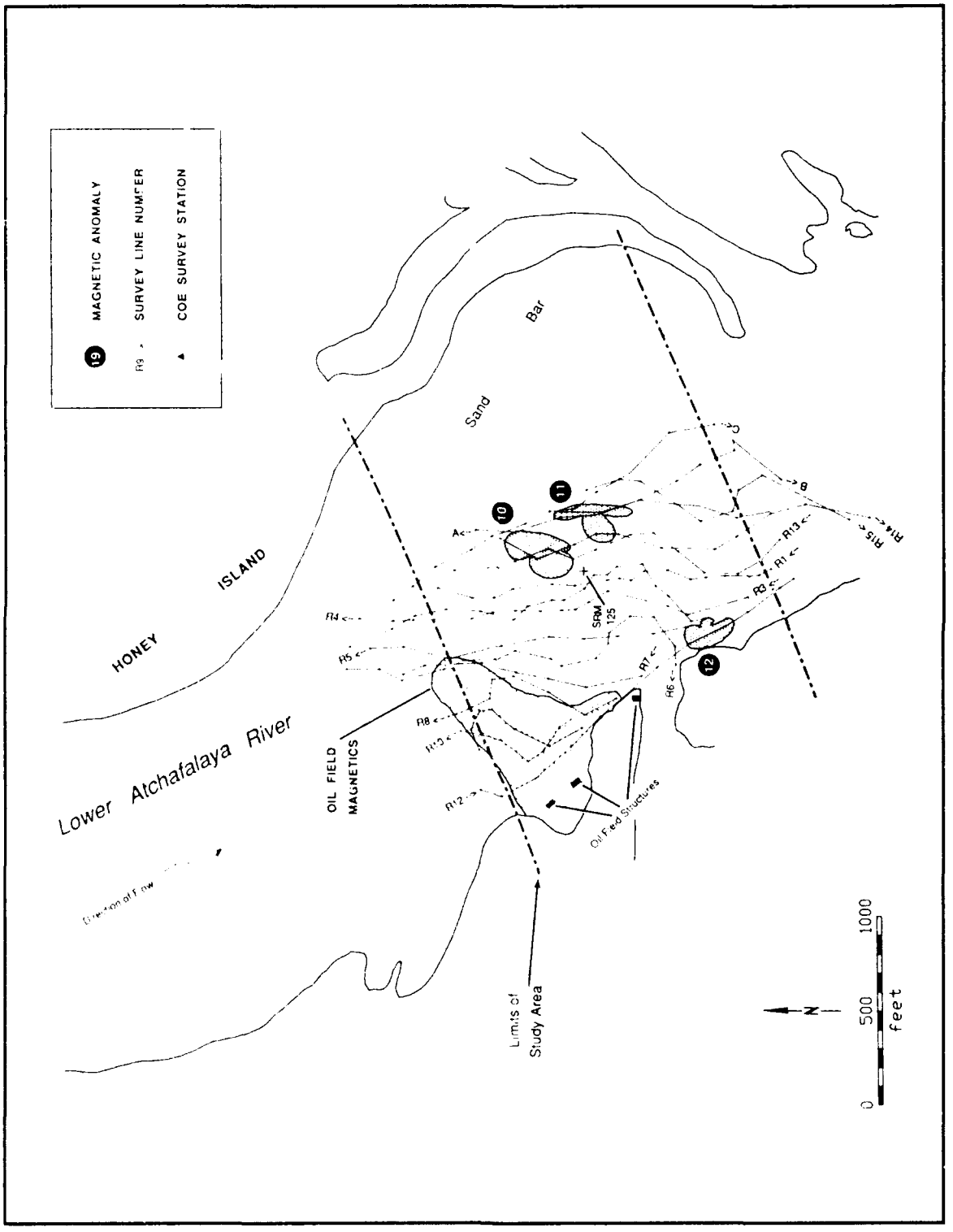

Figure 27. Survey data from the Atchafalaya River in the vicinity of River Mile 125, study areas below Morgan City.

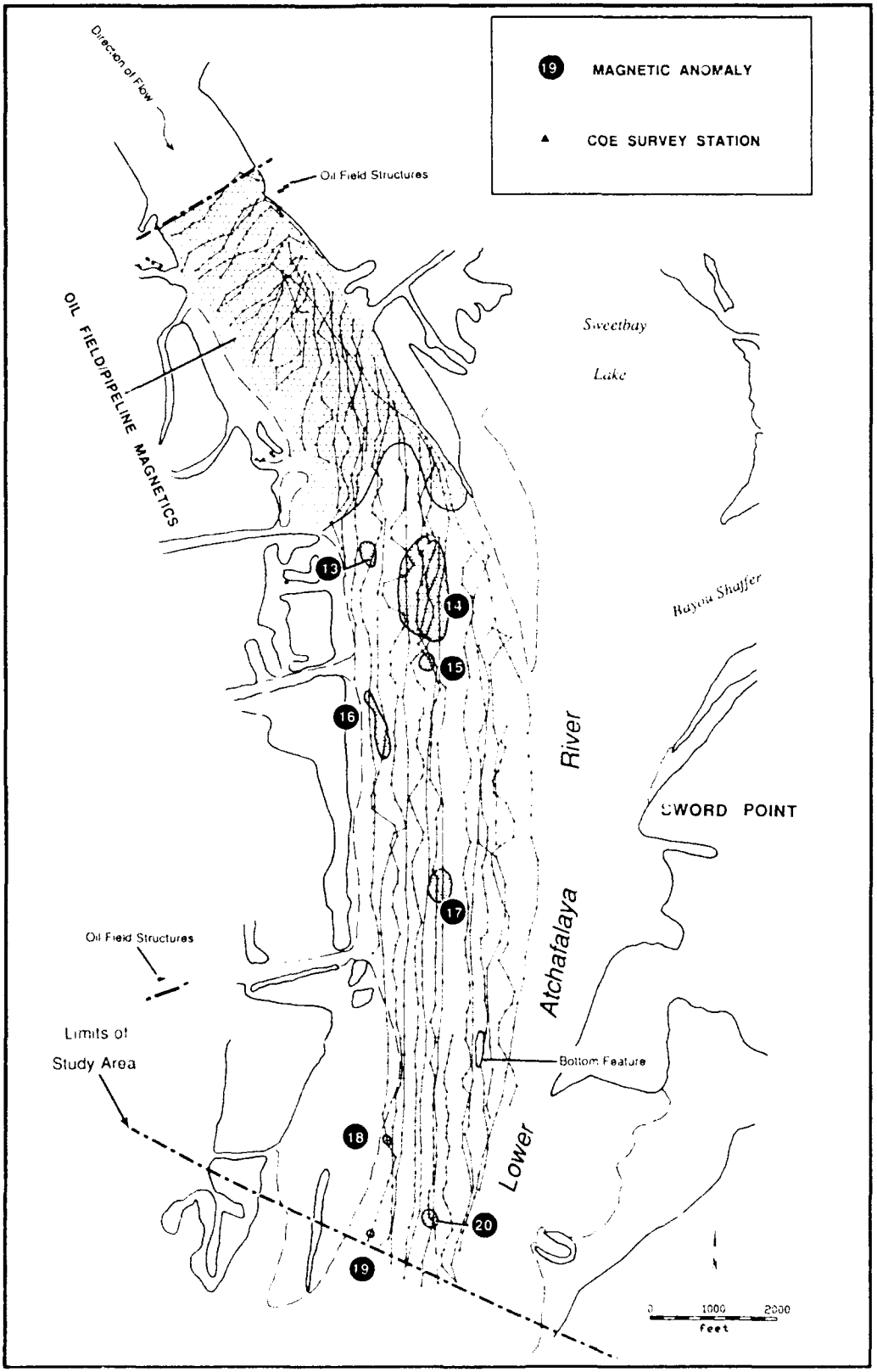

Figure 28. Survey data from the Atchafalaya River in the vicinity of Sweetbay Lake and the entrance to Bayou Shaffer, study areas below Morgan City.

Debris from oil and gas field activities, as well as well heads, production facilities, and docking facilities were common along the river banks in the survey areas. In addition, several pipelines crossed the upper and lower study areas. All of these affected the utility and interpretation of the magnetic data. In Table 6, it is assumed that Anomalies 6 through 11 are associated with modern debris and material from oil and gas extraction activities. Several of these, such as Anomaly 10, are located at or just below the mouths of oil field canal and probably represent material lost from boats or barges using the canals. None of the anomalies recorded appear to be related to the remains of sunken vessels.

Survey of the Reported Area of the Wreck of the Kinsman

The *U.S.S. Kinsman* was a Federal gunboat which sank in Berwick Bay in February 1863. Originally the sidewheel steamer *Gray Cloud*, the 245-ton *Kinsman* had been renamed the *Colonel Kinsman* by the Confederacy, prior to her capture by Federal forces in 1862. During her involvement with Union naval activities in the lower Atchafalaya region, she struck a snag on the night of February 23, 1863, while moving up the Atchafalaya River. She managed to make it back to Brashear City, but sank with a loss of 6 lives, despite efforts to pull her ashore (Way 1983:272). During the course of the fieldwork for the present study, Mike Stout of the New Orleans District, Corps of Engineers, informed the authors that Mike Davis, a member of the U.S. Coast Guard stationed in Morgan City, had found artifacts and structural remains which he believed were related to the wreck of the *Kinsman*. The artifacts included several Minié balls and at least one larger "cannon" ball, while the vessel remains included two large pieces of wooden structure buried in the muddy bottom of Berwick Bay near the entrance to Bayou Boeuf. Mike Davis reported that some of the wooden structural remains appeared to be the deck of a large boat. In order to examine Mr. Davis' findings more carefully, Mike Stout requested that Coastal Environments, Inc., conduct a brief remote-sensing survey of the location of the structural remains during the course of our survey of the Atchafalaya River below Morgan City. This survey was undertaken on March 14, 1990.

Mr. Davis reported that the remains he had discovered were located in Berwick Bay, several hundred feet below (southwest of) the entrance to Bayou Boeuf and just offshore of the navigation light located at the north end of Bateman Island. One piece of structure was supposedly located directly off of the light, while the other was located somewhat downriver of the light. Examination of the hydrographic maps for this area indicated a significant rise in the river bottom just off of and below the navigation light, possibly suggesting the presence of a buried or submerged object. The remote-sensing survey utilized a magnetometer and fathometer. Three survey lines were run parallel to the shoreline of Bateman Island. The lines were spaced about 100 ft apart, with the inshore line positioned about 100 ft off the bank. Additional crossing lines, perpendicular to these three, were run from the shore of Bateman Island out into Berwick Bay. The intent was to space these crossing lines about 50 ft apart, however, the extremely swift current in this area made regular placement impossible, such that some of the crossing lines were as much as 75 to 100 ft apart. A Loran was used to record positioning points along all lines. The total area covered by the survey measured about 2500 ft long by 500 ft wide and encompassed the two locations of buried structure indicated by Mr. Davis.

A cluster of 6 magnetic anomalies were recorded within this area. One anomaly is located about 400 ft due north of the navigation light, near the entrance to Bayou Boeuf. The signature of this anomaly consisted of a complex, 40-gamma dipole. Another anomaly recorded in this area was produced by the navigation light itself. The other four anomalies were all located downriver (southwest) of the navigation light and consisted of a complex, 60-gamma dipole, located about 450 ft downriver of the light; a 10-gamma monopole located about 700 ft downriver of the light; a 20-gamma dipole located about 1000 ft downriver of the

light; and a 60-gamma dipole located about 1300 ft downriver of the light. The latter three anomalies are all located near the bank and in relatively shallow water.

The two upriver anomalies, the one located just above the navigation light and the one located 450 ft below the light, are farther offshore and in over 30 ft of water. The size and intensity of these magnetic signatures suggests fairly large objects, very possibly the two pieces of probable boat structure found by Mike Davis. Additionally, the anomaly located about 450 ft downriver of the navigation light is in the vicinity of the significant bathymetric rise on the bottom which suggests the presence of a buried object. The magnetics, coupled with the presence of the bottom feature, could very well indicate the existence of a shipwreck, but whether this is the *U.S.S. Kinsman* is impossible to determine with the available data. Verification of this will require diving and physical examination of the two upriver targets.

CHAPTER 4: DIVING AND SITE INVESTIGATIONS

Introduction

The final element of field investigation involved the hands-on evaluation of a selection of eight target locations in the study areas above Morgan City and in the two Bayou Shaffer areas. No targets were to be selected from the study areas along the Atchafalaya River below Morgan City. The selection of targets was made in consultation with the Corps of Engineers. The sample selected for examination consisted of two categories of targets. One category consisted of those judged to have the greatest potential for representing historic shipwrecks; the other consisted of a representative sample of other anomalies, not believed to be shipwrecks. The purpose of examining this latter class of targets was to gather information which would aid in future evaluations and interpretations of remote-sensing data collected within the region.

The initial step in the evaluation of these selected targets involved relocating them, and, where needed, conducting a detailed magnetic survey using the shore-based survey technique discussed in the previous chapter. Once targets were relocated, a diver physically examined the river bottom in an effort to locate the target. Probes and a metal detector were sometimes used. In a couple of instances, excavations were conducted to uncover portions of some objects discovered. Some of the targets selected for examination were in very shallow water and could be examined without diving or with a minimum of diving.

The principal dive vessel used was the same boat used during the survey. In addition, because of the quantity of equipment required, a second boat was used during a portion of the diving operations. A surface-supplied air system was utilized, with the air supply consisting of three high-pressure tanks located in the dive vessel, each capable of supplying about 3 hours of air. The diving mask used was a Kirby-Morgan band mask which had radio communication with the dive boat. A complete set of SCUBA gear was maintained on the dive vessel as an emergency back-up system. All of the safety considerations required by EM 385-1-1 and ER 385-1-86 were followed during the diving operations.

Study Areas Above Morgan City

As a result of evaluation of the collected remote-sensing data, and after consultation with the Corps of Engineers, six of the seventy-seven magnetic anomalies recorded in the areas above Morgan City were selected initially for inspection. None of these targets could be identified positively as wreck remains; they were selected as a representative sample in terms of magnetic intensity, size, and complexity. An additional criteria for selection included surface expression identified on the fathometer and/or side-scan sonar data. The targets selected for investigation were Anomalies 16, 17, 33, 52, 55, and 78 (see Table 4). Anomaly 33 was subsequently removed from the list when it was identified as the metal barge hatch covers discussed above, and it also became apparent with more detailed examination of the data that Anomalies 16 and 17 could be considered a single entity. The locations of the anomalies finally examined, plus critical survey data, are shown above in Figures 15 and 20.

As discussed earlier in this report, the boat-wreck potential of the study areas located above Morgan City was considered to be low, and previous work in the area had tended to substantiate this assumption (Pearson and Saltus 1989). As a result, it was believed that the targets selected had only a moderate to low probability of being boat remains, but one of the objectives of the study was to physically verify a sample of targets in order to enhance and expand our abilities to interpret and evaluate similar data collected in the future.

Modern debris was found on the river bank adjacent to all the targets selected for examination. This debris included logs, trees, and brush, often in huge jams; large ferrous objects such as metal navigation buoys, barge hatch covers, pipe sections, choker cable, and automobile parts; and massive quantities of smaller objects such as plastic bottles, jars, cans, buckets, etc. All of this material attests to the amount of modern activity occurring on and adjacent to the river, including commercial river traffic, oil-related construction activities, fishing, hunting, and channel maintenance construction and dredging. These activities have resulted in the loss, disposal, and accumulation of a tremendous quantity of debris in and adjacent to the Atchafalaya Main Channel. Much of this debris is detectable by the remote-sensing instruments used in this study.

Anomalies 16 and 17, located about 3000 ft above Blue Point Chute in about 12 ft of water (see Figure 15), were found to be caused by a single piece of 1 3/8-in-diameter iron cable. This cable measured at least 60 ft long; much of it was found still coiled. In the original magnetic survey this target was identified on two lines and interpreted as two anomalies, however, the detailed survey at this location revealed that the two anomalies coalesced into a single signature (Figure 29). The anomaly consists of a dipolar signature encompassing an area of 270 x 170 ft and producing a 625-gamma deflection. As shown in Figure 29, the cable is located adjacent to a steep drop-off into the main channel. The side-scan sonar image of this target revealed the cable as a very faint object located between two sunken trees. It was only after diver investigation that these objects could be identified on the side-scan sonar records. On the bank and slightly downriver of this target, the drive shaft and differential of an automobile or truck was found. How this object came to be deposited in this location is unknown, since access is available only by water. It is presumed that the cable was lost or discarded from a boat or barge.

Anomaly 78, located adjacent to the bankline just above Blue Point Chute (see Figure 15), was selected for investigation primarily because inspection of the bankline had revealed some timbers near the anomaly. It was thought that these may have come from a watercraft of some sort. Investigation of this anomaly involved diving as well as examination of the adjacent bank via visual inspection and shovel testing. A partially buried navigation buoy was found in the bank at this location, and in the shallow water just offshore divers found a squared post or timber, some barbed wire, an iron strap or brace measuring 3 ft long, 4 in wide, and 1 in thick, and a 1-in-diameter iron cable strewn out on the bank 50 to a 100 ft above the anomaly.

The area around the possible timber and iron strap was examined extensively by hand and by probing with a 6-ft-long iron probe. Nothing else was found. It is possible that the iron strap is from a wooden barge or similar structure, but, if so, it exists in isolation and is not associated with any intact watercraft remains. The identity of the timber could not be determined.

Anomaly 52 is located opposite the mouth of Little Island Pass near river mile 110 (see Figure 20). The detailed survey of this anomaly revealed a magnetic signature with a deflection of 175 gammas covering an area measuring 335 by 500 ft (Figure 30). The focus of the anomaly is located in about 30 ft of water and site-specific bathymetry shows a scouring in the river bottom extending upriver and bankward of the focus (Figure 30). The remote-sensing data and diver investigation indicated that the river bottom at this location consisted of fairly large sand waves. With the exception of these sand waves, no objects were identified on the side-scan sonar records.

Diver investigation of this locale was attempted, but had to be discontinued because of current speeds on the order of 2 to 2.5 knots. The diver was able to confirm the sand bottom and the presence of sand waves, and also attempted to probe the bottom in the area of the

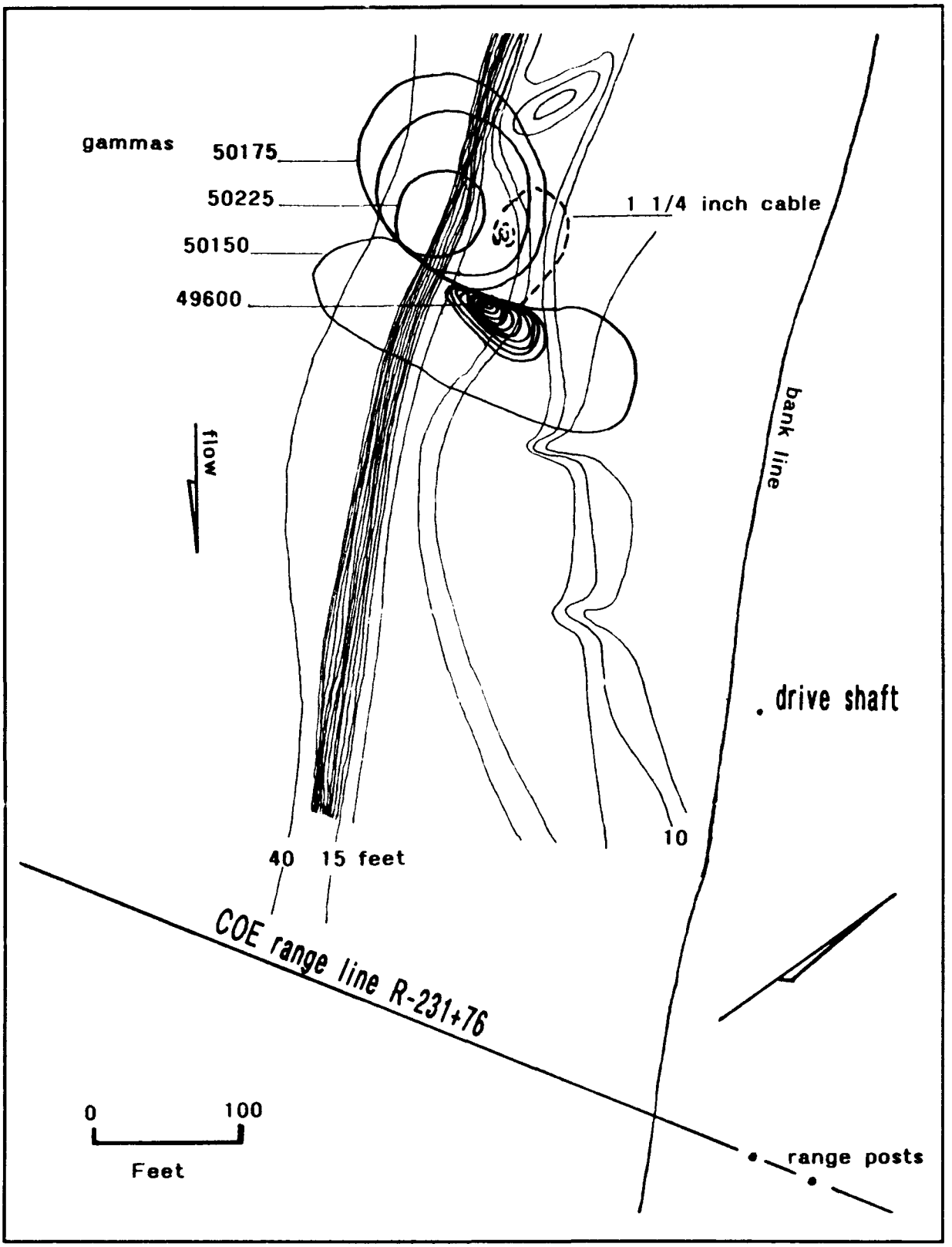

Figure 29. Magnetic and bathymetric contour data at Anomalies 16 and 17, above Morgan City.

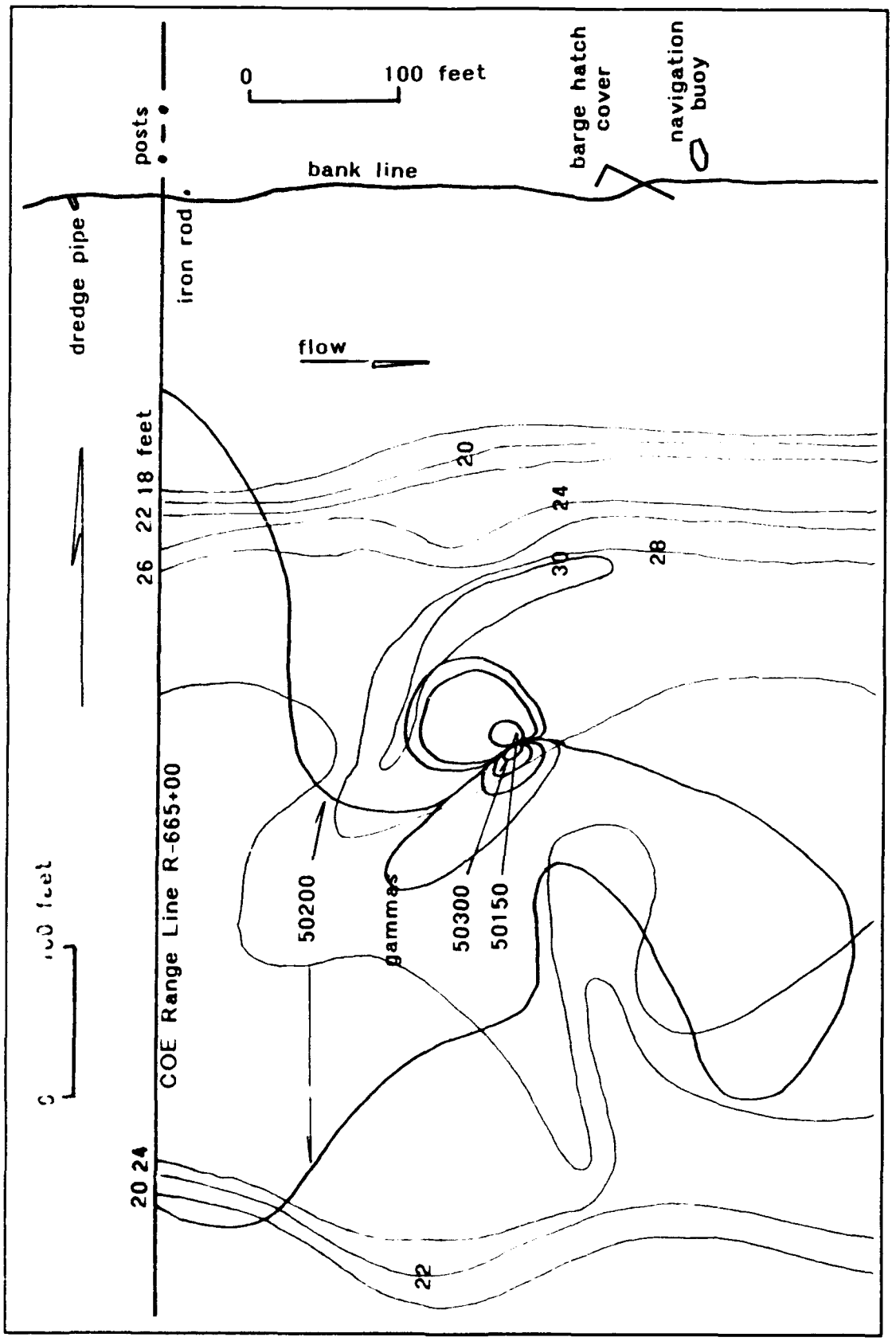

Figure 30. Magnetic and bathymetric contour data at Anomaly 52, above Morgan City.

anomaly focus. Probing was not possible, however, because of the hard, sandy bottom. Nothing was found during the short period of diver investigation.

Several pieces of metal debris were found on the river bank adjacent to the the anomaly. These consisted of a metal hatch cover, a metal navigation buoy, a section of iron dredge pipe, and a 1 by 1 in rectangular iron rod 18 in long. There is a strong possibility that the source of Anomaly 52 is a modern object such as a hatch cover or similar object.

Anomaly 55 is located about 1500 ft downriver of Anomaly 52 (see Figure 20). The detailed magnetometer survey of this anomaly revealed a complex dipolar signature covering an area 150 ft by 130 ft (Figure 31). The maximum magnetic deflection was 645 gammas. Diver investigation of this target revealed that the source consisted of two sections of iron pipe, each measuring 22 ft long and 30 inches in diameter. The bathymetry at this location revealed scouring between the two pipe sections and slightly below the pipe nearest the shore (Figure 31). This scouring was certainly produced by the flow dynamics around the pipes. These pipes were seen on the side-scan record, but were assumed to be tree trunks or logs prior to the diving. Reexamination of the record did reveal the two pipe sections. Several pieces of logs and trees were found around the pipes and some of these also are visible on the side-scan record. Five sections of 1-in-diameter iron pipe were found piled on the bank adjacent to Anomaly 55.

Study Areas Below Morgan City

Bayou Shaffer - Upper Area

Two targets were investigated in the upper Bayou Shaffer study area. One of these, designated Anomaly 1, is located some 800 ft above the study area's southern boundary on the shoal area of the left descending bank. No definitive objects were identified on the side-scan sonar records from this; however, a small gully or cut in the subsurface bankline was noted. When diving was undertaken at this locale, the water depth was on the order of 5 to 8 ft. Examination involved a complete search of the area of the anomaly plus probing at 2-ft intervals. Particular attention was paid to the examination of the cut seen on the side-scan sonar records. Nothing was found during the examination of the river bottom, but one probing hit a small metal object. Despite an exhaustive search, the object could never be relocated. It is suspected that the anomaly source is a small-diameter iron cable or pipe.

The other area examined is identified as Anomaly 2 and is located on the western bank of the bayou approximately 800 ft below the study area's southern limits (see Figure 24). While outside of the designated project area, this locale was examined because it was recorded on both magnetometer and side-scan sonar records. Because the object was so easily distinguished on side-scan records, no detailed magnetic survey was conducted. As shown in Figure 32, the object was initially identified as a squared-end barge, possibly wooden. This latter identification was based on what appeared to be upright posts or beams along one side of the barge (Figure 32). The barge rises several feet above the river bottom and was easily identified on fathometer records (Figure 32).

Diver investigation revealed that this was a decked iron barge, on the order of 100 ft long. The vessel is lying in 11 to 17 ft of water and was more or less completely buried in its southwestern corner although the other three corners were exposed. The fathometer records indicate that the deck is listing away from the bank. During the diving, the current in this area was extremely fast, making it difficult to carefully examine the vessel. It is apparently entirely or almost entirely intact. This barge is a modern vessel, identical to several others that were seen moored just upriver of this location during the fieldwork.

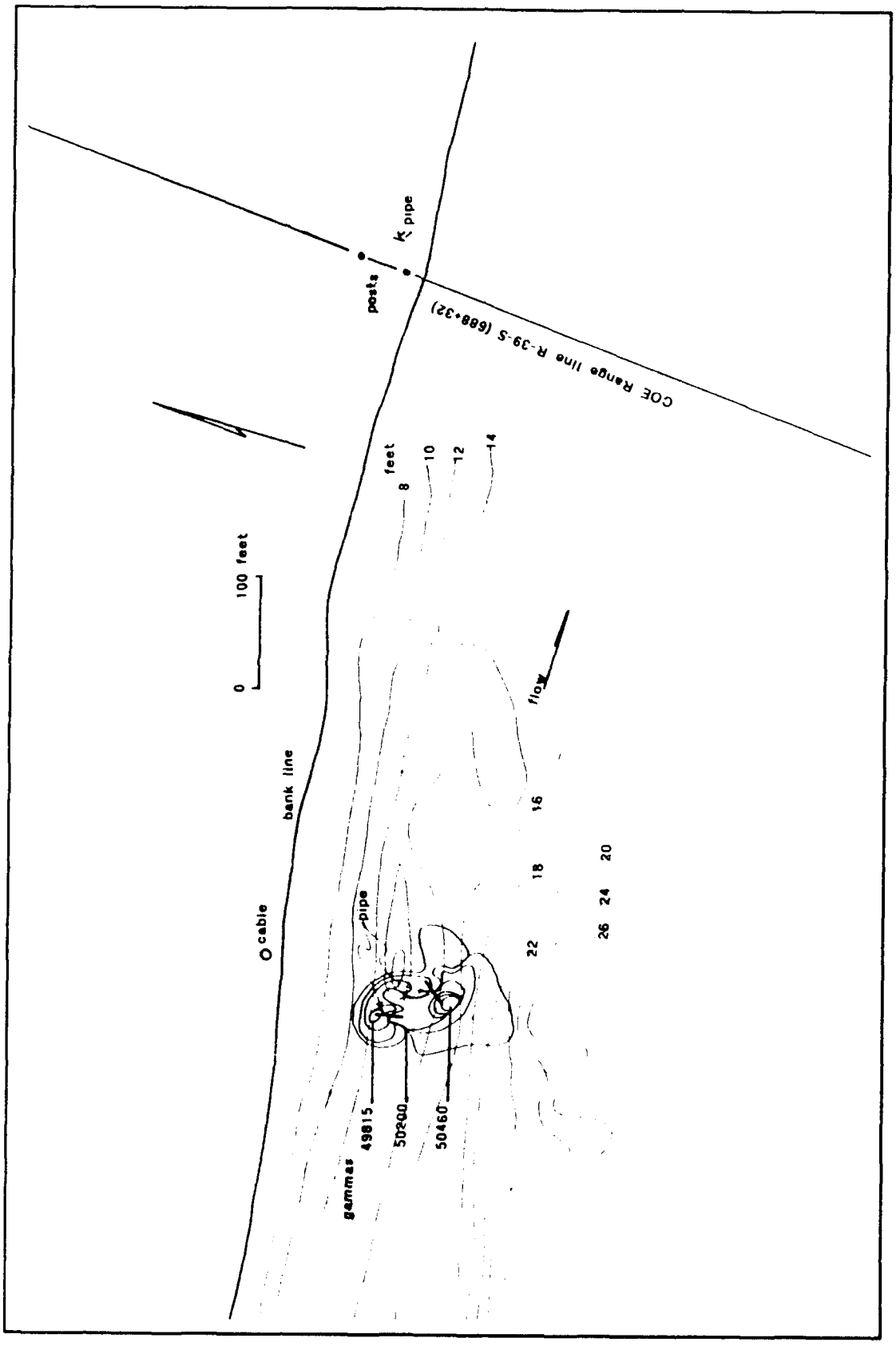

Figure 31. Magnetic and bathymetric contour data at Anomaly 55, above Morgan City.

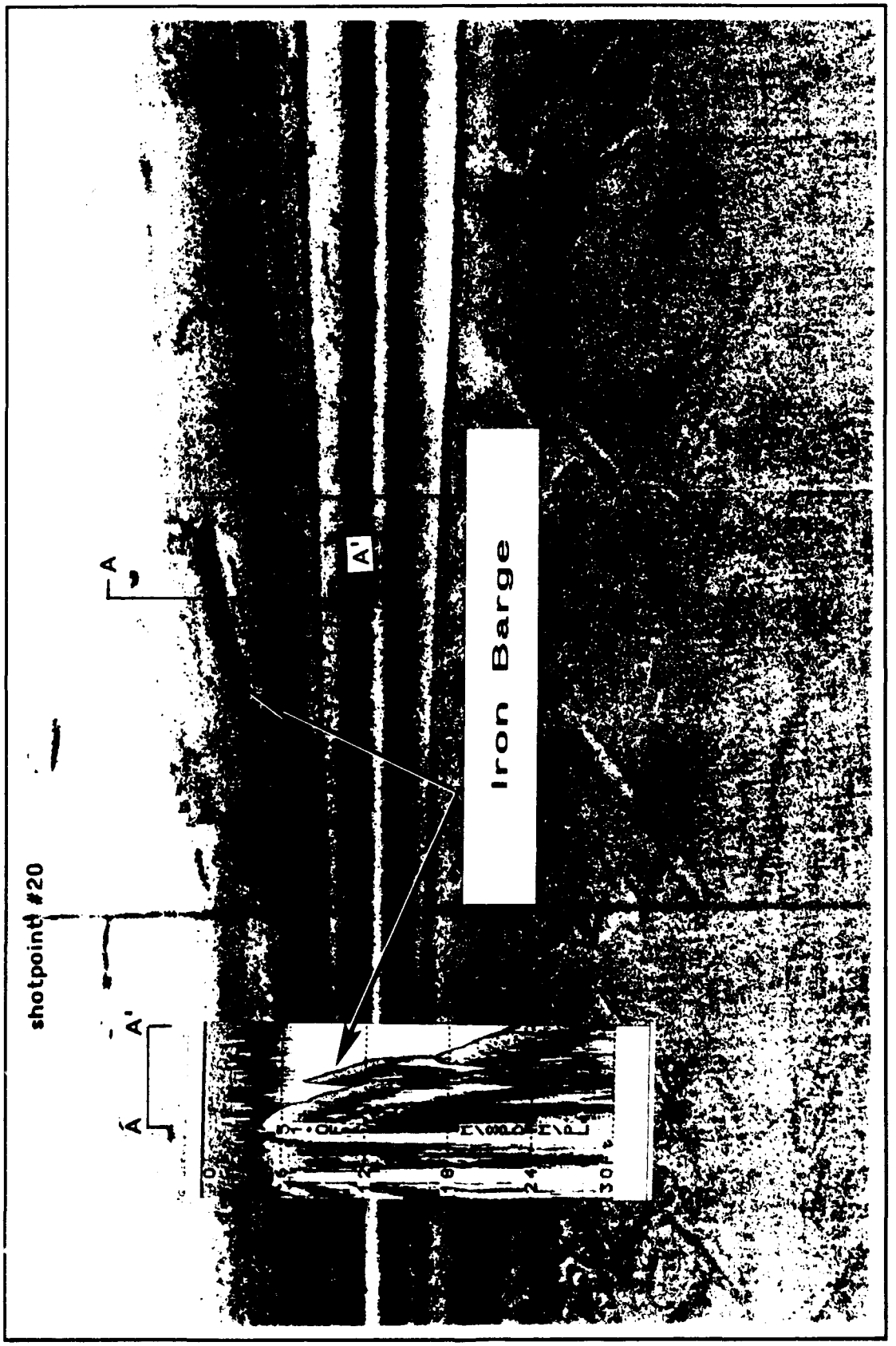

Figure 32. Side-scan sonar and fathometer records at Anomaly 2, Upper Bayou Shaffer area.

Bayou Shaffer - Lower Area

Investigations in the lower study area in Bayou Shaffer were planned to involve the examination of two of the seven magnetic anomalies recorded, plus to make a cursory inspection of two vessels whose remains could be seen along the western bank of the bayou. The two anomalies examined were numbers 6 and 7 in Figure 25. The two vessels to be inspected were also associated with magnetic signatures, designated Anomalies 4 and 5 (see Figure 25). Both of these locations had been briefly examined during an earlier survey of the area and had been given site numbers 16 SMY 55 and 16 SMY 58, respectively (Gibson 1978:163,166). (It should be noted that while Gibson recorded the structural remains at site 16 SMY 55, he did not mention any boat remains.) The other two targets, Anomalies 6 and 7, in addition to producing magnetics, also appeared as objects on side-scan sonar imagery. The results of the investigation of these four targets are discussed below. In addition, while examining the bankline in the upper end of this study area, the survey crew located the remains of several watercraft and a settlement locale. These remains have been given site number 16 SMY 61, and are discussed fully below. In total, the investigations in this study area located the remains of 20 watercraft or sections of watercraft. Figure 33 provides information on the location of this newly discovered site, plus the locations of sites 16 SMY 58 and 16 SMY 55 (combined with adjacent site 16 SMY 56 in Figure 33) and several watercraft found in the vicinity of this latter site.

Magnetic Anomaly 6 lies in 8 to 12 ft of water about 350 ft above the dock remains at site 16 SMY 55 (see Figure 25). The side-scan sonar image at this location appeared as a small circular object resting on the bayou bottom. On the basis of the side-scan and magnetometer data this object was identified originally as a large metal wheel or gear. One assumption was that it may have been related to William Wofford's sugar plantation facility, known to have been located along the west bank of Bayou Shaffer in this area (see Figure 11). When investigated by diving, the target was found to be a deposit of modern material, including a 4-in-diameter pipe stuck in the bottom and protruding upward for 2 ft; a 28-in-diameter pipe of unknown length protruding out of the bottom; a large marine battery; a set of large iron bitts, probably from an iron barge; plus miscellaneous pieces of pipe, wooden boards, rope, etc. The material does not come from a single, articulated vessel, but appears to be simply a pile of debris, probably purposely dumped at this location.

Efforts to relocate Anomaly 7 via additional magnetometer survey were unsuccessful. The reasons for this are unknown, and somewhat surprising, since the original survey had indicated a rather substantial magnetic signature at this location (see Table 5).

Oyster Camp Site, 16 SMY 61

This site is located on Avoca Island on the left descending bank of Bayou Shaffer about 2.4 mi below Bayou Boeuf (see Figures 25 and 33). It went undetected during the remote-sensing survey and was discovered during a visual inspection of the batture in this area. This inspection was being conducted to locate a sunken wooden skiff reported somewhere along the bankline by Gibson (1978). The boat reported by Gibson was never found. The Oyster Camp site was initially identified with the discovery of a row of several iron bolts projecting 3 to 4 in above the mud and water along the bankline. Probing and further visual search of the area indicated that the bolts are part of an intact wooden barge partially covered by water and buried beneath about 3 ft of sediment. Probing also revealed the remains of another buried wooden vessel lying adjacent to the barge. Additionally, a pile of oyster shell and brick was found 100 ft or so inland of the buried vessels and the remains of a small cypress skiff were found further inland in a pile of drift wood. The buried vessels and the oyster and brick piles may be culturally associated, although the cypress skiff apparently has simply been washed up into the woods and may be totally unrelated to the rest of the site. On the basis of surface observations

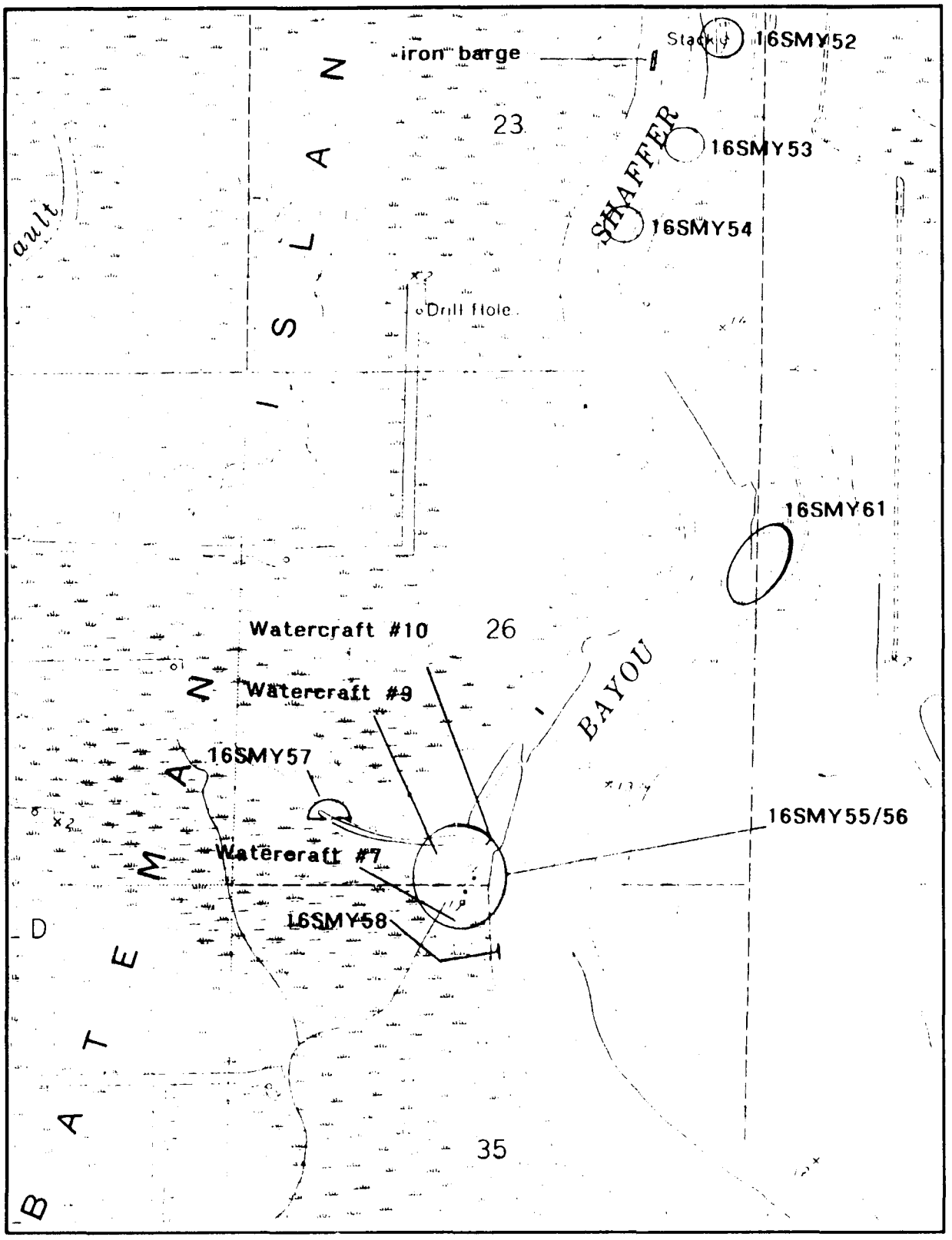

Figure 33. Site locations in the lower Bayou Shaffer study area.

and metal detector and magnetometer surveys, the site, exclusive of the skiff, seems to extend about 200 ft back from the bank of Bayou Shaffer and about 300 ft along the bayou (Figure 34). Both of the buried vessels found at the site appear to have been purposely abandoned, possibly at or near a former landing. Presumably, abandonment occurred when the need for the vessels had ended or they had become unserviceable.

The wooden barge, designated Watercraft 1, was delineated by probing and using a fluxgate magnetometer to locate and follow the iron bolts that were not exposed. Probing and subsequent test excavations revealed that the boat is covered by about 3 ft of sediment. Today a large number of cypress and willow trees are growing on top of the buried barge, the larger trees measuring up to 18 inches in diameter. The vessel measures 117 ft long, 26 ft wide, and has at least a 3 ft depth of hold. Probing had indicated that a thin layer of coarse material, presumed to be coal, rested on the inside bottom of the vessel. Excavations subsequently substantiated this identification and it is assumed that the vessel was a coal barge. A test unit placed at one of the exposed iron bolts along the side of the vessel (Figure 34) revealed that it (the side) consisted of a basal 6 by 17 in beam or sill into which was driven an 18-in-long iron bolt or pin (Figure 35, A). The bottom of the vessel is composed of planking running perpendicular to the side and evidently fastened to the bottom of the basal sill. These bottom planks are of unknown thickness, but in the small area excavated, boards are at least 10 in wide. The excavations revealed a thin layer of coal mixed within a clay/silt matrix resting on the bottom planks.

The examination of the vessel indicated that the bottom and the basal sill or "chine log," as it is sometimes known, is almost completely intact, and in very good condition. Originally, additional sills had been fastened to the top of the chine log, to form the sides of the barge. The next upper sill seems to be missing entirely, and only the iron pins which held it in place are extant. These pins are spaced some 4 to 5 ft apart. The presence of several headless iron pins not conforming to this standard spacing sequence suggests that a third beam had been attached atop this structure.

The shape of the ends of the barge could not be specifically determined, although, the evidence suggests that it had square ends, possibly raked. The construction of this watercraft is commonly known as "sill on sill" and is very similar to the construction of a coal barge recently found along the Mississippi River at West Memphis, Arkansas (Figure 36). Barges of this type were in common use during the second half of the nineteenth century and during the early years of this century. These barges were commonly used to carry coal to the many sugar houses in the region. There is no doubt that Watercraft 1 was a coal barge, but its date of construction cannot be specifically determined. Wooden barges were being phased out in favor of metal ones by the first world war, but some continued in use long after that date. In general, the construction technique suggests a nineteenth-century date of construction. The fact that the vessel is buried and overgrown by fairly large trees also suggests a loss or abandonment, at least early in this century.

The second watercraft found at this location (Watercraft 2) is a keeled watercraft of an as-yet-unknown type. The vessel was located by probing and by the discovery of a length of timber containing two iron pins, barely exposed above the water adjacent to the bankline. The area of this exposed timber was investigated with a 5-ft trench. The exposed timber appears to be a bulkhead or piece of deadwood attached atop an 8-by-14-in timber identified as a keelson (Figure 35, B). The excavations uncovered only about a 4-ft length of this structure, which, on the basis of probing, seems to be discontinuous or missing along much of the presumed length of the vessel. Planks running under and perpendicular to the identified keelson were found at the bottom of the excavations (Figure 35, B). Dimensions of these planks were not obtained, but they are assumed to represent hull planking or interior ceiling planking.

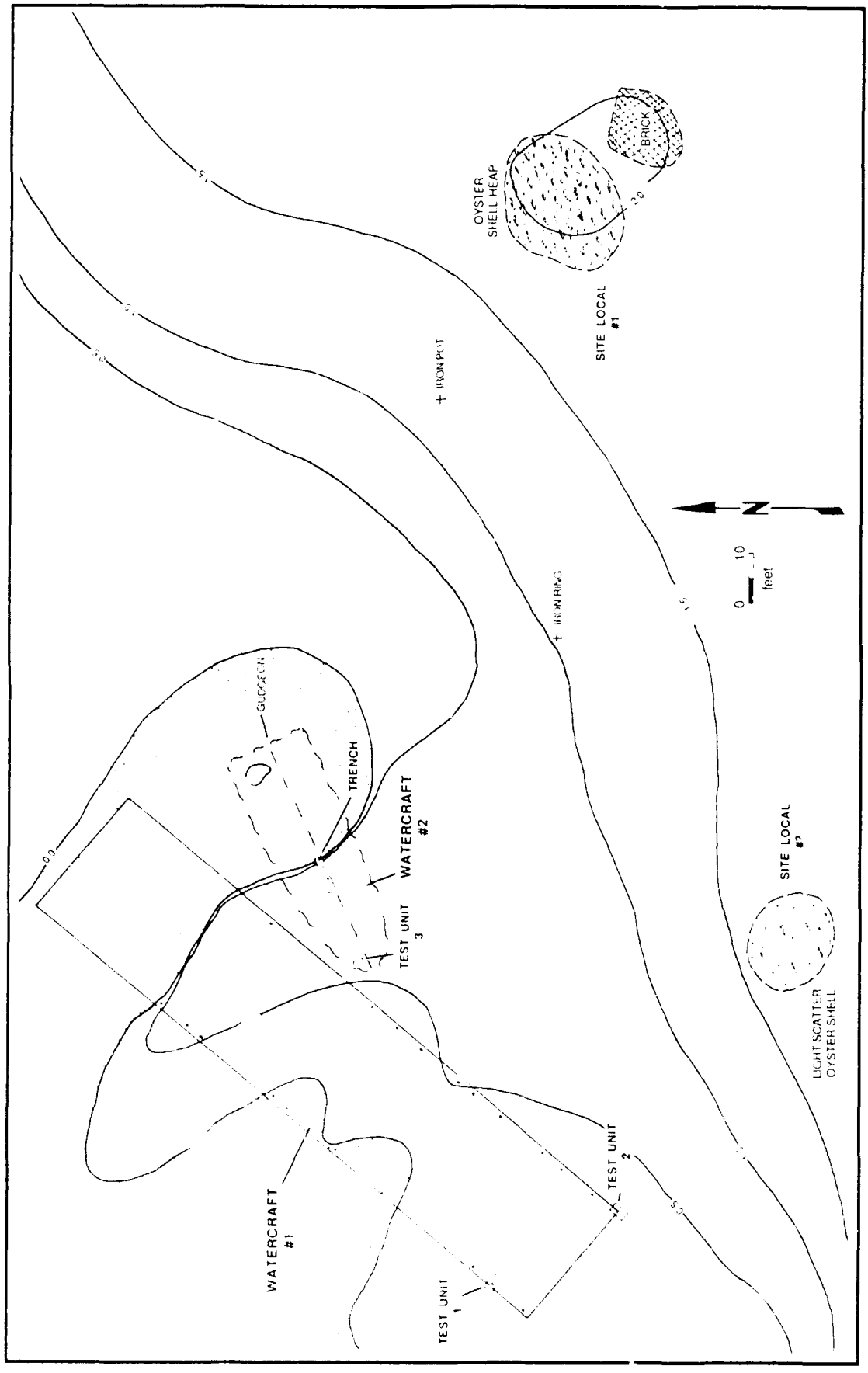

Figure 34. The Oyster Camp site, 16 SMY 61. Watercraft 3, a cypress skiff, is located about 75 m northeast of the watercraft shown here.

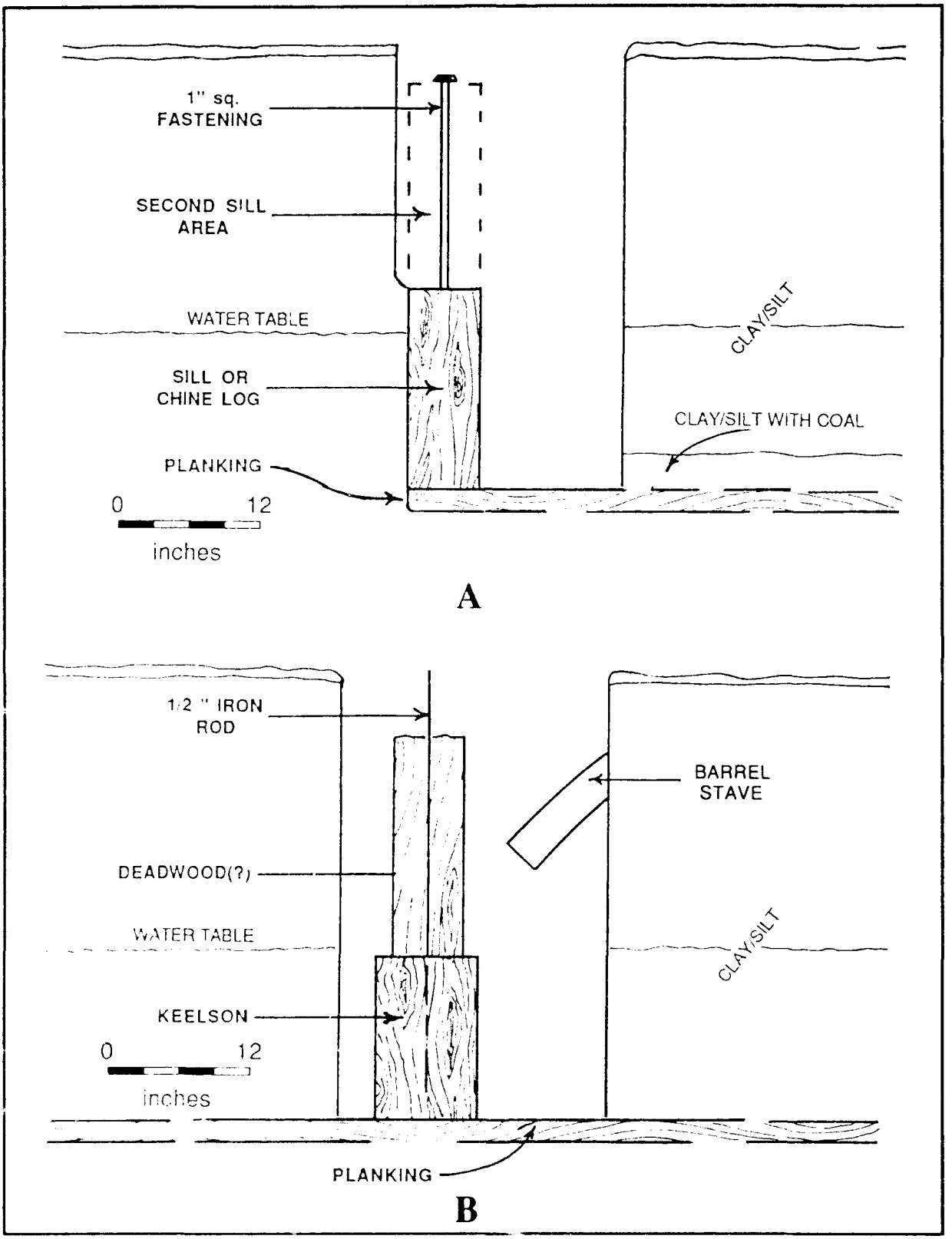

Figure 35. Data from watercraft at 16 SMY 61. A. Section through the side of the coal barge, Watercraft 1. B. Section through the keelson of the possible sailing lugger or sloop, Watercraft 2.

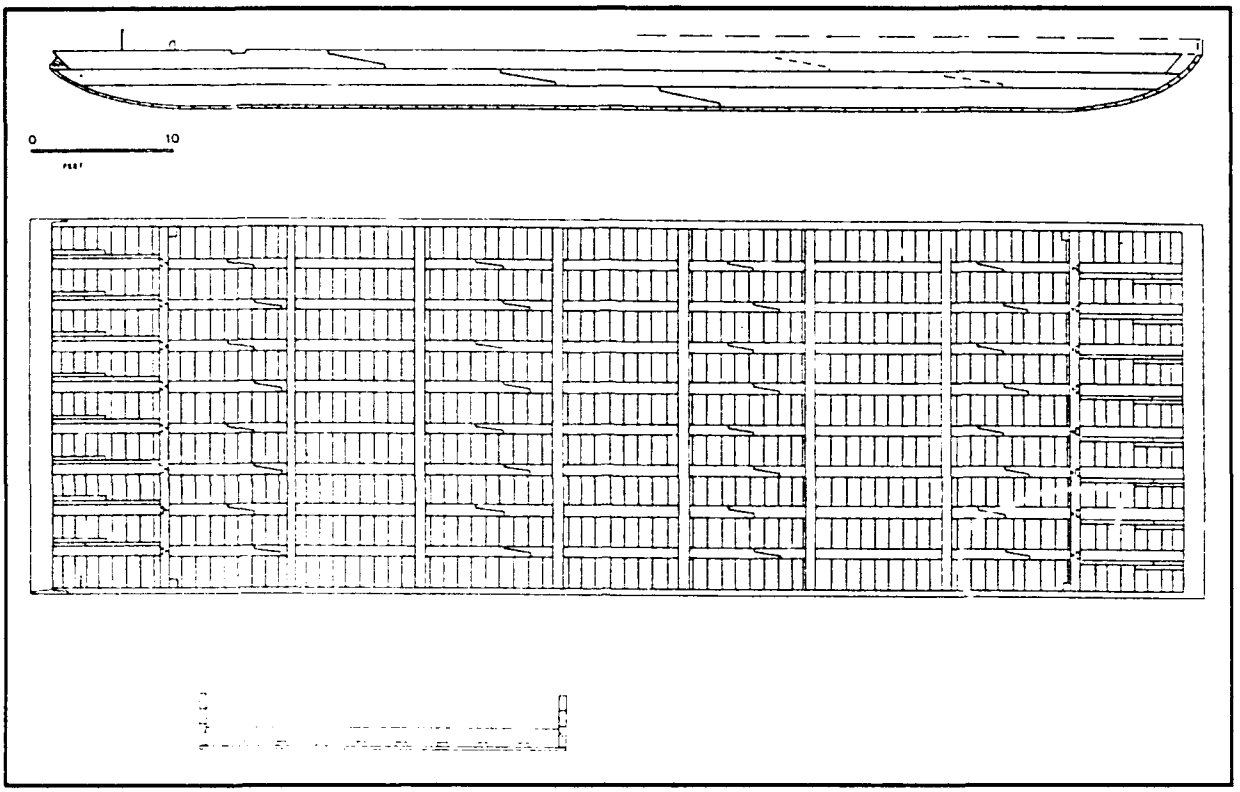

Figure 36. Drawing of a wooden coal barge found at West Memphis, Arkansas (drawing by Allen R. Saltus, Jr.).

Probing suggests that the bottom planks slope upward away from the keelson, but a large amount of wooden debris in the sediment covering the vessel (including at least one barrel stave, see Figure 35, B) prevented the development of an accurate cross-sectional profile. The information collected does suggest that the vessel has a "modeled" bow (i.e., pointed) and is about 46 ft long, 16 ft wide, with about a 3-ft depth-of-hold (see Figure 34). An iron rudder gudgeon was found in situ at the identified stern post of the vessel. The gudgeon, which was used to attach the rudder to the vessel, was buried in mud about 2.5 ft below the surface of the water, and is fairly small, measuring 16 in long, 5 in wide, and about 2 in thick.

As noted, buried in the interior of Watercraft 2 was a considerable amount of wooden debris, much of it consisting of pieces of sawn lumber. This material may have been purposely dumped here, or it may represent the disarticulated and jumbled upper structure of the vessel. Regardless, this debris made it difficult to develop a precise plan of the buried remains. The information that was collected from probing and the small excavation unit suggests that the boat was a sailing vessel, slightly larger than the typical sailing lugger of the region, and more likely to be either a sloop or schooner.

Some conjecture can be made as to the construction date and date of abandonment of Watercraft 2. Saltus (1988) has suggested that various indices derived from the dimensions of vessels used in the Lake Pontchartrain area can be used as measures of construction date. One of these indices is the length/beam ratio minus the beam/depth ratio. For Watercraft 2 this index equals -2.5 (i.e., 2.8 [length/beam] minus 5.3 [beam/depth]). This value suggests a construction date of 1850 ± 15 to 20 years based on data developed on schooners, sloops, schooner barges, and round bottom barges operating on the inland waterways of the Florida

Parishes (Saltus 1988). The data from the Florida Parishes area may not be directly applicable to the lower Atchafalaya River area, but for the present it is the best information available. Additionally, given that the life span of the Florida Parishes' watercraft averaged around 40 or so years, it is possible that Watercraft 2 would have been abandoned sometime during the period 1870 to 1920. This date is not out of line with the date of abandonment proposed for the coal barge.

The third watercraft, Watercraft 3, is a cypress skiff found well back from the bankline near a large pile of logs, timber, brush and other high water debris. This skiff is representative of one of the most common and typical types of folk craft used in the French-speaking region of southern Louisiana. Over the years, a great deal of interest has developed in the material culture of the Acadian populations of Louisiana, including watercraft. As a result, there is a considerable literature as well as photographic record of historic boat use in the region. Surprisingly, however, there are few precise drawings or detailed descriptions of the small watercraft used in the area. The cypress skiff found at 16 SMY 61, plus several other craft found at nearby site 16 SMY 55, provided an opportunity to collect detailed information on the construction of these small boats. The plans and drawings developed during this study represent a significant and unique contribution to the literature on watercraft of the region.

Watercraft 3 is a flat-bottom, cypress-plank skiff measuring 18 ft, 10 in long; 4 ft, 8 in wide; and 11 1/2 in deep at mid ship. When found, the boat was resting on the surface of the ground and portions of the starboard side and stern were missing (Figure 37). Figure 38 presents a drawing of the reconstructed boat, including plan, side and end views with frame details. The skiff has a well formed fore and aft sheer along the gunwales, but has no apparent bottom sheer. The bow structure is composed of a cutwater, straight stem post and breasthook (Figure 38). The aft face of the stem post is tapered top to bottom. A small seat is located at the bow, between the stem post and the first floor frame. Twelve sets of floors (pieces placed athwartship across the bottom) and frames (structural pieces running up the sides, i.e., "ribs") were more or less evenly spaced along the length of the boat. None of the floors appeared to have waterways and no live well had been built into the boat. The sides were each composed of a single, wide cypress plank, and the bottom was built of three cypress planks running stem to stern. These bottom boards extended slightly beyond the transom at the stern. The tops of the sides were finished with a half round sheer guard on the outside, a 1-by-2-in board affixed to the top edge of the frames, and another half round piece which capped the tops of the frames and the 1-by-2-in board.

The skiff had been motorized, and the remains of the internal shaft log and shaft bushing are extant (Figure 38). The shaft log is composed of two timbers which had been grooved to hold the shaft and then nailed together. The pipe flange used as the shaft bushing is held to the shaft log by 8-in-long bolts that are affixed to the side of the shaft log with fencing staples. The motor had been removed, but it had probably been a one cylinder, water- or air-cooled engine. The motor was placed aft of the center of the boat. The area forward of the engine was left open as a space for handling and storage of fishing or trapping gear such as nets, lines, traps, boxes, etc. Neither the shaft, propellor or rudder were extant.

Except for the small seat at the bow, there was no evidence that any seats had been built into the boat. Informants indicate that seats were rarely built into skiffs, and that the operator sat on the gunwale or on a box or bucket (Mr. George Adams, Jr., personal communication 1989).

Along the starboard side, near the bow, an effort had been made to back a long crack in the watercraft's side with a thin batten of wood (Figure 38). It appears as though this was not a repair but was done during the construction of the boat, since the frames had been notched and placed over the batten. A plywood patch bolted to the side at the end of the crack between

Figure 37. Remains of Watercraft 3, a cypress skiff, 16 SMY 61.

frames 8 and 9 does appear to be a repair. Either way, these efforts reflect a resourcefulness with making due with what was available, and may suggest a long period of use.

This watercraft represents what in the area is considered an old-style cypress skiff, a type of vessel with a long history of use in southern Louisiana. The skiff (*esquif*) has been defined as "a wide boat with a pointed bow, blunt stern, flat bottom and very good lines" (Comeaux 1972; Knipmeyer 1956). The skiff represents just one of a variety of small, flat-bottomed watercraft which have been adapted to the conditions found on the inland waters of southern Louisiana. In addition to the skiff, these include the flat or flatboat, the bateau and the pirogue. While of different shapes, all of these boat types share certain common

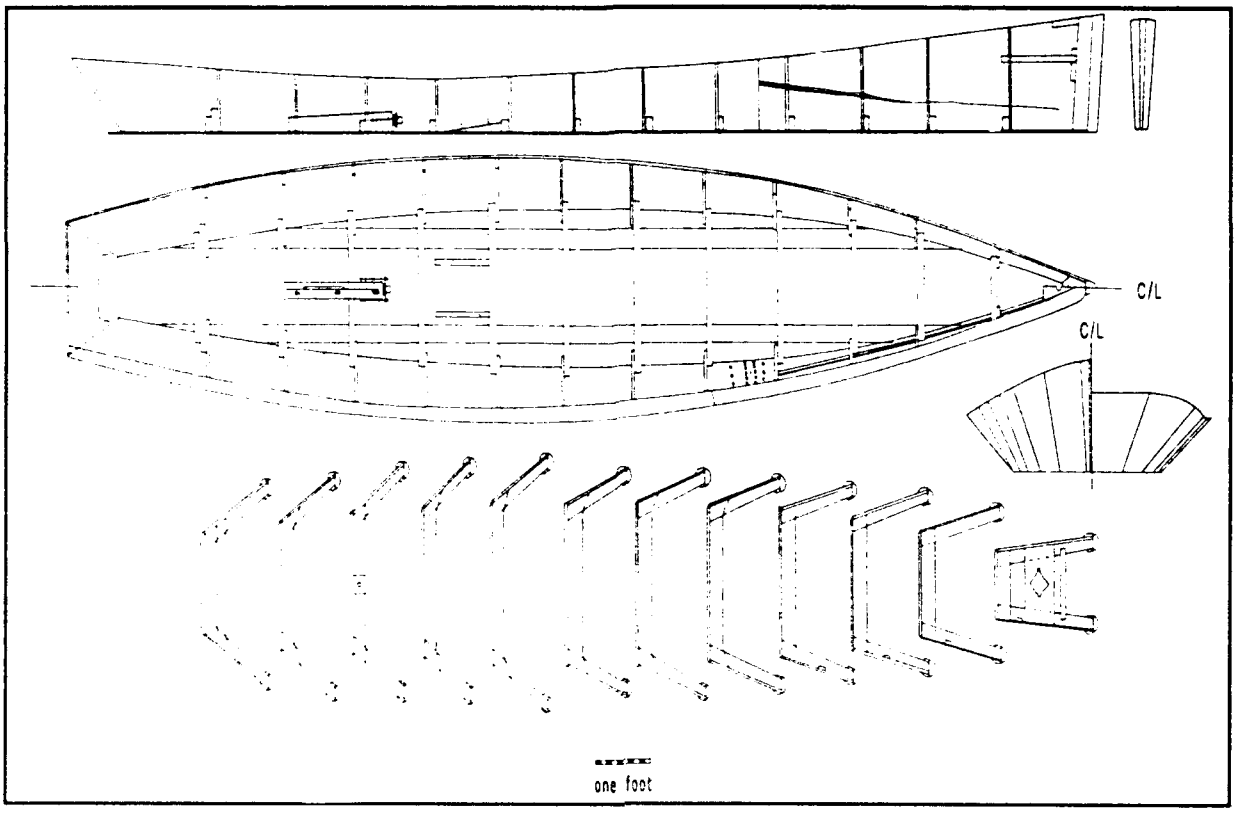

Figure 38. Plans developed for Watercraft 3, 16 SMY 61, a cypress skiff.

characteristics, including flat bottoms, usually flared sides, chine pieces (i.e., boards or timbers running along the juncture of the side and the bottom, and the placement of the bottom boards parallel to the length of the boat rather than across the boat, as was more common in Atlantic coast construction. These vessels were used for transportation, fishing, trapping, and hunting.

Comeaux (1972) has identified several types of skiffs in use in Louisiana, defined on the basis of distribution and minor differences in shape, size, etc. In his classification, a triangular stern is associated with the Creole Skiff, a narrow trapezoidal stern is associated with the Mississippi Skiff, and the wide bottom trapezoidal stern is associated with the Lake Skiff (Figure 39). The Lake Skiff is supposedly the largest and heaviest-built of the types, whereas the Mississippi Skiff is about the same length, but narrower. The Creole Skiff is smaller and lighter than the other two, has a narrow beam, considerable sheer, and a high, slightly overhanging V-shaped stern (Knipmeyer 1956).

Skiffs ranged in length from about 14 to 25 ft and were built almost exclusively of cypress. A few cypress skiffs of this type are still to be found, but they began to disappear in the 1950s as they were replaced by other boats made of aluminum and fiberglass. Watercraft 3 from 16 SMY 61 is probably most similar to the Creole skiff, although the stern is less tapered than is apparently the norm.

These vessels are also often called "pulling skiffs," because when rowed they were fitted with elevated oarlocks (*jouges* in French) and the rower faced forward, "pulling" the boat ahead (Curtis Leonard, personal communication 1989). Beginning in the late-nineteenth century, these skiffs began to be motorized, using single-cylinder, two-cycle, water-cooled or

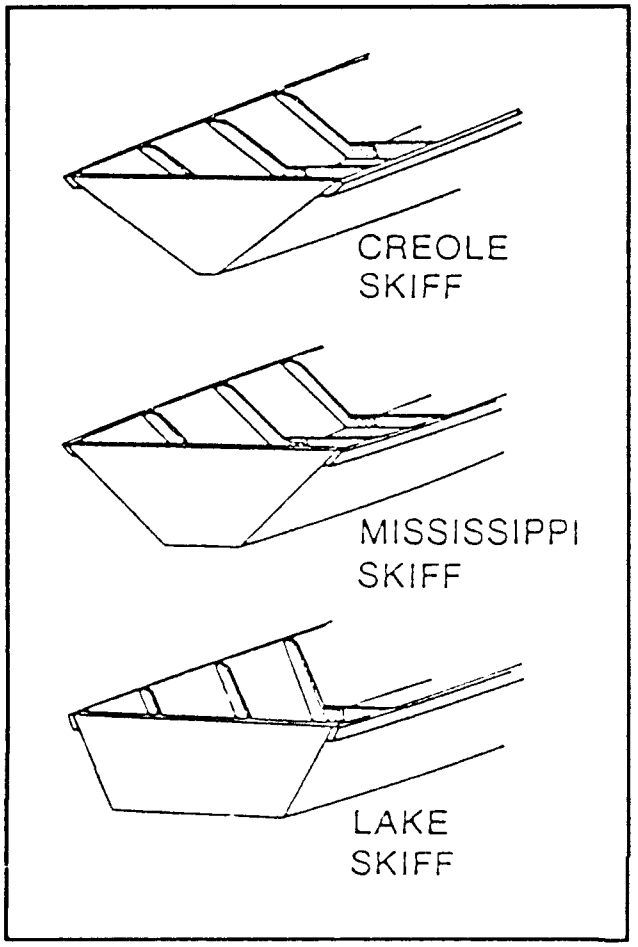

Figure 39. Types of Louisiana skiff sterns (after: Comeaux 1985).

air-cooled engines. Guirard (1989) notes that these engines developed from 2 to 8 horsepower.

The skiff from 16 SMY 61 is somewhat smaller than the typical motorized skiff in use earlier in this century, which reportedly measured 20 ft or more in length (Guirard 1989). However, it is approximately the same length as the two skiffs found at 16 SMY 55 (see below). It is presumed that the skiff from site 16 SMY 61 was built originally to be motorized, and not converted as many were. This presumption is based on the manner of construction, particularly, on the fact that the stern is slightly wider than would be expected for the typical Creole Skiff. This slight widening of the stern was to accommodate the weight of the engine (Mr. George Adams, Jr., personal communication 1989).

The age of Watercraft 3 cannot be specifically determined, but it is a type that was in common use between about 1910 and 1940, and had begun to disappear by the 1950s. It probably was built before 1950, but may have been in use into the 1960s.

Adams Place Site, 16 SMY 55/56

Sites 16 SMY 55 and 16 SMY 56 were both previously recorded by Gibson (1978). Site 16 SMY 55 was recorded as the Adams Place site, a prehistoric and historic site named after George Adams who lived at the location from 1935 until the flood of 1973 (George Adams, Sr., personal communication 1989). The other site, 16 SMY 56, was identified as a

prehistoric *Rangia* shell midden by Gibson. The two sites occupy low levee ridges formed by two small bayous which enter Bayou Shaffer. Both of these ridges have been occupied since at least the mid-nineteenth century. By the 1860s sugar was being grown on the natural levees of the two ridges and a sugar house and quarters had been built (see Figure 11). There is no doubt that a landing has existed at this location since an early date. The two sites are here considered as a single entity and referred to as 16 SMY 55 in the discussions.

The landing at 16 SMY 55 includes the pilings of a dock and an older adjacent landing area reportedly used formerly for loading sugar cane (George Adams, Jr., Personal communication 1989). The pilings for the more recent dock extend about 100 ft into the bayou. This dock was abandoned and began to deteriorate in 1973, when the Adams family moved from Bateman Island. All that remains of the older landing is a series of four posts placed in a square located about 50 ft south of the present dock remains and about 50 ft from the bank of Bayou Shaffer. According to George Adams, Jr. these posts once supported a capstan used to pull barges and other large vessels close to the bank for loading and unloading.

Several portions of structures remain at the Adams Place site. These include a small ramshackle wooden dwelling, noted as Adams' camp on Figure 40, a burned shed behind this cabin, three small outbuildings or sheds, a portion of a shed used to house animals and the brick chimney of a larger house. The Adams had lived in this later house, but it burned soon after they moved in 1973. George Adams, Sr. stated that the house was "old" when they moved into it in 1936, and it was possibly one of the structures depicted on the 1864 Confederate maps shown as Figure 11. Between the dock and the Adams' cabin, an old two-cycle engine was found. This engine was probably used in a boat.

The initial object in the investigation of this locale was to examine the remains of a wooden boat partially exposed in the water adjacent to the bankline. This vessel, shown as Watercraft 1 in Figure 40, proved to be the hulk of a motorized cypress Lafitte skiff. During the examination of this boat, the remains of several other watercraft were found buried or partially buried near the bank, as well as abandoned on the shore. Nine complete or almost complete watercraft, and pieces of two others were found in the 16 SMY 55 area; those located near the Adam's landing are shown in Figure 40. In addition, several individual pieces from unidentified watercraft were found in the area. Three watercraft, designated Watercraft 2, 3, and 4, and one section, designated Watercraft 14, were found on the bank between the bayou and the standing cabin. Four boats, designated Watercraft 1, 5, 6, and 8 were located in the water near the dock (Figure 40). All of these four vessels were partially or totally buried and submerged. One small portion of an unidentified wooden boat, designated Watercraft 15, was found about 100 ft south of the dock, and another large segment of boat, a cypress skiff designated Watercraft 7, was located in the woods some 200 ft west of the bayou (see Figure 33). An effort was made to accurately record all of the more complete vessels and each is described below.

Watercraft 1 is the hull of what is generally known as a Lafitte skiff. The boat is pulled up against the bank bow-first, on the downstream side of a set of small pilings representing the remains of a dock. The vessel is largely filled with mud and only the upper portions of the remaining hull extend above the water (Figure 41). The exposed portions of the vessel were measured and photographed, and iron probes were used to obtain depths and cross-sectional information. In addition, excavations were conducted in the bow to gather detailed information on construction. Figure 42 presents a drawing of the reconstructed hull. The vessel measures 28.6 ft long, 9.5 ft wide, and 3.4 ft deep. A large tin-lined plywood box measuring 8 ft by 5 ft by 2 ft is located in the forward section of the boat. This box served as an ice box for shrimp and fish. The block of a 6-cylinder, "New Marine Chrysler" engine is still mounted in the boat (Figure 41).

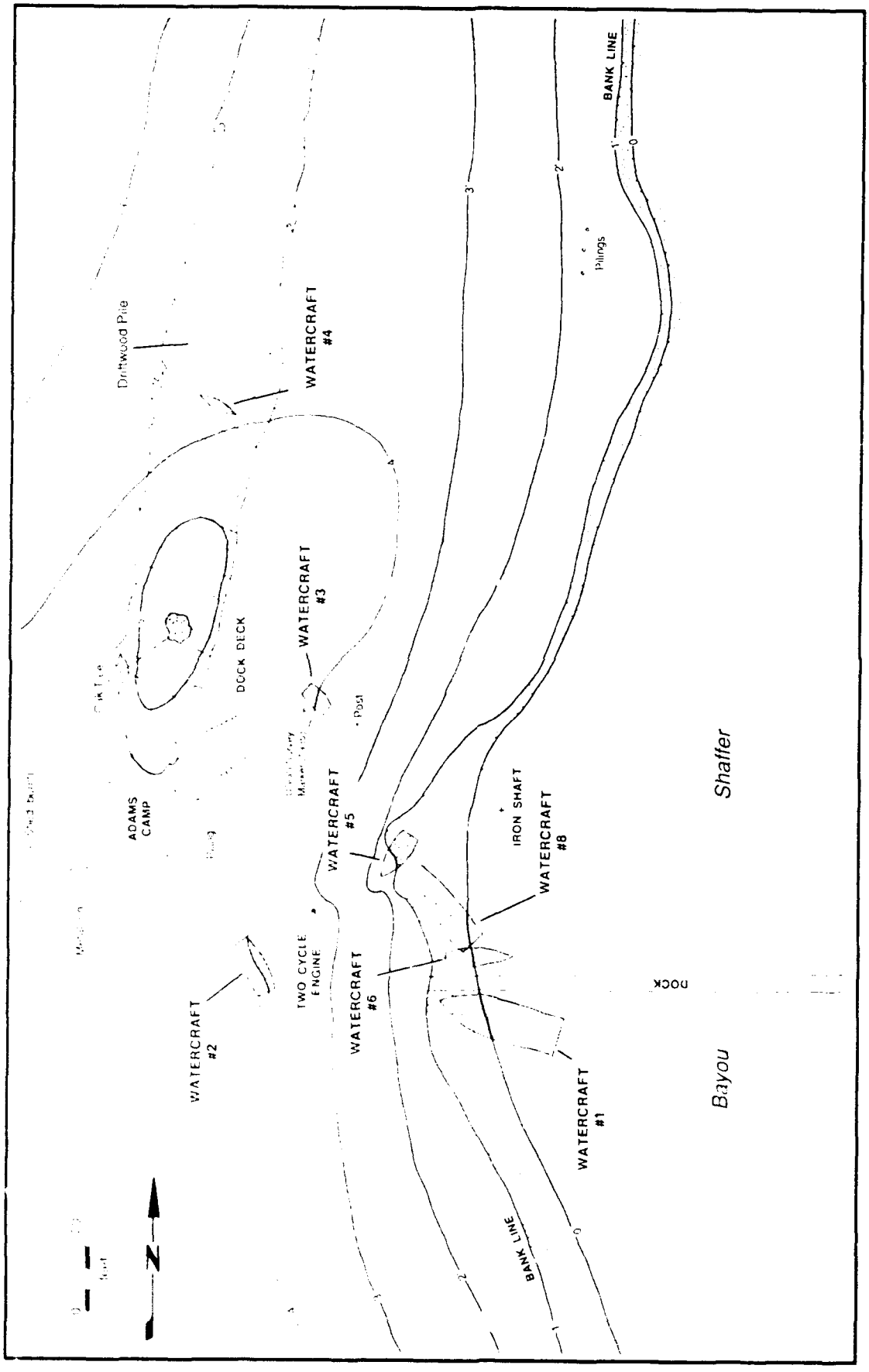

Figure 40. The Adam's Place site, 16 SMY 55, showing the locations of several complete or almost complete watercraft. Watercraft 7, 9, and 10 are located off of the map.

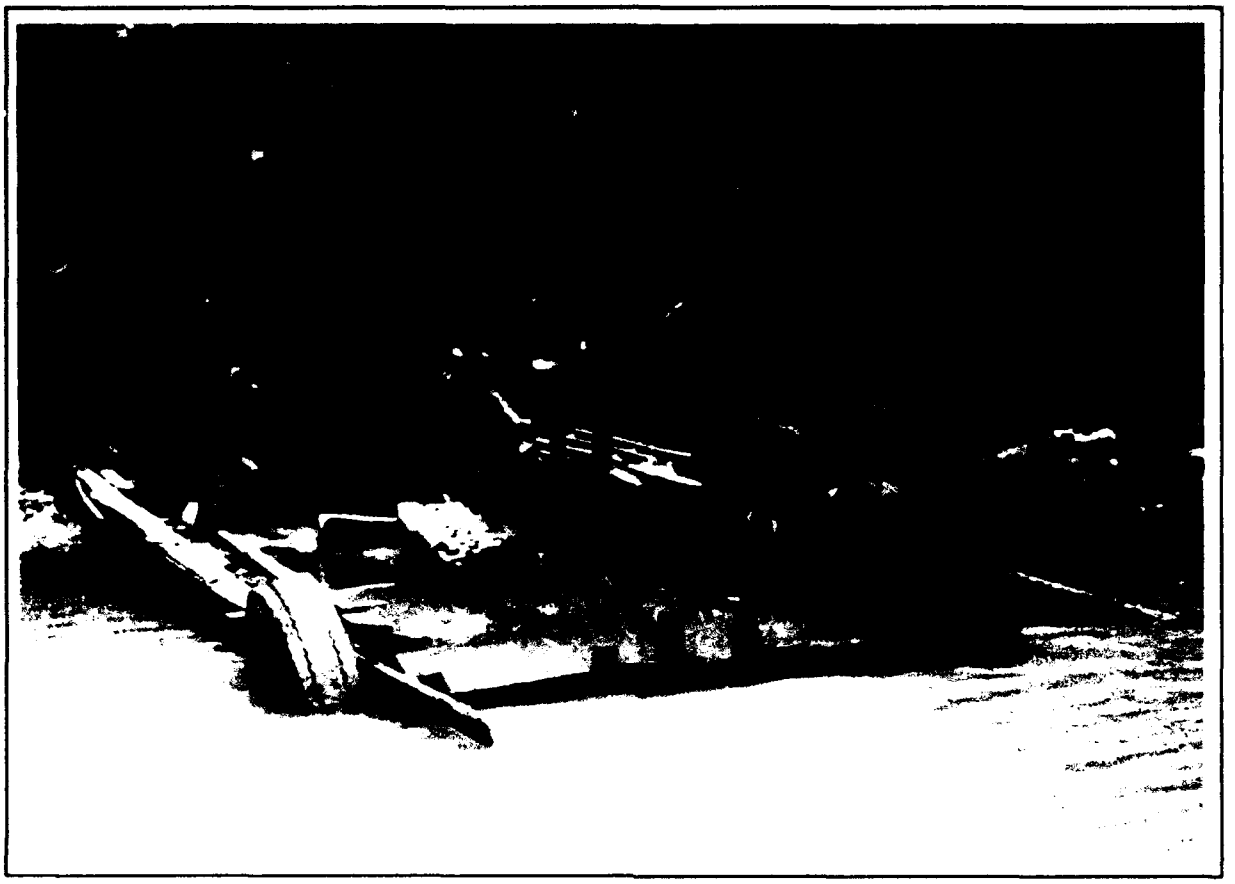

Figure 41. The remains of Watercraft 1, a Lafitte skiff, 16 SMY 55. Note the remains of dock pilings to the right.

The stem post, cutwater and stem band assembly is sharply curved. The vessel has a chain link and eye bolt fastening extending from the stem post assembly to an upright timber post located farther aft (Figure 42). The timber post is stepped on a board which extends between and on top of the first to the fourth floor frame. The first two frames (numbered from the bow) are made of 1-by-2-in boards. The third frame is a curved 1-by-5-in board attached to a 2-by-6-in floor. The fourth frame is also curved, but the remaining frames seem to be straight. These 26 frames are spaced about 1 ft apart. The sides of the boat are made from 3/4-in-by-6-in cypress planks, except for the platform extensions at the stern, which are cut from 10-in-wide boards. All of the wood in the boat, except for the plywood, appears to be cypress.

This boat probably closely resembled the typical Lafitte skiff, a type which has been used for many years in the region, primarily for shrimping (Figure 43). The Lafitte skiff usually has an inboard engine with a stern overhang. It has a semi-v bow and tapers to a flat stern, and the stern almost always has a fantail. The dimensions of Lafitte skiffs are usually 28 to 32 ft long and 10 to 13 ft wide (Butler 1985). Watercraft 1 closely matches these characteristics.

Watercraft 2 represents the remains of a large wooden "flat" which, when complete, measured 15.7 ft long, 6.1 ft wide, and 1.5 ft deep (Figure 44). The boat had originally been

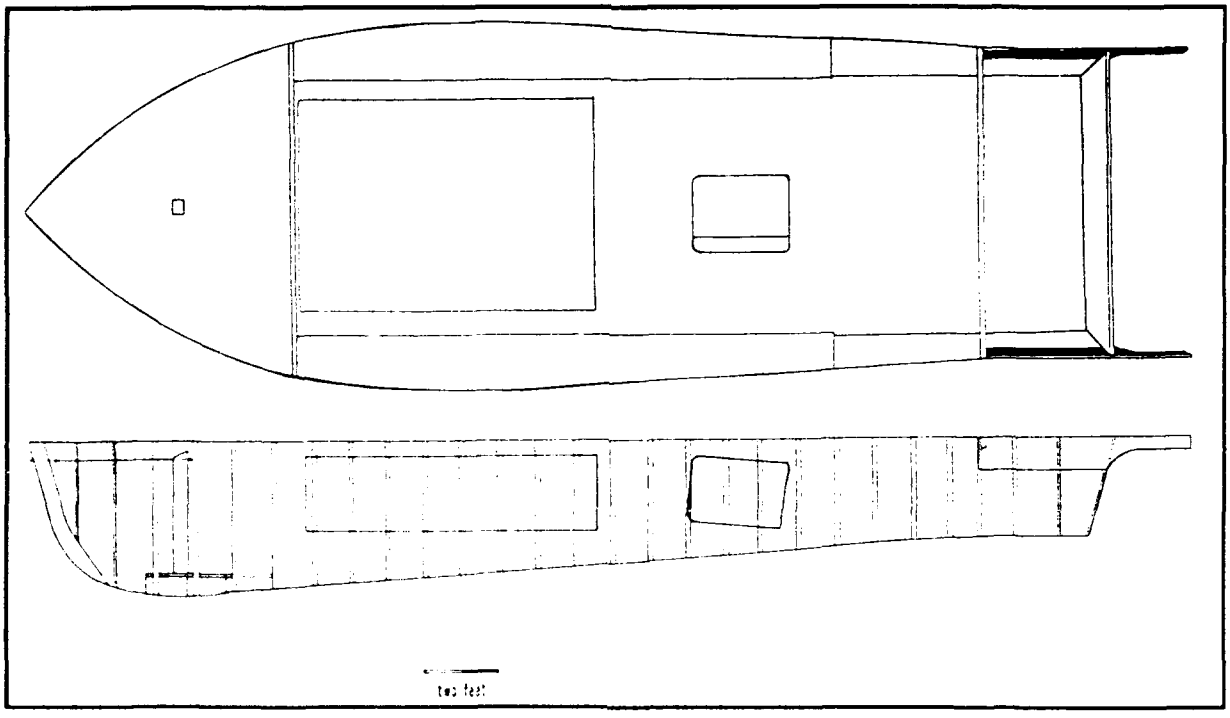

Figure 42. Watercraft 1, a Lafitte skiff, 16 SMY 55.

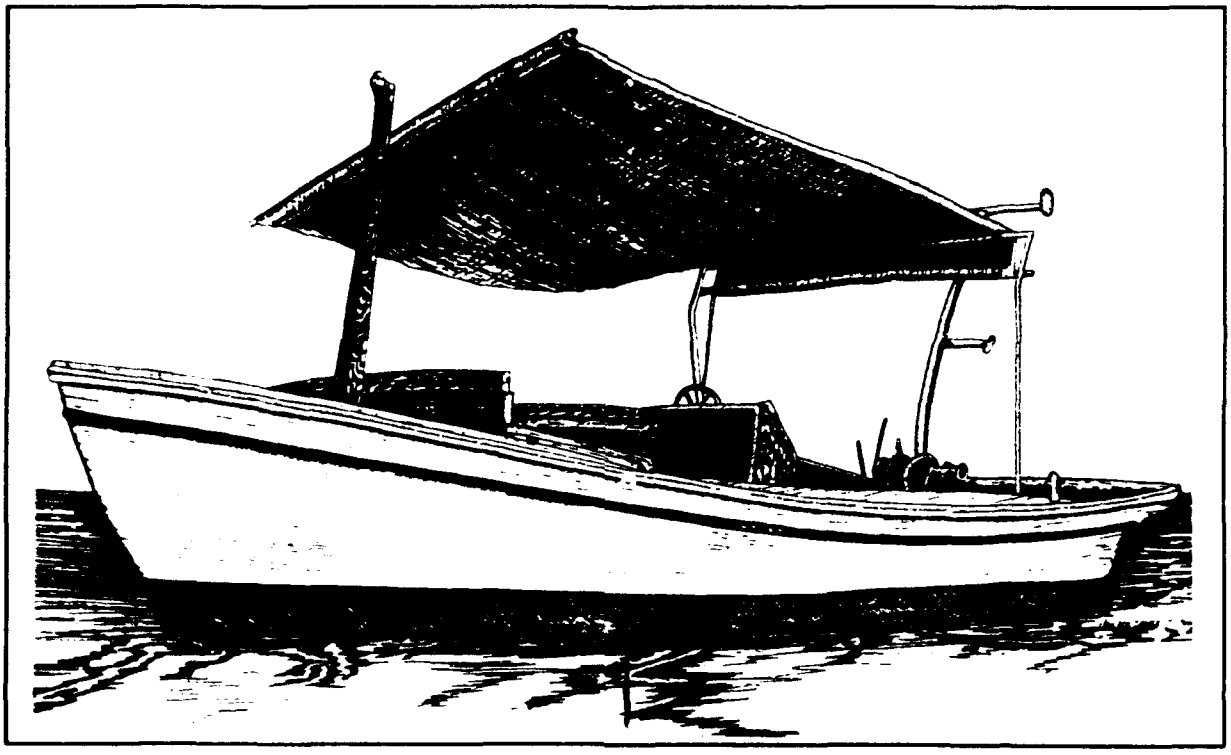

Figure 43. A typical Lafitte skiff (source: Butler 1985).

Figure 44. Remains of a plywood flat or flatboat, Watercraft 2, 16 SMY 55.

motorized, but the motor is now missing. A drawing of the reconstructed boat is presented as Figure 45. The sides and bottom are made from 1/4-in plywood and the exterior has been coated with fiberglass. The top of the sides are straight and the bottom sweeps up from the fourth frame to the bow. Nine floors and frames are more or less evenly spaced along the length of the vessel. The fifth floor is built of two pieces with an inch and a half separation. The floors and frames are of slightly varying sizes.

Beneath the floors are three 1-by-4-in strakes or "streamers" running lengthways from underneath the first floor to the transom (Figure 45). One streamer is placed down the center from underneath the first floor to the transom. The others are placed on 13-in centers either side of the centerline. Two smaller, 1-by-2-in streamers are located between the larger streamers and extend from underneath the fourth frame to the transom. The first two floors have been notched to fit over the streamers, while all the other floors are placed directly on top of the them.

Along the bottom of each side is a 1-by-3-in board or chine. The chine has been split from the bow to the fourth floor to allow the upward bend in the bow area (Figure 45). Both the small bow piece and the stern transom have a slight outward rake, and the base of the bow piece has been beveled to accept the bottom as it sweeps upward.

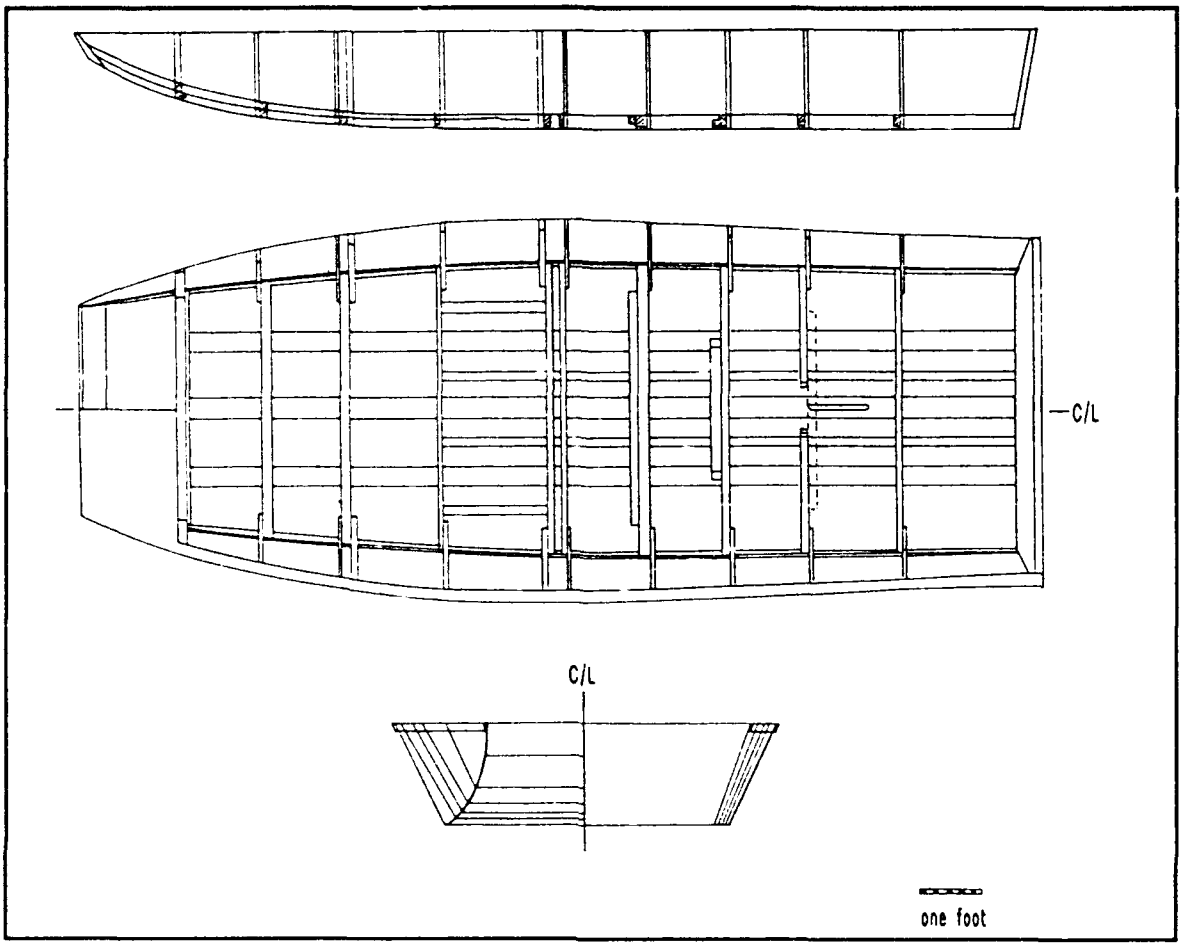

Figure 45. Plans of Watercraft 2, a plywood flat or flatboat, 16 SMY 55.

The sixth and seventh floors have been notched and fortified with sister floors to provide a base and mounting for an inboard motor. There is an opening in the eighth floor and a hole in the center streamer between the eighth and ninth floors which would have been for the propeller shaft. This opening had been filled, indicating that the internal engine had been removed and suggesting that the boat had been converted to outboard motor prior to loss or abandonment.

In terms of form, this watercraft fits the characteristics of the regional vessel generally called a "flat" or "flatboat." As described by Knipmeyer (1956), the flat typically has blunt ends, and the stern is always wider than the bow. The maximum beam occurs a little aft of the waist, and the forward sheer is enough to keep the bow out of the water. Flats measure between 12 and 14 ft long, and are about 3 ft wide. They have flared sides, a fish well, and horizontal and elbow braces on the inside. The boatman's seat was commonly located aft, unless the craft is rowed. Although similar to the typical flat, Watercraft is slightly larger than is typical, and it apparently lacked a live well. Watercraft 2 may have been used for several purposes. More than likely it would have been used for fishing with hoop nets (George Adams, Sr., personal communication 1989), or, possibly, crabbing. The lack of any evidence of a live well may support the latter use.

A boat similar to the flatboat is the bateau or john boat. The bateau is flat-bottomed with a blunt bow and stern, usually measuring over 15 ft long and from 4 to 5 ft wide. It typically has a considerable amount of forward sheer, and the bow is narrower than the stern. Normally the bateau is partially decked fore and aft, and sometimes the sides are constructed to leave an open well in the waist. The well is surrounded by a coaming, and some bateaux even have a cabin. Watercraft with a deck and/or an inboard motor are often categorized as bateaux, even though they may be smaller than a flatboat (Knipmeyer 1956). The lack of any evidence of a deck or combing on Watercraft 2 eliminates it from being classified as a bateau.

Watercraft 3 does represent the remains of a small john boat or bateau. The remains consist of most of the bottom and floors, and small portions of the side. The boat measures 11.6 ft long, 4.5 ft wide, and 1.3 ft deep. Figure 40 presents plans of the reconstructed vessel. The craft's sides and bottom are made from 3/8-in-thick plywood. The top of the sides are straight and the bottom sweeps up from the forward portion of the live well to within 6 in at the bow. The internal structure includes two (1 x 3 1/2 in) chine sills, eight (2 x 4 in) floors, eight paired (1/2-in-thick) frames, and two (1-in-thick) live well walls (Figure 46). The frames are all shaped (rounded) at their tops. No waterways were cut in the underside of the floors. The tops of the frames suggest that there was probably a narrow decking or coaming around the sides of the craft. Nail patterning on the side of the live well walls suggest that an additional 1-by 2-in board was placed across these two features on either side. The 2-in-thick

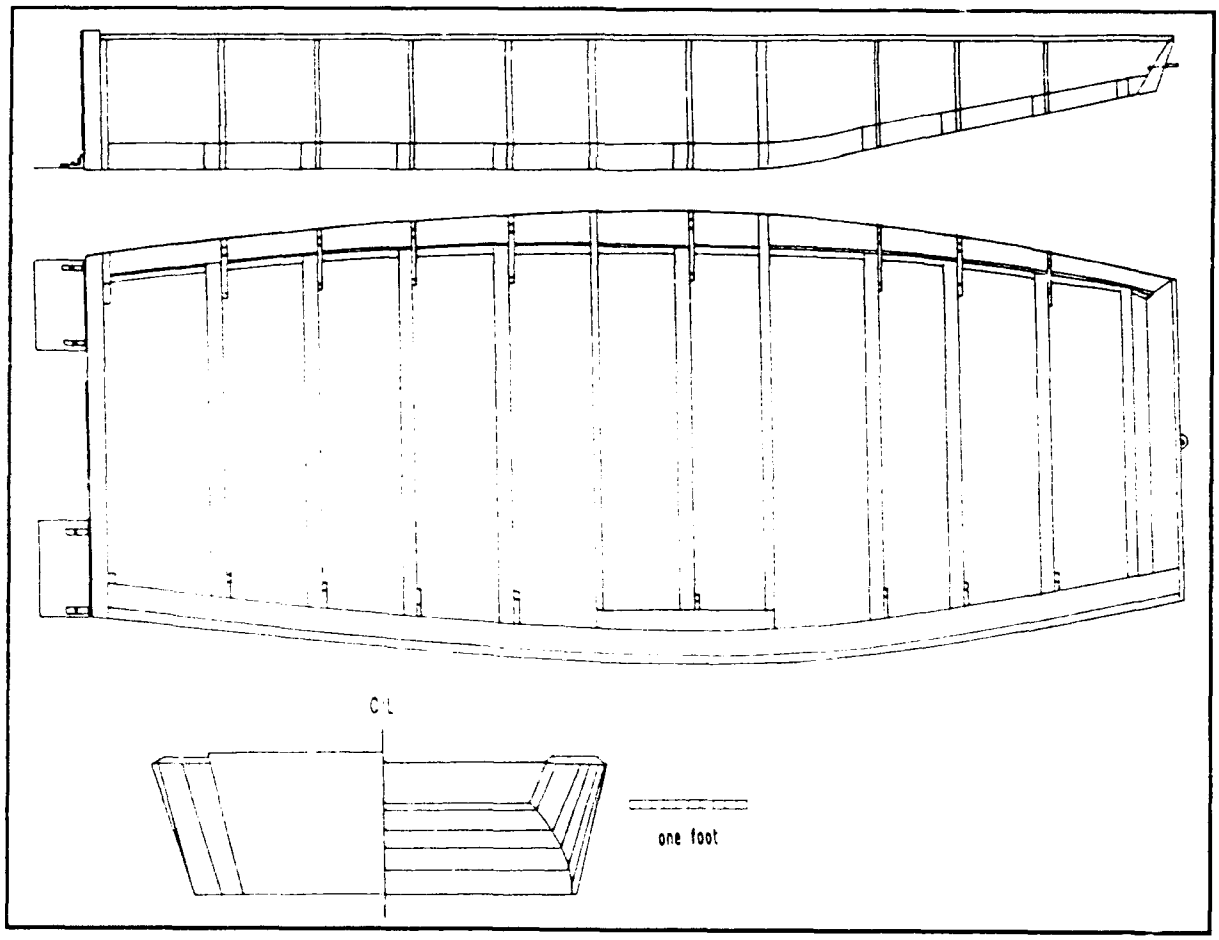

Figure 46. Plans of Watercraft 3, 16 SMY 55, a plywood bateau or duck boat.

stern transom was perpendicular to the bottom. On the outside of the stern transom there is a 1/4-in-thick aluminum plate measuring 14 in wide extending down from the top of the transom for 15 in. This was used to protect the transom when mounting an outboard motor. Also on the outside and at the base of the transom are two homemade aluminum trim tabs (see Figure 46). This watercraft had received several coats of paint -- red, light blue, and finally black. The presence of the live well suggests that the boat was used for fishing; however, in size, form and shape, it closely resembles the small duck-hunting boats still used in the area. There is no doubt that this boat is modern, and it may be only a few years old.

Watercraft 4 represents the remains of a cypress plank pirogue found in a pile of drift on the bank. The boat, which is complete except for the bottom, measures 15.3 ft long, 3.2 ft wide and 0.8 ft deep (Figure 47). The craft had been painted grey and then green The sides are made from single planks of 1/2-in-thick cypress. The boat has a rocker bottom rising about 3 in fore and aft. Its top sheer is more pronounced, rising about 6 in at both ends. The construction at the ends consists of a stem post, cutwater, and breasthook piece. The inside faces of the stem posts taper from 3 in at the top to 2 in at the bottom. The cutwater is rounded on its outside edge and straight on its inward side, overlapping the stem post and the ends of the side boards. The floors and frames are more or less evenly spaced and there are two live

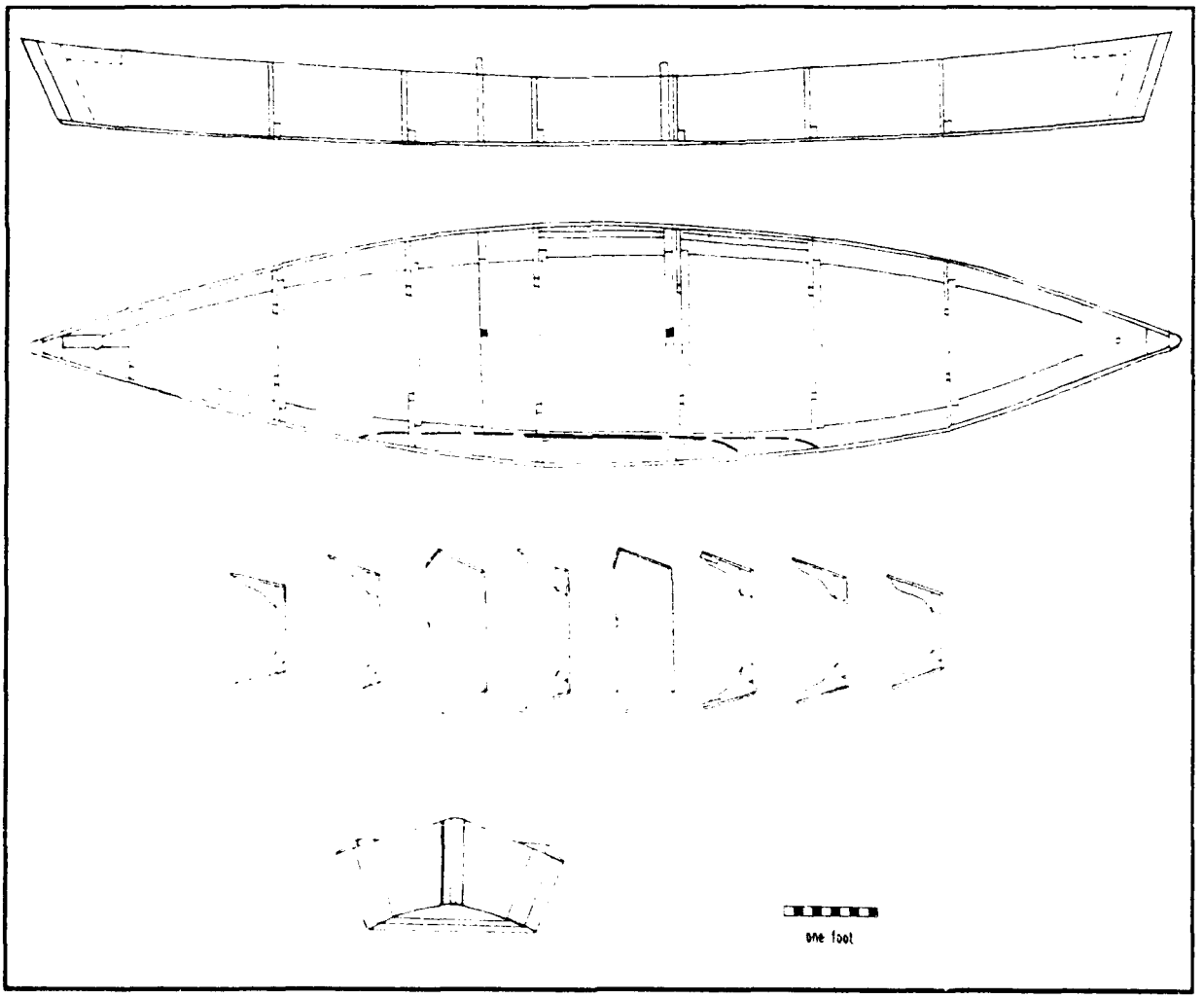

Figure 47. Plans of Watercraft 4, 16 SMY 55, a cypress plank pirogue (*pirogue en planche*).

well walls or bulkheads crossing the hull (see Figure 47). These extend some 2 in higher than the sides and are beveled along their edges. Under each floor, including the one between the live well walls, a small triangular notch has been cut as a waterway. Rounded notches have been cut into the tops of each of the live well walls (see Figure 47). These would have been used as a rack for a paddle or push pole, or for placing a rifle when hunting (Mr. George Adams, Sr., personal communication 1989).

Vessels of this type were, and still are, commonly used for fishing, trapping, and hunting. Presumably, this boat was used for similar purposes. Cypress plank pirogues, or *pirogue en planche*, have been used since the early-nineteenth century. As early as 1842, the Tchefuncte lighthouse keeper noted that he was building one (Thurston 1842). Comeaux (1976) suggests that the plank pirogue became popular when large cypress logs became scarce. A more likely explanation is that they came into use as sawmill lumber became more readily available and less expensive. In recent years, they have been replaced by plywood and/or fiberglass pirogues. The age of this watercraft cannot be determined, but it could be on the order of 30 or 40 years old.

Watercraft 5 represents the remains of what is generally called an Atchafalaya skiff (Comeaux 1972) buried in the bank of Bayou Shaffer and partially submerged (see Figure 40). The vessel was partially excavated to collect information on construction, and probes were used to gather dimensional data. The vessel measures 13.4 ft long, 4.8 ft wide, and 1.8 ft deep (Figure 48). The hull of this skiff is made of plywood. The stempost appears to be straight, tapering slightly along its aft edge. The top of the bow is fortified with a 1-in-thick breasthook. A chine sill of undetermined dimensions was located at the bottom of each side. Probing suggests that there is little or no rocker to the bottom, although this may be a factor of

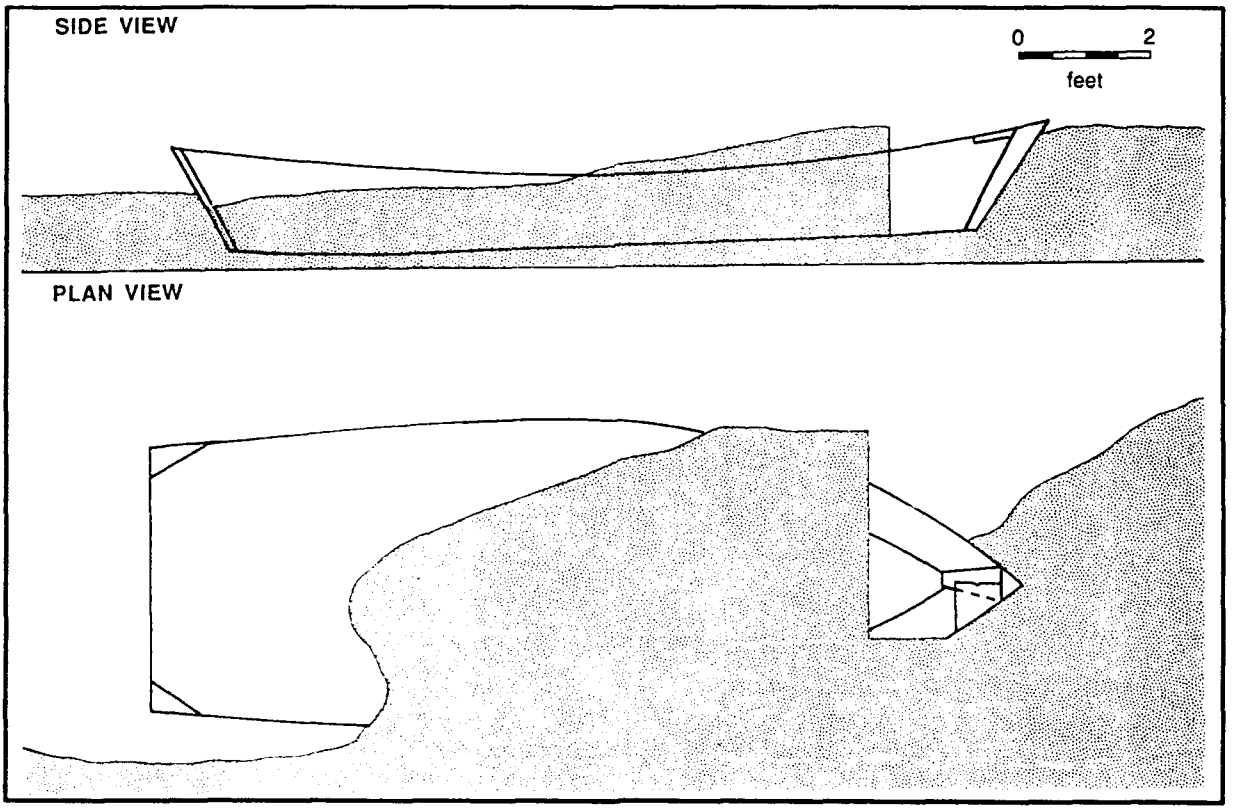

Figure 48. Sketches of Watercraft 5, 16 SMY 55, a plywood Atchafalaya skiff.

twisting and warpage since the boat is resting at an angle on the bank. The exposed portion of the boat displays a sheer of 6 in aft and 9 in forward. Marks on the transom indicate that an outboard motor was used to propel this craft.

This rather tubby watercraft is similar in form to the popular aluminum skiff now used as a work vessel throughout the lower Atchafalaya Basin. There is no doubt that this wooden Atchafalaya skiff form is ancestral to the aluminum version. Although aluminum versions have been made for many years, informants reported that the proliferation of the aluminum skiffs has occurred since the 1982 oil and gas recession in Louisiana. The recession put many people out of work, who have since turned to commercial fishing as a part-time occupation. Many of the unemployed were experienced welders who turned to building these boats.

Watercraft 6 is a complete and well-preserved motorized cypress creole skiff. When found, the boat was completely buried and submerged in the shallow water at the edge of Bayou Shaffer (see Figure 40). The vessel was initially delineated by probing (Figure 49) and

Figure 49. Delineating the submerged and buried Watercraft 6, 16 SMY 55, a cypress skiff.

was subsequently excavated completely (Figure 50) and removed from the bayou (Figure 51). The excavations required the construction of coffer dam embankments and the use of pumps to remove water from the cleared vessel (Figure 50). Plans of the vessel are presented as Figure 52. In terms of form and dimensions, this vessel was very similar to the cypress skiff found at 16 SMY 61. The vessel, which had been outfitted with an inboard engine, measured 16.7 ft in length, 4.9 ft wide and had a depth of 1.3 ft. This skiff has a well-formed fore and aft sheer along the top of the gunwales and a rockered bottom (Figure 52). The bow is constructed of a curved stem post with no breasthook or cutwater. The aft face of the stem post is tapered top to bottom. The lack of a breasthook is mitigated by a small seat extending side to side from about halfway down the stem post to aft of the first floor. Only one half of this seat is still extant (Figure 52).

The sides of the boat are formed of a single 3/4-in-thick cypress board topped by three 2-in-wide boards. On the port side an additional, 2-in-wide board had been fitted into the wide plank. Originally this was believed to be a repair, but, more likely it reflects original

Figure 50. Excavation of the cypress skiff, Watercraft 6, 16 SMY 55.

Figure 51. Recording the completely excavated and recovered Watercraft 6, 16 SMY 55.

construction, probably necessitated because a crack or imperfection in the board originally selected for the side. The bottom is made of three cypress boards laid stem to stern. The bottom planks do not extend beyond the transom, as did the bottom on the skiff found at 16 SMY 61. A plywood patch or thickening piece has been nailed to the inside of the bottom between the third and fourth floors. A board was nailed across the inside of the transom, suggesting there may have been a seat in this area. The top of the sides were finished with a half-round sheer guard and a corresponding half-round piece on the inside between the frames. About one-third of the way down the frames on the inside, starboard side is a board running fore and aft (Figure 52). The floors and frames are more or less evenly spaced down the length of the vessel. The sternmost frames are missing. Waterways have been cut through the floors and frames on the starboard side with the exception of the first floor.

A piece of board, which had served as the engine mount, was attached between the sixth and seventh floors. Both of these floors were doubled ("sistered") to provide extra strength (Figure 52). The shaft log, propeller shaft, and propeller were still in place. The shaft was held in place by a long wooden skeg attached to the bottom of the boat (Figure 52).

As noted, this boat was similar to the skiff found just up the bayou at the Oyster Camp Site. Like that boat, this skiff is shorter than the average Creole skiff, as described in the literature, plus the floor at the stern is slightly wider. The age of the boat is difficult to

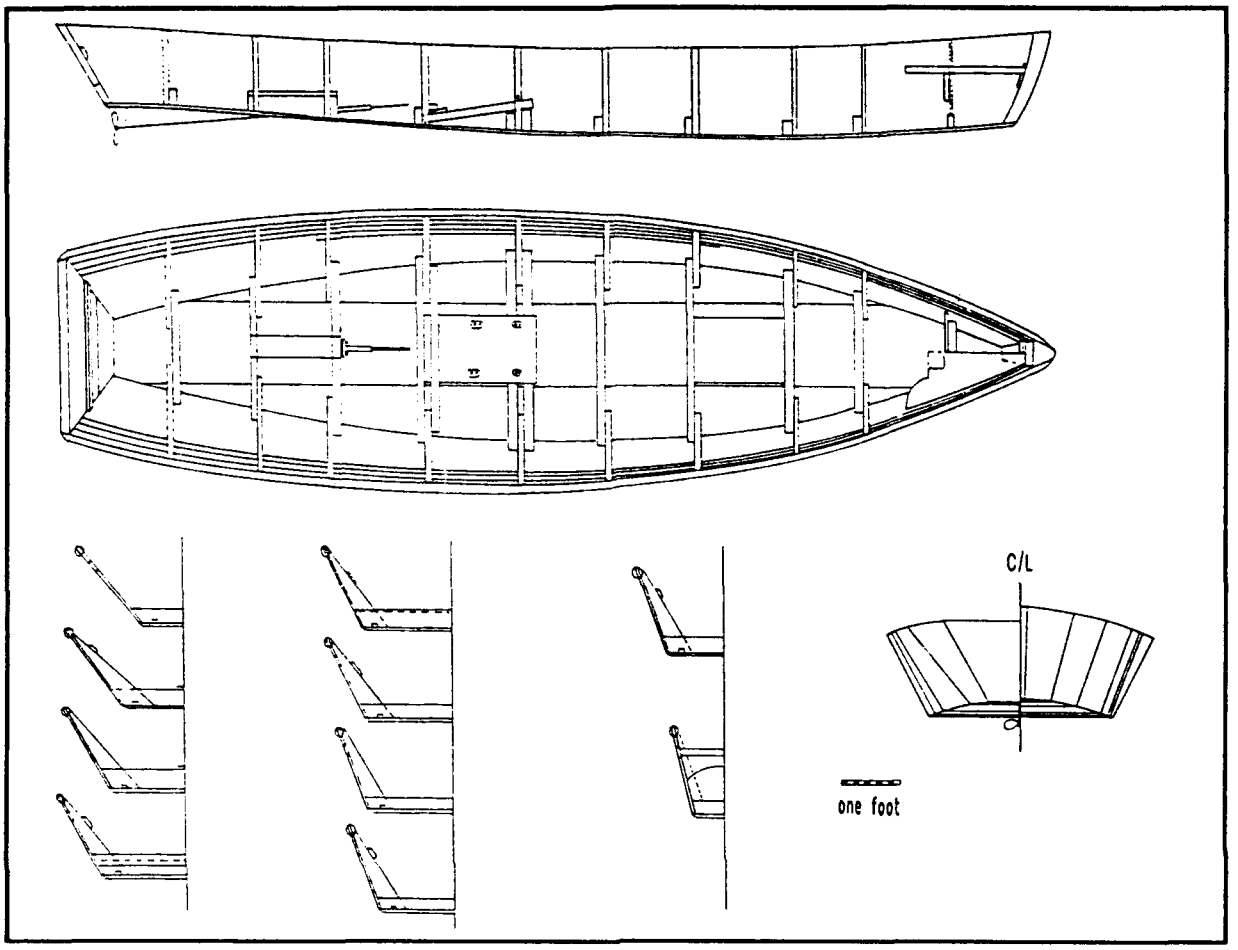

Figure 52. Plans of Watercraft 6, 16 SMY 55, a cypress skiff.

determine, but George Adams, Sr., who lived at this site from 1935 to 1973, has no recollection of this boat and suggests that it was abandoned and buried before he settled there. While it is possible that the boat was built before 1935, it certainly seems that it was abandoned and buried sometime after that date, but certainly before 1973.

Watercraft 7 is another motorized, cypress Creole skiff which was found in the woods over 200 ft from the banks of Bayou Shaffer (see Figure 33). When found, the boat was almost completely buried and only portions of the bow were exposed. Excavation of the vessel revealed that only the bottom and small portions of the sides remained (Figure 53); however, additional pieces of the boat were found scattered in the vicinity. Presumably, the boat was dragged to this location sometime in the past and abandoned. Figure 54 presents the reconstructed lines of the vessel. Reconstructed dimensions of this boat are: length, 16.0 ft; width, 4.2 ft, and depth, 0.9 ft. This flat-bottomed skiff has a well formed fore and aft sheer and a rocker bottom. The bow is composed of a curved stem post and curved cutwater, with a narrow iron stem band. There is no breasthook. Like Watercraft 6, the lack of a breasthook was resolved by placing a seat at the bow. The seat is missing, but some of the nails that formerly held it in place are present. The aft face of the stem post is tapered from top to bottom. The sides of the boat are each made of a single 3/4-in-thick cypress board, and the bottom consists of three boards laid stem to stern. The bottom boards do not extend beyond the transom.

Figure 53. Cypress skiff, Watercraft 7, 16 SMY 55, after excavation.

The nine floors and frames are more or less evenly spaced along the length of the boat. The end floors apparently had no associated frames. Two live well walls were incorporated into the frames at floors four and six. No waterways were observed. Floors six and seven were doubled to provide stability for mounting the engine.

A 1-in-diameter hole is drilled through the transom, presumably through which a rudder post was fitted (Figure 54). The shaft log is extant, and a portion of a small iron skeg through which the propellor shaft had passed is still attached. The propellor shaft and rudder are missing. A short piece of board ("fin") was nailed under the boat at the bow; probably to

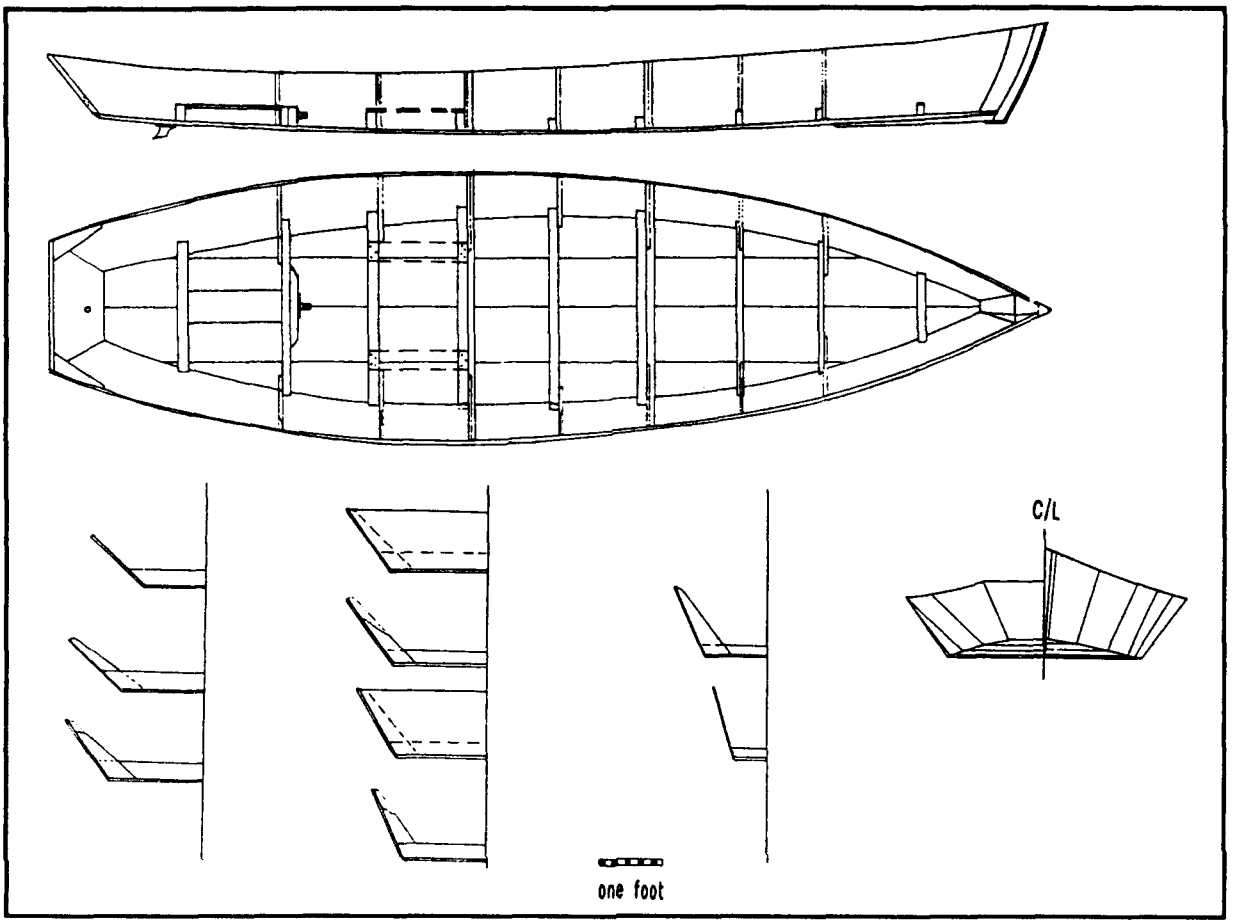

Figure 54. Reconstructed lines of Watercraft 7, 16 SMY 55.

strengthen and protect the bottom of the boat when pulling it ashore. This vessel had been painted several times with a variety of colors including reddish-orange, gray, white, and green.

The dimensions and form of this skiff are almost identical to those of Watercraft 6. In fact, they are so similar that it is possible that they were built by the same person. Again, the age of this vessel is difficult to determine, but it probably dates to the 1930s or 1940s.

Watercraft 8 was found during the excavation of Watercraft 6. This cypress boat is completely submerged and buried, and only a minimal amount of information about it was collected. Through probing, it was determined that this boat was over 24 ft long, 7.3 ft wide, and had an unknown depth (see Figure 40). The probing also suggests that the boat is largely intact. Portions of the stern transom and port side were exposed during the excavation of Watercraft 6. These were built of cypress board measuring about 1-1/4-in thick, much heavier than the lumber used in the construction of the two skiffs discussed above. The lumber in this boat was in excellent condition, as was that from all of the buried and submerged vessels examined. It is possible that this boat is a large flat or Lafitte skiff. The age of this boat cannot be determined, except to note that it was abandoned at the same time or earlier than Watercraft 6.

Watercraft 9 is the remains of a motorized, wooden lugger found near 16 SMY 56, about 800 ft northwest of the Adam's Place site. The boat is buried within the channel of the

small bayou that formerly ran through here. Only the stem post and cabin of this watercraft were exposed above the ground level when discovered (Figure 55). Dimensions of the vessel, which were derived through probing, are: length, 33.2 ft; width, about 9 ft; and depth, 4 or more ft. The hull of the vessel is apparently made of cypress, but the remaining cabin seems to be constructed of various wood types. George Adams, Jr., stated that he had played on this buried watercraft when he was a child in the early 1940s.

Figure 55. Partially buried, motorized cypress lugger, Watercraft 9, 16 SMY 55.

Watercraft 10 represents the remains of a large dredge on a wooden barge located well above the Adam's Place landing and about 50 ft from the western bank of Bayou Shaffer (see Figure 33). The visible remains of the vessel consist of massive iron frames, pipes, and platforms, some rising 20 ft above the ground and covering an area measuring about 60 by 120 ft. The hull of the dredge is now buried beneath several feet of sediment. When initially found, this object was believed to be an abandoned oil platform, docking facility, or sawmill operation of some sort. However, an interview with the George Adams family revealed that this was a large dredge barge abandoned at this location in 1937. Mr. Adams noted that the dredge barge had once had a wooden hull. No other information concerning this dredge was obtained.

Five small pieces of watercraft were found scattered around the area of sites 16 SMY 55 and 16 SMY 56: Watercraft 11, a wooden bow stem section from a skiff; Watercraft 12, a wooden transom section from a skiff or john boat; Watercraft 13, a wooden bow section from a john boat; and Watercrafts 14 and 15, sections of a side plank and frame(s).

The bottom portion of a wooden skiff-like watercraft was found partially buried in the western bank of Bayou Shaffer below, and outside of the study area. These remains were noted during the initial remote-sensing survey of the area, and were not reexamined later.

School Boat Stop Site, 16 SMY 58

16 SMY 58 represents the remains of a partially exposed watercraft originally recorded by Jon Gibson (1978). The hulk is located on the western bank of Bayou Shaffer, near the lower end of the study area (see Figure 33). When Gibson recorded this boat in the 1970s, most of the superstructure was extant. Now only small portions of the hull and some pipes in the center of the vessel project above the water. Figure 56 presents a side-scan sonar record obtained of the wreck. Investigation of the wreck by divers involved collecting basic dimensional measurements and developing some cross-sectional information.

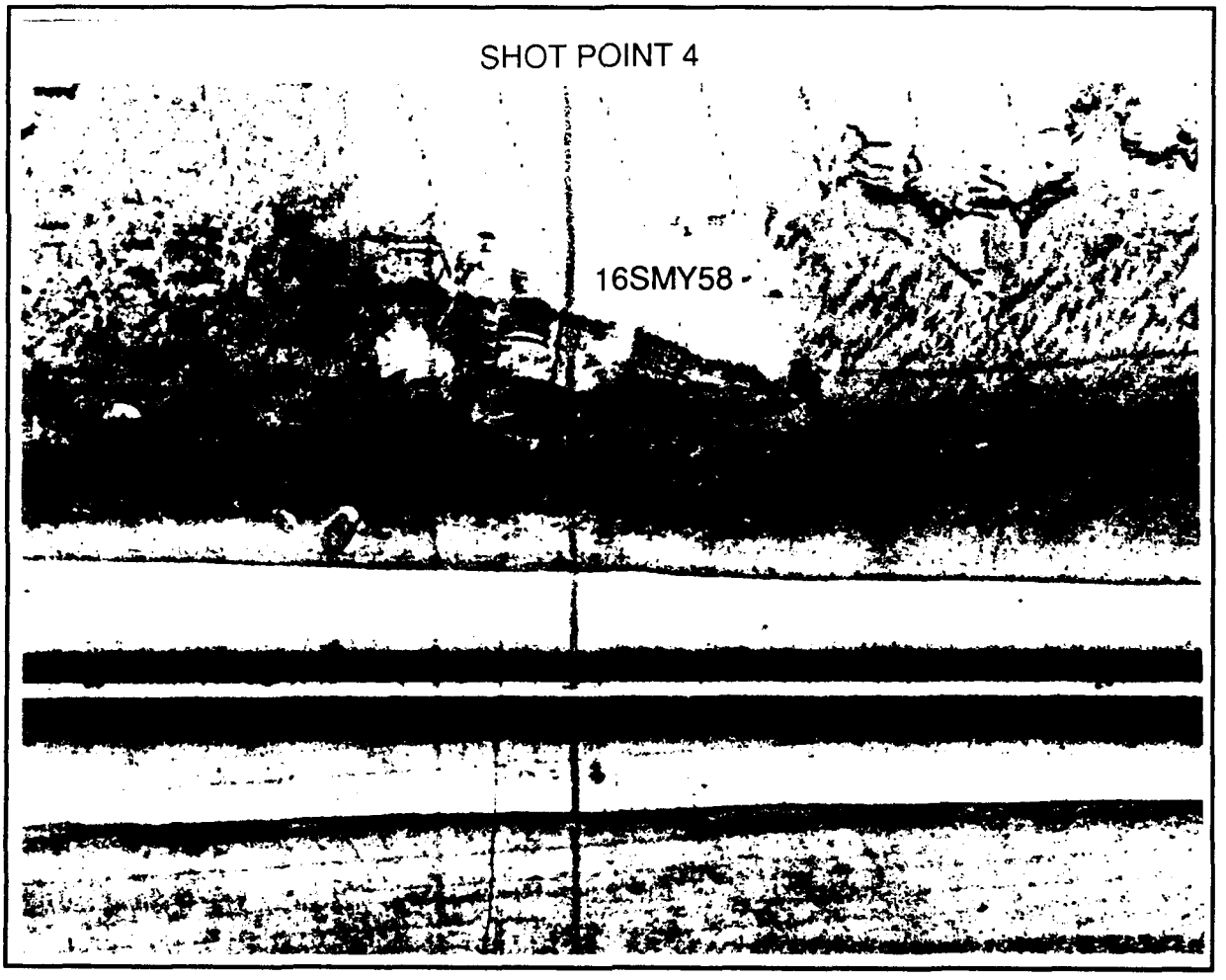

Figure 56. Side-scan sonar record of the remains of Watercraft 1, 16 SMY 58, a World War II, wooden mine sweeper.

The dimensions of the wreck are: length, 129.8 ft; width, 23.4 ft; and depth, over 4.7 ft. The sides of the vessel are constructed of 5-by-8-in frames set on 15-in centers. Additional structural support is provided by diagonal crisscrossed iron strapping, measuring 5 in wide and 1/4 in thick, placed between the frames and an outer layer of planking composed of boards measuring 7 in wide and 3/4 in thick. Outside of these planks is another layer of boards composed of 7 by 1 5/8 in planks. These represent the outer hull planking of the vessel. At least three wooden bulkheads constructed of 2 by 4 in framing and 1 1/4 in plywood were recorded. Apparently, the machinery and motors have been removed from the vessel.

This hulk represents the remains of a wooden vessel built and used as a mine sweeper during World War II. After the war, the boat was decommissioned, sold, and converted into a "pogy" (menhaden) boat prior to being abandoned in Bayou Shaffer in the 1960s (Curtis Leonard, personnel communication, 1989). The boat was later used by the children living on Bateman Island as a school bus stop.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Introduction

The present study was designed and implemented to locate, identify and evaluate sunken watercraft that may exist within the bounds of several study areas located along the lower Atchafalaya Main Channel and Bayou Shaffer. The approach used in this study has its foundation in a series of similar studies conducted in the region. Specifically, an effort has been made to position the conduct of a remote-sensing survey, plus the evaluation of the collected data, within a regional and locale-specific assessment of the history of watercraft use and loss. The remote-sensing instruments used, the magnetometer, side-scan sonar, and fathometer, are now standard elements in studies involved in searching for sunken vessels. As such, their use and utility are well understood. This, however, as noted in the body of this report, does not necessarily make the interpretation of data collected with these instruments straight-forward. This is particularly true of the magnetometer. Most importantly, as argued and demonstrated in this study, the evaluation of the remote-sensing data must be done within the context of locale-specific natural, settlement, and navigation history. For example, the study areas located above Morgan City do not closely coincide with confined historic navigation routes, or historic landings, docks, boat yards, etc. Rather they, primarily, cross large areas that until recently were shallow lake bottoms. Additionally, these study areas do coincide with a modern navigation route that is characterized by a considerable amount of commercial boat traffic as well as recreational boat usage. On the basis of this geological and cultural history, one would expect few historic boat losses within the study areas, but, possibly, a considerable amount of debris and material lost or discarded from the recent commercial and recreational activities. In fact, this is exactly what has occurred, as evidenced by the results of this study. Large numbers of small magnetic anomalies and side-scan sonar targets were recorded and diving on a small number revealed that they were modern debris.

The Atchafalaya River below Morgan City has been a major navigation route for a long period of time, but there has, apparently, been little if any historical settlement along its banks in the three study areas examined. Additionally, extensive oil and gas extraction activity has produced facilities and debris throughout the study areas, which essentially make the remote-sensing data noninterpretable. No diving was conducted in these study areas, but the history of use of these areas, would indicate that the targets identified are almost certainly modern objects related to mineral extraction activities, and that sunken vessels will not be common.

The study areas in Bayou Shaffer, have quite different settlement and geological histories. The bayou has experienced relatively little morphological change during the historic period, and, presumably, as evidenced by some prehistoric sites along its present bankline (Gibson 1978), this stable condition extends back into the prehistoric period. Therefore, the location of historic settlements, landings, docking facilities, etc., if initially established along the banklines of Bayou Shaffer, will still be physically close to the present-day banklines. Siltation has occurred along some areas of the bayou, and, as seen in this study, this has served to bury and preserve numerous small boats.

The Bayou Shaffer areas also differ from the other study areas in its history of use and settlement. Several sugar plantations were established along its banks in the nineteenth century and individual settlement and/or camps existed until quite recently (circa 1973). All of these required the use of boats for transportation, communication, and commerce. Over time, as vessels became decrepit, they would have been dismantled or abandoned, with that abandonment commonly occurring at or near former landing areas. Additionally, the high usage of boats within the confined waterway could result in and concentrate any accidental

losses that occurred. The results of this study indicate that these actions are occurring in Bayou Shaffer.

Over 20 watercraft or pieces of watercraft were found in the lower Bayou Shaffer study area. Most of these are small wooden vessels which, while abundant in the region earlier in this century, have almost entirely disappeared in the past 30 years or so. Of some interest is the range of types of craft found, including small, motorized skiffs, a Lafitte skiff, a plank pirogue, flats, plus a large barge, and a possible sailing sloop or schooner. Each type had its own function or functions within the context of the water-dependent life in the region, and an array of types was necessary for the survival of individual families or larger socio-commercial units (e.g., sugar plantation). At other sites like the Adams Place site, where hunting, trapping, and fishing were undertaken and where travel was boat-dependent, one would expect a similar range of small boat types to have been used, and, ultimately, a similar range would have been abandoned or discarded along the adjacent water body, and, thus, may exist as preserved remains.

No documentary information on shipwrecks in the Bayou Shaffer area was found during this study, in significant contrast to the archaeological findings. However, this is not so surprising in light of recent findings concerning the characteristics of the generally-available documentary record of shipwrecks versus the nature of shipwrecks themselves (Pearson et al. 1989). Pearson et al. (1989:277-279) note that the historical record tends to be very biased toward recording the losses only of large or important vessels. The losses of smaller craft, particularly such as those found along Bayou Shaffer, or vessels which have been abandoned for one reason or another, tend to go unrecorded in the documentary record. In some cases, such as during navigation improvements, these previously unrecorded wrecks may get incorporated into the historical record, particularly if they represent a navigation hazard. However, where these improvements have not been undertaken, or where they have not been documented, even these vessels will go unreferenced. The results of the research along Bayou Shaffer provide data which substantiate these findings and have implications for future studies undertaken along most of the navigable waterways in south Louisiana. The historical record of shipwreck losses cannot be used as the only measure of the shipwreck potential of a waterway, and, in fact, it will often be a very unreliable measure of that potential. Any attempts to project the shipwreck potential of a waterway, or to characterize that population of wrecks, must rely heavily on the waterway's history of vessel use and its history of settlement, particularly as it relates to the locations of landings, docking areas, shipyards, etc.

Recommendations

Study Areas Above Morgan City

Although numerous magnetic anomalies and side-scan targets were recorded in the study areas above Morgan City, those examined consisted of modern debris. Based on the geological history and past use of the areas, it is anticipated that the non-examined targets are also modern materials. No significant cultural remains were found in these areas and no further work is recommended. Additionally, the information collected in this study suggests that unless there is overriding historical evidence (i.e., landings, known shipwrecks, heavily traveled historic navigation route, etc.), additional remote-sensing surveys of much of the filled portions of the lower Atchafalaya Basin will be unproductive.

Study Areas Along The Atchafalaya River Below Morgan City

A large number of magnetic anomalies were recorded along the Atchafalaya River below Morgan City. No physical examination of targets was conducted in this area; however, none of them are believed to be related to significant cultural resources, and no further work is recommended. The lack of historic settlement or landings along the banks of the river in the study areas argues against the occurrence of many abandoned or lost vessels. Additionally, an extensive amount of oil and gas activity has resulted in numerous pipelines, plus the accumulation of large amounts of ferrous debris, throughout the study areas. These factors seriously inhibit the utility of the magnetometer in finding sunken vessels.

Study Areas In Bayou Shaffer

The geological, settlement, and navigation history of Bayou Shaffer suggested that it has a high probability for containing the remains of lost historic vessels. A number were discovered during the survey. Of particular importance are the boat remains at the Oyster Camp site (16 SMY 61), and the Adams Place site (16 SMY 55). The small wooden craft found at the Adams Place site represent significant resources. They represent types of craft that have had a long and significant history in the region, but which have almost entirely disappeared from use. As noted earlier in this study, careful and detailed recordation of these types of vessels has been neglected, such that we know little about specific construction, style, or form changes over space or time. One of the boats from the Adams Place site, the cypress skiff designated Watercraft 6, was excavated and now rests on the bank at the site. It is recommended that this boat be collected and placed in a public facility or museum, such as the Swamp Gardens Park in Morgan City. The several boats on the bank at the site have been amply recorded and no further work on these is recommended. At least one sunken and buried watercraft remains along the bankline (Watercraft 8) at the site and other, undiscovered boats may exist in the vicinity of the landing and dock at the site. Therefore, it is recommended that the vicinity of the Adams Place site be avoided. We recommend that avoidance consider a buffer zone of 300 feet around the dock area. If this site cannot be avoided, it is recommended that more intensive searches in the dock area (via probing) be conducted to locate other buried boat remains and that the remains of the known buried boat (Watercraft 8) be more thoroughly examined.

The remains of two buried vessels were found in the bankline at the Oyster Camp site, 16 SMY 61. Minimal testing at this location revealed that one of the boats is a wooden coal barge and the other may be a sailing sloop or schooner. Neither of these vessels was included in the sample of targets selected for examination, and their discovery was fortuitous. Both of the boats are presumed to date to the nineteenth century, but accurate assessment of the condition, age, and potential significance of these boats will require additional examination. This examination will require excavation of portions of each of the boats. It is suggested that the excavations be designed to expose the bow, center, and stern of each vessel, and that the areas exposed be sufficient to collect information on vessel form, construction detail, and condition. These excavations will require the use or pumps for dewatering and may involve the construction of small earthen embankments or coffer dams such as was done for Watercraft 6 at the Adams Place site.

No significant or potentially significant remains were found in the upper study area of Bayou Shaffer. However, as noted in the body of the report, much of the area was crossed by pipelines or contained anchored barges that eliminated the utility of the magnetometer data. We anticipate that other vessels, particularly small "folk" craft exist as preserved remains in Bayou Shaffer. In particular, these will probably be located immediately adjacent to the bankline at historic landing areas, such as near the old Avoca Plantation landing on the eastern side of the bayou just below Bayou Boeuf. We recommend that the area along the bank at the landing be

carefully examined by pedestrian survey or be avoided. Additionally, our findings suggest that future survey work intended to locate historic wrecks in Bayou Shaffer, or in similar areas, incorporate careful pedestrian survey of banklines in the vicinity of historic landings or settlements with the standard riverine remote-sensing survey. The bankline inspection should include probing and metal detector survey.

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