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U.S. Army Corps
of Engineers
New Orleans District

REMOTE SENSING INVESTIGATIONS OF CIVIL WAR ERA SHIPWRECKS IN THE VICINITY OF FORT ST. PHILIP, PLAQUEMINES PARISH, LOUISIANA

April 1994

FINAL REPORT

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PREPARED FOR:

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			Captain Charles McIntosh	Fort Jackson	Mississippi River

19. ABSTRACT (*Continue on reverse if necessary and identify by block number*)

This report presents the results of a cultural resource survey and testing project at historic Fort St. Philip in Plaquemines Parish, Louisiana. The goal of this project was the discovery of vessel remains associated with a naval battle between Union and Confederate forces that occurred at this location in April 1862. Extensive historical research was conducted on both the battle and the ships that took part in it, in order to prepare an historical précis. An initial magnetometer survey was conducted in the Mississippi River and across the batture area in front of the fort. As a result of this survey, six magnetic targets were identified for subsequent testing. These targets later were examined by means of core borings taken at the target locations. Sixty core tests were drilled to a depth of at least fifty feet in the five target areas. (continued)

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18. SUBJECT TERMS, continued

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Plaquemines Parish
River Defense Fleet
shipwrecks

19. ABSTRACT, continued

Two historic vessels were located as a result of the survey and testing program. The first has been identified as the Confederate ironclad C.S.S. *Louisiana*, based upon the size of the target, the fabric of material encountered by the core drill, and its location in relationship to historic accounts of its sinking. The second target, composed of iron and bald cypress planks, has been identified tentatively as the River Defense fleet vessel *Defiance*. Both vessels presently are buried under tens of feet of sediment on the batture between the levee and the Mississippi River. Because the remains of these vessels are inaccessible by conventional means, it is recommended that the New Orleans District produce informational materials to inform the public of these significant resources.

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

March 31, 1994

Planning Division
Environmental Analysis Branch

To The Reader,

This cultural resources effort was designed, funded, and guided by this office as part of our cultural resources management program. Documented in this report is historical and archeological research of several Civil War era shipwrecks in the lower Mississippi River near Fort St. Philip.

The research was performed in advance of construction of the Olga Revetment, a feature of the Mississippi River Channel Improvement Project. Revetment construction has been completed and neither of the potentially significant anomaly locations were affected by the project.

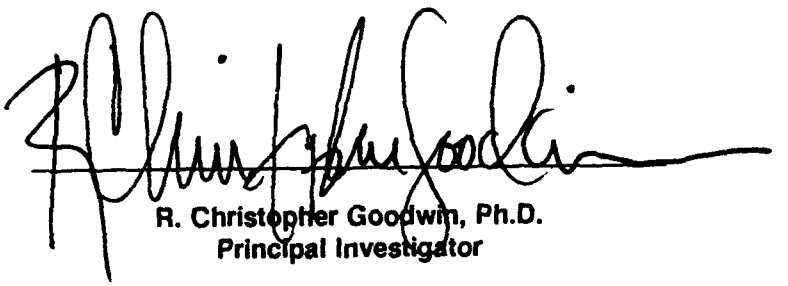
We concur with the authors' conclusion that historical and archeological information of wide public interest has been assembled during this project. Therefore, we will prepare an informational brochure as recommended in the report.

Michael E. Stout
Technical Representative

R. H. Schroeder, Jr.
Chief, Planning Division

REMOTE SENSING INVESTIGATIONS OF CIVIL WAR ERA SHIPWRECKS IN THE VICINITY OF FORT ST. PHILIP, PLAQUEMINES PARISH, LOUISIANA

FINAL REPORT



R. Christopher Goodwin, Ph.D.
Principal Investigator

By

Jack B. Irion,
David V. Beard, and Paul V. Heinrich

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April 1994

For

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Mr. Robert Holcombe of the Confederate Naval Museum provided considerable information on the C.S.S. *Louisiana* and other Confederate ironclads. Wood species identification analyses were conducted by Dr. Terrence Connors of the Mississippi Forest Products Laboratory, Mississippi State University. The assistance of Mr. Donald Shomette of the Library of Congress in obtaining historic images of the battle is gratefully acknowledged. Historic materials were photographed expertly by Mr. Michael Pohuski of Pohuski Studios, Inc., of Baltimore. The authors also are indebted to the staffs of the National Archives, the National Maritime Museum, the Naval Historical Center and the Historic New Orleans Collection for their kind assistance.

On the staff of Goodwin & Associates, Inc., Dr. R. Christopher Goodwin, Principal Investigator, contributed insight and useful advice. Mr. William P. Athens ably served as Project Manager and facilitated work on the project. Dr. Jack B. Irion directed the project in the field and conducted much of the historical research. Supplemental research at the National Archives was conducted by Leo Hirrel, Michelle T. Moran, and Martha Williams. Mr. Paul Heinrich contributed to the report by providing his expertise in developing the environmental setting. David Beard prepared sections comparing the construction of the C.S.S. *Louisiana* to other Confederate ironclads. The graphics were prepared by David Courington, and Martha Williams edited the report. Christine Herman and Stacie Goeddel produced the report.

CHAPTER I

INTRODUCTION

Introduction

This report presents the results of a terrestrial and marine magnetometer survey, and of subsequent bore-hole testing near the site of Fort St. Philip, on the left descending bank of the Mississippi River between River Miles (RM) 19.5 and 20.5, in Plaquemines Parish, Louisiana (Figure 1). Fieldwork initially was performed during July 1991, by R. Christopher Goodwin & Associates, Inc., for the U.S. Army Corps of Engineers, New Orleans District, pursuant to Delivery Order 06 of Contract DACW29-90-D-0018. The work was conducted in conjunction with the construction of the Olga Revetment, a concrete mattress revetment proposed for construction from RM M-20.2 to 17.7-L. Plans call for the land-side toe of the revetment to be placed approximately 33 m (110 ft) riverward of the levee centerline in front of Fort St. Philip. The articulated concrete mattress will be laid mechanically from the Low Water Reference Plane (LWRP) to a point 52 m (170 ft) riverward from the river centerline. Proposed preparation of the bankline and adjacent area will include tree removal and grading by a barge-mounted dragline. Grading as close as 40 m (130 ft) riverward of the levee centerline is proposed for the area between ranges U-117 to U-120, the presumed location of the C.S.S. *Louisiana*, a Confederate ironclad warship destroyed on April 28, 1862. Plans also include the construction of a crushed stone road parallel to and 30 - 60 m (100 - 210 ft) riverward from the levee centerline. Research performed by Garrison and Baker (1982) suggested that the remains of the C.S.S. *Louisiana* might be impacted by the revetment construction.

This report presents the results of field and archival research undertaken to locate the wreck of the C.S.S. *Louisiana* and other historically significant vessels. Investigations were designed to identify all large-scale magnetic anomalies within the project area, and to assess the research potential of each anomaly encountered. A four-step approach was utilized to fulfill these requirements. These steps included: (1) historic, archival, and cartographic research; (2) marine and terrestrial magnetometer survey of the project area; (3) data mapping and archeological assessment of each anomaly discovered; and, (4) bore-hole testing of potentially significant anomalies to ascertain their potential as historic shipwrecks.

During survey, nine large-scale magnetic anomalies were identified within the 1.6 km (1 mi) project area. Approximately 14.8 ac (6 ha) were covered by terrestrial survey. A total of 22.2 km (12 nautical miles) were subjected to marine survey in transects spaced at intervals of 50 ft over the 1-mile project area.

Six magnetic anomalies were selected for subsurface testing based upon their areal extent. Testing consisted of core borings intended to establish the fabric, nature, and extent of each anomaly. The testing was accomplished during September 1992, under Delivery Order 16 of Contract DACW29-90-D-0018.

Organization of the Report

The physiographic setting of the project area is described in Chapter II. Previous investigations are discussed in Chapter III. Historical research, described in Chapter IV, involved the collection and analysis of contemporary maps and papers relating to the passage of Admiral Farragut's fleet, which would assist in piecing together the events that led to the destruction of 19 Union and Confederate vessels, including the C.S.S. *Louisiana*. An analysis of river contours, using historic maps, also was undertaken to determine the location of the *Louisiana* when she sank, as well as to examine the changes that have occurred in riverbank locations since April of 1862. U.S. Army Corps of Engineers records also were searched to ascertain what, if any, wreck removal activities might have been implemented since the Civil War. The survey field

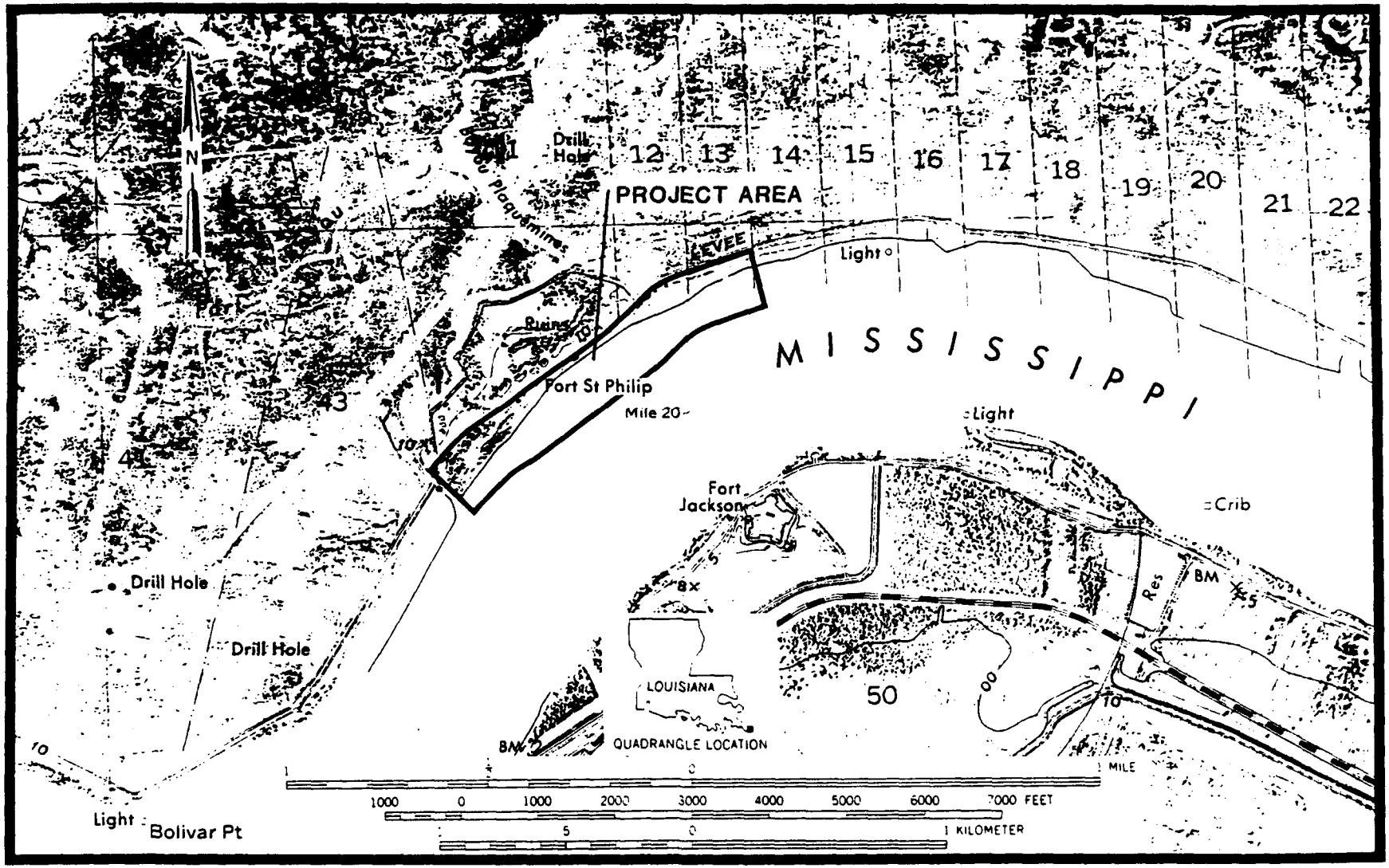


Figure 1. Excerpt from the 1971 USGS 7.5' topographic quadrangle, Triumph, Louisiana, showing the location of the project area.

investigations, which were directed principally towards accomplishing both subaqueous and subterranean remote sensing, are described in Chapter V; field work was designed to detect magnetic or acoustic anomalies whose signatures were consistent with those that would be produced by an ironclad warship measuring over 79 m (260 ft) long. The results of the field work are described in Chapter VI. Subsequent testing initiatives and results are discussed in Chapter VII, which also offers management recommendations and guidelines for additional studies.

CHAPTER II

NATURAL SETTING

The Fort St. Philip project area consists of a 1.6 km (1 mi) long stretch on the left descending bank of the Mississippi River within the Balize delta complex between River Mile (RM) 19.5 and 20.5. The project area is located in front of historic Fort St. Philip on a stretch of river known as Plaquemine Bend (Figure 2). This is the first major bend upstream of the Head of Passes, which is the confluence of the deltaic distributaries that comprise the mouths of the Mississippi River. The Spanish first availed themselves of the strategic advantage of Plaquemine Bend by constructing a fort where any vessel under sail would be required to anchor until a tidal or wind change allowed it to proceed upstream. An approaching ship, even with the most favorable wind, would have come under fire from the fort for at least a quarter of an hour (Casey 1983:204).

Geology and Geomorphology

The natural levees that flank the segment of the Mississippi River within which the project lies have a maximum elevation of just over 1.5 m (5 ft) above sea level, and vary in width from 150 to 650 m (492 to 2132 ft). Because of subsidence, the distal edges of the natural levees now lie below sea level and remain subaerially exposed only where protected by artificial levees. Immediately adjacent to the channel, the natural levee deposits vary in thickness from 3 m (10 ft) to less than 1.5 m (5 ft). These natural levee deposits typically overlie marsh deposits approximately 1 m (3.3 ft) thick. The natural levees on the left descending bank tend to be thinner and narrower than the natural levees along the right descending bank. Away from the banks of the Mississippi River, the natural levee deposits quickly thin and grade laterally into marsh deposits approximately 5 to 7 m (16 to 23 ft) thick.

The natural levee deposits consist of well-bedded, unfossiliferous, clayey silts and silty clays deposited by seasonal floods. The marsh deposits are composed of massive, organically-rich, clayey silts and silty clays that contain ostracods, the remains of fiddler crabs and crayfish, and gastropods such as *Littorina* sp. and *Neritina* sp. (Fisk et al. 1954; Kolb 1962).

The Plaquemine Bend lies directly south of the buried southern edge of the Plaquemine delta complex. As a result, the sedimentary sequence that forms the Balize Delta Complex within the bend consists of approximately 35 m (115 ft) of marsh, natural levee, subdelta, interdistributary bay, delta front, and prodelta deposits. The upper 5 to 7 m (16 to 23 ft) of these deposits are composed of natural levee and marsh sediments. Underlying these sediments are approximately 20 m (66 ft) of subdelta and interdistributary bay sediments that in turn overlie 8 to 10 m (26 to 33 ft) of delta front and prodelta deposits. The Balize Delta Complex lies upon shelf deposits that cover the delta front and prodelta deposits of the adjacent Plaquemine Delta Complex (Coleman and Gagliano 1964; Fisk et al. 1954; Kolb 1962).

Plaquemine Bend consists of two immature meander loops. The inside, convex side, of these loops are underlain by point bar deposits that are approximately 700 m (2,296 ft) wide. The available data indicates that these point bar deposits extend to a depth that slightly exceeds 40 m (131 ft) below sea level. The deepest point bar deposits consist of about 32 m (105 ft) of well-sorted fine to very fine-grained sand with rare interbeds composed of clay and organic material. The upper 6 to 8 m (20 to 26 ft) consist of interbedded silty sand, silts, and clays. About 1 to 2 m (3 to 6.5 ft) of natural levee silty clay and clayey silt typically overlie the point bar deposits (Fisk et al. 1954; Kolb 1962).

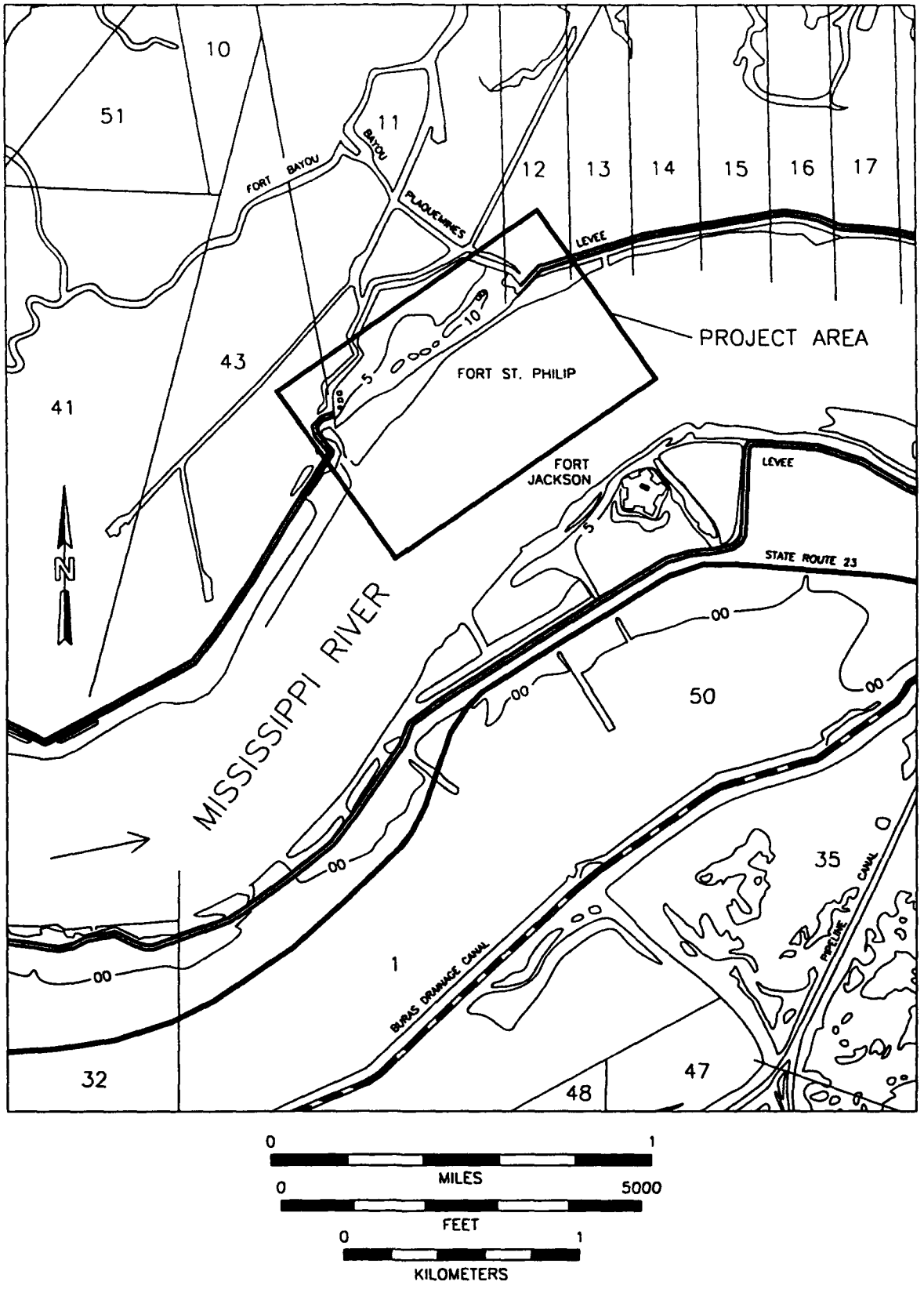


Figure 2. Project area map. Source: USGS topographic quadrangle, Triumph, Louisiana.

Analysis of a series of historic maps shows that the meander loop within the project area migrated downstream soon after the Civil War and prior to 1888 (Figure 3). Downstream movement of the meander loop resulted in the accretion of a strip of land ranging from 50 to 200 m (164 to 656 ft) in width, but generally 50 m (164 ft) wide on the upstream bank of the cutbank, and the removal of a strip between 50 to 250 m (164 to 820 ft) wide from the downstream edge of the cutbank. Since 1862, approximately 150 to 200 m (492 to 656 ft) of the upstream edge of the point bar on which Fort Jackson lies have been eroded, while a bar approximately 200 m (656 ft) wide has formed on the downstream edge of that point bar. Over 6 ha (15 ac) of land have been added to the batture in front of Fort St. Philip between 1862 and 1888. Analysis of a map prepared by the Union Navy to aid in the direction of mortar fire suggests that the anchorage for the ironclad C.S.S. *Louisiana* lies presently within the present batture area (Figure 4). The marshes and distal natural levees adjacent to Fort St. Philip and Fort Jackson cover historic subdeltas. The marshes adjacent to Fort St. Philip cover the Bayou du Mardi Gras Subdelta which formed during the early 1700s. The Liard Bayou Subdelta, which formed during the middle 1700s, underlies the marshes that adjoin the natural levee and the point bar deposits on which Fort Jackson lies (Figure 5) (Morgan 1977). Coleman and Gagliano (1964) have presented a detailed explanation of how subdeltas form and a description of the deposits that compose them.

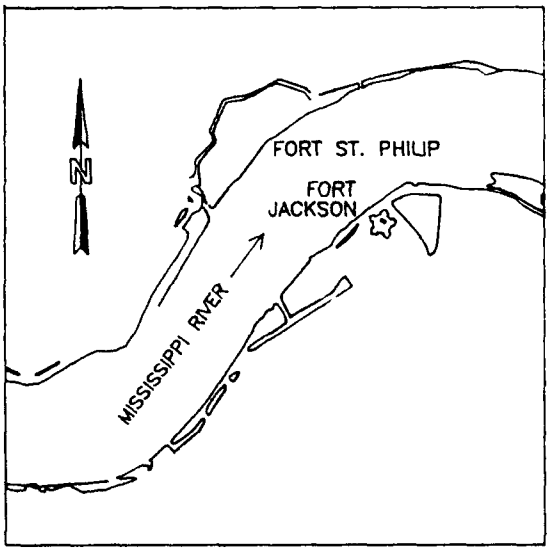
Geologic History during the Late Quaternary Period

The accumulation and dissolution of continental ice sheets caused eustatic sea level to fluctuate generally between 20 to 70 m (66 to 230 ft) below present sea level in 20,000 year cycles. As a result, the shoreline migrated north and south across the Louisiana Continental Shelf as much as 140 km (87 mi). The maximum high stands of sea level occurred at approximate intervals of approximately 140,000 years during interglacial periods such as the Holocene and Early Sangamonian stages. The Ingleside-Pamlico Barrier Island chain marks the shoreline formed by the highest sea stand of the Sangamonian stage (Suter et al. 1987).

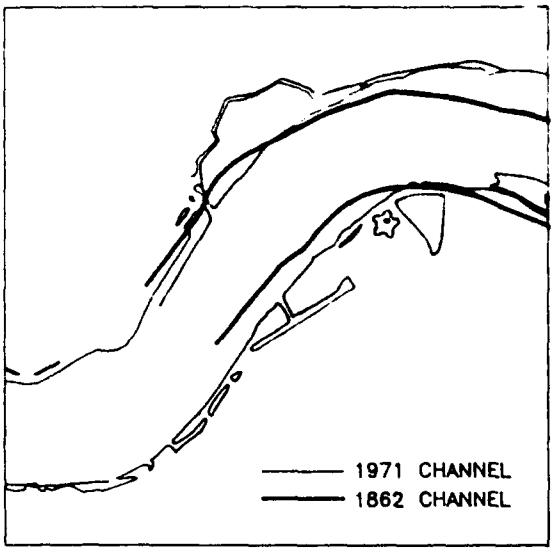
During the Late Wisconsin stage, at approximately 21,000 years Before Present (B.P.), sea level dropped by about 120 m (394 ft) below its present level. As a result, the shoreline moved southward, subaerially exposing large areas of the continental shelf. Fluvial systems that flowed across the Central Louisiana Continental Shelf trenched into it, forming valleys 10 to 30 m (33 to 100 ft) deep. During this low stand, the Mississippi River and other coastal fluvial systems flowed within these shallow valleys across the Louisiana Continental Shelf to shelf-margin deltas located along the edge of the continental shelf. Between 58,000 and 30,000 years B.P., fine-grained sediments from the Mississippi River also filled the Mississippi Trough, which was a submarine canyon formed by large-scale retrogressive slumping initiated by shelf-margin delta deposition and enlarged by turbidity currents (Morton and Nummedal 1983; Suter and Berryhill 1985).

Sea level rose from approximately 120 m (394 ft) below present sea level at about 20,000 years B.P. to 30 m (100 ft) below present sea level by 10,000 years B.P., during the latter part of the Wisconsin stage. As sea level rose, a thick stratum of unnamed fluvial, estuarine, and marine sediments accumulated within the Mississippi River Valley. As the shoreline migrated landward, its shoreface typically eroded the upper 7 to 10 m (23 to 33 ft) of the highly weathered, formerly exposed surface of the continental shelf and the upper part of the unnamed sediments that had accumulated within the Mississippi River Valley, forming an erosional surface called a "ravinement surface" (Frazier 1967; Suter et al. 1987).

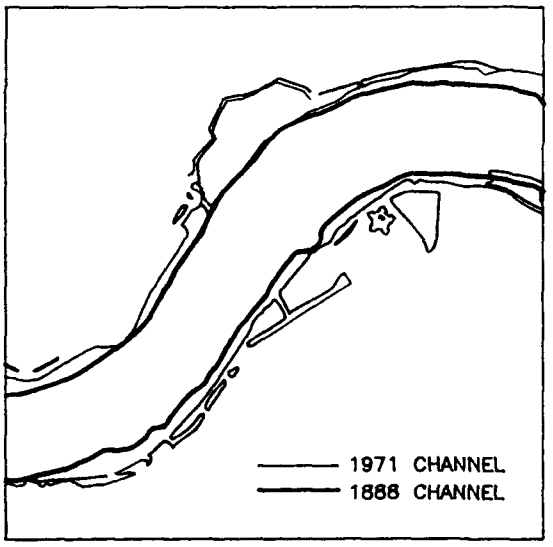
During the Late Wisconsin and Holocene epochs, the Mississippi River constructed a series of delta complexes. Each delta complex consisted of a cluster of deltas associated with an individual course of the Mississippi River. The cluster of deltas resulted from the switching of the locus of deposition at the end of a specific river course. When a Mississippi River course was abandoned, the associated delta complex, being derived of its source of sediment and water, also became inactive . The new river course, in turn,



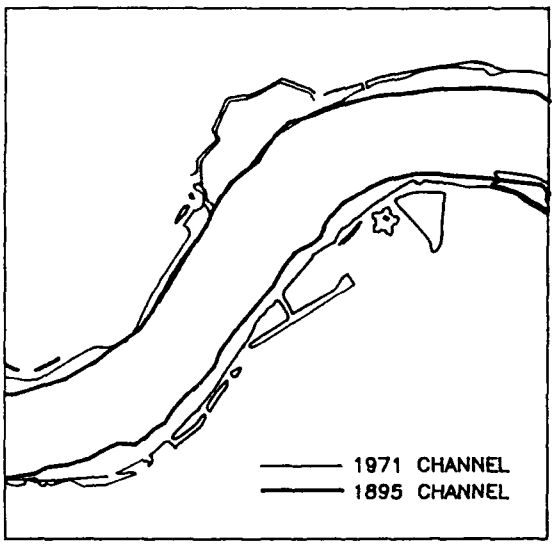
1971 USGS BANKLINE



1862 VS. 1971



1888 VS. 1971



1895 VS. 1971

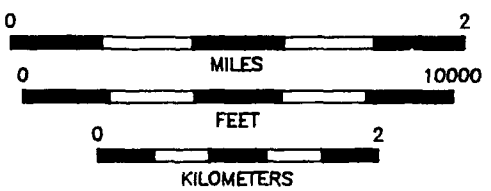


Figure 3. Shoreline changes, 1862 to 1971.

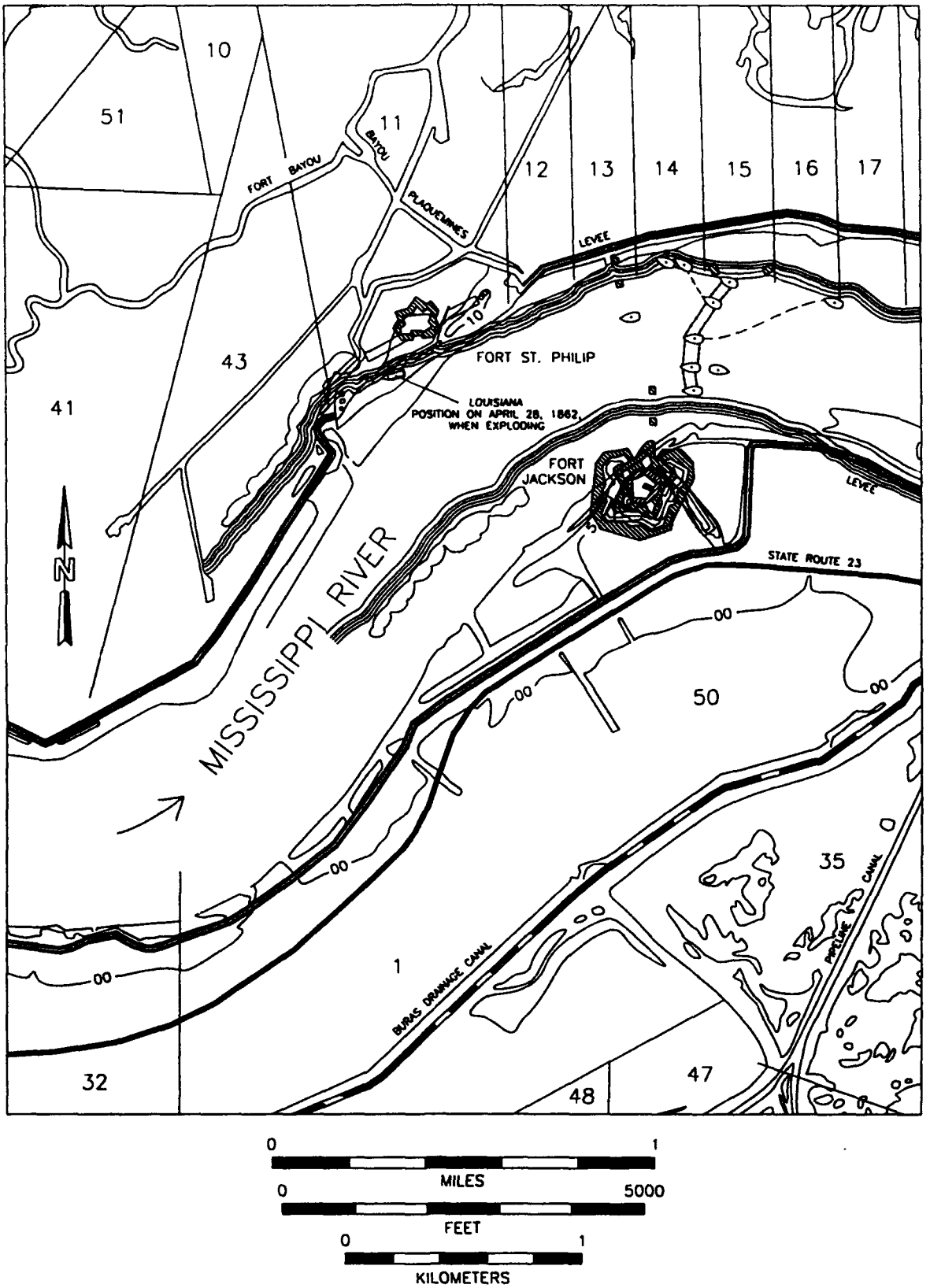


Figure 4. Overlay of a 1971 USGS topographic quadrangle on Kroehl's 1862 map, showing the position of the *Louisiana* relative to the modern shoreline.

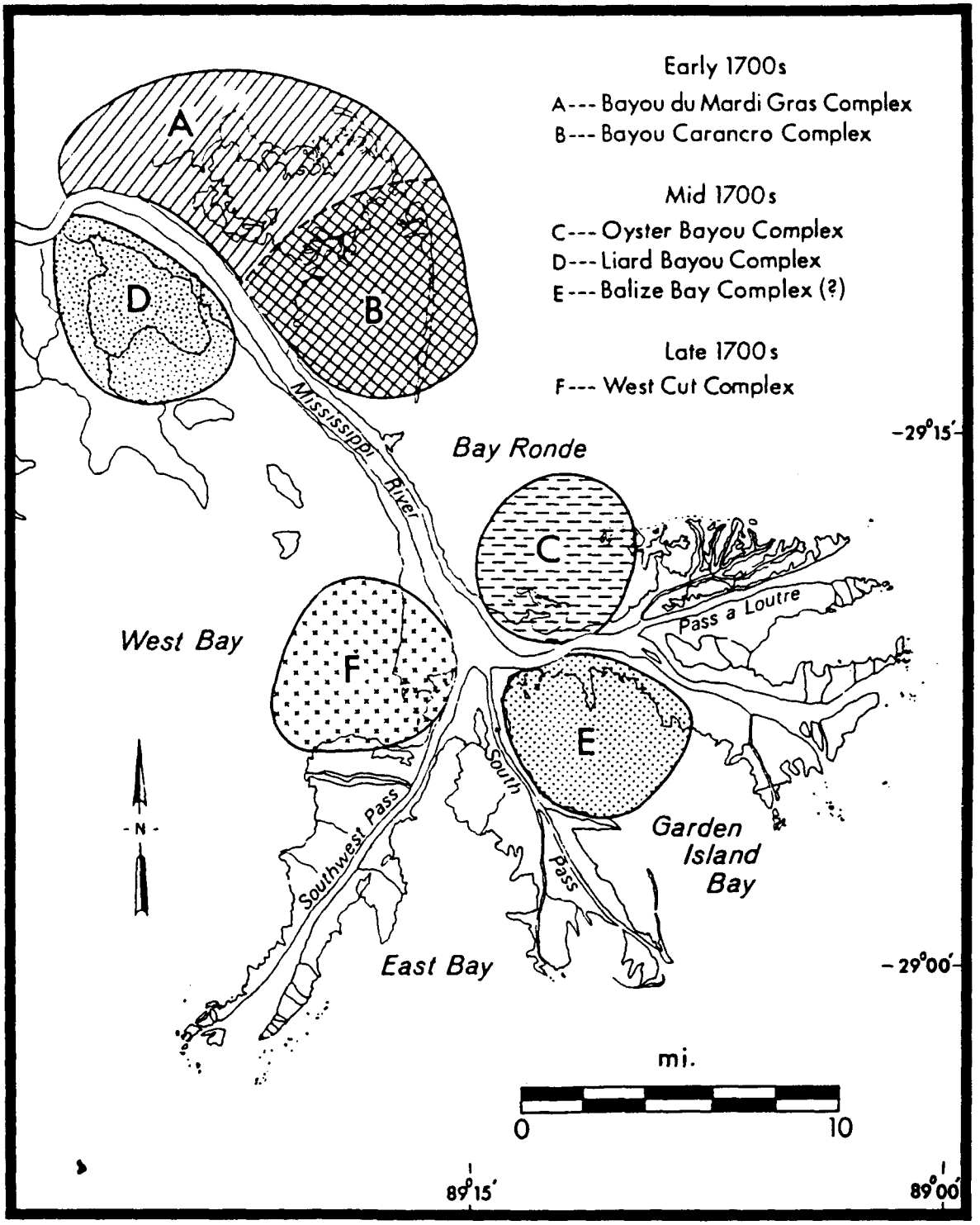


Figure 5. Location and extent of major historic subdeltas prior to 1883 and within the Balize Delta Complex (adapted and redrawn from Morgan 1977).

would create a new delta complex at its gulfward end. If sea level remained unchanged, the active delta complex coalesced with the previous delta complex to form a common geomorphic delta plain (Frazier 1967, 1974).

According to Penland et al. (1985), the deposition of deltaic sediments by the Mississippi River began as early as 12,000 years B.P. The sea level rose rapidly during the Early Holocene; except for a stillstand of sea level between about 15,000 and 12,000 years B.P., only thin shoal-water deltas would have accumulated during that period. The transgressing shoreface associated with rising sea level eroded these thin shoal-water deltas, and marine processes redistributed them into broad sand sheets and marine shoals such as the Sabine Bank on the western continental shelf. The delta plain of these delta complexes, the Outer Shoal Delta Complex, underlies the Maringouin Delta Complex (Frazier 1967) at depths of 15 to 25 m (49 to 82 ft). The Outer Shoal Delta Complex represents an episode of delta building associated with a still stand of sea level below present sea level that occurred around 9200 to 8200 years B.P. (Frazier 1974).

From about 7500 to 5500 years B.P., during the otherwise rapid rise in sea level, another stillstand occurred at a depth of 5 to 6 m (16 to 20 ft) below the present line. During part of this time, the Mississippi River built the Maringouin Delta Complex (Figure 6). However, the continued rise of sea level submerged most of the surface of the Maringouin Delta Complex, called the "Late Holocene Delta Plain" by Penland et al. (1987), by 5,000 years B.P. The landward movement of the shoreline across this delta plain formed a well-defined ravinement surface that later was buried by the Teche Delta Complex. Marine processes have reworked the exposed portion of this delta complex into the Tiger, Ship, and Trinity Shoals. An irregular line of shell ridges of uncertain origin within Terrebonne Parish may represent the eroded edge of the Maringouin Delta Complex (Weinstein and Gagliano 1985). At the same time, rising sea level flooded the eastern portion of the Mississippi River Alluvial Valley. This flooding resulted in the movement of the shoreline up the Mississippi Alluvial Valley to the latitude of Baton Rouge. As a result, a brackish water embayment occupied this part of the Mississippi River Valley at about 6000 to 5000 years B.P. (Saucier 1963).

Between 6000 years B.P. and 3400 years B.P., the Mississippi River formed the Metairie Delta complex in southeastern Louisiana and the Teche Delta Complex near and east of Marsh Island. Between 3400 to 1800 years B.P., two delta lobes of the St. Bernard Delta Complex prograded gulfward despite a rapid rise in eustatic sea level (Figure 6). The larger of the two shoal-water delta lobes prograded eastward forming much of what is now St. Bernard Parish. The smaller delta lobe built southward from the area of New Orleans into the area now occupied by the Barataria Interlobe Basin (Frazier 1967; Penland et al. 1987).

Starting about 2500 B.P., after eustatic sea level reached modern levels, the Mississippi River built the shoal-water deltas of the Lafourche Delta Complex south of Donaldsonville. About 1000 years B.P., the gradual change in the course of the Mississippi River started the progradation of the shoal-water Plaquemine Delta Complex. Between 600 and 500 years B. P., the Mississippi River abandoned the Plaquemine Delta Complex for the Balize Delta Complex. By about 450 years B.P., the Balize Delta Complex prograded southeast of Belle Chase and crossed the edge of the subsiding Plaquemine Delta Complex. As the Balize Delta Complex prograded onto the shelf, the modern shelf-margin, bird-foot delta formed (Figure 6). The present partial diversion of the Mississippi River down the Atchafalaya River has started the construction of the Atchafalaya Delta Complex (Fisk et al. 1954; Levin 1991).

Soils

Soils in the project area are mapped as the Sharkey-Commerce, Frequently Flooded Association. This association consists of somewhat poorly drained to poorly drained soils that are subject to frequent flooding. These soils typically are semi-permanently inundated or saturated for a major portion of the growing season. Because of their poor development and low height, the crests of these immature natural

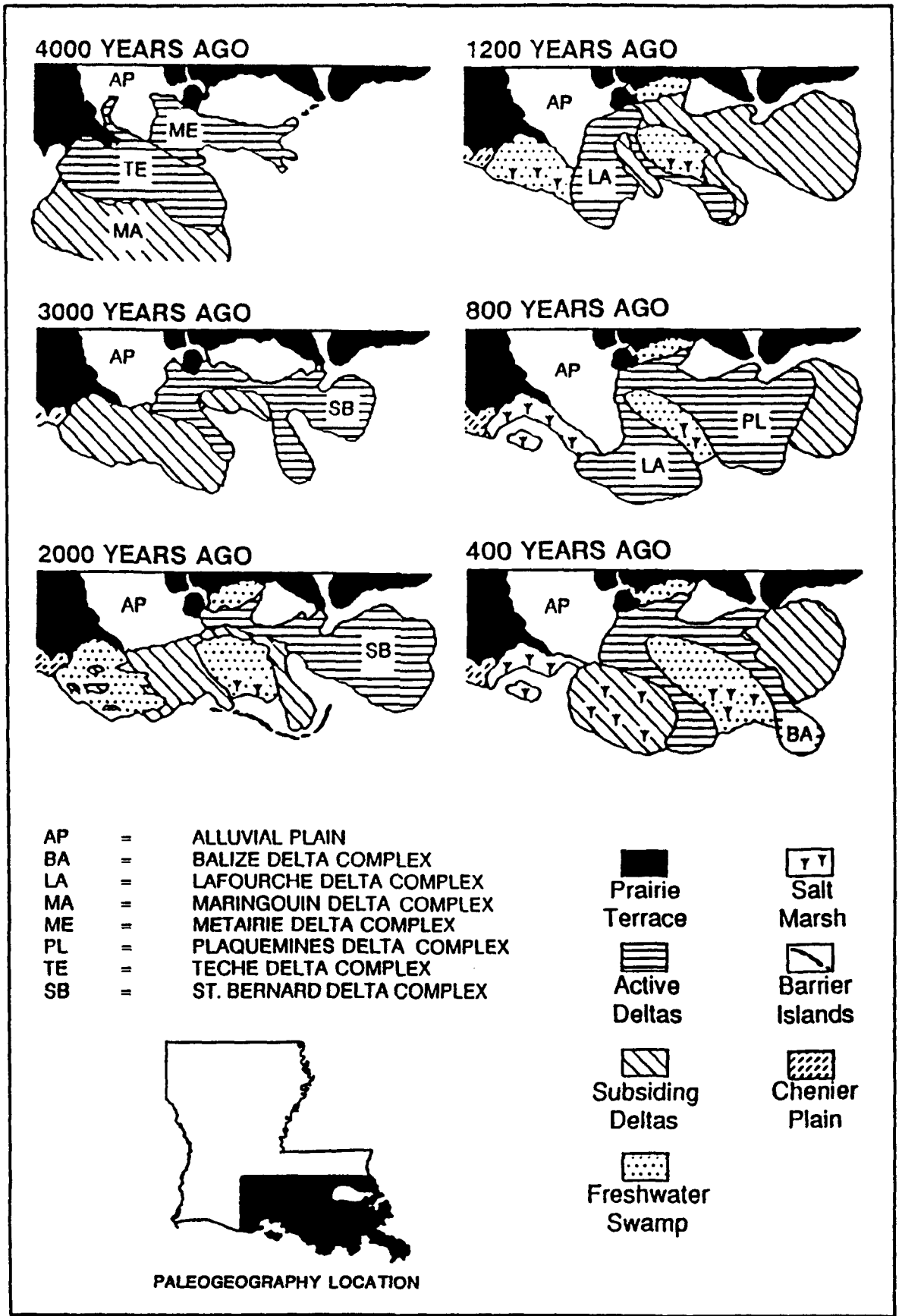


Figure 6. Paleogeography of the Mississippi River Delta (adapted and redrawn from Kosters 1987).

levees are characterized by the Commerce series, which normally occurs only on the low distal edges of mature natural levees. The Commerce series is a nonacid entisol that typically has a 50 to 100 cm (20 to 39 in) thick sola with an A-Bw-Ab-C horizon sequence. The buried A horizon, designated as an "Ab" horizon, results from high sedimentation rates within an aggrading natural levee system. The Sharkey series is a poorly drained, nonacid inceptisol developed within the distal edge of the natural levees. Typically, its sola consist of a 91 to 150 cm (36 to 59 in) thick, A-Bg-BCg-Cg horizon sequence with a clay surface layer and either a silt loam, silty clay loam, or silty clay subsurface layer. The Sharkey soil has a high shrink-swell potential (Schumbacher et al. 1988; U.S. Fish and Wildlife Service 1981).

Fauna and Flora

The flora and fauna of the project region vary greatly between the natural levees and the adjacent freshwater swamps. The differences in fauna and flora result from the distinct differences in the drainage of each area (Penfound and Hathaway 1938).

The natural levee within the project area was covered by a natural levee oak forest. The principle overstory within the oak forest would have been water oak (*Quercus nigra*), overcup oak (*Quercus lyrata*), cottonwood (*Populus deltoides*), sweetgum (*Liquidambar styraciflua*), sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), hackberry (*Celtis laevigata*), swamp privet (*Forestiera acuminata*), water locust (*Gleditsia aquatica*), and honey locust (*Gleditsia triacanthos*). The understory of these forests includes shrubs such as buttonbush (*Cephalanthus occidentalis*), wax myrtle (*Myrica cerifera*), dwarf palmetto (*Sabal minor*), marsh elder, elderberry (*Sambucus canadensis*), and yaupon (*Ilex vomitoria*), and vines such as trumpet creeper (*Campis radicans*), poison ivy (*Rhus radicans*), and ratten vine (*Berchmis scandens*). The ground cover of the natural levee consists of various grasses (*Gramineae*) and sedges (*Cyperaceae*). The transition zone between the natural levee oak forest and adjacent marsh is covered by dense shrubs and cane (Penfound and Hathaway 1938).

Vegetation within the batture area consists of those pioneer species that first appear upon newly formed land along the margins of a point bar. It occupies an area that receives some sand and silt with each new flood. The flora commonly is dominated by black willow (*Salix nigra*) and associated cottonwood (*Populus deltoides*). The black willow is a temporary, short-lived pioneer species that rapidly colonizes newly deposited fluvial sediments. Cottonwood ultimately outgrows the black willow and becomes the dominant tree, except where frequent and extended flooding during the growing season covers the trees and limits its growth. Depending upon the degree that batture aggradation has limited flooding, other plants such as riverbirch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis laevigata*), swamp privet (*Forestiera acuminata*), water elm (*Planera aquatica*), bald cypress (*Taxodium distichum*), box elder (*Acer negundo*), and red mulberry (*Morus ruba*) also can become a significant component of the batture community (Craig et al. 1987).

The natural levee oak forests and adjacent batture community support a large and varied fauna. The fauna includes large mammals such as white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), eastern cottontail (*Sylvilagus floridanus*), and swamp rabbit (*Sylvilagus aquaticus*). The fauna of both communities also include predator mammals such as red fox (*Vulpes fulva*), gray fox (*Urcyon cinereoargenteus*), raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), and mink (*Mustela vison*). These species, together with raptors, are important in limiting the size of rabbit, mouse, squirrel, and bird populations. The mink and raccoon also are important along with nutria (*Mycocaster coypus*) and opossum (*Didelphis marsupialis*) as fur bearers. Some of the avian species commonly found within these forests include painted bunting (*Passerina cirris*), red-winged blackbird (*Agelaius phoeniceus*), common crow (*Corvus brachyrhynchos*), common night hawk (*Chordeiles minor*), screech owl (*Otus asio*), black vulture (*Coragyps atratus*), and turkey vulture (*Cathartes aura*). The oak forests are home for numerous amphibians such as various species of salamanders, toads, tree frogs, and

true frogs. The numerous reptiles found within the oak forests include a variety of iguanids, skinks, lizards, snakes, pit vipers, and turtles (Lowery 1974a, 1974b; Penfound and Hathaway 1938).

Climate

The survey area has a humid subtropical climate with prevailing southerly winds. The long summers are hot and humid and the winters are warm. The moderating effect of the waters of the Gulf of Mexico prevents temperatures within the project area from varying greatly during the year. During July, the hottest month of the year, the delta area is the warmest part of Louisiana at night and the coolest part of the state during the day. The July mean maximum temperature is between 32.2° and 32.7° C (90° and 91° F), and the July mean minimum temperature is 24° C (75° F). During January, the coldest month of the year, the delta area is the warmest part of Louisiana at night and during the day. The mean January maximum temperature is about 17° C (63° F), and the mean January minimum temperature is about 10° C (50° F) (Fournerat and Larimore 1981). According to data recorded at New Orleans between 1955 and 1977, the average annual rainfall is 150 cm (59 in). July, August, and September are the wettest months with an average precipitation that varies from 1,570 to 1,600 mm (6.19 to 6.32 in). October is the driest month, with an average precipitation of 7,210 mm (2.84 in). The heaviest one-day rainfall during the period of record was 2,490 mm (9.8 in) at New Orleans on May 31, 1959. Rainfall and hurricane storm surge are the main causes of flooding within the project area. The rainfall-associated flooding results from either near-stationary cold fronts or hurricanes. Both phenomena are capable of producing rainfall at the rate of one or more inches per hour (Matthews 1989).

CHAPTER III

PREVIOUS INVESTIGATIONS

Previous archeological investigations conducted within the vicinity of the project area suggest a high potential for historic cultural resources. Beginning with the construction of Fort St. Philip by the Spanish during the 1790s, the project area has been a locus of human activity. Six relevant previous investigations conducted within five miles up and downriver of Fort St. Philip and Fort Jackson are discussed below.

Castille, George

1978 *Cultural Resources Survey of a Protection Levee around Fort Jackson, Plaquemines Parish, Louisiana.* (Survey No. 22-408)

George Castille conducted a cultural resources survey of a protection levee around Fort Jackson. The area closest to Fort Jackson, a section approximately 400 m (1,312 ft) long, was subjected to intensive pedestrian survey, and two small test excavations were placed on the batture side of the existing levee. Because of high water, observations on the batture side were confined to the foot of the artificial levee.

The study found that the outer brick parapet wall which originally surrounded the fort was intact only on the landward side of Fort Jackson. A portion of the brick wall extended northward on the western side of the fort and ended abruptly at the edge of a concrete sidewalk. An intact lower portion of the brick wall protruded from the north bank of the ditch that extends parallel to the ring levee.

The study also examined the bankline in the vicinity of the fort. Castille concluded that the 1898 gun emplacement, incorporated into the batture slope of the existing ring levee, was the only observed cultural feature that would be impacted by the proposed levee construction.

It was recommended that levee expansion be confined to the batture side of the existing ring levee in the vicinity of Fort Jackson.

Davis, Dave D., John D. Hartley, and Ruth Wiens Henderson

1979 *An Archaeological and Historic Survey of the Lowermost Mississippi River: Cultural Resources Survey, New Orleans to Venice Hurricane Protection Levee: East Bank Barrier Levee Plan.* (Survey No. 22-560)

Davis et al. conducted a cultural resources survey of the New Orleans to Venice Hurricane Protection Levee, East Bank Barrier Levee Plan. The project area included the east bank (River Miles [RM] 10 AHP to 45 AHP) and west bank (RM 10 AHP to 20 AHP) of the Mississippi River in southern Plaquemines Parish, Louisiana. The areas directly impacted by the proposed construction included the existing levees immediately adjoining land, and certain parts of the river batture on the east bank designated as borrow sources for the levee improvements. A total of 44 river miles was surveyed by means of pedestrian reconnaissance, augmented by vehicular survey, surface collection, and the excavation of judgmental trowel tests.

Two properties in the project area, Fort Jackson and Fort St. Philip, already had been listed on the National Register. Twenty-three previously unrecorded historic sites were located during survey in the project area, and four previously recorded sites were revisited. Three sites were recommended for further testing. No aboriginal cultural materials were located.

No sites were found within the right-of-way on the west bank. An above-ground cemetery used by the Buras, Bernard, and Ledet families, with burials dating from the late nineteenth and twentieth centuries, was noted outside of the right-of-way. Fort Jackson (16PL38) also was noted, but it was not investigated because it would not be impacted by the proposed levee.

Twenty historic sites were found on the east bank; none was considered eligible for nomination to the National Register, and no further work was recommended.

16PL39 (Fort St. Philip)

The property includes not only the fort proper, but also the associated structures and land within the seawall that surrounds the reservation. A pedestrian survey of the levee right-of-way was conducted. No evidence of the Quartermaster's Mess or Sleeping Quarters was found. However, the Artillery Store House was located. All that remained of this building were the cement foundation pilings, many of which had been broken and overturned.

Fort St. Philip is bounded along the river by a levee and a sea wall. Three of the four Officers' Quarters were located at the farthest point upriver within the enclosure. The Officers' Quarters were two-story wood frame buildings raised approximately one meter off the ground by concrete pilings. One of these buildings was inhabited and maintained by the Christos family at the time of the survey. Two others were deteriorated, but still standing, and the fourth had been destroyed by fire.

Downriver, the Post Exchange and Bowling Alley was the next standing structure located. This raised wood frame building was constructed in 1908. It was found to be in fairly good condition, despite the removal of several ceiling beams and other vandalism.

The water storage tanks and the Power Plant were located between the Post Exchange and the levee. The rectangular concrete Power Plant was built sometime before 1908. Downriver from the Power Plant were what appeared to be the remains of Battery Ridge.

Most of the extant remains of Fort St. Philip are associated with improvements made during the Spanish-American War. The remains of the 19th century fort are located near the center of the site. Most of the fort's exterior wall, and at least one building within the wall, still were standing. At one time, there were a number of gun platforms in front of the old fort, facing the river; three of these were extant. Each gun platform consisted of an artificial earth mound with a small concrete structure built into its side. Five concrete gun emplacements downriver from the old fort also still were standing; these included Battery Scott, Battery Brooke, Battery Forse, Battery Pike, and Battery Merril. The area between the original fort and the back sea wall was overgrown heavily at the time of survey. The concrete foundation of at least one building was visible behind the fort wall.

In summary, the remains of the fort were found to have deteriorated, but they were considered to be in fairly good condition. Several structures built during later occupation of the site were still standing, while others had been destroyed partially or completely.

No intensive test excavations of areas within the levee right-of-way were recommended. However, a proton magnetometer survey of the right-of-way was recommended before construction proceeds through the Fort St. Philip reservation.

Detro, Randall A., Donald W. Davis, and Francine Middleton

1979 *Mississippi River Ship and Boat Sinkings from the Delta to Baton Rouge 1814 to 1979.* (Survey No. 22-1201)

The U.S. Army Corps of Engineers, New Orleans District, funded this comprehensive historical survey that examined existing archival documents for references to shipwrecks within the designated project area. The study documented 793 sinkings in the Mississippi River from the Delta to the northern limits of Baton Rouge. Included in this number were sinkings related to the Union Navy's successful passage between the Confederate-held forts at Plaquemine Bend in 1862. However, further detailed analysis of the events surrounding the naval engagement of April, 1862, could alter the relative placement of these vessels as depicted on the map that accompanies this report.

Garrison, Ervan G., and James G. Baker

1982 *A Technical Report on a Methodological Evaluation of Underwater Instrumental Search in the Lower Mississippi River, Venice, Louisiana to the Gulf of Mexico.* (Survey No. 22-986)

Garrison and Baker conducted an underwater survey of the Lower Mississippi River, from Venice, Louisiana, to the Gulf of Mexico utilizing magnetometer, side-scan sonar, and sub-bottom profile equipment. This survey produced evidence of numerous anomalies in the stretch of the river examined.

1) The Boothville Survey Area was located in the vicinity of RM 16 (LMS 250 and 249). Intercorrelation of magnetometer, side scan sonar, and sub-bottom profile data in this area revealed three, and possibly four, vessel-sized features. Isometric maps showed two large magnetic anomalies along the right descending bank, and one less pronounced broad feature on the left descending bank. Side scan survey located topographical features directly associated with two of these anomalies. The sub-bottom profiler also recorded the presence of one of the two magnetic anomalies.

2) The Wildlife Refuge Survey Area was located opposite Delta National Wildlife Refuge at RM 4-5, above Cubits Gap. Two large anomalies were recorded and confirmed by isometric maps of the same area.

3) The Southwest Pass Survey Area was located in the major portion of RM 5 below Head of Passes. The site of the sunken wooden Mexican ship, *Merida*, lost in 1891, was thought to be in this area. Seven significant anomalies, representing features ranging from large debris to vessels, were identified; two to three magnetic anomalies were ship-sized.

4) The C.S.S. *Manassas* Site was a localized sub-area of the Boothville survey area, and was thought to contain the sunken Civil War ironclad, C.S.S. *Manassas*, sunk during the battle at Forts Jackson and St. Philip in 1862. The suspected wreck site was located by Clive Cusler in 1981 through magnetometer and sub-bottom profile surveys. The Garrison and Baker survey, near the right descending bank, isolated a large vessel-sized anomaly from associated submerged non-significant cultural debris; residents along the shore have contributed extensive debris to the present bank line, and a stone breakwater overlies the suspected wreck site. A sonogram obtained in the vicinity of the suspected wreck site correlated with magnetometer readings.

5) The C.S.S. *Louisiana* Site was suspected to lie by Fort St. Philip on the left descending bank inside a rock breakwater. A magnetic survey produced a contour map that reflected a broadly dispersed, multi-point magnetic feature typical of Civil War shipwrecks, and the intensity of the anomalies indicated a burial depth of 3 to 4 m (10 to 13 ft). The wreckage of the vessel was scattered across the length of the 150 m (492 ft) survey area. Both the area outside the rock breakwater and the area under the present levee toe were thought to contain significant parts of the vessel, although these areas were not surveyed.

6) The Fort Jackson to Bolivar Point Area. Two anomalies were located with side scan sonar survey in the channel between the forts and Bolivar Point.

Muller, J. W., and Tony Flayharty
1982 *Cultural Resource Summary of Reaches B-1, B-2, and C* (title assigned by ACA-ENMU)

This survey, which was listed in Montgomery (1988), was completed but the report was not. Information about this survey was derived from field notes, and from a draft report outline on file at the U.S. Army Corps of Engineers, New Orleans District. Reach B-I was located on the west bank between Tropical Bend and Fort Jackson. Reach B-2 was located on the west bank from Fort Jackson to Venice. Reach C was located on the east bank between Phoenix and Bohemia. Muller and Flayharty conducted a land and boat survey of the area. According to the field notes, no cultural resources were recorded.

Stuart, David R., and Jerome A. Greene
1983 *An Archeological Survey of the Proposed Venice Revetment (M-18.7 to 10.5-R).* (Survey No. 22-8EC)

Stuart and Greene's archeological survey of the proposed Venice revetment included a vehicular reconnaissance survey of the project area, followed by a systematic pedestrian survey across the batture at quarter-mile intervals; over 80 per cent of the project area was inspected. No cultural resources were identified during the survey, due to annual flooding and recent alluvial deposition, lack of significant historical development, and disturbance by previous levee construction. No further investigation was recommended.

Saltus, Allen R., Jr.
1984 *Survey of Selected Civil War Naval Engagement Sites in the Area of Fort St. Philip and Fort Jackson, Plaquemines Parish, Louisiana.* (Survey No. 22-914)

The project area for this study encompassed the site of major activities in the naval battle on April 24, 1862. Fourteen Confederate vessels and two Union vessels were destroyed in the Mississippi River as a result of this engagement and subsequent events. The survey area included the Mississippi River bottom from statute river mile (SRM) 27.5, near Buras, to SRM 14, above Venice, Plaquemines Parish, Louisiana. The field work was divided into two segments: systematic remote-sensing survey, including proton magnetometer and side-scan sonar; and subsequent diver investigations of selected areas.

Eight magnetic anomalies were selected for diver investigation based on historical criteria, geographical data, and magnetic and acoustic feature characteristics. Four targets were found to have been caused by modern cultural material, such as oxygen or acetylene bottles, rebar, a camshaft, and in the case of the purported *Manassas* site originally located by Cussler (1981), by 75 to 100 sections of pipe, measuring 7.6 cm (3 in) in diameter and 6 m (20 ft) long.

Three magnetic perturbations were defined in Area 3, Fort St. Philip/Bolivar Point. Site 16PL97, upriver of Light 22, represents the remains of an abandoned light and other unidentified debris. Coal, timbers, melted bars and solder, ship fittings, and iron bars suggested that the site may also represent the remains of a steam vessel, possibly the C.S.S. *Warrior*. Site 16PL96 was interpreted as a mid- to late nineteenth century dock/refuse area extending at least 43 m (140 ft) from the land beyond the wooden revetment. Numerous artifacts also were recovered from a 1.5 x 1.5 m (5 x 5 ft) test unit excavated in an area of a series of eroded posts. Recovered artifact types included bone, shell, wood, leather, glass, ceramic, stone, and iron. A third anomaly was located upriver from the sand bar (SRM 21.2), but it was not investigated.

A pedestrian survey also was conducted along the shoal below Fort Jackson. A steam boiler was located at SRM 18.5; since it was found lying on the rocks of the revetment rather than under them, the manner in which it came to rest there is unknown. The stern paddlewheel of a steamboat was noted in the willows just above Fort Jackson; this was removed from in front of Fort Jackson, and may have come from a Corps of Engineers snag boat.

Three anomalies were recorded in Area 6 (Boothville Area), the area that Porter's mortar fleet occupied in 1862, and the supposed site of the wreckage of the mortar vessel *Maria J. Carlton*. However, investigation found only modern debris; no nineteenth century cultural materials were located.

Montgomery, John L., Keith Landreth, Joan Exnicios, Kathleen Bowman, and James Bowman
1988 *Final Report of Cultural Resource Investigations within the U.S. Army Corps of Engineers New Orleans to Venice Hurricane Protection Project.* (Survey No. 22-1274)

Montgomery et al. submitted a summary of cultural resource management projects conducted as part of the New Orleans to Venice (NOV) Hurricane Protection Project. The project area included the natural levee on the west bank of the Mississippi River from Happy Jack, Louisiana, to Venice, Louisiana, and along the natural levee on the east bank of the Mississippi River from Phoenix, Louisiana, to Baptiste Collette Bayou. Major open water bodies adjacent to the NOV area included Black Bay, California Bay, and Quarantine Bay; to the west were Adams Bay, Bastian Bay, and Barataria Bay. The purpose of the NOV was to construct new levees and to increase the height and base of existing levees.

The report used information provided in 31 previous cultural resource management studies conducted over the last 14 years in areas affected by the NOV. Forty sites within the NOV area were determined to be affected potentially by project activities.

Three National Historic Landmarks were found to be affected by the NOV: Fort De La Boulaye (16PL27), Fort Jackson (16PL38), and Fort St. Philip (16PL39). Fort Jackson and Fort St. Philip fall within the current Fort St. Philip project area. The report presented research designs, management options, and recommended treatments for these cultural resources, as well as for Olga (16PL61), Ostrica (16PL66), Adolph's Camp (16PL80), and Dunn's Camp (16PL82), all of which were recommended for further investigation. It was recommended that raising the height of the levee at Fort St. Philip should be accomplished on the outside of the existing levee and without using the Fort St. Philip site for a borrow pit. It was determined that impact to the fort site would be entirely visual and aesthetic.

Stout, Michael E., Stephen F. Finnegan, Edwin A. Lyon, and Theodore G. Hokkanen
1989 *Assessment of Aesthetic Impacts on Fort Jackson, A National Historic Landmark located in Plaquemines Parish, Louisiana.* (Survey No. 22-1411)

This draft report anticipated the visual impact on Fort Jackson due to the New Orleans to Venice Hurricane Protection project. The project included enlargement of the mainline Mississippi River levees, the excavation of several borrow areas, and the relocation of a marine facility. The report discussed only the visual impacts on Fort Jackson; no cultural resource investigation was performed.

Hunter, Donald G.
1990 *Archeological Surveys and Evaluations of Four Construction Areas in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana.* (Survey No. 22-1515)

Coastal Environments, Inc. (CEI) conducted archeological surveys and evaluations within four construction areas near Fort Jackson as part of the development of the New Orleans to Venice Hurricane Protection Project. Methodology applied included pedestrian survey, shovel testing, and metal detector scans. The survey recovered only numerous Civil War-era artillery shell fragments associated with the battle fought at Plaquemines Bend, and one stoneware jug fragment. No other potentially significant cultural resources were encountered. The project area was found to be impacted extensively by previous construction, natural agents, and collecting activities. Hunter concluded that no important archeological sites or features existed in the project area, and that no further investigations were recommended.

Hunter, Donald G., and Sally K. Reeves
1990 *A Research Design for Cultural Resources Investigations in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana.* (Survey No. 22-1294)

This cultural resource investigation related to a proposed 106 ha (261.7 ac) borrow pit (Borrow Area A), to be excavated south of Fort Jackson as part of the New Orleans to Venice Hurricane Protection Project. Much of the project area has remained undeveloped swamp. The borrow area was shovel-tested at 100 m (328 ft) intervals along transects spaced 20 m (66 ft) apart; the shovel test alignment was staggered to effect a 50-meter (164 ft) offset pattern. Judgmental shovel testing augmented this procedure. Metal detector scans also were implemented in selected areas. The only cultural resources found were a light scatter of Civil War-era artillery shells and fragments, which were not considered to be significant.

Conclusions

Previous investigations in the Fort St. Philip project area revealed a number of significant and potentially significant cultural resources, including Fort Jackson, Fort St. Philip, and, possibly, Olga (16PL61), Ostrica (16PL66), Adolph's Camp (16PL80), and Dunn's Camp (16PL82). According to these surveys, few previously unidentified terrestrial cultural resources can be anticipated within the current Fort St. Philip project area. The area has been disturbed heavily by prior levee construction, alluvial deposition, and artifact collectors, and has experienced little significant cultural development.

Remote sensing surveys also have located what may be the remains of the C.S.S. *Warrior* (Saltus 1984) and the C.S.S. *Manassas*. Garrison and Baker (1982) believed they had located the C.S.S. *Louisiana*; however, it is difficult to correlate their results with the present study because their survey did not incorporate all of the present study area.

The data indicated that there are a high number of documented sites in the area, many of which may be extant. The number of historical sites located, as a percentage of the number of anomalies investigated in this area, is higher than in other riverine surveys (Saltus 1984). The project area contains an extensive cross-section of valuable naval architecture, maritime history, and technological and cultural data. However, due to geomorphological processes, much of the area between the two forts, the potential location of the greatest number of wrecks, either is under heavy overburden (on the Fort St. Philip side), or is in deep water (mid-river and Fort Jackson side) (Saltus 1984). These factors increase the potential for preservation of significant cultural remains, but they also render data recovery difficult.

CHAPTER IV

RESOURCES IN THE RIVER: THE BATTLE OF NEW ORLEANS, 1862

At the outbreak of the Civil War in 1861, the South did not possess a single warship with which to defend a coastline that stretched from Texas to Virginia. Her only defense consisted of a series of masonry forts, towers and batteries that had been built by the Federal government during the two decades following the War of 1812. While these fortifications were adequate for the state of warfare in the 1820s, the rifled cannon of the 1860s rendered them obsolete. However, the Confederacy did not immediately develop a master plan for coastal defense; rather, it let individual states solve the problem as best they could. What developed, therefore, was a political solution rather than a military one, in which the first goal was the protection of private property (Bright 1961). Unwilling to yield an inch without a fight, the new nation attempted to defend too much with too little. This policy resulted in several initial defeats, and, by 1862, the only major ports still under Confederate control were Charleston, Wilmington and Mobile (Nichols 1957).

One of the most devastating losses was that of New Orleans in April 1862. From a strategic standpoint, the Confederacy should have mustered its resources to defend this vital port. However, until Confederate congressional policy changed in 1864, the nature of the Confederacy's states' rights doctrine prevented the sacrifice of militarily less important political principles in order to achieve a tactically more critical goal.

By denying the Confederate states the use of the Mississippi River and establishing a blockade of their ports, the Union hoped to encircle the Confederacy in a ever-tightening strangle hold. The key to the Mississippi River was New Orleans, and her primary defense lay in two forts, St. Philip and Jackson. Located in the lower delta below the city, both forts were armed heavily and were surrounded by swamps that made them unassailable by land (Figure 7).

When the forts were built, it was inconceivable to military engineers that ships could pass through the fire of a coastal fortification designed to interdict a channel. The fundamental premise of all coastal defense theories had assumed that shore batteries were stronger than ships. In fact, one gun in a fortress was deemed equivalent to five aboard ship (Vauban 1706). However, technological changes that occurred between 1830 and 1860, such as the development of the marine steam engine, the armored warship, and rifled cannon that could deliver exploding shells over great distances, ended the reliance on stone and brick forts.

The Confederate command at New Orleans recognized early that, unless the river was obstructed in some way to hold the ships under fire, steam vessels could run by the two forts with ease before the defending gunners could fire their weapons (Dufour 1960:90). However, efforts to install channel obstructions were limited severely by the great depth of the river (over 100 feet) and by the force of its flow. A boom of hulks chained together was erected across the river below Fort Jackson. However, this device was damaged during an unusually forceful spring freshet and was not repaired adequately before the Union fleet launched its attack.

In 1861, the Union possessed a fleet of steam-powered wooden warships which were swift enough to run by Confederate fortifications; the South lacked a single warship that could prevent such a maneuver. The Confederacy also lacked the funds to build a large navy, but undertook a program to build heavily armored ships designed to counter the Union's superior numbers of wooden vessels (Still 1985:20f).

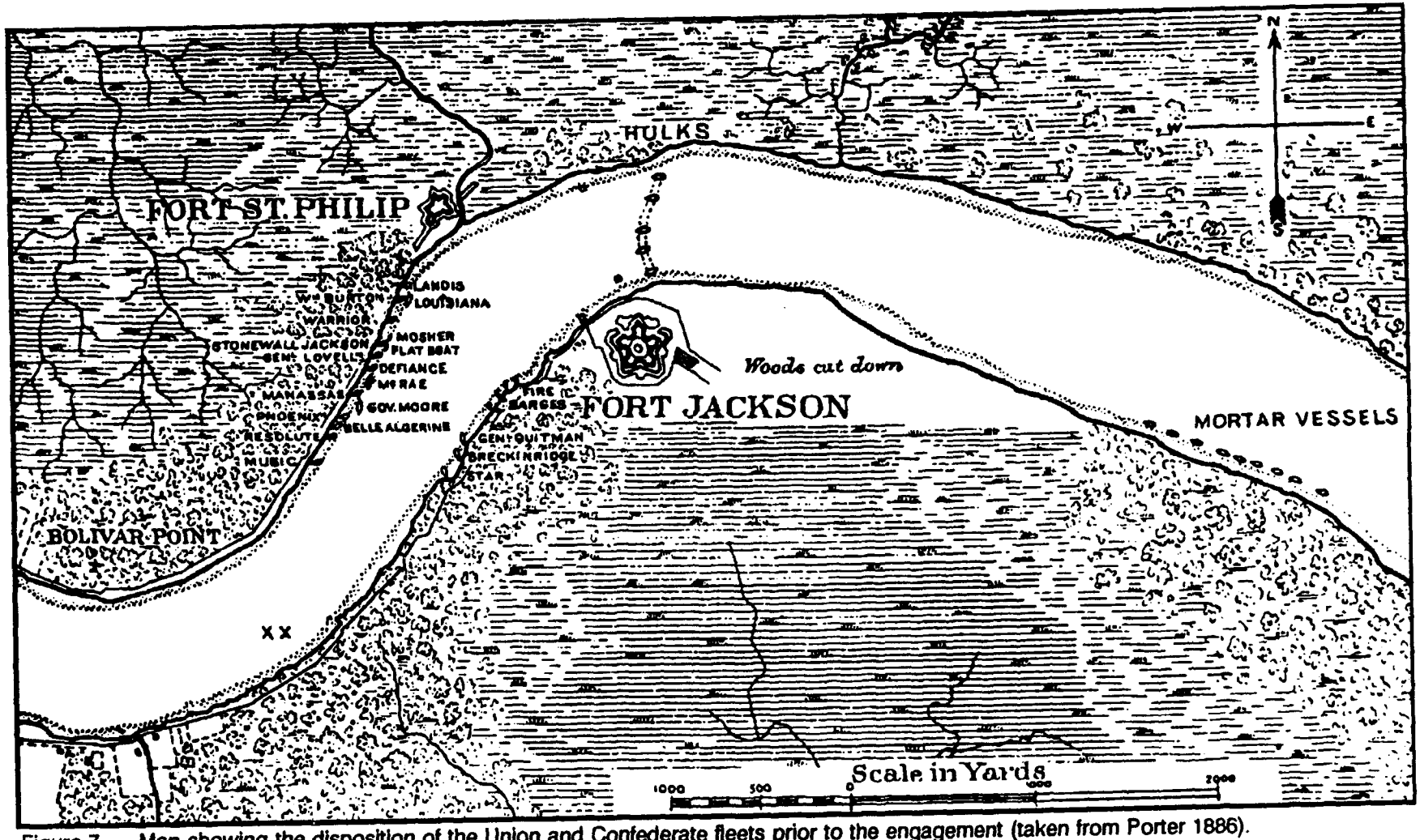


Figure 7. Map showing the disposition of the Union and Confederate fleets prior to the engagement (taken from Porter 1886).

The armored warship was not an American invention. The first such vessel, the *Gloire*, had been launched in France in 1859. However, the success of armored vessels in combat during the Civil War instantly rendered every other navy in the world obsolete, and had international repercussions on military thought and practice.

Perhaps out of desperation, or perhaps because they had no traditions and old-navy prejudices to overcome, the South got a head start into the new era of ironclad warships. Even before work began on converting the frigate *Merrimack* into the famous ironclad *Virginia* at the Tredegar Iron Works in Richmond, Virginia, a syndicate of New Orleans businessmen undertook the conversion of a powerful tugboat into a formidable ironclad ram, renamed the *Manassas* (Figure 8). The *Manassas* was launched on August 15, 1861, five months before the completion of the *Virginia*. However, the *Manassas* was privately owned, and its backers hoped to realize prize money for its use as a privateer against the Union blockade. Their hopes were dashed when the vessel was commandeered by the Confederate government. This strange vessel, described by observers as a floating cigar, was the first ironclad vessel to engage in combat. She later fought during Farragut's passage under Forts Jackson and St. Philip, where she was lost.

In the meantime, other ironclads were under construction in New Orleans, including the *Mississippi*, which was designed to be the most powerful warship in the world. A contract also was awarded by the Confederate government to E.C. Murray, a Kentuckian, to construct in New Orleans a 264-foot long, 62-foot wide (80.4 x 18.9 m) ironclad, to be named *Louisiana* (ORN II, I:434). Murray, who had built 120 vessels during his 20-year boat-building career, came highly recommended to the government (Dufour 1960:103).

The contract for the construction of the *Louisiana* was signed in Richmond, Virginia, on September 18, 1861, between E.C. Murray and Stephen R. Mallory, Secretary of the Navy (*Specifications and Directions for Building a Gunboat* 1861). The contract called for the vessel to be completed on or before January 25, 1862, at a cost to the Confederate government of $196,000.00. Murray was to receive $24,500 when one-sixth of the vessel had been completed, and the same amount when each succeeding one-sixth was finished. When the *Louisiana* was ready to receive her battery, the remaining $49,000.00 would be paid. One-third of the payments were to be made in bonds of the Confederate States, and two-thirds in treasury notes.

Construction began on the vessel at a yard in Jefferson, Louisiana, on October 15, 1861. Arrangements for timber to come from Florida had been made before Murray left Virginia, but the Union blockade prevented its shipment (Neill 1940:51). Instead, contracts were made with W.W. Cary and with the New Orleans and Jackson Railroad to supply timber from Lake Pontchartrain. The quantity needed was estimated at 1,700,000 ft (ORN II,1:755).

Engines for the vessel were removed from a river steamer, the *Ingomar*, that Murray had bought for the purpose. The *Ingomar* had been a 730 ton displacement side-wheel steamer built in Louisville in 1854. Her power plant probably consisted of high pressure horizontal or inclined engines. Two months were required to transfer the machinery from the *Ingomar* to the hull of the *Louisiana*. The power plant for the *Louisiana* therefore consisted of two engines from the *Ingomar*, and her two main shafts, each of which measured 33 cm (13 in) in diameter and were about 7.3 m (24 ft) long. Two smaller engines were to be constructed by Robert Kirk of New Orleans to drive the propellers that assisted the vessel's steering mechanism. The propeller shafts were built of wrought iron, 16.5 cm (6 1/2 in) diameter and 5.5 or 5.8 m (18 or 19 ft) long (ORN II, 1:760). These shafts were not delivered to Murray until the 19th or 20th of April, 1862, only a day or two before the *Louisiana* departed for the forts (ORN II, 1:761).

Murray's plan called for the use of railroad "T" iron for the vessel's armor, since standard iron plate was difficult to procure. Murray sought to purchase 500 tons of railroad iron from Mr. Wadley, the president of the Vicksburg and Shreveport Railroad. Murray had been informed that the iron belonged to "alien enemies," and that he would have no trouble getting it (ORN II, 1:754). Disputes concerning the ownership

Figure 8. Artist's conception of the C.S.S. *Manassas*. Source: Naval Historical Center NH608.

of the iron and delays in obtaining the money from the government to purchase it caused Murray finally to complain to the New Orleans Committee of Safety. They instructed Murray to take the iron and said that "they would back [him] up with 2,000 muskets if necessary" (ORN II, 1:755). Mr. Wadley, left with little choice, handed the iron over to Murray.

Labor difficulties plagued Murray through the months ahead. All of the ship carpenters participated in a general strike for higher wages on November 6, just three weeks after work had begun on the vessel. As Murray later reported to a Joint Special Committee of both Houses of the Confederate Congress appointed to investigate affairs of the Navy Department:

> I asked my men to remain at work, and I would abide by whatever result followed; that if the wages were increased as a result of the strike to $4 or $5 a day, I would pay it. They kept on at work after this assurance was given. The next day 40 of the strikers came up and threatened to throw the tools in the river if my men did not knock off. They staid about the river, and the procession increased before long to six or seven hundred. We had to knock off for about four or five days. This was the first interruption (Murray 1863).

A delay of this sort to a project that most New Orleanians regarded as essential to their protection elicited an outraged response from local newspapers. The *True Delta* editorialized:

> . . . we deem the subject of sufficient importance to bestow upon it more attention than a mere passing allusion . . . The ship-carpenters of Algiers, it is alleged, refuse to work for the government . . . unless a sum said to be entirely unusual, improper, and exorbitant be paid them for their labor . . . If this be a true version of the affair . . . they will be condemned as unreasonable, as unjust, and as unpatriotic, and we shall not in their behalf protest against the judgement (*True Delta* 1861).

While this was the only instance of a strike among Murray's workers, labor shortages habitually impeded the progress of construction. Losing workman to military drills and enlistments, Murray sought men elsewhere. Some of his workmen came from Memphis; others occasionally were borrowed from the Tift Brothers, who were building the ironclad *Mississippi* in the next yard (ORN II, 1:757).

A delay of four or five days also resulted from an alteration in the *Louisiana*'s port holes. Captain McIntosh, acting on intelligence of the fight between the *Monitor* and the *Virginia*, insisted that the port holes should be made oval in shape (ORN II, 1:756). These same port holes later would be a source of grief to the *Louisiana*'s officers.

Murray appears to have made every effort to overcome his many frustrations and to complete his vessel. His workman labored on Sundays for about two-thirds of the construction time, and they began working at night between 20 and 40 days before the completion of the vessel. These efforts not withstanding, the commander of the naval station at New Orleans, John Mitchell, estimated that "it would have taken at least six weeks, if not two months longer" (ORN II,1:455) to ready the *Louisiana* for battle.

Despite Murray's success as a builder of commercial craft, his design for a warship was a disaster. The *Louisiana* was built on the casemate design which was favored by Southern builders, since the design's flat surfaces did not require the more difficult manufacture of curved plates. The hull of the vessel was constructed of oak, pine and cypress (National Archives 1861-1865). Power was provided by two paddlewheels mounted inside an interior well so that they would not be exposed to shot. Other accounts

described the hull as being divided into two hulls aft of the midship section, in a kind of pontoon-like arrangement (Morgan 1917:72). Inside the well, one wheel was mounted behind the other; the effect of this design element was that the after wheel did not help to move the vessel through the water. The chief engineer of the *Louisiana*, Wilson Youngblood, complained that the wheels forced water out under the stern so that it formed an eddy around the rudder, rendering the vessel unmanageable (ORN I, 18:318). The vessel was equipped with two propellers powered by separate small engines that were intended to assist in steering, but the whole propulsion system was so poorly conceived and under-powered that the *Louisiana* was unable to navigate through the current of the Mississippi.

Lt. W. H. Ward, C.S.N., who served aboard the *Louisiana*, made the following statement to a Confederate Court of Inquiry regarding the condition of the vessel just prior to the engagement:

> When we left New Orleans, by some mistake or mismanagement some of the guns - about three or four - were mounted on carriages that did not belong to them, and could not be worked efficiently . . . All the time we had was devoted to the correction of this mistake. There was also one gun lying on the dock that was not mounted at all. In my division, owing to an improper mounting of an 8-inch shell gun, it was ineffectual. The facilities for mounting the guns were very indifferent; it had to be done by blocking them up. Her motive power was also incomplete. She had to depend on wooden tugs to give her motion. Her wheels, which were designed as her chief motive power, were wholly inadequate, and I think they could never have been made serviceable. Her propellers, which were merely auxiliary, it was said would have been done that day (of the attack), but I do not think they would have moved her; their chief value would have been to assist in steering the vessel. I looked upon her as a total failure, except that she might have been used as a floating battery; but even then her accommodations were so inferior that it would have been difficult to have lived on her. It may be well to state that the crew of the *Louisiana* was not full, and of a mixed and indifferent character. A company of artillery from the Crescent Regiment constituted a larger part of the crew, and were not skilled in the use of heavy guns (OR XVI:607).

William C. Whittle, Jr., who was third lieutenant on the *Louisiana*, provided further information concerning the appearance of the vessel:

> The hull of the *Louisiana* was almost entirely submerged. Upon this were built her heavy upper works, intended to contain her battery, machinery, etc. This extended to within about twenty-five feet of her stem and stern, leaving a little deck forward and aft, nearly even with the water, and surrounded by a slight bulwark. The structure on the hull had its ends and sides inclined inward and upward from the hull, at an angle of about forty-five degrees, and covered with T railroad iron, the lower layer being firmly bolted to the woodwork, and the upper layer driven into it from the end so as to form a nearly solid plate and a somewhat smooth surface. This plating resisted the projectiles of Farragut's fleet (none of which perforated our side), although one of his largest ships lay across and touching our stem and in that position fired her heavy guns. Above this structure was an open deck which was surrounded by a sheet iron bulwark about four feet high, which was intended as a protection against sharp-shooters and small arms, but was entirely inefficient, as the death of our gallant commander, McIntosh, and those who fell around him, goes to prove (Scharf 1887:283).

Three early illustrations purport to show the *Louisiana* with varying degrees of accuracy. One image (Figure 9), contained in the National Archives' *Vessel Papers*, is a rough sketch of the vessel done by her commander John K. Mitchell. The sketch shows an oblique view of the starboard side of vessel. One gun port in the aft quarter is blocked. The parapet around the roof of the casemate and a single stack also are depicted. A slightly later image (Figure 10) of the port side of the vessel contains numerous inaccuracies. Most notably, the two paddlewheels are shown side by side rater than fore and aft. A railing is shown around the top rather than the iron plated parapet that was to serve as a rifle pit for sharpshooters. Finally, the port holes are both incorrectly spaced and are depicted as circular rather than oval.

The gun deck of the *Louisiana* is rendered accurately in a drawing done from a sketch by Mitchell (Figure 11). The paddlewheels are shown inside their well with one in front of the other. The placement of the guns is shown, as are the locations of the stack, the propellers, the tiller, and the access hatch to the engine room below.

When J.K. Mitchell (Figure 12), commander of naval forces at New Orleans, received orders to bring the *Louisiana* down river to assist in the defense of the forts at Plaquemine Bend, the problems with the engines still had not been worked out. In fact, the ship had to be towed to the scene of the battle by her two tenders (Figure 13). It was hoped that repairs could be completed while the vessel lay under the protection of the guns of Fort St. Philip. However, by April 22, after the forts had suffered three days of heavy mortar bombardment from the Union fleet, Mitchell reported to the fort commander that the *Louisiana's* engines could not be made ready in any reasonable amount of time. The commander of the fort, General Johnson K. Duncan (Figure 14), urged Mitchell to move the *Louisiana* below the raft of obstructions, where she could be employed as a floating battery to enfilade the Union mortar vessels (Figure 15). Mitchell steadfastly refused to commit his vessel to such an action and he feverishly continued to make the engines operational while keeping the *Louisiana* tied to the bank opposite the water battery just above Fort St. Philip. Duncan, who pointedly had been denied any authority over naval units, was powerless to do anything more than fume over Mitchell's obstinacy to Major-General Mansfield Lovell, Commander of Confederate Department No. 1, headquartered at New Orleans (Figure 16).

Mitchell's testimony to a Confederate Court of Inquiry indicated that the *Louisiana's* usefulness even as a floating battery was limited. According to his statement, the ironclad's guns were not moveable and could only command about 40 degrees of the horizon. In addition, the small size of the gun ports prevented the guns from being elevated more than four or five degrees, which limited the range of the guns to about 2,000 yards, too short to reach the mortar fleet from the anchorage that Duncan had requested. Mitchell also complained that it was impossible to weigh the vessel's anchors once they were let go, and that her steering apparatus prevented her from being anchored by the stern in the middle of the river, which would have brought more of her guns to bear on the enemy (OR XVI:612). Finally, the deck on top of the casemate was only lightly armored, having been designed to withstand broadsides, and would have been penetrated easily by Union mortars. The Court of Inquiry later found Mitchell's statements to be true and absolved him of any blame attached to his refusal to move the *Louisiana* below the line of obstructions (OR XVI:641).

Twenty-one Confederate vessels were stationed in the river at Ft. St. Philip when Farragut attacked on the morning of April 24, 1862. These included two ironclads, the *Louisiana* and the *Manassas*; two deep-draft steamers, the *McRae* (Figure 17) and the *Jackson*; two launches (converted fishing boats), No. 3 and No. 6; and two lightly built side-wheelers, the *Gov. Moore* and the *General Quitman.* Three unarmed steamers, the *Phoenix*, the *W. Burton*, and the *Landis*, served as tenders for the *Manassas* and *Louisiana*. Four chartered steamers, the *Mosher*, the *Belle Algerine*, the *Star*, and the *Music*, also were under naval authority.

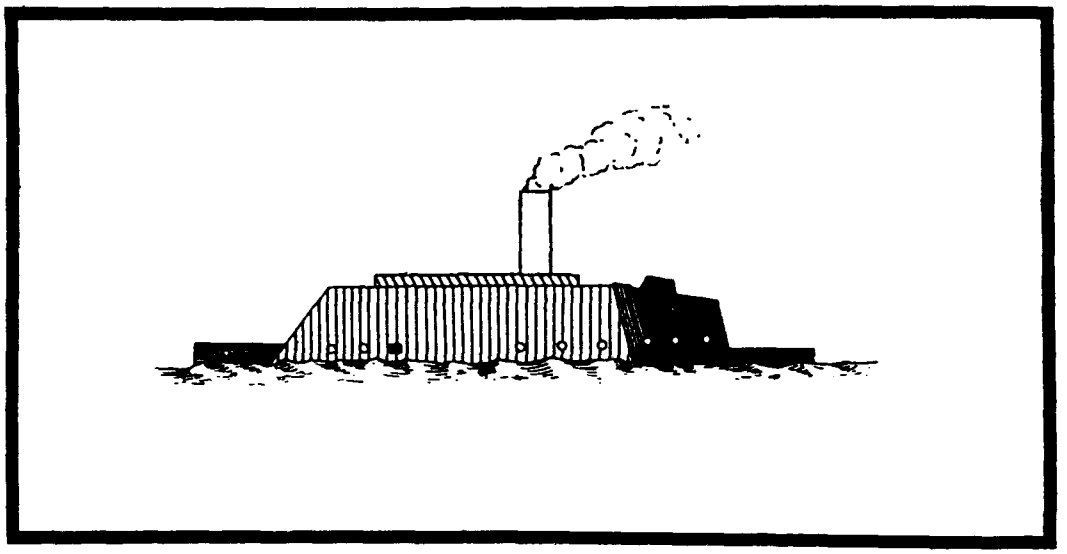


Figure 9. Sketch of the *Louisiana* made by her commander, John K. Mitchell. Source: The "Vessel Papers," National Archives.

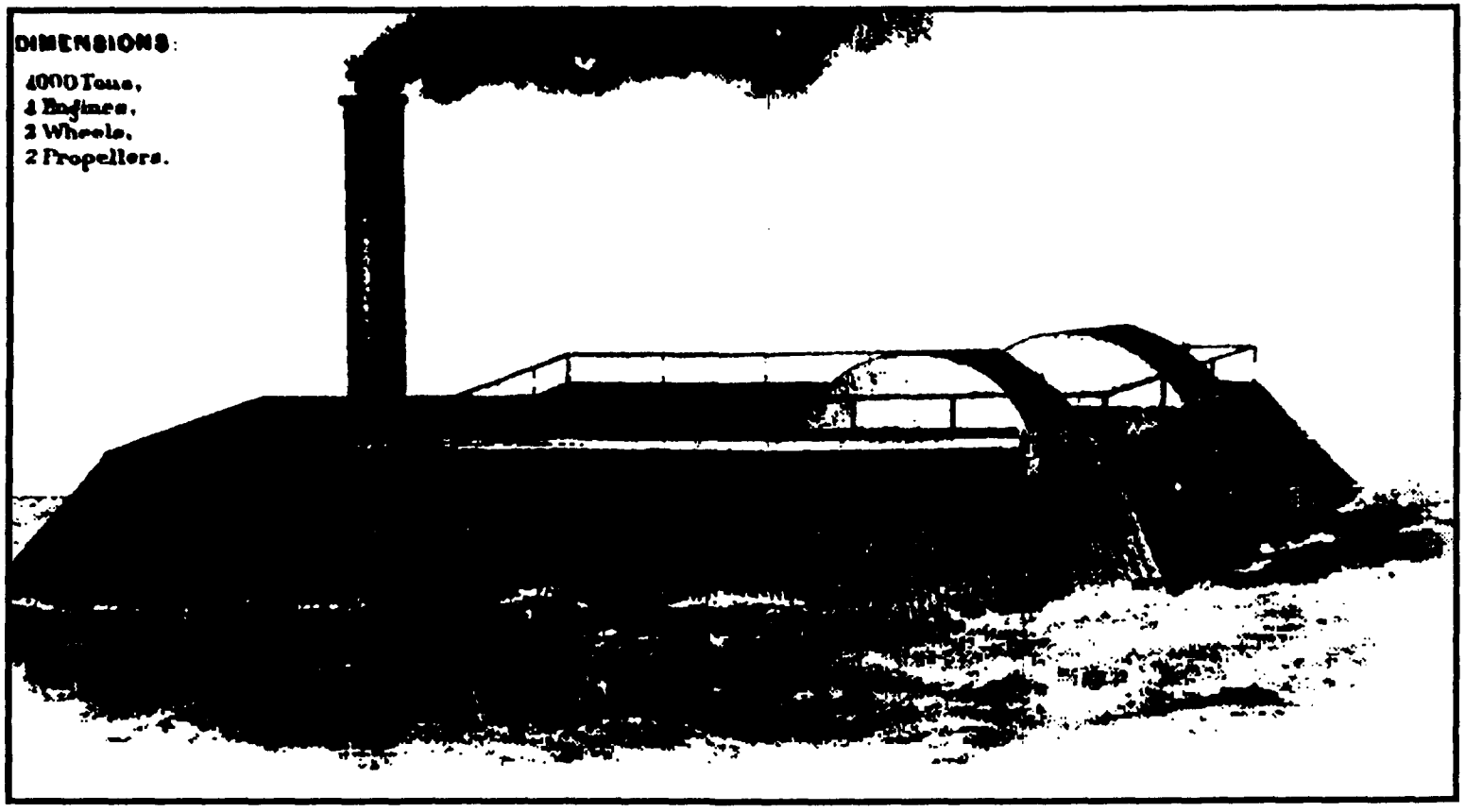


Figure 10. Inaccurate rendering of the *Louisiana*, showing her two paddle wheels side by side rather than fore and aft. Source: Naval Historical Center 2275.

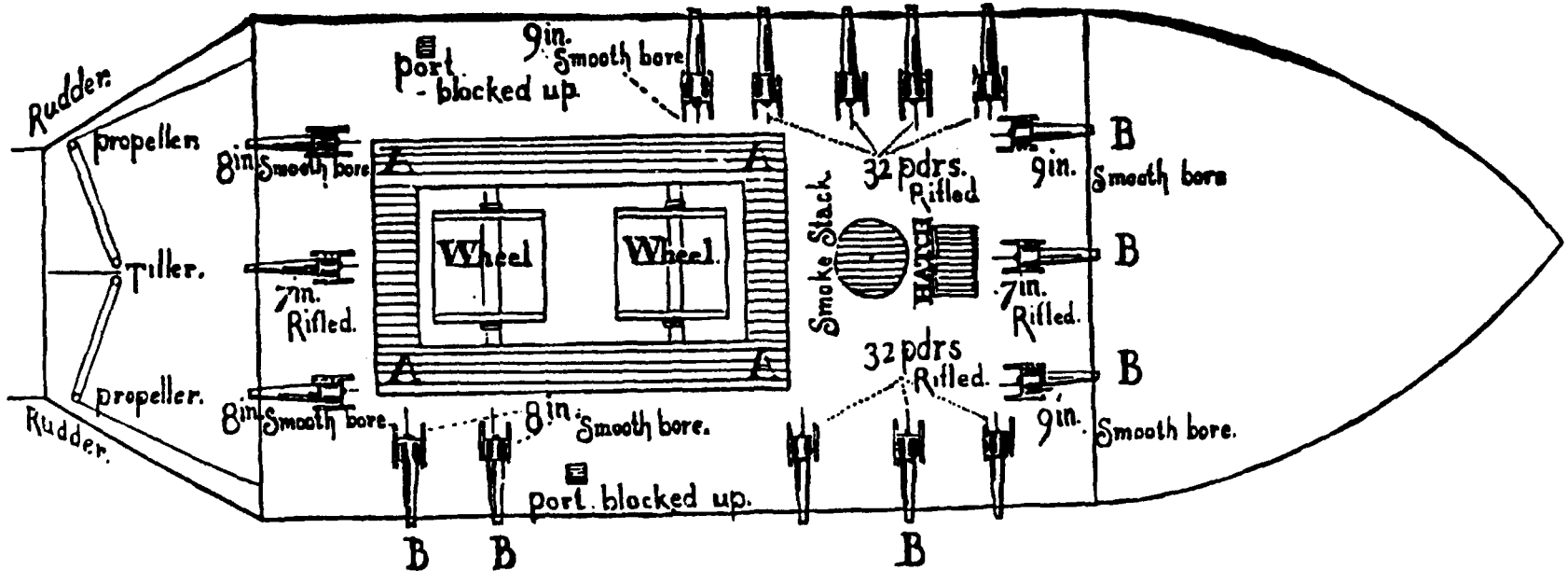


Figure 11. Deck plan of the *Louisiana* (taken from Porter 1886).

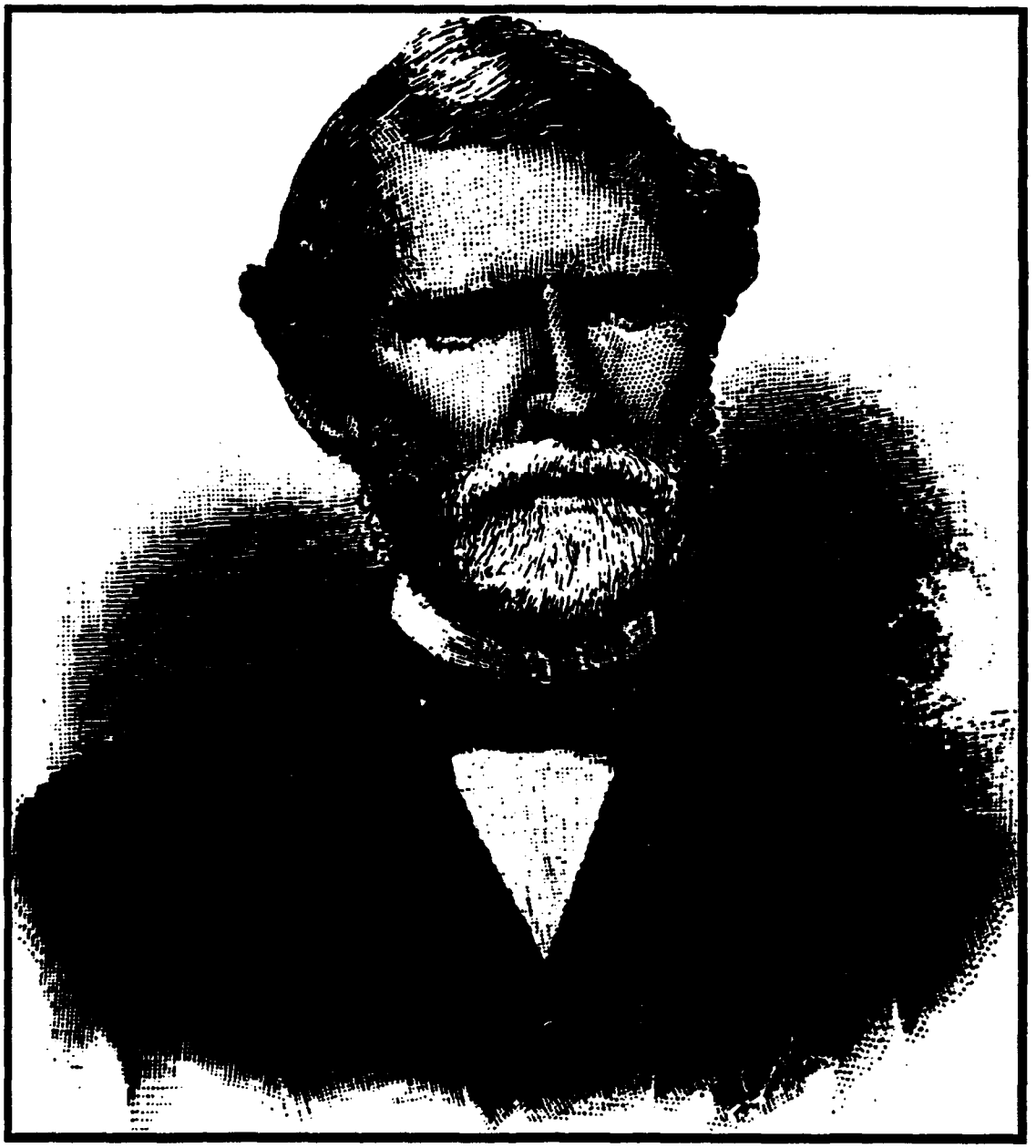


Figure 12. A photograph of Captain John K. Mitchell by D.H. Anderson (taken from Porter 1886).

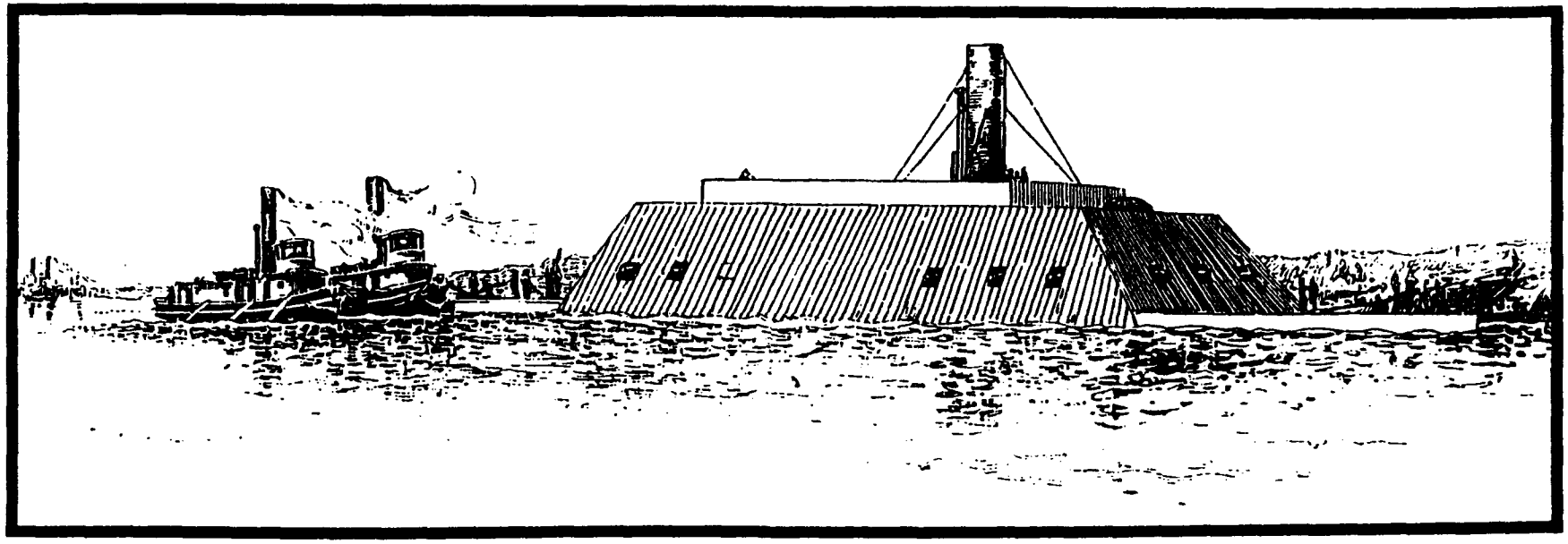


Figure 13. Artist's conception of the *Louisiana* being pushed by tugs to Fort St. Philip (taken from Porter 1886).

Figure 14. General Johnson K. Duncan, commander of the Confederate Army at Forts Jackson and St. Philip (taken from Porter 1886).

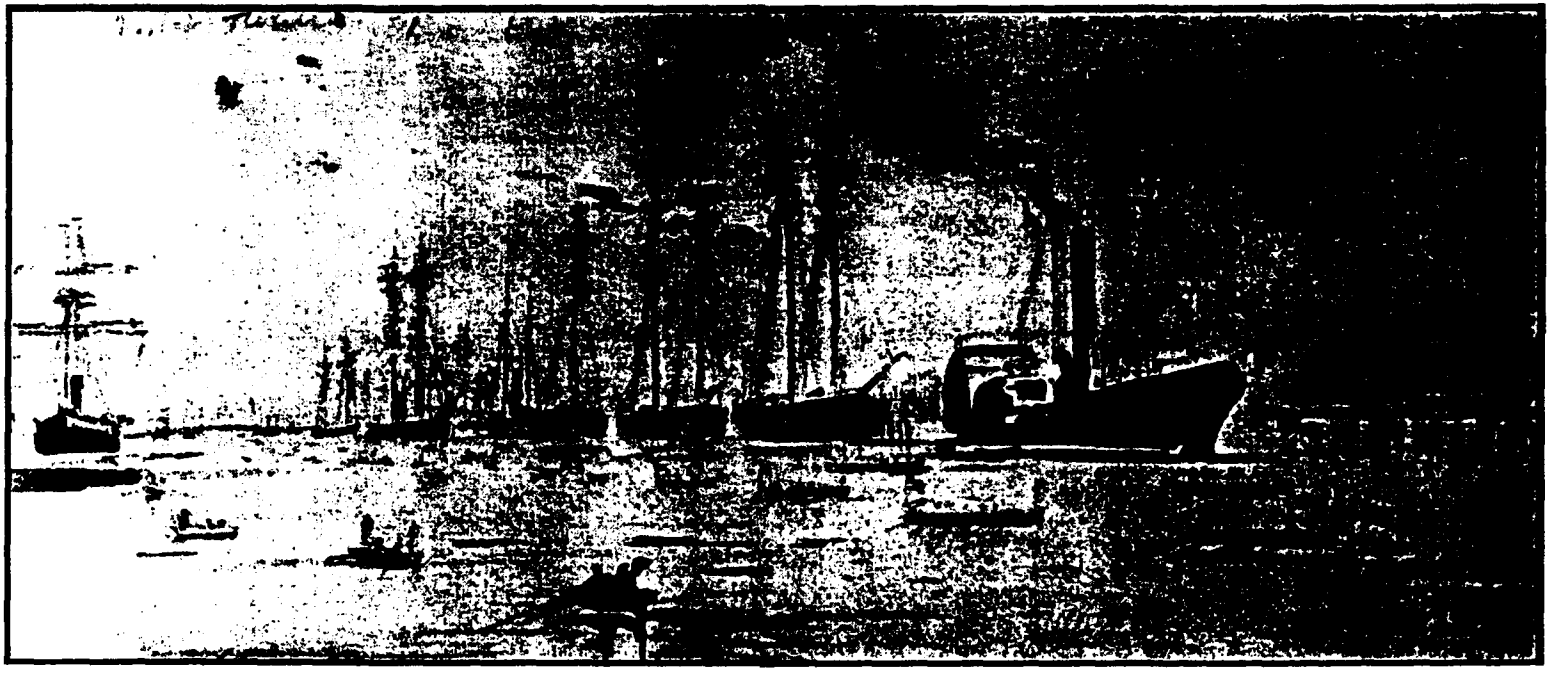


Figure 15. The Federal mortar fleet being towed into position below the forts. The tops of the masts are camouflaged with tree branches to hide their position from artillerymen in Fort Jackson. Source: Print Room, New York Public Library.

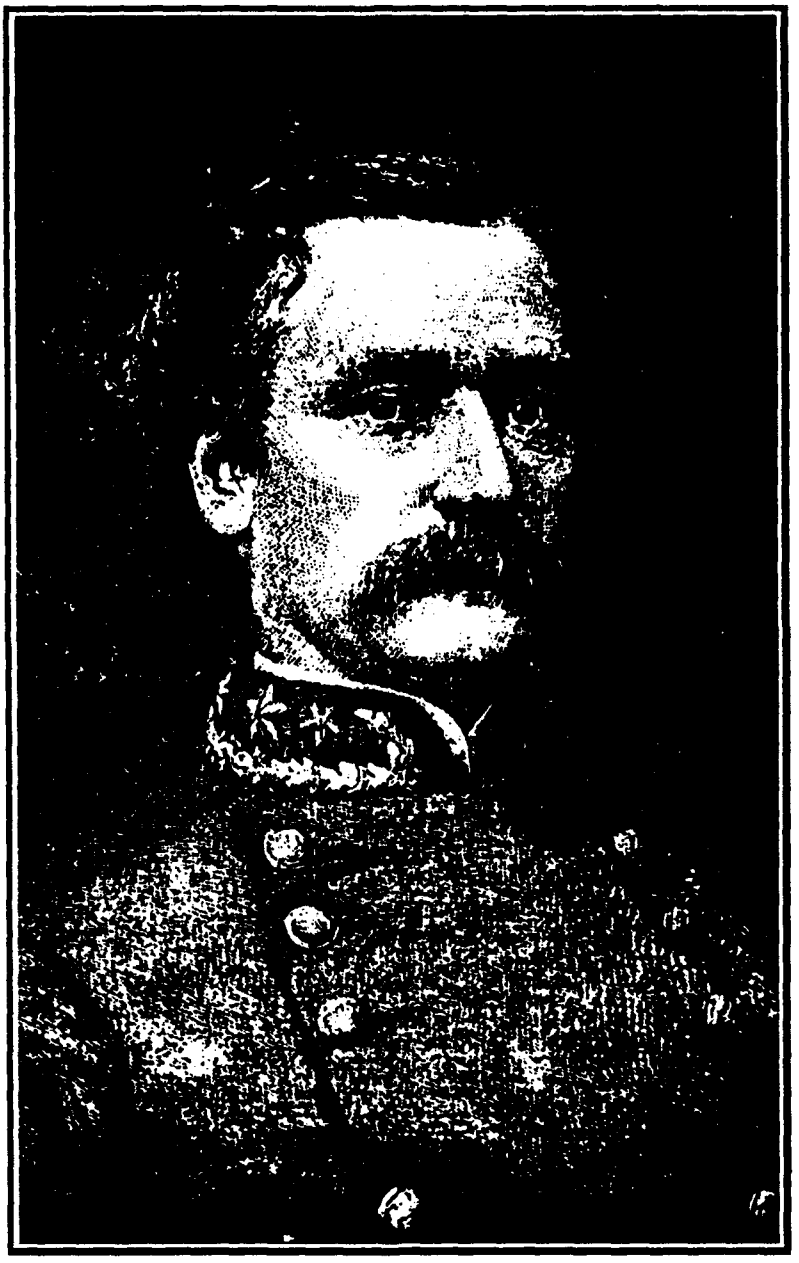


Figure 16. A photograph of General Mansfield Lovell by D.H. Anderson (taken from Porter 1886).

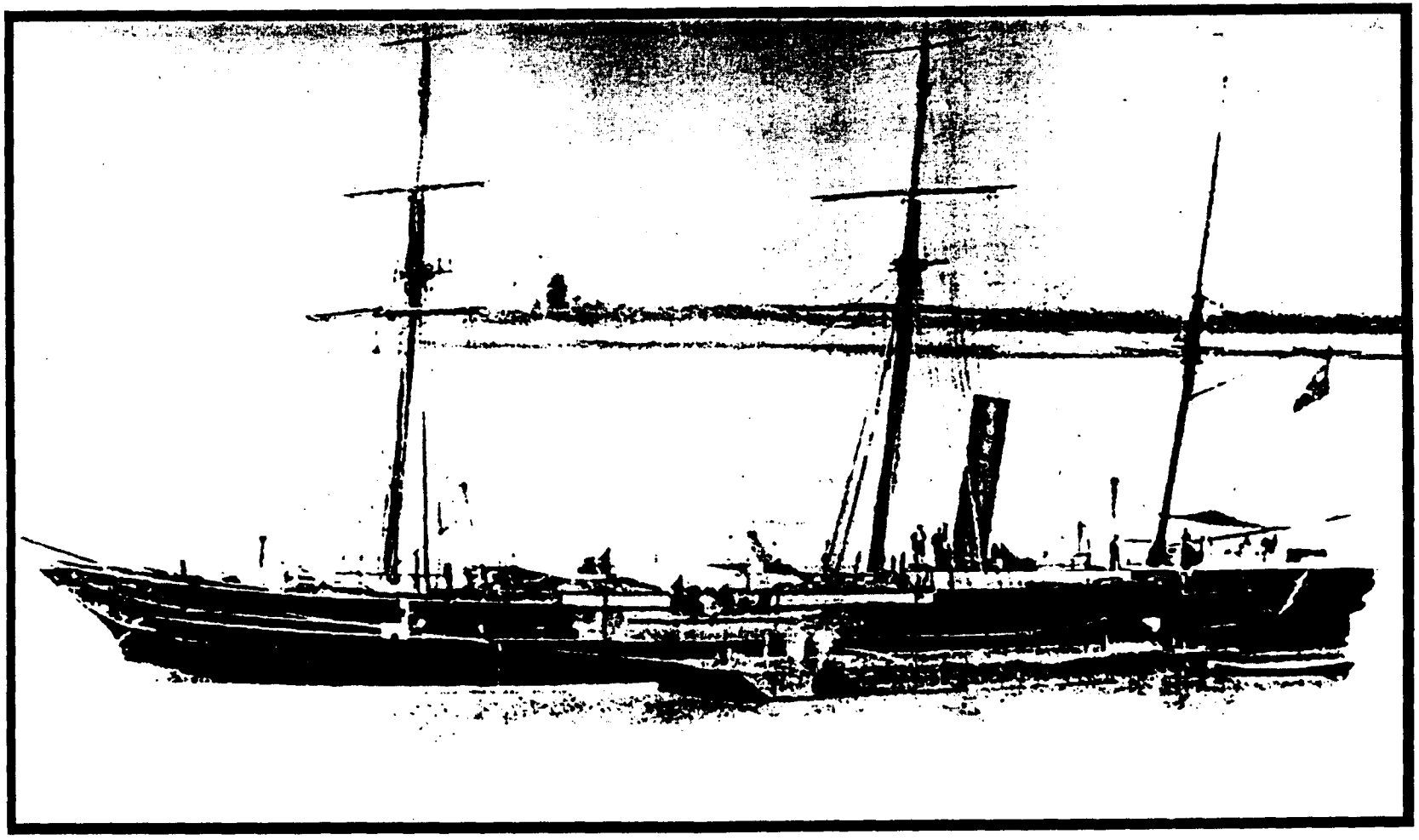


Figure 17. The C.S.S. *McRae*. Source: Naval Historical Center, NR&L (0) 17192.

Six towboats that had been converted to gunboats of the War Department's River Defense Fleet, including the *Warrior*, the *Stonewall Jackson*, the *Resolute*, the *Defiance*, the *General Lovell*, and the *R. J. Breckenridge*, also were present. The captains of these River Defense gunboats resolutely refused to place themselves under naval command. During the battle, four vessels were set on fire or abandoned by their own crews, the *Resolute* was run ashore and abandoned (she was later burned by the Confederates) and the captain of the *Defiance*, reportedly drunk, sailed around in circles. A Confederate officer later remarked that if the River Defense Fleet had rammed Farragut as hard as they rammed the river bank, some of Farragut's ships would have been sunk (ORN I, 18:346).

Preparations for the Union's final assault on the two forts began on April 23. Orders were issued to the commanders of the Union vessels to ready their ships for action by sending down their light spars, painting their hulls mud-color, and hanging chain cable over their sides to protect their engines from shot (Porter 1956:38). At 2 o'clock on the morning of April 24, the Union fleet weighed anchor and began steaming up river (Figures 18 and 19).

The Union fleet had been divided into three divisions. The First Division, under Captain Bailey, consisted of the *Cayuga*, the *Pensacola*, the *Mississippi*, the *Oneida*, the *Varuna*, the *Katahdin*, the *Kineo*, and the *Wissahickon*. The Center Division, under Flag-Officer David Farragut, consisted of his flagship, the *Hartford*, as well as the *Brooklyn*, and the *Richmond*. The remaining six vessels, the *Sciota*, the *Iroquois*, the *Kennebec*, the *Pinola*, the *Itasca*, and the *Winona*, made up the Third Division under Captain H.H. Bell.

At 3:30 am, the *Cayuga* moved through the break in the obstructions. Ten minutes later the vessel was spotted by the Confederate defenders and the batteries from the forts opened up on the Union fleet (Figure 20). Within 15 minutes, the *Cayuga* had run by both forts. With its masts, rigging and hull riddled by 42 shots, the vessel found itself alone among the Confederate fleet. Fortunately for Captain Bailey, he encountered the infamous River Defense Fleet, who immediately disgraced themselves by abandoning their vessels. Confederate commander Beverly Kennon, aboard the *Gov. Moore*, later wrote:

> Suddenly two, then one Confederate ram darted through the smoke from the right to the left bank of the river, passing close to all of us. They missed the channel for New Orleans, grounded on and around the point above, and close to Fort St. Philip; one was fired and deserted, and blew up soon after, as we passed her; the others, the ram *Defense* and the ram *Resolute*, were disabled and deserted (Scharf 1887:284).

In the smoke and confusion of the battle, it was nearly impossible to piece together a precise chronology of the engagement. Contemporary accounts of the action are a confused series of recollections that sometimes contradict one another. Later illustrations depicting the great battle are subject to this same confusion, and they often show principal events of the engagement occurring simultaneously (Figures 21, 22, and 23).

The lightly armored vessel *Manassas* was one of the first Confederate vessels to engage the enemy. Again and again the small vessel threw itself against the Union ships, ramming the *Brooklyn* and firing its single gun from a distance of ten feet. The shot entered the *Brooklyn* five feet above the waterline and lodged itself in sandbags protecting the steam drum. The protective chains hung over the *Brooklyn*'s sides deflected damage from the *Manassas*' ram. Following this encounter, the *Manassas*, seeing the C.S.S. *McRae* engaging four of the enemy, turned to assist her. Two of the Union vessels broke off from the *McRae* to meet the strange looking newcomer. One of these ships, the *Mississippi*, attempted to run down the *Manassas* (Figure 24), but she managed to shear away at the last minute and strike the *Mississippi* a glancing blow aft of her port paddle wheel. However, the *Manassas* soon was done for. With her single forward gun unshipped and riddled with shot, her commander ordered her delivery pipes cut and ran the

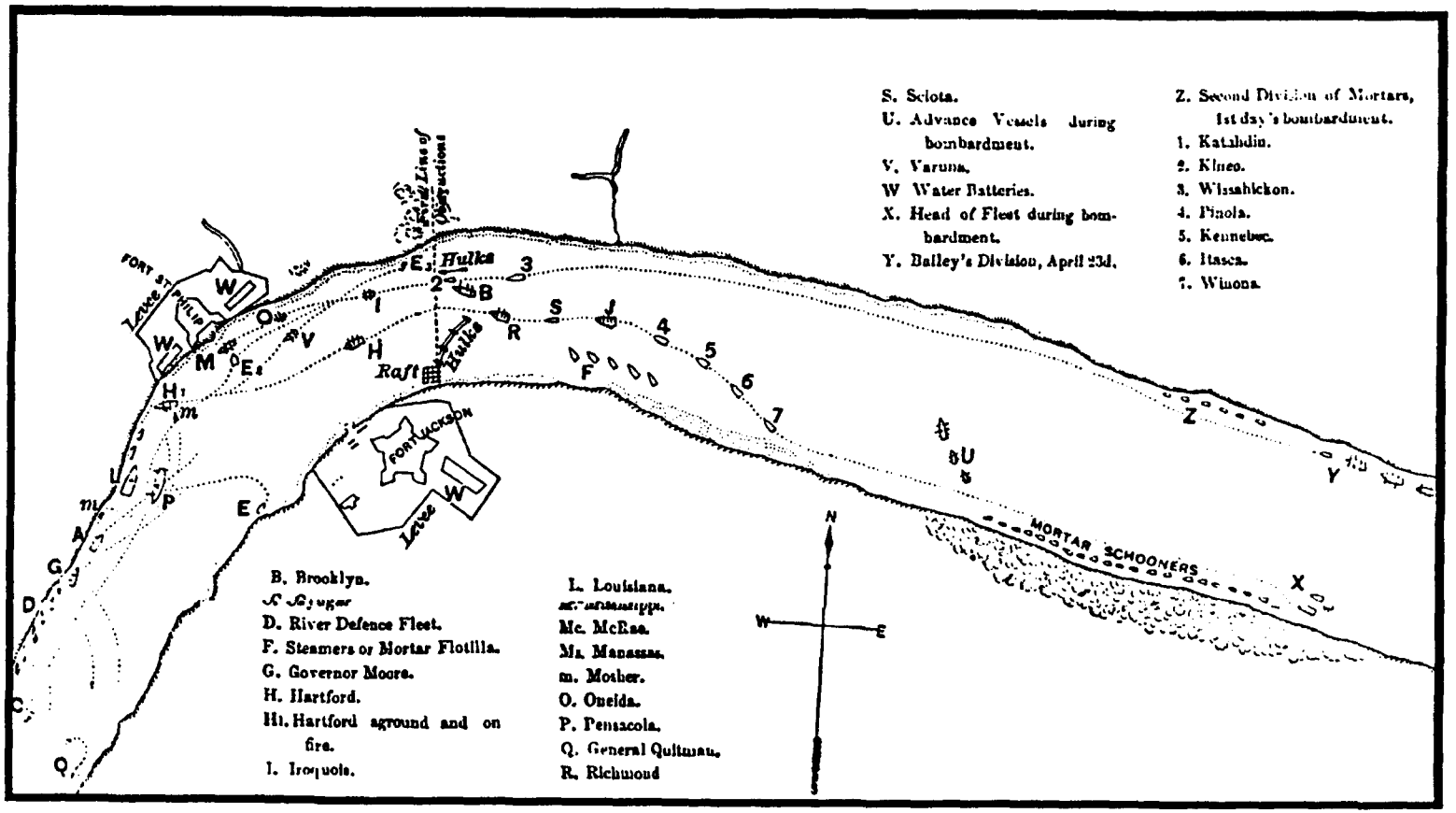


Figure 18. Map showing the advance of the Federal fleet between the Forts Jackson and St. Philip (taken from Mahan 1883).

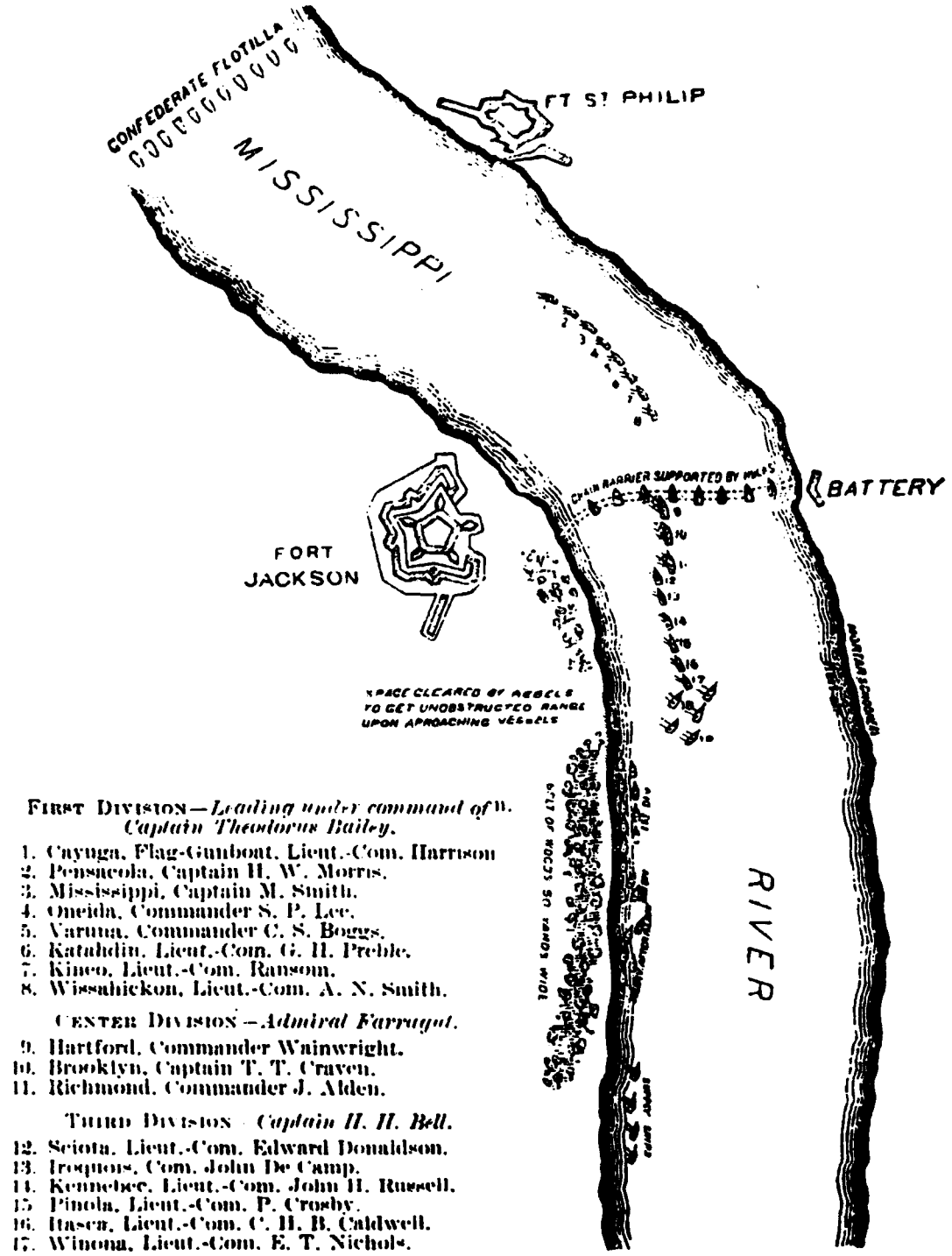


Figure 19. Map of an attack plan by Farragut showing the order of the Federal fleet. The Confederate fleet is not depicted accurately. Source: Naval Historical Center, USN 903009.

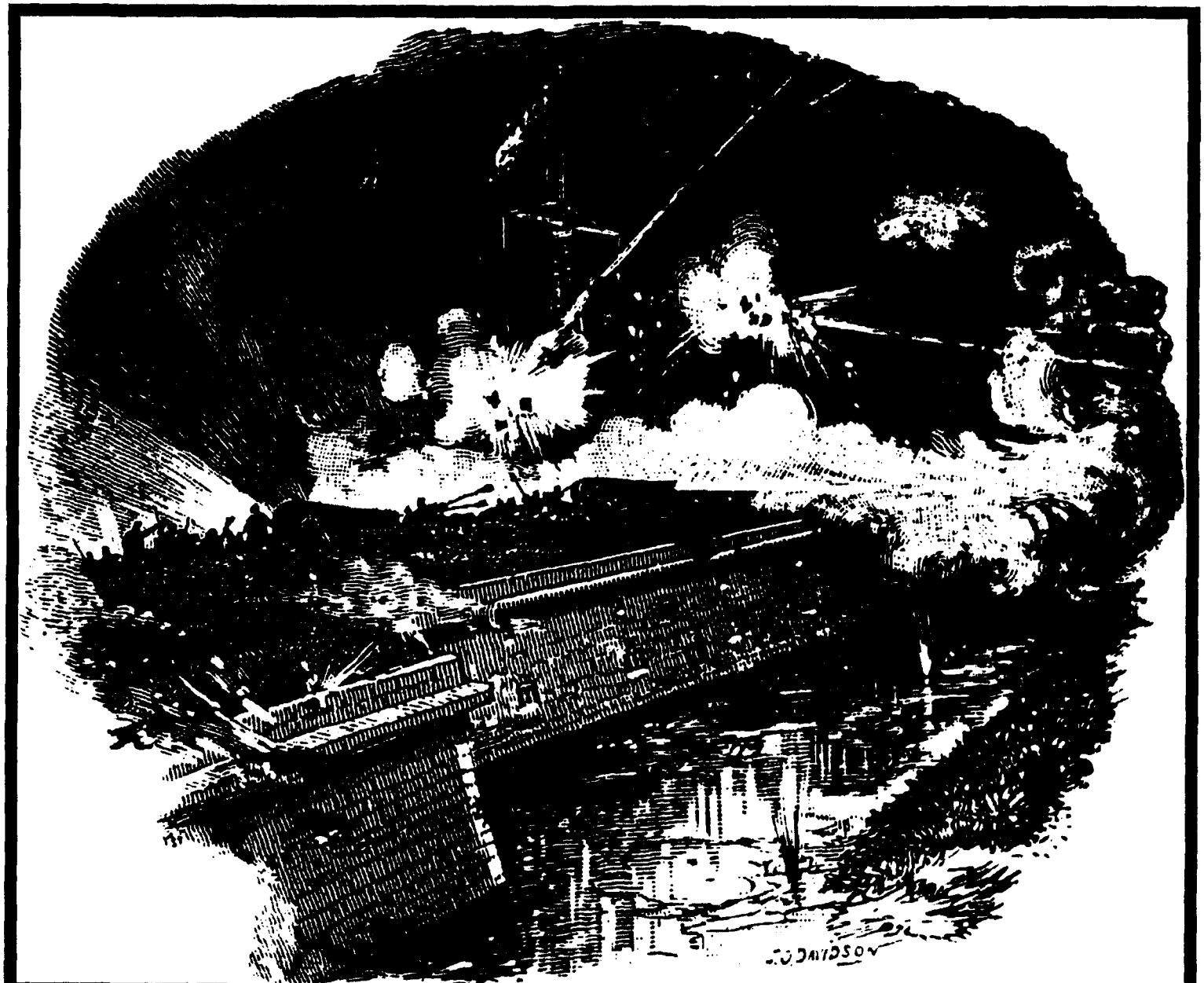


Figure 20. Artist's conception of Fort St. Philip during the engagement. Details of the fort were drawn from photographs taken in 1884 and 1885 (taken from Porter 1886).

Figure 21. Painting of the battle showing Fort Jackson on the right and Fort St. Philip on the left. The *Manassas* is shown center right attacking a Federal ship. Source: Naval Historical Center, USN 903021.

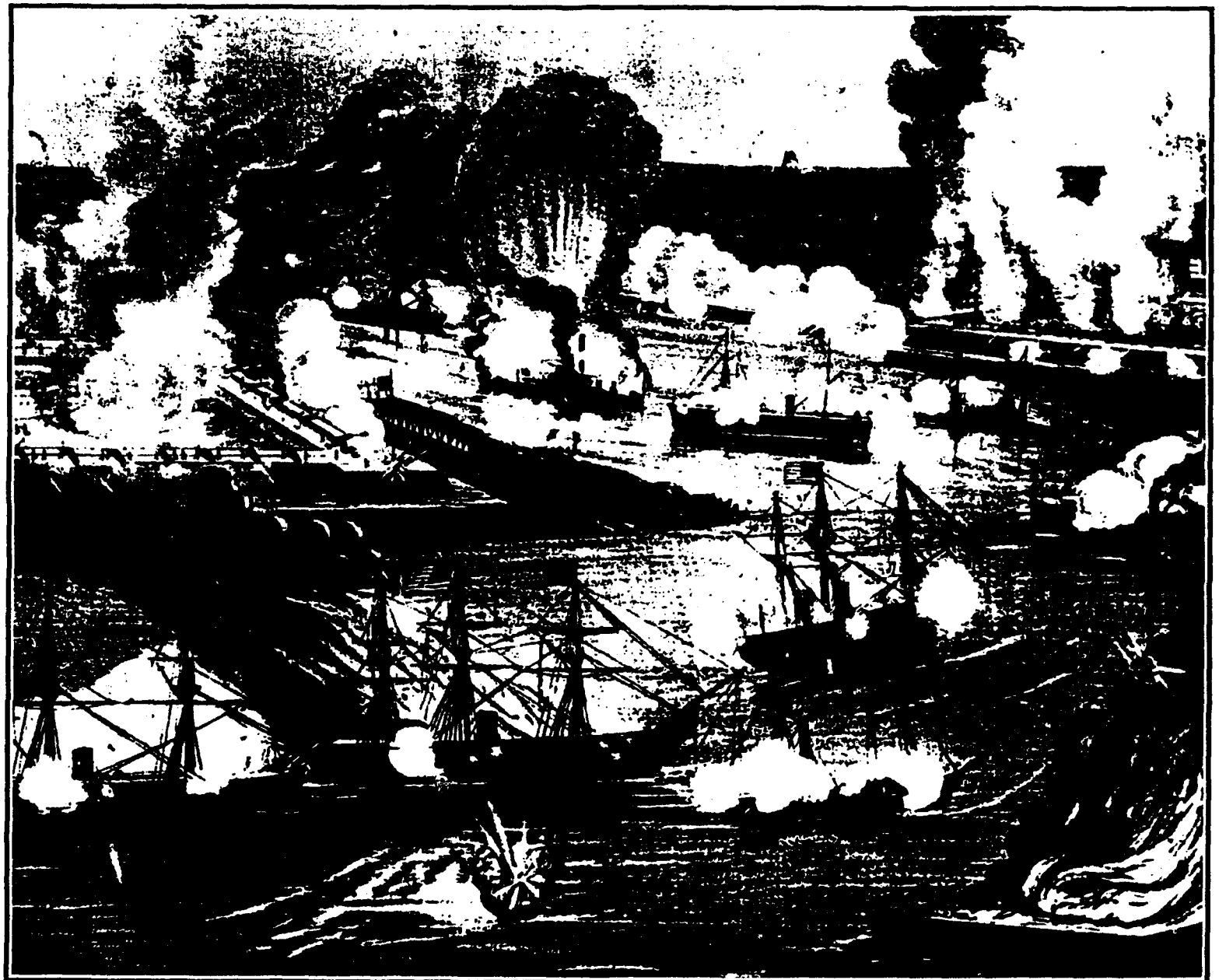


Figure 22. View of the battle at Plaquemines Bend. A fire barge is seen in the lower right corner (taken from *Navy Chronology*, VI-148).

Figure 23. Bird's-eye view of the passage of the forts below New Orleans (taken from Porter 1886).

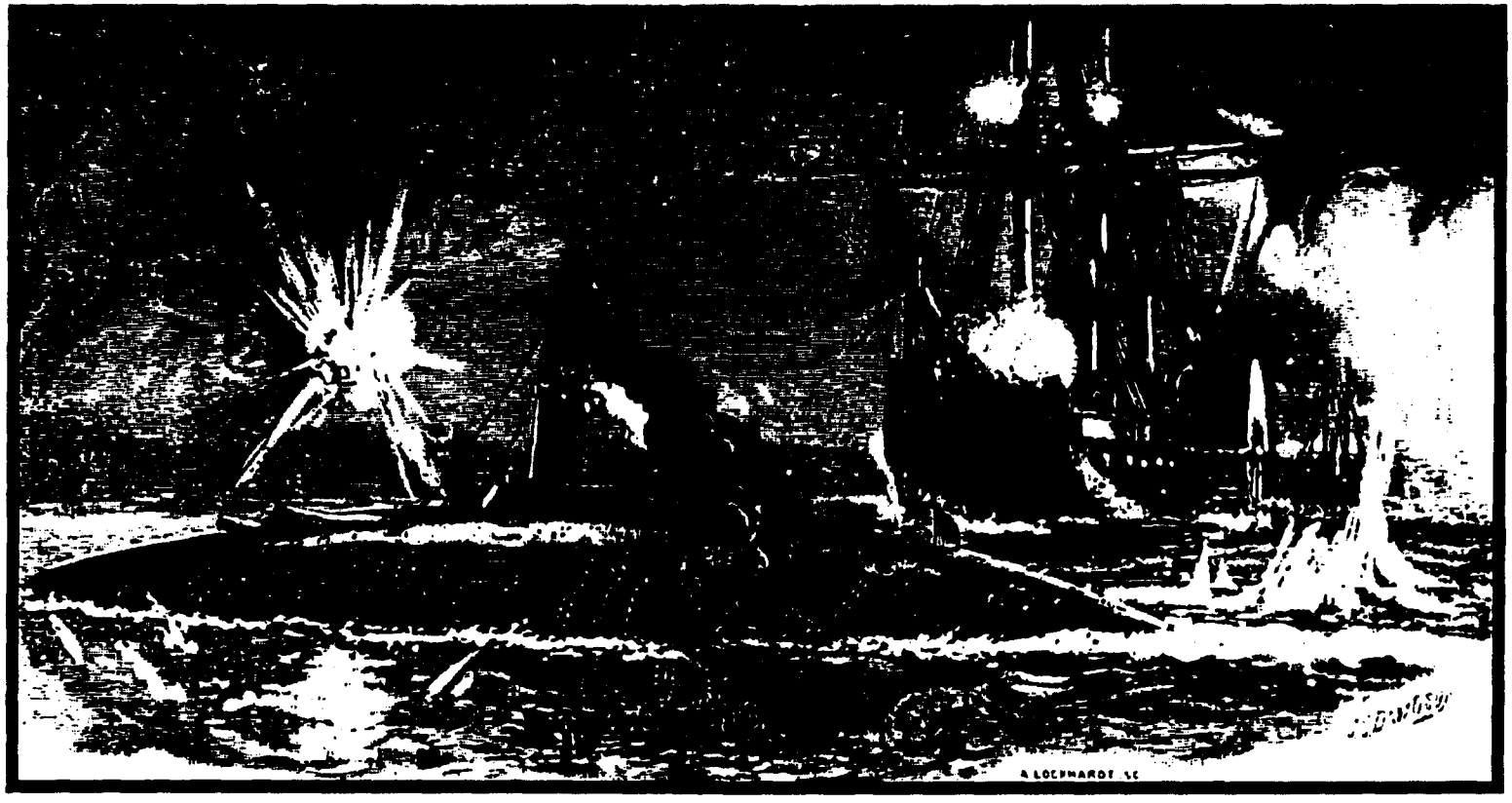


Figure 24. The U.S.S. *Mississippi* attempting to run down the C.S.S. *Manassas* (taken from Porter 1886).

ram into the bank. The *Mississippi* poured broadsides into the ship until it eventually slid off the bank and floated downstream in sinking condition (Figure 25).

Farragut's own flagship, the *Hartford*, came close to being a casualty. Veering to avoid a fire raft, the *Hartford* struck a shoal and ran aground under the guns of Ft. St. Philip. The Confederate tug *Mosher*, the only vessel of the River Defense Fleet to take part in the fight, shoved the burning fire raft under the *Hartford*'s port quarter (Figure 26). The vessel caught fire along her port quarter but her crew managed to sink the fire raft, douse the flames on the ship, and wrench free of the shoal, her gunners sinking the *Mosher* (Figure 27).

Another of Farragut's fleet, the *Iroquois*, nearly was lost to the *Louisiana*. Caught in an eddy current, the great ship came athwart the *Louisiana*'s hawse with her starboard side nearly touching the stem of the Confederate ram. The three forward guns of the *Louisiana* poured shot into the *Iroquois*, but, unable to depress the guns because of the construction of the ports, were unable to hit the Union vessel below the waterline to sink her. The *Louisiana*'s commander, Charles F. McIntosh, believing the enemy would try to board, led his men to the upper deck, where he was mortally wounded (Figure 28).

As dawn broke, the fastest of the Union ships, the *Varuna*, found itself well ahead of the rest of the fleet, with the *Governor Moore* of the Louisiana State Navy in hot pursuit. By showing the same blue light in her tops as the Federal ships used as a recognition signal, the *Moore* had succeeded in getting so close to the *Varuna* that she only could fire at the Union ship by depressing her big bow gun and sending the shot through her own hull.

With most of the Federal fleet safely past the forts and most of the Confederate fleet sunk or in flames (Figure 29) the battle was over. Following the battle, only the *Defiance*, the *McRae*, the *Louisiana* and her two tenders, the *Landis* and the *Burton*, were still afloat. The *Stonewall Jackson* escaped the battle, but she was scuttled by her crew 13 miles above the forts (Scharf 1887).

With the Union fleet safely past the forts and his own troops in Fort Jackson in open mutiny, General Duncan was left with no alternative but to surrender. On April 28, 1862, Adm. David Porter, U.S.N., accepted General Duncan's surrender aboard the *Harriet Lane* (Figure 30). While negotiations were pending on the *Harriet Lane*, it was reported that the *Louisiana*, with her guns protruding, was on fire and adrift (Figures 31 and 32). Porter later claimed that the Confederates had attempted to send the ship, containing some 20,000 pounds of gun powder, to destroy the Union fleet then assembled under a flag of truce. Duncan later stated that the *Louisiana* was fired prior to the time that the Union vessels anchored and that there was no change in her position (OR XVI, 533). In Porter's initial report of the incident on May 2, 1862, he wrote:

> Had the *Louisiana* blown up in the midst of our vessels she would have destroyed every one of them. As it was, good fortune directed her toward Ft. St. Philip, when she exploded with great force, scattering fragments all over the work, killing one of her own men in the fort, and landing a large beam close to the tent of Commander McIntosh (the captain of the *Louisiana* during the battle), who was lying with one arm blown off, another broken, his kneecap shot away, and a leg broken (ORN I, XVIII:439).

Porter recounted in his memoirs that he said to the Confederate officers: "This is sharp practice, but if you can stand the explosion when it comes, we can" (Porter 1886:51). Porter's recollection seems to be somewhat faulty; a U.S. Court of Inquiry accepted testimony that the explosion of the *Louisiana* occurred before Porter had been made aware that the vessel was on fire and had released Mitchell from the "close arrest" under which Porter had placed him. Lieutenant Whittle, from the *Louisiana*, stated that he had been dispatched by Commander Mitchell to inform the Union flagship that the magazines and guns had

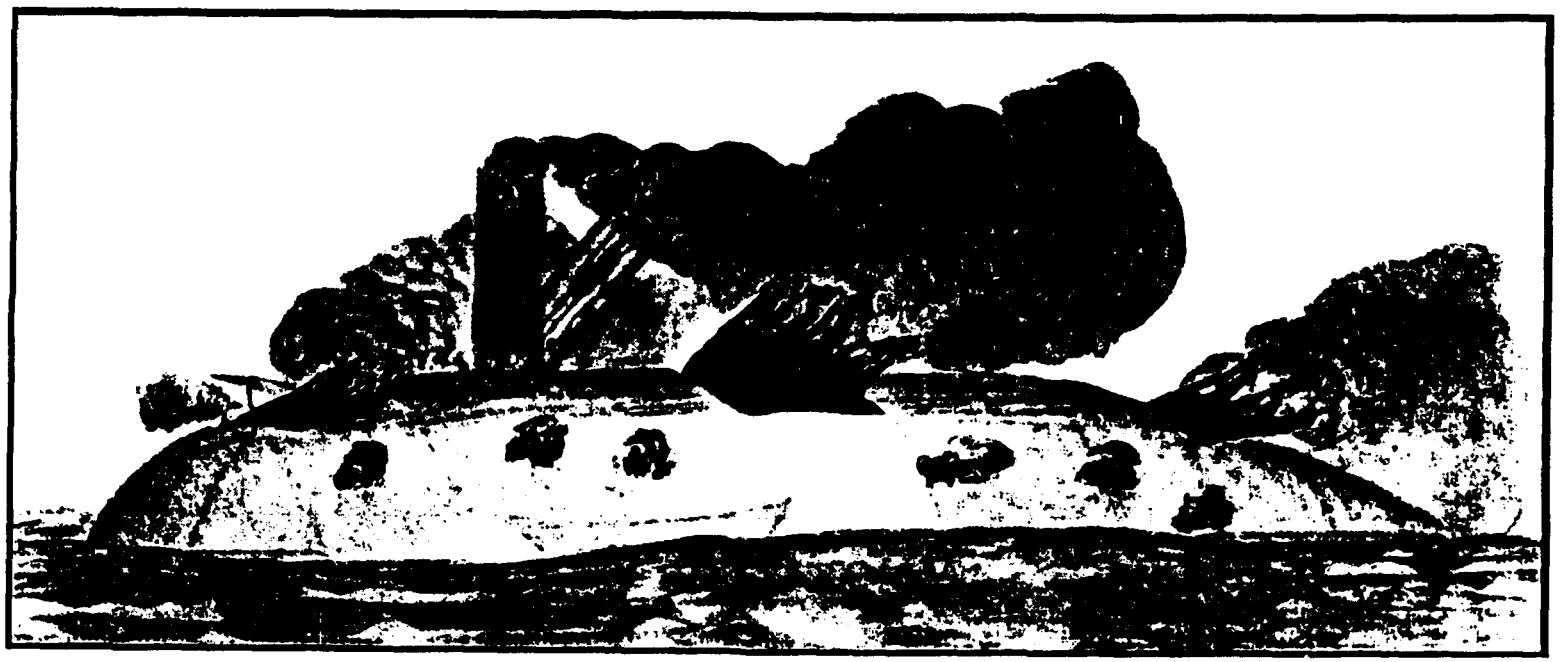


Figure 25. The C.S.S. *Manassas* in flames. Source: Naval Historical Foundation.

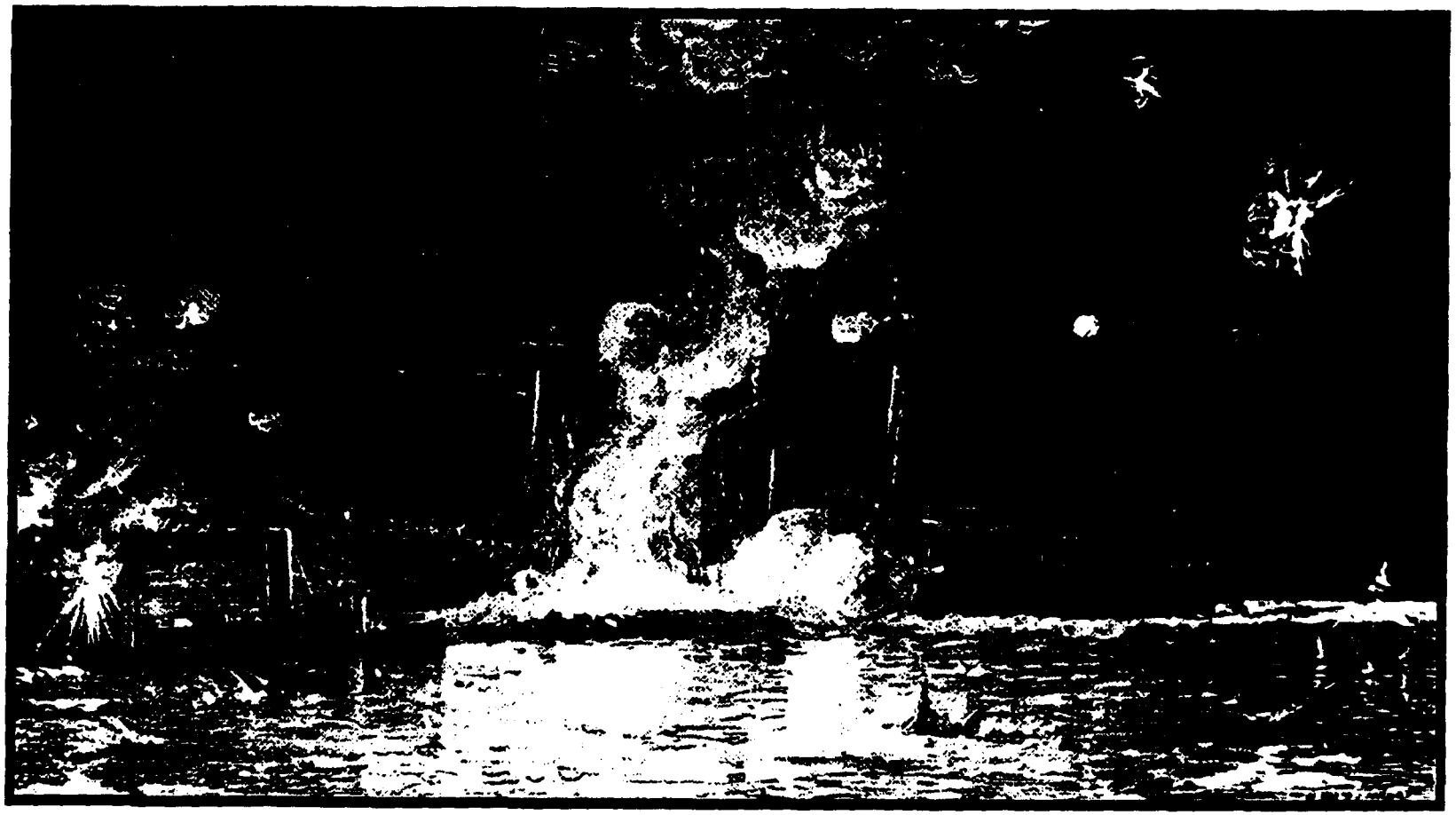


Figure 26. The *Mosher* pushing a fire raft against the U.S.S. *Hartford*. The *Mosher* is rendered inaccurately since it was an unarmed tug (taken from Porter 1886).

Figure 27. The C.S.S. *Louisiana* in combat with the U.S.S. *Hartford*. An unidentified River Defense Fleet ram is shown aground and sinking on the left. The tug *Mosher*, inaccurately shown as a gunboat, is shown pushing the fire boat into the *Hartford*'s port side (taken from Porter 1886).

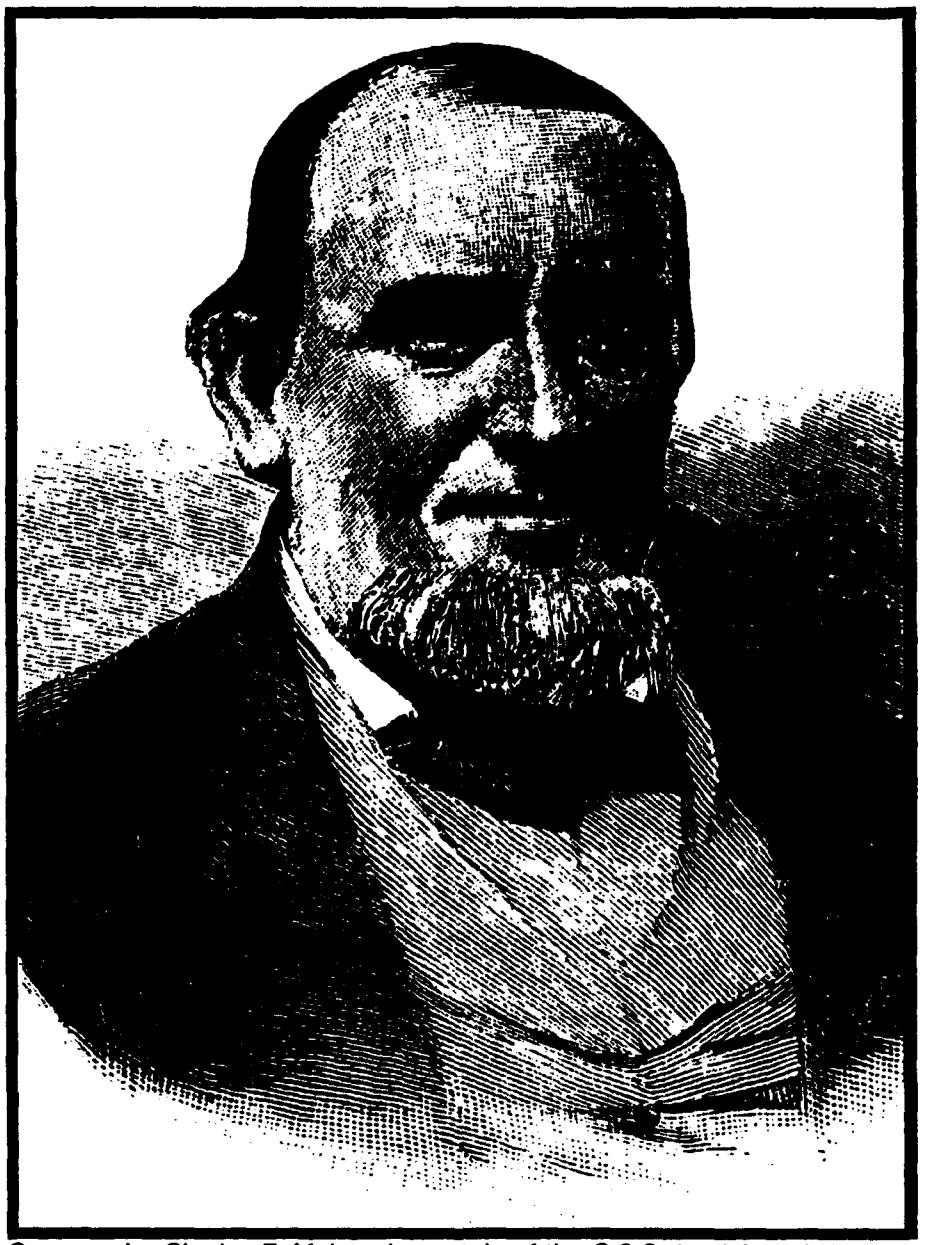


Figure 28. Commander Charles F. McIntosh, captain of the C.S.S. *Louisiana* (taken from Porter 1886).

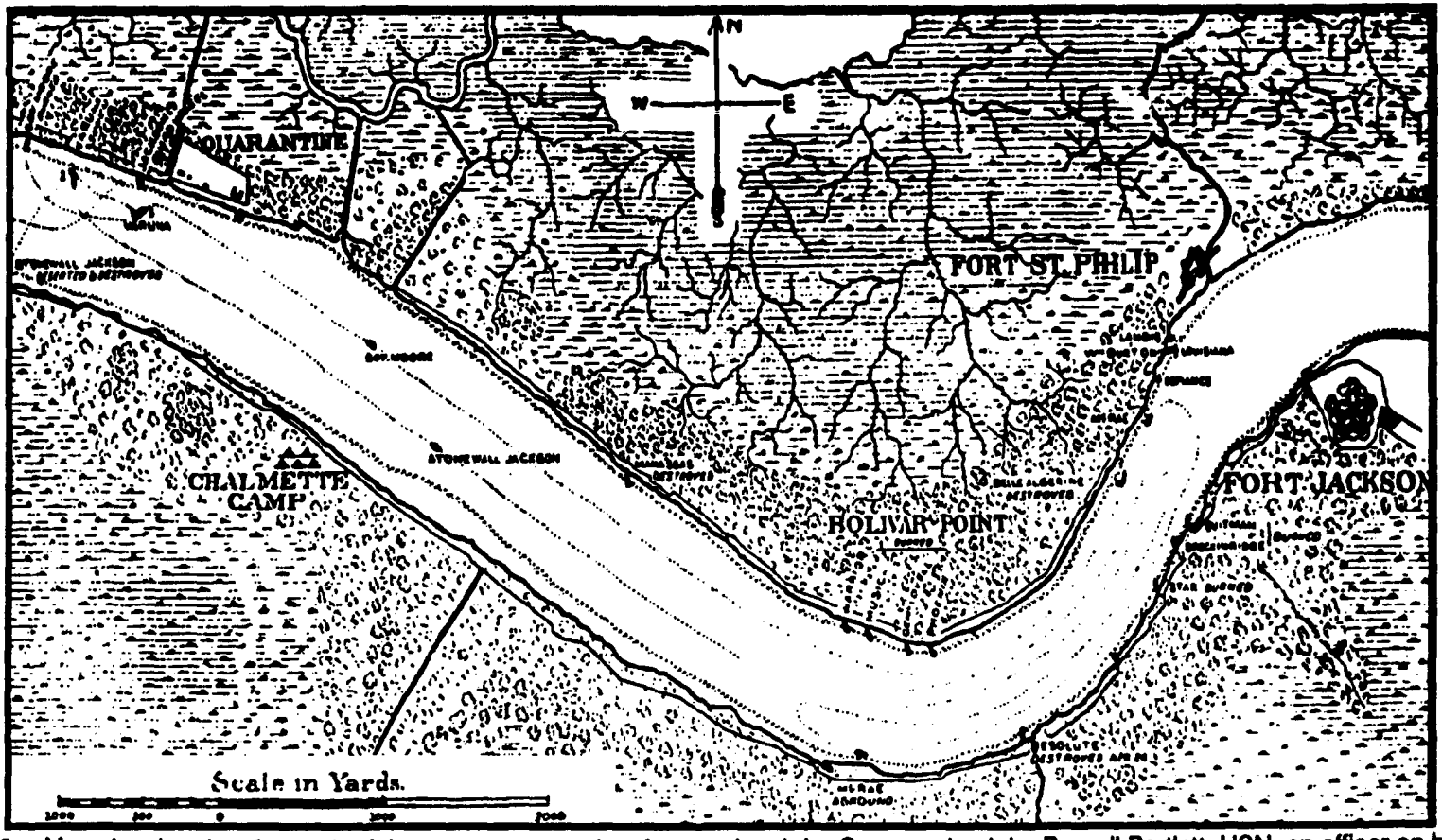


Figure 29. Map showing the aftermath of the engagement, taken from a sketch by Commander John Russell Bartlett, USN, an officer on board the U.S.S. *Brooklyn* (taken from Porter 1886).

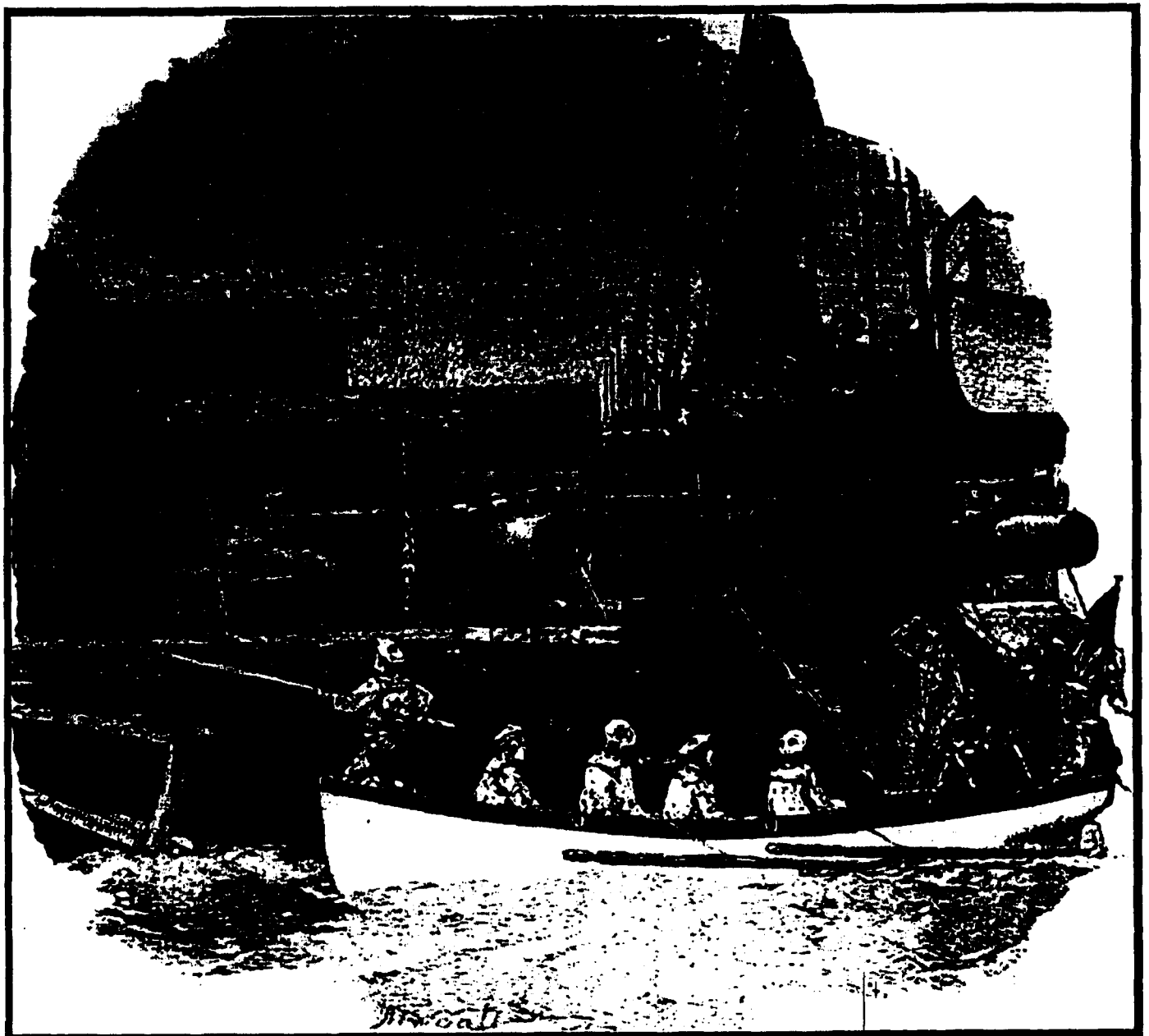


Figure 30. Commander Porter receiving Confederate officers on board the *Harriet Lane* to accept their surrender (taken from Porter 1886).

Figure 31. Explosion of the C.S.S. *Louisiana* (taken from Porter 1886).

Figure 32. The explosion of the C.S.S. *Louisiana*, drawn at the scene by William Waud for *Frank Leslie's Illustrated Newspaper* (taken from *Frank Leslie's Illustrated Newspaper*, May 24, 1862).

been drowned as much as possible and that the *Louisiana* had been set afire. The *Louisiana* exploded before he had covered a third of the distance separating the two ships. When Whittle turned to look, he saw that the *Louisiana* "had blown up at or near the spot where I left her" (Scharf 1887:298). While imprisoned in Ft. Warren, Lt. Whittle wrote that the *Louisiana* sank less than a ship's-length away from where she had been moored adjacent to the water battery at Ft. St. Philip (ORN I, 18:314).

In attempting to ascertain the possible present location of the *Louisiana*, it must be remembered that the level of the Mississippi River was exceptionally high during April 1862. General Lovell reported that, "the whole country became one vast sheet of water, which rose in the forts and covered places heretofore safe from its encroachment (OR XVI:513). General Duncan complained that the parade plain and casemates of Fort Jackson were generally submerged to a depth of 3 to 18 inches because of "the excessive rise in the river" (OR XVI:521). Yet another Confederate officer reported that:

> The river at this time was so high that the parade ground of the fort was covered with water, and we had 9 inches of water in the casemates. Traverses were built around the magazine doors, and an engine and a large detail of men with buckets were kept constantly at work day and night during the bombardment to keep the water out of the magazines (OR XVI:592).

By all accounts, the *Louisiana* remained moored to the bank until she was set afire. With the river at apparently 3 to 3.6 m (10 to 12 ft) above its normal level, the vessel most likely was moored close to the levee and just above the water battery on the upstream side of Fort St. Philip. The fire apparently parted her mooring lines at nearly the last moment and she drifted about 61 m (200 ft); the eddies kept her close to the shore. She must have been opposite the water battery, almost to the fort itself, when the magazine blew and she disappeared, almost instantly, beneath the water. A contemporary map of Fort St. Philip, drawn by the Federal officer in charge of destroying river obstructions, showed the *Louisiana* in precisely this position when she exploded (ORN I, 18:432) (Figure 33). Mitchell's report confirmed this, stating that, "being fired and abandoned, (the *Louisiana*) broke adrift from shore, and being caught in a eddy, blew up at about 10:45 a.m., near the water battery of Fort St. Philip" (ORN I, 18:299). One Confederate officer later quipped wryly that blowing her up was the only way she could be propelled on her own (ORN I, 18:346).

The *Louisiana* probably is not the only remnant of the battle for New Orleans that remains in front of Fort St. Philip. Some of the estimated 10,000 mortar shells that were rained on the two forts probably lie buried beneath the mud. The Confederate fireboats, consisting of flatboats filled with pine knots which the Confederates intended to send down amongst the Union fleet, were caught instead in a river eddy; these vessels also went aground directly in front of the fort. Duncan noted that the debacle over the fireboats was a source of frustration:

> Orders were repeatedly given to Captain Stephenson, of the river fleet, to cause the fire barges to be sent down nightly upon the enemy; but every attempt seemed to prove an abortion, the barges being cut adrift too soon, so that they drifted against the banks directly under the forts, firing our wharves and lighting us up, but obscuring the position of the enemy (OR XVI:524).

Remnants of these flatboats may be preserved along the shoreline.

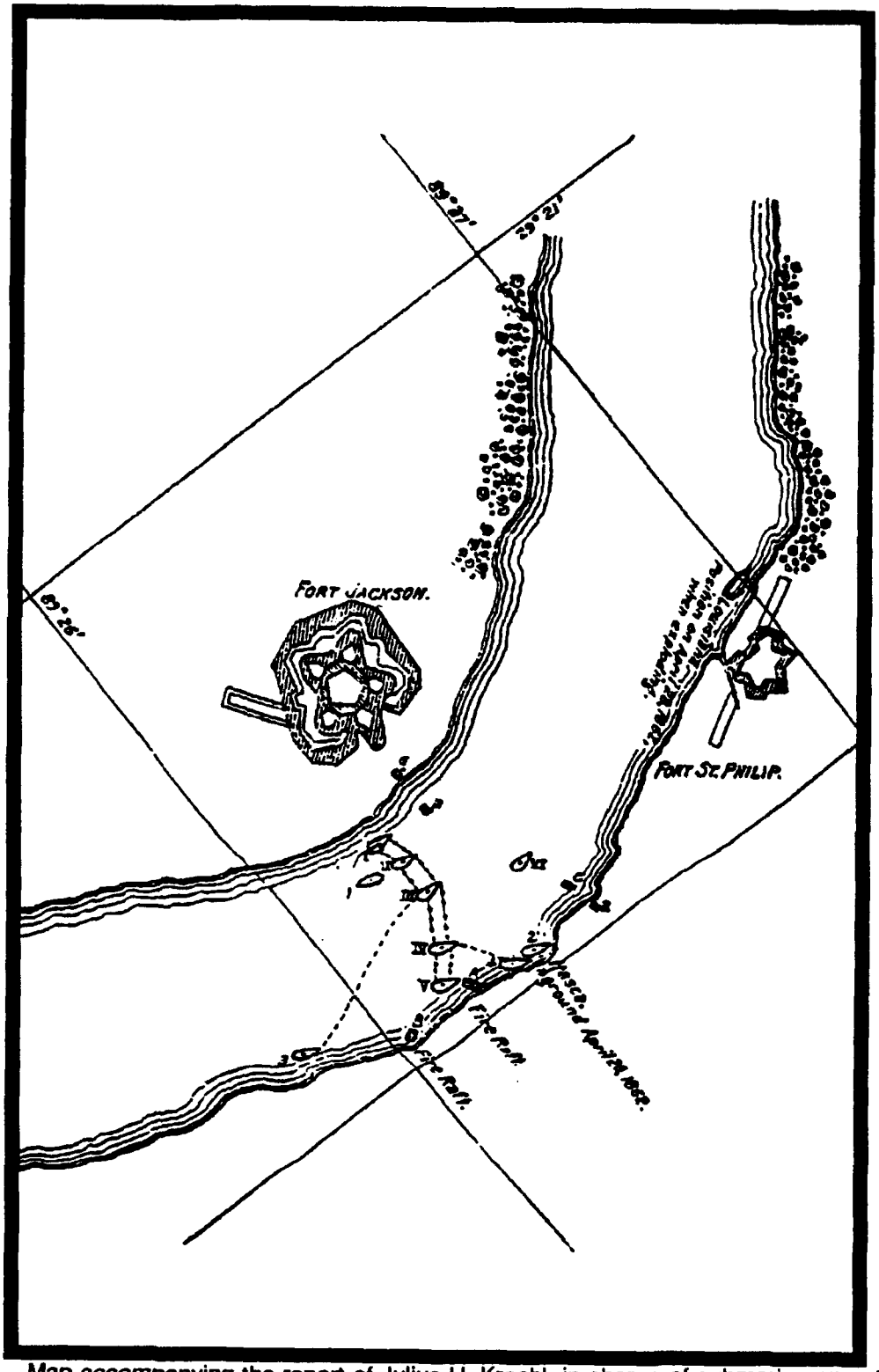


Figure 33. Map accompanying the report of Julius H. Kroehl, in charge of submarine operations in the Mississippi River, to Gideon Welles, Secretary of the Navy, June 2, 1862 (taken from ORN I, 18:432).

Other Confederate vessels besides the *Louisiana* were sunk in front of Fort St. Philip. The egregiously named River Defense gunboat *Defiance*, whose captain completely avoided the battle, was scuttled on April 28 by order of Commander Mitchell (ORN I, 18:297). Launch No. 6, one of the converted fishing boats, was burned with the *Louisiana*, presumably in the same spot (ORN I, 18:299). The *Belle Algerine* was sunk by another Confederate vessel, the C.S.S. *Governor Moore*, after repeatedly running afoul of the larger vessel while it was trying to leave its mooring to join the battle (ORN I, 18:305). Prior to the battle, the Confederate fleet had been just above the *Louisiana* (Scharf 1887:290).

Almost all of the Confederate fleet was lost in the battle. It is impossible to say which, if any, of these vessels came to rest at Fort St. Philip. Many of those vessels which were destroyed during the battle appear to have drifted down stream. Several commanders of Union mortar schooners recorded in their logs that the burning hulks of several side-wheel steamers were seen drifting past (ORN I, 18:385, 401, 404, 416, 421). In addition to the *Louisiana*, the remains of the *Defiance* and Launch No. 6 are most likely to be preserved beneath the batture mud in front of Fort St. Philip.

Post-Civil War Wrecks

In addition to the vessels discussed in relation to the present project, a number of other significant ships have sunk beneath the waters of the Mississippi River in the vicinity of the project area. Detro et al.'s exhaustive 1979 study *Mississippi River Ship and Boat Sinkings from the Delta to Baton Rouge* provides an extensive listing of vessels reportedly sunk in the area, although caution should be exercised concerning the positions of some of the vessels. A review of Corps of Engineers' records was made for the river section between M-27 and M-14 to collect data concerning possible removal of these vessels (U.S. Army 1866-1945). No reports of vessel removals were made in this area, presumably because the great depth of water in which many of these vessels sank precluded their becoming hazards to navigation. Saltus' (1983:38-39) reported discovery of what he believes to be remains of the *Warrior* lying in 6 to 26 m (20 to 85 ft) of water testifies to the potential presence of other vessel remains throughout the area.

The C.S.S. *Louisiana* in the Evolution of Confederate Naval Policy Concerning the Construction of Ironclad Ships of War

As discussed previously, the Confederate States of America began the Civil War without any naval vessels at their disposal. Individual states managed to confiscate some vessels for this purpose, but overall, any real naval power was lacking.

Resources were a major problem. The South lacked the industrial and shipbuilding facilities needed for a large-scale program of constructing warships. The foundries and shipyards that did exist dealt mostly with the construction of shallow draft river steamers. Two noteworthy exceptions were the Tredegar Iron Works in Richmond and the Gosport Navy Yard at Norfolk.

Tredegar Iron Works was the only facility within the new Confederate States of America with the capacity for rolling two-inch thick iron plates to use as armor for ironclad warships, as well as for any large-scale production of steam machinery and ordnance (Still 1969:10, 25-26). The Gosport Navy Yard also was of particular value to the Confederacy. It had been one of the best equipped navy yards in the United States before the war, and its seizure by the South yielded thousands of naval guns, miscellaneous naval craft, and the recently scuttled remains of the screw-driven steam frigate *Merrimack* that was destined to become the Confederacy's first and most famous ironclad warship (Still 1985:10).

Military leaders realized early in the conflict that it would be impossible through traditional means for the Confederacy to achieve any sort of capacity to meet the Union naval threat. Although there were some proponents for building a large fleet of small shallow-draft wooden gunboats, much like the ones constructed during Thomas Jefferson's administration, most realized that ironclad vessels were the Confederacy's only hope. Stephen R. Mallory, Secretary of the Confederate States Navy, regarded "the possession of an iron-armored ship as a matter of the first necessity" because any wooden warships that the Confederacy might build "would fall easy prey to [the United States'] comparatively numerous steam frigates." He felt that the numerical superiority of the United States' Navy "may be compensated by invulnerability," and that, without regard to initial cost, both economy and naval success dictated "fighting iron against wood" (ORN II, II, 52).

Once the die had been cast for the construction of a fleet of ironclad warships, it was necessary to decide what form they would take. The hull and decks of virtually every ironclad built by the Confederacy were largely submerged, and were topped with a sloping armored casemate (Figure 34). The reasoning behind this design was that the vessels would be harder to sink, because their hulls would be protected from direct artillery fire and the sloped casemates would resist penetration by causing the projectiles to strike glancing blows.

Motive power was another consideration. The paucity of facilities for the construction of powerful steam engines necessitated the "recycling" of available power plants. These consisted mainly of the small high-pressure steam engines used in paddlewheel river steamboats. However, paddlewheel steamers had some serious flaws when it came to being converted into warships. Secretary Mallory realized this and wrote to President Davis that:

> Sidewheel steamers, from the exposure of their machinery to shot and shell, and their ability to be disabled by a single shot, from the fact that if prevented from steering they are helpless as sailors; and that they can not carry to sea sufficient coal for any but short cruises, are regarded as unfit for cruising men of war (ORN II, II, 54).

These weaknesses appeared to dictate that the South build screw-powered steamers that were more maneuverable and less susceptible to being crippled by shot. The problem was that the engines that were available generally were unsuited to the task without undergoing major modifications. In order to produce the RPMs required to drive a screw, the engines had to have additional sets of gears added that would "gear them up" to the necessary speed (Robert Holcombe, personal communication 1992).

The Union military establishment already had begun to solve this dilemma. During the summer of 1861, construction was begun on the first generation of western river armored gunboats that would be instrumental in gaining control of the Mississippi River and its tributaries in the southern states. Technically, the small, one-gun ram C.S.S. *Manassas* was the first armored warship used during the war, but her one and one-half inch thick shield proved not to be particularly impervious to artillery shot. However, the seven "City Class" gunboats designed by marine engineer James B. Eads were the first armored warships to be used effectively in the Civil War.

While not true ironclads, since they were only partially armored, the Eads gunboats did incorporate some innovations that were used on later Union and Confederate ironclads. One of these innovations was that of placing the paddlewheels in a central waterway in the stern quarter of the vessels, affording them some protection from shot (Figure 35). One of these vessels, U.S.S. *Cairo*, became the first victim of another technical innovation of the Civil War: the torpedo (Bearss 1980:99).

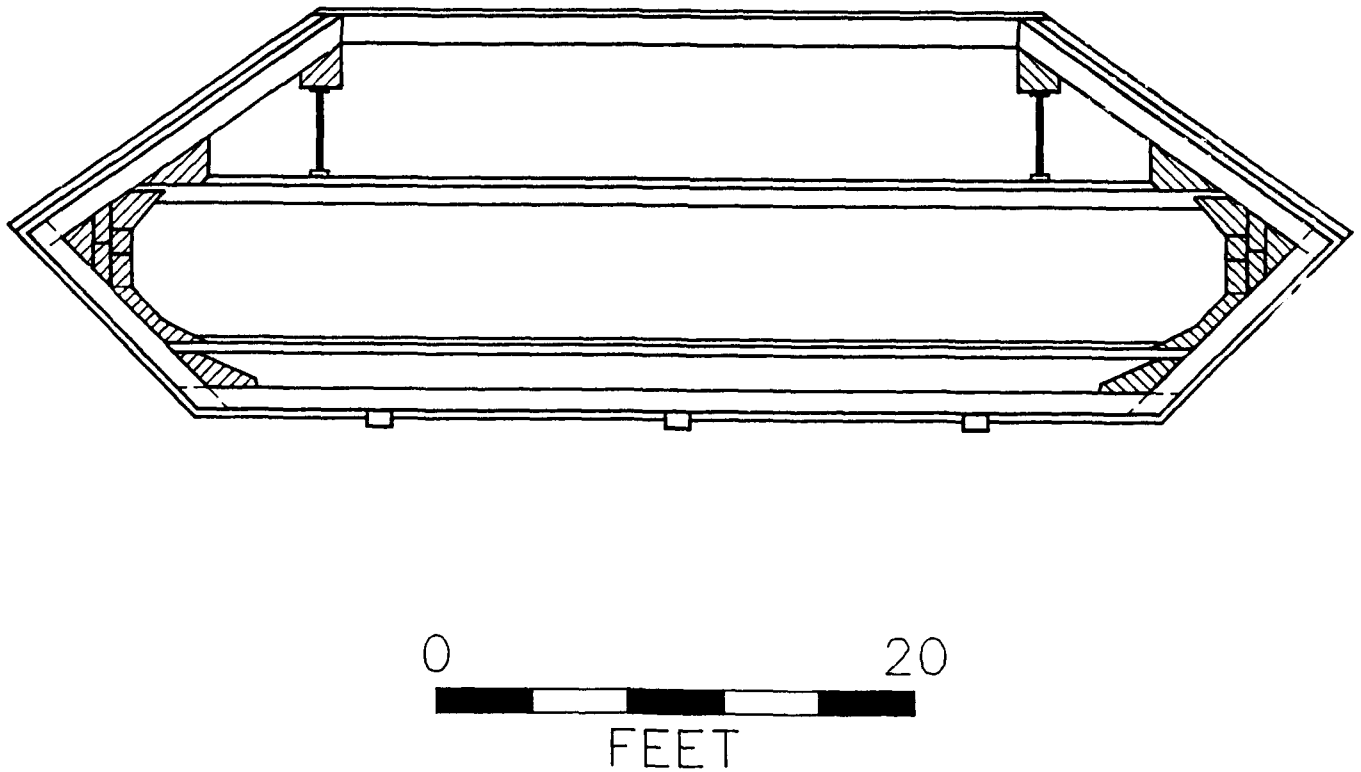


Figure 34. Cross-section of a typical Confederate ironclad. Courtesy of Robert Holcombe, Confederate Naval Museum.

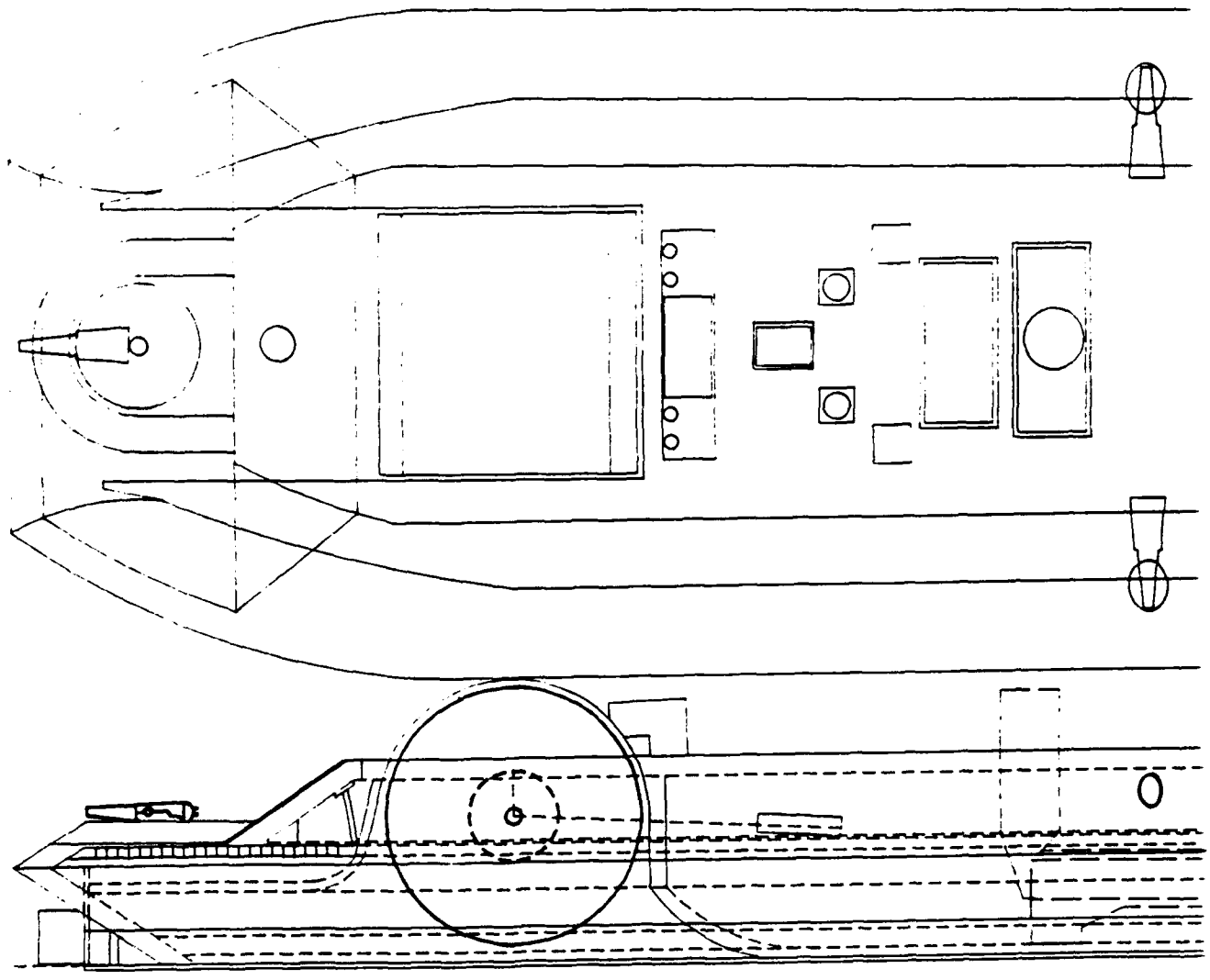
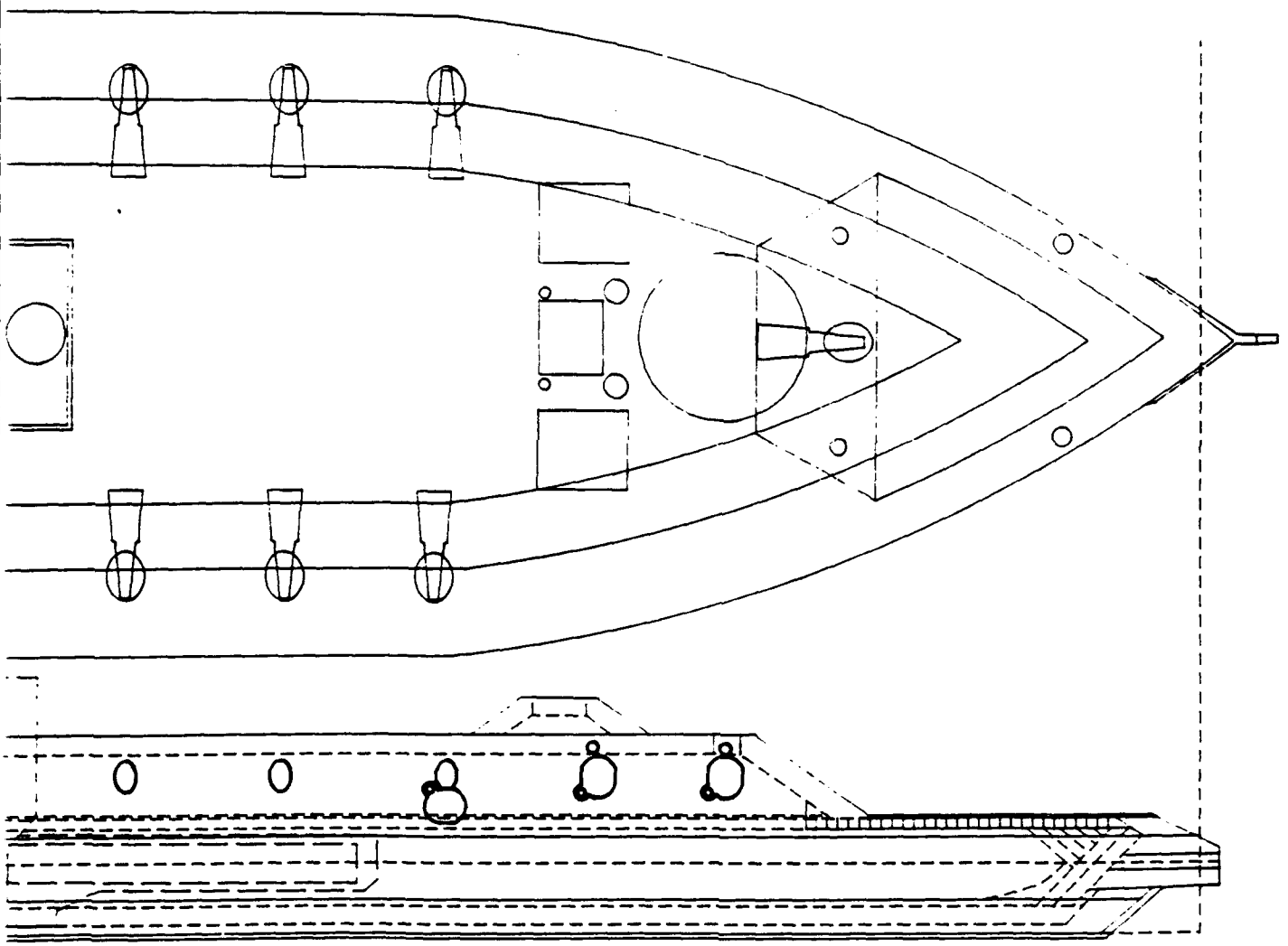


Figure 36. Plans for Confederate centerwheel ironclad. Courtesy of the Museum of the Confederacy, Richmond, Virg



. Richmond, Virginia.

This central paddlewheel design appealed to a number of persons involved in the development of the Confederate Navy. For one thing, a large supply of engines already was available for this purpose, thus reducing the cost and difficulty of building the vessels. Another advantage of the central paddlewheel, or any paddlewheel for that matter, was that vessels could be constructed with a much shallower draft than that required for screw-driven vessels. Considering that much of the combat in which these vessels would be involved was projected to take place in shoal coastal waters and in shallow rivers, the latter was a very important consideration.

The C.S.S. *Louisiana* was one of the Confederacy's earliest experiments with center paddlewheel ironclads, and also one of its most abysmal failures. The major idiosyncracy of the *Louisiana*'s design was her use of two central paddlewheels, one in front of the other. The result of this was that the wash caused by the forward wheel rendered the after wheel ineffectual. Also, an eddying effect of the wheels kept the rudders from acting properly, causing the vessel to be very sluggish in answering her helm (ORN I,XVIII:318). Had the two paddlewheels been placed side by side, it is possible that the *Louisiana* might have been able to make a reasonable rate of speed.

The Union's City Class gunboats also had some difficulty in perfecting their center paddlewheel design. On her trial run down the Mississippi River from St. Louis to Cairo, Illinois, the U.S.S. *St. Louis*, later renamed *Baron de Kalb*, experienced a number of troubles related to her design. Her first captain, Commodore John A. Winslow, reported that the *St. Louis*, upon attempting to back upstream, was caught off line by the current and became unmanageable. Winslow suggested that this problem could be solved by "trimming the vessels by the heads" and increasing steam pressure to 140 pounds. In order to trim the vessel he recommended "continuance of the casing [armor] to the forward end of the casemates." Three benefits derived from this modification would be "increased ease in steering", "increased freedom for discharge of the water from the wheels", and "increased security for protection of her men in fighting" (Winslow 1861).

The failure of the *Louisiana*'s design did not deter the Confederacy from pursuing a program of central paddlewheel ironclad gunboats. On the contrary, the Confederate Navy Department contracted for the construction of at least five, two of which, the *Muscogee* (*Jackson*) and the *Missouri*, were completed. A general plan for these vessels was prepared by Confederate Naval Constructor John L. Porter (Figure 36). The *Muscogee* was built at Columbus, Georgia and the *Missouri* was built at Shreveport, Louisiana (Robert Holcombe, personal communication 1992).

The *Muscogee* was plagued with many of the same problems as the *Louisiana*. A scarcity of machinery, building materials, and trained workmen slowed construction considerably. When an attempt was made to launch her, she would not come off the ways. Porter determined that the vessel was too heavy with the paddlewheel; he recommended that she be lengthened and that her means of propulsion be changed to twin screws (Robert Holcombe, personal communication 1992). Figure 37 illustrates the physical results of this conversion. In the end this change and the delays it caused doomed the *Muscogee*. Her draft was so great that low water kept her from being able to flee advancing Union cavalry during the spring of 1865. Federal forces burned her in the Chattahoochee River below Columbus (Still 1969:52).

With the losses of New Orleans to Farragut's fleet and the central Mississippi River defenses at Island Number 10 during April of 1862, and the fall of Memphis in June to the Union's Western Flotilla, the Confederacy's last bastion of defence in the west was Vicksburg, Mississippi. As long as Vicksburg stood it kept the two Federal fleets from joining together and controlling the Mississippi River through the heart of the beleaguered South. Vicksburg kept open the vital link with the trans-Mississippi states of Arkansas, Louisiana, and Texas, all of which could supply the Confederacy with much needed resources.

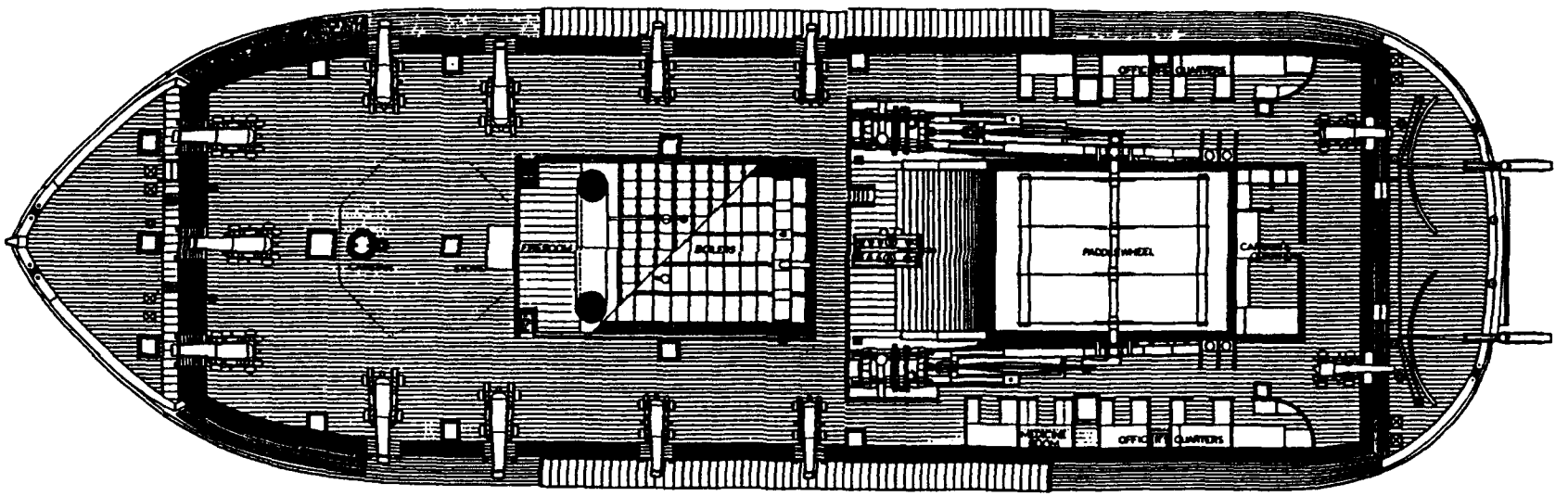


Figure 35. Plan view of gundeck of the *City Class* gunboat showing the central paddlewheel well (taken from McGrath and Ashley 1981).

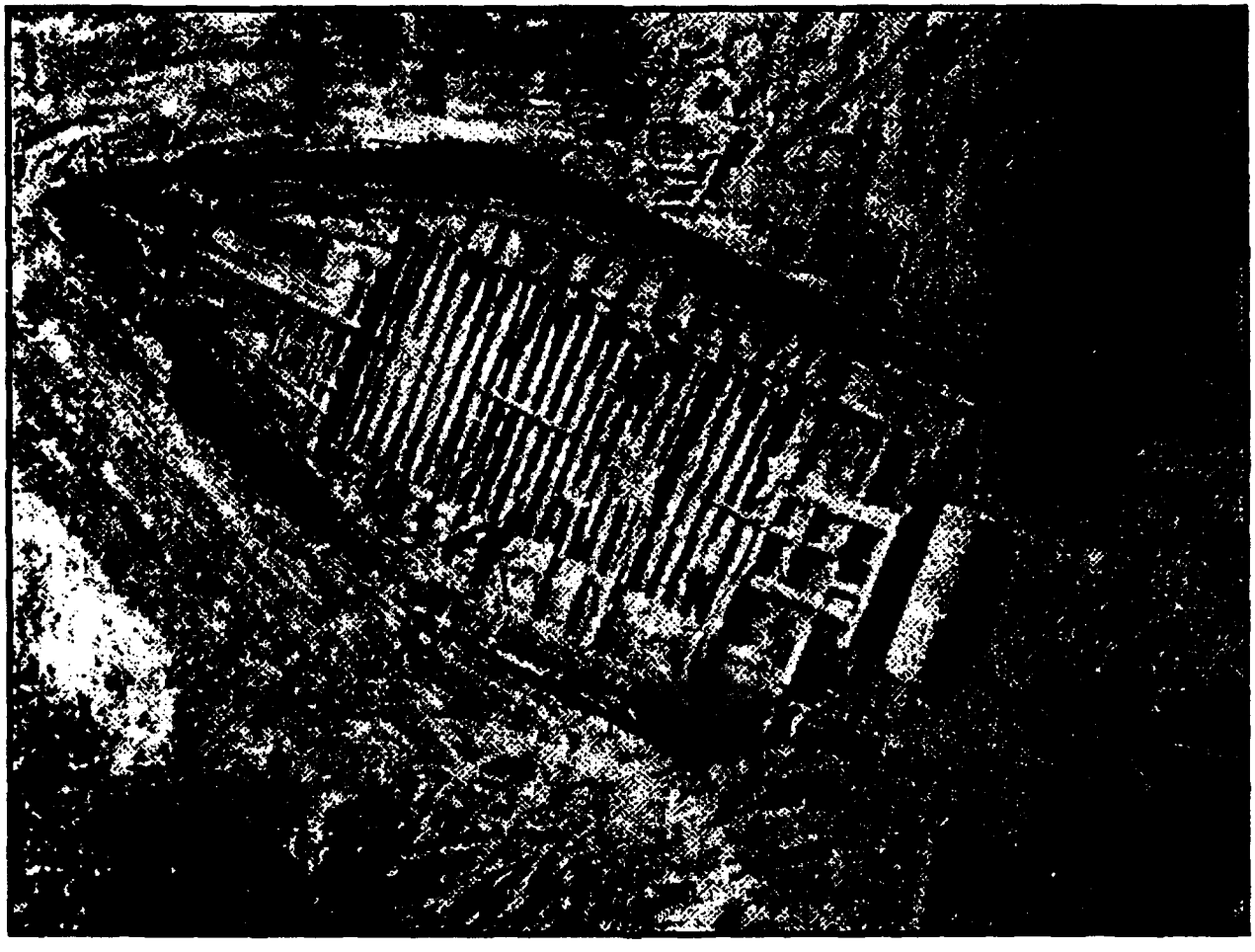


Figure 37. Stern of the C.S.S. *Jackson* (Muscogee) showing signs of alteration from center paddlewheel to screw propulsion (taken from Lang 1981).

The captain of the *Missouri*, Lt. Jonathan H. Carter, recognized this. In June of 1863 he wrote to Secretary Mallory:

> The importance of constructing gunboats for the defence of the Miss. River must be evident to the Dept., and since no other vessels can be built by private contract for the price fixed by the Dept. I would earnestly recommend that a Naval Constructor be sent here and a Navy Yard established by the Govt. No signs of peace are visible, and this arm of the country's defense should in my opinion be strengthened (Carter 1863).

Although the *Missouri* was completed and put into service, it came too late. On July 4, 1863, Vicksburg surrendered to forces under the command of General Ulysses S. Grant, giving the North clear and undisputed control of the Mississippi River. Earlier that same week the Confederacy suffered another major blow as its forces under Robert E. Lee were defeated at Gettysburg, Pennsylvania, in a bid to take the war to the north. These two events, more than any others during the war, doomed the Southern cause.

CHAPTER V

SURVEY FIELD METHODS

Terrestrial Survey

Data Collection

A magnetic survey of approximately 6.1 ha (15 ac) of shoreline was undertaken along the left descending bank of the Mississippi River between RM M-20.5 and 19.5-L. The survey employed two Geometrics G856 proton precession magnetometers to record magnetic readings in gammas; one unit served as a mobile data collector and the second as a base unit to record diurnal variations in the ambient magnetic field at an arbitrarily selected control point. It also served as a backup in the event that the mobile collector failed to perform while in the field. The G856 is designed specifically to be a portable, yet highly accurate, unit having a measured variability of less than plus or minus 0.1 nanoTesla (nT) (gamma). Magnetic readings, in nanoTeslas, may be recorded at pre-set time intervals or selectively recorded by the operator. During survey, the base unit was set to acquire a reading every two minutes while the mobile unit was activated by the operator at the interstices of a pre-determined grid net. Up to 2,500 readings may be stored on the G856's internal firmware. The data then may be transferred through a standard RS232 port to an IBM-compatible computer for processing. The data initially were processed using MAGPAC software supplied by Geometrics, Inc. Data contouring later was performed with Golden Graphics software.

A control grid was established for the terrestrial magnetic survey (Figure 38). East-west transect lines were established at 10 m (33 ft) intervals along the width of the batture parallel to the river. The transects were divided into 50 m (164 ft) long survey blocks of variable width; survey blocks generally were between 40 and 60 m (131 and 197 ft) wide, depending upon the width of the batture. Magnetic data were collected at 2 m (6.5 ft) intervals along each transect. Control was provided by means of a non-magnetic mylar tape stretched the length of the 50 m (164 ft) transect. The survey of each 50 m (164 ft) long block required between one and one and one-half hours to complete; approximately 900 readings could be acquired in one day.

Environmental conditions in portions of the survey area inhibited the efficient collection of data, although the field work generally was favored by low water conditions, which permitted land access to many areas that otherwise would have been submerged. A portion of the survey area, near the upstream end, was characterized by a partially inundated swamp infested with biting flies and mosquitoes. Although survey of these near-shore areas was timed to coincide with low tide, work in this area was slow because members of the survey party frequently worked in knee-deep mud.

Data Analysis

Magnetic prospection is an effective and economical means of providing a broad overview of the distribution of cultural remains within historic sites. Several forms of cultural behavior perturb the magnetization characteristics of the subsurface and yield corresponding perturbations of the geomagnetic field that may be used to obtain information about the subsurface distribution of human disturbances (Frese and Noble 1984:39).

Magnetometers first were applied to terrestrial archeology in England in the 1950s for the exploration of the internal structure of Iron Age hill-forts (Aitken and Tite 1964; Fowler 1959, 1960). Later improvements in the equipment permitted greater refinement of methodology to allow for the special conditions of application required for archeology (Linington 1970:101). The Indiana Historical Society was the first

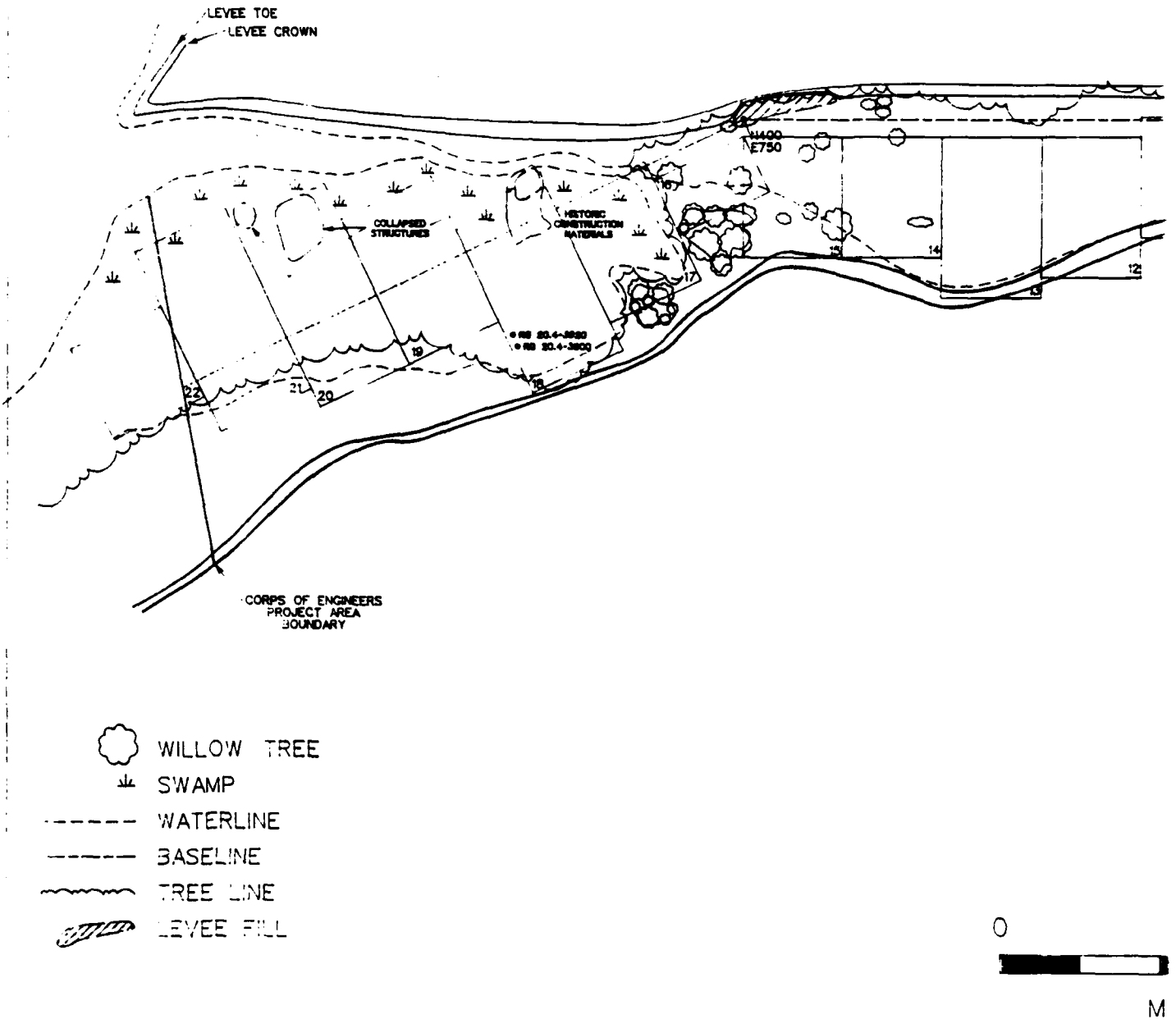
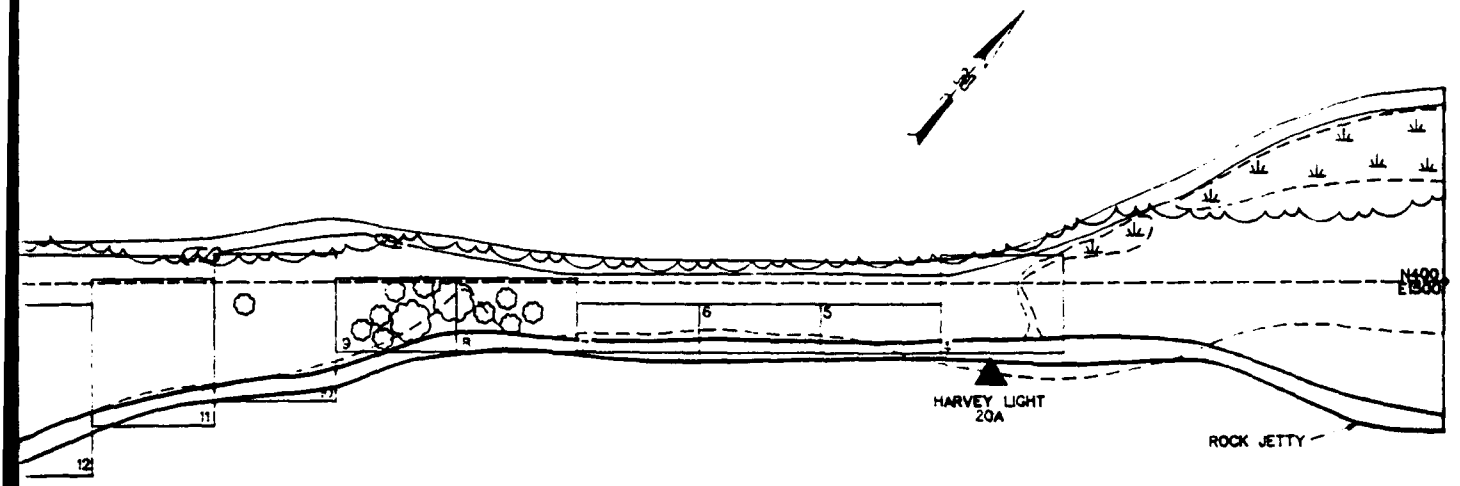


Figure 38. Plan view of the project area showing the location of the terrestrial survey grid.



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organization in North America to apply magnetic prospection to archeological sites with tests at Angel Mounds, Indiana, and at Wetherill Mesa, Colorado (Black and Johnston 1962:201-202; Johnson 1961:71).

Typically, terrestrial magnetic surveys have been conducted to define internal patterning within discovered sites. However, they also have been used successfully to discover sites. For example, the riverboat *Bertrand* was found by magnetic survey through widely spaced traverses over the portion of the river channel where it was known to have sunk (Petsche 1974:28-29). The *Bertrand* survey serves as a direct analogue for the terrestrial survey conducted in front of Fort St. Philip during the present investigation.

Unlike other terrestrial magnetometer surveys that have sought to locate and characterize subsurface features such as hearths, fire and refuse pits, burials, wells, building foundations, and discreet artifact concentrations (Aitken 1964; Frese and Noble 1984; Tite 1972), the desired result of the Fort St. Philip survey was the discovery of vessels lost as a consequence of events associated with the Civil War. Historical sources had suggested that at least three Confederate vessels, the ironclad ram C.S.S. *Louisiana* and the converted towboats *Defiance* and *Launch No. 6*, had been destroyed purposely in front of Fort St. Philip (Scharf 1887). Subsequent sediment deposition in front of the fort, combined with the extremely high water conditions that prevailed when the ships sank in April 1861, made the present batture area the most likely location for the remains of these vessels. Other potential targets that could be discovered in this area include historic wharfs and other structures associated with river transportation which serviced the fort.

Since the targets that were anticipated as a result of the development of the research design were relatively large structures (the *Louisiana* measured 264 ft long and 62 ft in the beam), as opposed to small isolated features displaying a low magnetic incidence such as might be anticipated on a habitation site, the magnetic data were analyzed as if they had been acquired during a marine survey. The analytical methods are described more fully in the following sections of this chapter.

River Survey

Data Collection

A magnetic and acoustic survey of the submerged portion of the project area was accomplished using a Geometrics G866 marine magnetometer, an EG&G 260 sidescan sonar, and a recording fathometer. Positioning control was maintained by a LaserTrak range: azimuth positioning system which simultaneously stored x and y position fixes on a magnetic medium at 3-second intervals and sent position fixes through an RS232 port to the magnetometer to annotate the magnetometer strip chart. The strip chart printed both the actual readings in nanoTeslas and a graphic line chart. Following survey, a magnetic contour map was produced; the x and y values represented Louisiana state plane coordinates and the z values were the magnetic readings in gammas.

Originally, the magnetometer survey was to have been conducted along survey lanes spaced 15 m (50 ft) apart. However, due to time constraints and highly variable weather conditions, four alternating lanes were not surveyed. This reduction resulted in lane spacing of 30 m (100 ft) for the four survey tracks closest to the center of the river; a lane spacing of 46 m (150 ft) generally is recognized as adequate for the detection of shipwrecks. No significant anomalies were detected along these four tracks.

The acoustic survey was performed after the magnetic survey was completed and was aimed principally at examining areas close to the shoreline where significant magnetic anomalies had been detected. Such bottom features as the mouth of Mardi Gras Bayou, the rock revetment lining a portion of the shore and natural scours, and sand waves clearly were evident using the EG&G's 100 KHz setting. The sonar fish was towed off the starboard side of an 18-ft aluminum survey boat about three feet under water.

Tracks were run parallel to the shoreline with range settings of 200, 100, 75, and 25 m (656, 328, 246, and 82 ft).

Data Analysis

The magnetic data were contour plotted for analysis and location identification of perturbations in the normal background magnetic field. Analysis of each anomaly included an assessment of the magnetic signature and an inspection of the sidescan sonagram.

Magnetic data were assessed on the basis of the deviation of the magnetic field in gammas, the detectable duration of the signature; signature characteristics (negative or positive monopole, bipolar or multicomponent); and spatial extent (detectable over multiple track lines). Acoustic signatures were analyzed on the basis of characteristics such as shape, relief, and spatial extent.

Numerous attempts have been made to characterize the types of magnetic signatures made by shipwrecks. Clausen (1966) and Clausen and Arnold (1976) suggested through an examination of early sailing vessels in Florida and Texas that their signature consisted of "a central area of magnetic distortion characterized by a number of intense and generally localized anomalies surrounded and, depending upon the depth and dispersion of the wreck, in some instances, interspersed by scattered, smaller magnetic disturbances." Later work by Watts (1980) demonstrated that shipwreck sites can generate minimal signatures, producing broad-based, 20-gamma anomalies. A magnetic survey of known eighteenth century ferries located in the Cape Fear River near Wilmington, North Carolina, produced no reliably detectable signature (Watts 1983).

Studies conducted on vessels dating after 1850 suggest that large ships of this period generate magnetic perturbations in excess of several hundred gammas. Work on iron or steel hulled ships of the Civil War period by Irion (1986) and Garrison and Anuskiewicz (1987) has indicated that such vessels produce a multicomponent signature in excess of several hundred gammas. Subsequent efforts directed at groundtruthing similar anomalies in Mobile Bay revealed that modern debris can generate virtually identical signatures (Irion 1986; Irion and Bond 1984). Archeological groundtruthing on the Tombigbee River (Saltus 1976; Saltus and Murphy 1981), the Elizabeth River, Virginia (Watts 1982), in Mobile Bay (Irion 1986; Irion and Bond 1984), and Matagorda Bay, Texas (Arnold 1981) have established that, while certain characteristics can be associated with various types of shipwreck sites, it is impossible to identify them on the basis of magnetic data alone. Watts (1986:4) observed that "the remains of vessels can be demonstrated to generate every type of signature and virtually any combination of duration and intensity."

Although magnetic data are not always reliable in identifying historic shipwrecks, such is not the case with acoustic imaging. The processed sonagram record produced by state-of-the-art sea floor mapping equipment such as the EG&G 260 can yield an image of almost photographic quality. The War of 1812 schooners *Hamilton* and *Scourge*, lost in Lake Ontario, and the *H.M.S. Breadalbane*, lost in Resolute Bay in 1852, are classic examples of high structural integrity and photographic quality sonar images. However, in cases where structural integrity is no longer preserved, or where sites are buried totally or partially in bottom sediments, identification can be extremely difficult, if not impossible (Watts 1982). Generally, the remote sensing survey produces targets that must be groundtruthed to determine their significance.

CHAPTER VI

ANALYSIS AND INTERPRETATIONS OF REMOTE SENSING DATA

Magnetic Data Analysis

Contouring of the magnetic data revealed nine major anomalies. For purposes of discussion, these anomalies have been assigned alphabetical designations, i.e., Anomalies A through I (Figure 39). In addition, numerous point source anomalies also were detected; however, tests at several of these smaller point source targets demonstrated a direct association with 208 liter (55 gallon) steel drums or radial automobile tires. Therefore, only those anomalies which were judged to be of sufficient duration and amplitude to represent potential nineteenth century watercraft are addressed in this discussion.

The analysis of the magnetic contour plot demonstrates conclusively that all the larger, potentially significant anomalies are located beneath the batture. All offshore anomalies identified during survey correspond to much stronger perturbations on land, and they appear to represent residual magnetism rather than the nearest location of the ferrous material producing the signature.

An ambient field of 49,700 gammas (γ) was observed throughout the period of survey. Gamma amplitudes are derived as a function of deviation from this ambient field. In the case of bi-polar anomalies, gamma amplitudes are given as the difference between the highest and lowest detected variation.

Anomaly A

Anomaly A, located in Block 10, was a 512γ negative monopole with a detectable duration of 20 m (66 ft). The main concentration of the anomaly was located near the levee, but signals continued to be detectable over a 20 m (66 ft) wide swath trending eastward toward the river. Evidence of this perturbation of the magnetic field also was observed in the offshore survey of the two track lines closest to shore. The duration and amplitude of this anomaly is consistent with the signature produced by wooden-hulled steamboats. This anomaly could represent one of the Confederate River Defense Fleet vessels that was run aground intentionally under the guns of Fort St. Philip during the engagement of April 24, 1862.

Anomaly B

Anomaly B was a 774γ positive monopole detectable over an area of approximately 900 m^2 (9,688 ft^2) in Block 13. The detection field of this anomaly was confined to the area immediately adjacent to the levee. Its proximity to the fort suggests the possibility of some association with the events of the battle, although it is impossible to ascertain the source of the target at present.

Anomaly C

Anomaly C is a 992γ bi-polar anomaly detected over an area of approximately 55.74 m^2 (600 ft^2) on the river side of the batture in Block 14. An anomalous zone also was detected off-shore on the track nearest the revetment. The duration and amplitude of this anomaly is consistent with the signature produced by wooden-hulled steamboats, and it could represent one of the Confederate River Defense Fleet vessels that was run aground intentionally under the guns of Fort St. Philip during the engagement of April 24, 1862.

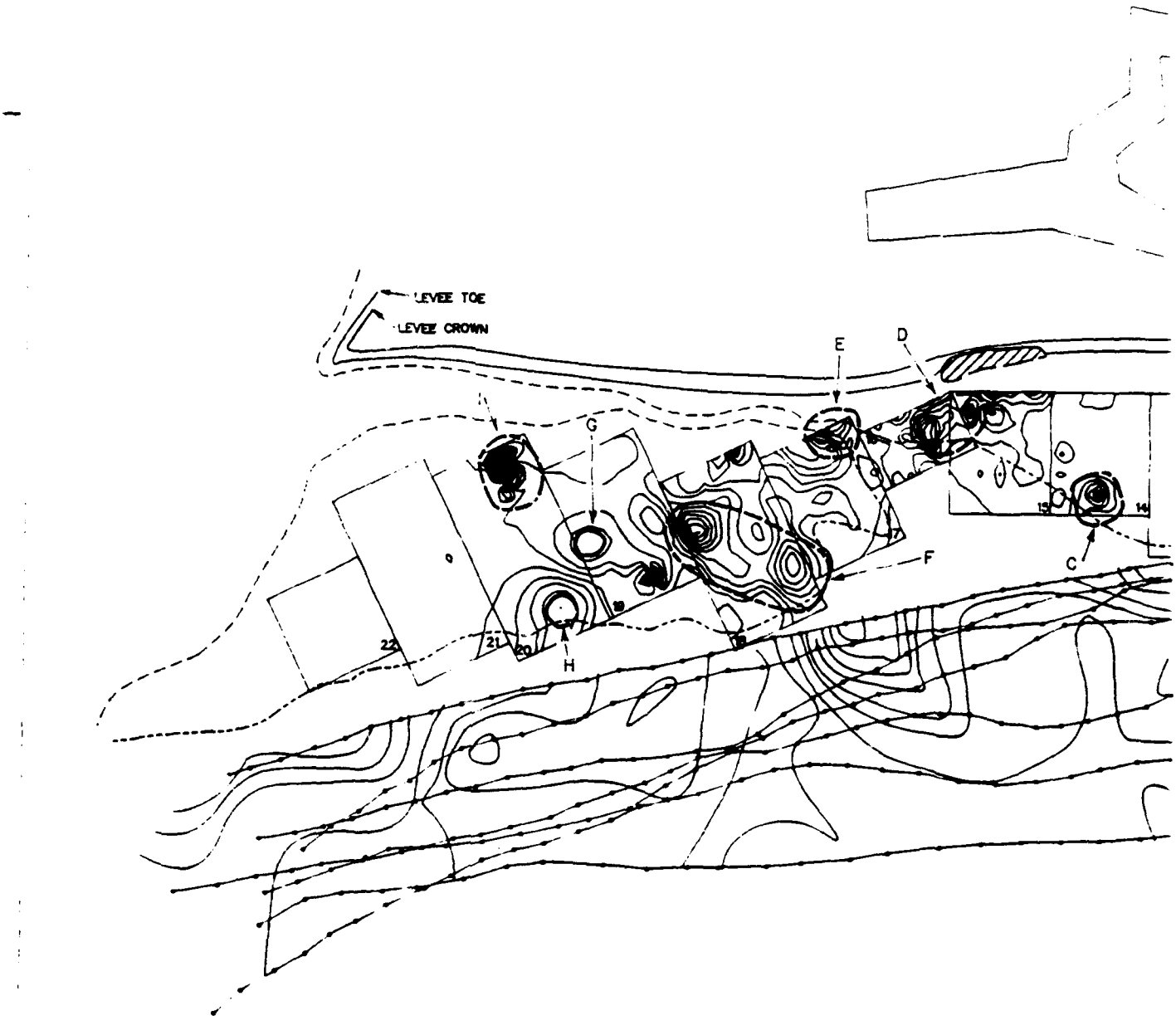
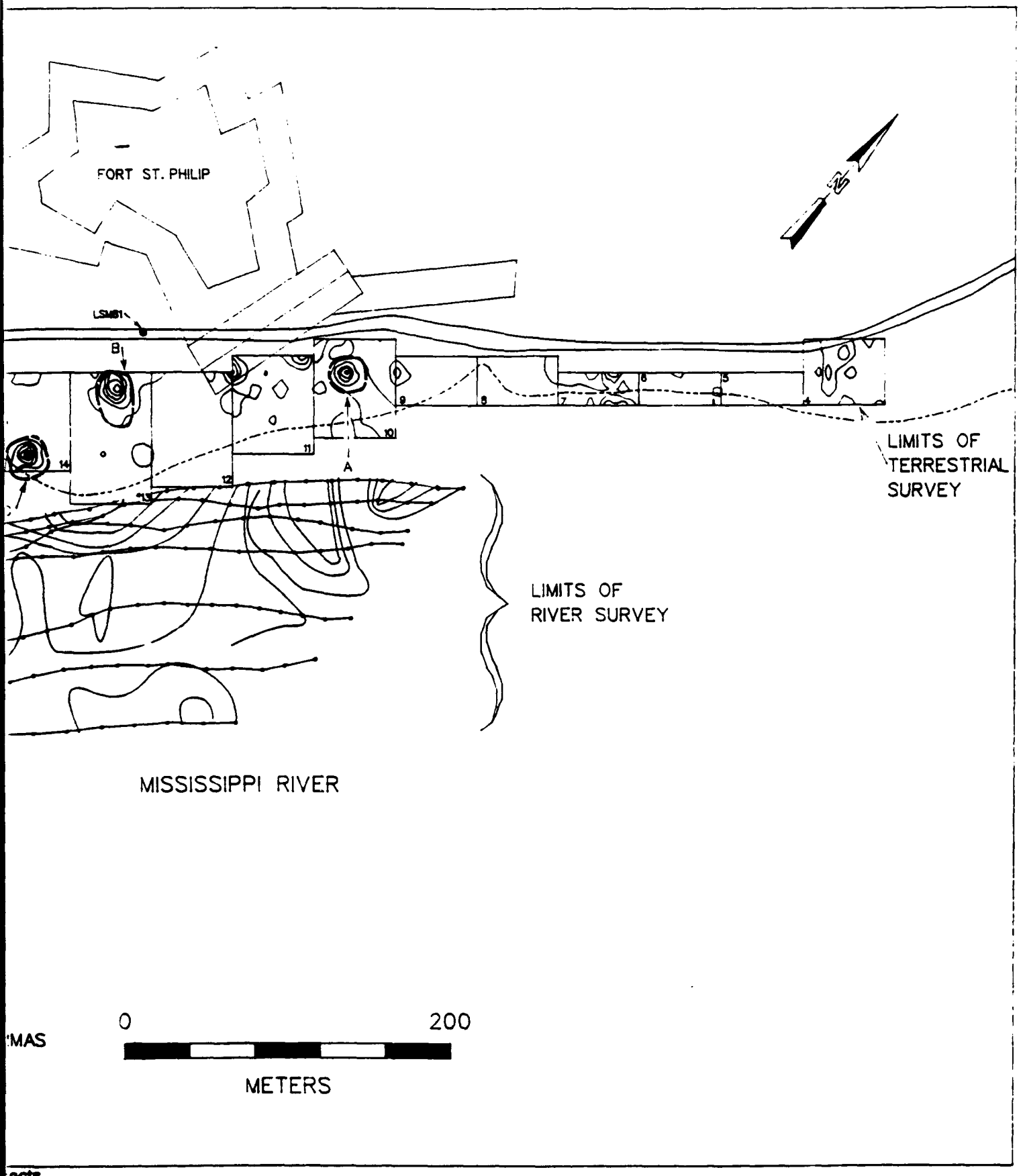


Figure 39. Magnetic contour map of the project area showing anomaly locations and marine survey transects.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SURVEY
LIMITS OF
RIVER SURVEY
MISSISSIPPI RIVER
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ects.

Anomaly D

Anomaly D, located in Blocks 15 and 16, is a complex multi-peaked anomaly with a maximum magnetic deviation of 530γ from the ambient field. The appearance of this anomaly corresponds with the shoreward terminus of a collapsed wharf and the ruins of a structure shown on a 1917 map of Fort St. Philip (Figure 38). A great deal of modern debris, including refrigerators and washing machines, which apparently were used to close a gap in the levee, also was observed. The magnetic signature of this anomaly is consistent with that of a debris field of a twentieth century structure.

Anomaly E

Anomaly E is a relatively localized 984γ bi-polar anomaly with a detectable diameter of approximately 45 m (148 ft); it is located at the northern end of Block 17. The appearance of this anomaly coincides with the observance of a concentration of twentieth century structural debris.

Anomaly F

Anomaly F is a large, complex dipolar anomaly with a maximum detected amplitude of 1,500 γ. The anomaly occupies nearly the entire area of Block 18, but it is concentrated primarily in a zone measuring 90 x 30 m (295 x 98 ft). A comparison between the position of this anomaly and a map drawn in 1862 under the direction of Flag Officer David Farragut to guide the Union mortar shelling of Confederate positions shows a close correlation with the reported position of the C.S.S. *Louisiana* (Figure 33). Anomaly F's signature appears to be consistent with that reported for other iron-hulled and iron-clad ships of a size similar to that of the C.S.S. *Louisiana* (Garrison and Anuskiewicz 1987). Based upon the Half-Width Rule for estimating the depth of anomalous magnetic targets, Anomaly F is located 6 to 7.6 m (20 to 25 ft) below present ground surface (Breiner 1973:31). There is strong evidence to suggest that Anomaly F represents the final resting place of the ironclad C.S.S. *Louisiana*. Moreover, since there is evidence that the vessel was completely buried within 25 years of its sinking, there is good reason to assume that whatever remained of the ship after the explosion is well preserved.

Anomaly G

Anomaly G is a relatively confined target exhibiting a magnetic amplitude of over 1,500γ. Located on the western edge of Block 19, the anomaly produced a bipolar signature with a duration of 18 m (59 ft). Its close proximity to Anomaly F suggests that the targets may be related.

Anomaly H

Anomaly H is a broad bi-polar anomaly located in Blocks 19 and 20; it exhibits a magnetic deviation of 924γ. Its proximity to Anomalies F and G suggests that these three anomalies may represent the C.S.S. *Louisiana* and its associated debris field. Alternatively, this anomaly may represent the remains of Launch No. 6, which was burned at the same time as the C.S.S. *Louisiana*.

Anomaly I

Anomaly I, located in Block 20, is a bi-polar anomaly with a duration of 20 m (66 ft) and an amplitude of over 5,300γ. An anomaly of this magnitude, confined to such a small area, suggests an

incredibly dense concentration of ferro-magnetic material which is relatively close to the sensor. The reading could be regarded with suspicion were it not for the fact that a deviation of nearly 1,400γ also was recorded on the adjacent track line, 10 m (33 ft) away. A concentration of surface debris, including iron bars and large silo hoops, accounts for the strong magnetic perturbations in this area.

Interpretations

The analysis of the magnetic and acoustic survey of the area in front of Fort St. Philip, and of the terrestrial magnetic survey of the associated batture area, identified nine large magnetic targets in the project area. Targets D, E, and I, are associated with modern debris observed on the surface. Three targets, Anomalies A, B, and C, represent isolated anomalies with broad, moderately strong magnetic signatures. One or more of these targets could be related to one of the Confederate gunboats reportedly lost in front of the fort. The River Defense gunboat *Defiance* would be the most likely candidate.

A dense area of magnetism, anomaly cluster F/G/H, exists at the southwestern end of the project area. Because of their close proximity to one another, these three anomalies could represent the debris field remaining after the explosion of the C.S.S. *Louisiana*, perhaps in conjunction with portions of Confederate Launch No. 6, which burned at the same time. Anomaly F, with a broad-based dipolar signature of over 1,500γ, is evocative of the signature produced by other Civil War era ironclads (Garrison and Anuskiewicz 1987). This target may represent the main portion of the hull. A comparison of the magnetic contours observed in this area to the 1862 Gerdes map showing the position of the *Louisiana* before the explosion demonstrates a close correlation. The suspected position of the warship based upon the magnetic contours (Figure 40) agrees with contemporary accounts of the sinking which described its final resting place as occurring within a boat length of the vessel's shore mooring (Chapter IV) near the water battery. A powerful magnetic perturbation in this very location would seem to be too great of a coincidence to be dismissed.

All identified targets presently are terrestrial. Anomalies identified during the river survey clearly are magnetic reflections of much larger perturbations generated from shore.

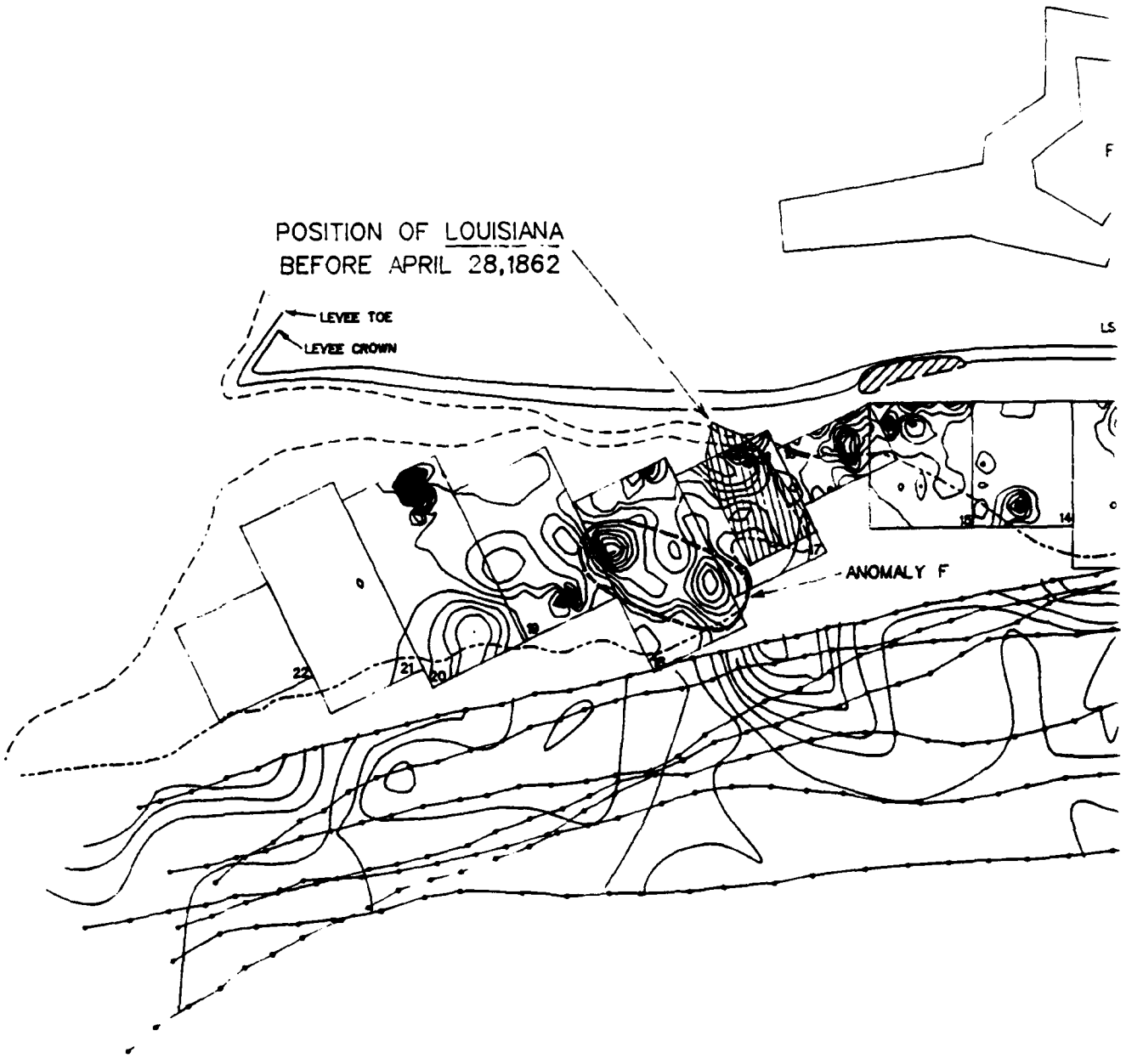
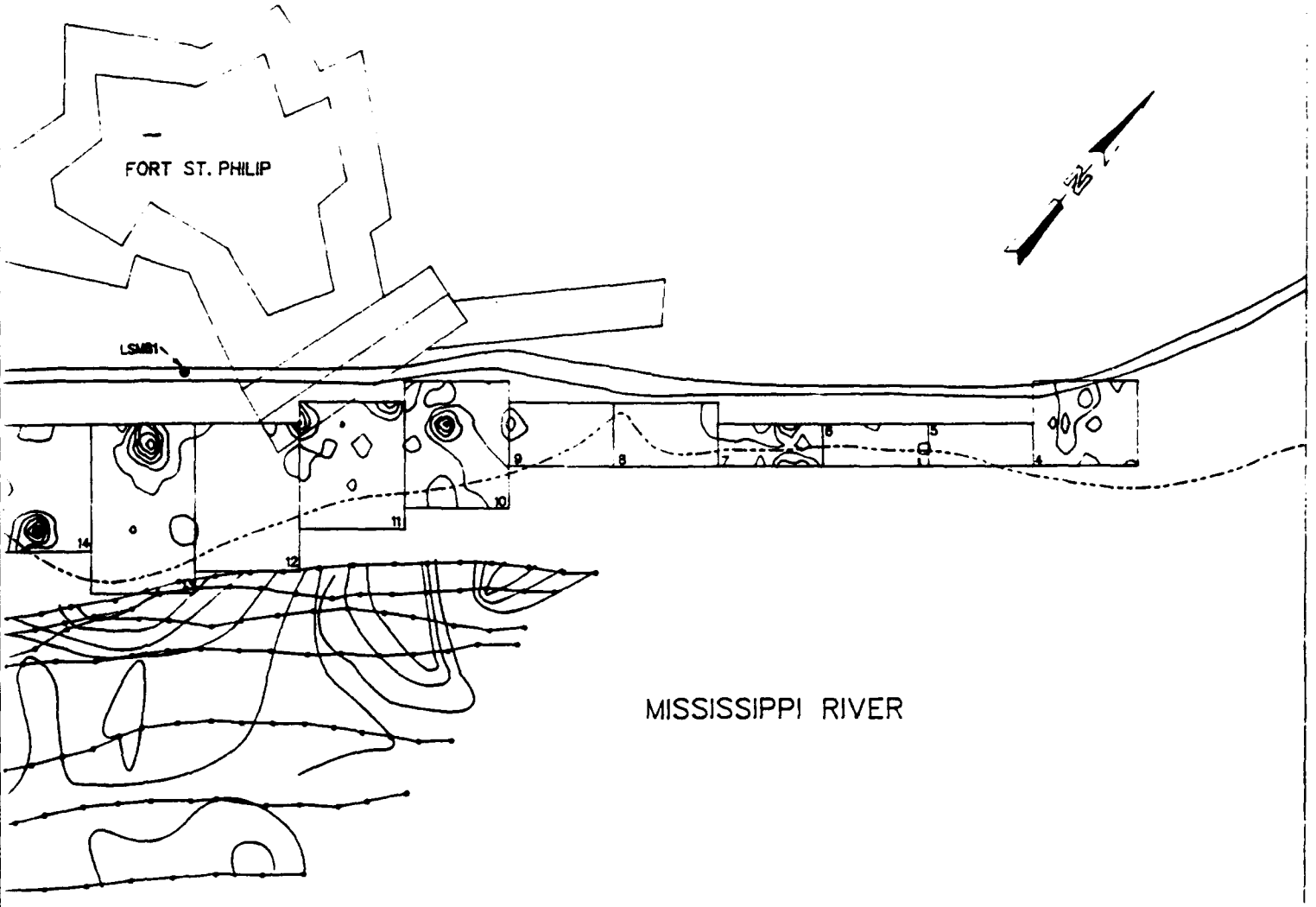


Figure 40. Location of Anomaly F in relation to the reported position of the *Louisiana* prior to her sinking.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CHAPTER VII

SUBSURFACE TESTING OF MAGNETIC ANOMALIES

Method of Investigation

Based on the results of the magnetic survey conducted in July 1991 (Chapter VI), six magnetic anomalies were selected for subsurface testing. One target, designated Anomaly F, was believed to be the wreck of the C.S.S. *Louisiana*, based upon its position relative to the fort. The reasons for this hypothesis have been discussed in Chapter VI. Other anomalies selected for testing were targets A, B, C, G, and H.

Prevailing conditions at the sites of the anomalies challenged the selection of a suitable testing methodology. There are no road approaches to the site on the right descending bank of the Mississippi River; all access is by boat. Much of the area is densely overgrown by stands of willow; other areas are soft and marshy. Remote sensing was not considered to be practical, since the site is not covered by enough water to permit the use of a subbottom profiler, nor is it dry enough for ground penetrating radar. Since researchers could not predict reliably the depth of cover over the targets, hand probing was not considered an option.

In order to gain enough information to identify confidently the targets as being vessel-related or non-vessel related, a testing program was designed that would probe the target areas, determine depth of cover, characterize materials that resisted probe penetration, and recover samples. A 7.6 cm (3 in) diameter core boring rig was utilized for this purpose (Figure 41). The coring device employed a fishtail bit attached to a hollow steel pipe in 3 m (10 ft) sections. Water was run through the pipe to facilitate the penetration of the bit through the soil. The device was mounted on a pontoon barge towed by a track-driven marsh buggy.

The suite of equipment was massive, and maneuvering in the more heavily wooded parts of the project area was difficult. The location of natural clearings over targets F and, especially G and H, dictated the placement of the bore holes to minimize environmental damage to the site. Targets A, B, and C were in open areas that permitted coring along defined transects.

Testing was initiated on September 9, 1992, and was completed on September 18. A total of 61 bore holes were drilled to an average depth of 15 m (50 ft). Two targets, believed to be historic vessels, were located as a result of this work.

Results of Subsurface Testing

Anomaly A

Anomaly A had been defined as a 512g negative monopole with a detectable duration of 20 m (66 ft). It was hypothesized that this anomaly could have been the site of one of the River Defense fleet vessels that were grounded underneath the guns of Ft. St. Philip.

Twenty-four test holes were drilled at the Anomaly A location (Figure 42). Fifteen of these produced negative results to 15 m (50 ft). Iron was struck at a depth of approximately 12 m (40 ft) in three adjacent holes along one transect (hole numbers 44, 45, and 46). Iron, when struck by the drill bit, produced a distinctive "ring," and refused further penetration of the drill.

Figure 41. Core boring equipment in use in the project area.

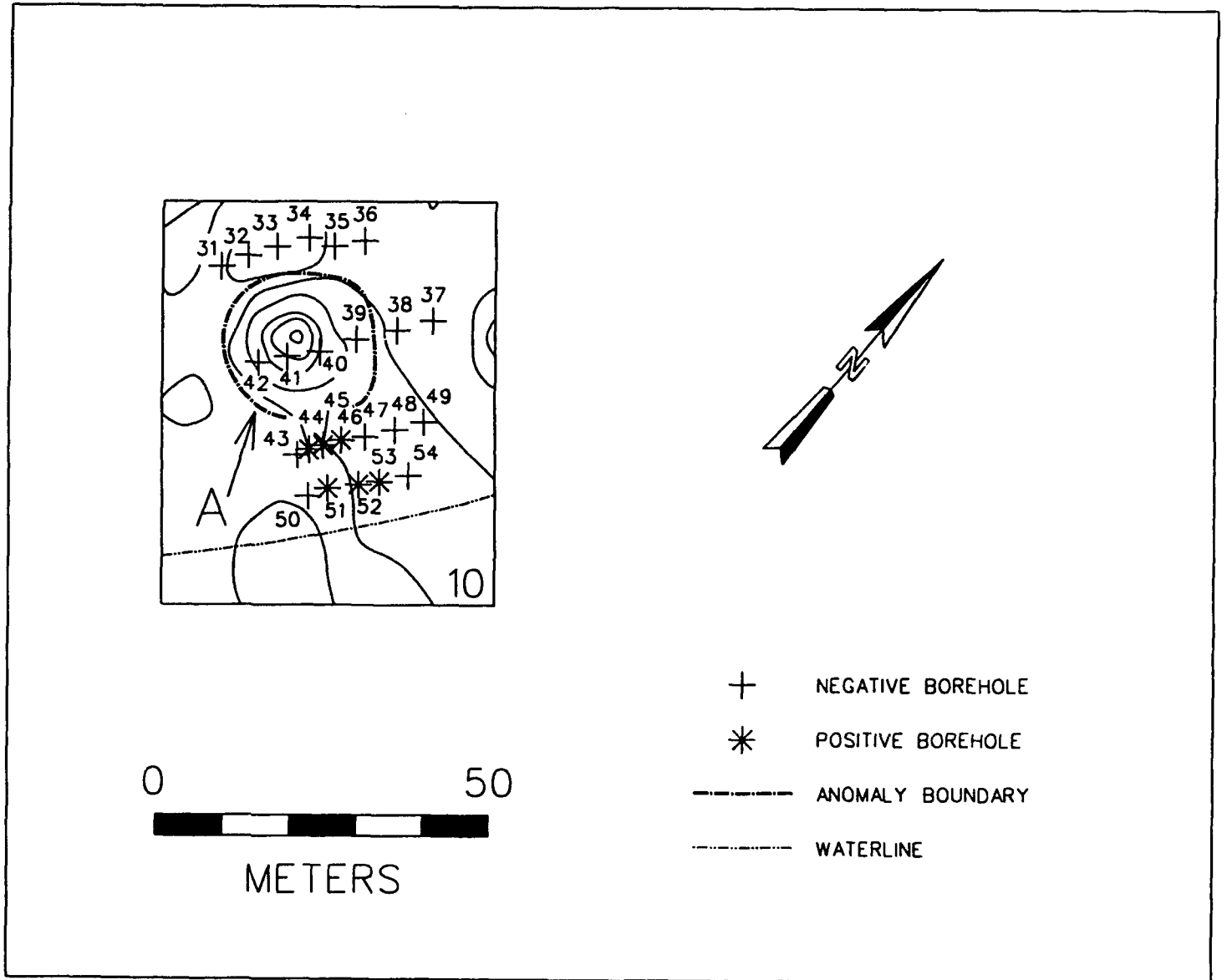

Figure 42. Map of Survey Block 10 showing the location of bore holes at Anomaly A.

Approximately 4.5 m (15 ft) closer to the river, wood was encountered in three adjacent holes (hole numbers 51, 52, and 53) at a depth of about 7.6 m (25 ft). The holes in which the wood was encountered were located directly adjacent to the previous three holes where iron was found. Cores were drilled through the wood into the strata below. Only clay and sand were encountered to the full core depth of 15 m (50 ft).

A wood sample was taken from one of the bore holes. Analysis of the wood identified it as a 7.6 cm (3 in) thick plank of bald cypress (*Taxodium distichum*), a wood favored by shipwrights because of its resistance to rot (Appendix D). Bald cypress ranges throughout the South along the Atlantic and Gulf Coastal Plains, and up the Mississippi River Basin into Indiana (Harlow and Harrar 1969:184).

The increased depth of the river beyond this transect precluded further tests, although it was clear from the magnetic survey that this object extends beyond the stone revetment into deeper water.

Anomaly B

Anomaly B was categorized as a 774g positive monopole detectable over an area of approximately 900 m^2 (9,688 ft^2). Nine bore holes were placed at 4.5 m (15 ft) intervals across the area (Figure 43). Each bore hole was drilled to a depth of 15 m (50 ft) and yielded only sand, or sand and clay. No potentially significant cultural objects were encountered. It is hypothesized that the object causing the perturbation of the magnetic field in this area is deeply buried and relatively small. A piece of steel pipe, for example, could produce a signature of this type and exhibit a small footprint that would be difficult to detect using the probe method.

Anomaly C

Anomaly C was recorded as a 992g bipolar anomaly producing a magnetic perturbation over a 56 m^2 (600 ft^2) area. Six 15 m (50 ft) deep borings and one 21 m (70 ft) boring were drilled at the anomaly location (Figure 44). The drill encountered only sand. A situation similar to that described for Anomaly B is hypothesized for Anomaly C. If the remains of a vessel had been present, they most certainly would have been detected by the probe.

Anomaly F

Anomaly F was believed to be the remains of the ironclad ram *Louisiana*. The original magnetic survey yielded evidence of a complex dipolar anomaly with a maximum detectable amplitude of 1,500g over an area measuring approximately 2,694 m^2 (29,000 ft^2). Based on Breiner's (1973:31) Half-Width Rule, the vessel was believed to be covered by 6 to 7.6 m (20 to 25 ft) of sediment. This conclusion subsequently was shown to be erroneous, leading one to question the usefulness of this formula in application to complex shipwrecks.

Eighteen test holes were drilled in the vicinity of Anomaly F (Figure 45). Eight of these borings yielded positive results in the form of solid iron, which produced an unmistakable ring when struck with the drill bit. The iron was encountered between 12 and 18 m (40 and 58.5 ft) beneath the surface, depending upon the location of the test (Table 1). The closer the tests approached the river, the deeper the level at which the iron was struck, although the surface of the iron appeared to be level parallel to the river. This observation leads to the speculation that the *Louisiana*'s bow had pointed into the river, just as the 1862 Gerdes map had shown it, and that it had come to rest on a sloping bottom with the bow lying in deeper water. This condition supports Commander John Mitchell's statement that ". . . the water being very deep

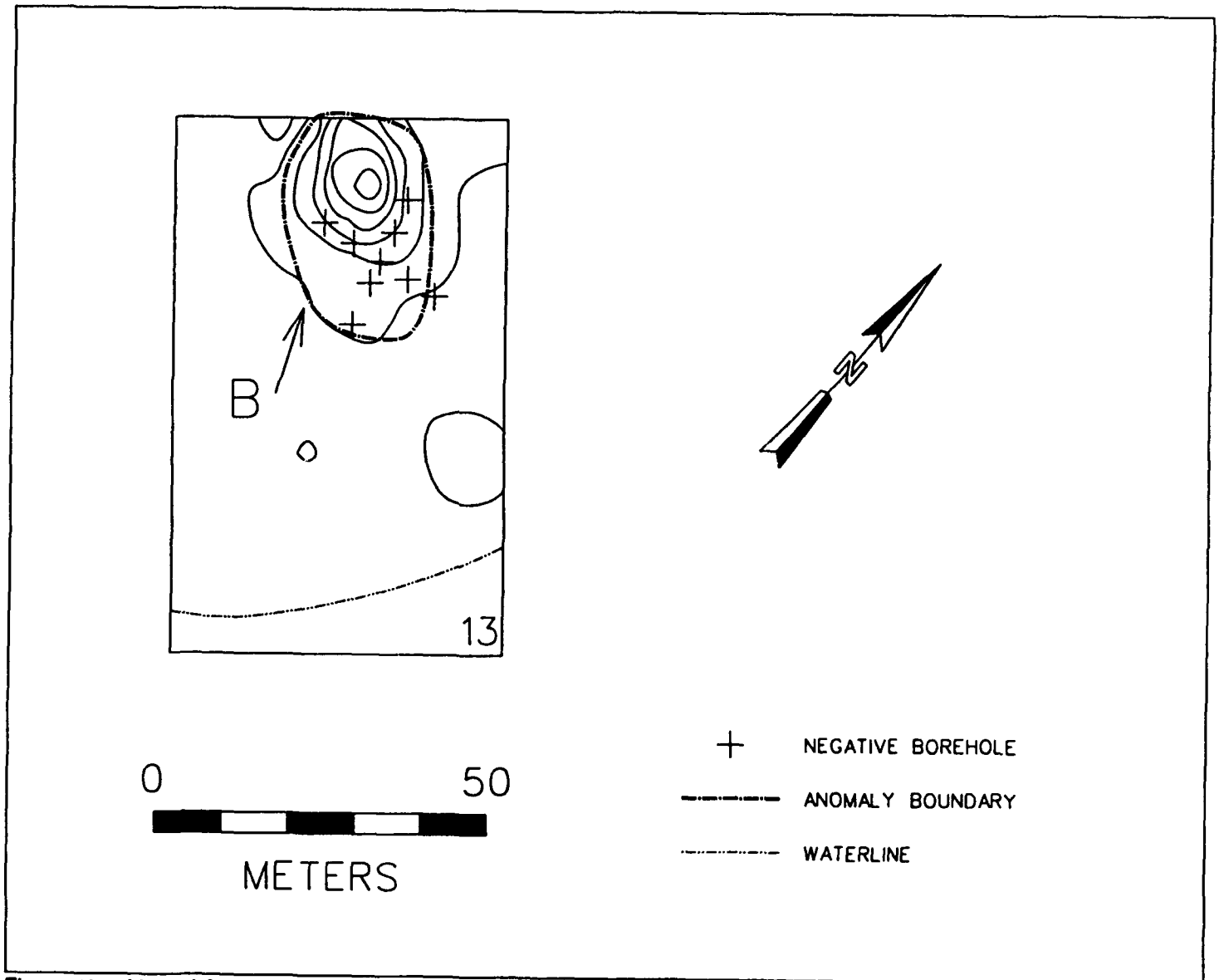

Figure 43. Map of Survey Block 13 showing the location of bore holes at Anomaly B.

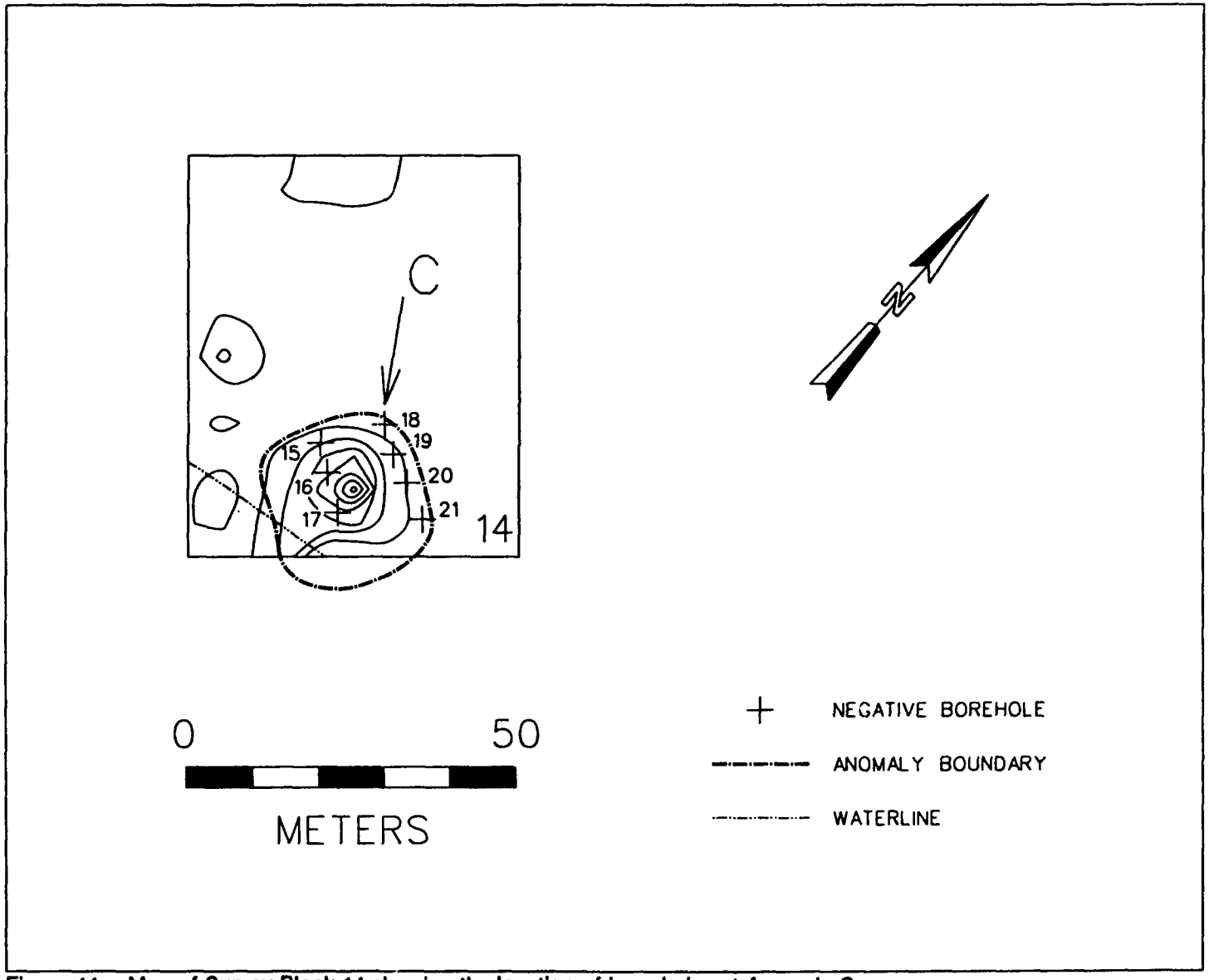

Figure 44. Map of Survey Block 14 showing the location of bore holes at Anomaly C.

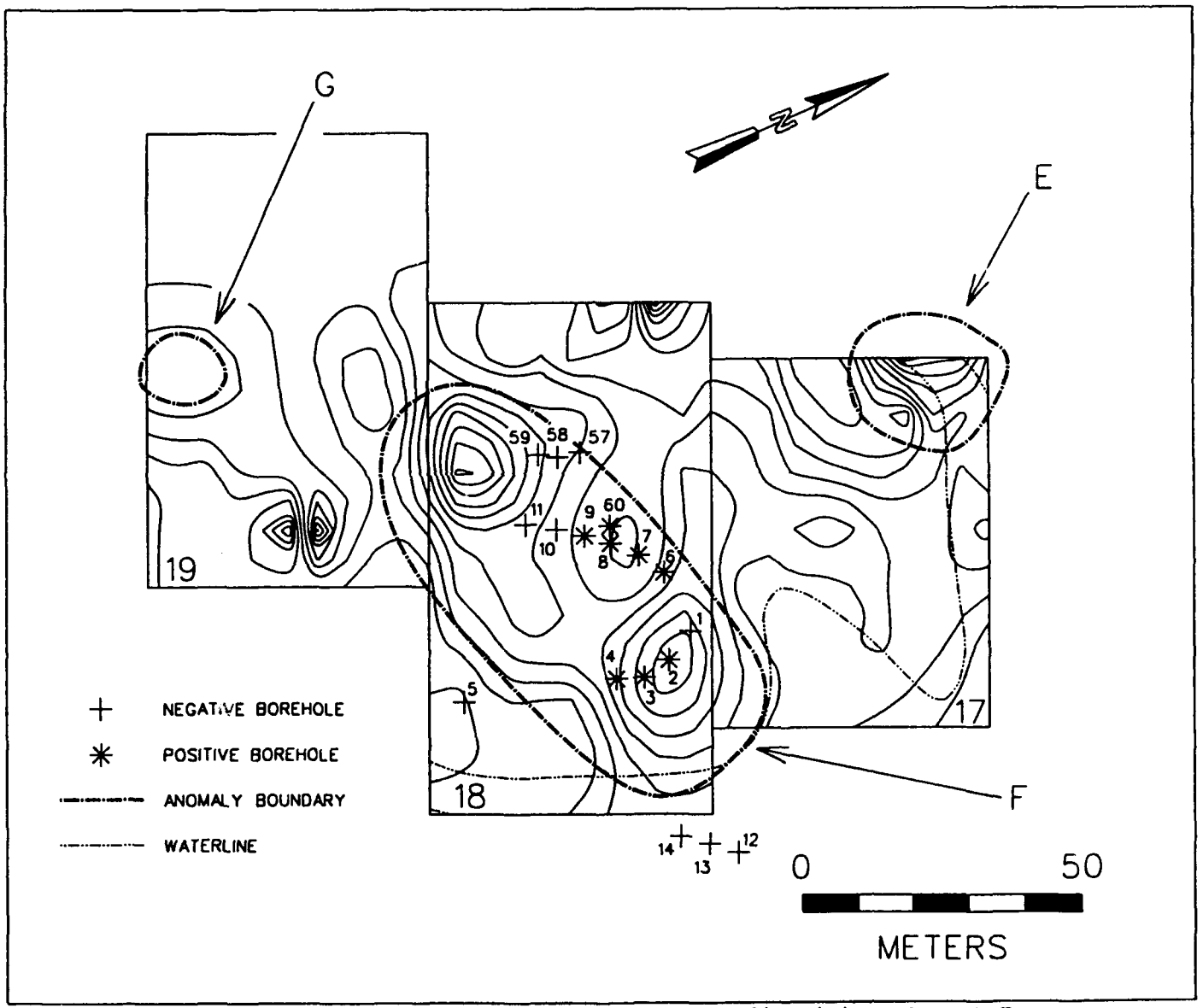

Figure 45. Map of Survey Blocks 17, 18, and 19 showing the location of bore holes at Anomaly F.

Table 1. Drilling Log.

HOLE NO.	DEPTH IN FT	BOTTOM	ANOMALY	REMARKS
1	50	Sand	F	Southwest of Anomaly F
2	48	Iron	F	South of center of Anomaly F
3	58.5	Iron	F	15 ft north of No. 2
4	51	Iron	F	15 ft north of No. 3
5	60	Sand	F	15 ft north of No. 4
6	43.5	Iron	F	
7	40	Iron	F	
8	40	Iron	F	Wood fragments, probably drift
9	45	Iron	F	Wood fragments in core
10	60	Sand	F	
11	60	Sand	F	
12	60	Sand	F	
13	70	Sand	F	
14	70	Sand	F	
15	70	Sand	C	
16	50	Sand	C	
17	50	Sand and Clay	C	
18	50	Sand	C	
19	50	Sand	C	
20	50	Sand	C	
21	50	Sand	C	
22	50	Sand	B	
23	50	Clay and Silt	B	
24	50	Clay and Silt	B	
25	50	Clay and Silt	B	
26	50	Clay and Silt	B	
27	50	Clay and Silt	B	
28	50	Clay and Silt	B	
29	50	Clay and Silt	B	

Table 1, continued

HOLE NO.	DEPTH IN FT	BOTTOM	ANOMALY	REMARKS
30	50	Clay and Silt	B	
31	50	Clay and Silt	A	
32	50	Clay and Silt	A	
33	50	Clay and Silt	A	
34	50	Clay and Silt	A	
35	50	Clay	A	
36	50	Clay	A	
37	50	Clay	A	
38	50	Clay	A	
39	50	Clay	A	
40	50	Clay	A	
41	50	Clay	A	
42	50	Clay	A	
43	50	Clay	A	Brick 4 to 6 ft below surface
44	40	Iron	A	
45	39.5	Iron	A	
46	38.5	Iron	A	
47	50	Sand and Clay	A	
48	50	Clay	A	
49	60	Clay	A	
50	50	Clay	A	
51	50	Clay	A	Wood planking at 25 ft
52	50	Clay	A	Wood planking at 26 ft
53	50	Clay	A	Wood planking at 24.5 ft, sampled
54	25	Driftwood	A	Sampled, appeared to be log
55	50	Clay	G	
56	50	Clay	G	
57	50	Clay	F	

Table 1, continued

HOLE NO.	DEPTH IN FT	BOTTOM	ANOMALY	REMARKS
58	50	Clay	F	
59	50	Clay	F	
60	38.5	Wood/Iron	F	6 in wood plank over iron
61	45	Clay	F	

the recovery of any ordnance or material is regarded as impossible" (Mitchell Papers, Mss 3 M694a). After the vessel sank, the bank built up to cover the wreck with clay and sand (Chapter II, Figure 4).

Any trace of the vessel was lost near the levee, nor does it appear to extend past the present shore line. One boring (No. 60) in what is believed to be the aft portion of the wreck struck wood at a depth of 11.5 m (38 ft) below ground surface. A sample was taken of the wood, which proved to be a 15 cm (6 in) thick pine plank. The pine was so well preserved that a strong turpentine aroma was noted when the core was brought to the surface. Later analysis of the sample by the Mississippi Forest Products Laboratory confirmed the sample's identification as Southern hard pine (*Pinus sp.*) (Conners, personal communication 1992) (Appendix D). Although Southern hard pines cannot be identified by species on the basis of wood anatomical features alone, Dr. Conners speculated that the sample could be longleaf pine (*Pinus palustris*) heartwood. Southern hard pine is, of course, indigenous to Louisiana, and it was used extensively in the construction of the *Louisiana*. Numerous receipts for materials used in the construction of the vessel are preserved in the National Archives' *Vessel Papers* (Appendix B); several mention the purchase of hundreds of board feet of pine planks.

After retrieving the wood sample, drilling continued through the plank and immediately encountered iron. It is hypothesized that the drill struck the upper deck, which consisted of 5 cm (2 in) boiler plate sheathed with pine planks (Mitchell Papers, Mss 3 M694a; Babcock Family Papers 1862 [Appendix A]; Pierce N.D. [Appendix C]). The exposed top surfaces of the *Louisiana*'s forward and aft deck and the top of the casemate were armored with boiler plate and covered with pine plank decking.

Iron was detected solidly inside an area measuring 14 x 29 m (45 x 95 ft), within a bracketed area measuring 23 x 85 m (75 x 278 ft). Dense stands of trees precluded a firm definition of the absolute length of the structure, although the width measurement of > 14 m and < 23 m (> 45 ft and < 75 ft) conforms well to the *Louisiana*'s beam of 19 m (62 ft). In addition, the detected remains that extend for a length of < 29 m but > 85 m (< 95 ft but > 278 ft) bracket the ironclad's length of 80 m (264 ft), particularly allowing for damage that would have occurred to the aft section from the explosion of over 4,000 pounds of gunpowder in her magazine (Mitchell Papers, Mss 3 M694a).

Anomaly G

Anomaly G is a relatively confined target exhibiting a magnetic amplitude of over 1, 500 gammas over an area about 18 m^2 (193 ft^2). It is located midway between Anomalies F and H and may be associated with one or both of these targets. Dense tree cover along the riverbank in the vicinity of Anomaly G precluded boring in this location without radical deforestation, which was adjudged in the field to be potentially injurious to the levee. Further consideration of this anomaly in relation to other discoveries at Fort St. Phillip leads to the conclusion that Anomaly G is a point source rather than a vessel. Both Anomalies A and F, which subsequent testing has shown to be vessel remains, demonstrated a much broader magnetic field and complex signature. Anomaly G, on the other hand, is a simple dipole, which is recognized widely as a characteristic signature of a single source anomaly. It is worth noting that the nearby C.S.S. *Louisiana*, to say nothing of Fort St Phillip itself, drew intense fire both during the battle and the preceding siege. It is highly likely that many of the shells fell into the river in the vicinity of Anomaly G and may produce the magnetic disturbance recorded in this area.

Anomaly H

Anomaly H is a target with a magnetic perturbation of 924g. It was hypothesized that Anomaly H, possibly in association with Anomaly G, could represent the remains of the lightly armed Confederate

gunboat *Launch No. 6*, which was burned by Commander Mitchell at the same time as the *Louisiana* (ORN I:18:297).

Testing of Anomaly H was complicated by the dense jungle-like vegetation that flourished in this part of the project area. The trunks of towering willow trees, some measuring more than 0.9 m (3 ft) in diameter, effectively prevented penetration by the marsh buggy and drilling rig. As it was, a path had to be cut just to bring the rig into position. Dozens of trees would have needed to be felled to maneuver the rig further. Since it was judged that deforestation on this scale could result in erosion that might impact the levee, the decision was made to limit the number of bore holes in this area to those that could be placed with the least environmental impact. As a result, two borings were placed near what should have been the center of the anomaly in the area exhibiting the maximum horizontal gradient or rate-of-change (Figure 46). Similar projections had resulted in the successful location of targets at both Anomaly A and Anomaly F.

Bore holes placed in the anomaly location failed to strike a solid target, leading the researchers to posit that the source of the target is not a ship. A large vessel would present, in all likelihood, an articulated target that would be difficult to miss with the drill. On both Anomalies A and F, researchers were able to predict the location of the center of mass of the anomaly even though a number of negative bore tests were drilled in both instances to define the limits of the target. It is likely that the intense magnetic disturbances in this area in front of Fort St. Philip result from the hundreds of shells that were hurled at it and at the *Louisiana* during the battle of April 24, 1862.

Conclusions and Recommendations

As a result of the survey and testing project at Fort St. Philip, two historic vessels associated with the crucial Civil War battle of April 24, 1862, are believed to have been located. While the testing methodology did not permit hands-on identification of the vessels, their identities can be inferred from an analysis of historical accounts of the battle.

Anomaly A: the *Defiance*

The first of these vessels, located at Anomaly A, is most likely the River Defense Fleet gunboat, *Defiance* (Figure 47). The *Defiance* was constructed as a sidewheel steamer (178 ft long, 29 ft 5 in beam, 10 ft 11 in draft, 544 tons) in Cincinnati, Ohio, in 1849 for the Southern Steamship Company (Vessel Papers 1973). Between January 25 and March 10, the vessel underwent conversion to a "cotton clad," having shot-proof cotton bulkheads added to her sides and a single thirty two-pounder gun pivoted aft (Moebs 1991:320; ORN I:263). The prow of the vessel was sheathed in iron to act as a ram (ORN I:263).

The River Defense Fleet was composed of 14 vessels purchased by the Confederate War Department to defend the Mississippi River in cooperation with the Confederate Navy. Manned by Army personnel, they were under the overall command of Capt. J. E. Montgomery, CSN, a former river steamboat captain (Navy Department 1971:VI-329). Eight of the 14 ships operated in waters around Memphis, Tennessee, where all but one was captured or destroyed during the battle of June 6, 1862. The remaining six vessels, all converted tug-boats, operated in the lower Mississippi and participated in the defense of Forts Jackson and St. Philip.

The *Defiance* was the only ship of the Confederate fleet to escape damage during the battle of April 24, reportedly because her captain was drunk and "ran about in the river . . . apparently without useful purpose" (ORN I:297). Commander Mitchell ordered the vessel scuttled in front of Fort St. Philip by cutting the pipes that supplied water to the steam boilers (ORN I:263).

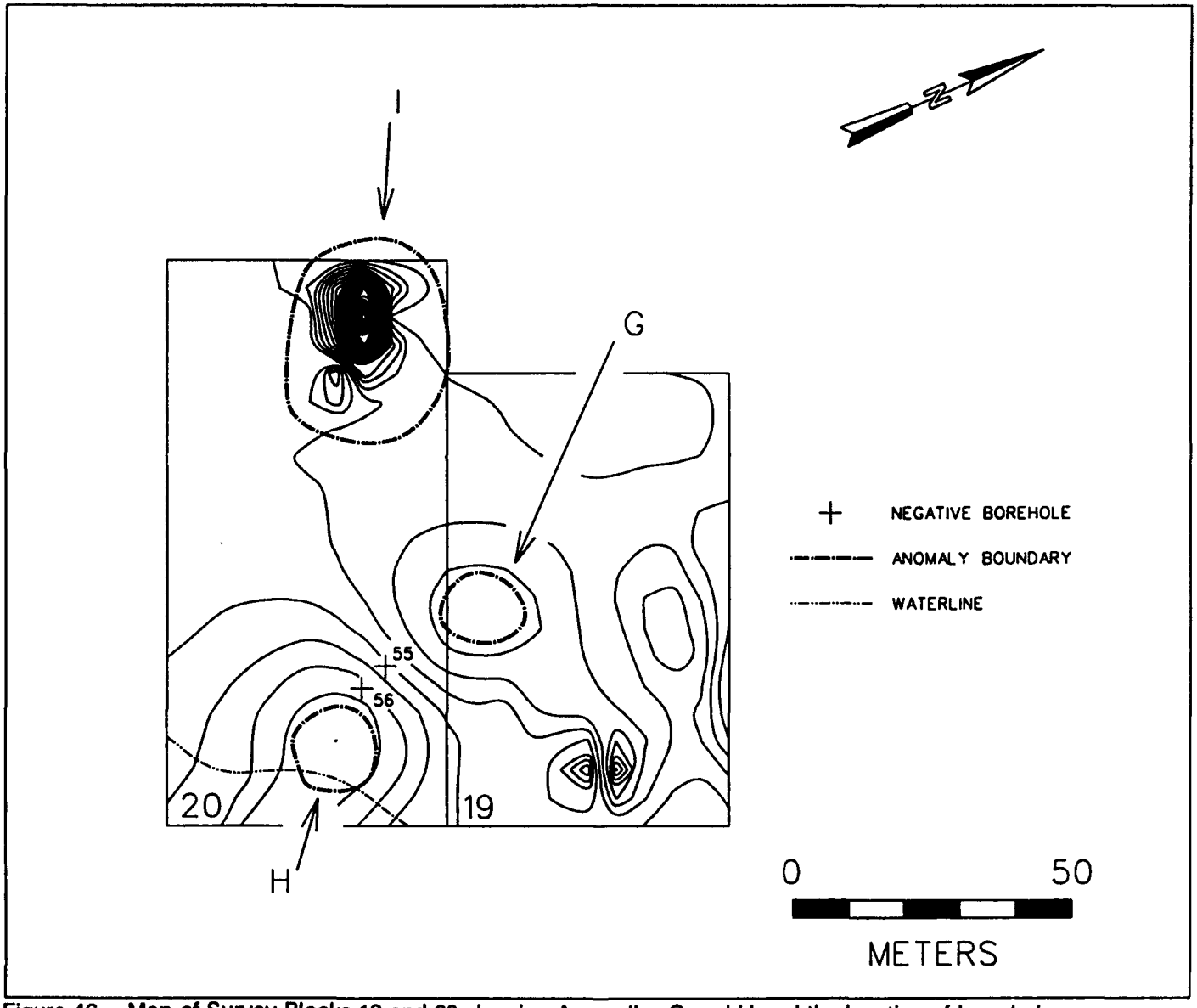

Figure 46. Map of Survey Blocks 19 and 20 showing Anomalies G and H and the location of bore holes.

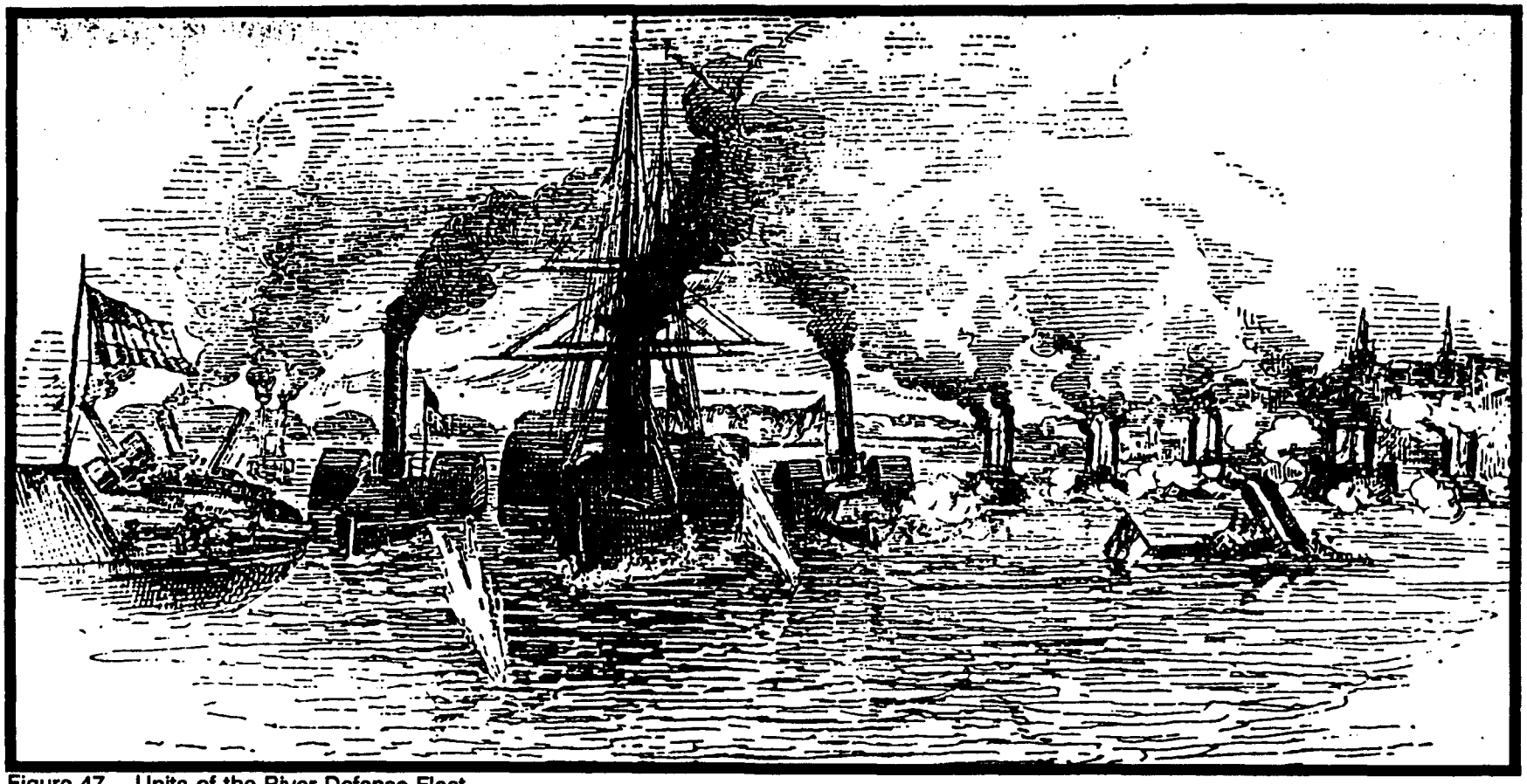

Figure 47. Units of the River Defense Fleet.

Testing at Anomaly A, which lies directly in front of the fort, encountered iron solidly at a consistent depth of about 12 m (40 ft) for a space of nearly 9 m (30 ft) in three bore holes parallel to the river at the edge of the water. About 4.5 m (15 ft) further into the river, wood was encountered over the same distance at a consistent depth of 7.6 m (25 ft). A recovered sample of the wood demonstrated that the core pierced a 7.6 cm (3 in) plank of bald cypress, a wood commonly used in ship construction throughout the Mississippi River valley (Figure 48). Nothing was encountered landward of this cluster, and the depth of water prevented testing farther into the river.

The width of the bald cypress plank stratum is consistent with the beam measurement on the *Defiance* of 9 m (29 ft 5 in). This wood, which ranges as far north as Indiana, was used commonly in ship construction because of its property of resistance to rot. Moreover, a 7.6 cm (3 in) outer hull plank would not be out of place in a river tug. A wooden-hulled harbor tug recently found in the Savannah River measured only 24 m (78 ft) long and was planked with 6.3 cm (2.5 in) white oak strakes (Gulf Engineers & Consultants 1992:35). In profile, the upper surface of the wood displays a slight concave curve that would be consistent with the lower hull of a flat-bottomed sidewheel river tug.

The iron member struck in bore holes 45, 46, and 47 is more puzzling. In profile, the iron would appear to be a solid plate with a slight upward tilt. As far as is known, none of the River Defense Gunboats were armored with anything other than pine planks and compressed cotton. The iron rams that were mounted on the vessels consisted of nothing more than flat bar-iron casings around their bows (Porter 1956: 129). The most likely explanation is that an iron engine bed plate, similar to that recorded in a mid-nineteenth century Savannah River tug, was struck by the core tube (Figure 49). It is not clear, however, why this plate would be found at a depth 4.5 m (15 ft) greater than the plank stratum. Unfortunately, there is insufficient information to resolve many of these issues.

The site of the River Defense Fleet gunboat *Defiance* is potentially eligible for inclusion in the National Register of Historic Places, as defined by 36 CFR Section 60.4 and National Register Bulletin #20 (Delgado 1985). Under Criterion A, association with "events that have made a significant contribution to the broad patterns of history," the vessel is potentially eligible for its association with the important battle of April 24, 1862. The vessel is likely to possess significance under Criterion C under the themes of "Architecture" and "Engineering." A vessel that is a good example of a specific type of naval architecture may possess significance. In addition, no indication exists that the engine was removed from the wreck, and in all probability, it represents a well preserved, intact example of a antebellum sidewheel engine for which there are no parallel extant examples. Under Criterion D, the vessel is likely to yield important information about her use, method of construction, operation, and her adaptation from workboat to warship.

Anomaly F: the C.S.S. *Louisiana*

Although the testing method employed at the Fort St. Philip site precluded a hands-on identification of the target at Anomaly F, the archival and physical evidence points to its identification as the Confederate gunboat *Louisiana*. Contemporary maps and eyewitness accounts place the vessel at this site. Geophysical investigations demonstrate that land building occurred in this location within 20 years after the battle in 1862. This phenomenon not only suggests an occurrence that would alter suddenly the sediment transport properties in this location, but it also would preclude the presence of any modern steel wrecks or barges. The recovery of a sawn pine timber from one of the bore holes is consistent with the type of wood used in the *Louisiana*. Finally, it is difficult to imagine what other object with a solid iron surface covering at least 397 m^2 (4,275 ft^2) possibly could be located here. Clearly, all the evidence presented in the preceding pages argues strongly for this appellation.

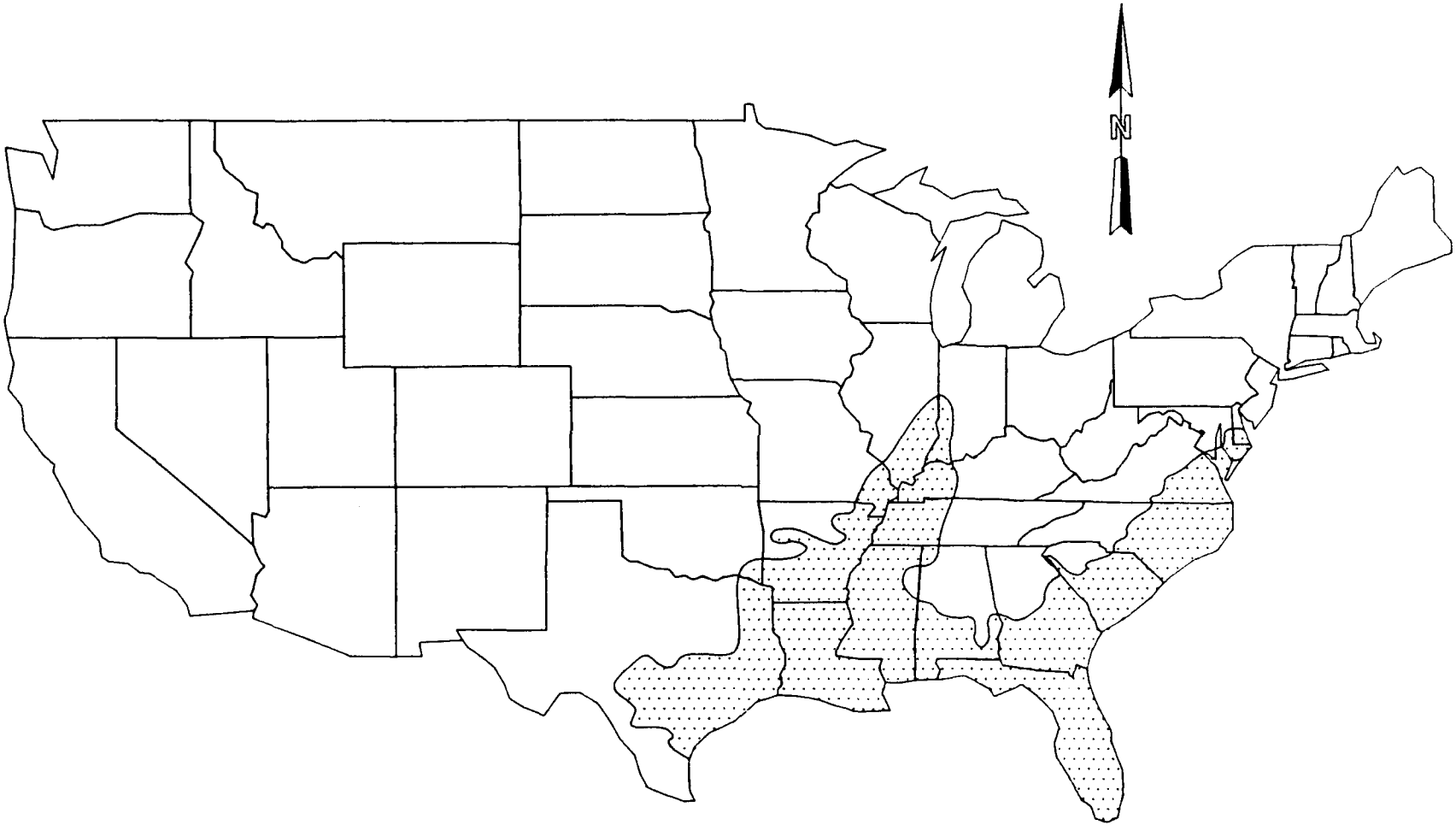

Figure 48. Map showing the distribution of bald cypress in the United States.

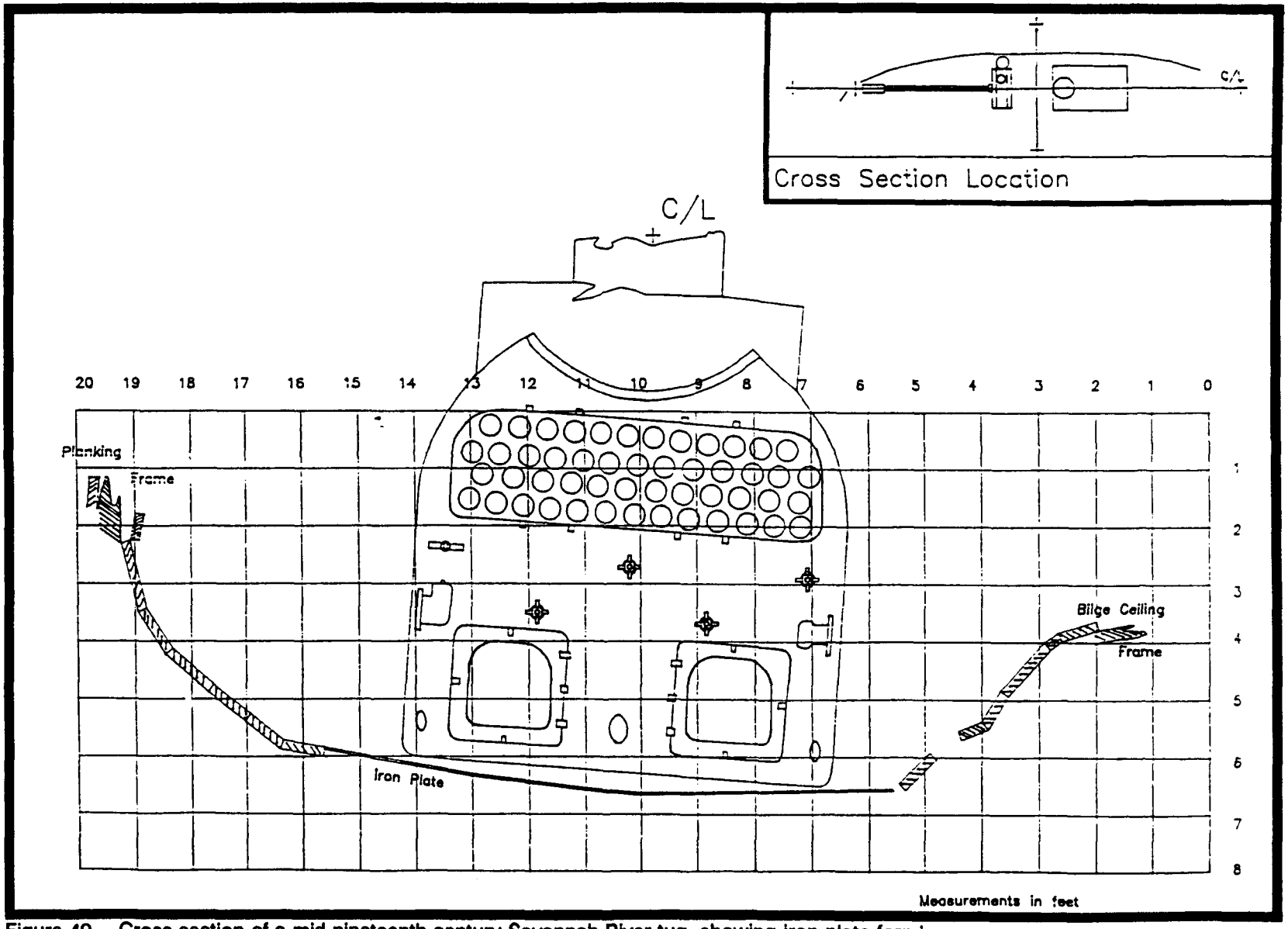

Figure 49. Cross-section of a mid-nineteenth century Savannah River tug, showing iron plate forming on the floor of the engineering space (taken from Gulf Engineers and Consultants 1992).

The site of the C.S.S. *Louisiana* meets every criterion for potential eligibility for inclusion in the National Register of Historic Places. Its association with the crucial battle that resulted in the fall of New Orleans to Federal troops in 1862 gives it significance within the theme of Military History under Criterion A. Its unique propulsion system, utilizing two in-line paddlewheels, makes it significant within the theme of Engineering, if only as a caveat to future designers. The C.S.S. *Louisiana* represents one of the earliest attempts at constructing an ironclad warship. Had her propulsion system functioned, it is arguable that she could have succeeded in driving off the wooden warships of the Federal fleet, which could have changed the course of the war significantly. As it was, the vessel was subjected to almost point blank fire and escaped virtually unscathed.

The vessel potentially possesses significance under Criterion B for its association with John K. Mitchell, an important figure in the Confederate Navy, who subsequently commanded the James River Squadron from 1864 to 1865 (Moebs 1991:242), and who was on the verge of being promoted to admiral at the close of the war. The association with the *Louisiana*'s adversaries, Admirals Farragut and Porter, is equally significant.

The vessel addresses several themes under Criterion C, including Architecture and Engineering. As one of the first ironclad warships launched in the world, she can be classified as a unique and experimental craft. The design and construction of her shield, the first to make use of readily available railroad iron, made her invulnerable to shot and shell, but the design of her paddlewheels, intended to lower their profile and make them less vulnerable to shot, was a disastrous failure. The construction of her gunports, which did not permit her cannon to be depressed or elevated, made her largely ineffectual even as a floating battery. Subsequent casemate designs incorporated lessons learned from the *Louisiana*'s failure.

The research potential of the wreck of the *Louisiana* is tremendous. Undocumented details of her construction, armament, and propulsion could be obtained from an archeological investigation of this unique craft. In fact, investigation of this craft could illuminate questions concerning the construction of the famous *Virginia* (commonly known by her prior name, *Merrimack*). E. C. Murray, the builder of the *Louisiana*, claimed that the plans for the design of the *Virginia* were his, although through "some jeremy diddling" credit for the design was given to Lt. John M. Brooke (ORN II, 1:757). To date, no casemated Confederate ironclad has been documented thoroughly through archeological investigation. As a result, the wreck of the *Louisiana* is potentially eligible for the NRHP, because it is likely to yield information important to history.

Opportunities for Further Research

The Confederate vessels buried in front of Fort St. Philip are remnants of a crucial event in American history. The archeological investigation of these vessels would supply critical information relating to the history of shipbuilding and to the events surrounding the fall of New Orleans during the Civil War. One error of history already has been amended by the discovery of the *Louisiana*. Union Admiral David D. Porter, a bitter enemy of the South whose enmity continued well after the end of the conflict, contended in his public writings (Porter 1956) that the *Louisiana* had been sent as a fire ship to destroy his fleet riding at anchor under a flag of truce. Porter's well known account of the event has become dogma among modern historians, even if they question Porter's charges of unbecoming conduct against the Confederate officers (Still 1985:60). The archeological remains, however, support the Southern contention that the vessel exploded near its mooring at least a mile from the Union fleet (Scharf 1887; Whittle 1885). Other crucial questions concerning the use of the vessel during the battle could be illuminated by an examination of its physical remains.

Unfortunately, the present setting of both the *Louisiana* and the *Defiance* would render their recovery prohibitively expensive. In the case of the *Louisiana*, up to 18 m (58 ft) of sand and clay covers

her remains. Excavation would require heavy equipment and enormous coffer dams, as well as huge pumps to keep out the waters of the Mississippi.

It may be possible to collect some additional data on the site by remote sensing. The use of a low frequency sub-bottom profiler could result in an acoustic profile of the buried remains. Since both vessels are now predominantly on shore, and the subbottom profiler works only in water, a series of backhoe trenches would have to be excavated at least 1 m (3 ft) below the water table through which the transducer could be towed. Theoretically, this should produce a profile of the buried remains and could reveal details of the *Louisiana's* casemate and of the *Defiance*'s hull. The potential success of the method, while theoretically possible, cannot be guaranteed, but it offers the best hope for positively identifying and delineating the archeological remains.

The Confederate ironclad warship C.S.S. *Louisiana* and the gunboat *Defiance* represent an important era in American history. Not only did the Civil War profoundly affect American culture, but technological innovations, such as armored warships, changed the nature of naval warfare.

The *Louisiana* is one of the few remaining examples of Confederate shipbuilding technology that remains in an undisturbed archeological context. Other similar vessels, the C.S.S. *Muscogee*, the C.S.S. *Neuse*, and the U.S.S. *Cairo*, were located and raised during the early 1960s due to Civil War enthusiasm. These actions badly damaged the vessels and caused the loss of irreplaceable archeological and architectural information.

Because both the *Louisiana* and the *Defiance* are buried beneath layers of sand and clay, the possibility of their loss is limited. However, this particular situation also eliminates the potential of detailed archeological investigation of the vessels. While the proposed action will not affect adversely the site of the *Louisiana* or the *Defiance*, this project could present an opportunity for the U.S. Army Corps of Engineers, New Orleans District, to disseminate information concerning its positive role in cultural resources management. Clearly, when large sums of money are expended for such projects, many with no significant archeological findings, it is important to give some public exposure to the projects that generate exciting results, such as the *Louisiana*.

The production of informative brochures provides an effective and economical means for conveying this type of information to the public because they can illustrate major points in an abbreviated form. In the cases of the *Louisiana* and the *Defiance*, a brochure could provide a brief history of the vessel, place it during a pivotal era of American history, and describe the discovery of the wrecks. The brochure could be accentuated through the use of distinctive photographs, maps, and illustrations. A convenient point of distribution would be Fort Jackson, situated directly across the river from the project area. Brochures also could be made available to educational institutions for instructional purposes and museums in the New Orleans area.

In brief, the production of an informative brochure about the *Louisiana* and the *Defiance* would complement the U.S. Army Corps of Engineers' mandate for public disclosure concerning its cultural resources management activities.

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APPENDIX A

LETTER FROM THE BABCOCK FAMILY PAPERS SOUTH CAROLINIANA LIBRARY

Jackson, Mississippi
June 2nd, 1862

Dear Richard,

I met an officer of the "Arkansas" here & I will send you a note by him. I would have written to you before but after hearing that your unit had left Mississippi, I did not know where to send my letters. I suppose you have been thinking that Mc and myself were taken to Fort Warren[1], but we were denied that pleasure. I will give you a long account of myself. We arrived in N. O. on the 22 April. There arriving we took a steamer and went down to the forts to join our vessel. We did not report for duty until the morning of the 23. We found the "Louisiana" totally unprepared for battle. All of her machinery was not up. Carpenters and blacksmiths were at work upon her. She did not come up to my expectations. I expected to see an ironclad, but I saw an ironclad box roofed over with both ends tapering. The roof was pine about two feet thick protected with railroad iron. The pieces locked into each other. She was intended for a ram and her bow for 15 feet was solid. This projected beyond her roof, and was intended by her construction, to be almost six inches under water when everything was aboard. She had two wheels, amidships, one behind the other, and two screws, one on each quarter. The wheels were inside the roof, but the upper buckets extended some distance above everything. Her armament consisted of 16 guns; three bow, 10 broadsides + three stern guns. Forward she had a seven-inch rifle and 2 9-inch shell guns making almost as good a battery as the *Resolute*[2] had. When the enemy had bombarded the forts a few days the people of New Orleans were clamorous for the "L[ouisian]a" to go down. They supposed that as soon as she got down the Yankees would take to their heels. I believe that public opinion at last forced Commander Mitchell to send her down in that unfinished condition. When it was decided to carry her down her guns were hurriedly [sic] mounted, and her stores got-a-board. When everything was ready a steamer got on each side of her and started down. After getting underway it was seen that she would not mind her helm, and it was difficult to keep her straight with the steamers. In the hurry to mount her guns some of them were placed at the wrong ports and had to be moved. When we reported on the 23rd, work on her was being pushed ahead as fast as possible by Capt. McIntosh. He was going day and night, and most everyone else work[ed] day and night to get her ready and stop Porter's fleet from throwing shells into the forts. The fleet

was behind some trees about 2 miles off & the fort could not fire with effect. From this place they fired night and day regularly until the forts were pounded by the gunboats. They fired at night more rapid than in the day and with more accuracy. At night it was a beautiful sight. We could see a flash of light from the dark trees, and then the shell, like a star, mounting upwards. After a time it would descend and soon would follow the crash of the explosion, sometimes in the fort, and sometimes in the river near the "La." That night (23rd) I went with a Lt. to the fort and remained at the landing in charge of the boat. Here I watched the shells for some time. I could tell near where they were going to strike before they had finished their ascent. While there, two fell within 50 feet of the boat and exploded under water. I felt the boat groan in every timber. After I returned to the "La" I saw that Capt. McIntosh had made every preparation for the attack by the fleet. Like the "Virginia"[3] some of her guns had to be manned by soldiers and they slept in two steamers alongside. The last thing he did was to send an order to the comdg [sic] officer to have everything ready for a fight; the men to sleep in their clothes, and the drummer at hand and etc. Our fleet at the forts consisted of the "La," "Manassas" and the "McRae", with about a dozen army boats, called the Montgomery Fleet. These boats were built strong forward and had some iron about the bow. I retired that night with no idea that the fleet would attempt to pass the forts; it being such a clear and beautiful night. About 12 it clouded up and was very dark. I forgot to mention that the "La" had no quarters for officers below. On our outer deck an arrangement very much like tents protected us from rain & sun and we made our beds on deck. When the steamers were alongside the officers occupied the berths. When the alarm was given, nearly all the officers were off the "La." We (Mc & myself) were awoke around 3 am by heavy reports. We knew the fleet had come up and we dressed as quickly as possible. When we went down on the steamer deck we saw that the "La" was some distance off. We found a small boat and pulled to her. When we started I did not expect to reach the vessel safe, so thick did shot; shell, grapeshot, cannister, & shrapnel; fly. We came out all right and were soon under our iron roof. This steamer had her lines shot away and then steamed off. When we got aboard we saw that but four or five guns could bear on the enemy. She was tied up to the bank and could not move so as to bring her guns to bear. Two of her broadside guns could not be used one having been mounted wrong, was dismounted and put on deck and it kept another from working. As soon as possible the gun on deck was removed; and the other manned. The fleet would

never have passed but we were betrayed. It was a complete surprise although it was expected. No alarm was given until the leading vessel was nearly between the forts. We had a guard boat out in charge of an Acting Master and he betrayed us and deserted to the enemy, nearly all the crew of the boat following him. On the appearance of the enemy he was to throw up a rocket; but he gave no signal and nothing was known of their presence until they had passed the obstructions. This was a chain across the river, buoyed up by a few schooners. When they were seen by the sentries at Fort Jackson there was a general call to quarters. Soon afterwards everything commenced firing. I never dreamed such a fire as there was for more than an hour. Port Royal[4] or Savannah[5] was nothing compared to it. They came up with 17 vessels and succeeded in running 13 past. Two were sunk and two were driven back. The "Louisiana" fired as long as there was anything to fire at. The "Manassas," Capt. Warley, was in the midst battling as much as he could. The difficulty was that they were faster than she and she could not get but about one butt at the same one.[6] She followed them, after they passed, firing her bow gun all the time. After she got up a little distance five of their largest ships turned around and surrounded her. They pound[ed] in broadside after broadside upon her which went through her. Warley saw that they were too much for him and run her in shoal water, cut her pipes[7], set fire to her & abandoned her. The Yankees chased lustily thinking they had captured a valuable piece but on boarding her they found her in a sinking condition and left her. Warley & crew left under a volley of musketry, grape and canister. They took to the marsh, about waist deep and walking around for three or four hours got on board the "La." The "McRae," Capt. Huger, fought nobly. She was in the middle of the river, giving first one broadside and then the other. She was very badly cut up, and her looking so much like the Yankee vessels was what saved her. Now for the great Montgomery fleet; the fleet that was all the time bragging how they were going to whip the Yankees and show the navy how to fight. As soon as the Yankees came up they fired their vessels and jumped ashore to save their precious carcasses. I am glad to say there was one exception. The "Morgan," Capt. Kenan, (who by the way was once in the navy) came out and fought until she went down. Had all the vessels of the fleet followed his good example the result would have been different. As it was the ships that passed were roughly handled. Some of these had as many as thirty shot in the hull. Their loss was considerable. Among others John Ander's son was killed. He and a signal Q.M. were knocked overboard by the same shot.

After they passed us, we worked harder than ever to get our machinery ready to go up the river and capture every one of them. Our Eng[ineer] worked day and night, and on the evening of the 27th, reported them ready. We were in great spirits and waited impatiently while getting up steam. After getting steam our screws worked badly and could not mover her in still water. The Engs. worked on them until they got them to revolve as fast as possible and still the "La" did not move. This was very discouraging and thoughts of capturing the enemy vanished. Early on the morning of the 28th we saw the white flag flying over the forts. We were surprised and could not account for it. Capt. Mitchell sent to get an explanation. Gen. Duncan informed him that the men had mutinied and spiked the guns and that he had surrendered in order to get the terms offered by the enemy the day before. At this time we were in a critical position. Capt. Mitchell got up as much steam as the boilers could stand and again tried to move: but in vain both wheels and her screws working she did not move in still water. What could she have done in the current? Mitchell called a council of his officers and it was decided to destroy her to prevent her falling into the hands of the enemy. We transferred some clothing to the two steamers, fired her and left her. After burning for about an hour she blew up and not a fragment of her was left. These two steamers tied up to the bank and we waited for the Yanks to come and get us. While there Mc and myself and some others thought we would try to escape. We took to the swamp and after getting about five miles we were captured by the pickets of the Mass. 26th Regt. They kept us awhile and then sent us aboard the gunboat "Kineo" to transfer us across the river to Quarantine Station. The "Kineo" was a beautiful craft. Carrying an 11-inch gun, and a Parrot on her forecastle. She received a great many shot; and had her bow sprit and mast of her cut water carried away. They put us on board the "Iroquois" alongside the wharf. Here we saw Mr. Farland. He is a "Master and getting 1200 dingbats a year." (We had hardly spoken to him before he made use of the above expression). We stepped ashore and were taken before Col. Jones Comdg the post. We pledged ourselves not to leave the camp, when we were shown to our quarters. This was a room 12 x 18 I suppose and two of us had to sleep in it. Our supper was nothing but dry hardtack. The Yanks said they had nothing else, their provisions had not arrived. They gave us two or three tents to be spread on the floor for beds. By morning some of their provisions arrived and we had coffee, beef & hardtack. They kept us in this room until the 1st of May when we were released on parole. [. . .]

I cannot write anymore. The gent who will bring you this is almost ready to start. In order to get as far as I have I have left out a great many things I would like to write; especially the particulars of the fight. Give Clarence my best respects.

I remain

Your Friend,

F. T. Chew

P.S.

Just as I finished my letter I learned that Mr. Phillips will not leave until tomorrow. About the same time I found that I could not go to Meridian this evening. During the day I requested to get a passport & it is now too late until morning. I thought I would add a P.S. giving you a few details. I find it hard to give a description of the "La": a person should see her in order to form a correct idea of her. In the description I omitted to mention her rifle pits for sharpshooters. This pit was the greatest humbug about her. It was made of pine about six inches thick with one thickness of boiler iron on each side. The sides stood perpendicular to the outer deck, and were almost five feet high, without any top. This was a nice place for men in close action. Not quite as safe as an open deck, on account of splinters and pieces of iron. Her outer deck (the bottom of the pit) was covered with one thickness of boiler iron: the woodwork same thickness as the roof. The night of the fight we had sharpshooters in the pen, and it is very strange that so few were hurt. We had two killed and three wounded. During the fight, Capt. McIntosh stood on the ladder which laid over the side of the pit, exposing his whole body. About the middle of the fight he was wounded by a shell. The fragment broke both arms and knocked his left knee off. His coat tail was torn to pieces by other fragments. A mattress was brought over and he lay on it in the bottom of the pit until the fight was over. It was so warm and close under the roof that he would have died if he had been taken below. After McIntosh fell Mitchell took command. In my hurry I forgot to mention McIntosh being wounded and Mitchell taking command until I told you something that he had done.

The clump of trees that the mortar fleet hid behind should have been cut down. Capt. McIntosh signalled Gen. Duncan to cut them down before they commenced the attack but he neglected it. If the trees had been cut away those boats could not have stayed in range. The fleet tried to be out in sight but the

fort soon drove them away. At night they could see their shells and tell where they fell. This enabled them to drop them in and around the fort all the time. Some officers counted as many as 20 shells in the air at one time.

During the terrific bombardment the men behaved admirably in the fort. They would carry sandbags to repair damages and never mind those large 15-inch shells exploding around them. A shell hit a sentry on post, bent his musket in a dozen different directions and sent him four feet under ground. The loss in the forts during the whole bombardment was not more than 50. On the "La" the loss was only five. This was strange as our pit was filled with men. The canvas top was cut to pieces and the sides were penetrated by grape. An 11-inch shell exploded in the pit and everything around was blackened by the powder. I do not know the loss of the "Manassas." The "McRae" had three men killed and fourteen wounded. I cannot see how she escaped with this small loss. She was badly cut up: a shell entered her starb[oard] quarter, exploded and tore a hole that you could move a barrel through though it is only four inches above water. Their largest vessels passed her and never gave her a shot thinking that she was one of their own. The Yanks had a blue light forward; (hoisting after the fight began) the "McRae" hoisted a blue light also, which deceived them. The gun boats sloops-of-war made use of [a ruse] to deceive the men in the forts. They had howitzers in eir tops. When they got abreast the forts they fired them supposing the forts would fire at the flash and then fire too high but these howitzers were not taken for guns on deck. They also had their cables hung over the side about the engines. The "Manassas" struck the frigate "Mississippi" [in] her chains and drove them four or five inches into her sides. Then backed off, got headway and ran at her again. This time she aimed at her wheel, but the current gave her a shove and the ram hit her on the quarter. Before this the "Miss." ran afoul of the "La" and carried away her catwalk. When she saw what we were she gave us a broadside and tried to get off before we could fire into her. We had but one of our forward guns loaded at the time, the 7-inch rifle. We put a shell through her. Our ports would not let us depress it [enough] to hit the waterline or we would have sunk her. By the time we loaded the outer two guns she had got out of range. We had our guns level and when a vessel came so the guns bore we fired it. Aboard the "Kineo" I was told how the chain was dispensed of. One of the gunboats had a grapal [sic] bucket perched from the bowsprit she steamed up until the chain brought her up where she let go the grapnel, [br]n off

had caught the chain. They hauled up on the line, brought the chain above water and sawed it when they all passed. If we had true men down there to give the alarm all preparations would have [co]me to fire the fire rafts. These would have filled the river and probably burnt some of them. At any rate they would have made the river as light as day and we would have sunk them with our guns. But through the treachery of Fairbanks they were upon us before we knew it and we had time to do nothing but run to the guns and fire at their flash. We could see them only when they fired. They did not get to the city until noon of the 25th. At the old battle ground, Chalmette, we had a small battery under the command of Col. Pinckney, formerly of the Naval Academy. We fought them until every gun was dismounted when we retreated. What an unfortunate thing it was that the "La" could not move herself, or that the "Miss" was not finished. I am informed that her chief carpenter said that she could have been finished in 3 or 4 days when the Yanks commenced bombarding the forts. It seems it was intended that she should not be finished. All her engines wanted was to connect the steam pipe and she could have been in running order, yet she lay in that condition for weeks before the Yankees came.

Nearly all the government stores were removed from the city. What could not be taken away was burnt. All the cotton in the city, about 30,000 bales, was burnt. The river, the evening of the 24th and all day the 25th, was filled with loose cotton partially burnt. This burning cotton was a glorious thing. We have been boasting that we would burn the cotton down here and now it is shown. In going up to the city from Quarantine in one of their transports a Yankee officer remarked that he did not see what induced us to burn our cotton when we could get "gold" for it. I said Lincoln promised Europe to open a custom port on the 1st of June and give them cotton. He opened the port, but where is the cotton he was going to give them? It is nearly all burnt and what is not burnt is piled up ready for the torch as soon as they get in the neighborhood.

Old Butler[5] has the boldness to call it the "cotton-burning mob." Butler is playing the devil in N.O. . . . I hope it is not long before he gets the end of it. He has been speculating with Confdt. money. When he issued a proclamation forbidding its use he began to buy it up, through an agent at a 75% discount. The people found it out and run it up on him to only 25% discount. He a[rr]ests s[...] citizens on imaginary charges and fines them large sums which he appropriates. If one of his troops gets drunk he has to forfeit

two or three months pay. Some of the most prominent citizens he has sent to Fort Jackson: some for a year or two and some for life. I wonder if he thinks his old guidon will always wave over New Orleans?

Not long since Old Butler hoisted a new flag on a new flagstaff put up [over] the custom house. A very large crowd collected to see it. As the flag was going up a yankee band struck up "Star Spangled Banner." When this was over they looked around the crowd, evidently expecting a cheer but the people maintained a sullen silence...

You must excuse all the scribbling when you have nothing to do [take] the sheet and try to decipher it; it will pass the time. I may not be able to write you for some time and I though I would give you something [...] while I [had] an opportunity,

Your Friend,

Chew

(Transcribed by Robert Holcombe, Confederate Naval Museum)

NOTES

1. Officers of the *Louisiana* were imprisoned at Fort Warren, Massachusetts, until they were paroled.

2. It is unclear to which *Resolute* the author refers. None of the vessels in service in 1862 fit this description. The *Resolute* in the River Defense Fleet at Fort Jackson mounted only 3 32-pounders.

3. The *Virginia*, formerly the U.S.S. *Merrimack*, was seized by the Confederates in Gosport Navy Yard and converted into an ironclad. On March 8, 1862, she engaged and sunk the U.S.S. *Cumberland* by ramming and destroyed the *Congress* by fire. On March 9, 1862, she engaged the U.S. vessels *Monitor, Minnesota,* and *St. Lawrence*, resulting in a standoff. Two days later she was set on fire and abandoned near Craney Island.

4. The Battle of Port Royal (November 7, 1861) was a victory for the Union navy against two heavily defended forts at Port Royal, South Carolina. Flag Officer Samuel Du Pont executed a maneuver which was only possible with a steam navy, ordering his ships to sail back and forth in front of the forts in a oval pattern while pounding them with heavy broadsides. Both forts were reduced after four hours of bombardment.

5. The author probably refers to the surrender of Fort Pulaski on April 11, 1862, after enduring two days of intensive bombardment by Union artillery.

6. The *Manassas* was built as a ram, meaning her principle offensive weapon was an iron projection on the bow that was used to hole enemy ships by running into them. The *Mannassas* was so slow, however, that she could only hope to get in one blow before her prey steamed out of reach.

7. "Cutting the pipes" that drew sea or river water into the steam boilers was an effective and commonly used method of disabling a steamboat to prevent its capture and reuse by the enemy.

8. Benjamin F. Butler gained lasting notoriety as the commander of the occupation troops in New Orleans for his infamous order of May 15 that any woman who persisted in the practice of insulting Northern soldiers "shall be regarded and held liable to be treated as a woman of the town plying her avocation." Southerners and many Europeans regarded this as a barbarous license for Northern troops to treat the ladies of New Orleans as prostitutes.

APPENDIX B

RECEIPTS FOR MATERIALS USED IN THE CONSTRUCTION OF THE LOUISIANA

New Orleans, April 21st 1862

Confederate States Navy Department,

For Gun Boat Louisiana

To J. Baumiller Dr.

March	19	To 1 Stay for Pilot wheel & 2 Bolts			10 00
April	1	" 862 lb Iron Plates from C. H. Slocomb & Co @ 10c	86	20	
"	"	" Punching 1572 Holes @ 1c	15	72	
"	"	" ~~128 lb wrought Nails " 45c~~	57	60	
"	"	" Hauling Iron from Boat & Back again	8	00	167 52
	2	" Punching 288 Holes @ 1c	2	88	
"	"	" 31 lb wrought Nails " 45c	13	95	
"	"	" Drayage	1	00	17 83
	4	" 1792 lb Iron Plates from C. H. Slocomb & Co @ 10c	179	20	
"	"	" Drayage from Store	1	00	
"	"	" Punching 371 Holes @ 1c	3	71	
"	"	" 30 lb wrought Nails @ 45c	13	50	
"	"	" Drayage to Boat	1	00	198 61
	5	" Punching 184 Holes @ 1c	1	84	
"	"	" 15 lb wrought Nails " 45c	6	75	
"	"	" Drayage	1	00	9 59
	7	" 400 lb Iron Plates from C. H. Slocomb & Co @ 10c	40	00	
"	"	" Punching 119 Holes @ 1c	1	19	
"	"	" 24 lb wrought Nails " 45	10	80	
"	"	" Drayage to Boat	1	00	
"	"	" Hauling R.R. Iron from Boat	2	50	55 49
	8	" 1 Day's work for 2 men on Boat @ 3 $			6 00
	11	" 56 lb wrought Nails " 45c			25 20
	12	" 40 lb do "	18	00	
"	"	" 6 Drayages @ $1	6	00	
"	"	" 1 " "		50	24 50
	14	" 587 lb Joint Hinges for grating on Hatch ways @ 30c	176	10	
"	"	" Cutting & Finishing 18 Bars R.R. Iron for same @ 3.50	63	00	
"	"	" 41 lb wrought Nails @ 45c	18	45	
"	"	" 7 Drayages	2	50	265 05
		Amt taken over			779 79

To Amt. Brot. forward		779.79
14 " Punching 3015 Holes @ 1c		30.15
15 " Hauling R. R. Iron from Boat	3.00	
" " 32 lb wrought Nails @ 45c	14.40	17.40
16 " 180 lb Joint Hinges & fastenings for new Hatchway @ .30	54.00	
" " Putting R. R. Iron together for same	25.00	
" " 57 lb wrought Nails @ 45c	25.65	104.65
17 " 36 lb do " " "		16.20
18 " 6 Iron Plates for Pilot House @ 8.00	48.00	
" " 80 lb wrought Nails @ 45c	36.00	
" " Cutting, Drilling & Binding 24 Bars R. R. Iron @ 2.50	60.00	
" " Cutting & Beveling 8 short Pieces do " 1.00	8.00	152.00
" " Punching 1200 Holes @ 1c	12.00	
" " 7 Drayages	7.00	19.00
		$1119.18

IN TRIPLICATE.

The Confederate States Navy Department,

To Lincoln & Cribben Dr.

Pay't C. S. Gun Boat, Appropriation for Louisiana

1862 April 16	For covering Forecastle of Gun Boat Louisiana as per agreement with C. S. N. Constructor Pierce		500 00
"	1434 lbs Wrot Spikes	25	358 50
22	" 51 " " Nails Countersunk a 45		23 00

Correct Jos. M. Pierce
NC

$881 50

_____ 186 . Received the above article for _____

Office of _____

_____ 186

Approved for _____ dollars and _____ Cents.

Captain in charge.

Jackson Miss June 3rd 1862 Received of Wm. B. Howell Navy Agt. Eight hundred & Eighty one dollars fifty cents in full of the above bill, and have signed triplicate receipts.

$ 881 50/100

Lincoln & Cribben

New-Orleans, April 5th 1862.

Confederate States Navy Department,

~~Per J. W. Pierce for Gunboat Louisiana~~

To Wheeler & Forstall Dr.

1 No. 1 Creole Cook Stove		300	.	
1 No. 6 Economist Range		100	"	
2 Ventilators for chimney tops		30	"	
125 lb Sheet Iron lining for deck	50¢	62	50	
25 lb Zinc for caulking	50¢	12	50	
Cartage to Washington St.		2	50	$507 50

I Certify that the above articles have been received. and in place on board of Lou[isiana] J. Pierce

Approved, and Navy Agent WM. B. HOWELL will pay the above sum of Five hundred Seven Dollars and Fifty cents.

Wm C. Whittle
Commandant

Received, New-Orleans, April 16th 1862, of WM. B. HOWELL, Navy Agent, the sum of Five hundred & Seven Dollars ~~and fifty~~ ~~cents, in payment of the above.~~

$ 507.50/100 dolls

Wheeler & Forstall

(Triplicate.)

New-Orleans, March 28 1862.

Confederate States Navy Department,

Per Gun Boat Louisiana

To C H Slocumb & Co Dr.

62	Slabs Cinnamon Sum 9 x ff				
13	do do do 10 x ff				
21	do do do 12 x ff				
	7082 10¢			708 20	
	To parties Shoop Fixtures				
	J L ...				
				708 20	

I Certify that the above articles have been received.

Joseph Pierce
Naval constructor

Approved, and Navy Agent WM. B. HOWELL will pay the above sum of Seven Hundred & Eighty Eight Dollars and Twenty cents

Jno K Mitchell
Commandant

Received, New-Orleans, April 2nd 1862, of WM. B. HOWELL, Navy Agent, the sum of Seven Hundred & Eighty Eight Dollars and Twenty cents, in payment of the above.

$ 708 20/100

(Triplicate.)

C H Slocumb & Co

AC

New-Orleans, 1862.

Confederate States Navy Department,

For Gunboat Louisiana

To McCan & Harrell Dr.

April	7	3 Deck Pipes	297 lbs @ 8	23 76
		Drilling Same	" 1.00	3 .
		Drayage		2 50
	9	2 Hawser Pipes	1072 " " 8	85 76
		Drilling Same	" 6.00	12 .
		2 Cast Flanges for Same	511 " " 8	40 88
		Drilling Flanges	" 3.00	6 .
		Drayage		2 50
	11	2 Hawser Pipes	1000 " " 8	80 .
		Drilling Same	6.00	12 .
		Altering Pattern		8 .
		Drayage		2 50
	12	2 Cast Flanges for Pipes	511 " " 8	40 88
		Drilling "	3.00	6 .
		12 1/2 in Bolts for Flanges	42 " " 25	10 50
		Cash paid Drayage		1 .
	14	2 Cast Steel Bull Chisels	3.50	7 .
				344 28

I Certify that the above articles have been received and used in the Ship [illegible]

Approved; and Navy Agent ~~WM. B. HOWELL~~ John W. Tryon will pay the above sum of Three hundred & forty four Dollars and twenty eight cents. W. Whittle Comdt.

Received, ~~New-Orleans~~, Jackson Sep 30 1862, of ~~WM. B. HOWELL~~ John W. Tryon, Navy Agent, the sum of Three hundred & forty four Dollars and twenty eight cents, in payment of the above.

$ 344 28/100

McCan & Harrell

(Triplicate.)

AC

IN TRIPLICATE.

The Confederate States Navy Department,

To T. R. Brady & Co. Dr.

~~Ship Ord & Gen'l Supplies for Louisiana~~

1862			$	
April 9.	1625 ft. Pine 4 x 4 - 3/	3	48	75
"	600 " Oak Plank for [illegible]	6	36	00
"	Sawing W. Romer's order		4	50
"	550 ft Oak Plk 2 1/2 in	5	27	50
[illegible]	[illegible] Pine [illegible]	3	54	90
14	558 " 5 in Pine [illegible]	5	27	90
17	1046 Pine [illegible]	25	26	15
	Cartage & [illegible]		11	25
	2544 ft Pine [illegible]	2	50	88
	74 " Cypress [illegible]	5	3	70
	145 " Cartage		2	50
	4500 ft Pine [illegible]	3	135	00
	Cartage		6	00
			452	03

I hereby certify the above bill to be correct and used for C.S.S. Louisiana

Joseph Pierce

$452 03

186 . Received the above article for

Office of

186

Approved for dollars and

Cents.

Captain in charge

Jackson July 4th 1862. Received of Wm. B. Howell

Four Hundred & Fifty two dollars three cents.

in full of the above bill, and have signed triplicate receipts.

$452 03/100

T. R. Brady & Co

Louisiana.

Recommended Allowance Sept 24 1863 of Paymaster U. S. Steam Tug Arow of eighty one Dollars in payment of twenty and a quarter days work at four dollars per day on the Confederate Steamer Louisiana during the month of April 62

$81.00

James Lynch

For approval of Capt W. S. White Comdt at New Orleans on voucher No 151 Pay accounts for April 2 Qr 1862

Chas H. Nixon
Paymaster

Lynch

APPENDIX C

RECORD GROUP 365
CONTRACT NO. 470
SPECIFICATIONS AND DIRECTIONS
FOR BUILDING A GUNBOAT

Extreme Length ..... 264 ft
Extreme Beam ..... 62 ft
Depth of hold (in the clear) ..... 7 ft
Draft of water not to exceed ..... 6 ft
and displacement at this line 2751

Floor timbers, to mould 11 and side 9 inches, and frames to be 14 inches from center to center leaving a 5 inch space between all the timbers fore and aft of the boilers. And in the space the boilers occupy it must be solid.

There will be five keelsons on this boat; four of them to run the entire length, to mould 12 and side 9 inches, and fastened with 7/8 bolts, one in every timber, to go through and clinch on rings.

Walls

The walls or sides to be formed of longitudinal logs, 14 inches square, and keyed every five feet. Care must be taken that the keys come between the *bolts*, and the *bolts* between the *knees* that sustain the walls. The bolts that sustain the walls to be in diameter 1 1/4 inches and set up with a nut, in diameter apart 6 feet.

The bottom plank to be 5 inches thick and fastened with spikes 10 1/2 inches long or 5/8 bolts if to be had, to bolts in each strake in the floor timber and one bull-bolt 2 feet from hood-end to go through and clinch on a ring.

Bulkheads

The bulkheads running fore and aft will be five in number, 7 inches thick and to be caulked.

There will be 17 cross bulkheads, one to come under each side gun and to be formed of 3 inch pine plank, with stanchions to support the plank, and to be water tight.

The Doctor engine to be so arranged with pipes leading to each apartment so as to free them from water when needed.

Keelsons

It will be borne in mind that the two 7/8 bolts are to go through the bottom plank in the floor, driven from the outside, and to clinch on rings on the top of keelsons fore and aft.

There will be a bolt to pass through this keelson and the bulkhead on top and through every other beam, and set up with a nut in the space of the floor timbers, and where the floor is solid, this bolt must go through the floor timber and bottom plank and set with a nut.

There will be in the after end of the boat an opening to receive the Paddle Wheels in the middle. It will be when finished 19 feet in the clear, and extend about 114 feet from the after end, as per plan. This opening will be formed by longitudinal bulkheads, and in the wake of the wheels, stanchions will be run up and planked with 2 1/2 inch pine plank, and made water tight.

Both wheels will be completely cased in a wheel house in the middle of the boat, as per plan.

Gun Deck Beams

Gun-deck beams to be 10 x 9 and 25 inches space between, so that two of the logs forming the roof will pass between them and bolt with one 7/8 bolt.

In the end of each beam, a vertical bolt will pass through each beam, as per plan.

Clamps

There will be two strakes of clamps on each side running the entire length of the shield, in thickness 4 inches and 10 inches wide, and fastened with two spikes in each frame 8 1/2 inches long.

There will be on this deck Hatches over every room below, combing to be 4 inches high and 6 inches wide, fitted with light covers.

Water Way

There will be a water way running all around the boat, 15 inches on two faces, triangular shape as per plan, and fastened with 7/8 bolts alternately, one in beam, and the other in rafter.

Deck Plank

The deck plank for 20 feet from the side will be 3 1/2 inches thick, and 10 inches wide.

Spikes, two in each beam 7 inches long, will fasten the deck. The boilers will be in the hold. There will be a long Hatch framed for the boilers on the Deck, combing to be as high as Port sill, and covered with iron grating, if to be had.

On this deck there will be a Hatch over each compartment 3 by 2 feet wide, with a combing 4 inches high, siding 6 inches, and covered with a tight cover.

One scupper to be within 5 or 6 feet of each port, to be 5 inches by 7, fore and aft, and leaded.

The Starts, Breeching and Eye Bolts will be put in ready to receive and work the guns.

There will be suitable Cable Bitts at each end (of the boat) for towing and mooring, as per plan, and hawse pipes or chocks cased with iron for the cable to lay in when at anchor.

Three capstans to be placed as per plan complete.

The Roof

The roof is to be formed of 12 inch square pine timber, at an angle of 38 degrees and 12 inch pine running longitudinally.

Then a layer of 4 inch oak is to run vertically and the whole to be covered with Rail Road T or other equally thick iron making a total thickness of 31 1/2 inches.

This metal will run down 2 feet below the water line as is shown in the cross section A.

There will be an opening in the center for ventilation and iron stanchions 2 feet 6 inches long, with a eye on the top for a ridge rope to run through as shown on top of cross section A.

Inside of this roof there will be beams 4 feet below the extreme height, 4 by 7 inches and about 4 feet of platform laid on these beams, so that men can use small arms in the upper opening and also for the men to hang their hammocks to.

There will also be cross Bridges on platforms 4 feet wide on these beams every 12 feet apart.

There will be around the Bridges also around the Platforms, a railing two and a half feet high.

One pair of steps will be put up at each bridge.

The opening on top will be formed as Hatches 9 feet wide, and fitted with gratings in the combing.

Port Shutters

Port shutters to be made heavy and strong and hung above and below, not less than 2 inches thick of wrought iron, with hinges and suitable fixtures for lowering and raising and securing them.

Port sill above deck will be 22 inches.

The Rail Road iron covering the roof will run up from the water's edge twenty feet on the side of the roof, the remaining part of the roof will be covered with 2 inch iron.

As the forward and after end of the boat is longer than the shield, there will be two cross Bulkheads, one forward and the other aft, formed of 14 inch square timber, the same as Gun-deck, and to be water tight, to have a light bulkhead of 2 inch plank, stanchions and rail 2 feet high.

It will be perceived that the plan shows two heights in the roof, either of which has its advantages and disadvantages, So the plan arranged for putting on the iron would save 200 iron plates, and be strong enough to *resist shot.*

There will be two rudders.

To make a wheel house and fit the Steering apparatus in the Most approved manner with wire or with chain wheel ropes, leading to the wheel house before the Smoke stack.

There must be a boom derrick so arranged to manage the Anchor when necessary.

The different apartments formed by the fore and cross bulkheads will be ample for all Store room, magazines, shot and shell, coal Bunkers, &c, &c.

The Captain's Cabin, and State Rooms for officers of all kinds are marked off on the plan. These rooms will be painted.

Calculations for Displacement

As this boat will have to run in the lightest draft of water, everything is reduced to the shortest possible allowance.

Launching draft of water with shield on her, will be, taking the water at 60 lbs to the foot = 36 inches or 1,450 tons.

Weight - the Engines and Doctor Engines with water in boilers will be = 290 Tons.

Weight of 22 Guns, carriages, sponges and rammers will =

viz, 2 of 11 inch caliber	30 tons
16 of 9 inch caliber	80 tons
Medium 4 of 6 inch caliber or 32 Pounders	9 tons
Shot, shell and Powder	125 tons
325 Men and their effects	32 tons
Provisions for above	22 tons
Coal for three days	64 tons
Anchors, cable and boats, two in no.	8 tons
Two small engines for changing position of the boat	6 tons

Contingent Purposes

Recapitulation of Weights

1450	Tons
290	"
119	"
125	"
32	"
22	"
64	"
8	"
6	"
2	"
Total =	2118 tons

Total weight of boat to 6 foot water line, taking the water at 60 lbs to the foot is =

$$\frac{260 \times 62 \times 6 \times 60}{2} = 2750 \text{ Tons x 150 for wheel space}$$

2750 Tons - 2118 tons = 632 tons for iron.

There will be one small propeller on each side, aft, of about 4 feet diameter to aid the boat in taking position, to be supplied by steam from the main boiler.

Machinery

Of the gun boat to be two cylinders, nine feet stroke, and thirty inches Diameter, to be supplied by six boilers thirty feet long and forty inches Diameter, with two flues in each boiler, 16 or 17 inches Diameter.

Water wheel to be twenty seven feet in diameter with 19 feet buckets.

Wheel arms to be 4 x 14 inches at butt end and 4 x 9 inches at flange.

Shaft to be 17 inches diameter at crank, if *cast iron*, or 12 inches if wrought iron and to be 10 inches at *out-side* journal.

To be supplied with a Doctor Engine for pumping up boilers and proper bilge pumps.

The Doctor Engine to have a separate boiler attached, and all to be placed upon bed plates, and cylinder timbers of suitable sizes for the size of the engines, with all necessary ties, bolts and fastenings, breechings, chimneys, fire beds &c, &c.

To be built and all completed as is usual in river boats of the first class.

Engines to be stationed in the vessel as per the drawing.

Second hand machinery can be used if suitable can be procured.

All to be done in a workmanlike manner and to the satisfaction of the officers appointed by Government to inspect the work.

All of which is most respectfully submitted &c.

Joseph Pierce N.C.

(Transcribed by Bob Holcombe, Director, Confederate Naval Museum)

APPENDIX D

MISSISSIPPI FOREST PRODUCTS LABORATORY REPORT

MISSISSIPPI FOREST PRODUCTS LABORATORY

Telex 785045
Fax (601) 325-8126

P.O. Drawer FP
Mississippi State, MS 39762-5724
Phone (601) 325-2116

September 25, 1992

Jack B.Irion, Ph.D.
Vice President - Nautical Archaeology
R. Christopher Goodwin and Associates, Inc.
5824 Plauche Street
New Orleans, Louisiana 70123

Dear Jack,

I completed the identification of the two specimens of wood sent with your letter of September 22 this morning. Sound portions of wood were excised from each sample and examined with a hand lens for initial evaluations; these portions were then sectioned and examined microscopically at 240 X and 400 X magnification. Multiple sections of three mutually orthogonal views of each portion were obtained: cross-section, radial section and the tangential section. The samples were keyed out according to the hand lens keys I prepared for my undergraduate classes, and also according to the microscopic feature key found in Panshin and de Zeeuw's Textbook of Wood Technology.

Specimen #1:

C.S.S. Louisiana, Anomaly A, Core Sample 53, 9-16-92

Identified as **Baldcypress (Taxodium distichum)**.

Diagnostic features:

- No resin canals
- Abundant longitudinal parenchyma
- Rays exclusively ray parenchyma
- Fairly coarse texture: average earlywood tracheid diameter approximately 50 to 60 micrometers
- Cross-field pitting cupressoid to taxodioid
- Cross-field pit diameter along aperture approximately 6.5 micrometers
- Cross-field pit aperture angle relatively flat, > 50O
- Ray parenchyma end walls lacking indentures
- Longitudinal parenchyma have nodular end walls
- Ray height ranges from about 4 to 20

Specimen #2:

C.S.S. Louisiana, Anomaly F, Core Sample 60, 9-18-92

Identified as Southern Hard Pine (*Pinus* spp.)
(Southern hard pines cannot be identified by species on the basis of wood anatomical features alone. Southern hard pines include longleaf, shortleaf, loblolly, slash, pitch, and pond pine. Based on shipbuilders' locations (shoreline) and condition of the sample given its probable age, it is possible that the sample is longleaf pine (*Pinus palustris*) heartwood.)

Diagnostic features:

- Abundant, large resin canals
- Thick latewood
- Rays consist of both ray parenchyma and ray tracheids
- Dentate ray tracheids
- Cross-field pitting exclusively pinoid
- More than three pits per crossfield (on average), at least 20% paired vertically

I am returning the samples to you separately, so this letter might reach you first. As I indicated in our phone conversation, I appreciated having the relatively large samples to work with. This made working with the baldcypress much easier, as I was able to cut into a sound portion of the core. (The identification itself does not require large samples; the small portions I actually worked with in making the analysis are enclosed in the outer bag for the baldcypress). Also find enclosed a couple of xeroxed pages from Harlow and Harrar's *Textbook of Dendrology* showing the range maps for baldcypress and longleaf pine (and a couple of other of the southern pines).

Please let me know if you have any additional questions or if you require an invoice, etc.

Sincerely,

Terrance E. Conners
Associate Professor

601/325-3091
601/325-8126 FAX

APPENDIX E

SCOPE OF SERVICES

CELMNPD-RN July 31, 1992

SCOPE OF SERVICES
CONTRACT DACW29-90-D-0018, DELIVERY ORDER 16
PHASE II TESTING OF MAGNETIC ANOMALIES,
FORT ST. PHILIP, PLAQUEMINES PARISH, LOUISIANA

1. Introduction. This order combines tasks originally contracted under Contract DACW29-90-D-0018, Delivery Order 06 with additional requirements described by this scope of service. Delivery Order 06 was terminated for the convenience of the Government on June 2, 1992. **The scope of services for Delivery Order 06 is hereby incorporated by reference;** all unfinished requirements will be accomplished under this delivery order. This scope of services expands the work conducted under Delivery Order 06 to include additional historical research, the placement of numerous bore holes and recovery of core samples from magnetic anomaly areas, analyses of these additional data and preparation of a report. The goals of this additional work are to identify the sources of selscted magnetic anomalies, determine their significance (i.e.National Register eligibility), and determine their present condition. The contract period for this delivery order is **110** days.

2. Description of the Study Area. The study area is defined as the locations of potentially significant magnetic anomalies on the building bank in front of Fort St. Philip. These include anomalies A, B, C, F, G, and H.

3. Study Requirements. The work to be performed by the Contractor will be divided into three phases: Historical Research; Fieldwork; and Data Analysis and Report Preparation.

a. Historical Research. Additional research will be conducted at archival repositories which may contain information on the construction methods and materials of the CSS Louisiana.

b. Fieldwork. A systematic and exhaustive program of borings will be placed over the identified anomalies. Borings will be placed at pre-established grid locations taking into account the field conditions and magnetic data. Core samples will be obtained when resistance is encountered, and detailed logs of core locations, depths and samples will be maintained. Borings will extend to a maximum depth of 50 feet below ground surface.

c. Data Analyses and Report Preparation. All data obtained from the historical research and fieldwork will be analyzed to assess the nature and origin of the tested anomalies. These data will be combined with information previously obtained to provide a definitive assessment of the tested magnetic anomalies. The Contractor shall

assess their historical significance, their National Register eligibility, and their potential for impact from Corps activities. For all anomalies recommended as significant, theContractor shall submit three complete copies of National Register nomination forms, and shall prepare a mitigation plan, if appropriate.

4. Reports.

a. Monthly Progress Reports. One copy of a brief and concise statement of progress shall be submitted each month throughout the duration of the delivery order. These reports, which may be in letter form, should summarize all work performed, information gained, or problems encountered during the preceding month and provide documentation of invoices for the same period. A concise statement and graphic presentation of the Contractor's assessment of the monthly and cumulative percentage of total work completed by task shall be included each month. The monthly report should also note difficulties, if any, in meeting the contract schedule.

b. Draft and Final Reports (Phases 1, 2, and 3). Five copies of a draft report integrating all phases of this investigation as well as work conducted under Delivery Order 06 will be submitted to the COR for review and comment 50 days after award of the order.

One separate copy of the Olga Revetment Record Map, on which the locations of all transects and magnetic anomalies are accurately plotted, will be submitted with the draft reports. The chart will be accompanied by tables listing all magnetic anomalies recorded during the survey. At a minimum, the table will include the following information: project name, magnetic target number, gamma intensity, target coordinates (Louisiana State Plane) and Olga Revetment range. The Contractor will also submit with the draft reports, one copy of Hydrographic Chart 67 on which all anomalies are recorded.

Project impacts to every cultural resource located by this study will be assessed. The draft and final reports shall include all data and documentation required to request Determination of Eligibility to the National Register of Historic Places for those sites recommended by the Contractor as significant. The Contractor will classify each anomaly as eligible for inclusion in the National Register or as not eligible, and shall provide a detailed explanation for each classification. The report will include a summary table listing all anomalies, their location, the assessment of potential significance, and recommendations for further work. The report shall contain recommendations for avoidance, protection, or data recovery for each anomaly/site assessed as significant. Further work must be justified in terms of the specific scientific contribution further investigation of each resource would accrue. Proposed investigative methodologies must be appropriate to each resource and its physical condition or location. An investigative plan for each resource will be discussed in detail, including equipment, explanation of any special procedures, approximate costs, sample sizes, recovery and analytic techniques, etc.

The COR will provide all review comments to the Contractor within 30 days after receipt of the draft reports (80 days after the date of the order). Upon receipt of the review comments, the Contractor shall incorporate or resolve all comments with the approval of the COR and submit one copy of the final draft for final review within 95 days of the date of the order. Upon approval, the Contractor will submit one reproducible master copy and 40 bound copies of each report of investigation, and all separate appendices to the COR within 110 days after the date of the order.