Report Entitled**:**

Phase I Remote Sensing Archaeological Survey
of Three Proposed Borrow Sites
Isle of Palms, Charleston County, South Carolina

Prepared for:

Coastal Science & Engineering, Inc.
P.O. Box 1643
Columbia, South Carolina 29202-8056

Prepared by:

Gordon P. Watts, Jr., Ph.D, RPA
Principal Investigator

Tidewater Atlantic Research, Inc.
P. O. Box 2494
Washington, North Carolina 27889

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Abstract

Coastal Science and Engineering, Inc. (CSE), is the consulting engineer for the City of Isle of Palms for a beach renourishment project on the north end of Isle of Palms. Three offshore areas south of Dewees Inlet have been identified as potential borrow sites. In order to determine the proposed project's effects on potentially significant submerged cultural resources, CSE contracted with Tidewater Atlantic Research, Inc. (TAR) of Washington, North Carolina to conduct a cesium magnetometer, sidescan sonar and sub-bottom profiler survey of the proposed borrow sites. Fieldwork was conducted during the period from 12 to 18 January 2017. Analysis of the magnetic and acoustic data identified no magnetic anomalies or sonar targets in survey Area G. Three small single anomalies were identified in Area F. All are likely to represent traps, cable, pipe, a small boat anchor or other similar modern debris. No sonar targets were identified in Area F. In survey Area E twelve magnetic anomalies and five sonar targets were identified. While eight of the anomalies are likely to represent traps, cable, pipe, a small boat anchor or other similar modern debris, four are clustered together and were discovered in the vicinity of a wreck on the current "NOAA Chart #11521-Charleston Harbor and Approaches." Those four magnetic anomalies are recommended for avoidance although they lie within the 200-foot border buffer surrounding the proposed dredge site. The remaining eight anomalies have signature characteristics suggestive of traps, cable, pipe, a small boat anchor or other similar modern debris. Two of five modern tires identified by sonar during the survey lie within the recommended avoidance buffer. Based on the findings, TAR recommends no additional investigation in either Area F or Area G. As the cluster of four magnetic anomalies in the southeastern border buffer of Area E could be associated with the charted shipwreck or possibly the remains of another vessel that site is recommended for avoidance. If avoidance of the Area E buffer is possible, proposed dredging will not impact any National Register of Historic Places eligible submerged cultural resources.

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Introduction

Coastal Science and Engineering, Inc. (CSE), is the consulting engineer for the City of Isle of Palms for a beach renourishment project on the north end of Isle of Palms. Three offshore areas south of Dewees Inlet have been identified as potential borrow sites. In order to determine the proposed project's effects on potentially significant submerged cultural resources, CSE contracted with Tidewater Atlantic Research, Inc. (TAR) of Washington, North Carolina to conduct a remote-sensing survey of the proposed borrow sites.

The survey was designed to meet the survey criteria of the South Carolina Institute of Archaeology and Anthropology (SCIAA) and comply with the National Historic Preservation Act of 1966, as amended, through 1992 (36 CFR 800, *Protection of Historic Properties*), the Abandoned Shipwreck Act of 1987 (*Abandoned Shipwreck Act Guidelines*, National Park Service, *Federal Register*, Vol. 55, No. 3, December 4, 1990, pages 50116-50145), the National Environmental Policy Act of 1969 (Public Law 11-190), Executive Order 11593, the Advisory Council on Historic Preservation Procedures for the protection of historic and cultural properties (36 CFR Part 800) and the updated guidelines described in 36 CFR 64 and CFR 66. The results of the proposed investigation were designed to furnish CSE with the remote-sensing data essential for complying with submerged cultural resource legislation and regulations. The survey was carried out using a cesium vapor magnetometer, a high-resolution digital sidescan sonar and a digital sub-bottom profiler. An on-board laptop controlled vessel positioning and remote-sensing data collection and was georeferenced using a differential global positioning system (DGPS).

Analysis of the magnetic and acoustic data identified no magnetic anomalies or sonar targets in survey Area G. Three small single anomalies were identified in Area F. All are likely to represent traps, cable, pipe, a small boat anchor or other similar modern debris. No sonar targets were identified in Area F. In survey Area E twelve magnetic anomalies and five sonar targets were identified. While eight of the anomalies are likely to represent modern debris, four are clustered together and were discovered in the vicinity of a wreck on the current NOAA Chart #11521. Those four magnetic anomalies are recommended for avoidance although they lie within the 200-foot border buffer surrounding the proposed dredge site.

The remaining eight anomalies have signature characteristics suggestive of traps, cable, pipe, a small boat anchor or other similar modern debris. Two of five modern tires identified by sonar during the survey lie within the recommended avoidance buffer. Based on the findings, TAR recommends no additional investigation in either Area F or Area G. As the cluster of four magnetic anomalies in the southeastern border buffer of Area E could be associated with the charted shipwreck or possibly the remains of another vessel that site is recommended for avoidance.

Remote-sensing activities were carried out during the period from 12 to 18 January 2017. Gordon Watts served as principal investigator, Ralph Wilbanks served as the remote-sensing equipment operator and Steve Howard served as vessel captain. Dr. Watts analyzed the remote-sensing data. Robin Arnold conducted the historical background research. This report was prepared by Dr. Watts and Ms. Arnold.

Project Location

The proposed Isle of Palms beach restoration borrow sites Area F and Area G are located approximately 1.5 nautical miles south of Dewees Inlet. Borrow site Area E is located approximately 2.2 nautical miles south-southwest of Dewees Inlet (Figure 1).

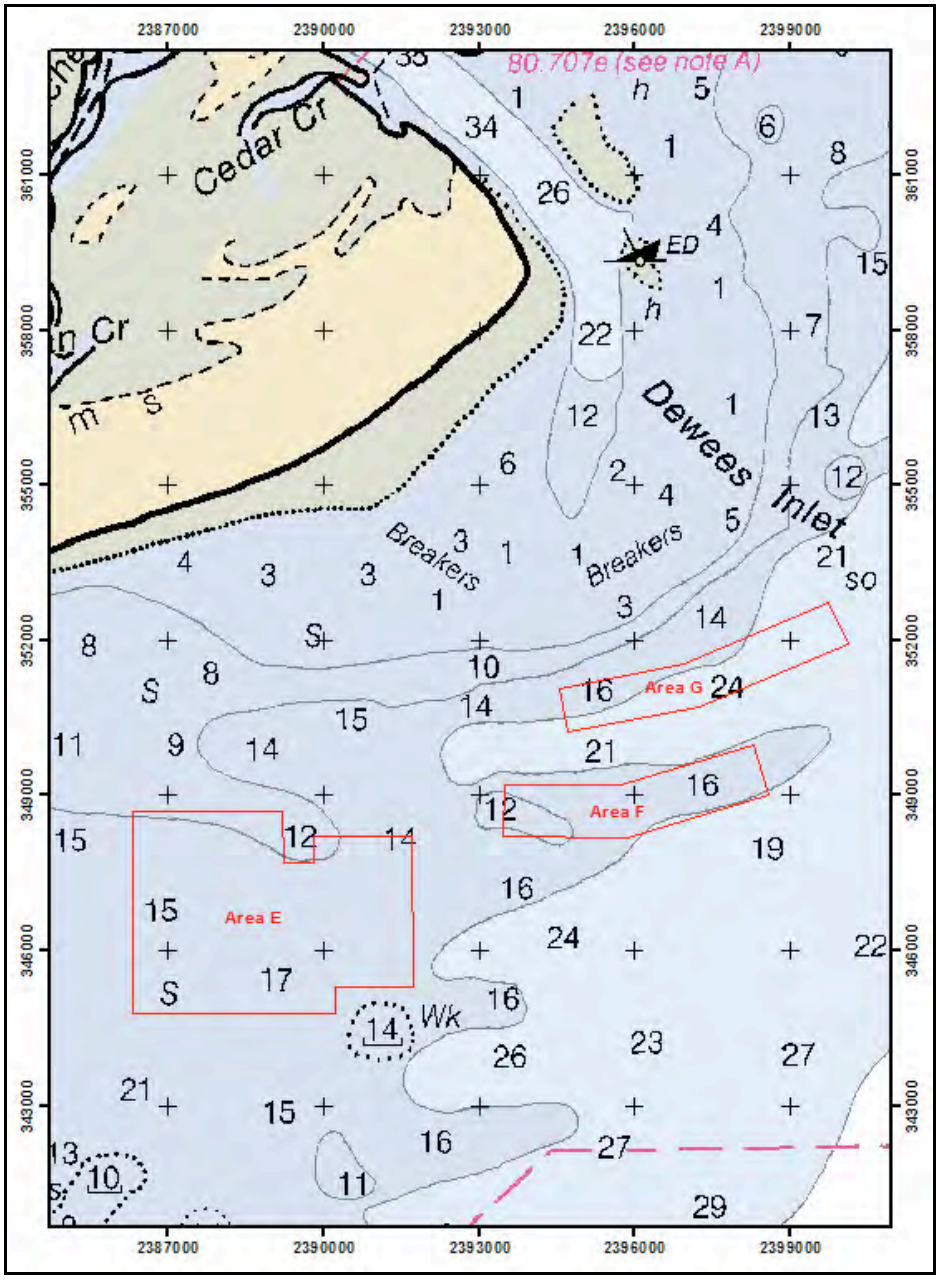

Figure 1. Extract of NOAA chart showing project location (NOAA Chart 11521).

Area F and Area G are dogleg rectangles and Area E is a polygon roughly rectangular in shape. Each of the survey areas includes a 200-foot buffer zone so that any magnetic anomalies or sonar targets located along the periphery of the borrow site could be identified and potential impacts from dredging assessed.

The Area E borrow site (Figure 2) with its buffer measures 5,400 feet long, and a maximum of 3,900 feet wide and covers an area of 430 acres.

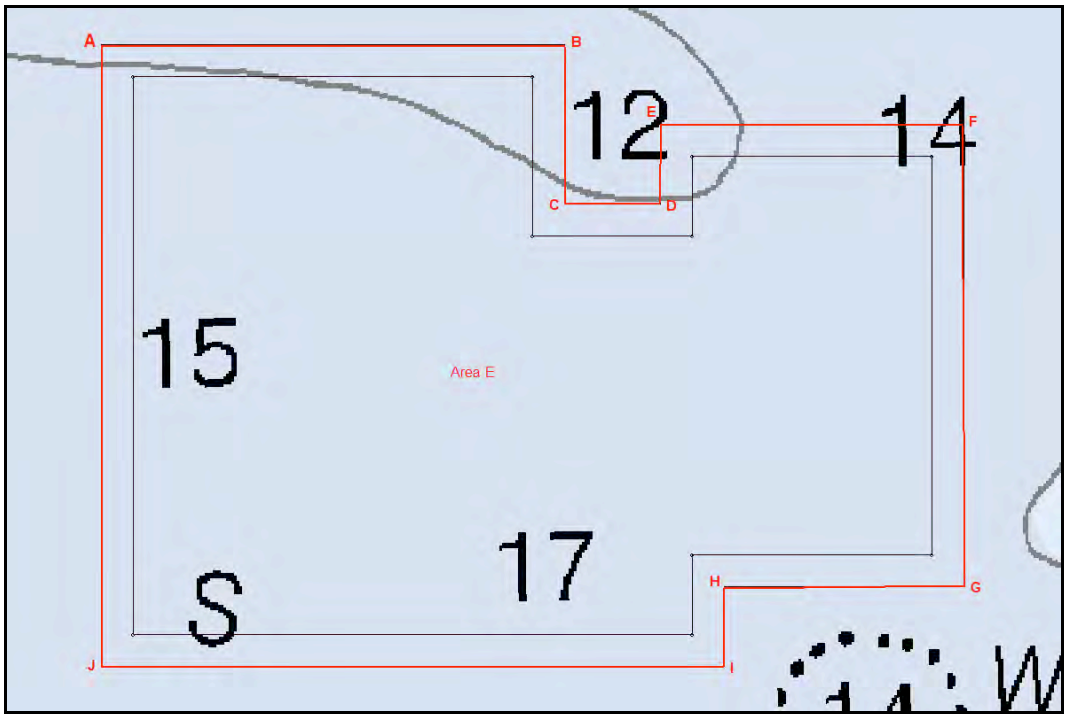

Figure 2 . Area E survey buffer border points.

Coordinates for the Area E survey area in South Carolina state plane coordinates, NAD 1983, US Survey foot are:

AREA E		
Border Point	**X Coordinate**	**Y Coordinate**
A	2386305.11	348694.98
B	2389199.64	348689.48
C	2389205.05	347700.71
D	2389794.07	347706.14
E	2389804.97	348200.69
F	2391688.44	348195.01
G	2391705.13	345306.18
H	2390199.58	345289.49
I	2390194.04	344795.13
J	2386305.11	344795.16

Table 1. Area E border points.

The Area F borrow site (Figure 3) with its buffer measures 6,250 feet long, 1,000 feet wide and covers an area 117 acres.

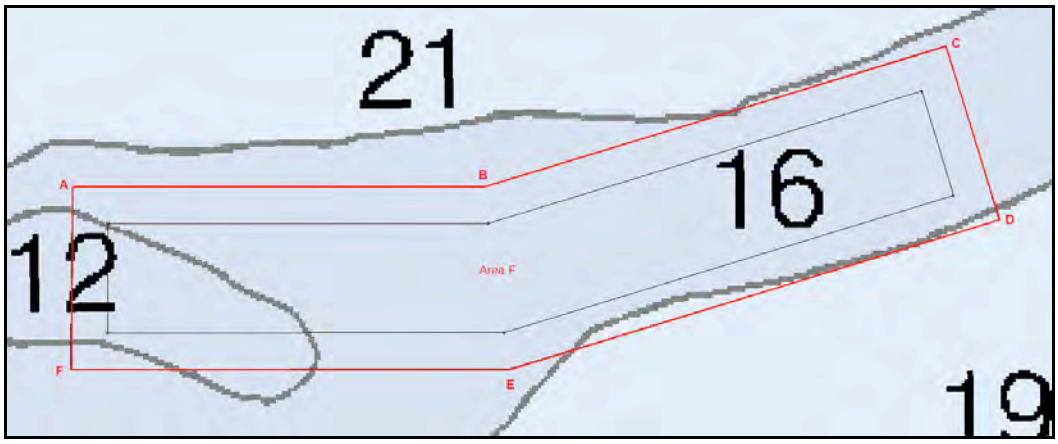

Figure 3. Area F survey buffer border points.

Coordinates for the Area F survey area in South Carolina state plane coordinates, NAD 1983, US Survey foot are:

AREA F		
Border Point	**X Coordinate**	**Y Coordinate**
A	2393460.03	349200.08
B	2395729.26	349200.08
C	2398281.01	349976.49
D	2398572.63	349020.03
E	2395880.09	348196.01
F	2393460.03	2393460.03

Table 2. Area F border points.

The Area G borrow site (Figure 4) with its buffer measures 5,500 feet long, 875 feet wide and covers an area of 113 acres.

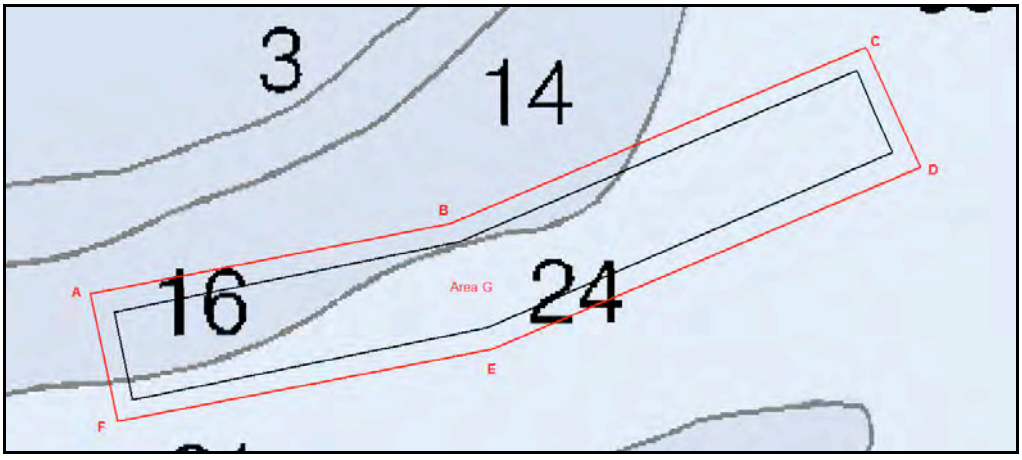

Figure 4 . Area G survey buffer border points.

Coordinates for the Area G survey area in South Carolina state plane coordinates, NAD 1983, US Survey foot are:

AREA G		
Border Point	**X Coordinate**	**Y Coordinate**
A	2394522.45	351070.35
B	2396946.03	351542.56
C	2399737.77	352730.09
D	2400105.79	351924.54
E	2397223.73	350702.28
F	2394703.03	350216.22

Table 3. Area G border points.

Research Methodology

Historical Research

TAR personnel conducted a literature search of primary and secondary sources to assess the potential to find significant historic and/or cultural resources within the proposed project area. The current archival research was designed to build upon previous in-depth studies to further construct and refine a background history of the development of the Charleston County region. The literature survey focused on documentation of activities such as exploration, colonization, development, agriculture, industry, trade, shipbuilding, commerce, warfare, transportation and fishing that would be contributing factors in the loss of vessels or presence of other submerged cultural resources in the vicinity of the proposed borrow sites.

Preliminary wreck-specific information was collected from sources that included: *The Encyclopedia of American Shipwrecks* (Berman 1972); *Merchant Steam Vessels of the United States 1790 - 1868* (Lytle and Holdcamper 1975); *Disasters to American Vessels, Sail and Steam, 1841-1846* (Lockhead 1954); *Shipwrecks of the Civil War: The Encyclopedia of Union and Confederate Naval Losses* (Shomette 1973); *Shipwrecks in the Americas* (Marx 1983); *Shipwreck Encyclopedia of South Carolina and Georgia* (Spence 1982) and other published materials. Additional information was generated by a survey of select South Carolina newspapers and journals presented in gratis and premium historical databases sponsored by Accessible Archives, Chronicling America [Library of Congress], Fold 3, GenealogyBank, NewspaperArchive, and Newspapers.com. Copies of numerous historical maps and charts permanently archived at TAR from collections of The National Archives (TNA) Cartographic Branch in College Park, Maryland; TNA-Washington, DC, the South Carolina Department of Archives and History, the South Caroliniana Library and the U.S. Army Corps of Engineers, Charleston District (USACE-C) were also reviewed. Scholarly cartographical references available in the TAR library including *Mills' Atlas of South Carolina* (Mills 1979), *The Historical Writings Of Henry A. M. Smith* (1988a, 1988b, and 1988c), and *The Southeast in Early Maps* (Cumming 1962) were consulted for project-specific details.

An examination of SCIAA site files [Columbia SC] was conducted with the supervision of Site Files Manager Keith Derting by Principal Investigator Gordon Watts and Historian Robin Arnold on 7 November 2016. Dr. Watts and Ms. Arnold discussed the project survey methodology and known shipwreck sites in the proposed project area with State Underwater Archaeologist James D. Spirek during the visit to the SCIAA office in Columbia.

Remote Sensing Survey

To reliably identify submerged cultural resources in the off-shore borrow areas where dredging activities will disturb the environment, TAR conducted a systematic remote-sensing survey using a 25-foot survey vessel (Figure 5). In order to fulfill the survey requirements of SCIAA, TAR employed both magnetic and acoustic remote sensing. A combination of cesium vapor magnetometer, high-resolution sidescan sonar and multi-frequency sub-bottom profiler represents the state-of-the-art in submerged cultural resource location technology. Data generated by those instruments provides the most reliable and cost effective method of locating and identifying potentially significant anomalies. Remote sensing data collection was controlled using a computer controlled differential global positioning system (DGPS). The DGPS produces the highly accurate coordinates necessary to support a sophisticated navigation program and assure reliable target location.

Figure 5. TAR project support vessel.

Magnetic Remote Sensing

EG&G GEOMETRICS G-881 marine cesium magnetometers, capable of plus or minus 0.001 gamma resolution, were employed to collect magnetic data in the survey area (Figure 6). To produce the most comprehensive magnetic record, data was collected at 10 samples per second. Due to shoal water within the project area, the magnetometer sensors were towed just below the water surface at a speed of approximately 4 knots. Magnetic data were recorded as a data file associated with the computer navigation system. Data from the survey were contour plotted using QUICKSURF computer software to facilitate anomaly location and definition of target signature characteristics. All magnetic data were correlated with the acoustic remote-sensing records.

Figure 6. Launching the Geometrics G-882 magnetometer.

Acoustic Remote Sensing

A 450/900 kHz KLEIN 3900 digital side-scan sonar interfaced with SONARWIZ data acquisition software was employed to collect acoustic data in the survey area (Figure 7). Due to shoal water within the project area, the side-scan sonar transducer was deployed and maintained approximately 10 feet below the water surface. Acoustic data were collected using a range scale of 50 meters to provide a combination of more that 200% coverage and high target signature definition. Acoustic data were recorded as a digital file with SONARPRO Klein software and tied to the magnetic and positioning data by the computer navigation system.

Figure 7. Rigging the Klein 3900 sonar.

Acoustic sub-bottom data was collected using an EDGETECH 3100P Portable sub-bottom profiler with an SB-216S tow vehicle (Figure 8). The SB-216S provides three frequency spectrums between 2 and 15kHz with a pulse length of 20 msec. Penetration in coarse and calcareous sand is factory rated at 6 meters with from 2 to 10cm of vertical resolution. During the survey the sub-bottom transducer was deployed and maintained between 4 to 5 feet below the water surface. To facilitate target identification, sub-bottom sonar records were electronically tied to DGPS coordinates. Sub-bottom data was recorded as a digital file using EDGETECH's Discover software and DGPS provided record positioning.

Figure 8. Launching the EdgeTech SB-216S tow vehicle.

Positioning System

Trimble DGPS systems were used to control navigation and data collection by computers on the survey vessel's helm (Figure 9). That system has an accuracy of plus or minus three feet, and can be used to generate highly accurate coordinates for the computer navigation system. The DGPS was employed in conjunction with on-board laptops loaded with HYPACK navigation and data collection software program. All magnetic and acoustic records were tied to positioning events generated by HYPACK. Positioning data generated by the navigation system were tied to magnetometer records by regular annotations to facilitate target location and anomaly analysis. All data is correlated to South Carolina State Plane Coordinate, NAD 83, US Survey foot coordinates.

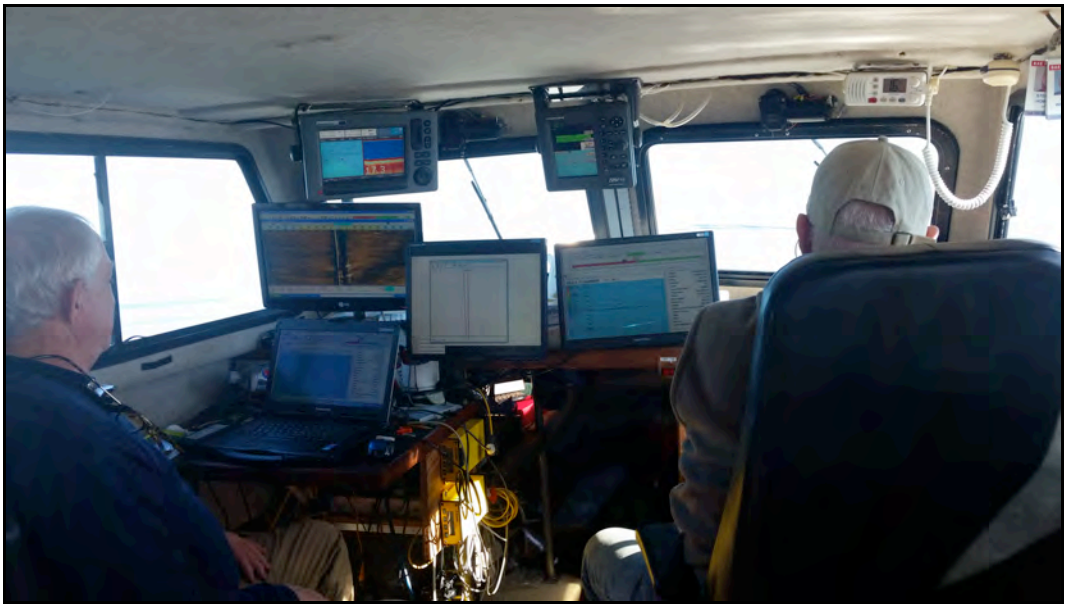

Figure 9. Navigation and data collection computers on vessel bridge.

All remote-sensing survey data was collected on lines established in HYPACK navigation software. Planned survey lines in all three areas were spaced at 20 meters. Records of the as-run survey lines confirm coverage (Figure 10).

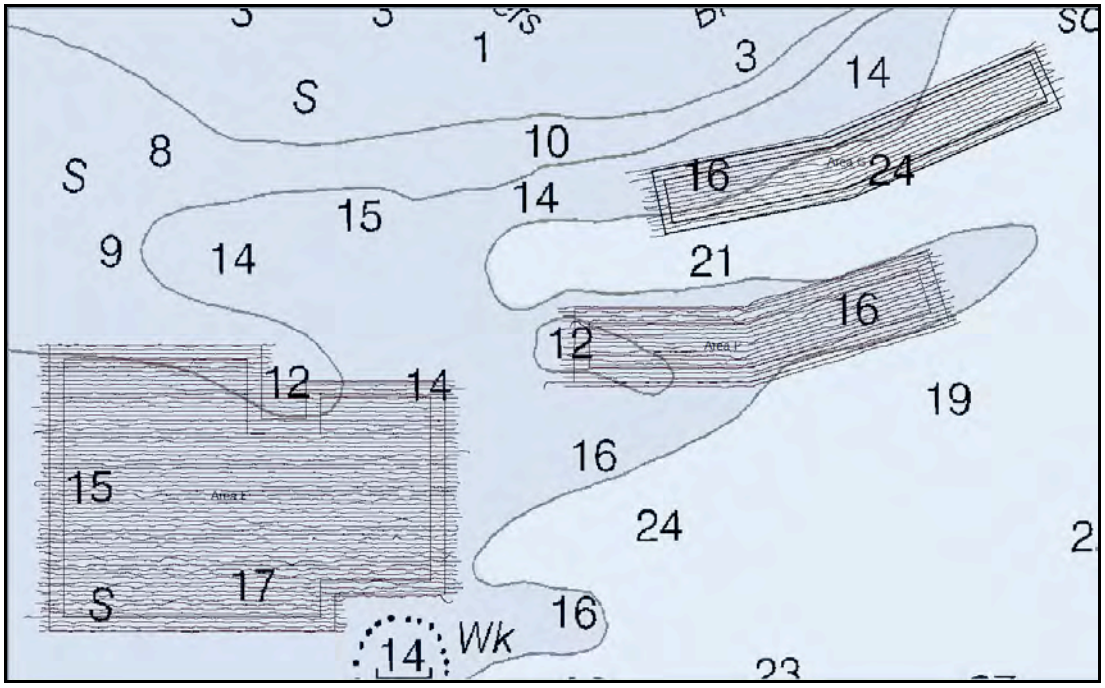

Figure 10. Survey vessel track lines in each survey area.

Data Analysis

To ensure reliable target identification and assessment, analysis of the magnetic and acoustic data was carried out as it was generated. Using QUICKSURF contouring software, magnetic data generated during the survey were contour plotted at 10-gamma intervals for analysis and accurate location of magnetic anomalies. The magnetic data was examined for anomalies that were isolated and analyzed in accordance with intensity, duration, areal extent and signature characteristics. Sonar records were analyzed to identify targets on the basis of configuration, areal extent, target intensity and contrast with background, elevation and shadow image, and were also reviewed for possible association with identified magnetic anomalies.

Data generated by the remote-sensing equipment were developed to support an assessment of each magnetic and acoustic signature. Analysis of each target signature included consideration of magnetic and sonar signature characteristics previously demonstrated to be reliable indicators of historically significant submerged cultural resources. Assessment of each target includes avoidance options and possible adjustments to avoid potential cultural resources. Where avoidance is not possible the assessment will include recommendations for additional investigation to determine the exact nature of the cultural material generating the signature and its potential National Register of Historic Places (NRHP) significance. Historical evidence was developed into a background context to identify shipwreck sites that could represent possible correlations with magnetic targets**.** A magnetic contour map of the survey area was produced to aid in the analysis of each target.

Regional Historical Overview

Coastal South Carolina was first explored by Europeans during the late sixteenth century. That region was part of the vast Atlantic coastal territory claimed by Spain and extended from Port Royal, South Carolina southward to St. Augustine, Florida. Initial exploration of the coast was a result of slaving expeditions in 1514 and 1521. Positive reports of the bountiful sea islands led to the first attempt to colonize South Carolina. In 1526, Lucas Vásques de Ayllón departed Santo Domingo with 500 settlers aboard six ships. Entering a river, which the Spanish named Gualdape, the colonists settled on a low sandy stretch of land. Though there has been much debate on the location of this colony, some theories place it at Punta de Santa Elena, modern Port Royal (Rowland, Moore and Rogers 1996:18). The colony was well organized; a municipal government was set up, and a number of private and public buildings erected. The settlers even constructed a shallow draft vessel to explore the surrounding coastal waters. Sickness, which claimed the life of Ayllón, and mutiny, however, would cause the abandonment of the settlement in less than a year. A second Spanish attempt to colonize the Santa Elena region in 1561 also ended in failure when a hurricane wrecked three of Angel de Villefañe's four ships while the Spaniard explored the surrounding coastline.

In 1562, a French expedition led by Jean Ribault explored the South Carolina area to establish a colony in the New World for the French Crown. Ribault selected the spacious harbor at Port Royal and immediately began construction of a fort, named Charlesfort, to reinforce France's claims to the region. The fort was described as being "160 feet long by 130 feet…[and] enclosed a house of wood and earth covered with straw with a moat ... with four bastions" (Rowland, Moore and Rogers 1996:23, 25). After Ribault's return was delayed by civil war in France, the Charlesfort garrison mutinied and returned to France in a small vessel they constructed (DePratter 2004).

In 1565, the French attempted to establish another settlement along the southern coast, this time on the St. Johns River. To protect Spanish interest in Florida, King Philip II dispatched Pedro Menéndez de Avilés to eliminate the French and establish a base in northern Florida. After expelling the French and establishing St. Augustine in Florida, Menéndez set up an outpost in the vicinity of Parris Island in early 1566 to frustrate any further intrusion into Spanish territory. Port Royal Sound provided Indies ships a final deep, protected harbor before the long Atlantic crossing to Spain. After the garrison of Fort San Salvador was reinforced during the summer a larger fortification with six guns, named Fort San Felipe, was constructed and the settlement of Santa Elena established (DePratter 2004).

Menéndez began to bring Spanish settlers to Santa Elena in 1568 and within a year a community of almost 200 farmers and artisans made the area their home. Although Menéndez made Santa Elena his capital, the settlement suffered a lack of supplies and protection. While the colonists adapted quickly to raising crops and livestock, supplies were not sufficient to support the colony and dependence on the local Indians for assistance led to a deterioration of relations. After Menendez died in 1574, Don Diego de Velasco took over as Governor. His management of the colony left the settlers dissatisfied and his treatment of the Indians provoked several attacks. During those attacks, Governor Pedro Menéndez (the younger) and several officials were ambushed and killed while traveling the inland waterway between St. Augustine and Santa Elena (Rowland, Moore and Rogers 1996:38). When Hernando de Miranda ordered Santa Elena abandoned in the summer of 1576, Indians burned the village and destroyed the fort (DePratter 2004).

The importance of Santa Elena to Royal policy in the New World and additional French incursions into the area, amplified by the loss of the French corsair *Le Prince* on the shoals at Port Royal in 1577, led to reoccupation of the settlement that same year. An expedition, under the command of Pedro Menéndez Marqúes, re-established the colony, building a new fort on higher, more defensible ground. The fort, San Marcos, was rectangular with a moat on three sides and a small creek on the fourth (Rowland, Moore and Rogers 1996:40). Bastions equipped with cannons were erected in the center of the west wall and on the northeast and southeast corners. To ensure the success of the colony the Spanish had to reassert control over the Native Americans. When peaceful overtures failed the Spanish resorted to force. Aggressive attacks on several villages eventually subdued all Native resistance and peaceful relations gradually developed between the Spanish and the Natives.

This settlement was more successful than all previous attempts. The colony was well administered and by 1580, the colony had grown to over 400 individuals and more than 60 houses (DePratter 2004; Rowland, Moore and Rogers. 1996:43). The re-introduction of cattle to the island and a successful crop of corn finally made Santa Elena self-sufficient. Prospects for the colony expanded when several settlers petitioned the government for land grants beyond the protection of the fort. Despite these signs of growth, the days of the colony were numbered.

Word of an English attempt to establish a colony on Roanoke Island and attacks on Spanish settlements in the Caribbean by Sir Francis Drake created alarm in Florida. Efforts were made to reinforce both Santa Helena and St. Augustine. Although, Drake did not attack Santa Elena, he destroyed St. Augustine in June 1586. That prompted the Spanish to abandon Santa Elena and withdraw to rebuild their settlement at St. Augustine (DePratter 2004). Under protests from its inhabitants, the colony was abandoned for the final time in 1587. Almost a century would pass before Europeans returned to South Carolina. The establishment of Charles Towne on the west bank of the Ashley River in 1670 marked the beginning of English settlement in South Carolina. Due to the vulnerability of the Ashley River site, the colonists eventually relocated the settlement to Oyster Point, located at the

confluence of the Ashley and Cooper Rivers (Waring 1970:22-24). The new site was easily defended by land and sea while the harbor and access to the interior through an extensive network of rivers and streams made it an excellent site from a commercial standpoint (Sellers 2012:5). This location was nearly ideal for the development of a commercial port and in 1680 one observer wrote:

> The cituation [sic] of this Town is so convenient for public Commerce that it rather seems to be the design of some skillful artist than the accidental position of nature (*Proprietary Records of South Carolina*).

By the early eighteenth century, the plantation system was well established in South Carolina. The lowcountry along the sea coast consisted of sand, pine barrens and swamps where rice and indigo were intensively cultivated by slaves on plantations ranging in size from 3,000 to 40,000 acres. Rice, which was ideally suited to the area's low-lying swamplands, and to a lesser degree indigo, naval stores and deerskins quickly became South Carolina's most important exports (Orvin 1961; Sellers 2012:6-7, 150).

The increasing rate of agricultural production was mirrored by the expansion of shipping in Charleston. In the 1730s, Charleston evolved from a frontier settlement into a major commercial center and port. During this decade, Charleston merchants loaded 220 ships annually for Europe. In comparison, 196 ships left New York in 1732 and 173 sailed from Philadelphia in 1733 (Sellers 2012:11). These numbers increased steadily in the years prior to the outbreak of the American Revolution and in 1755, approximately 300 ships of various types and sizes entered the port of Charleston.

By 1765, that number increased to 450 and remained relatively constant through 1770. In that year Lieutenant Governor Bull wrote to the Earl of Hillsborough that Carolina's commerce kept "equal pace with its agriculture, that its trade extended to all parts of the world consistent with the navigation acts, and that now near 500 sails of vessels" were employed in the export of produce and import supplies and manufactured goods (Sellers 2012:11-12).

Because the navigable waters of the Ashley and Cooper Rivers extend so far inland, some coastal traders, and even ocean vessels, traveled well into the heart of the plantation country. Approximately five or six miles above the town of Dorchester, Bacon's Bridge represented the "head of sloop navigation" on the Ashley River (Mathew 1992:95-96). The Cooper River provided even greater inland access, as its navigable headwaters, near Biggin's Creek, were some 40 miles from Charleston (Mathew 1992:68). In 1751 Governor Glen described shipping on the Cooper River. Glen stated, the "...Cooper River appears sometimes a kind of floating market, and we have numbers of Canoes, Boats, and Pettygues that ply incessantly, bringing down the Country Produce to Town and returning with such Necessarys as are wanted by the Planters" (Sellers 2012:5).

Vessels employed in the Charleston trade represented three classes: inland, coastal and ocean-going. Interior trade was carried out by inland boats of a few tons' burden. These vessels included canoes, periaugers and flats. The largest of the inland boats had trunk masts that had to be folded when passing beneath bridges. They provided the colonists with an effective form of communication and transportation. Products from plantations in the maritime parts of the province were transported to market in vessels with standing masts, decked to protect the produce from the weather. These "decked periaugers" were essentially coasters, some of them as much as 50 tons' burden. Similar vessels, some as much as 70 tons' burden, carried on the coastal trade (Rogers 1969:3-5; Sellers 2012:63-64).

Sloops and schooners probably comprised the largest portion of coasting vessels. These were single and double masted respectively, and designed to operate in a variety of environments. Due to the shallow inlets and rivers of the lowcountry, shipbuilders produced shallow draft sloops and schooners. A vessel's carrying capacity and sailing qualities in variable operating conditions were critical features to the planters. Much of the rice and indigo cultivated on the plantations was transported to Charleston in schooners. An example of plantation schooner usage is provided by eighteenth century merchant Henry Laurens, owner of two plantations. Laurens employed two schooners. One schooner, the *Baker*, operated from Laurens' Mepkin plantation on the Cooper, while the other, the *Wambaw*, served his Wambaw plantation on the Santee River (Harris, Moss and Naylor 1993).

Ocean-going vessels, usually employed in the European trade, ranged from 200 to 500 tons, although the latter was considered a very large ship. These vessels included ships, snows, brigantines and larger schooners and sloops. Most of those vessels transported from 1,000 to 1,200 barrels of rice, or 250 to 300 tons. Bostonian Josiah Quincey visited Charleston during the height of the 1773 shipping season and noted that the "number of shipping far surpasses all I had seen in Boston. I was told there was not so many as common at this season, though about 350 sail lay off the town."

During the fall of 1775, the Provincial Congress, fearful that the British might attempt an assault on Charleston, ordered a blockade of the main channels to the harbor. In addition, the South Carolina Navy was created and by early 1776 the schooner *Defence*, the brig *Comet* and the ship *Prosper* had been converted and armed to patrol the waters around Charleston (U.S. Navy Department [USND] v. 3, 1968:133, 177, 623, 1310). In that year, a British naval force under General Sir Henry Clinton and Sir Peter Parker arrived off Charleston. In spite of the impressive nature of the British fleet, efforts to capture the city failed primarily due to the complexities of navigating in the shallow inlets and skillful American defense of the fortifications on Sullivans Island.

In December 1779, the Continental forces received reports that the British were preparing another offensive against Charleston. American efforts to strengthen the existing fortifications on Sullivans Island, Haddrells Point and James Island, and to construct a line of trenches, batteries and oyster shell and mortar redoubts linking the swamps and rivers to the east and west of the peninsula were justified on 14 February 1780, when a British fleet moved into the North Edisto River and landed 6,000 troops at what is now Seabrook Island, approximately 20 miles from Charleston.

In early March, Fort Johnson, on the northeast end of James Island, fell to the British leaving them in command of the southern approach to Charleston Harbor and the west bank of the Ashley River (Weir 1983:331-332; Fraser 1976:119-121). General Lincoln, the American commander, realized that his ground troops, four armed frigates and some barges in Charleston Harbor were no match for the combined British forces threatening Charleston. In an attempt to hinder the British naval attack, he ordered 11 vessels, including the frigates, scuttled near the mouth of the Cooper River. A boom was then strung between the exposed masts of the sunken vessels in order to obstruct the channel. In spite of this effort, British warships crossed the bar into the harbor on 20 March and by 3 April, British troops had moved across the Ashley and established a two-mile-long line of trenches and redoubts connecting the Ashley and Cooper Rivers (Middleton Family Papers). By 14 April, the British completed their encirclement of Charleston. After a period of artillery bombardment and a series of infantry assaults, Charleston surrendered on 11 May 1780. Charleston remained under British control for the next two years.

During the war a number of vessels were lost or abandoned in Charleston Harbor. In 1775, four hulks were scuttled in Hog Island Channel and in 1780, 11 more were scuttled in the mouth of the Cooper River. In addition to the scuttled vessels, two British warships were lost. The first, H.M.S. *Actaeon* grounded off Fort Moultrie in July 1776, and could not be refloated. Five years later H.M.S. *Thetis* was lost as the British abandoned Charleston. During the British occupation, the vessel *Friendship* grounded on the Middle Ground and broke up in 1780, and the privateer *Lord North* and the vessel *Jamaica* sank inside the harbor in 1781.

Charleston recovered quickly from the war and the two-year British occupation. Much of this recovery can be attributed to the introduction of cotton as a major cash crop. The invention of the cotton gin in 1793 enabled planters to develop large scale cotton production, both on the coast and in the piedmont. Consequently, an increasing number of planters devoted their land to cotton. Between 1 October 1799 and 30 September 1800, South Carolina exported more than 6,000,000 pounds of cotton, an increase of approximately 6,000 percent over the same period a decade earlier (Petit 1976:170).

Efficient water transportation was the cornerstone of Charleston's rapidly expanding position as an agricultural center and port. During the nineteenth century, as in the eighteenth, there was an abundance of boat and vessel types in Charleston and the surrounding area. One example of a specialized type was a vessel known as a "cotton boxe" or "box boat." Planters used these to carry bulky cotton cargoes down river. These vessels, some as large as 60 feet long and 25 feet wide, were cheaply constructed and designed for one-way trips down river. Typically, upon reaching their destination, they were broken up and the lumber sold (Fleetwood 1982:87).

Charleston's burgeoning maritime activities were temporarily interrupted by war with Great Britain in 1812. By the fall of 1812 an intensified British blockade began to stifle trade in the port. From that time, until the end of the war, the British maintained at least one warship off Charleston at all times. British vessels also entered the inlets and river mouths looting plantations, capturing vessels and completely disrupting coastwise trade (Wallace 1951:368-369).

To defend Charleston, the United States Navy utilized the brig *Vixen* and several small gunboats (Dudley 1985:60, 101-102). In addition, privateers occasionally slipped out to prey on British shipping in the West Indies. Although privateering was effective in capturing or destroying West Indian shipping, it had little effect on the blockade. The city's economy and maritime traffic suffered until the Treaty of Ghent in December 1814.

An 1819 economic depression effectively ended Charleston's commercial expansion (Greb 1978:18, 27). Although the economy stabilized following the depression, the city entered into a lengthy economic decline. Rice and cotton declined as export commodities between 1815 and 1860, and Charleston steadily lost its commercial strength to New York and the emerging Gulf ports, particularly New Orleans. Another factor in Charleston's economic slump was cotton production in the American southwest. As more cotton was produced elsewhere, Charleston diminished in relative importance. South Carolina's cotton production began to show signs of weakening as early as 1812. In that year South Carolina's production, approximately 50 million pounds, totaled only 28 percent of the American total of 177 million pounds (Smith 1958:7). Throughout the 1820s, Charleston's domestic and foreign commerce declined. In 1815, Charleston owned 15,619 registered and 10,578 enrolled tons. By 1829, the aggregate tonnage dropped to less than 7,000 tons, a decrease of 75 percent (Hutchins 1941:243).

Charleston's residents, acutely aware of mounting economic problems, made several attempts to improve regional transportation systems and regain economic momentum. In 1829, construction began on a railroad from Charleston to the Savannah River. The Charleston and Hamburg Railroad was completed in 1833. Although there was a slight increase in Charleston's inland trade during the 1830s, it appears that the railroad did not contribute significantly (Smith 1958:160).

In order to regain direct trade with foreign ports, a deeper harbor was required. By the 1840s, the harbor and approach channels needed at least a 16 to 17-foot depth in order to accommodate vessels engaged in foreign trade. In 1851, the city, in cooperation with the U.S. Army Corps of Engineers, attempted to deepen the harbor. Although moderate success was achieved, the secession crisis and war halted the project (Moore 1981:15-19).

By the middle of the nineteenth century, Charleston had developed into a banking and manufacturing center, which provided liquid assets necessary to stimulate trade. Successful banks were chartered in the 1830s. Manufacturing was even more successful. In 1850, the city ranked third in the South behind Richmond and New Orleans (Lander 1960:330-351). During the 1850s, trade in Charleston began to grow once more (Eaton 1961:241). The combined value of the port's imports and exports increased from $13,381,585 in 1850 to $22,764,907 in 1860, an increase of more than 71 percent (Van Deusen 1928).

Charleston was a focal point of the social, economic and political pressures that erupted into civil war following secession. On 20 December 1860, the Convention of the People of South Carolina issued the statement that, "The Union now subsisting between South Carolina and other States, under the name of the 'United States of America' is hereby dissolved." On 15 April 1861, newly organized Confederate forces under the command of P.G.T. Beauregard attacked the U.S. garrison at Fort Sumter and shelled the fortification into surrender. President Abraham Lincoln promptly declared that a state of open rebellion existed and called for volunteers to preserve the Union. Lincoln also issued a proclamation on 19 April 1861 that confirmed a blockade of southern ports.

President Lincoln's proclamation calling for a blockade of the Confederacy, was viewed as a "paper blockade," because the Federal government did not possess sufficient vessels to carry out such a blockade. The arrival off Charleston of the frigate *Niagara* on 11 May did nothing to halt the passage of blockade runners through Charleston Harbor (*Charleston Courier* 13 May 1861). However, the attack and seizure of Port Royal late that year, which gave Union forces possession of one of the best small harbors on the east coast, left no doubt that war was indeed underway. The capture of Port Royal gave Union naval forces a port where blockading vessels could be supplied, repaired and fueled. It also gave Union naval forces control of the coast from above Georgetown, South Carolina, to New Smyrna, Florida, with the exception of Charleston (Hayes 1961:365).

The arrival of additional blockading vessels off the Charleston bar did little to effectively close the harbor. However, in December 1861, 16 vessels loaded with granite and designated as the "Stone Fleet" arrived off Charleston. The vessels, mostly old whaling ships, were sunk checkerboard fashion across the mouth of the main channel leading to Charleston in an effort to increase the effectiveness of the blockade. An editorial in the *New York Herald* stated, 'Charleston, so far as any commerce is concerned except that in small coastwise vessels, may be considered 'up country' (U.S. Navy Department [USND] 1971, I:39). The next day the *Charleston Mercury* carried an article that read in part, "On the occurrence of the first heavy northeaster, after the sinking of the wrecks, the force of the wind, the heave of the sea and the action of quick-sands, will according to all previous experiences dissipate the Yankee obstruction" (*Charleston Mercury* 21 December 1861).

In spite of the questionable effectiveness of the blockade more than a dozen vessels were destroyed attempting to run into or out of Charleston during the war. Many, like the *Flora*, *Flamingo* and *Presto*, were fast steamers purchased or constructed to run the blockade. By 1863, Charleston had become the South's major blockade running port. Private companies used it while the Confederate government concentrated its blockade running activities at Wilmington. Between 1 January and 30 June 1863, some 40 steamers entered the harbor and another 32 cleared, taking with them more than 29,000 bales of cotton (Wise 1983:223, 254-257). Charleston so dominated early blockade running that the American consul wrote from Liverpool that its capture would be regarded "as the deathblow to the rebellion, and do more than discourage those who are aiding them with supplies and money than any other thing."

Following the defeat of Union troops in the Battle of Secessionville, General Beauregard was assigned to command the Department of South Carolina and Georgia. He assumed this command in September 1862 and immediately began the task of strengthening Charleston's defenses. Modifications were made in both Forts Sumter and Moultrie and additional heavy guns were requested to facilitate control of the harbor. The Confederate Navy also contributed to the city's defenses. Two ironclads, the *Chicora* and *Palmetto State*, were built in Charleston and joined the city's defense in October 1862. This naval force was bolstered with the addition of the ironclads *Columbia* and *Charleston* in early 1864 (Still 1988:79-87, 91, 112). By 1863, the port had an impressive network of defenses including forts, minefields and warships.

On 30 January 1863, the *Palmetto State* and *Chicora* crossed the bar and attacked the Union blockaders. After a confusing night engagement in which two Union warships surrendered, but were not taken, the Confederate vessels steamed back under the protection of the city's fortifications. Although the blockade was not "raised," Flag Officer Francis DuPont, in command of the South Atlantic Blockading Squadron, urged that reinforcements be sent (DuPont 1969:416). DuPont was ordered to attack the city after receiving reinforcements which included a powerful force of ironclads.

DuPont's fleet arrived off the Charleston bar on 5 April 1863. Two days later, in line of battle, the fleet steamed slowly toward the harbor. As the entire channel was carefully buoyed so that the gunners on Fort Sumter, Morris Island and Sullivans Island would know the exact range of the attacking vessel, the Federal fleet came under a barrage of heavy and extremely accurate fire. Nearly all of the attacking Union vessels were damaged and many were disabled during the action. The double-turreted ironclad U.S.S. *Keokuk* steamed within 900 yards of Fort Sumter where its guns were incapacitated and the hull and turrets riddled. The vessel was able to move away but sank the next morning off Morris Island (USONWR XIV:23).

The Confederate victory was short lived. DuPont's warships quickly returned, and blockade running declined. From July until September 1863, only four vessels entered and cleared Charleston, and from September until March 1864, no runners steamed in or out (Wise 1983:257-258). Wilmington replaced Charleston as the center of Confederate blockade running. Nevertheless, up to the war's end, blockade runners occasionally slipped in or out of the harbor.

In July 1863, Federal forces launched an assault designed to gain control of Morris Island. The assault was supported by Federal vessels. Faced with overwhelming fire power, the Confederate forces on the island were forced to withdraw. Realizing that control of Morris Island alone would not provide access to Charleston, General Gillmore, commander of Federal forces on the island, ordered construction of several batteries that would house his

heaviest artillery for battering down the walls of Fort Sumter. In anticipation of a bombardment, Beauregard ordered the casements and other areas of Sumter be filled in with wet sand and bales of cotton soaked in salt water. A new sallyport and wharf were constructed west of the city side of the fort (Johnson 1890:180-189). Union forces, with the support of the monitors *Passaic* and *Patapsco* began shelling Fort Sumter on 17 August. Upon inspecting Fort Sumter after the first day's shelling, the fort's commanding officer found that seven guns were disabled and the masonry had been damaged extensively (USND 1971:III-133).

The next several days progressed in the same manner, with damage to Sumter becoming more and more apparent. During the lull in fighting that followed an abortive attempt by Federal forces to storm Forts Sumter and Wagner, efforts were made to strengthen the harbor defenses. Early in October, the Confederate torpedo boat *David*, under the cover of darkness, left Charleston Harbor and rammed its spar torpedo into the side of the Federal vessel *New Ironsides*. This effort nearly swamped the *David* and did not inflict serious damage on the Federal ship. For months, the daily bombardment of Fort Sumter and Charleston continued. The constant shelling, coupled with damage from the fires that broke out almost daily, caused the Northern press to state that "block by block of that city is being reduced to ashes" (Burton 1970:257-259). In addition, the blockade of Charleston had steadily tightened.

In an effort to inflict damage on the Federal fleet, Confederate commanders decided to employ the submarine *Hunley*. Late in December 1863, the *Hunley* had been ordered to the vicinity of Charleston Harbor. On the night of 17 February 1864, the vessel moved through the channel of Breach Inlet toward the open sea and the Federal blockading vessel *Housatonic*. The *Hunley* rammed its spar torpedo into the vessel, blowing away the after part of the ship and caused it to sink immediately in 27 feet of water. The *Hunley* did not return to station and was assumed lost as a result of the action against the *Housatonic* (USND 1971:IV-21).

During the attacks on the city, Federal picket boats and at times monitors were sent in to test the obstructions in Charleston Harbor. The monitor *Patapsco* struck a mine while searching for obstructions the night of 15 January 1865, and sank in less than a minute. The vessel went down approximately 800 yards off Sumter with only the top of the stack showing above water (Dahlgren 1882:492).

On 10 February, Federal troops again landed on James Island, aided by the heavy fire of the monitors *Lehigh* and *Wissahickon*. In mid-February, 18 Federal vessels were sighted off the Charleston bar, 13 of which moved to Bulls Bay to attempt troop landings. The Federal batteries on Morris Island increased their rate of fire on the city, and on 14 February, General Beauregard made the decision to evacuate the city. The evacuation took place on the nights of 17-18 February with troops coming in from the outlying positions as well as from Fort Sumter. The ironclads guarding the harbor were destroyed by retreating Confederate forces to prevent them from falling into Union hands. Upon his entrance into the city, General Gillmore, of the Union Army, noted, "The city itself is little better than a deserted ruin" (USND 1971:V-37).

For Charleston, the Civil War was economically disastrous. Before economic prosperity could return the city had to be rebuilt. Although commercial vessels entered the port almost immediately after the war's conclusion, normal oceanic trade could not resume until the sunken warships and obstructions were removed from the channels. This would not begin until more than five years after the war ended, when Colonel Quincy A. Gillmore, who ironically played a major role in the Union bombardment of Charleston, was appointed

supervising engineer for river and harbor improvements in the Cape Fear to St. Augustine area. An engineer office was established in Charleston in 1871. As Professor Moore wrote in his history of the Charleston District of the Corps of Engineers, "the devastation of the Civil War made a partnership with the Federal government an absolute necessity for Charleston" (Moore 1981:109).

Colonel Gillmore was convinced that the city could become a thriving port again. He was also convinced that extensive harbor improvements would play a major role in achieving that economic revival. His opportunity came in 1877 when Southern and Midwestern members of Congress aligned together to obtain federal funds for river and harbor improvements (Moore 1981:32-33). Gillmore developed a plan for dredging and maintaining a 21-foot channel in Charleston Harbor. His plan included using jetties to help natural scouring create the required depth.

Gillmore anticipated that once the desired depth had been achieved, the power of the ebb tide would maintain it (Moore 1981:33-35). Gillmore's plan was put into effect between 1878 and 1895. Although a channel depth of only of l7 1/2 feet was achieved, it was considered a success. As Professor Moore wrote, "Charleston at last had a modern harbor, one which could admit the largest vessels afloat. Physically at least, the city was in a position to regain commercial prominence" (Moore 1981, See also *Annual Report of the Chief of Engineers* 1879:731-738 for Gillmore's plan; and annual reports until 1896 for progress reports).

The port had not been dormant during these years. Although it would not reach its pre-war level and prosperity for many years, Charleston's commerce nevertheless recovered rapidly. In 1870, there were two lines of steamers to New York, one each to Baltimore, Philadelphia and Liverpool and steamboat connections with Savannah, Beaufort and Georgetown (Simkins 1966:282). In 1870, exports totaled $10,772,071 and imports $505,609, less than half the 1860 total. Charleston's export trade did not recover its pre-war level until the mid-1870s. Whereas, the import trade remained stagnant until the twentieth century (Moore 1981:157).

By 1880, the city's population had reached 50,000, nearly doubling that of thirty years before. During that period, Charleston's ocean-borne trade continued to climb, averaging more than $20.1 million in exports by 1883. The city's wharves could handle more than 200 ships of all sizes. Cotton, rice and phosphate were the principle exports. Despite these improvements, Charleston still had not recovered entirely from the effects of the Civil War. It had been a manufacturing center in the 1850s, but industry in the city nearly disappeared during the war years. The city did not re-develop a substantial industrial base until the twentieth century.

Ports depend upon an inland transportation system. During the first decade after the Civil War, railroad mileage in the United States more than doubled. Charleston's rail link with Savannah had been destroyed during the war and was not operational again until 1870. More importantly, the expansion of railroads connecting interior towns with the coast seriously affected Charleston's economic future. Railroads would determine trade routes and urban growth. Because of railroad expansion, Norfolk had surpassed both Charleston and Savannah, and was third behind New Orleans and Galveston in cotton exports by the mid-1870s (Brownell and Goldfield 1977:95-96). Also, more and more cotton products moved out of the South by rail. By 1892, Charleston was receiving only 5.67 percent of the nation's cotton crop for export, less than half its 1870 volume. The city's export trade for the l900 to l909 period was less than a fourth of the value of the 1885 to 1894 trade (Moore 1981:169).

Although the Corps of Engineers worked to create a modern harbor in Charleston, the city's trade continued to decline. The U.S. Navy's decision to locate a naval base at Charleston provided the city with an economic boost and further justification for large expenditures for harbor improvements. Although the Union had used the harbor at Port Royal, it was not until 1889 that a Navy commission recommended that a new Navy base be built at Port Royal. This facility would serve the central-southern portion of the United States. A wooden dry dock, which was to act as the cornerstone of the new facilities, was begun in 1891, but was never satisfactorily completed.

Furthermore, the decision to switch from wooden to stone dry docks was made shortly thereafter and rendered this structure obsolete. In 1899, Major Adger Smyth and South Carolina Senator Benjamin Ryan Tillman initiated a campaign to move the Navy Yard to Charleston. The following year a board of Navy officers under the auspices of the Navy Secretary decided that the Naval Station should be moved to Chicora Park, Charleston (Moore 1981:58-60; Simkins 1966:365-367, 524-527).

To attract the Navy Yard, the City of Charleston arranged for the purchase of land from Chicora Park to Shipyard Creek. On 12 August 1901, the Navy assumed possession of that property. In March 1907, the navy constructed a 583-foot by 97-foot stone dry dock at the Charleston shipyard. During the First World War the U.S. Navy built eight wooden hulled submarine chasers, a gunboat and partially completed a destroyer at the Charleston Navy Yard. At its peak, the yard employed 5,600 people.

Despite a lull in the yard's post World War I activities, an influx of post-depression monies allowed the U.S. Navy to develop the yard into a first class facility by the beginning of World War II. Between the wars, the navy constructed a new dry dock and a second shipyard. During the post-World War II era, the shipyard became a submarine overhaul yard, as well as a nuclear shipyard in 1956 (McNeil 1985:146). Beginning in 1948, the Navy utilized the Charleston Navy Yard for submarine overhauls and surface ship repairs. In addition, naval yard expansion facilitated the development of the North Charleston area.

The port's tonnage varied between six and eight hundred thousand tons during the pre-World War I years. The value of this trade, however, declined from over 100 million in 1910, to less than half that amount in 1914 (Wallace 1951:652). During the twenties, commerce averaged slightly under 2.5 million tons. The Great Depression affected Charleston as it did other ports throughout the country and between 1931 and 1941 the port lost 16 percent of its tonnage.

World War II ended this decline, and Charleston, with its large naval base and shipping facilities, boomed economically during the war. As in World War I, the government built massive water transportation centers. Moreover, in 1947, the government transferred these facilities to the city, which, consequently, conveyed them to the State Port Authority (Pender and Wilder 1974:6). As a port, Charleston prospered during the post-World War II years. By 1949, the city's shipping averaged 5,000,000 tons and Charleston once again became one of the most important southeastern seaport (Sass 1949:62).

Previously Documented Area Shipwrecks

Four wrecks are listed in the SCIAA site file inventory in the vicinity of the current study area. All are located offshore of Isle of Palms. Unquestionably, the submarine *H. L. Hunley* is the most well-known Civil War shipwreck in the project vicinity. The Confederate submarine sank after successfully torpedoing the sloop-of-war USS *Housatonic* on 17

February 1864 (Shomette 1973:72). The remains of *H. L. Hunley* were discovered on 3 May 1995 by a team of archaeologists supported by Clive Cussler and led by Ralph Wilbanks (Ralph Wilbanks, pers. comm. 29 March 2008). Following several years of controversy over its ownership, testing of the wreck site and structure, planning and fundraising, the submarine *H. L. Hunley* was raised on 8 August 2000 (Ralph Wilbanks, pers. comm., 29 March 2008). Since its recovery, the submarine has been stored at the Hunley Conservation Lab [former Warren Lasch Conservation Laboratory] in North Charleston. There, the interior was excavated, the hull has been documented and conservation is underway (Friends of the Hunley).

In conjunction with the search for and the investigation of the *H. L. Hunley*, the remains of the USS *Housatonic* were located and investigated. The *Housatonic* was torpedoed by the Confederate submarine *Hunley* on 17 February 1864 (Shomette 1973:72). The location of the wreck was established in 1980 by a research team led by Clive Cussler (Ralph Wilbanks, pers. comm., 29 March 2008). In 1996 the National Park Service, the Naval Historical Center and SCIAA carried out a pre-disturbance remote-sensing survey of the wreck site (National Park Service [NPS] 1998). Personnel from those government agencies carried out an assessment of the *Housatonic* site to evaluate the archaeological integrity of the wreck and characterize the sediments containing the vessel remains (NPS 1998).

Remains of three Anglo-Confederate blockade runners also lie in the vicinity of the survey areas. Two of those vessels are the steamers *Georgiana* and the *Mary Bowers* (Figure 11). The inbound screw propeller *Georgiana* was run ashore under fire from vessels of the U.S. Navy in March 1863 (Shomette 1973:425-427). In August 1864, the inbound paddle-steamer *Mary Bowers* hit the wreck of *Georgiana* and sank on top of that vessel (Shomette 1973:444). The third Anglo-Confederate wreck was the paddle-steamer *Constance*. *Constance* (Figure 12) ran aground south of the *Georgiana* and *Mary Bowers* in October 1864 and was destroyed by Union vessels (Shomette 1973:412). The *Georgiana, Mary Bowers,* and *Constance* were located in 1968 by E. Lee Spence. Spence subsequently salvaged material from all three vessels (Spence 1984:722-736).

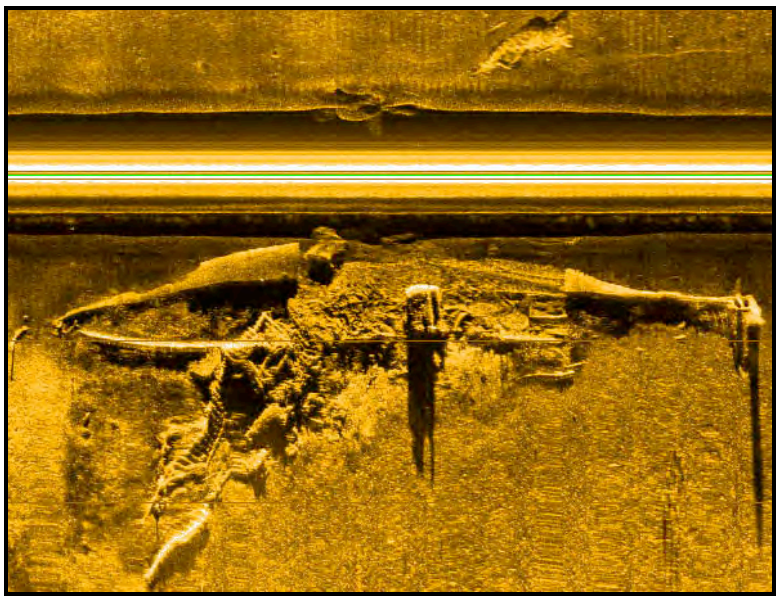

Figure 11. Sonar image of *Georgiana* and *Mary Bowers* (courtesy Diversified Wilbanks).

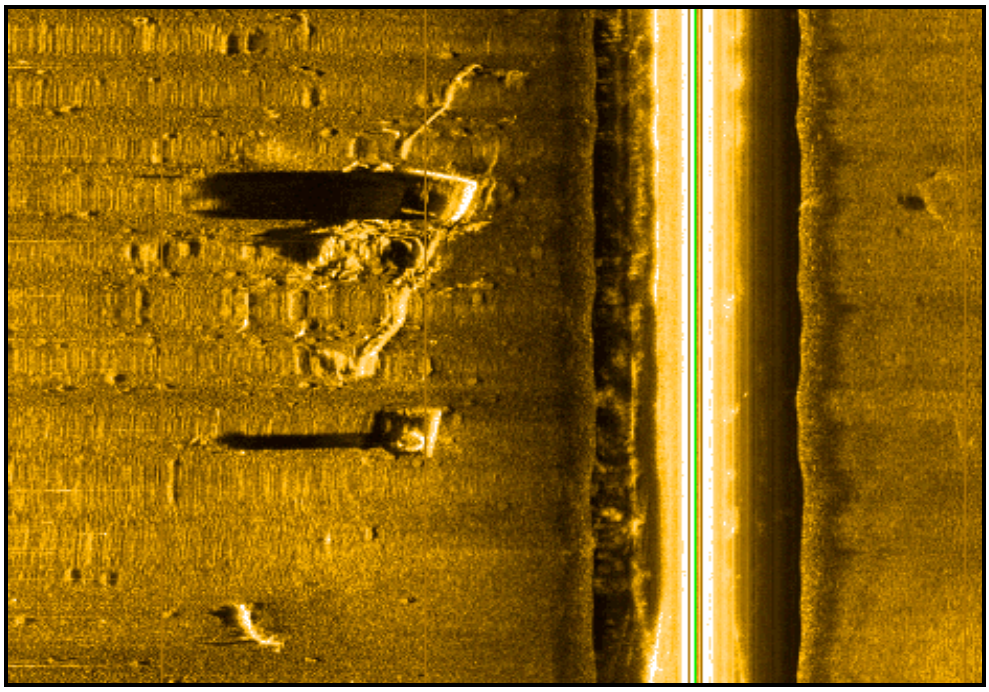

Figure 12. Sonar image of the *Constance* (courtesy Diversified Wilbanks).

In 1999, SCIAA's Maritime Research Division (MRD) initiated a five-year study of Naval shipwrecks in South Carolina waters. The "South Carolina Naval Wreck Survey" was co-sponsored by the then Naval Historical Center (NHC). The first phase of research focused on identifying historical and cultural data associated with U.S. Navy vessels lost in South Carolina. The second phase of project research focused on remote-sensing surveys in four areas associated with naval activity and vessel losses during South Carolina's history and particularly during the War Between the States (Spirek and Amer [eds.] 2004; Spirek and Amer 2005).

In 2008, the MRD received a National Park Service American Battlefield Protection Program grant to research and study the history and cultural resources in the Charleston Harbor Naval Battlefield. Project research focused on identifying the boundary and defining features of the battlefield such as sunken vessel, inundated batteries and obstructions.

Field operations carried out between 2009 and 2011 investigated the remains of Union warships, Anglo-Confederate blockade runners, submerged fortifications and obstructions inside Charleston Harbor and near Morris Island and the remains of vessels known as the first and second stone fleets. That research identified the geographical extent of the Charleston Harbor Naval Battlefield (Figure 13) and provided the South Carolina SHPO, SCIAA and the NHC with information necessary to protect and preserve Charleston's submerged cultural heritage (Spirek 2012a).

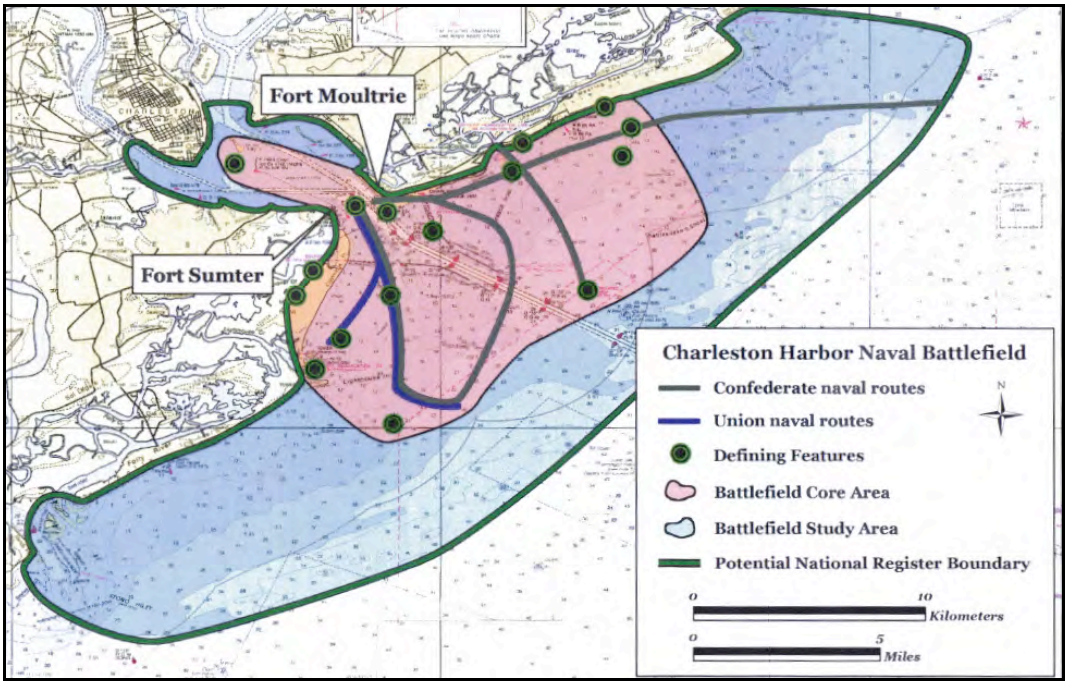

Figure 13. Geographical extent of Charleston Harbor Naval Battlefield (Spirek 2012a:236).

In 2008, CSE was the consulting engineer for the City of Isle of Palms for a beach nourishment project on the north end of Isle of Palms (Figure 14). Two offshore areas south of Dewees Inlet were identified as potential borrow sites. In order to determine the proposed project's effects on potentially significant submerged cultural resources, CSE contracted with TAR to conduct a cesium magnetometer, sidescan sonar and sub-bottom profiler survey of the proposed borrow sites. Analysis of the magnetic and acoustic data identified three single and two concentrations of anomalies in the northern survey area and three single anomalies in the southern survey area. The northern survey area single anomalies were likely generated by cable, pipe, a small boat anchor or other similar modern debris (Watts 2008). The two concentrations of anomalies in the northern area appeared to be associated with a wreck symbol on NOAA Chart #11521- "Charleston Harbor and Approaches."

In the southern area three single anomalies identified in the magnetic records also appear to represent small targets likely generated by cable, pipe, a small boat anchor or other similar modern debris. Only one of those signatures was within the borrow area and the remaining two lie near the edge of the 100-foot buffer. Based on the findings TAR recommended no additional investigation in the southern area as there is no evidence that proposed dredging will impact a NRHP eligible submerged cultural resource. In the northern area TAR recommended that the two concentrations of anomalies should be either buffered and avoided or additionally investigated to determine if material generating those signatures is indeed associated with a historic shipwreck.

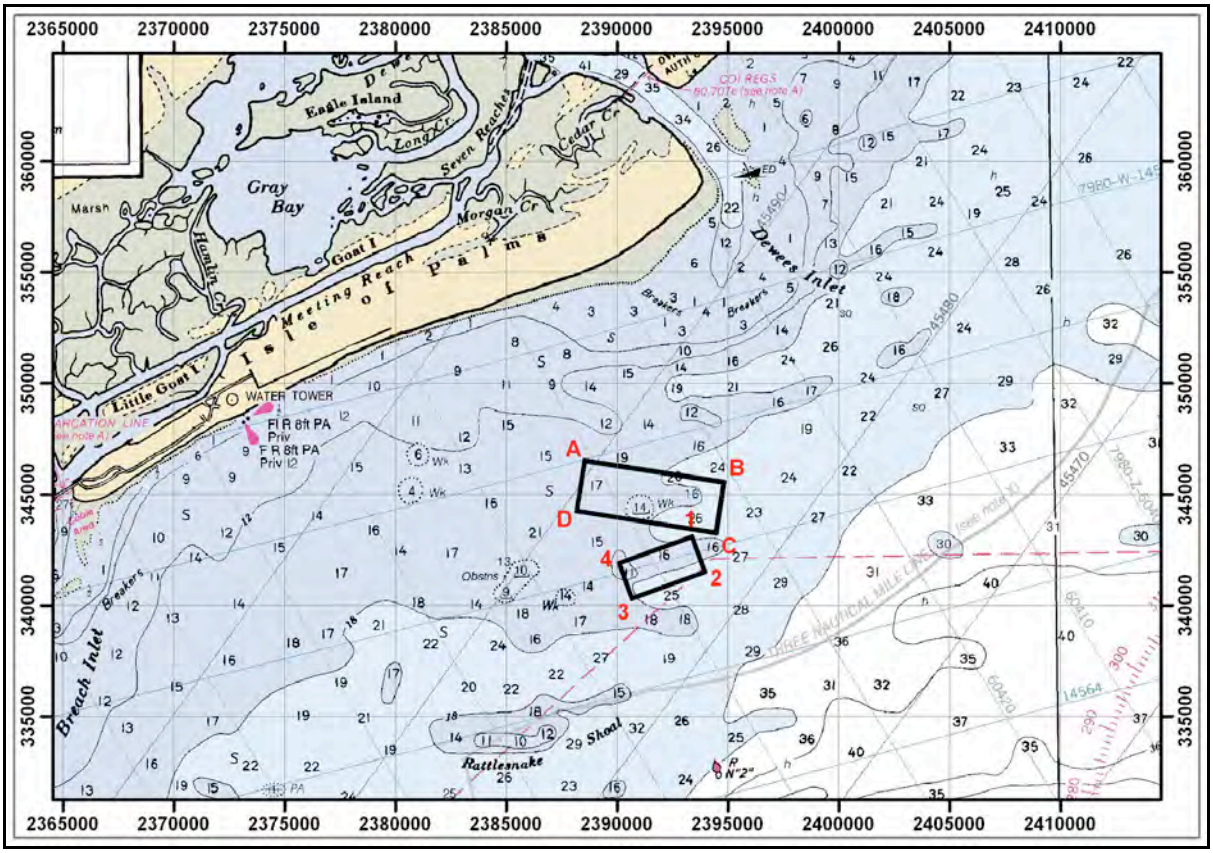

Figure 14. Extract of NOAA chart showing borrow sites surveyed by TAR in 2008 (NOAA Chart #11521).

Data Analysis and Assessment

Area E

Line-by-line analysis and contouring of the magnetic data from Area E identified 12 anomalies in the area surveyed (Figure 15; Appendix A).

Five of the anomalies (008-1, 064-1, 065-1, 066-1, and 067-1) lie in the 200-foot border buffer. Four of those are geographically associated with a concentration of tires identified in the sidescan sonar data (SSS003, SSS004, and SSS005). Both the four magnetic anomalies and the three associated sidescan sonar images of tires lie west-northwest of a charted wreck on "NOAA Chart 11521, Charleston Harbor and Approaches." That scatter of anomalies and tires has been isolated by a 600-foot diameter Avoidance Buffer 1 (Figure 16). Coordinates for the center point of the recommended buffer for are, X coordinate 2389996.82 and Y coordinate 344894.42.

The remaining anomalies (040-1,042-1, 043-1, 044-1, 045-1, 050-1, and 054-1) appear to be associated with small to moderate single ferrous objects. Those objects could represent traps, cable, pipe, a small boat anchor or other similar modern debris.

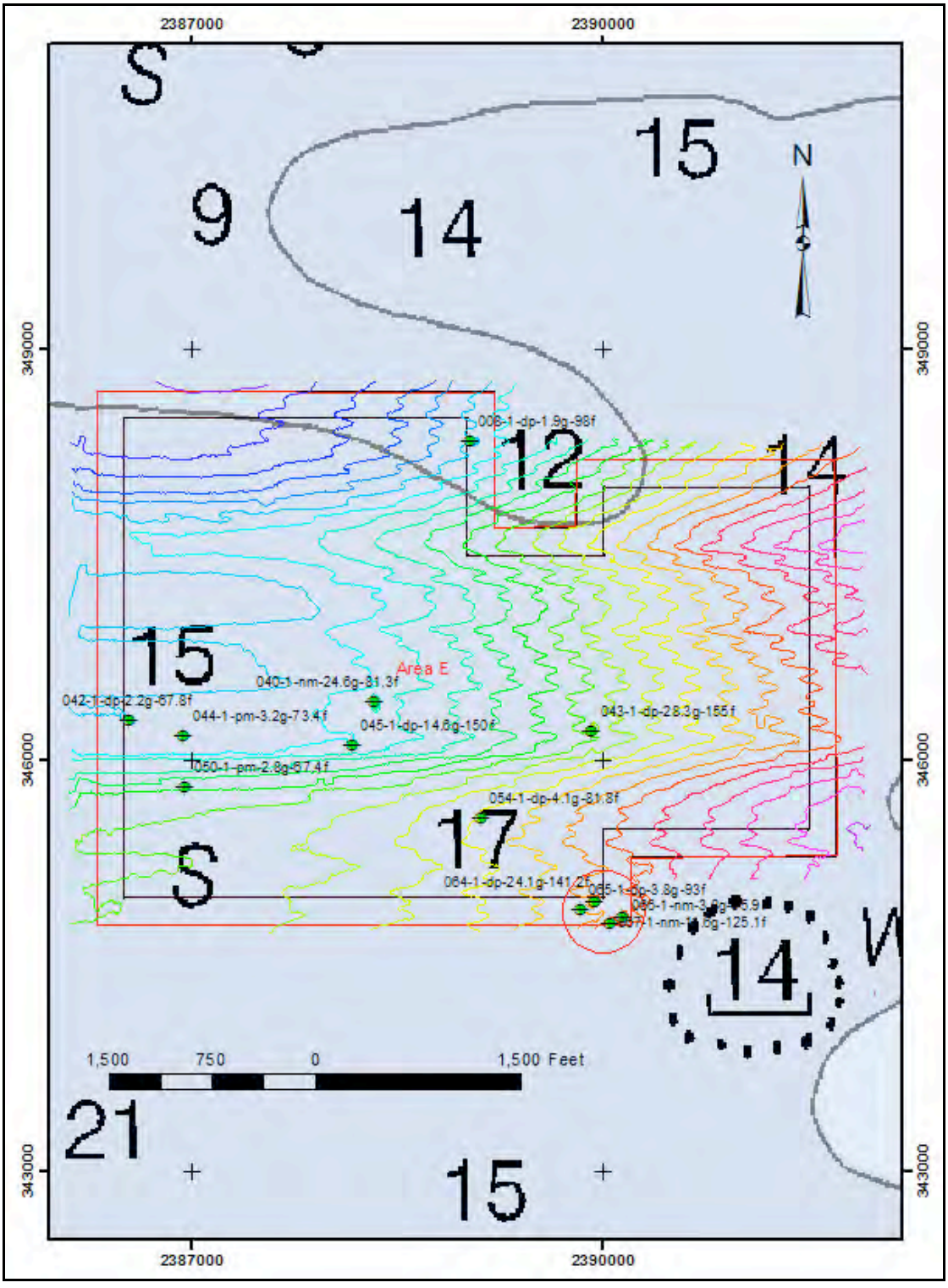

Figure 15. Survey Area E showing magnetic contours and anomalies.

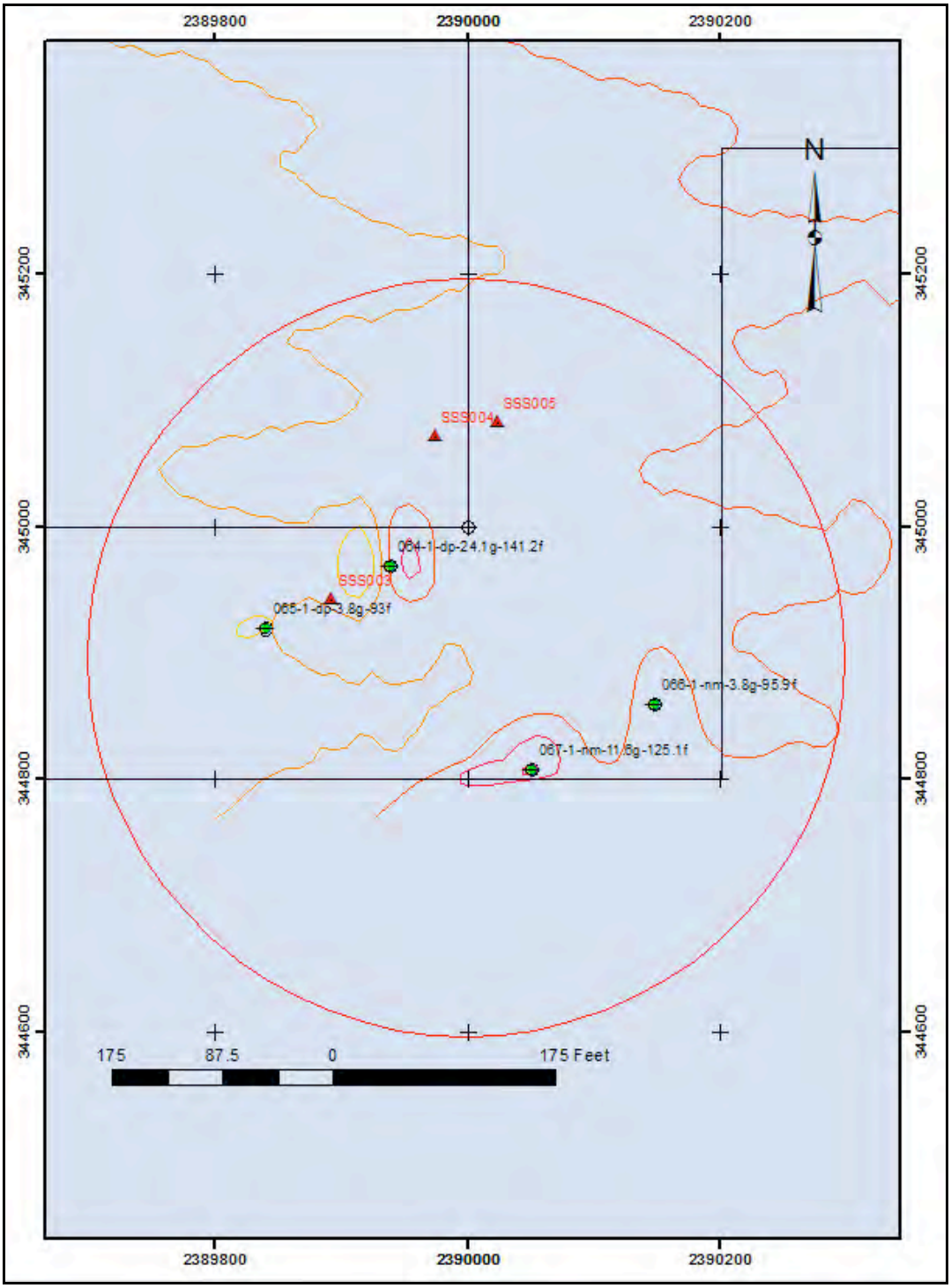

Figure 16. Anomalies and sonar target isolated by Avoidance Buffer 1.

Analysis and mosaicing of the sidescan sonar data identified five bottom surface targets within the area surveyed (Figure 17). All five (SSS001, SSS002, SSS003, SSS004, and SSS005) represent modern tires (Appendix B). Three (SSS003, SSS004, and SSS005) are geographically associated with four magnetic anomalies (064-1, 065-1, 066-1, and 067-1) but are not necessarily responsible for any of the magnetic signatures.

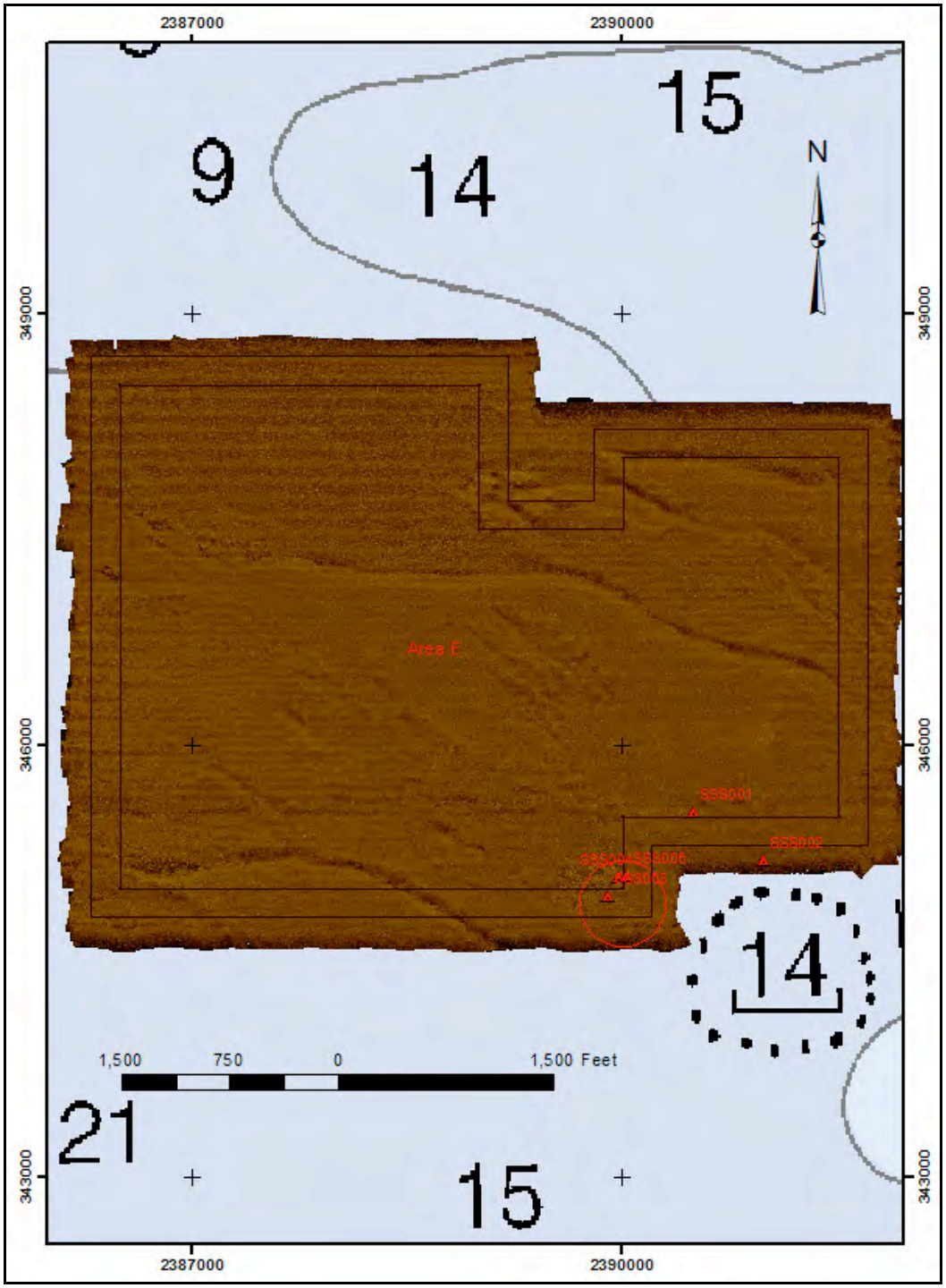

Figure 17. Area E sonar coverage mosaic with target locations.

Analysis of the sub-bottom profiler data generated no additional insight into the source of magnetic anomalies or features associated with the tires (Figure 18). Although fragmentary evidence of relict channels (Figure 19) was apparent in the northern and southern border buffers, no evidence of intact relict landforms that could be associated with prehistoric habitation were in evidence.

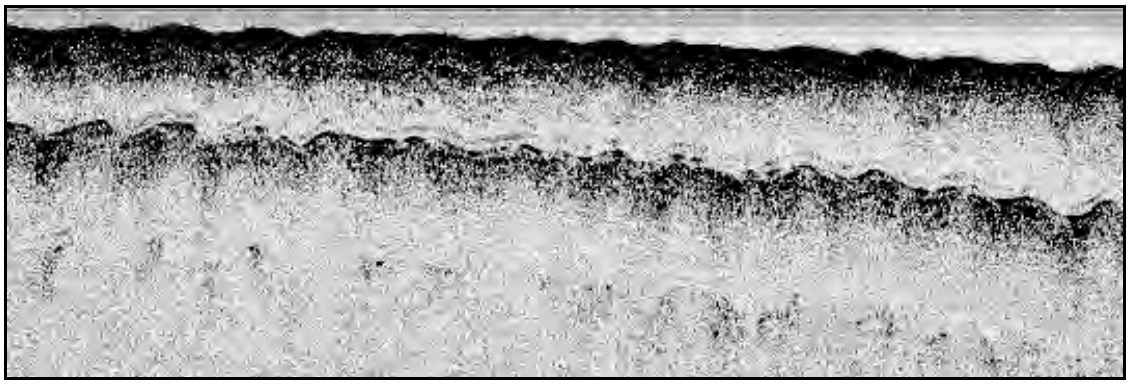

Figure 18. Sub-bottom profiler record at Area E Avoidance Buffer 1.

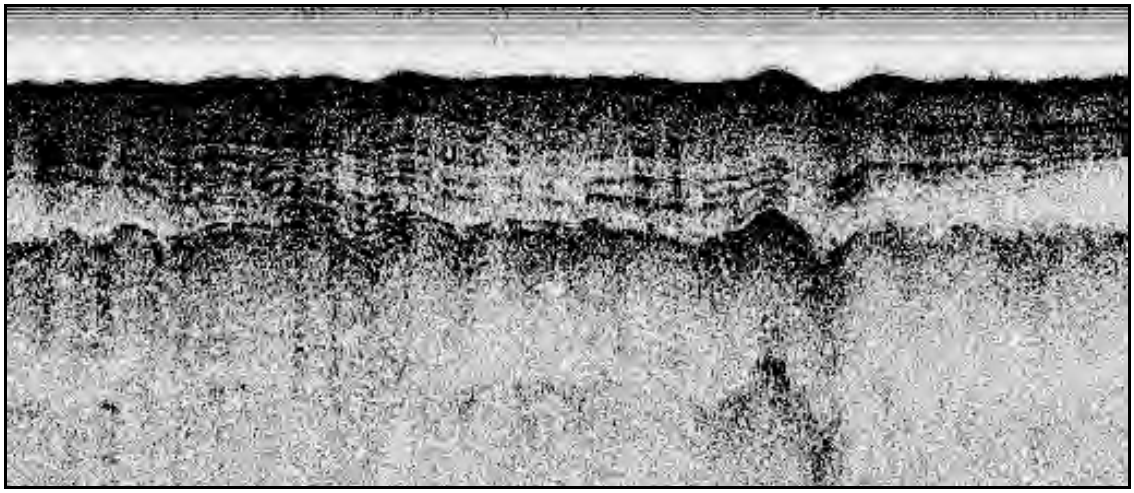

Figure 19. Sub-bottom profiler record in Area E north border buffer.

Area F

Line-by-line analysis and contouring of the magnetic data from Area F identified three magnetic anomalies in the area surveyed (Figure 20; Appendix C). One anomaly lies in the border buffer (015-1). The remaining two anomalies lie near the eastern end of the proposed dredge site.

All three of the anomalies appear to represent small single ferrous objects. Material generating those signatures likely represents traps, cable, pipe, a small boat anchor or other similar modern debris.

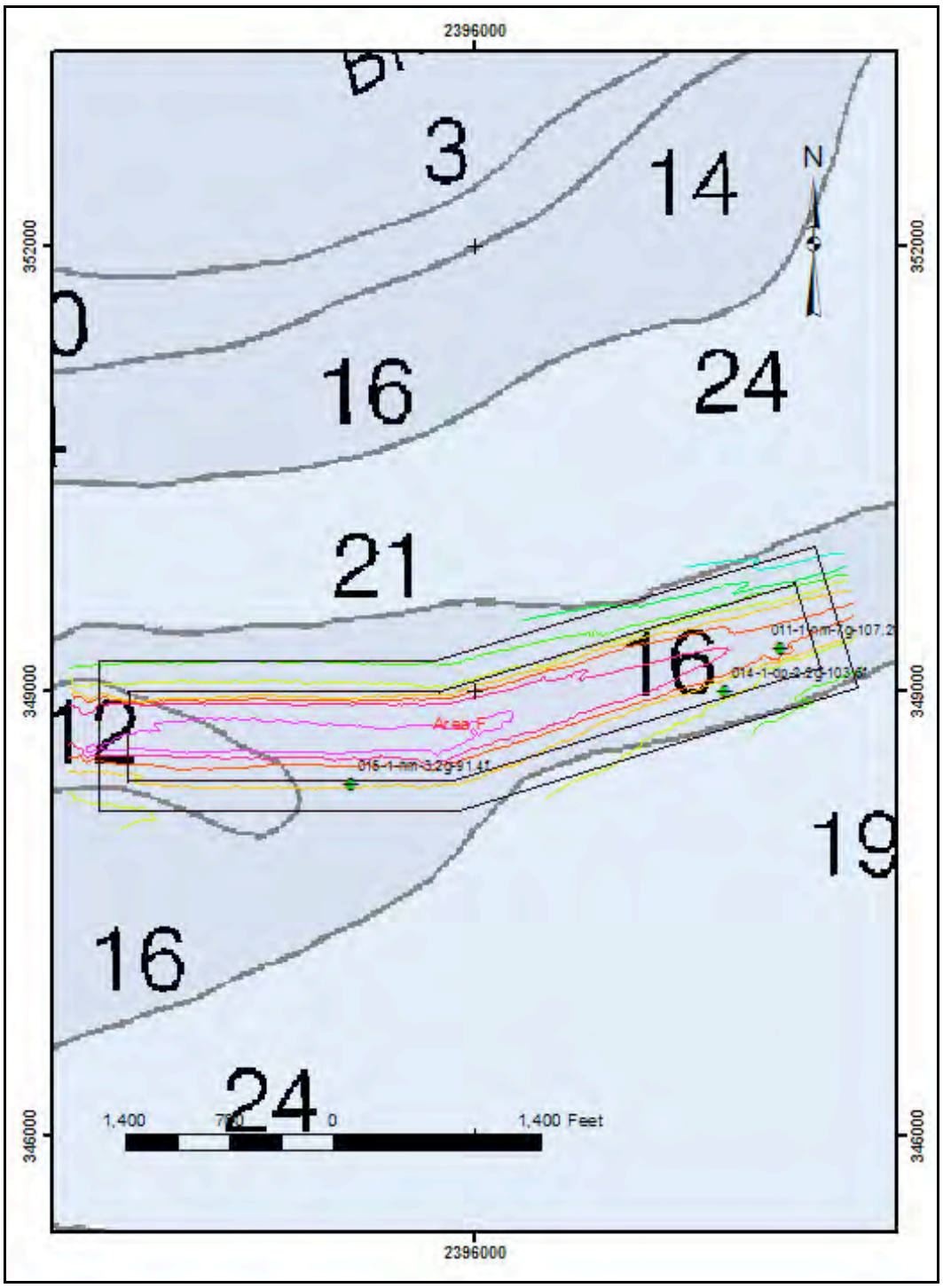

Figure 20. Survey Area F showing magnetic contours and anomalies.

Analysis and mosaicing of the sidescan sonar data identified no bottom surface targets within the area surveyed (Figure 21). Likewise, analysis of the sub-bottom profiler data identified no evidence of intact relict landforms that could be associated with prehistoric habitation were in evidence.

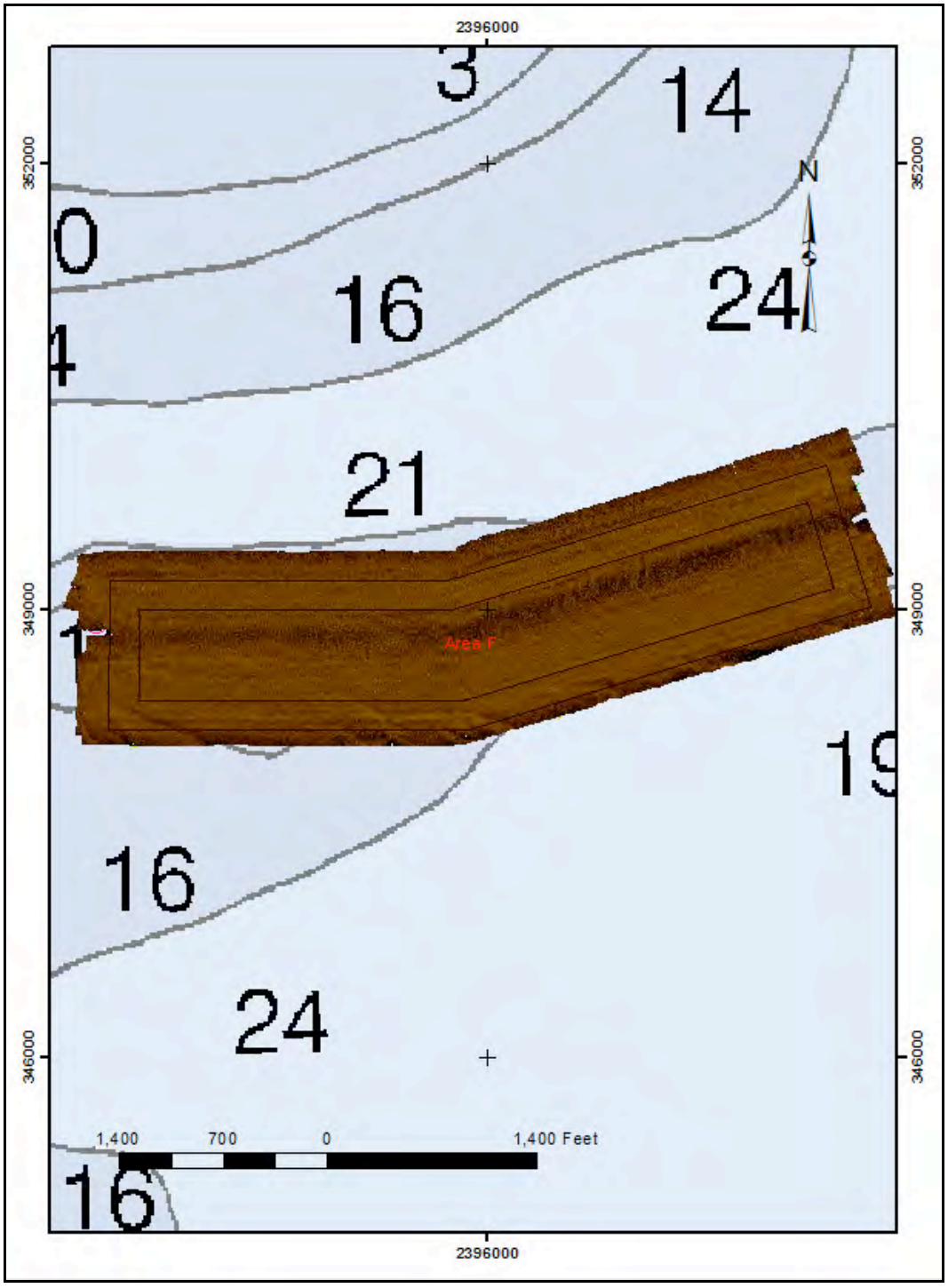

Figure 21. Area F sonar coverage mosaic.

Area G

Line-by-line analysis and contouring of the magnetic data from Area G identified no magnetic anomalies in the area surveyed (Figure 22).

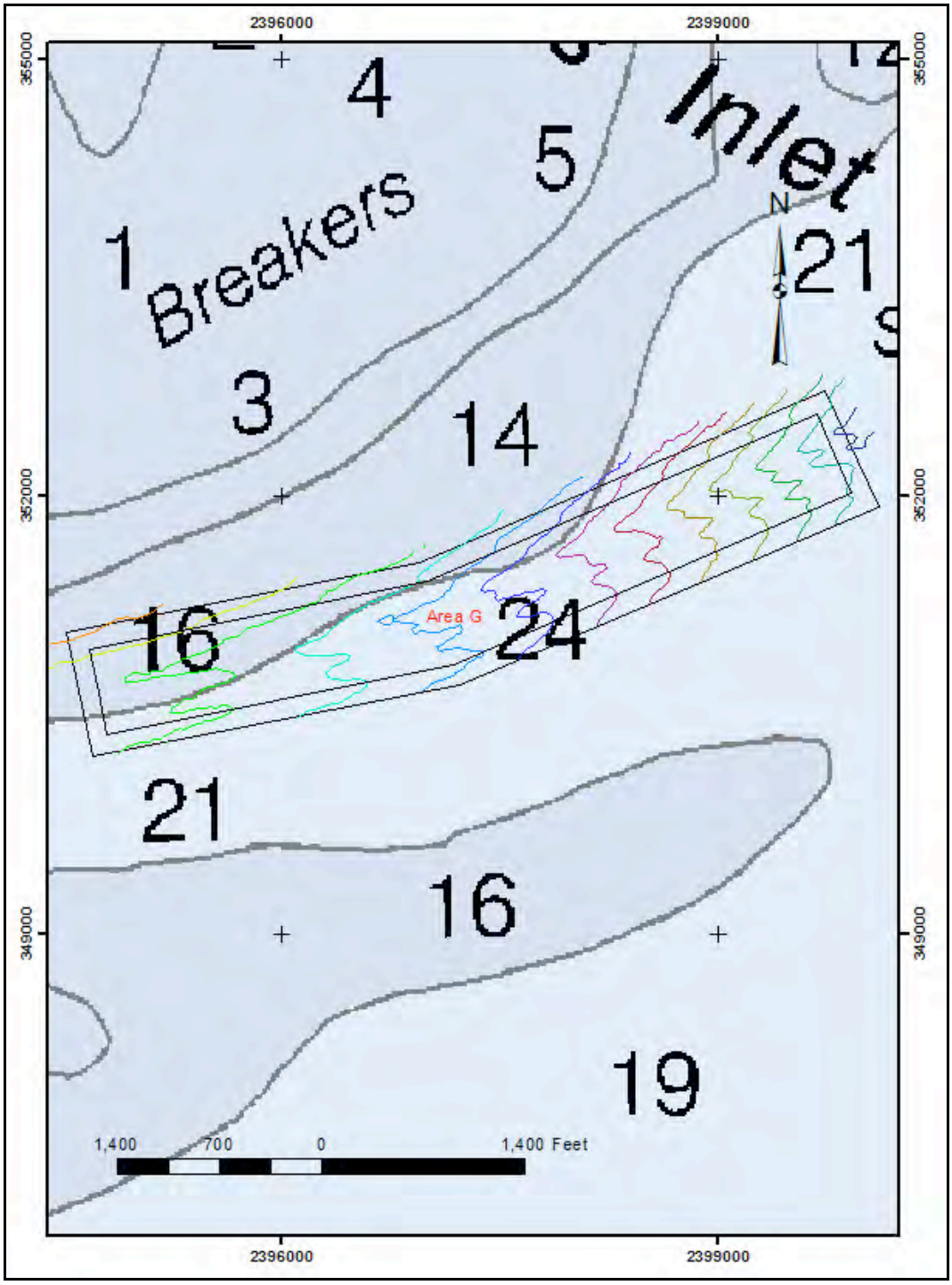

Figure 22. Survey Area G showing magnetic contours.

Analysis and mosaicing of the sidescan sonar data identified no bottom surface targets within the area surveyed (Figure 23). Likewise, analysis of the sub-bottom profiler data identified no evidence of intact relict landforms that could be associated with prehistoric habitation were in evidence.

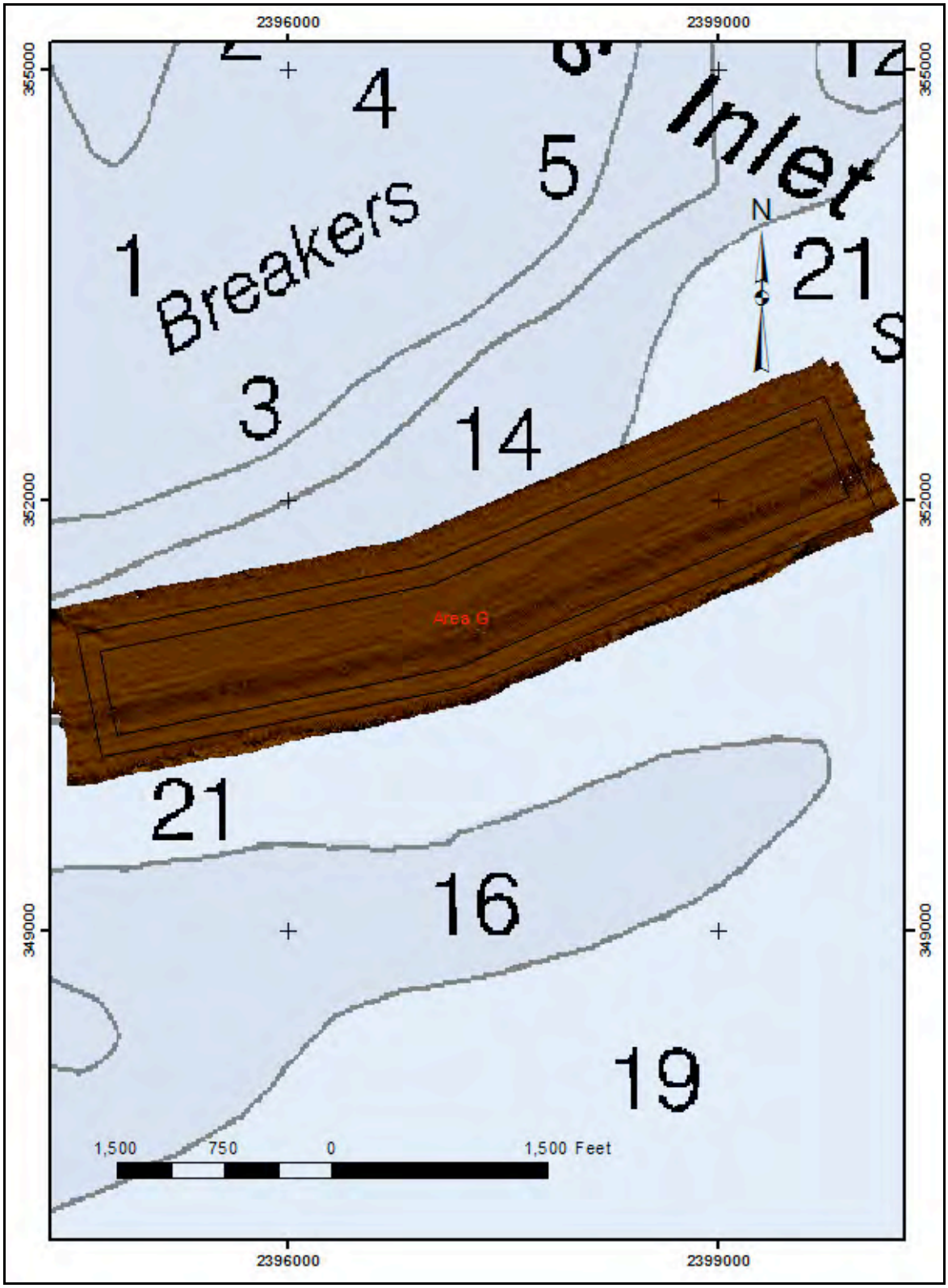

Figure 23. Area G sonar coverage mosaic.

Conclusions and Recommendations

A survey of historical and archaeological literature and background research confirmed evidence of sustained maritime activity associated with the coast of South Carolina in the vicinity of Charleston. Documented navigation along the coastal waters off Isle of Palms and neighboring waterways date from the first quarter of the sixteenth century. The region became a focus of settlement as early as 1670 and development generated a flourishing maritime commerce. During the more than 300 years since the first English settlers arrived at Charlestown, the inshore and Atlantic waters have been navigated by a broad spectrum of vessel types associated with exploration, colonization, trade, transportation, fishing and military activity. Thus, the inshore and coastal waters around Charleston must be considered to be a high priority area for submerged cultural resources.

Although Dewees Inlet was not suitable for navigation by coastal and oceanic vessels there are several documented shipwrecks in the vicinity of offshore bars. In addition, there is one charted wreck immediately south of the southeastern extremity of Area E. Information concerning Record 7583 associated with that wreck from the NOAA AWOIS is related by Figure 24. NOAA data indicates that a sunken wreck and 14-foot depth of water at that location was confirmed by divers and soundings in 1969 (NOAA n.d.).

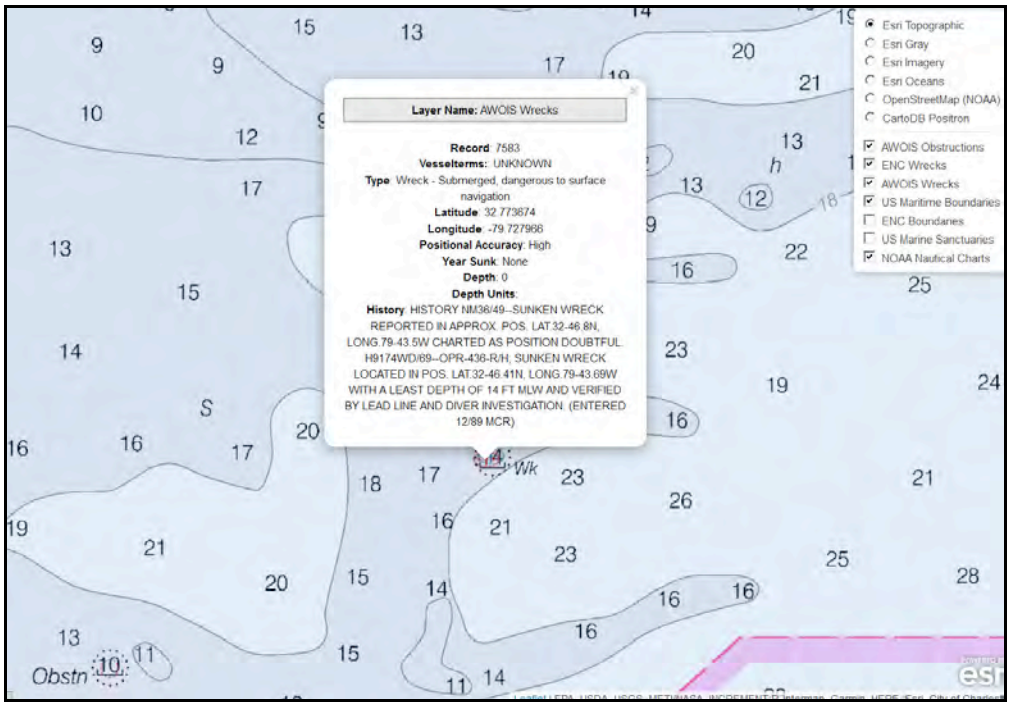

Figure 24. Screen capture of AWOIS data for Record 7583 (NOAA n.d.).

Investigation of the three proposed borrow areas identified a limited number of anomalies and sonar targets. None were identified in Area G and only three magnetic anomalies were identified in Area F. With the possible exception of anomalies in the border buffer of Area E, all appear to be generated by traps, cable, pipe, a small boat anchor or other similar modern debris. No additional investigation of those targets is recommended as they are not suggestive of submerged cultural resources that would be eligible for nomination to the NRHP.

Based on the cluster of magnetic signatures in Area E, Avoidance Buffer 1, and their geographical association with the charted wreck immediately southeast, those anomalies are recommended for avoidance. A 300-foot radius buffer is recommended to protect material generating those signatures. In the event that Buffer 1 cannot be avoided, additional investigation is recommended to identify and assess the historical significance of material generating the signatures.

Finally, in the event that any project activities expose prehistoric or historic cultural material not identified during the remote-sensing survey, the dredging company under contract to CSE should be required to *immediately* notify the designated City of Isle of Palms point of contact. The South Carolina State Historic Preservation Officer and South Carolina State Underwater Archaeologist James Spirek should be *immediately* notified of the situation. Notification should address the location, where possible, the nature of material exposed by the project activities, and options for immediate archaeological inspection and assessment of the site(s).

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Appendix A

Appendix A: Isle of Palms Area E Magnetic Anomalies

Anomaly	X Coordinate	Y Coordinate	Line #	Anomaly #	Signature	Gammas	Duration	Assessment
008-1-dp-1.9g-98f	2389033.2	348332.9	8	1	Dipolar	1.9g	98f	Small Single Objet
040-1-nm-24.6g-81.3f	2388332.8	346428.2	40	1	Negative Monopolar	24.6g	81.3f	Small Single Objet
042-1-dp-2.2g-67.8f	2386546.2	346297.2	42	1	Dipolar	2.2g	67.8f	Small Single Objet
043-1-dp-28.3g-155f	2389918.8	346220	43	1	Dipolar	28.3g	155f	Moderate Single Object
044-1-pm-3.2g-73.4f	2386943	346178.6	44	1	Posative Monopolar	3.2g	73.4f	Small Single Objet
045-1-dp-14.6g-150f	2388167.2	346115.8	45	1	Dipolar	14.6g	150f	Moderate Single Object
050-1-pm-2.8g-67.4f	2386950.9	345808	50	1	Posative Monopolar	2.8g	67.4f	Small Single Objet
054-1-dp-4.1g-81.8f	2389111.4	345583.5	54	1	Dipolar	4.1g	81.8f	Small Single Objet
064-1-dp-24.1g-141.2f	2389938.3	344969.2	64	1	Dipolar	24.1g	141.2f	Buffer 1 Possible Wreck
066-1-nm-3.8g-95.9f	2390147.3	344859.7	66	1	Negative Monopolar	3.8g	95.9f	Buffer 1 Possible Wreck
067-1-nm-11.6g-125.1f	2390049.9	344808.2	67	1	Negative Monopolar	11.6g	125.1f	Buffer 1 Possible Wreck
065-1-dp-3.8g-93f	2389839.2	344919.2	65	1	Dipolar	3.8g	93f	Buffer 1 Possible Wreck

Appendix B

Appendix B: Isle of Palms Sonar Target Table

Target	X Coordinate	Y Coordinate	Assessment
SSS001	2390485.219	345528.0318	Tire
SSS002	2390967.195	345192.2993	Tire
SSS003	2389886.883	344943.0318	Tire
SSS004	2389968.775	345071.9781	Tire
SSS005	2390018.108	345082.6987	Tires

Appendix C

Appendix C: Isle of Palms Area F Magnetic Anomalies

Anomalies	X Coordinate	Y Coordinate	Line #	Anomaly #	Signature	Gammas	Duration	Assessment
011-1-nm-7g-107.2f	2398047.9	349295.8	11	1	Negative Monopolar	7g	107.2f	Small Single Object
014-1-dp-2.2g-103.6f	2397678.9	349003.9	14	1	Dipolar	2.2g	103.6f	Small Single Object
015-1-nm-3.2g-91.4f	2395162	348379.9	15	1	Negative Monopolar	3.2g	91.4f	Small Single Object