Ground Penetrating Radar Reconnaissance at Beaulieu Plantation, Chatham County, Georgia

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Preface

I was now called upon to give the place a name, and thereupon, naturally revolving in my thoughts divers places in my native country, to try if I could find any that had a resemblance to this, I fancied that Bewlie, a manor of His Grace the Duke of Montague, in the New Forest, was not unlike it much to its situation, and, being on the skirts of that forest, had plenty of large timber growing everywhere near; moreover, a fine arm of the sea running close by, which parts the Isle of Wight from the main land, and makes a beautiful prospect, from all which tells us it took its name, and was antiently called Beaulieu, though now vulgarly ‘Bewlie.’ —William Stephens, March 21, 1739
Introduction

Beaulieu was the name of a large plantation at the mouth of the Vernon River in present-day Chatham County, Georgia (Figures 1 and 2). Preliminary archaeological investigation on a portion of the Beaulieu Plantation site (9CH1228) was provided by the LAMAR Institute, Savannah, Georgia. This work included Ground Penetrating Radar sampling and shovel test reconnaissance survey. Fieldwork for this project was conducted on September 2, 2006. These results are detailed in this report. The LAMAR Institute’s survey team consisted of Daniel T. Elliott and Rita Folse Elliott, assisted by Mr. And Mrs. Robert W. Groves, III.

Figure 1. Beaulieu Study Area.

Background

Beaulieu plantation has a rich and colorful history. Mr. Robert W. Groves, III authored a recent historical summary of Beaulieu history, which includes the chain of plantation ownership (Groves 2006). Additional information about Beaulieu Plantation was compiled in 2001 by Marc Bellanger (2001a-b). Groves’ history serves as the primary source of background information for the present study.
Beaulieu plantation was established by William Stephens, who was a prominent early Georgia colonist. A published biography of William Stephens states:

STEPHENS, William, president of the colony of Georgia, born in the Isle of Wight, England, 28 January, 1671; died in Georgia in August, 1758. He was educated at Winchester school and King's college, Cambridge, and studied law, but, abandoning it for public affairs, was a member of parliament and held several important offices. About 1730 he went to South Carolina for the purpose of surveying a barony of land. He was well pleased with his reception in the colony, became intimate with General James Oglethorpe, and, on the recommendation of the latter, was appointed secretary to the trustees in Georgia in 1837. His duty in this office consisted in supervising the affairs of the colony. He was made president of the county of Savannah in 1741, and of the entire colony in 1748. He held this post up to 1750, when he gave such evidence of mental and physical decline that he was requested to resign. He wrote "A Journal of the Proceedings in Georgia, beginning October 20, 1737" (3 vols., London, 1742). This work includes "State of the Province," which brings the narrative down to 28 October, 1741. The latter was also published separately (London, 1742). The work, which is exceedingly rare, especially the third volume, is believed to be of great importance in connection with the early history of Georgia.--His son, Thomas, was the author of "The Castle-Builder, or the History of William Stephens, of the Isle of Wight" (2d ed., London. 1759): (Appletons Encyclopedia 2001).
Beaulieu plantation achieved greater notoriety in the American Revolution when it was selected as one of two landing sites for the French forces commanded by Count D’Estaing. More than 1,200 French troops disembarked at Beaulieu on September 11, 1779 where they remained until September 15th, when they advanced to lay siege to the City of Savannah (Jones 1874a: 14-16). D’Estaing was met at Beaulieu by Count Pulaski’s and his legion of cavalry. The five day occupation of Beaulieu by the French army may have left some archaeological trace, although this amount of time would not allow for the construction of elaborate defenses.

In the American Civil War Beaulieu plantation was again used for military purposes. A Confederate army camp was established there in 1862. The confederate camp at Beaulieu was used by the Confederates until December 1864. General Robert E. Lee had issued orders for many of Georgia outlying coastal forts to be abandoned when it became obvious that any attempt to maintain these forts against the massive Union blockade would be foolish, particularly after the Confederate’s loss of Fort Pulaski in February 1862. In March, 1862 the Confederate armaments at Skidaway Island and Green Island were dismantled. The heavy ordnance from Green Island was transferred to the battery at Beaulieu (Jones 1874b:99).

Colonel Charles C. Jones, Jr., a Confederate artillery commander, further described the defenses at Beaulieu, “The point at Beaulieu being an important one, was strongly fortified and provided with one 8-inch and two 10-inch columbiads, two 42 and three 32-pounder guns. A light battery was also stationed within supporting Distance” (Jones 1874b:103).

General Beauregard sent this assessment of the Savannah defenses to General S. Cooper, Adjutant and Inspector General C. S. A., Richmond, Virginia, on November 1, 1862, which included this reference to the Confederate heavy ordnance at Beaulieu, “Of an eight-gun battery, of two 42-pounders, five 32-pounders, and one rifled 12-pounder, at Beaulieu, on Vernon River, some 12 miles distant from Savannah, and to which 17 feet of water can be carried” (OR, Volume 26:662-664; Ehistory.com 2008).

Confederate records, dated March 21, 1863, record Captain McCrady’s recommendations for the distribution of heavy ordnance in the Savannah area, which included, “Beaulieu Battery: Two 10-inch columbiads, one 8-inch columbiad, one 7-inch rifled gun, two-mortars” (OR Volume 14:867-869; Ehistory.com 2008). McCrady’s report suggests that the number of heavy artillery pieces emplaced at Beaulieu was reduced from that described by Beauregard less than five months earlier.

As these records indicate the number and type of heavy ordnance that were placed at Beaulieu varied over the course of the war. The defenses were formidable and
were effective at keeping the U.S. Navy fleet at a distance. The Confederate defenses at Beaulieu were commanded by Captain Cornelius R. Hanleiter. Captain Hanleiter commanded a company of Georgia Light Artillery (also known as Joe Thompson Artillery) in Wright’s Legion, 38th Georgia Regiment. Captain Hanleiter kept a diary during his war service, which has been published (Kurtz 1969). The original 5-volume diary, which covers the period from November 7, 1861-January 14, 1865, is archived at Emory University Library (MSS426).

About 30 officers and 220 private soldiers served in Captain Hanleiter’s Company during the course of the war (NPS 2008). Officers in the company included:

- **Captains**—Cornelius R. Hanleiter and Lewis J. Parr

- **First Lieutenants**—S.F. Atkinson, Elijah J. Craven, William P. McDaniel, and Augustus Shaw

- **Second Lieutenants**—W.A. Ballard, William R. Hanleiter, Thomas A. Kenady, James T. Peacock (later reduced to rank of Private), and Augustus Shaw (promoted to First Lieutenant)

- **Corporals**—William A. Allmond/Allman, John T. Daniel, John B. Delaney, J.A. Fannin (also spelled I.A. Fannin and J.A. Fanning), Augustus M. Holmes (later reduced to the rank of Private), S.A. Howell, James B. Laurence/Lawrance (later reduced to rank of First Sergeant), J.R. Martin, James B. Martin, John E. Milner/Milnor, E.L. Newton, Algernon S. Robbins/Robins (later reduced to rank of Private), Samuel H. Shaw, Alfred D.M. Sutbles, J.A. Tanin, Samuel J. Whiting, and A.A. Wilson (later reduced to rank of Sergeant)

- **First Sergeants**—James B. Laurence/Lawrance

- **Sergeants**—Drury B. Cade, John W. Holiday, William H. Joice, William H. Thrash (Holiday, Joice and Thrash were later reduced to the rank of Private), William M. McKemie, Linton A. Stephens and William A. (A.A.) Wilson

- **Buglers**—Robert E. Simril (later reduced to rank of Private) and William H. Stevenson

- **Surgeon**—James H. Houston

- **Artificers**—Greenberry McDaniel and Ezekiel L. Morgan

One of the most daring events to take place on the Georgia coast in the Civil War was the Confederate’s capture of the *U.S.S. Water Witch* (Figure 3). First Lieutenant Thomas P. Pelot, C.S. Navy, arrived at Camp Hunter, Beaulieu Battery
on June 1, 1864 when he wrote to Flag-Officer W.W. Hunter about his plans to capture the *Water Witch*. The raiders, under command of Lieutenant Pelot, embarked from Beaulieu at 9:30PM on June 2, 1864. Lieutenant Pelot, his pilot Moses Dallas, and three other men were killed and 10-12 were wounded. On June 3, 1864 W.C. Jones, Assistant Surgeon, C.S. Navy, wrote from Beaulieu Battery advising Flag-Officer W.W. Hunter, “Will require immediate ambulances for about 25 killed and wounded some wounded very badly”. Later that day Flag-Officer Hunter dispatched the *C.S. Firefly* to tend to these men. Captain Hanleiter filed a brief report from Beaulieu Battery on June 4, 1864 (U.S. Naval War Records Office 1902: 491-496). The Confederate’s capacity to make use of their prize was extremely limited. The *U.S.S. Water Witch* was moored in the Vernon River and was burned by the Confederates in December, 1864 to avoid its recapture by the Union. Recent underwater archaeological survey by the Georgia Department of Natural Resources located the wreck of the vessel and plans are underway for its investigation.

![U.S.S. Water Witch](DANFS Online 2008)

In December 1864 the United States Navy began a heavy bombardment of the Confederate defenses at Beaulieu. On December 13, 1864, Major General J.G. Foster reported to Major General William T. Sherman concerning the coastal forts near Savannah. Foster noted that, “Beaulieu Battery, nine guns, open gorge, guards the Vernon River” (OR 44(1):707-708; Ehistory.com 2008).

Rear-Admiral Dahlgren wrote in his report of December 23, 1864, while aboard the Flag-Steamer *Pawnee* near Savannah, that their attack on Beaulieu, “would be limited to the naval cannonade, which…would had begun and continued with deliberation by Lieutenant Commander Scott in the *Sonoma*, assisted for a day or so by the mortar of the *Griffiths*, Acting master Ogilvie” (United States Navy 1865:221). The bombardment of the Confederate fortifications at Beaulieu lasted from about December 14-21, 1864 (Navy & Marine Living History Association
The Groves family cherishes one particular relic from this intense naval bombardment, which is a large unexploded artillery shell. This specimen is currently used as a doorstop in their home. Mr. Groves noted that it was discovered during the construction of his house foundation. No doubt many other examples of exploded and unexploded ordnance may remain buried in the Beaulieu vicinity.

Figure 4. U.S.S. Pawnee (U.S. Navy, Naval Historical Center 2008).

Figure 5. U.S.S. Sonoma (U.S. Navy, Naval Historical Center 2008).

U.S. Army Engineer Orlando Poe, who was Major General William T. Sherman’s most trusted engineering officer, drafted a map of the Savannah vicinity, which showed the Confederate defenses at Beaulieu (Library of Congress Manuscript Division 2008; Poe ca. 1864, 1881). Another map, drawn by U.S. Engineer
Adolphus Lindenkohl, also shows the Beaulieu defenses and a portion of this manuscript map is reproduced in Figure 6.

Figure 6. Portion of Adolphus Lindenkohl’s 1860s Map, Showing Beaulieu (Library of Congress 2008).

In 2001 the Beaulieu Neighborhood Association and academics with the Savannah College of Art and Design gathered information on the historic architecture and landscapes of Beaulieu plantation. Two draft documents were compiled as a result by Historic Preservation student, Marc Bellanger, These included a draft National Register Nomination form for the Beaulieu Historic District and a draft historic preservation ordinance for Chatham County (Bellanger 2001a-b). After consultation with the Georgia National Register Review Board, Bellanger’s proposed nomination was rejected. It should be noted that “Archaeology” was not considered in Bellanger’s proposals, nor were they addressed during the Board’s review of the property. The Beaulieu Historic District, as proposed in 2001, encompassed about 50 acres, including the present study area.
Methods

Ground Penetrating Radar

The GPR device uses high frequency electromagnetic waves to acquire subsurface data. The device uses a transmitter antenna and closely spaced receiver antenna to detect changes in electromagnetic properties beneath them. The antennas are suspended just above the ground surface and the antennas are shielded to eliminate interference from sources other than directly beneath the device. The transmitting antenna emits a series of electromagnetic waves, which are distorted by differences in soil conductivity, dielectric permittivity, and magnetic permeability. The receiving antenna records the reflected waves for a specified length of time (in nanoseconds, or ns). The approximate depth of an object can be estimated with GPR, by adjusting for electromagnetic propagation conditions.

The GPR sample blocks in this study area were composed of a series of parallel transects, or traverses, which yielded a two-dimensional cross-section or profile of the radar data. These samples are called radargrams. This two-dimensional image is constructed from a sequence of thousands of individual radar traces. A succession of radar traces bouncing off a large buried object will produce a hyperbola, when viewed graphically in profile. Multiple large objects that are in close proximity may produce multiple, overlapping hyperbolas, which are more difficult to interpret. For example, an isolated historic grave may produce a clear signal, represented by a well-defined hyperbola. A cluster of graves, however, may produce a more garbled signal that is less apparent.

The GPR signals that are captured by the receiving antenna are recorded in an array of numerals, which can be converted to gray scale (or color) pixel values. The radargrams are essentially a vertical map of the radar reflection off objects and other soil anomalies. It is not an actual map of the objects. The radargram is produced in real time and is viewable on a laptop computer monitor, mounted on the GPR cart.

GPR has been successfully used for archaeological and forensic anthropological applications to locate relatively shallow features, although the technique also can probe deeply into the ground. The machine is adjusted to best probe to the depth of interest by the use of different frequency range antennas. Higher frequency antennas are more useful at shallow depths, which is most often the case in archaeology. Also, the longer the receiving antenna is set to receive GPR signals (measured in nanoseconds), the deeper the search.

The effectiveness of GPR in various environments on the North American continent is widely variable and depends on conductivity, metallic content, and other pedo-chemical factors. Generally, Georgia’s coastal soils have moderately good properties for its application.
Ground penetrating radar signals cannot penetrate large metal objects and the signals are also significantly affected by the presence of salt water. Although radar does not penetrate metal objects, it does generate a distinctive signal that is usually recognizable, particularly for larger metal objects, such as a cannon or man-hole cover. The signal beneath these objects is often canceled out, which results in a pattern of horizontal lines on the radargram. For smaller objects, such as a scatter of nails, the signal may ricochet from the objects and produce a confusing signal. Rebar-reinforced concrete, as another example, generates an unmistakable radar pattern of rippled lines on the radargram. Conyers notes: “Ground-penetrating radar works best in sandy and silty soils and sediments that are not saturated with water. The method does not work at all in areas where soils are saturated with salt water because this media is electrically conductive and ‘conducts away’ the radar energy before it can be reflected in the ground” (Conyers 2002).

GPR has been used to a limited extent on archaeological sites in Georgia yielding mixed results. Recently, the LAMAR Institute team has conducted GPR survey with good results on several of Georgia’s barrier islands, including Cumberland, Jekyll, Ossabaw, Sapelo, St. Catherines and St. Simons islands (Elliott 2006a-d).

GPR is particularly well suited for the delineation of historic cemeteries. Historic graves are often easy to recognize in radargrams, as evidenced by a pronounced hyperbola. When 3-D slices intersect these hyperbolas the graves are usually clearly evident in plan view. When a series of graves are closely spaced, however, the grave radar “signature” is less clear-cut. By slicing the radar data at various depths along the hyperbola, the aerial perspective can be refined for optimal viewing and recognition. Since not all graves were dug to the same depth, 3-D slices at different depths can often yield very different views of graves in plan by varying the slice only a few centimeters.

Using the same Ramac X3M GPR system as that used in the present study, Elliott conducted several GPR studies of 18th and 19th century archaeological sites in coastal Georgia. The first study was at the New Ebenezer town site in Effingham County, Georgia (Elliott 2003a). The results of the GPR work at New Ebenezer were quite exciting and included the delineation of a large portion of a British redoubt palisade ditch and the discovery of several dozen previously unidentified human graves (both within and beyond the known limits of the Jerusalem Lutheran Church cemetery). The Ebenezer work was followed by a GPR survey of the colonial-era Horton House site (and DuBignon Cemetery) in Glynn County, Georgia (Rita Elliott et al. 2002). More recently, GPR survey was conducted by Elliott and his colleagues, at Fort Morris and Sunbury Cemetery (Liberty County), Sansavilla Bluff (Wayne County), Woodbine Plantation cemetery (Camden County), and Garden Homes [Waldburg Street, Savannah] (Chatham County), and the Gould-Bethel Cemetery (Chatham County) and numerous other sites with satisfactory results (Elliott 2003a-c; 2004; 2006a-d; 2007a-b, 2009).
The equipment used for this study consisted of a RAMAC/X3M Integrated Radar Control Unit, mounted on a wheeled-cart and linked to a RAMAC monitor. A 500 megahertz (MHz) shielded antenna was used for the data gathering. A Toshiba Satellite A65 personal computer was used to record the GPR data. MALÅ GeoScience’s *Ground Vision* (Version 1.4.5) software was used to acquire and record the radar data (MALÅ GeoScience USA 2006a). The radar information was displayed as a series of radargrams. *Easy 3D* software (Version 1.3.3), which was developed by MALÅ GeoScience (2006b), was used in post-processing the radar data and 3-D imaging. This entailed merging the data from the series of radargrams for each block. Once this was accomplished, horizontal slices of the data were examined for important anomalies and patterns of anomalies, which were likely of cultural relevance. These data were displayed as aerial plan maps of the sample areas at varying depths below ground surface. These horizontal views, or time-slices, display the radar information at a set time depth in nanoseconds. Time-depth can be roughly equated to depth below ground. This equivalency relationship can be calculated using a mathematical formula. An estimated soil velocity of 55 (an approximate value for wet sand) was used to generate the GPR maps in this report.

The GPR data from the present study was further processed with more robust imaging software, which was developed by Dean Goodman and called *GPR-Slice* (Version 5.0). Goodman’s *GPR-Slice* program is recognized as the world leader in GPR imaging (Goodman 2006).

Various adjustments to the GPR equipment were made in the field during the data collection phase. The time window that was selected allowed data gathering to focus on the upper 1.5 meters of soil, which was the zone most likely to yield archaeological deposits. Additional filters were used to refine the radar information during post-processing. These include adjustments to the gain. These alterations to the data are reversible, however, and do not affect the original data that was collected. This same combination of GPR equipment and radar imaging software was used previously in coastal Georgia with very satisfactory results (Elliott 2003a, 2003b; Rita Elliott et al. 2002).

Upon arrival at the site, the RAMAC X3M Radar Unit was set up for the operation and calibrated. Several trial runs were made on parts of the site to test machine’s effectiveness in the site’s soils. It should be noted that the study area was subjected to heavy rain on the day prior to the survey. Machinery settings included the following:

**Block A**
- Time Window: 75 ns
- Number of Stacks: 4
- Number of Samples: 716
- Sampling Frequency: 9605 MHz
- Antenna: 500 MHz shielded
Antenna Separation: 0.18 m
Trigger: 0.02 m
Radargram orientation: Odd-Northwest; Even-Southeast
Radargram progress: Northeast
Radargram Spacing: 50 cm
Number of Radargrams: 31
Total Length of Radargrams: 465 m
Dimensions: 30 m Northwest-Southeast by 15 m Northeast-Southwest
Reference: Approx. UTM of Southwest Corner of Grid is: Z17 E489316 N3532616; located on brass cover plate of buried gas tank in front yard of Robert W. Groves, III residence. Grid was oriented at approximately 325 degrees Northwest. The Block A datum (SW corner) is located 17 meters from the rip-rap on the bank of the Vernon River and the northwest corner is located six meters from the rip-rap.
Comment: Above mentioned buried gas tank is prominent anomaly in Southwestern corner of GPR block. The GPR survey was supplemented by two 50 cm by 50 cm shovel tests (Shovel Tests #2 and #3). Shovel Test 1 was located 13 m south of Block A. The soil from each test was screened through ¼ inch hardware cloth.

**Block B**
Time Window: 75 ns
Number of Stacks: 4
Number of Samples: 716
Sampling Frequency: 9605 MHz
Antenna: 500 MHz shielded
Antenna Separation: 0.18 m
Trigger: 0.02 m
Radargram orientation: Odd- South-Southeast (160 degrees); Even-North-Northwest (340 degrees)
Radargram progress: East-Northeast
Radargram Spacing: 50 cm
Number of Radargrams: 25
Total Length of Radargrams: 68 m
Dimensions: 45 to 65 m South-Southeast by 12 m North-Northwest
Comments: Shovel Test #4 was placed approximately 25 m at 340 degrees bearing from the begin point (Datum) of Radargram B-1. Radargram B-1 was oriented at approximately 160 degrees bearing. Block B is completed vegetated in grass.

The GPR grids were established by using a hand held compass and a fiberglass metric tape, which reduced the accuracy for the site map somewhat. The UTM coordinates for the corner datum of each GPR blocks were established using a Garmin V hand-held GPS receiver with less than 7 meter accuracy. This factor
should be considered by archaeologists returning to the site to investigate any of the GPR anomalies that were identified. These locations are approximate.

**Area C**
Non-systematic GPR reconnaissance was done at a third area, north of the Grove’s residence, which was designated Area C. Machine settings were identical to that described for Block B. A strong linear anomaly was recognized with the GPR, which was visible in profile in several radargrams. This linear reflection was confirmed by Shovel Test 5, which encountered a shallow, buried stoneware drain pipe. This ceramic drainpipe was followed using a metal probe. Time and resources did not allow any additional work at this location.

A state site form for the Beaulieu plantation (9CH1228) was submitted in 2009 as part of this study. The area had not been previously recorded in the state files despite its well-established historical significance.

**Results and Interpretation**

Archaeologists Daniel Elliott and Rita Elliott conducted an archaeological reconnaissance of the Robert Groves property at Beaulieu on September 2, 2006. The archaeologists collected ground penetrating radar (GPR) data from three areas of the property, as well as excavating five 50 cm by 50 cm shovel tests in selected areas (Figure 7). The results of this work are discussed below.

GPR Block A was located on the waterfront of the Groves' residence. This sample survey located any radar anomalies. Some of these more shallow radar reflections probably represent modern utility lines, but others probably represent older cultural features. The latter may be of great historical significance.
Three shovel tests were excavated in the vicinity of Block A. Shovel Test 1 was located 13 m south of the block and 10 m east of the Block A datum. Shovel Test 1 was placed in the middle of an observed depression, which may represent a historic feature. It was excavated to a depth of 60 cm below ground surface. It was terminated when a PVC utility pipe was encountered. Artifacts were found throughout the test and sterile soil was never encountered. Two large brick fragments, an iron strap hinge, and a concentration of oyster shell were located 56 cm below ground surface. Other artifacts in the test included a plain porcelain sherd, clear bottle glass, square nails, window glass, brick fragments, and an iron barrel hoop fragment. Its approximate UTM location was Z17 E489330, N3532616. Soils in this test consisted of:

- 0-24 cm, very dark gray brown (10YR3/2) sandy silty;
- 24-30 cm, brown (10YR4/3) silty sand;
- 30-45 cm, dark gray brown (10YR4/2) silty sand;
- 45-60 cm, brown (10YR4/3) medium coarse sand.

Shovel Test 2 was placed within a large shallow depression, which may represent a historic feature. The test was located 2 m east and 7 m north of the Block A datum. Artifacts were found in two zones. which was excavated to a depth of 1.08 m. Artifacts in the upper 40 cm included bottle glass, iron, and oyster shell. The soils between 40-90 cm below surface were devoid of artifacts. Artifacts resumed from 80-108 cm depth and included: bottle glass, square nail, a kaolin tobacco pipe bowl fragment, and oyster shells. Soils in Shovel Test 2 consisted of:

- 0-15 cm, very dark gray (10YR3/1) sand loam;
- 15-36 cm, brown (10YR4/3) loamy sand;
36-60 cm, yellowish brown (10YR5/6) sand;
60-78 cm, light yellow brown (10YR4/4) sand;
78-101 cm, dark yellow brown (10YR4/4) sand, and
101-108 cm, light yellow brown (10YR6/4) sand.

Shovel Test 3 was located 2 m east and 23 m north of the Block A datum. This test was excavated to a depth of 86 cm and it is likely an example of the typical soil stratigraphy on this portion of the Vernon River terrace. Artifacts were sparsely scattered in the upper 40 cm of this test and included: one dark green and one medium green bottle glass sherd, 1 clear thin pharmaceutical bottle glass sherd, and 1 corroded nail fragment. Soils in Shovel Test 3 consisted of:

0-28 cm, dark gray (10YR4/1) sand loam;
28-40 cm, dark gray (10YR4/1) sand loam mottled with brown (10YR5/3) sand;
40-62 cm, brown (10YR5/3) sand, and
62-86 cm, yellow brown (10YR5/4) sand.

Figures 8 through 11 show a series of aerial plan views of GPR Block B with increasing depth. Several modern utility trenches are evident in the uppermost view. At greater depths, however, other GPR anomalies appear strong. These may relate to deeply buried archaeological deposits or structural features. These images suggest that a large sub-rectangular feature, at least 15 m in diameter, is contained with the area sampled by the GPR.

Figure 8. Plan of GPR Block A at About 25 cm Depth.
Figure 9. Plan of GPR Block A at About 40 cm Depth.

Figure 10. Plan of GPR Block A at About 1 m Depth.
GPR Block B was located in a large grassy area in the yard of the Groves' residence. It covered an area 64 m by 12 m, or 768 m². Landowner Groves speculated that the Confederate defenses crossed this area on a parallel course to the marsh. GPR Block B was placed to test this hypothesis. The GPR survey of Block B revealed no subsurface indications of any linear ditch work relating to the Civil War. The survey block did identify a known utility line, which was confirmed by Mr. Groves. This area was remarkably devoid of any strong radar reflections, other than the modern utility ditch.

Figures 12 and 13 show two aerial plan views of GPR Block B. The first view is at about 25 cm depth, while the second view is about 1 m below ground.
Figure 13. Plan of GPR Block B at About 1 m Depth.

Shovel Test 4 was located approximately 25 m at 340 degrees bearing from the GPR Block B datum. The UTM location for this test was Zone 17, E489450, and N3532758. This test was excavated to a depth of 70 cm below ground and no artifacts were encountered. Soils consisted of: 0-22 cm, very dark grayish brown (10YR3/2) sand loam, 22-52 cm, brown (10YR4/3) sand and, yellowish brown (10YR5/6) sand.

A third area of the Grove’s property was subjected to non-systematic GPR examination, which was designated Area C. This area, located north of their residence. The GPR was used to make preliminary passes over this location and one strong linear anomaly was noted. Shovel Test 5, which was placed in the vicinity of this anomaly, encountered two sections of a glazed stoneware sewer pipe. Archaeologists used a metal probe to follow this pipe for a distance of about 5 m to the east and west of Shovel Test 5. At about 5 m to the west the pipe possibly diverges into a “Y”. Artifacts from Shovel Test 5 included: eight window glass fragments, seven square nails, two corroded nails, brick fragments, and nine oyster shells. Sterile soils were not encountered because of the drainage pipe. Soils consisted of: 0-17 cm, very dark grayish brown (10YR3/1) silty loam and 17-27 cm, dark yellow brown (10YR4/4) sand.

Historical research provides us with many clues as to the historical significance of Beaulieu plantation. Cartographic evidence from the Civil War includes several U.S. Army maps of the area that depict the Beaulieu battery. U.S. Army Engineer Adolphus Lindelkohl’s 1860s manuscript map is one such map. This map was “rubber sheeted” over a modern aerial photograph of Beaulieu from Google Earth (Google Earth 2008). That GIS exercise suggests that the Confederate battery was located on the Grove’s property and possibly situated between GPR Blocks A and B. This portion of the Grove’s property was not explored by the present study.

Preliminary study of the archaeological resources at Beaulieu plantation shows the area to have promise for intact subsurface remains from its historic occupation. GPR Block A indicates that a large area of deep ground disturbance. This disturbance probably represents a large historic structural excavation. The large GPR anomaly observed in Block A may be related to the Confederate earthworks. Alternatively, it may represent a large cellar from an earlier plantation building, or it even may represent the remains of Revolutionary War
activity. This area of the Beaulieu site deserves additional archaeological exploration.

The area examined in GPR Block B appears to contain very few subsurface disturbances. Family tradition, as related by Mr. Groves’ grandfather, held that the Confederate trench line was located in this vicinity. The strongest radar reflection was associated with a buried utility water pipe, which was previously known to Mr. Groves. While the possibility remains that this utility trench happens to parallel a pre-existing Civil War trench, our preliminary interpretation is that is not the case. If this area of Beaulieu had been the location of the Confederate defenses the GPR reflections would have most likely been more widespread. With the exception of the utility trench, however, most of this sample contained few strong radar reflections. While the area within Block B may yet harbor important archaeological evidence, it does not appear to be a major area of human activity and thus tentatively serves as negative evidence for delineation of cultural resources at Beaulieu plantation.

Area C of the Grove’s property was only slightly explored. One strong GPR anomaly was identified and confirmed by one shovel test and by the use of a metal probe. The anomaly proved to be a shallow, stoneware drain. Artifacts in the shovel test indicated early historic activity in this area. More archaeological study of this portion of the site is warranted.

Beaulieu plantation is an important archaeological site. It should be recognized as such for its significance in shaping colonial, revolutionary war, antebellum, and Civil War history. The present study consisted of less than one day of fieldwork and it has barely “scratched the surface” of the resources likely contained within this site. The relationship between the archaeological resources identified in the present study and known historical personages and events associated with Beaulieu plantation, including William Stephens, John Morrell, the French Revolutionary War encampment, and Confederate military fortifications, remains a fertile subject for study. The findings provide a starting point for evaluating the site’s resources but a more systematic and complete survey of Beaulieu plantation is recommended.
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