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GPS, GIS and the Civil War Battlefield Landscape: A South Carolina Low Country Example

ABSTRACT

The results of Global Positioning System (GPS) mapping and Geographic Information System (GIS) analysis of Civil War earthworks in Beaufort and Jasper counties, South Carolina, are presented. Most earthworks were part of a defensive system built by Confederate forces over the course of the war to protect the Charleston to Savannah railroad, which itself was part of a vital supply line allowing rapid transport of men and materiel throughout the Confederacy. For most of the war, Union forces were deployed at Port Royal Sound less than 40 km from the railroad. The Confederates met this threat through fixed defenses at strategic locations combined with rapid movement of troops by rail. This strategy and these tactics are understandable within the geographic context provided by GPS/GIS technology and a military context provided by a detailed campaign history.

Introduction

In May 1861 the new Confederate states initiated efforts to defend the South Carolina coast and interior lines of supply from Union invasion by the construction of defensive positions at strategic locations between Charleston and Savannah. Critical to the movement of troops and supplies was the railroad between these two southern ports (Robinson 1950). In November of that year, Union forces arrived at Port Royal Sound, South Carolina, and gained a solid beachhead on Hilton Head Island. Unable to dislodge the Union from Port Royal Sound, the Confederates fell back and began fortifying the numerous inlets and approaches vulnerable to potential Union thrusts against their vital rail lifeline. From spring 1862 until early 1865, the Union Army attempted to cut the railroad, the most serious effort being the move against the rail stop at Grahamville, South Carolina. On 30 November 1864, only two miles short of their goal, the Union forces were stopped at the Battle of Honey Hill, suffering heavy casualties. The Confederates successfully protected the railroad until General William T. Sherman captured Savannah. The loss of Savannah and the threat of Sherman's army moving north into South Carolina finally caused the Confederates to abandon the railroad's defense.

Three years of Union maneuvering and Confederate response resulted in numerous batteries and long lines of infantry trenches scattered across the landscape of South Carolina's Jasper and Beaufort counties. Today, evidence of this struggle is largely gone, due to postwar land modification, road creation and widening, wetlands draining, and increased population. These landscape changes have largely obliterated the geographical context of the lines, making it difficult to understand their strategic significance. While there are some remarkably well-preserved batteries, forts, and lines, their historical meaning and purpose is obscure to all but the most ardent students of the Civil War in South Carolina. Tourists hurrying to recreational areas like Beaufort, Hilton Head, and Hunting Island, South Carolina, may occasionally wonder about those little mounds and ditches just off the highway, but most will speed past never knowing they are crossing a once-bloody landscape.

This article presents the results of a first step towards rediscovering and preserving the remaining monuments of the low-country struggle by mapping their locations and major features using Global Positioning System (GPS) technology (Clement et al. 2000). The work was performed by the South Carolina Institute of Archaeology and Anthropology and funded by the National Park Service's American Battlefield Protection Program. The project had two mutually supporting goals: (1) gather sufficient GPS data to produce Geographic Information System (GIS) maps of the Honey Hill battlefield and 16 other batteries associated with the defense of the Savannah to Charleston Railroad (Table 1), and (2) provide enough historical and archaeological data to interpret their histories. The generation of GIS maps of the lines and batteries, combined with a detailed historic context in the form of a campaign history, provided South Carolina resource managers with the data necessary for understanding the significance of these sites and developing a multiple National Register Nomination. At the same time, researchers were able to provide a

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TABLE 1
BATTERIES AND LINES MAPPED

Name	Site Number	Type of Site
Frampton House	38JA1017	battery remnant
Frampton Creek	38JA255	earthworks, lines
Pocotaligo/Castle Hill Complex	38BU1859	lines, batteries
Pocotaligo	38BU1862, 38BU1863	batteries
Pocotaligo West	38JA256	lunette
Brewton	38BU1861	battery
Tomotley	38BU1860	battery
River Road	38BU1864	battery, line
Combahee Fort	38BU1217	redoubt
Mackey (Mackay) Point	38JA254	lines, redoubt, salient
Pages Point	38BU1857, 38BU1858	battery
Bees Creek	38JA249	lunette
Euhaw Church	38JA248	lines
Dawsons Bluff	38JA250	redoubts
Boyds Landing/Boyds Neck	38JA251, 38JA253	lines with salients, lunette
Honey Hill	38JA1008	lines
Delta Plantation	38JA169, 38JA252	lines, fortified camp

better understanding of the batteries and lines in relation to the two adversaries' strategies and tactics. With this first step accomplished, it is hoped that protection measures can be taken and programs developed with the goal of interpreting the low country's Civil War past for both tourists and natives alike.

The Project Area

The project area consisted of the counties of Beaufort and Jasper, South Carolina (Figure 1). Beaufort County is almost exclusively in the Coastal Zone, while much of Jasper is in the Outer Coastal Plain. The Outer Coastal Plain is characteristically flat and slopes very gradually to sea level; it contains most of the batteries and lines mapped for this project. It was formed as a result of millions of years of sea-level fluctuations, beginning in the Miocene Epoch, 18 million years ago. The latest series of sea level rises and falls occurred during the Pleistocene as a result of the forming and melting of the glaciers. Most of the topography seen today was shaped by the action of the seas smoothing the landscape. The result was a series of gentle terraces from the Coastal Zone to the Inner Coastal Plain that are not readily apparent to most people except geologists and geographers. About 50% of the area has elevations less than 42 ft. (Kovacik and Winberry 1987:18–22).

The Coastal Zone, much more complex and diverse than the Outer Coastal Plain, is the interface between the ocean and the mainland, and the waterways are affected by tides. In the project area, the Coastal Zone is full of barrier islands, tidal inlets, interior waterways, bays, river mouths, and backwater swamps. From Cape Romaine just south of the Santee River, south into Georgia, barrier islands and erosional remnant islands make up the sea island

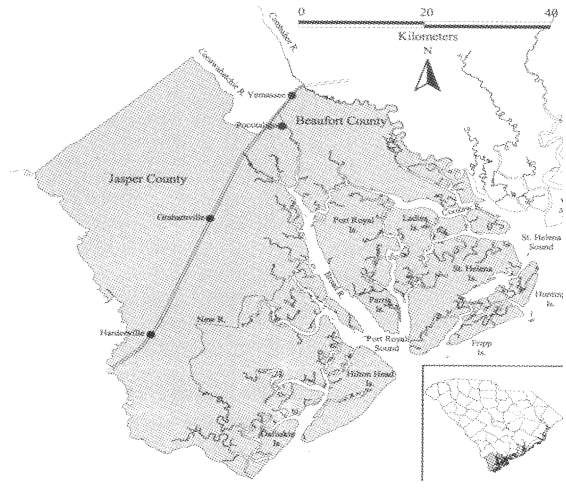

FIGURE 1. Beaufort and Jasper Counties, South Carolina (South Carolina Department of Natural Resources).

complex. Erosional remnants are so classified because they were once part of the mainland; barrier islands, on the other hand, are active, changing sand dunes, held together by vegetation and subject to the winds and tides (Kovacik and Winberry 1987: 23–26). Nineteen percent of the Coastal Zone is flooded daily or occasionally by tidal flow.

Two major rivers drain the project area. The Coosawhatchie River empties into the Broad River, a tidal river that opens to become Port Royal Sound. The Combahee River, north of the Coosawhatchie empties into St. Helena Sound. Between the two sounds, Whale Branch and the Coosaw River join to cut off a complex of remnant islands. This complex includes the larger islands of Port Royal, St. Helena, Parris, and Ladies, the barrier islands of Fripp and Hunting, and many other smaller islands mixed between. A smaller river called the New, south of the Coosawhatchie, drains the narrow land between the Coosawhatchie-Broad rivers and the Savannah River.

The rivers, islands, and interior waterways of the Coastal Zone in the project area created obstacles to the construction of the Charleston and Savannah Railroad around the Jasper County-Beaufort County border. As a result, although they were laid entirely within the Outer Coastal Plain where only the Coosawhatchie and Combahee Rivers formed major impediments, the tracks in this area closely follow the interface between the two geographic provinces. Unlike in other areas, then, the Charleston and Savannah Railroad at the border of Jasper and Beaufort counties was accessible by water, a fact that was readily apparent to the Union Army occupying the islands around Port Royal Sound. It was these factors that dictated the Confederate defensive strategies and tactics in the project area.

Methods

The field effort consisted of identifying and mapping batteries located previously by regional Civil War avocational and professional historians. One very active avocational historian had been attempting to research and locate all the batteries in the region for several years and knew the landowners either by name or personal acquaintance. He was quite interested in sharing his knowledge and became the project's lead liaison between the numerous landowners and the project team.

GPS data were collected using a Trimble® Pro-XR data logger with real-time differential correction. The data were also corrected in the laboratory during post-processing and were then edited. The National Park Service's Civil War batteries data dictionary, developed and tested by the American Battlefield Protection Program (ABPP), was adopted to capture and record field data. The ABPP's data dictionary has separate fields for such attributes as width and height of parapets, gun emplacements, ramps, and embrasures.

Post-processing consisted of downloading the data into Pathfinder Office® software on a Windows® NT-operated computer. The files were downloaded each evening and checked. In the laboratory, positions were differentially corrected using base station files obtained on the World Wide Web from the closest public base station. Most of the data were edited in the laboratory using Pathfinder Office® software once fieldwork was completed. Editing consisted of smoothing lines created by individual positions recorded by the data logger. The data dictionary and field notes assisted this process. Once the data were edited, they were transferred into ArcView® for generating battery location and feature maps.

Simultaneously with the field effort, an historical context was researched and written by the project historian. It focused on the military campaign in the region, with emphasis on the various military features that were constructed as a result of Confederate defensive and Union offensive efforts. This history, presented below, is admittedly lengthy, detailed, and complex, but it is, after all, the military context within which the lines and batteries were created. It represents one of the primary contributors to the locations of the lines and batteries on the landscape. Past archaeological examinations of military landscapes have sometimes oversimplified the historical events that created them. This can make a battlefield appear as a static set piece rather than the scene of a highly dynamic, fluid series of events, each event influenced by human personality, physical limitation, and emotion as well as by the lay of the land. The goal was to attempt to understand and interpret a complex remnant landscape. To do so, it is necessary to illuminate both the cultural and geographical nature of that landscape with equal fervor.

Historical Background

With the completion of a bridge over the Savannah River in spring 1861, the Savannah to Charleston Railroad was to be the region's principal transportation and commercial link to the rest of the South and the nation. Long before the completion date, small railroad stops and communities were established along the route in anticipation of becoming interior distribution centers for goods going to and coming from Port Royal's harbor. Though there were no docking facilities in the region, small vessels could reach the railroad by navigating the Broad and Pocotaligo rivers to a location where goods could be transferred for a short hop to the railroad and then throughout the South (Wise 2000:12). But war was at hand.

As early as May 1861, the Confederate commander in South Carolina, General Pierre G. T. Beauregard, undertook an examination of the coast to plan its defense. The expedition resulted in construction of the first of what would be many earthen fortifications stretching from Charleston to the Savannah River. These first works were placed at the mouth of navigable inlets. Their purpose was to deny enemy vessels access to the inland sounds and waterways (Wise 2000:13; *Official Records of the Union and Confederate Navies in the War of the Rebellion* [*ORN*] 1901[I]:167–168, 178). With so many possible access routes, the coastal landscape soon became dotted with small forts. The batteries were positioned and designed by General Beauregard and constructed under the direction of state and Confederate engineers. Labor was accomplished by slave gangs requisitioned from neighboring plantations (Freeman [1]:607–608, 613–615; *War of the Rebellion: Official Records of the Union and Confederate Armies* [*ORA*] 1899–1901 [VI]:38).

Construction of the defenses actually fell to Brigadier General Roswell Sabine Ripley, who took over the command of South Carolina in August 1861. Ripley and his commander at Port Royal, Brigadier General Thomas Drayton, believed the fortifications could resist naval attacks, keeping the enemy from capturing the sea islands and reaching the Charleston and Savannah Railroad. Ripley's confidence stemmed from the outdated military theory that one gun on land was worth 10 on board a ship and that land-based gunners, using larger guns than could be mounted on a ship, could take their time and sight-in on the slow moving, sail-powered warships. This theory was soon proved to be disastrously wrong when on 7 November 1861, Union steam power shattered the Confederacy's forward coastal defenses in the Battle of Port Royal (Viele 1885:329–340; Rowland et al. 1996:451–455). Ripley had the sad duty of reporting the defeat to the new commander of the Department of South Carolina, Georgia, and East Florida, General Robert E. Lee, who arrived at Coosawhatchie, South Carolina, on the evening of the battle.

Lee assembled the remnants of Ripley's defeated command along the headwaters of the Broad River and immediately prepared for an enemy attack inland. He saw that the South did not have enough men or cannon to defend every inlet, so he turned to a new defensive scheme, predicated on mobility, to defend the region and the railroad. He drew on his father's theories on coastal defense, an army report written in 1826 by Major Joseph G. Totten, and Colonel Ambrosio Gonzales's proposed coastal defense, which used "flying batteries" that could be rushed to any threatened coastal region. Lee adopted these strategies and added the element of rail transportation (Freeman 1951 [1]:613–614). Critically, Lee did not want to fight the enemy from fixed fortifications. He wanted to meet and defeat his adversaries in the field. So he planned his strategy around the use of fixed positions that would serve as bases from which he could launch counterattacks, using troops assembled and concentrated via the railroad (Wise 2000: 16). Savannah and Charleston were to be the anchors in his new defense line. While these bulwarks were strengthened, Lee concentrated his efforts on fortifying the headwaters of the Broad River and key points between the Savannah and Combahee rivers. Reinforcements allowed Lee to improve his defenses. Works were started at Red Bank on the New River, at Pages Point, at Port Royal Ferry on the Coosaw River, and at Tar Bluff on the Combahee. Besides the batteries, Lee ordered additional obstructions and torpedoes in the region's rivers and creeks (*ORA* [VI]:85–87; *ORN* [XII]:500–506).

On 8 December 1861 Union troops made their first of many uninspired attempts against the Confederates, coming ashore at Cunningham

Point near Hall's Island at the mouth of the Coosawhatchie, Tullifinny, and Pocotaligo rivers. Lee immediately rushed troops from nearby Pages Point and Garden's Corners, but the Federals withdrew before any engagement occurred (*ORA* [VI]:329–331, 338). By Christmas 1861, Lee's command was growing in numbers, and he began establishing positions closer to waterways patrolled by Federal warships. These forward positions proved tempting to the Union, and on 1 January 1862 an amphibious expedition led by Brigadier General Isaac Stevens and supported by gunships swept over the Confederate works at Port Royal Ferry, driving off the defenders and destroying the fortifications. This affair chastised Lee and reminded him of the dangers of exposing his men and equipment in battles against the enemy's warships and amphibious mobility. The exposed positions were abandoned (Wise 2000: 19). Though Lee hoped his command could protect the railroad, Lee prepared an alternate rail route through Augusta, Georgia, and, at the same time, ordered Major George W. Rains to locate fortifications upstream on the Savannah River to guard Augusta.

Lee directed the most concentrated effort in the region of the entire war. Mid-February 1862 saw the first of a long, slow, continual drain of men and materiel from the region. Because of disasters in the western theater, the Confederate War Department had to send reinforcements from Lee's command to Tennessee. Soon some 4,000 men were on their way to Mississippi. Lee was not pleased with the prospect of defending his department with a weakened force, but he would soon have new, more challenging problems to face. In March, Jefferson Davis requested Lee's presence in Richmond, Virginia. By the time Lee left his Coosawhatchie Headquarters, he had established a strong force ready to react to any enemy movement, despite the manpower drain (Freeman 1951 [1]:627–630, [2]:1–8).

Major General John C. Pemberton assumed Lee's South Carolina command on 4 March 1862. Pemberton was forced to deal with the same tactical problems that had so harried Lee, but he also faced a more aggressive enemy and a continuing drain of men and materiel. By spring 1862, the Federals, so long dormant on their sea island beachhead, began to stir. Union forces first tested Pemberton's preparations in mid-March, embarking from Seabrook on Hilton Head for a reconnaissance into the May River. On 20 March, proceeding in barges, the Northerners landed at Bluffton and drove off some Confederate cavalry. The Union forces left soon afterward, but the reaction displayed how the Southern defensive scheme worked. Cavalry pickets reported the presence of the enemy. While they skirmished with the attackers, word was relayed to the district and department headquarters. Troops from the surrounding military districts moved forward to meet the enemy, while others were rushed by rail to man the fortifications guarding Grahamville and Coosawhatchie. This dress rehearsal proved the strategy successful as did another on 1 April 1862 at Pages Point (Wise 2000:23). But nine days later, Pemberton received orders from Lee to send six of his regiments to Beauregard in Tennessee. From this point on, where once regiments stood, there would be only companies (*ORA* [VI]:428, 432, 433–443).

On 29 May 1862 Union Brigadier General Isaac I. Stevens organized a reconnaissance in force to probe the Confederate defenses guarding the railroad near Pocotaligo Station. His force crossed over to the mainland at Port Royal Ferry and moved toward Pocotaligo. Driving in enemy pickets, the Federals marched through Gardens Corner and along Sheldon Church Road until they were stopped by dismounted cavalry at a causeway crossing Screven's canal. Here the Southerners fought a protracted skirmish until they were driven back to a position some 400 yd. past the town of Pocotaligo. Reaching the town, the Union troops learned that Confederate reinforcements were arriving and decided against pushing on to the railroad. Again they withdrew. The attack convinced Pemberton to keep more troops near Pocatalico. Meanwhile, Lee siphoned more troops from Pemberton's command, telling him that the hot and sickly summer months would stop all enemy movements in the Beaufort area (*ORA* [XIV]:20–27, 505, 539, 584–586; Robinson 1950:16–21).

In August 1862 Beauregard was reassigned to command the Department of South Carolina, Georgia, and East Florida, but he did little to supplement Colonel William S. Walker, now in charge of the Beaufort District. In October Walker wrote Beauregard pointing out that he had no heavy artillery and only 2,000 troops to man defenses designed for 10,000 men. Later

in the month Beauregard sent aides to meet with Walker who reported back on the colonel's defensive plan. As a portion of this report demonstrates, the defense of the railroad was like attempting to plug a leaky dike. There were simply too many avenues of approach:

> Should the enemy attempt to force their way to the railroad at Pocotaligo he [Walker] calculated to hold them in check in rear of Screven's rice fields ... . Should they attempt to advance to the bridge across the Combahee River at Salkehatchie by the road parallel to the river and another small road known as Seller's road, he would then hold them in check at the junction of the two roads near the bridge ... . In case of a landing being made at Huguenin's, on Broad River, he would hold them in check at the causeway and bridge across Bee's Creek, on the old mail road, at the junction of the Euhaw and Grahamville roads ... . Should they land at Bluffton, he has selected a position at New River Bridge, on the old mail road, where he has an embrasure battery to protect the bridge. If they land at Red Bluff, ... he has selected a position near New River, where he has two small works erected (*ORA* [XIV]:640–641).

The report convinced Beauregard to dispatch some reinforcements. Walker consolidated these forces around Pocotaligo, Grahamville, and Hardeeville. He did not have long to wait. Less than a week after filing his report, Federal troops again moved against Pocotaligo. On the night of 21 October, under the protection of a Naval Squadron, a Union force of 4,500 men sailed up the Broad River. The next morning, a division of 4,200 men under Brigadier General John M. Brannan landed at Mackey Neck, between the Pocotaligo and Coosawhatchie rivers, and marched toward Pocotaligo. At the same time, a much smaller force of about 300 infantrymen and engineers ascended the Coosawhatchie River with orders to break the railroad near Coosawhatchie (Wise 2000:27). Walker distributed his forces between the two threatened points and called for help from Savannah and Charleston. Walker directed a guard of artillery with some sharpshooters and two companies of cavalry to meet Brannan's Division as it advanced along Mackey Point Road. Although Brannan's men made steady progress against Walker's rolling defense, overrunning the fixed batteries in front of them, the Federals were eventually stopped by a combination of Confederate reinforcements and the Pocotaligo River. The Federals again withdrew. But the weaker prong of the Federal attack had made its way along the Coosawhatchie and delivered an effective fire into a passing Confederate troop train. The course of this battle hints that the Confederate defensive works, so long labored over, may not have been very effective in stopping a determined enemy. With so few troops to man them, these fortifications were becoming essentially useless. Still, even undermanned and undefendable, they delayed the enemy long enough for Walker to respond to the threat.

For the rest of the year, newly promoted Brigadier General Walker had an effective force ranging from about 2,300 to 3,000 men with more than half being cavalry. Reductions continued and by the end of May 1863, the Third District numbered 527 infantry, 1,463 cavalry, and 596 artillerymen. With the hot months coming on again, the district's heavy artillery was removed from the fortifications and their garrisons pulled back to healthy areas away from the marshy low lands (*ORA* [XIV]:290–308, 983, 945, 962–963). Through most of the spring and summer, the Federals left the Confederates in the Beaufort District alone as a result of a renewed effort against Charleston.

Finally, in December 1863 the Confederate high command began to take a greater interest in the Third District. To assist Walker, Beauregard sent Major General Jeremy Gilmer, Chief Engineer of the Confederacy and Beauregard's acting second-in-command, to inspect the area. During his tour, Gilmer suggested a number of improvements, including the combining of the Third District with the District of Georgia. Beauregard concurred, and on 24 December Gilmer was given temporary command of the combined district. Gilmer went to work improving positions and roads. On the last day of 1863, Walker's command, supplemented by men from the Savannah defenses, numbered about 4,100 effectives. Their distribution still centered around the district's three main depots of Pocotaligo, Grahamville, and Hardeeville (*ORA* [XXVIII] Pt. II:506, 568, 577, 578, 601).

Through the first half of 1864 and into the fall, there was little action in the Beaufort District. The Federals launched a campaign from Jacksonville, Florida, against Tallahassee. Confederate units were rushed south from Georgia and South Carolina, and the Union drive was stopped at Olustee. During the campaign, Walker

with a reduced command was left in South Carolina. He harassed the enemy forces around Port Royal by firing rockets and beating drums in an attempt to prevent Union reinforcement of the Florida campaign (Wise 2000:39).

Gilmer and Walker ultimately had more to do with the development of fortifications within the Third District than any of the previous district or department commanders. Whereas Lee initially used fortifications as a delaying measure, he did not intend to use them to stop the enemy. Gilmer and Walker, however, had to deal with a greatly reduced command, and this called for fortifications to stop the enemy before it reached the railroad. Walker designed a more-fixed defensive scheme in which cavalry units armed with rifles and batteries of field artillery were used to slow down enemy attacks at fortified choke points but could still utilize the rail system to bring in infantry units (Wise 2000:40).

Over the summer, troops were further reduced, and the withering Department of the South was reorganized for the final act of the war. Beauregard was replaced by Lieutenant General William J. Hardee as commander of the department. Hardee arrived in Charleston on 5 October 1864. Hardee made the best of a deteriorating situation. But as work crews were sent out to repair the rail line and strengthen fortifications throughout the area, other events were occurring that forced the Confederates to make major alterations in their defensive plans.

On 16 November 1864 Sherman led an army of 65,000 effectives out of Atlanta on a march toward Savannah. Before leaving Atlanta, Sherman requested that the War Department send orders to the Union commander of the Department of the South, Major General John G. Foster, to break the railroad around Pocotaligo during or near the first week of December. The attack could trap the Confederates in Savannah, or it could make the Southerners spread their meager forces even thinner as they attempted to fend off attacks from the east and west. Foster organized a field division under the command of Brigadier General John T. Hatch. The division was under strength and more than half of the regiments were composed of black soldiers led by white officers.

The Federals planned to sail the 5,500-man division from its rendezvous off Hilton Head to Boyds Landing on the southern shore of the Broad River. Once ashore, they planned to march through Grahamville and on to the railroad junction at Gopher Hill. Delayed by fog, faulty maps, poor guides, and Confederate skirmishers, the Federals lost the entire day of 29 November in landing and then marching and countermarching. Finally, on the morning of 30 November 1864 the lead Union brigade located the correct road and made camp for the night, planning to continue the drive toward Gopher Hill the next morning. Their confusion, however, had given the Confederates time to react (Wise 2000:43–45).

Though greatly diminished in numbers, the Confederates followed their prearranged defensive scheme. District commander Colonel Charles Colcock of the Third South Carolina Cavalry covered the Savannah River crossings with over half his regiment in case Sherman should try to cross the river north of Savannah and move cross country to Port Royal. This left the Confederates only a battalion of cavalry (about 250 men) and five artillery companies under Major John Jenkins to guard the railroad between the Savannah and Combahee rivers. Still, Jenkins and his men did their job. They spotted the Federal vessels when they entered Boyds Creek and sent word of the enemy advance to the Confederate forces at Grahamville, Savannah, and Charleston. Jenkins split his command between the defenses that guarded the approaches to Coosawhatchie and Grahamville while his cavalrymen skirmished with the Federals. Hardee, the Confederate department commander, was unable to weaken the garrison in Savannah but ordered Major General Samuel Jones in Charleston to send units to Jenkins's relief. Jones was too far away, so General Gustavas W. Smith's 3,200-man Georgia militia was deployed as soon as they arrived from Macon. When the sleepy militiamen reached Savannah at 2:00 A.M. on 30 November, Hardee ordered them on into South Carolina.

Meanwhile, Jenkins and his cavalry were ordered to Honey Hill, where fortifications had been built back in 1861. There his men cleared off the brush that had grown up around a redoubt and dug additional trench lines on either side of the battery. This small work was part of a defense line of detached works covering the two widely spaced roads leading from the northeast and east to Grahamville and the railroad. In front of the earthwork ran a

marshy creek that the main road crossed on a wooden causeway. The bridge had been partially dismantled, and the area in front of the redoubt was cleared of trees and undergrowth, providing an open field of fire.

At dawn on 30 November, the Federals broke camp. Soon Hatch's command stretched from the Grahamville Road back to Boyd's Landing on the Broad River. Once some reinforcements came up, Hatch began his final advance about 8:00 A.M. Delayed by Confederate artillery and cavalry, the Federals did not reach the Confederate defense lines until the Georgia militia arrived and took position in the main works overlooking the road. At 11:00 A.M. the lead Northern brigade, some 3,000 men, reached the partially dismantled bridge. To their front at Honey Hill, at least 2,000 Confederates were waiting in fixed works with their cannon positioned to sweep the roadway with deadly canister. The Federals deployed for battle. Two artillery pieces were placed on the road to duel with the Confederate guns. In the first attempt to dislodge the Confederates, the Union officers sent the 35th United States Colored Troops to charge up the road. Under heavy fire, the black regiment was stopped.

The Federals then moved to test the Confederate flanks. Shortly after midday, elements of the second brigade under Colonel Alfred Hartwell arrived. Orders were passed to Hartwell to charge up the road while the rest of the command moved on the Confederate flanks. Hartwell placed five companies of the 55th Massachusetts in a double column and led the black soldiers forward. The men crossed the bridge and charged the hill. Hartwell went down with a severe wound and within five minutes the attack was repulsed. Of the 150 men who went forward, 100 were killed or wounded.

Though their attack against the Confederate center had been turned back, the Federals continued to press the Confederate flanks. But Confederate reinforcements from Charleston arrived and Union General Hatch abandoned the attack. Once again, the Confederates' mobile defensive strategy worked, at the heart of which was the use of the railroad they were attempting to protect. The fight cost the Northerners more than 700 casualties of the 3,000 men engaged, while the Confederates lost about 150 men from their force of approximately 2,300 men. The battle of Honey Hill proved to be a last hurrah for the Confederates. Although successful in defending the railroad from the coast, they could not stop the march of Sherman in their rear.

The Southerners did not pursue after defeating the Federal forces at Honey Hill but allowed them to fall back to a defensive position near their initial landing area at Boyd's Neck. Constructing fortifications, the Federals stayed in this position for five days before they began shifting men by boat to Gregorie's Neck, a peninsula between the Coosawhatchie and Tullifinny rivers for another strike at the railroad. To meet any new attacks, the Confederates reorganized their defenses, brought in reinforcements, and gave command to Jones.

Early on the morning of 6 December, the Federal forces came ashore in two separate landings on Gregorie's Neck. Once ashore, the Federals moved inland. To stop the attack, Jones ordered the Confederates at Coosawhatchie to counterattack in force, but the entire Confederate front collapsed. For once, the Federals pressed on, seized the roadway, and then, running out of ammunition, stopped and entrenched at an area known as Tullifinny crossroads (Wise 2000: 46–47). Jones was outraged by the failure and counterattacked the next day. The movement started well, but support troops failed to materialize. Without support, Jones called off the attack, and his men retired to their fortifications at Coosawhatchie, the Tullifinny trestle, and along the railroad. The two sides began an artillery duel, the Union attempting to disrupt rail traffic between Charleston and Savannah by using long-range siege guns to fire on enemy positions at Dawsons Landing and at the trestle over the Coosawhatchie River (*ORA* [XLVIV]: 438–448; Robinson 1950:54–57). As the two sides dueled, on 10 December artillery fire was heard by Hatch's men in the direction of Savannah. Sherman had reached the sea.

Under pressure from Sherman and Hatch, the Confederates abandoned Savannah and moved their forces into South Carolina. Not only was Savannah evacuated but so, too, was the Beaufort District. The men guarding Hardeeville, Grahamville, Coosawhatchie, and Pocotaligo joined their comrades in retreating across the Combahee. While the retreat was in progress, Beauregard once again became the new overall commander of the Confederate district. With dwindling

forces, he attempted to rush reinforcements from the shattered Army of Tennessee to South Carolina. Time was running out for the Confederates, but slowly. Nearly a month passed as the Union Army remained in their works, while Sherman refitted his troops in Savannah in preparation for the final drive into South Carolina.

Finally on 15 January 1865, Sherman put his forces in motion. High water delayed his advance, but eventually the Federals drove the fragments of the Confederate forces before them as they pushed into the old Beaufort District from Savannah. The Confederate defenses fell. Sherman spent the next few days inspecting the evacuated Confederate works around Pocotaligo. He was surprised that they had been abandoned without a fight. He later wrote,

> All the country between Beaufort and Pocotaligo was easily defended by a small force; and why the enemy had allowed us to make a lodgement at Pocotaligo so easily I did not understand, unless it resulted from fear or ignorance ... . It was to me manifest that the soldiers and people of the South entertained an undue fear of our western men, and, like children, they had invented such ghostlike stories of our prowess in Georgia, that they were scared by their own inventions (Sherman 1892 [2]:240–243, 252–257).

More likely, there were just too few men to occupy the batteries, and, as had been proven time and again against a determined foe, the isolated batteries were easily overcome.

Strategic Analysis

Behind any successful campaign runs an effective system of supply and logistics. By holding onto the Charleston and Savannah railroad and protecting the land side of Savannah and Charleston from attack, the Confederates were able to keep open lines of communications and support that assisted them in maintaining their war effort. For a little over three years, the Southern defenders, manning an earthen defense line that stretched from the Edisto to the Savannah River, successfully guarded the vital railroad against Union invaders.

As detailed in the historic context, the Confederate defensive strategy for the protection of the Charleston to Savannah Railroad evolved as the war beyond southern coastal South Carolina intensified. Started by General Ripley, the earthworks were initially established to stop further incursions after the fall of Port Royal Sound. General Lee took these fortifications and designed them into a line of departure from which his troops could sally forth to counterattack the advancing enemy. This offensively oriented defensive strategy required a few fixed positions in combination with large numbers of defenders for punch and counterpunch. After Lee was transferred to Virginia, General Pemberton briefly retained Lee's concept of launching massive counterattacks against an invading enemy, but as troop strength was reduced, a new strategy had to be developed.

Though Pemberton began the development of a more fixed defense line, it was General Walker who was responsible for the construction of additional earthworks and the defensive strategy that went with them. Walker's entrenchments were not all built at once. They evolved over time as Walker added new fortifications as a result of continued depletion of his forces. His dedicated work resulted in a series of batteries and forts that effectively covered all potential attack routes against the railroad. Still, even in this weakened posture, the Confederates attempted to maintain a somewhat fluid defense, using interior lines of supply and maneuver. Walker also developed an overall strategic plan that made use of the very thing he was guarding. The mobility provided by the railroad gave Walker the ability to shift his troops to any point threatened by the enemy. Though only attacked twice, Walker was able to counter the Federal advances by utilizing his fortifications and the railroad. Later in the war, General Gilmer added his expertise to the region's defenses. Gilmer was especially sensitive to the area along the New and Savannah rivers. Under his direction, new works were built in this region. Walker's command was tied to the District of Georgia, but Gilmer's input was minimal when compared to Walker's accomplishments.

In late 1864, after Walker and Gilmer left the department, their lines were tested by renewed Federal attacks. To meet the strikes, the Confederates continued to use their fortifications and the railroad. At the same time, they added numerous field works and trench lines to the existing entrenchments. They stopped the Federals at both Honey Hill and Tullifinny. During the extended operations, the Northerners added their own entrenchments that created a far-ranging and

complex labyrinth of earthworks throughout the low country.

Any explanation of Confederate success must be tempered with the reality that the Union's grand Atlantic Coastal strategy was focused from the beginning on the establishment and protection of a base for the South Atlantic Blockading Squadron. Only later in the war was the army tasked with the capture of Charleston, South Carolina, and Savannah, Georgia. Cutting the link between them was never a high priority of the department commanders or the War Department. Port Royal Sound was not captured to cut the railroad link but, rather, as a base for blockaders and a defensible enclave that might serve as a staging area for campaigns against Charleston and Savannah. As with the Southern forces, events beyond South Carolina caused a continual weakening of Union forces in the region as the war progressed. Serious threats against the railroad were not mounted until late in 1864, when the siege of Charleston had stagnated and Sherman was on the march through Georgia. Thus the Confederates successfully defended the railroad from the sea throughout the war by applying two basic principals of warfare, mass and economy of force. By using interior lines of communication and supply, Confederate strategists were able to mass their meager forces rapidly and efficiently at the point of Union attack while maintaining an economy of force in areas not threatened. The Confederates also made excellent use of the local topography to maintain this economy of force.

Figure 2 depicts that portion of the study area where the Charleston to Savannah Railroad crosses both the Combahee River and the Coosawhatchie River. Roads, the railroad, and wetlands on Figure 2 are derived from modern GIS data maintained at the South Carolina Department of Natural Resources. Only those roads

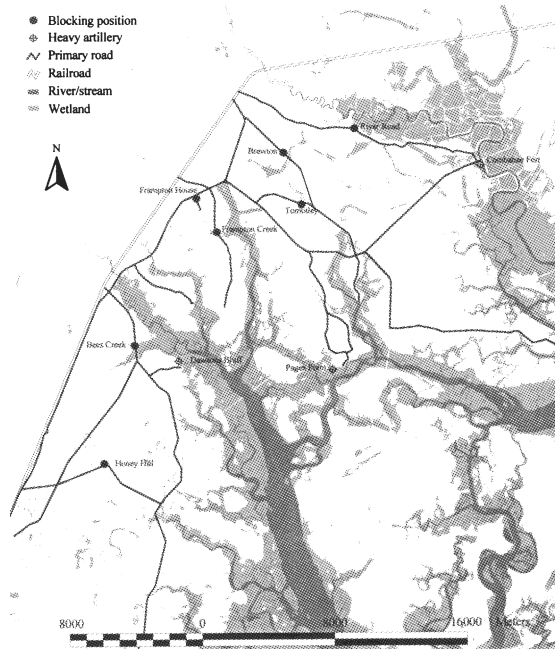

FIGURE 2. Confederate defensive positions in the Combahee River and Coosawhatchie River area (South Carolina Department of Natural Resources).

Tactical Analysis

The events in Beaufort and Jasper County from 1861 to 1865 reflect an evolving Confederate defensive strategy and tactical intent. The surviving earthworks in the study area offer a static picture of this evolution but one that is clearly illustrated through accurate mapping of earthwork locations, extent, character, and orientation. When combined with a context highlighting the geographic and military situation characterized by the defense, by a limited number of troops, of a long, linear feature (the railroad), and with numerous but identifiable approaches available to a highly mobile opposing force, the widely scattered Confederate defenses become part of a larger picture that is both clear and comprehensible.

that occur on Robert Mills's (1825) map of the Beaufort district and on early topographic maps (United States Geological Survey 1918a, 1918b; United States Army Corps of Engineers 1943) are depicted. Though navigation up either river to the railroad was difficult, Union forces could most closely approach the tracks using the rivers or Whale Branch as transportation routes. The Confederates countered this possibility by siting heavy artillery where it could bring fire on Union gunboats and troop ships advancing upriver. Combahee Fort on the Combahee, Pages Point on Whale Branch, and Dawsons Bluff on the Coosawhatchie, all command long reaches of their respective target watercourses, maximizing the time that Union forces could be brought under

fire. But to truly disrupt Confederate supplies, the railroad tracks needed to be torn up for a considerable length. It took troops to accomplish this task. Troop landings could only be effected at locations characterized by the juxtaposition of deep, navigable channels and dry ground. On Figure 2, such locations are suggested by areas where the darkly shaded rivers and streams abut unshaded portions of the map.

The juxtaposition of deep water and high ground was also the most advantageous location for plantations, which had to ship their crops to the market via waterways (South and Hartley 1980). The early overland transportation system developed largely within the plantation road system that led to river landings, so by the Civil War, many of the main roads accessed, either directly or indirectly, potential Union landing zones. The Confederate defenders were well aware of this but could not easily deny the enemy troops their landing zones in the face of accompanying gunboats. The tactic adopted by the Confederates was to establish blocking positions along the main roads leading from potential landing zones to the railroad. In siting these positions, the Confederates took advantage of the natural terrain features where possible by keeping low, swampy land to their immediate front and, thereby, limiting the ability of Union commanders to maneuver in the face of the enemy. The locations of works at Brewton, Frampton Creek, and Bees Creek (Figure 2) are clear examples.

These basic principles are clearly illustrated in the Battle of Honey Hill. When Union troops effected a landing in force at Boyds Landing on Boyds Creek, the Confederates rushed troops to their blocking position at Honey Hill (Figure 3 [Parapet widths in this and subsequent figures are not to scale]). This position sits atop a 25 ft. (7 m) escarpment overlooking a small, intermittent stream (Figure 4). Both geographic features limited Union maneuverability. The Honey Hill position was also strengthened, both during and after the battle. The works visible today at the southern end of the Confederate lines, where the blocking position was initially established, are much more massive than the other blocking positions located by the project. They are not complex, however, testament to the rapidity with which they were thrown up. During the course of the battle, as more Confederate troops

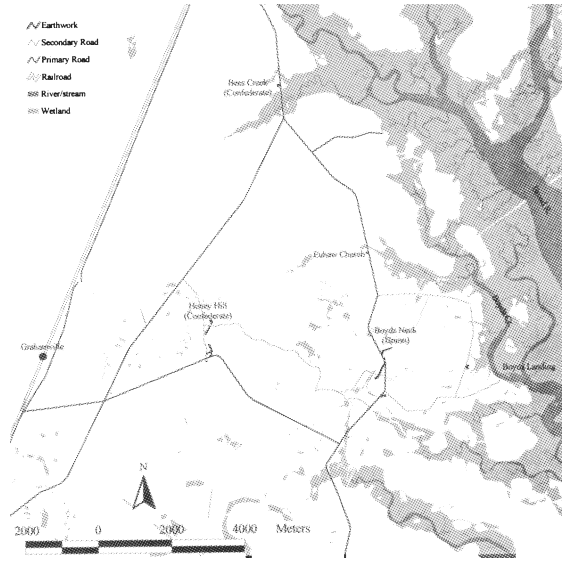

FIGURE 3. Confederate and Union earthworks at the Honey Hill battlefield (South Carolina Department of Natural Resources).

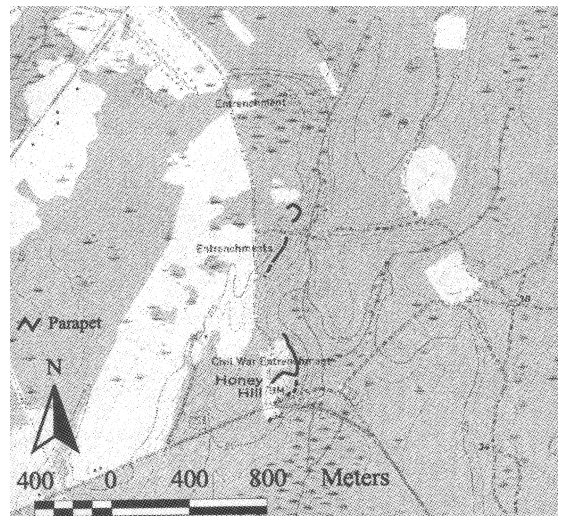

FIGURE 4. Confederate earthworks at Honey Hill overlaid on United States Geological Survey Quadrangle (USGS 1961).

became available, the lines were extended from the strong point on the main road, northward to cover an adjacent secondary road that would have allowed Union forces to flank the main works. Though these improvements have been greatly disturbed by continued land use, this extension

consists mainly of a line of infantry trenches and terminates in a second strong point where the secondary road crosses the line. A USGS topographic map shows additional earthworks further to the north (USGS 1961), but these could not be relocated. In any event, faced with a well-entrenched foe and repulsed in their efforts to storm the Honey Hill works, the Union forces retreated to Boyds Neck where they established a defensive perimeter before reorienting their attack towards landings at Gregories Neck.

Principles of Fortification

To better understand the extant remnants of Civil War earthworks in their historical context, we must reconstruct the past landscape and consider the military tactics of the times. The earthworks in the project area were not randomly placed nor constructed. Of all human behaviors, the art of war is perhaps the most ordered—fortification is but one clear example. The science of fortification advanced somewhat during the course of the war, but in reality the changes were merely refinements and local adaptations of the formal fortification practices established long before. The basic foundations of military engineering had been laid by Sebastien LePrestre de Vauban back in the early-18th century (de Vauban 1740). De Vauban's manual for siege craft and fortification became the bible for both the construction and reduction of 18th-century European fortifications. Largely due to very little change in the technology of warfare during this period, it remained the basic text into the early-19th century.

For Civil War engineers, many of whom were trained at West Point, several manuals appeared before or during the war to supplement and update the basics laid down by de Vauban. Foremost among many titles were D. H. Mahan's *A Treatise on Field Fortifications* (1836), and J. C. Duane's *Manual for Engineer Troops* (1864). There were others; however, according to Francis Lord, these two volumes were in "general use" (Lord 1960:41). Duane's section on the "Construction of Batteries" in his engineering book closely imitates Mahan's work, so a closer look at Mahan is sufficient.

Generally, the fortifications seen during this project were what Mahan called *redans*, *lunettes*, and *redoubts*. Redans are simply earthworks consisting of two faces (parapets) forming a point toward the enemy and an open rear called the gorge. According to Mahan, redans were used to defend an important position or point located behind it and could be constructed quickly with no great expertise needed. Lunettes are simply redans with an additional flanking face on each end of the primary face but still with an open gorge. Redoubts were closed fortifications and could come in many shapes, the simplest being a triangle or square. Mahan defines a battery as a collection of several guns, and (probably for that reason) by the time of the Civil War *battery* had come to be a generic term for just about any small fortification—redan or lunette. Duane, for instance, defines a battery as "any position prepared for the reception of artillery in such a matter as to cover the pieces and cannoneers from enemy fire" (Duane 1864:241).

While command may be an art, a glance at Mahan will quickly confirm that fortification was a science. Mahan goes into great detail regarding the construction of fortifications, even to the point of suggesting the number of men, their positions, and the distance a man could, on average, throw a shovel of dirt—two shovelers to one pick man, spaced 4.5 to 6 ft. apart, throwing dirt about 6 ft. To build a fortification like a redan, the first task was to find the best location. This part was indeed art based on experience but adhering to basic principles. For instance, the position should be located on ground higher than the surrounding landscape if at all possible. Allowing the enemy to get above you and fire down on your position is in violation of the basic military principle of controlling the high ground. Also the land in front of the position should have few dead zones or areas where the enemy could crawl into to escape fire from the battery. The ground in front of a position was often prepared by filling in low areas when time permitted in order that the defenders have good sweeping fields of fire. Mahan also suggested that positions be chosen to avoid giving the enemy flanking cover, such as woods, which would allow the enemy to close or surround the position rather than attack its front.

Once the position was chosen, the exact location of the centerline or crest of the battery was marked on the ground using a pick. At 20-ft. intervals along this line, another line of stakes was placed perpendicular to the line drawn by

the pick. On these stakes were placed wood or string to indicate to the laborer the profile of the battery. The basic profile consisted of (from front to rear) a ditch, berm, parapet, and on the interior perhaps ramps or platforms for the guns. The laborers (note the use of laborer rather than soldier, many of these batteries were built by slave labor) then stood in the area where the ditch was to be dug and began picking and throwing dirt to the area where the parapet would be created. Another laborer worked to ram the loose dirt down to form the parapet. Mahan suggested that the average man in average soils could dig about 6 cu. yd. per day. In order to be effective in stopping an enemy advance, the ditch had to be not less than 6 ft. in depth (1.8 m), and not less than 20-ft. wide (6.1 m) or out from the parapet (Mahan 1836:22). The parapet, too, had to be a certain height to be effective. It should not be less than 5 ft. high. In practice, 8-ft. height (2.4 m) was the suggested standard, and Mahan noted that it was impractical for laborers with pick and shovel only to construct a parapet greater than 12 ft. The thickness of the parapet is proscribed by the height of the parapet, the enemy face or scarp of which needs to be about 60° or better. Experiments with various caliber cannon balls and musket shot showed that, for instance, a 18-lb. cannon ball, fired at a range of 110 yd. could penetrate 6 ft. 6 in. into a compacted earthen embankment. A smoothbore musket ball penetrated about 10 in. at 60 yd. (Mahan 1861:19). As a general rule for all ranges, the parapet had to be about 3 to 4 ft. thick to be musket-proof or about 9 to 12 ft. thick (2.7 to 3.6 m) to stop a 12-lb. cannon ball (Wright 1982:20).

How do the batteries we recorded compare with these ideals? In terms of general shape, the isolated batteries we mapped do not fit the ideal Mahan redan, a triangular shaped, two-faced structure with open gorge, the angle formed by the two parapet faces at 60°. Many of our batteries were more crescent-shaped or rounded structures with wide fronts facing the enemy. Erosion and time may have rounded some of these works from their original shape—the sharp-angled shape of the classic redan. These wide fronts would have allowed more guns within the battery. Brewton (Figure 5) is an example, as are the second and third batteries at Fort Pocotaligo/Castle Hill, the River Road battery, and the Tomotley battery. The Tomotley battery has a single flanking face like an incomplete lunette.

Very well defined lunettes are seen at Boyd's Landing (Figure 6), built by the Union Army, and at Pocotaligo North. Combahee Fort, Mackey

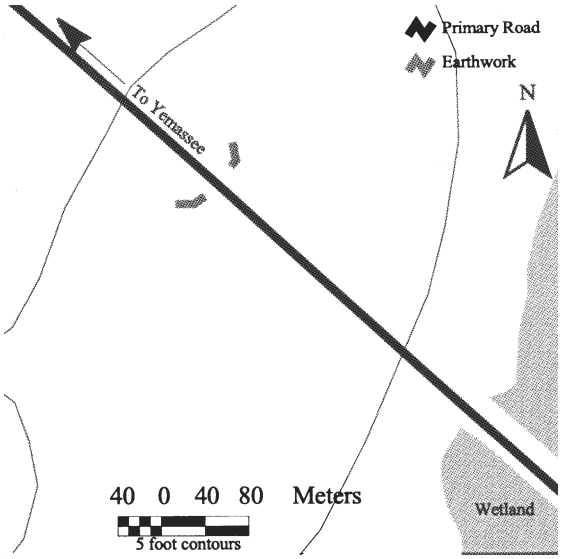

FIGURE 5. Brewton earthwork (South Carolina Department of Natural Resources).

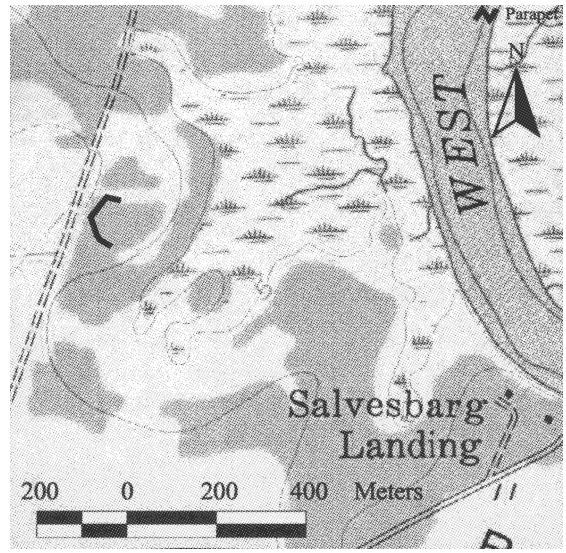

FIGURE 6. Boyds Landing earthwork (USGS 1962).

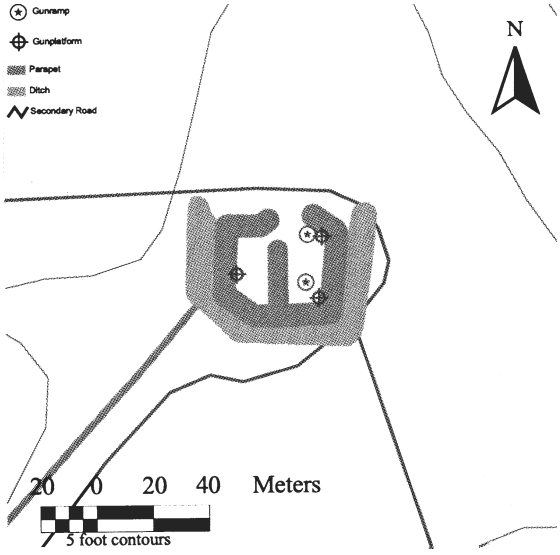

FIGURE 7. Mackey Point main battery earthwork (South Carolina Department of Natural Resources).

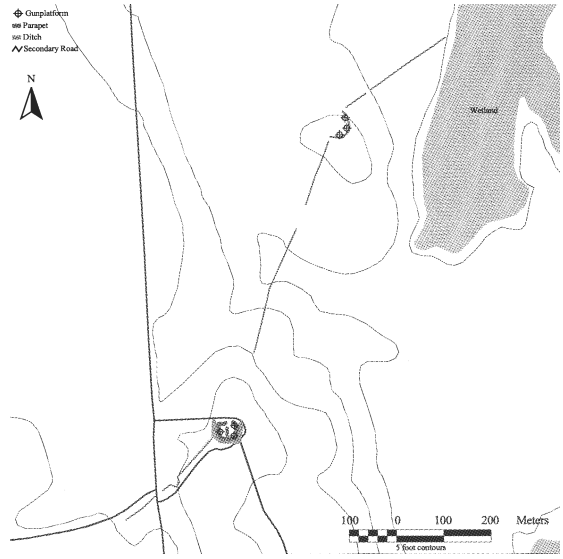

FIGURE 8. Overview of Mackey Point earthworks (South Carolina Department of Natural Resources).

Point main battery (Figure 7), and Dawsons Bluff are well-preserved examples of redoubts. The Mackey Point complex is especially interesting as, like Honey Hill, it provides a good example of a variety of fortifications and their use in defending a wide front (Figure 8). From its northern anchor along the edge of a wetland, an infantry trench line runs west-southwest to a large salient consisting of a rounded lunette. The infantry line then continues south-southeast to the main battery (the line interrupted by modern farm development). This main battery, a well-preserved redoubt with a central traverse, anchors the line, which from there turns again southwest and then gradually west. Along this final stretch is a salient shaped like a classic redan. Within a stretch of some 500 m, the three most common fortifications are exhibited, linked by an infantry trench.

Two fortifications stand out as unusual (at least as far as the batteries in this region go): the fortifications found at Honey Hill and at Delta Plantation. The Honey Hill works have already been discussed. Hardy's Camp on Delta Plantation is an enclosed camp covering some 12 acres (Figure 9). The parapet of this fortification is unique in its condition in that the parapet along the highway retains its original parallelogram-like shape with flat crest and sharp angles along the scarp, both front and rear. It is an impressive

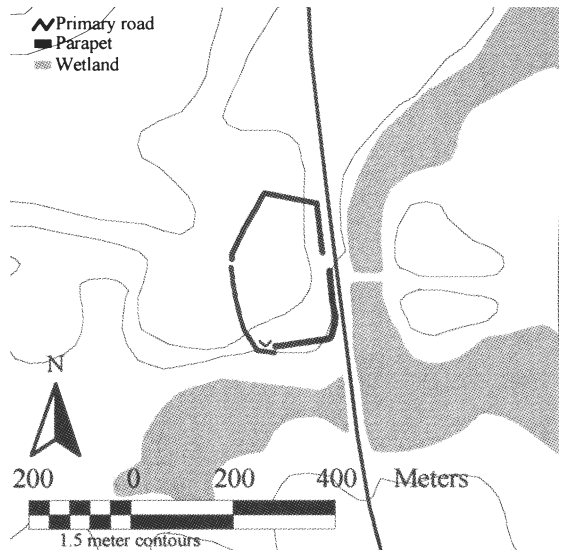

FIGURE 9. Delta Plantation (Hardy's Camp) earthwork (South Carolina Department of Natural Resources).

fortification but seems tactically unnecessary and overbuilt. It does show, however, that the designers were clearly following Mahan's engineering manual.

Following Mahan's manual or not, the parapets of many of the batteries, where they are in good shape, appear to be overbuilt for defense against mere field cannon. Some of this is due

to postwar erosion, causing the base of these batteries to widen. It is also possibly the result of experience with the increased velocity of Civil War ordinance over that of the 1830s. For instance, the second battery at Fort Pocotaligo/Castle Hill was 3 m high and 7 m wide at the base, likewise Hardy's Camp parapet was some 9 m wide, much more than necessary it would seem. Some redoubts along the river, like that at Dawsons bluff, Combahee Fort, and Page's Point were equally massive, though that would be expected to be the case as they might be attacked by heavy naval ordinance. Overall, it would appear that both the Confederate and Union armies adopted the basic principles of Mahan's and Duane's manuals but made necessary changes according to the needs of the tactical and practical situation.

Use of GPS and GIS in Reconstructing the Battlefield Landscape

What we see today across the interior Beaufort-Jasper County landscape is the end result of both a dynamic Confederate defensive strategy over an extended time period and short-term, intense efforts by the Union Army. Additionally, the defensive works of the Confederates were strengthened by expedient efforts when an attack was imminent. The Honey Hill battleground is a clear example. Sorting out the purpose of a fragmentary isolated battery today, all that exists of much more extensive works during the war, is very difficult. Adding to the confusion are inadequate and missing records. However, the greatest problem in understanding these complex and fragmentary positions is postwar landscape modification, particularly to the road network, combined with natural erosion of the works. In the field it was not always obvious why the location of a battery or position had been chosen. However, in looking at early-20th-century topographic maps, prepared before many wetlands had been drained and roads modified, their strategic locations made greater sense. This is an important, albeit basic, lesson that military sites archaeologists need to remember. Figure 10 depicts the works at Bees Creek. To the right, the works are overlain on an early 15-ft. quadrangle (United States Geological Survey [USGS] 1918a), while to the left the background is provided by a modern quadrangle (USGS 1988). Comparison of the two suggests that as late as 1918, the Bees Creek works were surrounded on all sides by low swampy ground, but by 1988 draining and filling had converted the landform into a small peninsula, approachable from the rear.

A second problem results from the scattered nature of the earthworks. Tying them together into a cogent interpretation was only possible

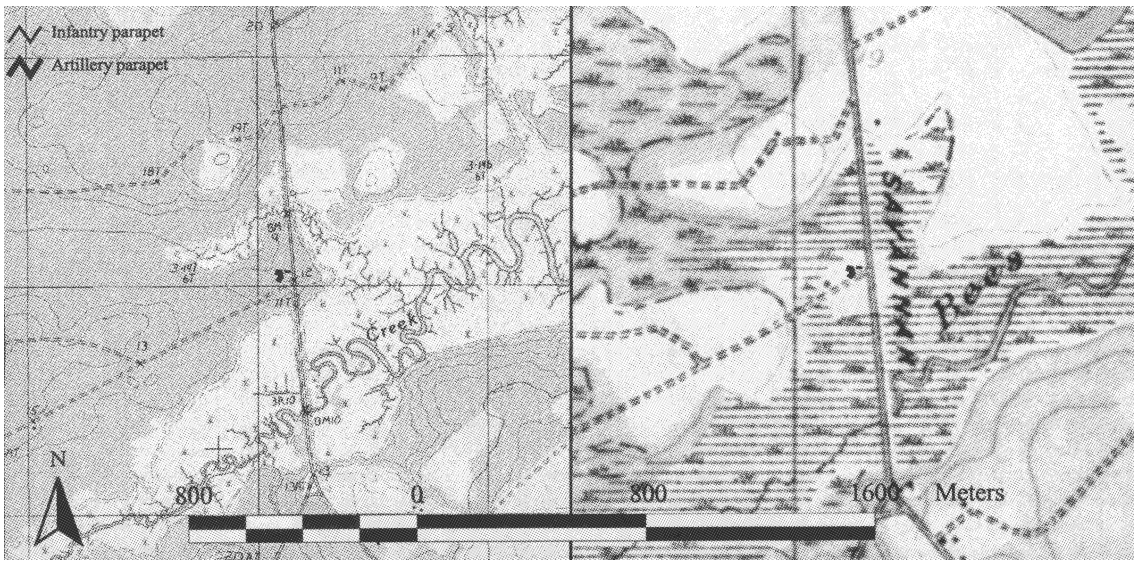

FIGURE 10. Setting of Bees Creek earthworks in 1918 and 1988 (USGS 1918a; 1988).

after detailed maps had been created and the historic context closely examined. In large part, it is the scattered and discontiguous character of the Beaufort-Jasper lines that has affected the public's interpretation. Earlier in this paper, it was stated that while these lines are known, for the most part they are viewed in isolation. Only within the larger picture provided by maps and context do their meaning and importance on both a tactical and strategic level become clear. A case in point is the lines at Euhaw Church (Figure 3). In the field, these were assumed to be Confederate lines and mapped as of "ditch in front" construction, meaning that the ditch from which the earth forming the parapet was taken faced the enemy. This seems counterintuitive because placing the ditch *behind* the parapet provides additional protection for sheltering troops. Only when the entire project area was mapped did it become apparent that the Euhaw Church lines are probably not of Confederate construction at all. Rather, more likely, they were built by Union troops in support of their main defensive works at Boyds Neck in the aftermath of the Battle of Honey Hill. In this context, both the position of the ditch as well as the location of the lines in relation to the small stream to the north make sense. The purpose of the lines at Euhaw Church was not to defend against Union attacks from the south but from Confederate counterattacks from the north.

The project clearly demonstrated that using GPS/GIS technology for mapping a complex system of batteries, forts, and lines is highly time effective and efficient. For fine-grained data recording of a single battery, a modern total-station may provide greater accuracy at a smaller recordation interval. GPS technology is (currently) very weak in the collection of topographic data for generating contour maps. However, it is unprecedented in its ability to collect locational data for earthworks and their larger features such as parapets, ramps, traverses, and embrasures. For planning and management purposes in the course of preservation, GPS technology provides the optimal method of collecting a large amount of data quickly.

Downloading the data into a GIS system and analyzing this data in conjunction with the historical record provides a useful method of battlefield analysis. This method is extremely simple and can be used universally at battlefields nationwide. In understanding the campaign in the defense of the Charleston to Savannah Railroad, the GIS system allowed researchers to sort through the numerous but scattered and fragmentary earthworks seen on the ground and to make sense of their strategic purpose and tactical design. For this project, then, the use of GPS and GIS technology has allowed archaeologists see more clearly, not only through the fog of war but also through the fog of time caused by human and natural landscape modifications.

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