CHAPTER 3
MOUTH OF SILVER GLEN RUN (8LA1-EAST)

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The large shell deposit that was located at the mouth of Silver Glen Run is listed in the Florida Master Site File as 8LA1. It was first noted by William Bartram in his 1766 travels through northeast Florida (Bartram 1942:44), and more than a century later by Jeffries Wyman (1875:38-39) and J. Francis LeBaron (1884:774). Wyman's account is the most detailed. The shellworks he described at the mouth of what was then called Silver Spring Creek were among "the most gigantic deposits of shells met with on the waters of the St. Johns" (Wyman 1875:38). He goes on to describe a massive U-shaped construction on the south side of the run:

> The one last mentioned is much the larger and consists of three portions forming as many sides of a hollow square. The first extending along the shore of the creek, near the mouth of which it has a height of from twenty to twenty-five feet by measurement; the second is on the shore of the lake, and measures from a hundred and fifty to two hundred feet in width, and the third extends inland at nearly right angles to this. Between these ridges is a deep valley, in which the shells are entirely wanting or are only sparingly found (Wyman 1875:39).

In addition to this description, Wyman made a simple sketch plan of the shellworks during his visit (Figure 3-1), although it was never published. Asa Randall located the sketch in his review of Wyman's field notes, curated at the Countway Library of Medicine at Harvard University. Even though it does not provide much detail, and cannot be taken as a literal rendering, the sketch at least corroborates the general shape of the deposit given in Wyman's description and thus provides a starting point for archaeological investigation.

Having been mined for shell in 1923, the U-shaped shellworks at the mouth of Silver Glen are no longer visible on the surface. Still, subsurface contexts and adjacent waters hold clues to the pre-mining configuration of the deposit. In fact, the east end of the deposit, fronting the lake, consists of exposed shell both on shore and along a submerged ridge a few tens of meters into the lake. Wyman (1875:39) described this submerged feature as a "beach wall," and rightfully attributed it to wave action that eroded the shell mound. Shoreline erosion has no doubt altered much of the site since Wyman's time, although most of its alteration can be attributed to mining activities. Despite massive alteration to the shoreline, we held out hope that three small islands at the mouth of the run were remnants of the original north ridge. Before the shell deposit was mined, the run was narrow at the mouth, as it remains today at its midpoint just northwest of the club house. Thus, the mining operation not only removed virtually all of the above ground shell, it also reconfigured the shoreline of the run and caused much of the basal portion of the north ridge to become submerged. Our testing on two of the three islands failed to locate intact deposits and suggested instead that shell miners emplaced shell in these locations, perhaps as part of a reclamation effort to maintain fish habitat or to subdue erosion of the mainland shore.

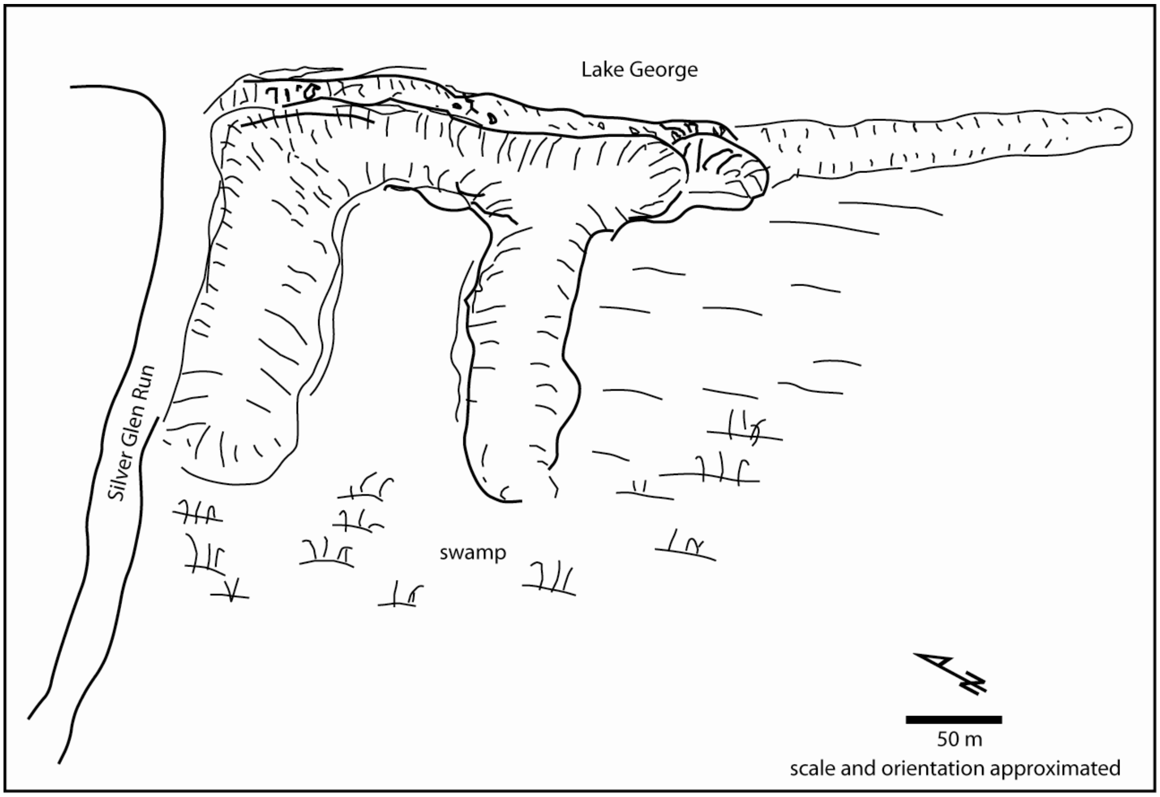

Figure 3-1. Digitized version of sketch map of U-shaped shellworks at 8LA1-East drawn by Jeffries Wyman, ca. 1875 (courtesy of Countway Library of Medicine, Harvard University, and Asa R. Randall).

Little more is known about 8LA1 except that it contained "an abundance of pottery," according to Wyman (1875:40). A large sample of sherds from this location is curated at the Florida Museum of Natural History in Gainesville. Among the sherds are many examples of Orange Incised, a pottery type that is among the oldest in Florida. Soot samples scraped from the surface of three Orange Incised sherds were submitted for radiocarbon dating in 2002 and returned conventional age estimates of 3680 ± 60, 4020 ± 60, and 4070 ± 60 radiocarbon years before present (rcybp) (Sassaman 2003a). The latter two age estimates are especially noteworthy because they are among the oldest ever recorded for the type. These estimates also provide a minimum age for the shell ridges, although given recent work elsewhere in the middle St. Johns region (e.g., Randall 2010; Sassaman 2003b; Randall and Sassaman 2005; Sassaman and Randall 2012), shell may have begun to accumulate as early as 7000 years ago. Nonetheless, 8LA1 is highly significant because it is one of only a few large shell deposits in the region with a sizeable Orange-period component.

Wyman and other early visitors to Silver Glen Run did not make mention of the shell ridge to the immediate west of the U-shaped shellworks and only passing mention of additional shell deposits in what we now refer to as 8LA1-West. As discussed in Chapter 4, there is no discernable break in the distribution of subsurface archaeological remains between the east and west portions of 8LA1. To facilitate communication about different components of the site, we refer to the area of the U-shaped shellworks as 8LA1-East and treat it as a subunit of a larger site for the purposes of this report.

The initial goal of archaeological investigations at 8LA1-East was to establish the distribution of subsurface remains across the entire landform through a program of augering. We were hopeful that enough of the base of the U-shaped deposit had survived mining to be detected simply by the presence of subsurface shell, and thus provide a means for inferring the original placement and orientation of the shellworks. In conjunction with augering, we began in 2007 a program of test unit excavation at the largest island in the run, as well as two locations in the presumed area of the south ridge. We doubled our efforts to locate remnants of the north ridge in 2008, but were largely unsuccessful. In 2010 we returned to 8LA1-East to continue testing in the area of the south ridge, this time in conjunction with Ground Penetrating Radar (GPR) and a program of close-interval coring. Although the results of GPR and coring showed promise for locating portions of a possible circular village, controlled excavations yielded ambiguous results. Nonetheless, the combined investigations of 2007-2010 at 8LA1-East confirm the presence of a large, U-shaped shellworks as described by Wyman, and provided enough evidence to suggest that the south ridge was emplaced on a natural surface by users of Orange pottery. Efforts to locate intact portions of the north ridge at 8LA1-East generally failed, although we hasten to add that so much of this deposit now lies below the watertable and is thus inaccessible without dewatering.

This chapter reports the methods and results of all archaeological investigations at 8LA1-East conducted by the St. Johns Archaeological Field Schools of 2007-2010, beginning with the establishment of a site-wide grid.

SITE-WIDE GRID

In 2007, the first year of investigation, a site-wide grid was established to provide horizontal and vertical spatial controls for all aspects of fieldwork. An arbitrary datum was set about 20 m east of the southeast corner of the deck of the clubhouse. Designated Datum A, this point of reference was assigned an arbitrary northing of 1000.00 m and an easting of 1000.00 m, with an arbitrary elevation of 10.00 m. A 4-ft long section of ¾-inch galvanized electrical conduit was driven into the ground at this location, eventually pushed in flush with the ground surface to prevent being dislodged. From this datum a cloth tape was pulled eastward across the lawn to a location near the bank of the easternmost pond and at 135.5 m a second section of conduit was driven into the ground to establish Datum B (N1000.00 E1135.50). A Nikon DTM-310 Total Station was used at Datum A to verify the taped distance to Datum B and to establish its elevation as 9.40 m.

With this baseline established, the Total Station was used to collect data for topographic mapping and, over the course of multiyear investigations, to determine the coordinates of all subsurface tests, surface finds, and various points of reference. In due course, the grid system at 8LA1-East was extended via Total Station to 8LA1-West, where pairs of permanent data were established at Loci A and B. The acquisition of

LiDAR data in 2008 obviated the need to collect Total Station data for surface topography, and the use of high-resolution GPS data alleviated the need to locate all shovel tests, auger holes, and surface finds with the Total Station. However, all excavation units across all areas of 8LA1 were sited with the Total Station, which was likewise used to maintain three-dimensional controls for many of the point-plotted artifacts uncovered in the 2009 block excavation at Locus B.

AUGER SURVEY

For the purpose of acquiring extensive subsurface data from the full extent of 8LA1-East, a series of augers were initiated in 2007 across the open terrain east and south of the clubhouse. Several augers were also sunk in the wooded area along the lakeshore, and on the largest of three islands (Island A) at the mouth the run. Two types of augers were used: a 6-cm diameter Dutch gouge auger with a maximum reach of 1.2 m, and a 10-cm diameter bucket auger with extensions capable of reaching ~4 m. Subsurface shell deposits and related strata across the expansive lawn could be adequately characterized with the gouge auger, but the bucket auger was required along the lakeshore, at the confluence of the run and the lake, and on Island A. The depth of shell deposits in these near-shore locations often exceeded 1.5 m in depth below the surface.

Transects for auger sampling were oriented parallel to the N1000 base line, spaced 20 m apart. Sampling along transects was conducted uniformly across all open terrain of 8LA1-East at an interval of 20 m (Figure 3-2). Sample points were determined by triangulating from baseline data with two cloth tapes. After a sample point was augered, its location was established within the site grid with the Total Station. All fill

Figure 3-2. Field school students sinking a Dutch gouge auger into subsoil of area east of the clubhouse, July 2007.

from augers was passed through ¼-inch hardware cloth and any recovered artifacts or vertebrate fauna were bagged and labeled by transect and auger numbers. Recorded for each auger were observations on the presence/absence of shell, the depth and condition of shell (crushed, whole, burned), and the presence/absence of nonshell midden.

The locations of 84 augers sunk in 2007 are displayed in Figure 3-3. As can be seen, sample coverage of 8LA1-East is biased toward the open, grassy portions of the site, and biased against its wooded and flooded portions to the east. The latter area is very difficult to traverse due to an abundance of downed trees, mostly the victims of tornadic winds associated with one of three hurricanes in 2004. To minimize this bias in coverage, we surveyed the wooded area for tree throws in 2010 using a GPS unit to record locations. These data do not include estimates of the depth of shell or other midden below the surface, merely observations on the presence/absence of shell. We will review these observations following discussion of the auger results.

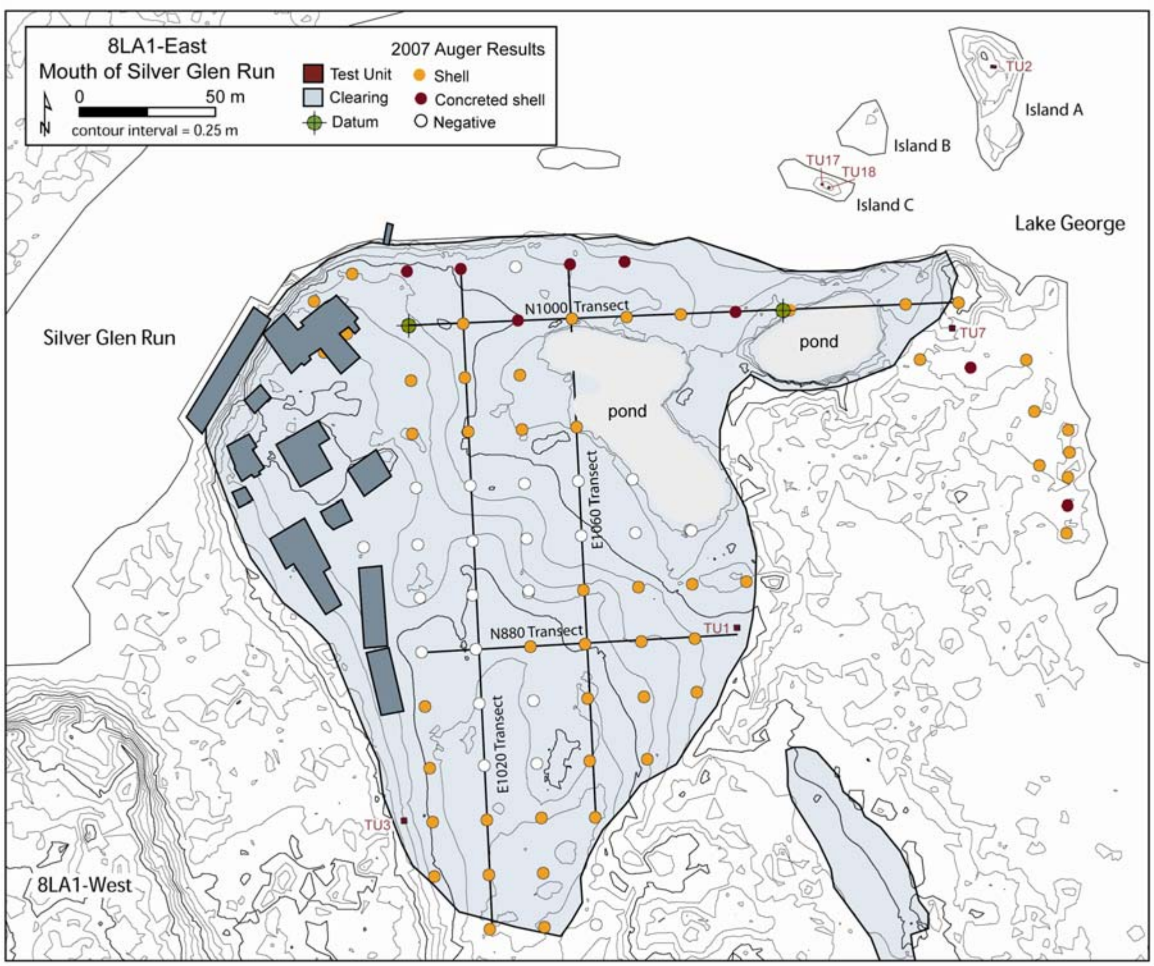

Figure 3-3. Topographic map of the 8LA1-East area showing locations of augers and test units excavated in 2007 and 2008 (refer to Figure 3-4 for cross-sectional views of auger transects).

Cross-sectional views of four transects of augers are provided in Figure 3-4. Starting with the northernmost cross-section (N1000 transect), we find a surface that slopes downward gently to the east before turning back upward at the end of the landform, essentially the point of land that marks the confluence of Silver Glen Run and Lake George. This high point of land at the east end, as we discuss further below, appears to be a product of mining operations, most likely a loading platform for barges used to haul away shell. Irrespective of this surface modification, shell depth increases from west to east, reaching roughly 2 m below surface and about 1 m below the water table on July 11, 2007. Two of the augers of this transect encountered concreted shell ~25 cm below the surface. Patches of concreted shell are evident at the surface just north of this transect, as well as in most of the augers that were placed along the shoreline of the spring run (Transect N1020).

Augers of the N1000 transect, as well as all augers north of this transect, penetrated shell matrix that ostensibly comprises the basal strata of the north ridge observed by Wyman. Because shell along the spring run is often concreted and well below the water table to the east, we suspect that most of this basal shell was actually deposited during the Mount Taylor era, long before the U-shaped configuration took shape after ca. 4200 years ago. If so, Orange-period shell deposition along the north ridge would have been grafted onto a ridge similar perhaps to Locus A of 8LA1-West (see Chapter 5).

A second west-east transect (N880) shown in Figure 3-4 likewise dips to the east gently, but here the subsurface shell is relatively thin (~50 cm BS) and its contact with underlying sand parallels the modern surface. We hasten to note that mining operations have altered all the surfaces shown in cross-section, making it impossible to estimate the contours of emplaced shell before 1923. The N880 transect is located in the presumed area of the south ridge observed by Wyman. As we will see below, shell along this transect was emplaced directly on an old ground surface by people who also deposited Orange fiber-tempered pottery, mostly plain, and dating from ca. 4050-3850 cal B.P. The lack of shell in augers at the west end of this transect may signify the terminus of the south ridge, although additional shell is found in augers to the south, well beyond the expected width of the south ridge.

Two north-south cross-sections in Figure 3-4 provide the best views of subsurface remains running perpendicular to the U-shape shellworks, showing clearly the area lacking shell in what should be the center of the deposit. Recall in the Wyman quote above that the center was “a deep valley, in which the shells are entirely wanting or are only sparingly found.” This area is hardly a “deep valley” today, given that shell was removed on either side to form relatively flat terrain. Because subsurface strata were so variable in composition and structure in many of the shell-free augers in this central location, much of the “valley” may consist of redeposited fill. Despite possible infilling, the cross-sectional views show clearly that shell to the south (on what is presumably the south ridge) was emplaced on higher terrain than shell to the north, along the spring run. As alluded to earlier, we suspect that the south ridge was added during the Orange period to an existing landscape of shellworks that included a Mount Taylor ridge along the

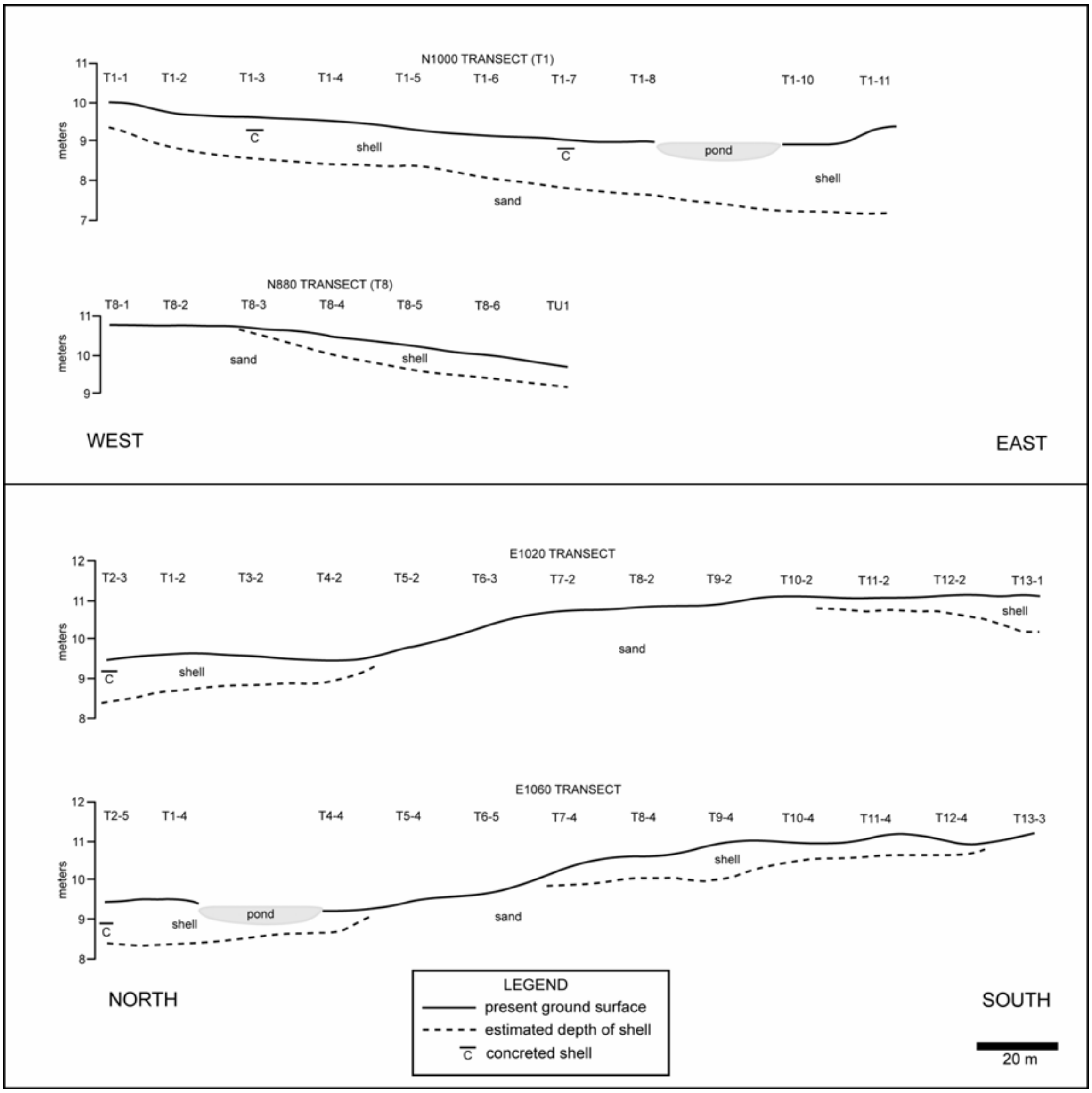

Figure 3-4. Cross-sectional views of two west-east auger transects (top) and two north-south transects showing surface topography, depth of shell, and presence of concreted shell. Vertical exaggeration x8.

spring run. Incidentally, both north-south transects in Figure 3-4 show concreted shell in augers directly adjacent to the spring run, again an indirect measure of the greater antiquity of shell in this location.

In sum, the results of augering enable the following conclusions: (1) shell deposits fronting Lake George are as much as 2.5 m in depth below the modern (mined) surface; (2) shell deposits fronting Silver Glen Run and Lake George contain numerous patches of concreted shell; (3) twenty-three augers lacking shell are concentrated in the south-central portion of open terrain; (4) additional shell deposits exist along the western margin of 8LA1-East, fronting a spring-fed swamp; (5) shell deposits in the purported location of the south ridge were placed on a low slope trending gently upward away from the run and lake; (6) significant archaeological deposits exist below the shell in several locations; (7) augers bearing shell in the presumptive center of the shellworks are among the most variable of the sample, and likely reflect considerable disturbance. On balance, the results of augering suggest that intact shell strata are deeply buried in the area of the north ridge and perhaps along the lakeshore, although most, if not all intact shell strata may be below the modern water table. To the extent this is the case, the challenge will be to determine what shell, if any, was deposited on formerly dry land (and thus of Mount Taylor age) and what shell was deposited in nearshore waters (and presumably of Orange age). A second challenge is to determine the configuration and disposition of shell deposits in the location of the south ridge. Augering shows that shell was emplaced on a slightly elevated landform, apparently directly on a ground surface lacking older midden deposits. Test unit excavations in 2007 and 2008 were designed expressly to address these two challenges.

TEST UNIT EXCAVATION: 2007-2008

Test unit excavations in 2007 and 2008 were designed to locate and sample intact subsurface shell deposits in the presumed locations of the north and south ridges of the U-shaped shellworks Wyman described in 1875. Test units in the area of the north ridge were largely unsuccessful in this effort, whereas those in the area of the south ridge were generally productive, albeit occasionally ambiguous. Our report of this testing begins with units placed on islands at the mouth of the spring run.

Islands at Mouth of Spring Run

The effort to locate intact shell deposits on the islands at the mouth of Silver Glen Run began in 2007 with a single 1 x 2-m test unit on the largest of the three, Island A. The lack of success in this effort redirected our interest back towards the mainland, although a fallen tree at the west end of Island C offered hope that the smallest of the three islands and most proximate to the mainland, retained a bit of intact shell mound. In 2008 we conducted limited testing on Island C to find that it too consisted of redeposited fill left by mining operations.

Test Unit 2. A single 1 x 2-m excavation unit was placed in the center of Island A in an attempt to locate an intact portion of the north ridge. Island A, like its counterparts upstream in Silver Glen Run, was formed by the mining of shell in 1923. Presumably, before 1923, Island A was part of the northeast corner of the U-shaped shellworks. The island today consists entirely of shell, with surface exposures of whole, unconsolidated *Viviparus* interspersed with patches of crushed shell. Little soil development has taken place on the island due to the limited time since the island was formed 85 years ago.

Test Unit 2 (hereafter TU2) was sited in the center of the island, at the topographic high of ca. 9.75 m, where a bucket auger placed one-half meter to the south revealed continuous shell deposits from immediately below the surface to at least 150 cm below surface. The water table was encountered in this auger at ca. 85-90 cm below the surface (8.79-8.74 m). Shoreline water level at the time the island was mapped measured approximately 8.75 m, consistent with the observed water table in the auger.

TU2 was excavated in 10-cm arbitrary levels using the ground surface at the southwest corner for a local datum (Figure 3-5). The upper three levels were dominated by modern refuse, notably construction materials such as wall plaster, wire nails, and window glass. Island A today, and apparently since its formation, is the recipient of all sorts of modern refuse. Bottles and cans, fishing tackle, and miscellaneous trash are routinely deposited on the island today by water and passers-by, but earlier last century the island also received sizable dumps of debris from mainland activities.

Augering before test excavations commenced suggested that shell deposits below about 30 cm were undisturbed and varied from whole, unconsolidated shell, mostly *Viviparus*, to lenses of finely crushed shell. Shell matrix was removed in zones defined with successive levels, although after Level C, it became apparent that shell was laid down in cross-bedded strata, suggesting fluvial reworking of the deposits. Two other observations supported this conclusion. First, alternating whole and crushed shell strata were both thoroughly winnowed of sediment and sorted into discrete depositional units. Second, recovered sherds and vertebrate faunal remains showed an advanced degree of water erosion. Photographs and line drawings of all four profiles of TU are given in Figures 3-6 through 3-8, and Table 3-1 provides descriptions of each stratum.

Figure 3-5. Excavation of Test Unit 2 in the center of Island A, 8LA1-East.

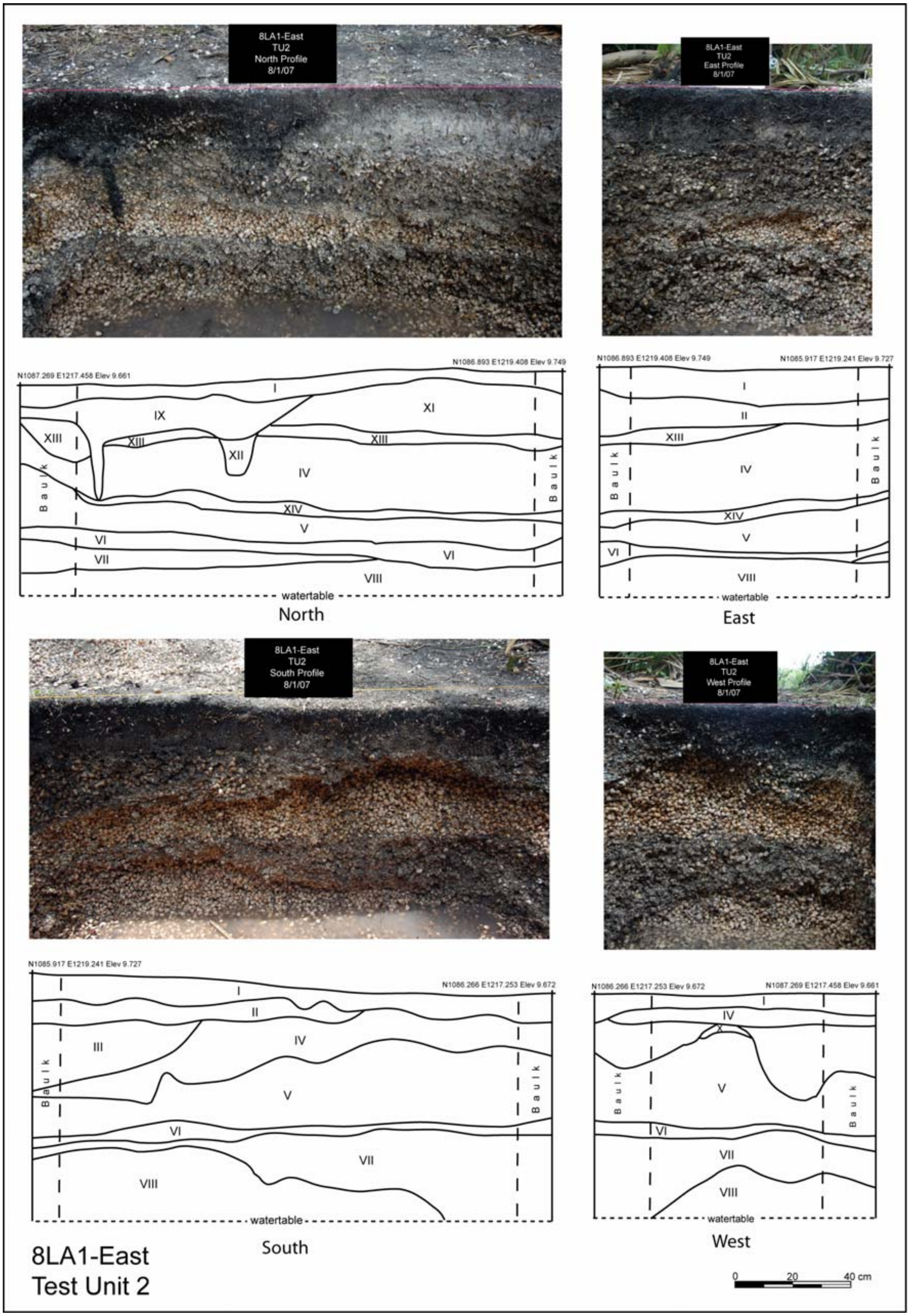

Figure 3-6. Photograph and line drawing of south profile of Test Unit 2, 8LA1-East.

Table 3-1. Stratigraphic Units of Test Unit 2, 8LA1-East

Stratum	Max. Depth (cm BS)	Munsell Color	Description
I	15	10YR2/1	black, very fine sand surface humus with rootlets
II	24	10YR4/2	dark grayish brown fine-medium sand with light grey (10YR7/1) fine sand mottles and traces of *Viviparus* shell
III	41	10YR3/1	whole *Viviparus* shell in very dark gray fine sand with clayey texture (possibly degraded shell)
IV	49	n/a	whole and crushed *Viviparus* shell lacking clastic matrix (grades horizontally into Stratum III in east corner of south profile)
V	63	n/a	whole, unconsolidated *Viviparus* shell with trace of Unionid shell and occasional iron staining, lacking clastic matrix
VI	71	n/a	crushed *Viviparus* and Unionid shell lacking clastic matrix
VII	79+	n/a	whole and crushed *Viviparus* shell lacking clastic matrix
VIII	86+	10YR3/2	whole, unconsolidated *Viviparus* shell with trace of Unionid shell, lacking clastic matrix
IX	49	10YR3/1	very dark gray medium-coarse sand with historic-era refuse
X	20	10YR2/0	black coarse sand
XI	23	10YR6/2	light brownish gray fine sand with historic-era refuse (grades horizontally into Stratum II in west corner of north profile)
XII	33	10YR2/2	very dark brown fine sand with whole Viviparus
XIII	28	n/a	crushed *Viviparus* and Unionid shell lacking clastic matrix
XIV	53	n/a	crushed *Viviparus* and Unionid shell lacking clastic matrix

Table 3-2. Inventory of Artifacts, Vertebrate Fauna, and Miscellaneous Items Recovered from Level Excavation of Test Unit 2, 8LA1-East.

Level	Lithic Flake (n)	Lithic Flake (g)	Orange Sherd (n)	Orange Crumb Sherd (n)	St. Johns Sherd (n)	St. Johns Crumb Sherd (n)	St. Johns Ck. Stmp. Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)	Botani-cals (g)	Historic Artifacts (g)
A*								21	4.9		78.2
B	1	1.3	1					28	27.6		2026.7
C (Zone A)	1	0.6		2	1	4		57	17.4	0.1	15.1
C (Zone B)	1	0.2			1	1		48	9.5		10.7
D (Zone A)				16		9		77	17.5	0.6	1.3
D (Zone B)	1	0.3		5	1	3		36	11.1		
E	1	1.1	1	11		14		118	25.5	2.2	
F**			3	7	1	10		110	26.5		
G			1	3	2	33	1	58	22.2	0.2	
H								7	2		
I				1				1	0.6		
Profile Clean-up	1	1.1	3	3				9	7.21	0.2	
Total	6	4.6	9	48	6	74	1	570	172.0	3.3	2132.0

* plus one marine shell disk bead 0.4 g
** plus one piece of modified bone 0.3 g

As the profiles show, TU2 penetrated what appears to be redeposited shell matrix, presumably the result of shell mining. The integrity of profiles was compromised by the collapse of unconsolidated, whole shell strata, especially after encountering the watertable at ca. 85 cm below surface. Excavation ceased at this point but deeper strata were sampled by two 2-inch percussion cores driven well past the basal shell deposits and into underlying peat (see below). There is no indication in these profiles and the strata observed in cores below the watertable that Island A contains intact, undisturbed archaeological deposits.

The distribution of artifacts recovered from TU2 corroborate the inference that shell matrix in this location is redeposited (Table 3-2). Historic refuse so prevalent across the surface of the island extended well into shell strata of TU2. Artifacts deeper than ~35 cm below the surface were exclusively pre-Columbian in age, but the relative order of artifacts was inconsistent with chronologies established for the region. Notably, St. Johns sherds were more numerous than the (presumably) older Orange-period sherds in levels greater than 50 cm below surface. Whereas the relative age of these two wares is generally well known, they apparently overlapped for several centuries. However, a single sherd of St. Johns Check Stamped pottery in Level G (58-68 cmbd) attests to the reverse nature of stratigraphy in TU2. Check stamped St. Johns pottery is believed to post-date A.D. 750 (Milanich 1994:247). Another indication of disturbance to the strata in TU2 is that many of the sherds were waterworn, irrespective of type.

Test Units 17 and 18. During the 2007 field school, the author and various members of the staff occasionally inspected exposures along the shoreline of the mainland and island by jonboat to collect artifacts eroding from shell matrix. On one trip we inspected the root mass of a tree that had fallen at the west end of Island C. Contained in the root mass and the water immediately below were sherds of Orange Incised pottery, most of which are shown below in Figure 3-9. Other exposures on the islands and along the south shoreline of Silver Glen Run also produced Orange pottery, as well as sherds of the St. Johns tradition, but none compared to the density of Orange pottery in this fortuitous exposure. Hopeful that this reflected the existence of an intact portion on shell mound on Island C, we opened in 2008 two small test units (50 x 50-cm) in the narrow spine of land that constitutes this island (Figure 3-10). Located but a few meters apart, TUs 17 and 18 both produced good examples of both Orange Plain and Incised sherds (Figure 3-11) in a charcoal-rich dark sandy loam with shells of *Viviparus*, other aquatic snails, and occasional Unionids. Water was encountered in both units at about 60 cm below the surface. Percussion cores sunk in the base of both units provided good profiles of subaqueous matrix. Unfortunately, a radiocarbon assay on charcoal from the TU 18 core indicates that the entirety of Island C, like Island A, consists of redeposited fill (see section on cores below).

Shell Point

A third attempt to locate intact portions of the north ridge was made in 2008 with the excavation of a 2 x 2-m test unit on the high ground of Shell Point, just to the east of the clearing shown in Figure 3-3. Test Unit 7 (TU7) was sited just to the south of the

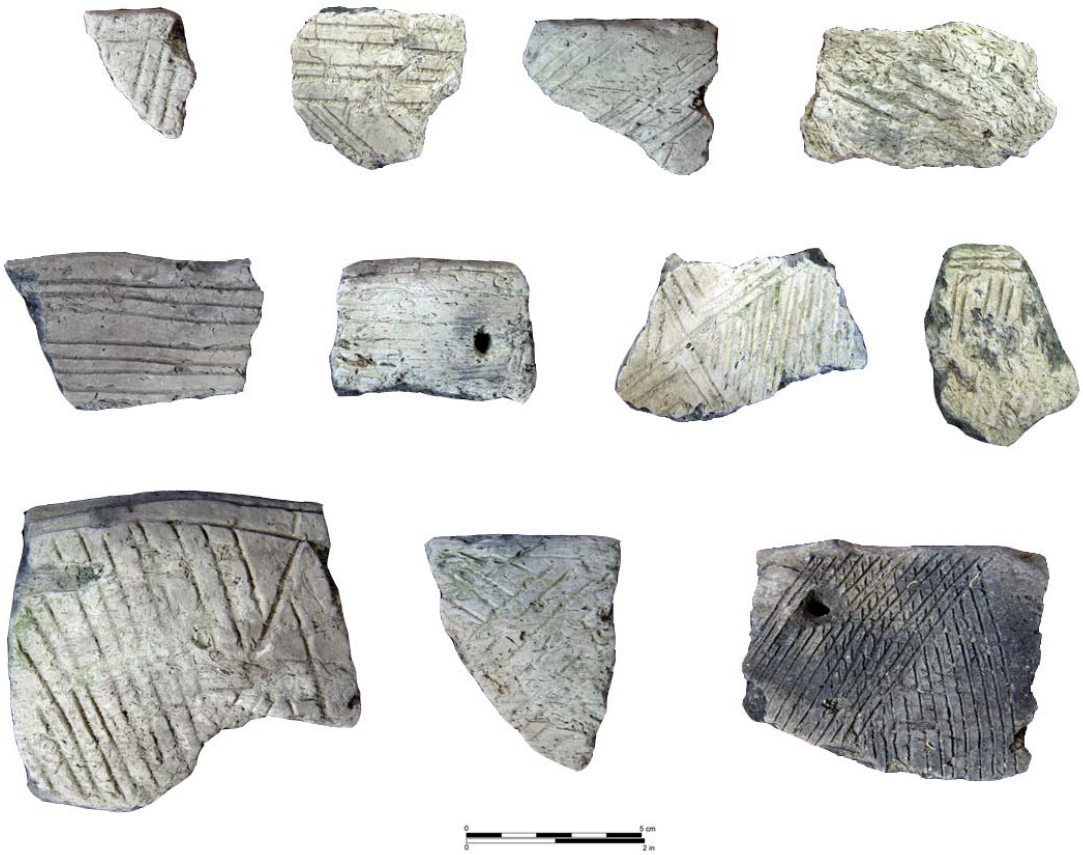

Figure 3-9. Examples of Orange Incised sherds recovered from a tree tip-up at the west end of Island C (Bag# 609).

easternmost auger hole along the N1000 transect, where subsurface shell extended well past the watertable, measured at ca. 110 cm below surface in July 2007. Before excavating TU7, a second sounding with a percussion core was inserted in the high ground of Shell Point, 0.5 m north of the aforementioned auger hole. Shell-rich matrix extended down nearly a meter below the watertable and rested on what appeared to be intact terrace sands.

Located about 10 m south of the core location at Shell Point, TU7 was excavated in the usual fashion of 10-cm arbitrary levels. After removing an upper level containing modern refuse, seemingly intact shell matrix was encountered in the south end of the unit. However, the next four levels produced a confusing array of matrices, some containing modern refuse (mostly metal fragments), as well as Orange plain pottery, chert flakes, and a limited amount of vertebrate fauna. Line drawings (Figure 3-12) and photographs (Figure 3-13) of the profiles show how discombobulated the matrices were. Groundwater was relatively high when TU7 was excavated in July 2008, preventing excavation deeper than ca. 80 cm below surface. Incidentally, seemingly intact shell matrix was observed near the bottom of the unit, labeled "Stratum XXXIX" in Figure 3-12 (note that

Figure 3-10. Extracting percussion core from bottom of Test Unit 17, Island C, 8LA1-East.

stratigraphic descriptions of strata in TU7 are not included in the usual table format given the lack of integrity; all such descriptions are available at the Laboratory of Southeastern Archaeology).

In an effort to extract materials from below the watertable, a 1 x 1-m plywood form was constructed to insert in the center of TU7. After repeated attempts to push the form into subaqueous matrix with heavy equipment, the plan was abandoned. In lieu of this strategy and some means of dewatering, only two levels could be removed from a 1 x 1-m subunit (TU7A) before matrix collapsed. Although stratigraphic controls were severely compromised at this depth, the subunit appears to have penetrated intact shell midden. Further consideration of intact matrix at Shell Point is reserved for discussion of percussion cores below.

Figure 3-11. Examples of Orange Plain (top row) and Orange Incised sherds recovered from two small test units (TU 17 and 18) on Island C.

Found throughout the redeposited fill of TU7 and into what appears to be intact matrix in TU7A, were sherds of Orange pottery (Table 3-3). Unlike those from the islands and along the spring run, however, sherds from TU were plain with one exception (Figure 3-14). Although many such sherds did not come from intact shell strata, the dominance of Orange Plain pottery in this general area corroborates the pattern seen in surface collections of the lake shore and testing along the south ridge. All three of these locations, in contrast to the spring run, have produced assemblages of almost exclusively Orange Plain pottery. Given what we know of the age of Orange Incised and Plain

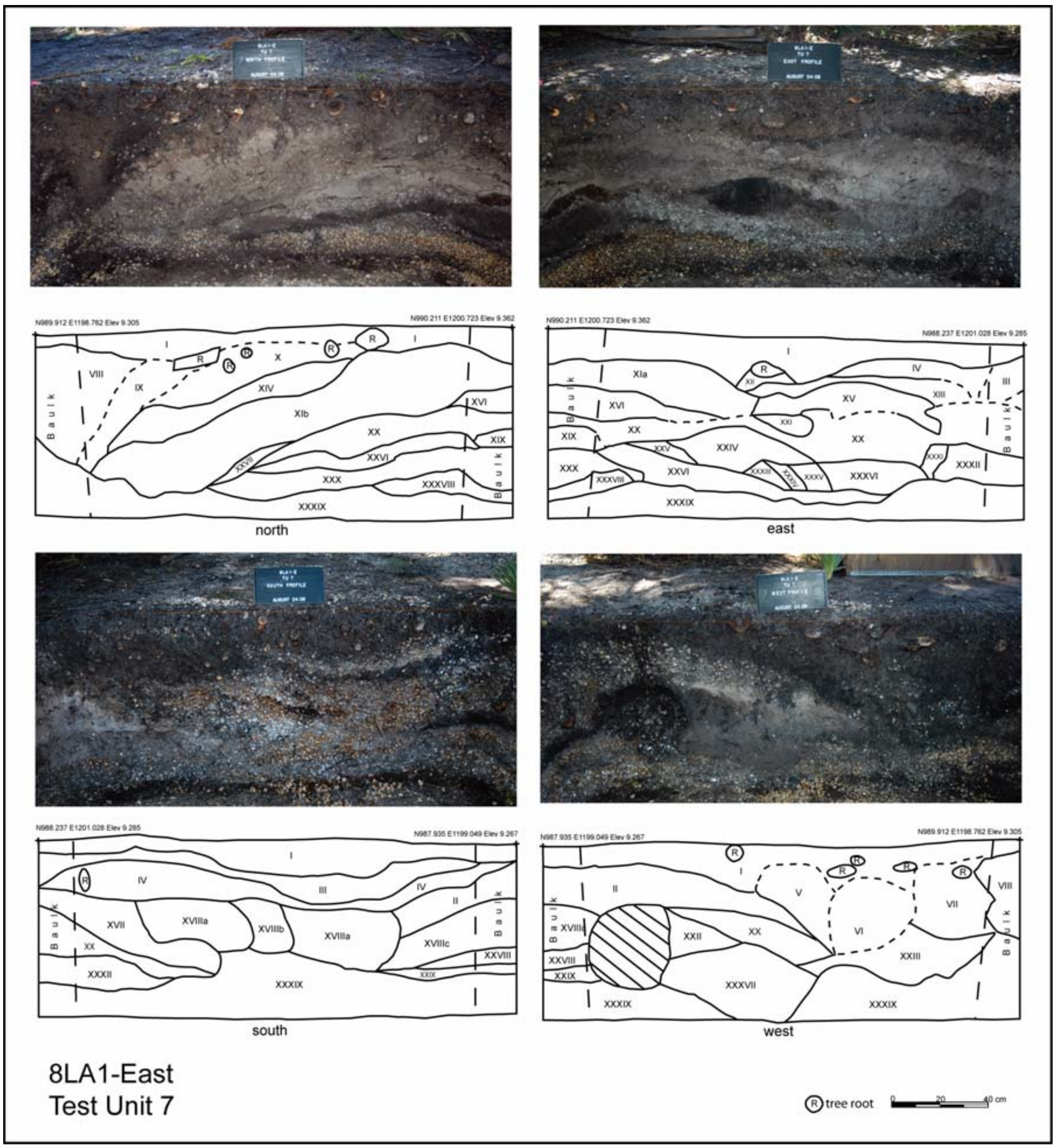

Figure 3-12. Photographs and line drawings of all profiles of Test Unit 7, 8LA1-East.

Table 3-3. Inventory of Artifacts, Vertebrate Fauna, and Miscellaneous Items Recovered from Level Excavation of Test Unit 7 and 7A, 8LA1-East.

Level	Lithic Flake (n)	Lithic Flake (g)	Modified Lithic (n)	Orange Plain Sherd (n)	Tick Island Incised Sherd (n)	Crumb Sherd (n)	Modified bone (n)	Vert. Fauna (n)	Vert. Fauna (g)	Historic Artifacts (g)
A								25	7.9	12.0
B	10	6.5		4		1		418	192.3	113.2
C*	11	8.4	1	2		4		805	271.2	26.1
D**	6	10.7	2	2		5	2	606	258.2	41.2
E***	3	1.6	1	7		6	1	373	141.1	
F	5	5.3		6		2		286	175.9	12.6
G	6	7.1	2	20	1			247	147.8	30.3
Profile Clean-up						4		55	27.1	0.4
7A-H				4		4		9	6.1	0.5
7A-I+				5		16		13	4.8	
Total	41	39.6	6	50	1	42	3	2837	1232.4	236.3

* plus one piece of groundstone
** plus 12 paleofeces, 12.8 g; 1 piece of miscellaneous rock, 12.7 g
*** plus 5 paleofeces, 12.8 g; 2 pieces of miscellaneous rock, 16.4 g
+ plus 0.2 g charcoal

Figure 3-14. Orange pottery sherds from Test Unit 7, 8LA1-East. All sherds in this sample are Orange Plain with exception of a single Tick Island Incised sherd (upper left).

pottery from the greater Silver Glen area, the emplacement of shell along the lake shore and the south ridge appears to be relatively late in the Orange sequence (i.e., post 3800 rcybp).

Percussion Cores at Shell Point and the Islands

Sampling of subaqueous deposits at Shell Point and on islands at the mouth of Silver Glen Run was enabled by the placement of several percussion cores. Coring was done by simply driving a 2-inch PVC pipe with a beveled edge into substrate with a sledge hammer. After reaching maximum depth, the PVC pipe was filled with water, capped with a rubber stopper, then extracted with a winch attached to a tripod. Cores were then split with a circular saw, photographed, mapped, and extracted for water processing through a #35 geological sieve. Annotated profiles of four cores are provided in Figure 3-15 through 3-18.

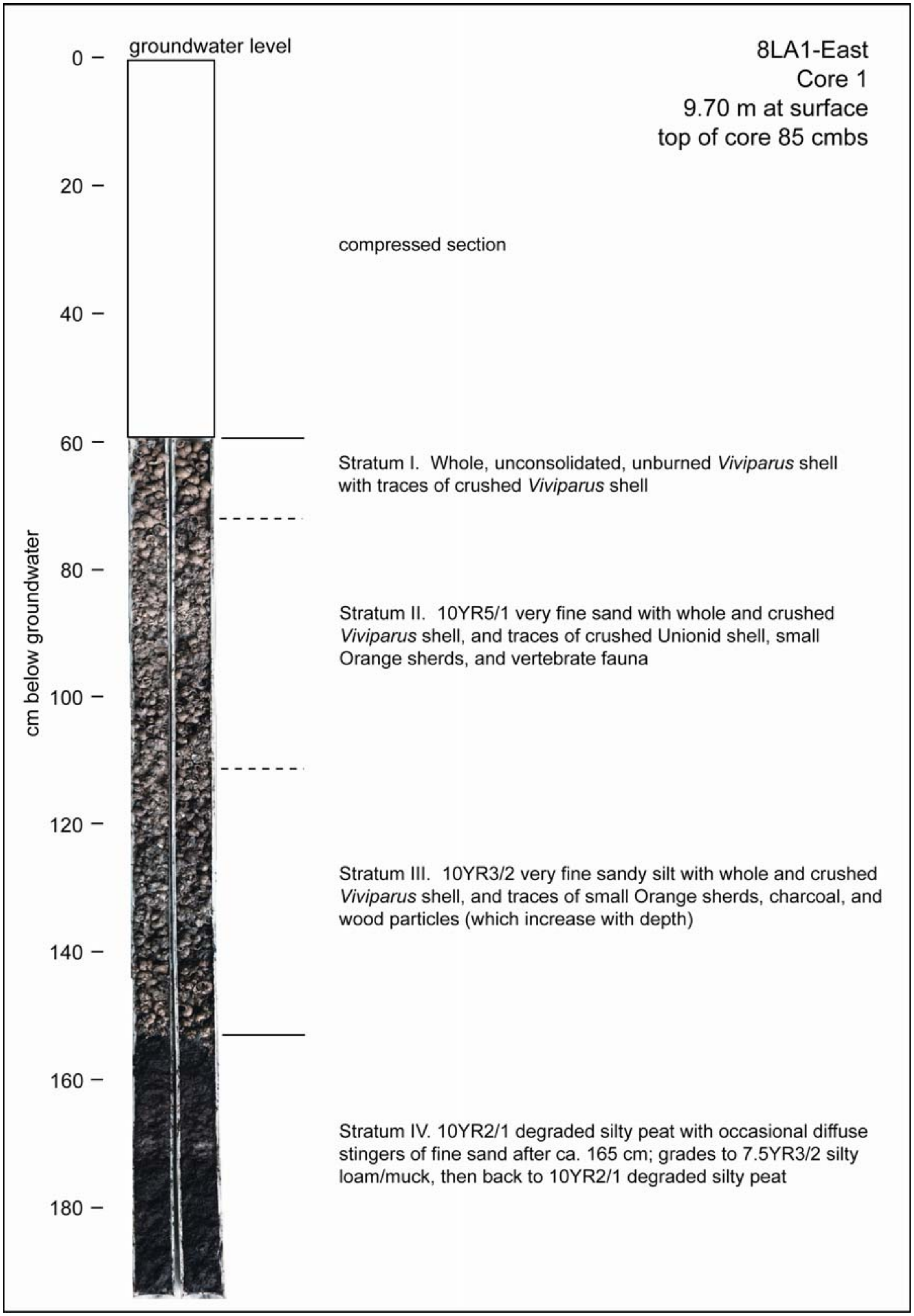

Figure 3-15. Split percussion core from Test Unit 2 on Island A, 8LA1-East.

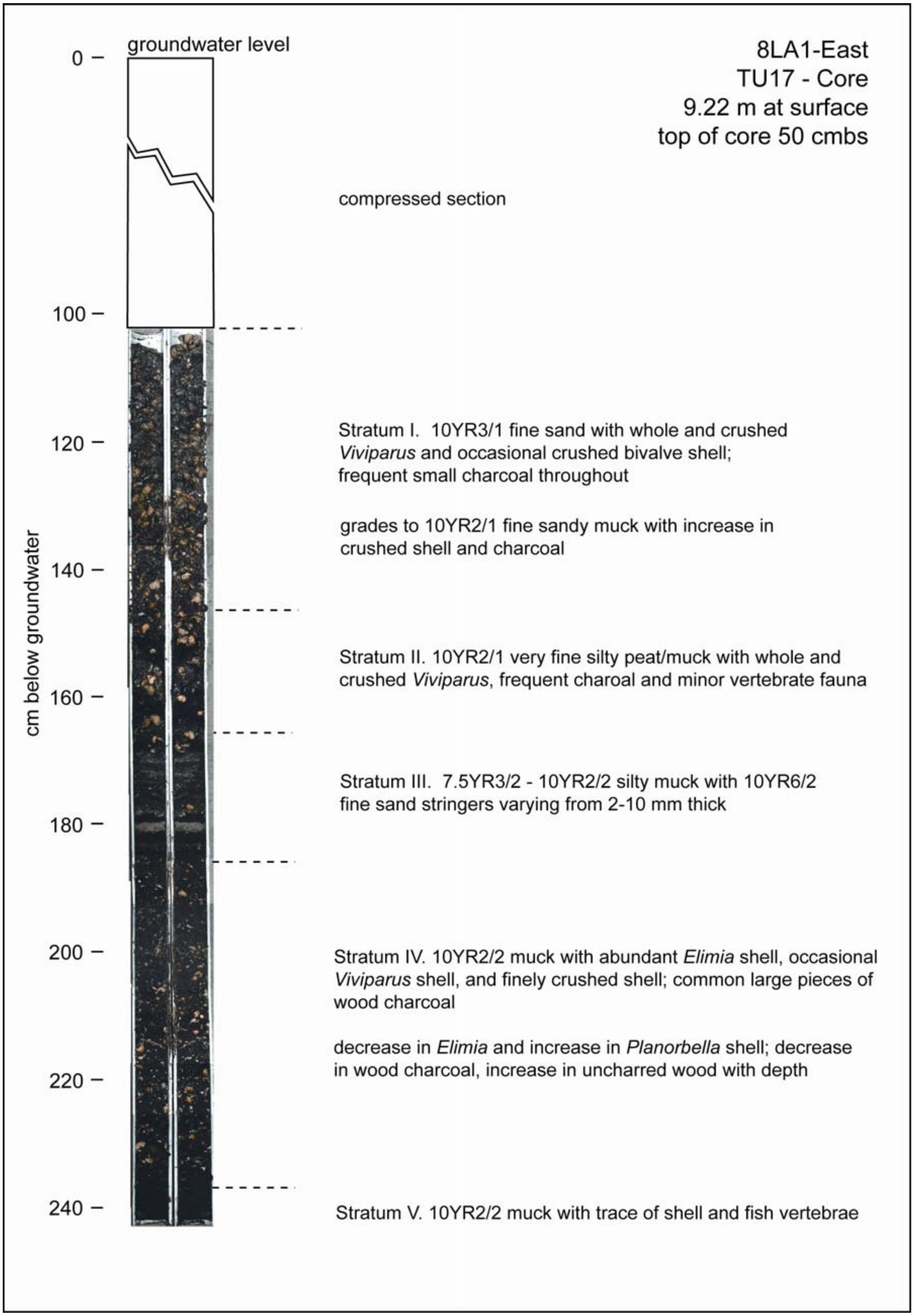

Figure 3-16. Split percussion core from Test Unit 17 on Island C, 8LA1-East.

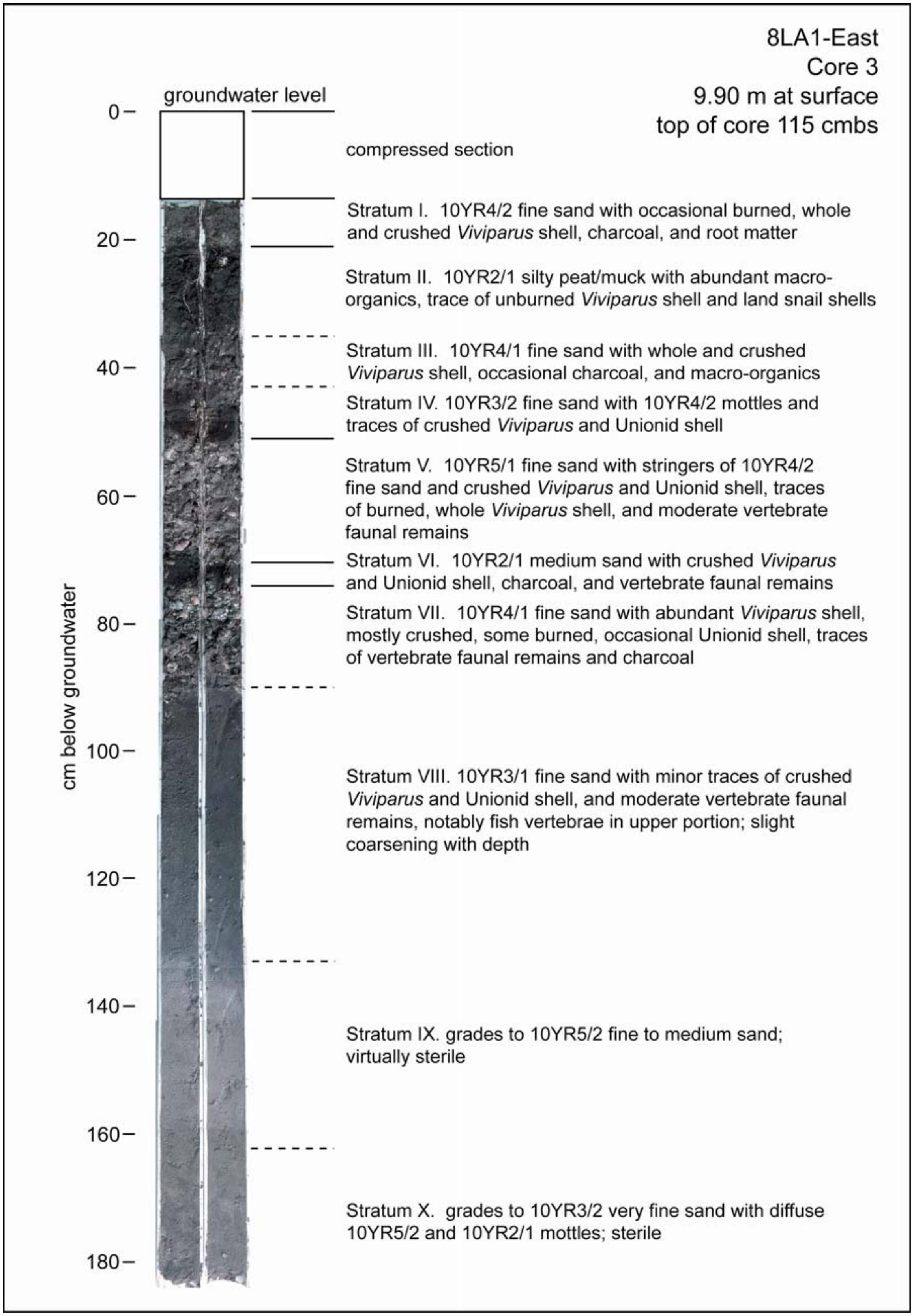

Figure 3-17. Split percussion core from shovel test near Auger 11-1, Shell Point, 8LA1-East.

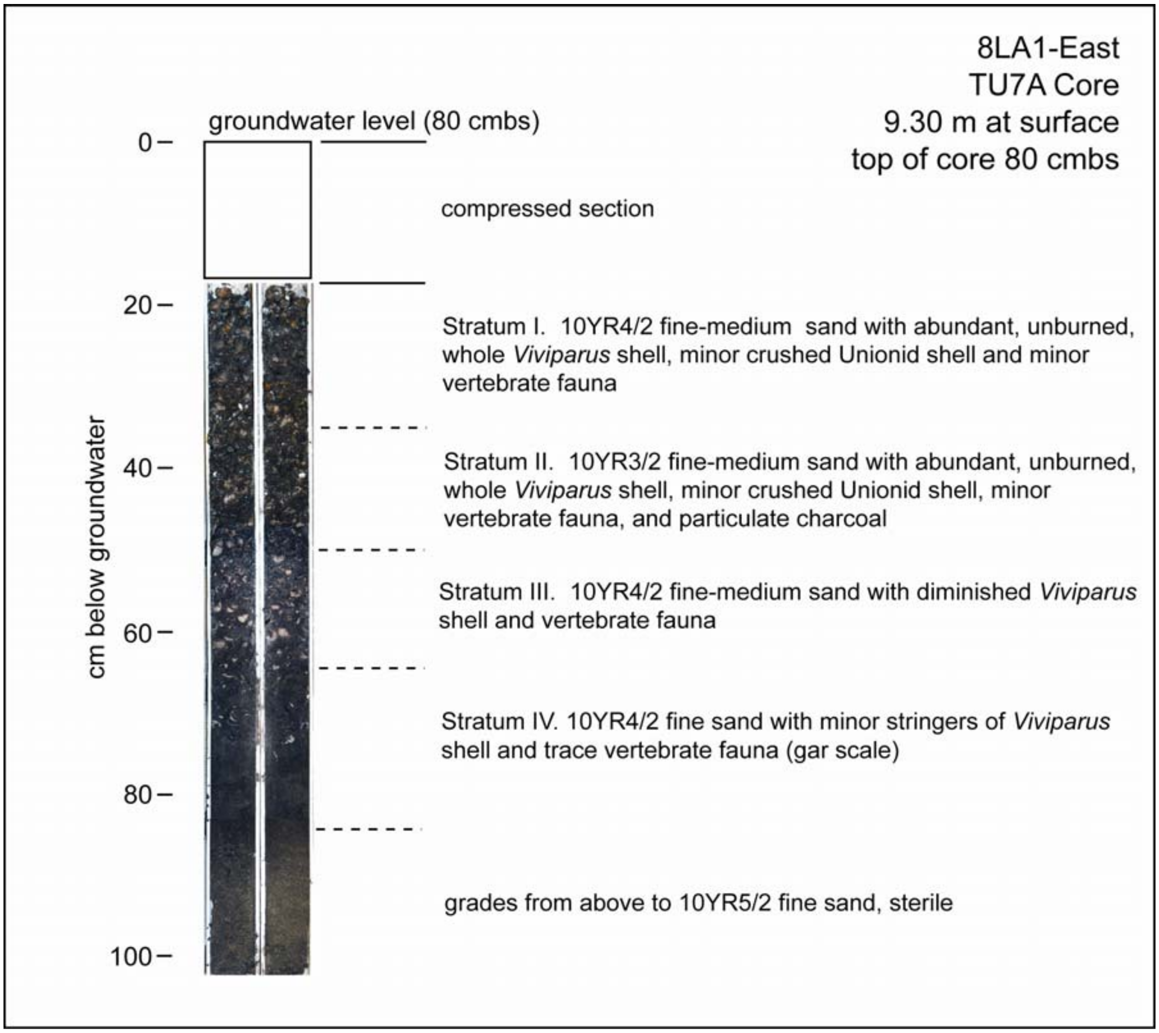

Figure 3-18. Split percussion core from Test Unit 7, Shell Point, 8LA1-East.

Cores sunk on islands at the mouth of Silver Glen Run extended at least 2 m below the watertable. One core (Core 1) in the base of TU2 on Island A (Figure 3-15) penetrated about 1.5 m of shell matrix overlying a degraded silty peat with diffuse stringers of fine sand. One AMS assay on the peat returned an age estimate of 1360 ± 40 B.P. (calibrated at two-sigma range to 1330-1260 B.P. or A.D. 620-690). It goes without saying that the Orange pottery recovered from shell-bearing levels overlying this peat must have been redeposited, presumably in the course of shell-mining operations, but certainly sometime after the thirteenth century B.P. We have no reason to doubt that the peat is autochthonous, but it is hard to reconcile its depth with a near-shore environment given such a late age. With so much landscape modification attending shell mining, as well as subsequent channel dredging, it is certainly possible that peat in this profile, like the overlying shell, was displaced and redeposited.

Two percussion cores were driven into the base of test units 17 and 18 on Island C. The one core profile shown in Figure 3-16 is representative of both cores. Unlike Core 1 on Island A, the Island C cores contained shell-bearing matrix to nearly the base, where shell-free black muck was encountered ca. 230 cm below the water level. Shell strata varied in composition and density but tended to be contained within a silty or very fine sandy muck or degraded peat with abundant charcoal. A 12- to 21-cm-thick stratum of sand stringers interrupted nearly continuous shell-bearing strata in both cores at ca. 170 cm below the water level. Orange Incised sherds were observed in the core of TU18 in shell strata at depths of 138 and 157 cm below the water level. Charcoal taken from the TU18 core at 200-228 cm below the water returned an AMS assay of 2440 ± 40 B.P. (calibrated at two-sigma range to 2710-2350 B.P. or B.C. 760-400). Given that this age estimate postdates the Orange pottery found above, the shell strata of this core evidently were redeposited much like the shell of Island A. However, it seems likely that below the sand stringers at ca. 170 cm shell strata are intact and undisturbed. If so, the age of this charcoal some 30-40 cm deeper suggest that the on-shore shell mound continued to accrete outward, into the spring run, well past the Orange period. The abundance of St. Johns pottery in the spring run to the west attests to intensive activity in the general area through at least 1200 B.P.

Cores driven into the onshore surface of Shell Point likewise penetrated thick shell strata well below the watertable. Core 3 at the east terminus of the N1000 auger transect also penetrated deeply into terrace sands beneath the shell (Figure 3-17). The contact between shell strata and sands is roughly 90 cm below the top of groundwater and some 205 cm below the present surface. Subaqueous shell in this core exists in alternating layers of sand and peat/muck with varying amounts of charcoal and vertebrate fauna. Like the subaerial shell strata of TU7, this varied sequence is likely the result of displacement and redeposition during shell mining. In fact, it would appear that the elevated landform of Shell Point was constructed during the mining operations, perhaps as a loading dock for barges to cart off shell via water. Given the redeposited shell is found today nearly one meter below the water level, miners must have dug deeply into the shell mound, perhaps even flooding the landform before backfilling and then building up a platform.

One final core placed in the bottom of TU7 likewise reached terrace sands at about 90 cm below the water, but here the shell strata above appear to be undisturbed (Figure 3-18). Lacking in ca. 90 cm of shell deposits overlying sand are any of the alternating strata observed in Core 3. Coupled with evidence for intact shell strata at the base of TU7, the subaqueous shell of this core provides some hope that basal anthropogenic deposits remain intact in at least a portion of the ridge connecting the north and south ridges of the U-shaped shellworks. It remains to be determined at a later date if these basal deposits were emplaced by people of the Orange period, or by their Mount Taylor predecessors. If the latter, shell was likely laid down on dry ground, when water levels were at least one meter lower than today. If, however, the basal shell was emplaced during the Orange period—as they seem to be along the south ridge (see below)—then they would have likely been deposited into the water's edge, meaning that the shell works would have prograded out towards the lake some 20-30 m since Orange times.

In sum, test excavations and coring at Shell Point and at two of the islands at the mouth of Silver Glen Run did not produce much evidence for intact archaeological deposits. Subaqueous deposits beneath TU7 appear to be intact, but elsewhere all shell appears to be displaced and redeposited, most likely during the 1923 mining operation. Figure 3-19 provides a schematic cross-section of the landform extending from Shell Point to Island A. The ancient land surface beneath shell is reasonably well documented at Shell Point some 2 m below the present surface and nearly 1 m below the watertable. We repeat that the elevated surface in this location is likely the result of shell-mining activity, specifically the creation of a loading platform for barges. All shell in the water and on the islands today appears to be redeposited. Given the age of peat on Island A and subaqueous shell beneath Island C, the original shellworks of 8LA1-east must have prograded outward into the run, and perhaps the lake, well past the Orange period. Unfortunatey, evidence of later activity has been thoroughly erased by mining. Small portions of basal shell of either Mount Taylor or Orange age await dewatering. In the meantime, remnants of the south ridge of 8LA1-East, residing on higher, drier ground, provide opportunity for documenting basal shell deposits.

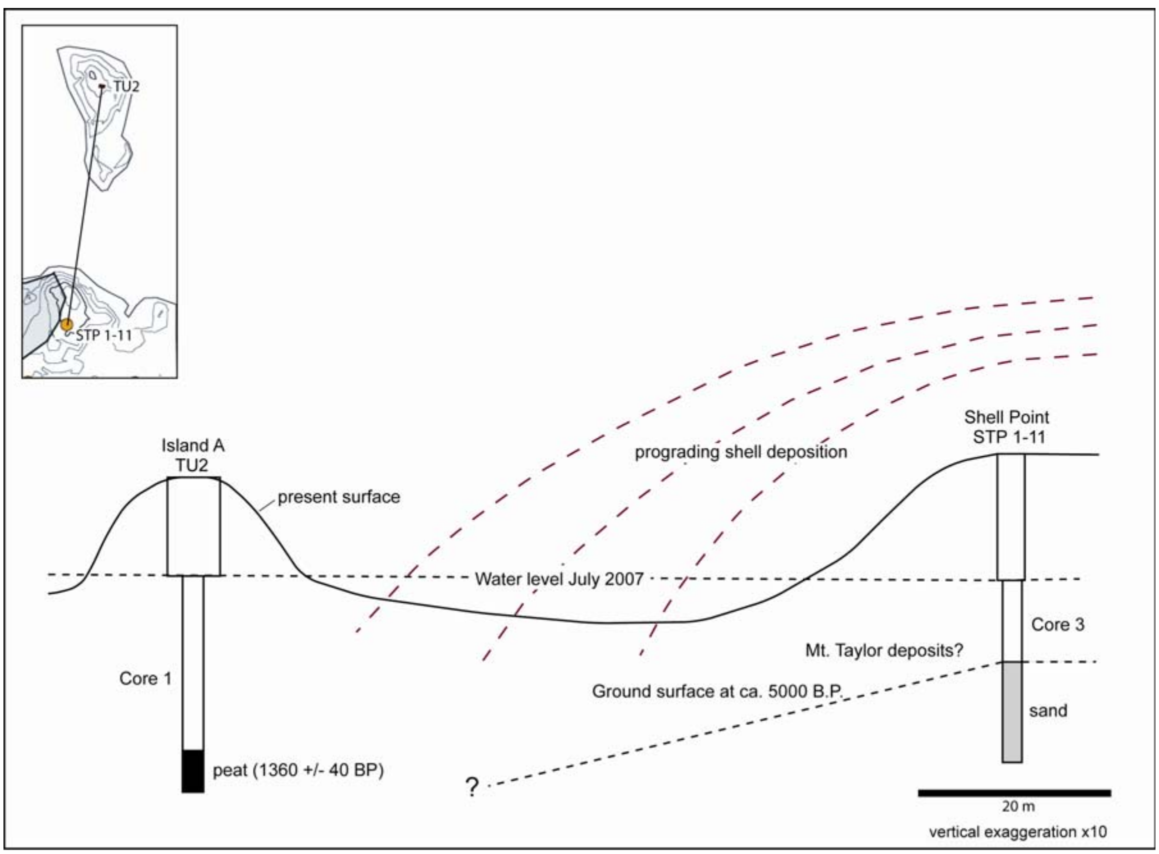

Figure 3-19. Schematic cross-section facing east of landform extending from Island A to Shell Point, 8LA1-East.

South Ridge

The results of augering reported earlier enabled an informed assessment of the likely location and orientation of the south ridge at 8LA1-East. Test Unit 1 was a 2 x 2-m unit placed in what was deemed to be the center of the south ridge, close to the present woods line east of the orange grove (Figure 3-3). A second 2 x 2-m unit, Test Unit 3, was sited on the far western edge of the clearing, where augering revealed subsurface shell in an area that was ostensibly to the west of the terminus of the south ridge (Figure 3-3). Both units were excavated in 10-cm arbitrary levels and all fill passed through ¼-inch hardware cloth.

Test Unit 1. Excavated in 2007, Test Unit 1 (TU1) revealed an intact profile of emplaced shell on a buried A horizon (i.e., old ground surface) overlying sterile, subsurface sands. As expected, the profile was truncated at the top by shell-mining, but other than some minor intrusive features dating to the modern era, the profile was in good shape and appears to represent a basal remnant of the south ridge. Figure 3-20 provides photographs and line drawings of all four walls, and Table 3-4 gives the descriptions of all strata recognized therein.

Generally whole, unconsolidated shell is concentrated in a single stratum (Stratum X) extending from beneath the surface stratum (Stratum I; plowzone?) to as much as 66 cm below surface. The upper portion of this shell was truncated by mining, so we have no basis for inferring its original thickness. We do, however, feel confident in the inference that this shell was placed directly on an ancient ground surface, one with a well-developed A horizon (Stratum III). Recall from earlier discussion of the results of augering that the south ridge appears to have been emplaced over a raised part of the landform, perhaps something akin to a river terrace. This apparent A horizon rests conformably on a mantle of white fine sand, the sterile substrate in this portion of the landform. In July 2007, then TU1 was excavated, the water table was encountered just beneath the maximum depth show in Figure 3-20, roughly 80 cm below surface.

Interrupting what is otherwise a simple profile are a few intrusive features, only one of which may be an intact aboriginal feature. Feature 1, in the northeast corner of the unit, is a large pit whose point of original was apparently truncated by mining (Figure 3-20). Recognized as a zone of alternating shell and organically-enriched sand, this ca. meter-wide pit was formally designated a feature at the base of Level F, ca. 60 cm below surface. The bottom of the pit appeared to be relatively flat, where dark gray sand with minor shell produced charcoal that returned an AMS assay of 3600 ± 40 B.P. (4060-4050 and 3990-3830 cal B.P.). Also recovered from the basal stratum of the pit were several sherds of Orange Plain pottery, examples of which are given in Figure 3-21. Otherwise, only trace amounts of vertebrate fauna were recovered from zones attributed to this feature. On balance, the evidence points to a bone fide Orange period pit feature similar to those found in abundance at 8LA1-West Locus B (see Chapter 6). However, the stratified fill of Feature 1 and apparent disturbance along its northern margins makes it difficult to judge the original form and function of this feature. At a minimum, we can

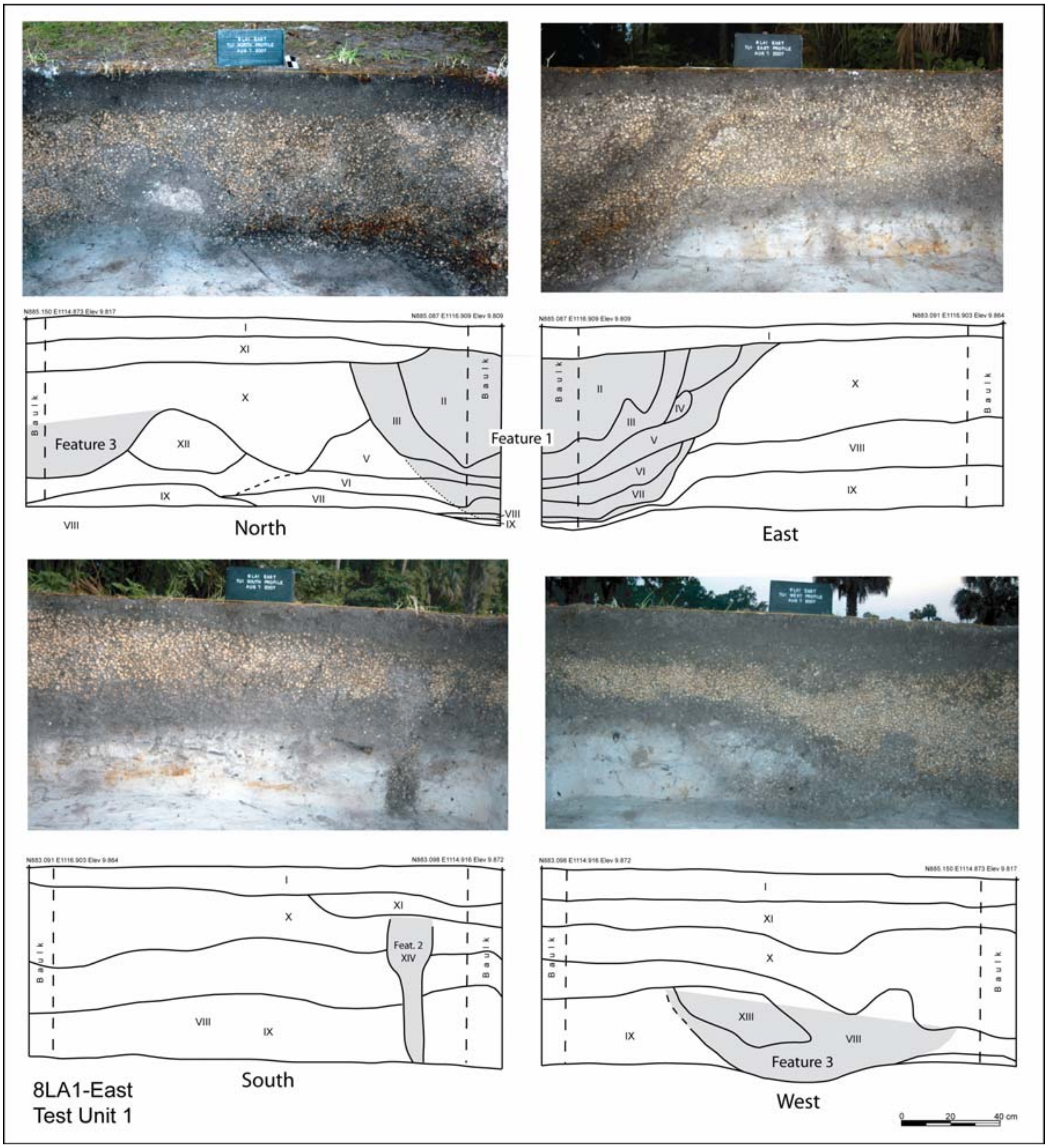

Figure 3-20. Photographs and line drawings of all profiles of Test Unit 1, 8LA1-East.

suggest that it was a relatively large pit that emanated from a surface well above the buried A horizon, and thus postdates the emplacement of shell on this old surface.

Feature 2, seen in the south profile of TU1, is an infilled posthole of the modern era, most likely a fence post (Figure 3-20). Its point of origin is clearly at or very near the modern ground surface.

Table 3-4. Stratigraphic Units of Test Unit 1, 8LA1-East

Stratum	Max. Depth (cm BS)	Munsell Color	Description
I	16	10YR3/1	very dark gray fine sand with root mat
II	58	10YR4/1	whole and crushed *Viviparus* shell in dark gray sand (Feature 1)
III	62	10YR2/1	whole *Viviparus* shell in black fine ashy sand (Feature 1)
IV	40	n/a	dense crushed shell (Feature 1)
V	67	n/a	whole *Viviparus* shell (Feature 1)
VI	76	n/a	organic and iron-stained *Viviparus* shell (Feature 1)
VII	79	7.5YR3/0	whole *Viviparus* shell in very dark gray medium-coarse sand (Feature 1; 3600 ± 40 B.P.)
VIII	88	10YR4/1	dark gray fine-medium sand with sparse whole *Viviparus* shell (buried A horizon)
IX	90+	7.5YR8/0	white fine sand with mottles throughout
X	66	10YR5/2	whole *Viviparus* shell in grayish brown sand
XI	32	10YR3/1	very dark gray fine sand with sparse whole and crushed *Viviparus* shell
XII	65	10YR7/2	light gray mineralized root
XIII	84	10YR4/1	dark gray clayey sand with whole *Viviparus* shell
XIV	82+	10YR6/1	gray fine sand with whole *Viviparus* shell (Feature 2; historic fence post)
XV	30	10YR5/2	whole *Viviparus* shell in grayish brown sand (Feature 1)

A third feature, Feature 3, was at first considered to a second large pit, but after completing the excavation, it seems more likely that this is the outcome of an intrusive disturbance involving either a burrowing animal or tree roots. The mineralized or concreted zone seen in the east profile of Figure 3-20 (Stratum XIII) recurs in other units of the south ridge area, specifically in places beneath thick shell strata. The plan area in the northwest corner of TU1 showed root or burrow casts, as well as numerous palm roots. However, the basal portions of this feature also produced more bivalve than in the overlying shell stratum, which was dominated by *Viviparus* shell. Incidentally, the large pit features of 8LA1-West Locus B contained a disproportionate frequency of bivalve

Figure 3-21. Examples of Orange Plain sherds from Test Unit 1, 8LA1-East.

shell compared to surface middens and other accumulations. It thus remains possible that Feature 3 is akin to Feature 1 and the Locus B pits, only badly disturbed.

The artifact inventory and associated vertebrate fauna from TU1 is rather meager (Table 3-5). A tapered stemmed hafted biface was recovered from the base of Level C in a zone in the northeast corner that is arguably in the upper portion of Feature 1. Virtually all of the fiber-tempered sherds that could identified to type (all Orange Plain) were also from various levels of the northeast corner, which, together with definitive Orange Plain sherds at the base of the Feature 1, puts them well within the fill of the pit. The same can be said for much of the vertebrate fauna, although the total assemblage is admittedly small. The only other notable class of recovered materials is lithic flakes, the vast majority of which (37 of 42) came from the light-colored sands beneath the shell. All of the historic era materials and three of four St. Johns period sherds came from the upper strata, near the surface.

In sum, TU1 revealed a relatively simple profile of emplaced whole *Viviparus* shell on a buried A horizon that was intercepted by at least one large pit feature dug during the late Orange period, ca. 3600 B.P. Aside from the fill of Feature 1, TU1 produced little in the way of material culture or food remains to suggest that shell accumulated on the old surface in the course of routine, domestic activities.

Table 3-5. Inventory of Artifacts, Vertebrate Fauna, and Miscellaneous Items Recovered from Level Excavation of Test Unit 1, 8LA1.

Level	Hafted Biface (n)	Lithic Flake (n)	Lithic Flake (g)	Orange Sherd (n)	Orange Crumb Sherd (n)	St. Johns Crumb Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)	Botani-cals (g)	Historic Artifacts (g)
A*		4	4.4		2	4	2	0.8	2.9	4.5
B (Zone A)							1	0.9	1.4	16.3
B (Zone B)					1		2	0.7		
C (Zone A)		1	0.2				5	2.4		
C (Zone B plot)	1									
C (Zone B)				4	12	1	31	10.3		
D (Zone B)					9		44	14.3	0.1	
E (Zone B)					16		38	8.6		
E (Zone C)							1	0.1		
F (Zone B)					4		34	8		
F (Zone C)							4	8.2		
F (Zone D)				1			9	1.2		
G (Zone A?)							3	0.4		
G (Zone B)				1	2					
G (Zone D)		1	0.7				2	0.3		
H (Zone D)		36	3.6							
Feature 1				4	2					
Total	1	42	8.9	10	48	5	176	56.2	4.4	20.8

* plus two *Euglandina* shells

Test Unit 3. Located about 50 m west of the projected location of the south ridge, Test Unit 3 (TU3) produced profiles resembling those of TU1 in some respects, but with notable differences. Like TU1, TU3 contained a near-surface stratum of *Viviparus* shell that appears to have been truncated by mining. Missing in TU3, however, was any clear indication that the shell was emplaced on an old surface (A horizon). The subshell strata of TU3 were instead dominated by concreted sand and shell matrix, perhaps a product of the lower elevation of this location and its fluctuating, near-surface watertable. Also, TU3 did noit produce much evidence of an Orange period component, and instead has more evidence than TU1 for a prepottery (Mount Taylor) assemblage. Photographs and line drawings of all four profiles of TU3 can be found in Figure 3-22; descriptions of the strata observed in these profiles are provided in Table 3-6, and all artifacts and vertebrate fauna recovered are summarized in Table 3-7.

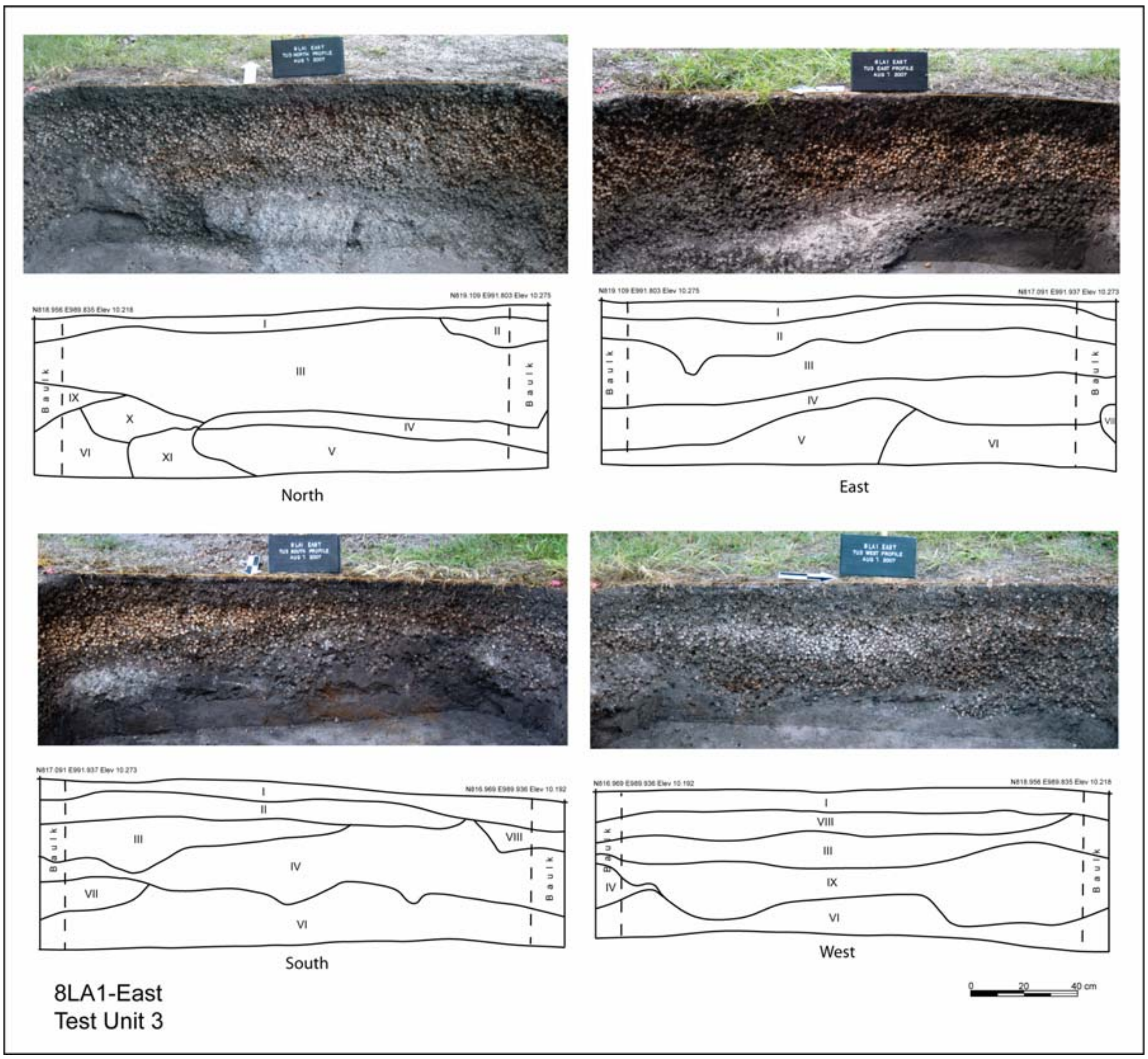

Figure 3-22. Photographs and line drawings of all profiles of Test Unit 3, 8LA1-East.

Table 3-6. Stratigraphic Units of Test Unit 3, 8LA1-East

Stratum	Max. Depth (cm BS)	Munsell Color	Description
I	12	10YR3/1	very dark gray medium sand with root mat
II	28	10YR2/2	sparse *Viviparus* shell in very dark brown fine-medium sand
III	45	10YR3/3	whole *Viviparus* shell in minimal matrix (dark brown fine-medium sand)
IV	56	7.5YR5/2	brown clayey sand with whole *Viviparus* shell
V	62+	7.5YR7/0	concreted light gray clayey sand with whole *Viviparus* shell and crushed Unionid shell
VI	64+	7.5YR4/0	dark gray fine sand (saturated)
VII	53	7.5YR3/0	concreted light gray clayey sand with whole *Viviparus* shell and crushed Unionid shell
VIII	21	7.5YR3/2	dark brown medium-coarse sand with whole and crushed *Viviparus* shell
IX	50	10YR3/1	very dark gray medium sand with whole, iron-stained *Viviparus*
X	47	10YR7/3	concreted brown sand with whole *Viviparus* shell and occasional Unionid shell
XI	62+	10YR3/1	very dark grayish brown clayey sand with whole and crushed *Viviparus* shell

No definitive features were identified in the excavation of TU3, although some of the concreted strata arguably are thermal features. Whether these are anthropogenic or simply natural is unclear. Unlike the mineralized roots seen in TU1 and throughout many of the units excavated in 2010 (see below), the concreted strata of TU3 are massive and generally larger in both horizontal and vertical dimensions, plus they contain substantial amounts of shell, including minor lenses of crushed Unionid shell. The best example is seen in Stratum V in the north and east profiles. Well over a meter wide and at least 30 cm thick, this stratum has a basin-shaped cross-section. Vertebrate faunal remains may have been recovered at greater frequency in this stratum than elsewhere in the unit, but that cannot be substantiated with the relatively limited assemblage available. Also, the only substantial Orange Plain sherds from TU3 came from the northeast quadrant of Level E, in the general vicinity of this stratum, but a direct association cannot be substantiated. The single hafted biface from TU3 was recovered just to the south of the concreted stratum, in light-colored, fine sand, where most of the lithic artifacts in TU1

Table 3-7. Inventory of Artifacts, Vertebrate Fauna, and Miscellaneous Items Recovered from Level Excavation of Test Unit 3, 8LA1-East.

Level	Hafted Biface (n)	Lithic Flake (n)	Lithic Flake (g)	Modifed Marine Shell (n)	Marine Shell Frag. (n)	Misc. Rock (g)	Orange Sherd (n)	Orange Crumb Sherd (n)	St. Johns Crumb Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)
A*		1	0.3		1					17	4.0
B									1	6	2.2
C				1		0.1		3		21	7.6
D						6.6		1		34	11.2
E										2	0.7
E (Zone A)						0.7				10	1.5
E (Zone B)										12	1.4
E (Zone C)							3			44	14.1
E (Zone D)				1						32	4.7
F (Zone C)										22	3.9
F (Zones C/D)										25	3.8
F (Zone D)	1	3	2.8							38	6.9
G (Zone C)										11	2.2
G (Zone D)										5	0.4
Total	1	4	3.1	1	2	7.4	3	4	1	279	64.6

* plus 3.7 g of historic era artifacts

were recovered. The tapered stem form of this biface signifies a probable Mount Taylor affiliation, as does the marine shell fragments scattered throughout the unit. Basin-shaped pits have been documented at Mount Taylor contexts at 8LA1-West Locus B, and concreted shell matrix in general tends to date to the Mount Taylor period (presumably because such components are often close to or below the watertable).

In sum, TU3 would appear to reflect the accumulation of shell and related materials earlier than and independent of the emplacement of shell along the south ridge during the late Orange period. Presumably Mount Taylor in age, the anthropogenic deposits of TU3 probably represent the use of wetland habitat to the immediately west, namely the slough separating the east and west portions of 8LA1. Additional testing in this area will be needed to verify the age of the deposit and develop better information on the types of activities taking place here.

2010 INVESTIGATIONS OF THE SOUTH RIDGE

Efforts to locate remnants of the South Ridge at 8LA1-East were intensified in 2010 with additional subsurface testing and the application of Ground Penetrating Radar (GPR). The results of our GPR survey are reported first.

Ground Penetrating Radar Survey

A program of Ground Penetrating Radar (GPR) was undertaken in 2010 courtesy of Richard Estabrook of the Florida Public Archaeological Network. Efforts to locate and characterize the south ridge of 8LA1-East to this point produced mixed results and the scope of these initial efforts was simply too small to enable strong inference about the location and orientation of the ridge. The advantage of using GPR was twofold: (1) large tracts of open terrain in the projected vicinity of the south ridge could be surveyed relatively quickly, and (2) data on subsurface strata could be collected with no additional impact to the site. Of course, ground truthing the results of GPR would require additional subsurface tests, but these could be targeted at specific anomalies of the GPR readings, rather than placed randomly or based on limited data, such as augers.

GPR was deployed in two different ways. We first simply ran a series of 30-m-long transects spaced 10 m apart across the area of the site believed to contain subsurface evidence of the northern edge of the south ridge. Second, we ran the GPR unit across a series of five contiguous blocks ranging in plan from 20 x 30 m to 7 x 10 m, using a method of orthogonal transects in order to produce “Z slices” or “time slices’ of data for display. Figure 3-23 shows the locations of the GPR transects and grids, as well as the locations of test units added in 2010 and the results of a tree throw survey that is discussed later below.

Richard Estabrook provided the following description of the GPR equipment, how it was deployed, and how the resulting data were processed:

> A Geophysical Survey Systems, Inc. (GSSI) SIR-3000 GPR system was used to collect the data. The configuration included a 400 MHz antenna mounted in a

> three-wheel cart with distance calibration provided by an on-board survey wheel. The radargrams were collected along transect spaced 50 cm apart within predefined grids of varying sizes. The perimeter of the grids were staked at 1-m intervals and fiberglass surveys ropes used to establish and maintain the transect rows. Initially, information from a single 20 x 30-m grid and nine separate linear transects was acquired. Later, we returned to collect data from an additional four grids. Because of an expansive evergreen tree in one portion of the area of interest, these data were collected as a series of contiguous blocks around the tree. Within each grid, the radar data was collected in a zigzag pattern with transects oriented in one direction. Once the data were collected, the grid was "flipped" 90 degrees and a second dataset perpendicular to the first then collected.
>
> The port-processing employed GPR-Slice® software (Version 7). The GPR data were converted from their GSSI file format, regained, and processed through a low-pass filter. These data are presented as individual time slices or as an animated sequence of time slices showing how the anomalies vary by depth. In the color ramp scheme selected, red indicates areas of greater reflectivity and blue shows areas of lower reflectivity. Yellow and green represent intermediate reflectivity grades. Red regions on the time slices represent locations that reflected more wave energy, and they are thought to be areas of higher density shell concentrations.

The results of preliminary transect survey are shown in Figure 3-24. This area was selected for survey given the likelihood that it encompassed the northern edge of the south ridge of shell. A slight crease in the surface topography of this vicinity lent some support to this inference, although this feature was neither completely linear nor continuous. Nonetheless, we were hopeful that the GPR unit would detect the boundary between subsurface shell and the natural, sandy substrate. The two easternmost transects (top two in Figure 3-24) were shorter than the other seven due to the saturated ground of a wetland depression extending southward from the shoreline of one of the ponds. Survey began with these eastern transects after calibrating the GPR unit to the results of Test Unit 1, reported earlier.

The results of this preliminary survey did not produce unambiguous evidence for the northern edge of the south ridge. The most prominent feature in the output of these transects is the high reflectivity of the wetland area. Another prominent feature is the waterline running east-west across the area surveyed, evident in Figure 3-24 as a series of parabolas. The only suggestive evidence for an edge to the south ridge is seen in the high reflectivity of the south end of the easternmost transects. In the first two transects, high reflectivity is seen in relatively thin bands of red tilted gently toward the north. A break in this pattern in the second transect is most likely the backfilled TU1. The next three transects (to the west, shown in Figure 3-24 as the third to fifth transects from the top) show variable levels of reflectivity but each shows a break or sorts at about 10 m from the southern line of origin. This is perhaps the best evidence we have for a break in subsurface shell, although as we progress farther west, this pattern dissipates and we know from the prior augering that subsurface shell extends north of this projected line by at least 15 m. On balance, the preliminary transect survey offers little evidence for a

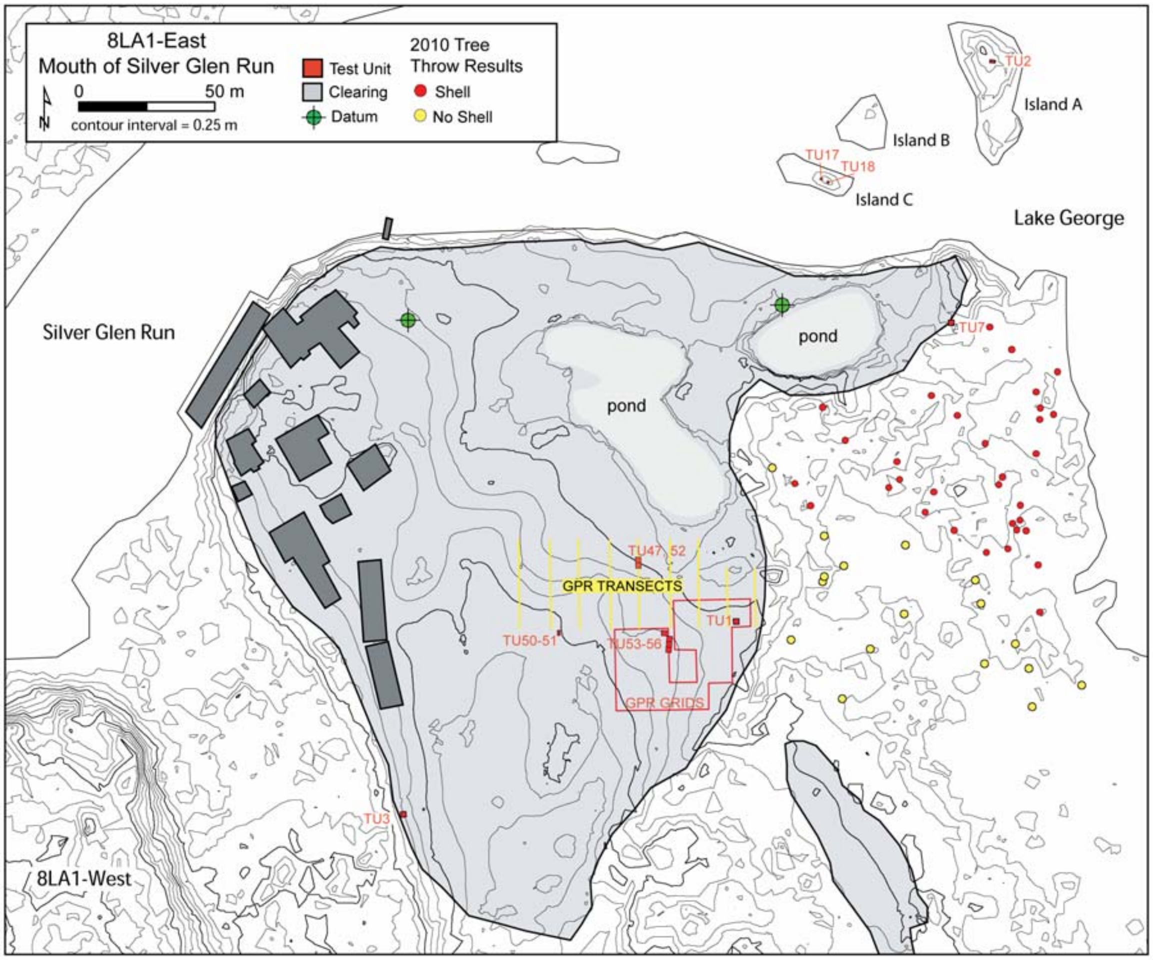

Figure 3-23. Topographic map of 8LA1-East, showing locations of GPR transects and grids, as well as test units excavated in 2010.

subsurface edge to the south ridge, although with better sampling and time-slice processing, this feature may indeed be detectable.

Grid survey with GPR began in an open area directly south of the transects with a 20 x 30-m block (Grid 1). Following procedures described above by Estabrook, field school students dragged the GPR unit at 50-cm intervals both east-west and north-south across the grid. Four subsequent grids were surveyed on a second visit to the site late in the 2010 field season. Although final post-processing of data from the grid surveys took place after completion of fieldwork, Estabrook provided preliminary results from Grid 1 to guide out efforts in subsurface testing. All ground truthing of GPR results in 2010 was confined to the Grid 1 area.

Figure 3-25 provides time slice output for all five grids in the range of 47-55 cm below surface. Thirty time slices from the surface to 177 cm below surface. The depths values are not literal, but rather a relative measure of reflectivity by depth, with some values attenuated vertically due to variations in matrix composition, density and

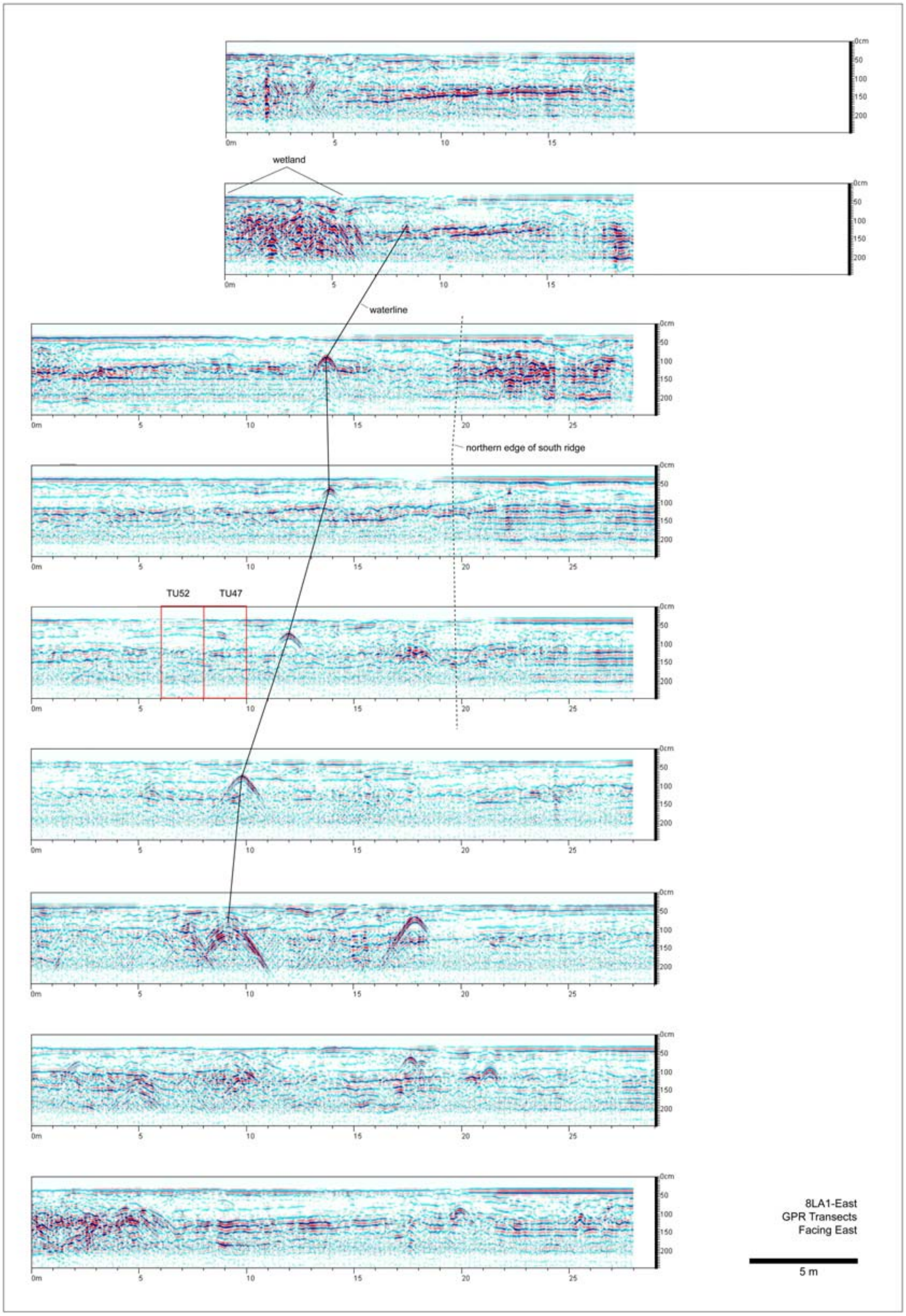

Figure 3-24. GPR results from nine north-south transects placed to detect north edge of south ridge, 8La1-East.

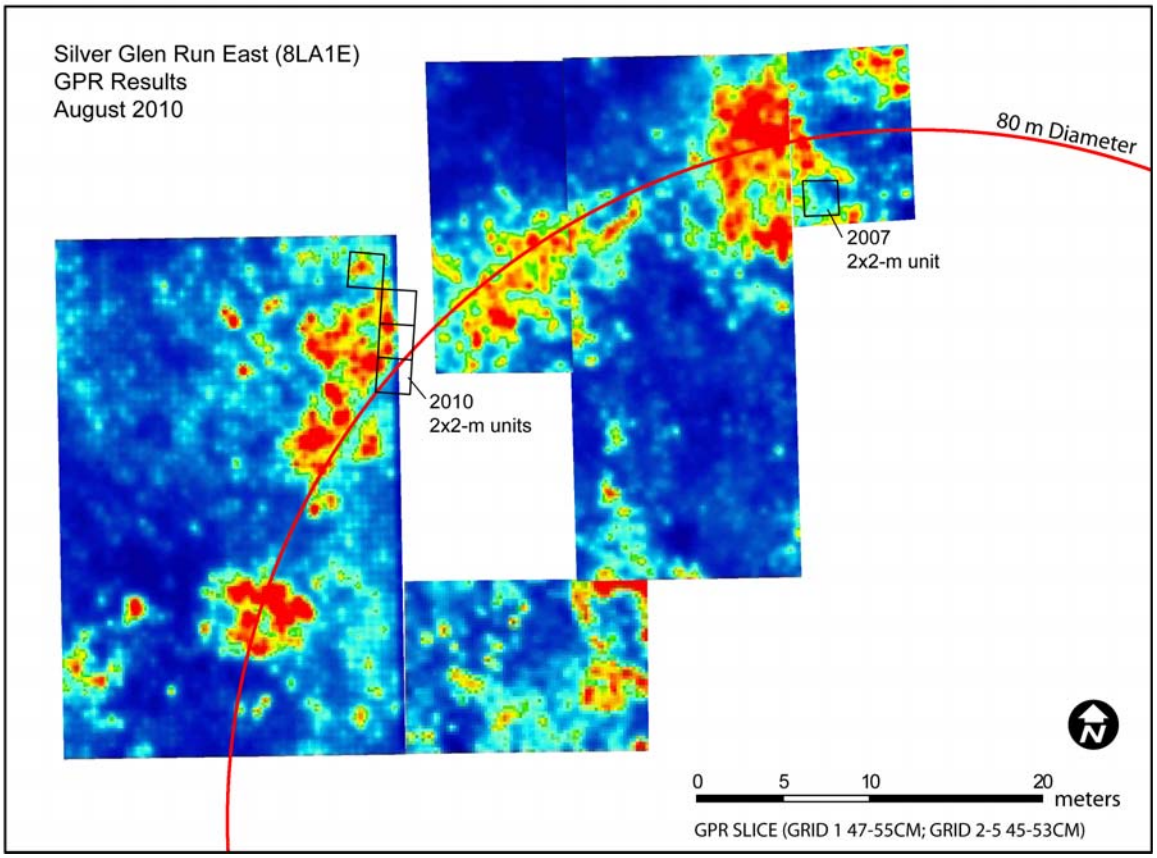

Figure 3-25. GPR results in five contiguous grids for time slice 47-55 cm below surface, with projected arc of anomalies consisting of dense shell.

moisture. In displaying slices in the 47-55 cm range, we are emphasizing those with the greatest clarity of anomalies; slices ranging from 35-78 cm below surface show the same general pattern as the output provided in Figure 3-25.

The output of GPR survey in all five grids offers some tantalizing patterning. As seen in Figure 3-25, major anomalies cluster in four areas some 5-10 m in diameter each, which together form an arc with a projected diameter of 80 m. The northern-most cluster shows a void in reflectivity that corresponds with the 2 x 2-m unit excavated in 2007, TU1. This alone provides strong indication that anomalies correlate with dense shell, although the occurrence of mineralized roots and pit features in this test unit may lend a bit more complexity to the output. In any event, if the arcuate array of anomalies comprises a complete, unbroken circle, some 80 m in diameter, we would expect a total of 16-17 clusters, each spaced about 15 m apart on center. We hasten to add, however, that the clusters are of variable size and shape, and the middle two in Figure 3-25 may actually converge in the strip of unsurveyed land between two of the blocks. Also noteworthy is the lesser anomaly in the southeast corner of the composite grid, where edge-matching of output form adjacent grids is problematic. Still, the area both outside and inside the projected arc of anomalous clusters is dominated by low reflectivity.

Ground truthing the GPR results was accomplished by a combination of coring and select controlled excavations, both in the area of Grid 1. Coring was accomplished with the use of an Oakfield soil tube, which is a foot-long, ¾-inch diameter, chrome-plated steel tube with an open face with a threaded fitting for extensions and a T-top handle. The entire 20 x 30-m area of Grid 1 was cored at 1-meter intervals along east-west transects spaced 1 meter apart. Recorded for each of the 651 tubes inserted along these transects were observations on depth of shell, shell density, substrate beneath shell (if present), and maximum depth of core. Shell density was recorded as low, low-medium, medium, medium-high, and high, if present, and converted to a numerical scale of 1-5, with 1 for low and 5 for high density.

Figure 3-26 provides interpolated output of shell density and maximum depth of shell from the soil tube data using Surfer mapping software (v. 6.01). Comparing these results to the time slice of Grid 1 used in Figure 3-25, we find relatively good conformity between GPR results and shell density, as we expected. The patterns are not a precise match, but there is general agreement between the arcuate shape of the GPR anomalies and shell density, event to the extent that shell density is low in areas to the inside and outside the projected arc. In contrast, depth of shell is more variable, with numerous occurrences in excess of 50 cm in the southern portion of the grid. If such occurrences reflect the presence shell-filled pits, such as the one described in TU1 (see above), then pit features fall well outside the projected arc of GPR anomalies.

In sum, the results of GPR show patterning in the distribution of anomalies that suggests the presence of a circular or arcuate arrangement of shell features. Although the pattern is far from clear, the results point to the possibility of a circular village akin to the Late Archaic shell rings of the Gulf and Atlantic coasts (Russo and Heide 2001). Those known for Florida, such as Horrs Island near Fort Myers (Russo 1991), are nearly as large as the U-shaped configuration Wyman observed at 8LA1-East. Others from Georgia and South Carolina tend to be smaller and generally fully enclosed, perhaps a better model for the pattern suggested by the GPR data. Whereas we did not expect to find a circular village under the shell of the south ridge, the practice of capping old settlements with shell is not all that unusual for the region (Randall 2010). It will take a considerable subsurface testing to substantiate the existence of houses or households, let alone a complete village. That process got underway in 2010 with the excavation of several test units in various locations of the south ridge.

Test Unit Excavation

The locations of test units in and around the area of GPR survey are shown in Figure 3-23. Two contiguous units (TUs 47 and 52) were placed to examine what was perceived to be the northern edge of the south ridge; four contiguous units (TUs 53-56) were excavated to investigate GPR anomalies in Grid 1; and two contiguous units (TUs 50-51) were placed to examine an area west of the GPR survey grids where incised Orange fiber-tempered pottery was found in an auger test. An account of the method and results of these tests follows below in the order just given.

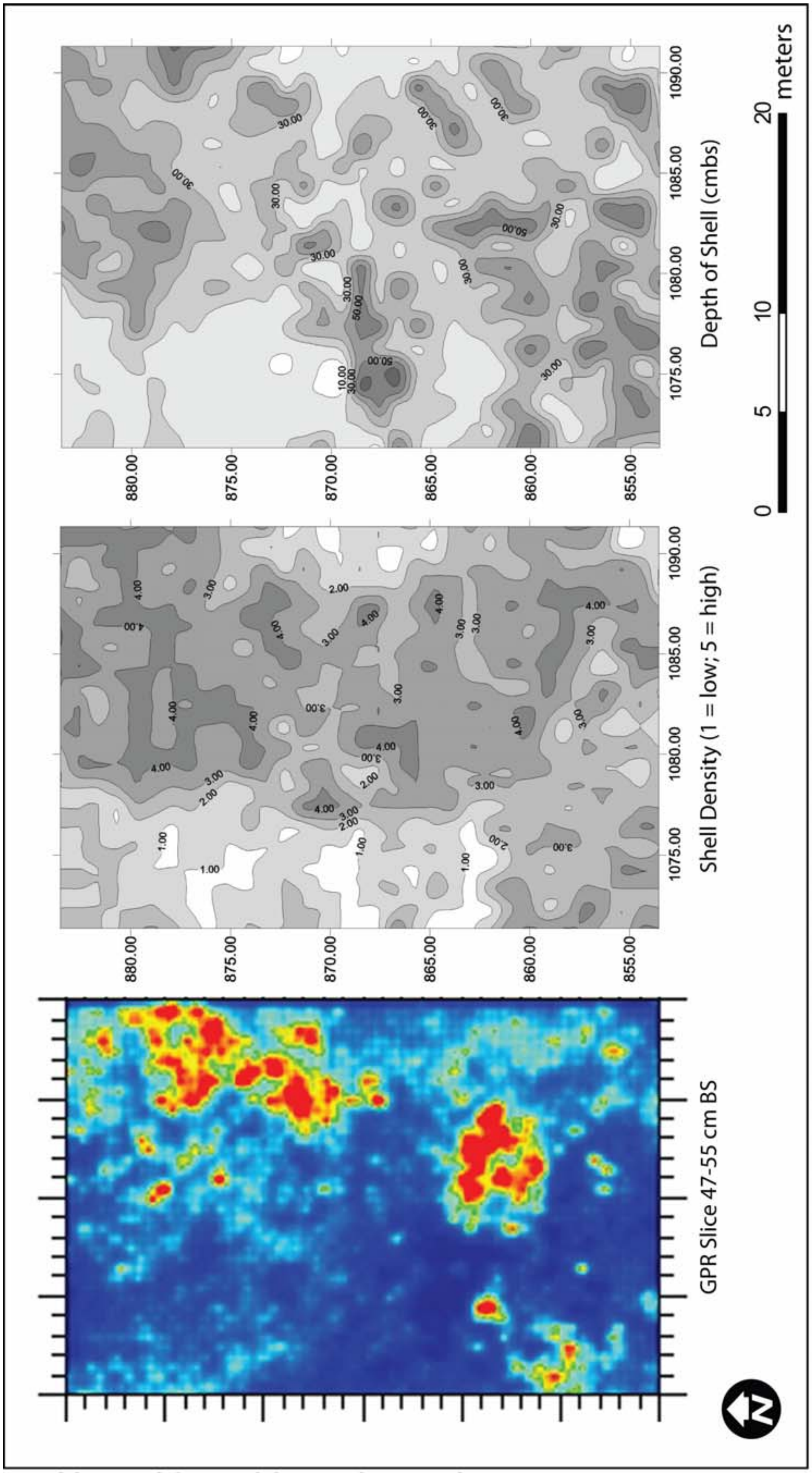

Figure 3-26. Comparison of GPR slice 47-55 cm BS (left) with soil tube data on shell density (center) and shell depth (right).

Test Units 47 and 52. As GPR survey got underway early in the 2010 field season, three contiguous 2 x 2-m units were laid out in the projected area of the south ridge where a slight crease in the surface topography hinted at the position and orientation of the north edge of the ridge. Ultimately, only two of the three units were excavated: Test Units 47 and 52 (TU47 and TU52). Revealed in both units was a discontinuous stratum of shell beneath a well-defined plowzone, and underlain by light-colored fine sands with a sparse but diverse assemblage of flaked stone artifacts. Definitive evidence for the north edge of the south ridge was not observed, although one of the long profiles of the contiguous units provided a hint of this feature. Photographs and line drawings of all profiles of TU47 and TU52 are provided in Figure 3-27. Description of the strata mapped in these profiles are given in Table 3-8, and Table 3-9 gives an inventory of the artifacts and vertebrate fauna recovered.

The upper stratum in both units was removed as a single level (Level A) to reveal well defined plow scars at the base of each unit, ranging up to 28 cm below the surface. Excavation thereafter proceeded in 10-cm arbitrary levels through the shell stratum (Stratum II) and into the underlying light-colored sands (Stratum III). All fill was passed through ¼-inch hardware cloth. Planviews of levels in TU47 revealed matrix of varying composition, which was generally divided into zones as excavation proceeded. Subplowzone matrix in TU52 was comparatively simpler than in TU47, with the exception of the west profile, which revealed an attenuation of Stratum II from TU 47. It was along this eastern profile in TU52 that we observed the only good indication of a terminus to emplaced shell. This can be seen in Figure 3-27 as a basin-shaped, shell-filled depression[1] coterminus with dark gray fine sand (Stratum IV) intrusive to the surrounding gray sand substrate (Stratum III). A second zone of dark gray sand (Stratum IV) was observed a bit farther north of this contact in the west profile of TU52, and a third in the north profile of TU52. The latter zone was designated Feature 66, but it, like the two along the west profile, appear to be recent intrusive disturbances.

One other notable aspect of the TU47 profile is the large, oval-shaped zone in the south profile designated Stratum V. Throughout excavation this zone was described as a clay or clayey sand, and was believed to be emplaced by either natural or human agents. After seeing several similar features in other test units of the south ridge, we came to understand this as the diagentic outcome of tree roots that were covered in shell. Put another way, Stratum V is a mineralized root mass whose source of mineral was the calcium carbonate that leached from overlying shell. In support of this supposition it is noteworthy that such features are not found outside of areas of overlying shell deposition. Given the size and shape of the mass mapped as Stratum V, we suspect this particular example is the mineralized root ball of a palm tree. Additional examples are seen in the profiles of Test Units 55 and 56, discussed further below.

The artifact inventory from level excavation of TUs 47 and 52 is relatively sparse (Table 3-9). Materials recovered from the plowzone and shell stratum were limited to a few lithic flakes, some retouched, two crumb sherds, and a small assemblage of

[1] recorded in the field as Feature 47, this shallow basin appears to be simply a low area of shell accumulation, as opposed to a purposefully dug and filled pit.

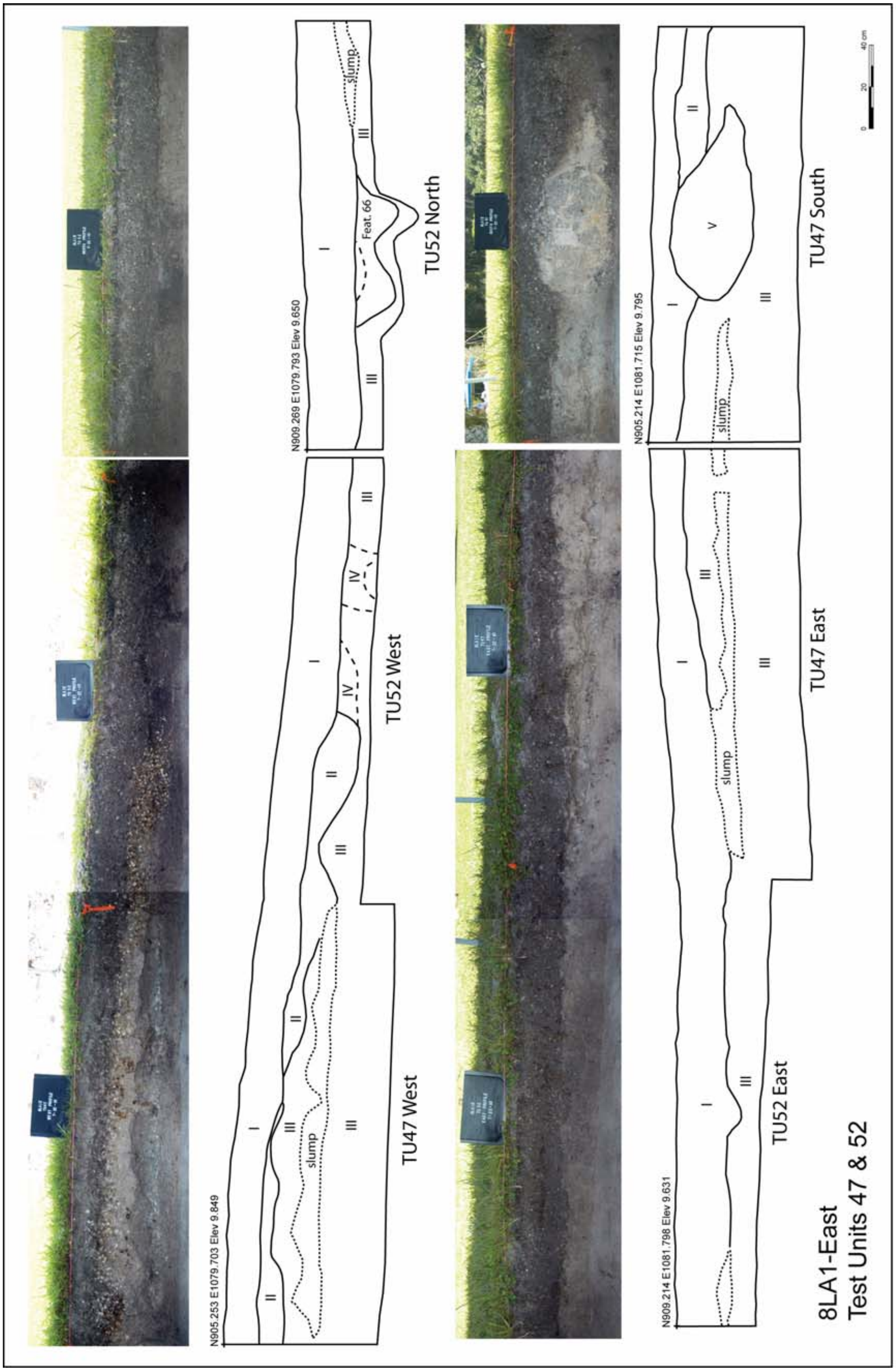

Figure 3-27. Photographs and line drawings of all profiles of Test Units 47 and 52, 8LA1-East

Table 3-8. Stratigraphic Units of Test Units 47 and 52, 8LA1-East

Stratum	Max. Depth (cm BS)	Munsell Color	Description
I	28	10YR4/2	dark grayish brown fine sand with minor *Viviparus* shell (plowzone)
II	37	10YR5/3	whole and crushed *Viviparus* in brown fine sand
III	71+	10YR6/1	gray fine sand with no shell grading to 10YR5/3 brown fine sand with mottling due to fluctuating watertable
IV	38+	10YR4/1	dark gray fine sand with no shell
V	46	10YR8/2	very pale brown fine clayey sand with 10YR5/2 grayish brown fine sand mottles and 10YR6/6 brownish yellow moist clay (mineralized root ball)
Feat. 66	46	10YR4/2	dark grayish brown fine sand with no shell

vertebrate fauna. Notably, most of the lithic artifacts came from the light-colored sands beneath the shell. After heavy rains flooded the units and caused the profile damage seen in Figure 3-27, TU47 was excavated a bit deeper to see how far lithic artifacts extending into the sandy substrate. Three additional 10-cm levels were removed before the receding water table was reached at 70 cm below surface. Recovered in these additional levels were 54 chert flakes greater than ¼-inch in size (students screening the sand from these levels noted an abundance of microflakes falling through the screen), and six chert tools, five of which are illustrated in Figure 3-28, along with tools from other units in the south ridge area. Many of the tools in this figure are unifacially modified flakes, some in forms archaeologists generally refer to as “scrapers” (e.g., Figure 3-28k-m). Another recurrent form is seen in the top row of Figure 3-28 (a-f). These small, pointed objects resemble the microliths of Mount Taylor affinity (e.g., Randall et al. 2011; cf. Jaketown perforators ACI 2001:2-8), and were likely used as drills. The larger pieces in Figure 3-28 (o, p, r, s) are unifacially modified flakes, two from TU47; two examples of biface fragment (Figure 3-28n, q) are also illustrated, including the haft element of a tapered stemmed point from TU52.

The lithic assemblage recovered mostly from subshell sands reflects the broader distribution of Early and Middle Archaic artifacts across much of the 8LA1 site area. A similar pattern was detected on the north side of Silver Glen Run, where field school students assisted in a U.S. Forest Service project to assess the impacts of infrastructure repair to the recreational facilities of Silver Glen Run (Randall et al. 2011). These artifacts reflect relatively intensive use of the greater Silver Glen area well before shell was deposited anywhere at the site, possible as early as the early Holocene, 9000 or more years ago. The Mount Taylor assemblage of microliths, as well as the tapered stemmed biface fragment is not unexpected of an archaeological complex that includes a massive

Table 3-9. Inventory of Artifacts, Vertebrate Fauna, and Miscellaneous Items Recovered from Level Excavation of Test Units 47 and 52, 8LA1-East.

TU47 Level	Lithic Flake (n)	Lithic Flake (g)	Modified Lithic (n)	Crumb Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)	Historic Artifacts (g)
A	3	1.4					17.2
B, Zone A	1	0.2					
B, Zone D	1	0.8					28.2
C, Zone B					1	1.3	
C, Zone D	4	1.0	1		19	4.7	
C, Zone E					1	0.2	
D	19	4.6	3		4	1.1	
E	12	2.6	2		1	<0.1	
F	23	11.4	1		6	1.0	
Subtotal	63	22.0	7		32	8.3	45.4
TU52 Level							
A	4	9.9	2	1	3	2.8	331.1
B	2	0.4	1		6	1.1	
C	12	2.4	2	1	19	5.2	
Wall Clean-up	1	0.8					
Subtotal	19	13.5	5	2	28	9.1	331.1
Total	82	35.5	12	2	60	17.4	376.5

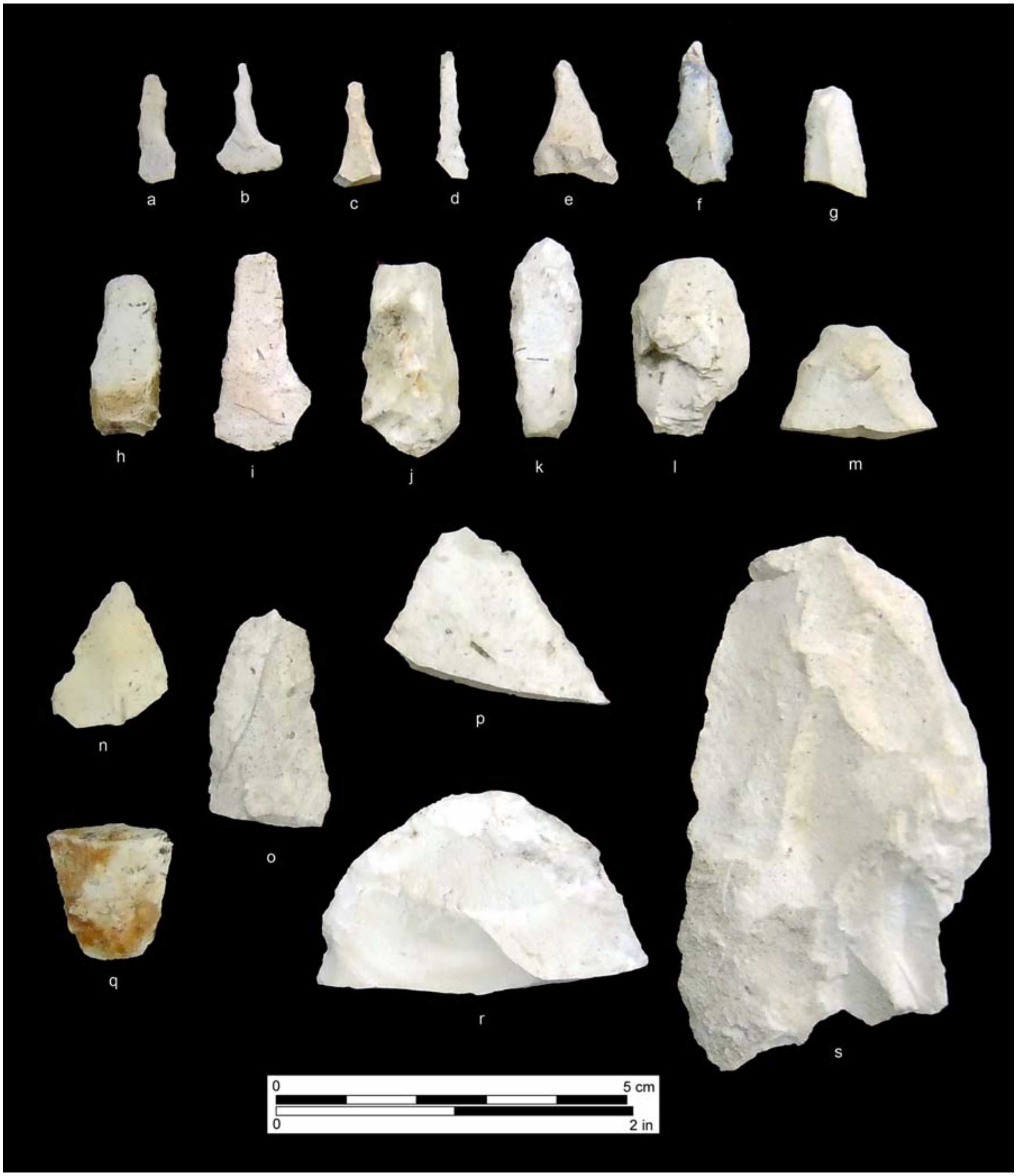

Figure 3-28. Flaked stone artifacts from various test units in the South Ridge area of 8LA1-East (a. 47D-3; b-c. 54I-2; d. 54H-3; e. 54 North G-2; f. 47C Zone D-3; g. 52C-2; h. 52A-4; i. 53F-2; j. 53D-3; k. 47D-3; l. 53G Zone D-2; m. 47F-3; n. 53G Zone B-2; o. 54J Zone A-3; p. 54K Zone A-3; q. 52A-3; r. 47E-1; s. 47E-2).

Mount Taylor shell ridge in Locus A, and possibly along the spring run in the eastern aspect of 8LA1.

In sum, TUs 47 and 52 provided a glimpse, in its west profiles, of the terminus of shell at the possible north edge of the south ridge. Because this observation was not duplicated in the east profiles, we are reluctant to put too fine a point on this inference. Irrespective of this ambiguity, TU47 provided two other useful observations: (1) mineralized roots in the sandy substrate are a good proxy for overlying shell, which is especially useful in contexts where shell have been removed recently; and (2) the sandy substrate of 8LA1-East, like other locations in the greater Silver Glen area, encases a robust record of earlier site use in the form of diverse chert tools and the by-products of their manufacture and use. So much of this record now lies beneath the water table and will thus require dewatering to be adequately sampled.

Test Units 53-56. A series of four contiguous 2 x 2-m units were excavated in the northeast corner of GPR Grid 1 to explore anomalies believed to be indicative of dense subsurface shell (Figure 3-25). The first unit, Test Unit 53 (TU53) was sited directly over a small anomaly, while three other units (TUs 54-56) were aligned offset to the south of TU53 to examine the edge of a larger anomaly. Together the four units provide a eight-meter-long profile of the area, the largest vertical exposure to date. With one exception, each of the units was excavated in 10-cm arbitrary levels and all fill passed through ¼-inch hardware cloth. The exception was excavation of TU55, which was conducted within observed archaeostratigraphy enabled by the “leapfrog” excavation of adjacent units (Figure 3-29).

All four profiles of TU53 are illustrated in Figure 3-30. Profiles that guided the excavation of TU55 are given in Figure 3-31, and the east profiles of TUs 54-56 are given in Figure 3-32. Description of the strata mapped in all four test units can be found in Table 3-10. An inventory of all artifacts and vertebrate fauna recovered for these test units is provided in Table 3-11.

The profiles of TU53 are relatively simple save for a few intrusive features (Figure 3-30). The south and west profiles of this unit provide good perspective with minimal disturbance. Beneath the plowzone (Stratum I) is a stratum of grayish-brown sand with varying amounts of mostly whole *Viviparus* shell with limited vertebrate fauna. This shell-bearing stratum (Stratum II) is underlain by the light-colored sands (Stratum III) seen elsewhere across the south ridge area. Unlike TU1, to the east, this shell stratum does not rest on a buried A horizon, but is instead directly atop the subsurface sands.

Aboriginal artifacts recovered from TU53 consist of 47 chert flakes, 6 chert tools, 60 sherds, and a modest assemblage of vertebrate fauna. All but 6 of the 62 sherds came from the upper strata, 50 from the shell itself, most notably a cluster of Orange Incised sherds from the base of Level C (30 cm below surface) (Figure 3-33). These sherds were conjoined in the lab to form a relatively large upper rim portion of an open bowl with an estimated orifice diameter of 36 cm (Figure 3-34). The exterior surface of this vessel is badly eroded, although traces of its rectilinear incisions are visible in preserved patches. The admittedly cryptic incisions would appear to consist of nested triangles or diamonds, motifs not uncommon to Orange Incised pottery in the region. However, unlike the many Orange Incised sherds found at the mouth of Silver Glen Run (see above), this particular

Figure 3-29. Excavation of Test Units 53-56 in location of GPR Grid 1, 8LA1-East.

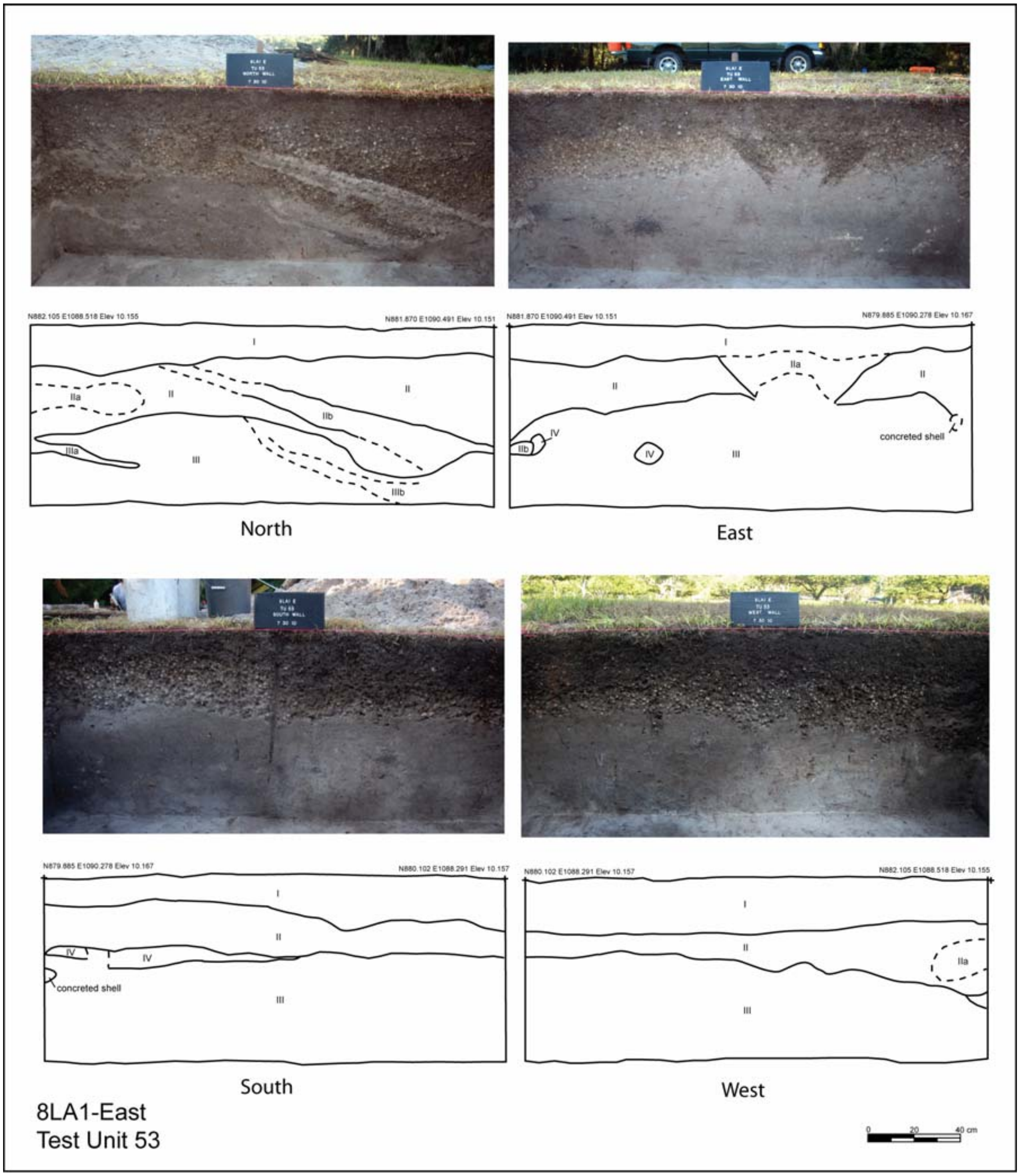

Figure 3-30. Photographs and line drawings of all profiles of Test Unit 53, 8LA1-East.

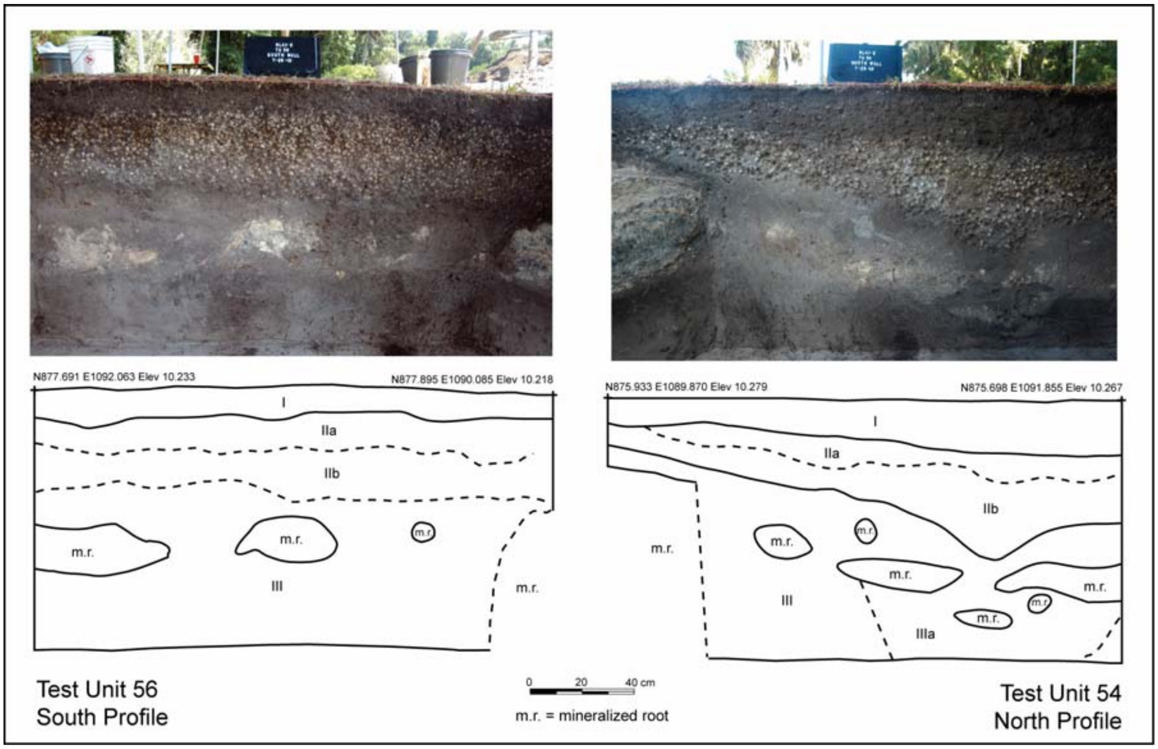

Figure 3-31. Photographs and line drawings of the south profile of Test Unit 56 (left), and the north profile of Test Unit 54 (right), 8LA1-East.

vessel does not contain obvious traces of sponge spicules, making it more similar, technologically, to the Orange Plain pottery found elsewhere in the south ridge area (e.g., TU1), as well as Locus B (see Chapter 6).

The intrusions evident in profiles of TU53 are instructive. The north profile (Figure 3-30) shows a large in-filled tunnel intruding through the shell stratum and into subshell sands at an angle of about 20 degrees. A gopher tortoise is the most likely agent of intrusion in this case. Over the years we have witnessed many excavations by gopher tortoises and they consistently enter the earth at about this angle. The depth and configuration of burrows varies depending on substrate and depth of water table, but they are generally straight, as in this example. A second intrusive feature is seen in the east profile of TU53. Consisting of two converging in-filled "wedges" this intrusion most likely comes from historic-era activity. Like the gopher tortoise intrusion, the contact between in-filled sediment and the surrounding matrix is sharp, indicating they were relatively recent. To the extent both were truncated by the plowzone, these intrusions must predate the last time the site was plowed, but certainly postdate the mining of shell in 1923.

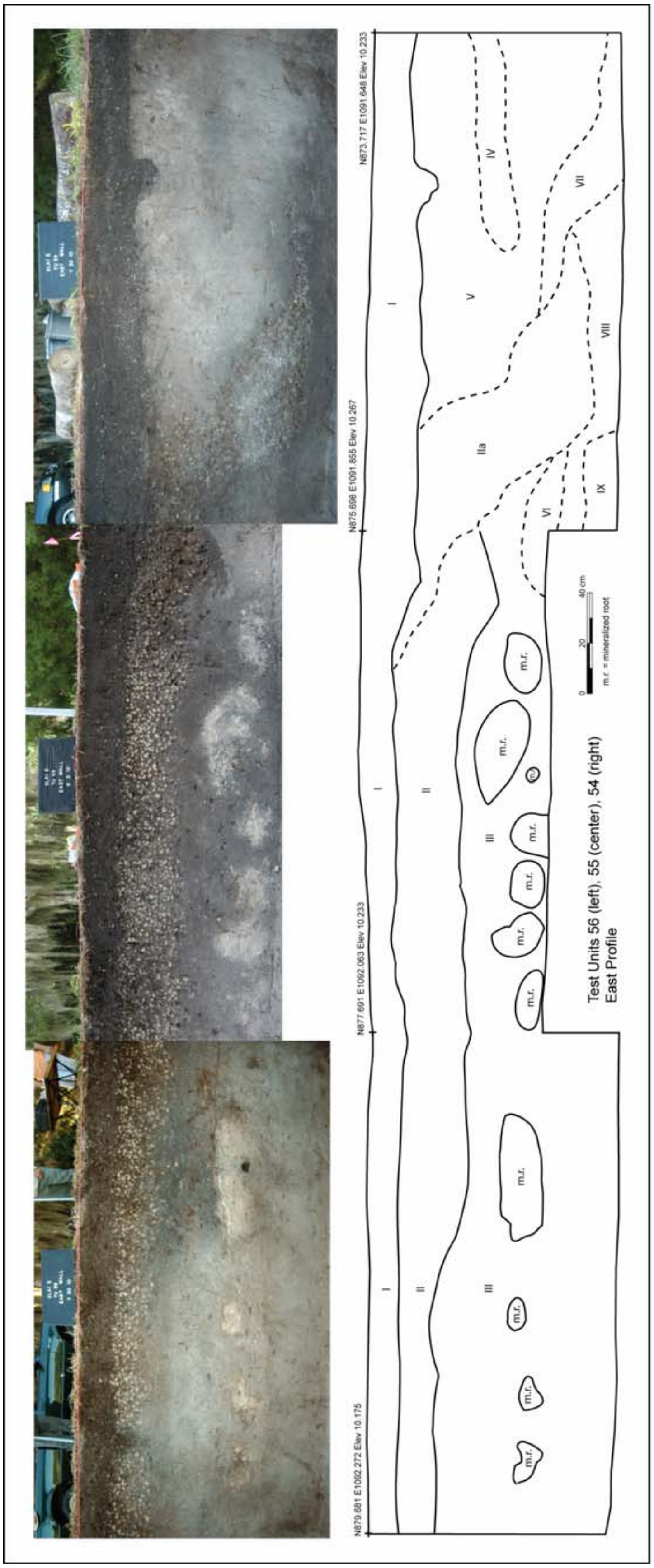

Figure 3-32. Photographs and line drawings of the east profiles of Test Units 54-56, 8LA1-East.

Table 3-10. Stratigraphic Units of Test Units 53-56, 8LA1-East

Stratum	Max. Depth (cm BS)	Munsell Color	Description
I	25	10YR3/1	very dark gray fine sand with minor *Viviparus* shell (plowzone)
II	55	10YR4/2	whole and crushed *Viviparus* in dark grayish brown medium sand grading to 10YR5/1 gray medium sand towards bottom of stratum
IIa	33	10YR5/3	mostly crushed *Viviparus* shell in brown medium sand (TU56 South and TU54 North only)
IIa	90	-	whole and crushed *Viviparus* in matrix on varying color and texture; intrusive feature (TU54 and 55 East only)
IIb	62	10YR5/1	fine-medium gray sand laminated with 10YR4/1 dark gray sand; gopher tortoise burrow (TU54 only)
IIb	62	10YR4/2	whole and crushed *Viviparus* in dark grayish brown medium sand (TU56 South and TU54 North only)
III	102+	10YR5/1	gray fine-medium sand with no shell but abundant mineralized roots when shell dense in overlying stratum
IIIa	62	10YR6/2	light brownish gray medium sand with no shell (TU53 only)
IIIa	99+	10YR4/2	dark grayish brown medium sand with no shell (TU54 North only)
IIIb	75+	10YR4/1	dark gray sand mottled with 10YR6/2 light brownish gray medium sand; gopher tortoise burrow (TU54 only)
IV	40	10YR6/1	gray medium sand with no shell (TU53 only)
IV	57	10YR4/1	dark gray mediums and no shell (TU54 East only)
V	90	10YR7/1	light gray medium sand mottled in upper half with 10YR5/2 grayish brown sand; no shell
VI	79	10YR4/2	dark grayish brown medium sand with no shell
VII	100+	10YR5/1	gray medium sand with no shell
VIII	100+	10YR5/1-2	gray to grayish brown fine-medium sand with no shell
IX	100+	10YR7/2	light gray medium sand with no shell

Table 3-11. Inventory of Artifacts, Vertebrate Fauna, and Miscellaneous Items Recovered from Level Excavation of Test Units 53-56, 8LA1-East.

TU53 Level	Lithic Flake (n)	Lithic Flake (g)	Modified Lithic (n)	Orange Plain Sherd (n)	Orange Incised Sherd (n)	Orange Eroded Sherd (n)	Crumb Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)	Historic Artifacts (g)
A*								3	0.8	7.3
B							4	16	4.6	
C	1	0.2			16	1	11	53	27.3	
D	2	0.6	1	1			20	90	40.0	0.2
E	3	0.7	1				6	19	4.7	
E, Zone A								13	4.3	
E, Zone B								6	1.3	
F	4	1.4	1							
F, Zone B								7	1.7	
G, Zone A	11	1.8						4	2.0	
G. Zone B			1					7	2.0	
G. Zone C	4	1.4								
G, Zone D	2	0.3	1				1			
G, Clean-up								1	0.2	
H, Zone A	15	4.7								
H, Zone C	2	<0.1	1					6	<0.1	
H, Zone D	2	<0.1						3	<0.1	
H, Clean-up	1	0.7						5	2.0	
Subtotal	47	11.9	6	1	16	1	42	233	91.0	7.5
TU54 Level										
B	1	0.3						2	1.3	
C							2	7	3.3	0.9
C, Zone A**					1		4	39	8.5	4.7
C, Zone B				1			1	3	0.5	
C, Zone B NW							1	51	14.2	
D							1	15	2.3	
D, Zone A							2	30	10.1	
D, Zone B							5	155	33.6	
D, Zone C							4	7	2.0	

Table 3-11. Continued.

TU54 (cont'd) Level	Lithic Flake (n)	Lithic Flake (g)	Modified Lithic (n)	Orange Plain Sherd (n)	Orange Incised Sherd (n)	Orange Eroded Sherd (n)	Crumb Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)	Historic Artifacts (g)
D, SW								2	1.4	
D (North)								10	2.5	
E, Zone B	1	0.3		1			10	23	3.6	
E (North), Zone B							1	29	13.0	
E (North), Zone D							7	53	8.2	
E (South), Zone A								1	0.9	
F (North), Zone D	8	2.2					2	9	2.1	
F (South)							3	1	0.1	
F (South), Zone B								9	2.3	
F (South), Zone C	1	0.1	1				1	3	0.5	
G (North)			1					4	0.6	
H	4	0.8	1					5	1.5	
I, Zone A	16	4.0	2							
I, Zone B	1	<0.1						1	1.0	
J, Zone A	6	2.0	1					1	0.7	
K, Zone A	5	1.3	1					2	0.3	
Subtotal	43	11.0	7	2	1		44	462	114.5	5.6
TU55 Level										
Stratum I						1	2			
Stratum II				1	1	3	20	323	233.4	
Stratum III	7	1.8		2		1	23	32	15.8	
Subtotal	7	1.8		3	1	5	45	355	249.2	
TU56 Level										
A***	1	<0.1		1				34	12.2	1.9
B	1	0.6					7	153	28.2	
C+	3	11.5				1	8	242	91.9	
D, Zone A	4	0.9					1	7	1.5	
D, Zone B								11	1.7	

Table 3-11. Continued.

TU56 (cont'd) Level	Lithic Flake (n)	Lithic Flake (g)	Modified Lithic (n)	Orange Plain Sherd (n)	Orange Incised Sherd (n)	Orange Eroded Sherd (n)	Crumb Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)	Historic Artifacts (g)
E	2	2.6		4		2	5	5	2.4	
E, Zone A							1			
F	2	0.8		1						
F, Zone B						1				
G, Zone A	9	1.9								
G, Zone B	2	0.4								
H	8	9.0								
I	13	2.9								
Subtotal	45	30.6		6		4	22	452	137.9	1.9
Total	142	55.3	13	12	18	10	153	1502	592.6	15.0

* plus two sherds of St. Johns Plain, 3.1g
**plus one sherd of St. Johns Plain, 1.8g
***plus one sherd of St. Johns Check Stamped, 2.6g
+plus one piece of unmodified marine shell, 0.2g

Figure 3-33. Plan view of Test Unit 53 at the base of Level f, showing cluster of Orange Incised pottery, 8LA1-East.

The profiles of TUs 54-56 are a bit more complicated than those of TU53, owing to an abundance of mineralized roots and at least one massive intrusive feature (Figure 3-32). The general sequence of plowzone-shell-sand seen in TU53 characterizes the profiles of TUs 54-56, but in the northern two units (TUs 55 and 56) the shell stratum is generally thicker and denser than in TU53, and the sand stratum is dominated by an array of mineralized roots well below the shell. The southern unit in this trio, TU54, generally lacks the shell stratum and is instead dominated by an apparent pit filled with light gray sand. Each of these two deviations from the "typical" profile is discussed in turn below.

Mineralized roots are especially abundant throughout the sand stratum at depths of roughly 55-80 cm below surface. Figure 3-35 provides an example of what these look like in plan at the base of Level E (60 cm below surface) in TU56. As noted for the

Figure 3-34. Reconstructed rim portion of Orange Incised vessel from Level C of Test Unit 53, 8LA1-East.

mineralized root mass in the south profile of TU47 (Figure 3-27), the round masses in TU56 are most likely the root balls of palm trees. The linear masses see in this plan are instead the likely the mineralized consequence of hardwood tree roots. In either case, the degree of mineralization appears to be directly correlated with the density and thickness of overlying shell. Insofar as shell in these profiles was truncated by mining operations, the underlying roots or root balls must have been from trees that either died naturally before the shell was emplaced or were felled by those who emplaced the shell. When we consider the lack of an A horizon beneath the shell, the possibility of deliberate felling of trees grows stronger. That is, the evidence for mineralized roots and lack of A horizon suggest strongly that the ground surface of the south ridge area was prepared for the emplacement of shell.

Figure 3-35. Mineralized root masses at the base of Level E, Test Unit 56, 8LA1-East.

Turning now to the light gray sand seen in the east profile of TU54 (Figure 3-32), it would appear that a large pit was excavated into the shell and underlying sands and then in-filled with sand lacking shell. Running under the north end of this in-filled pit is a stratum of displaced shell (Stratum IIa) that appears to have originated from the shell stratum (II) beneath the plowzone. On first inspection this deeper shell appeared intrusive; in fact, it had the hallmarks of an ancient tortoise burrow that was backfilled with shell. However, in other exposures afforded by the excavation of TU54, the relationship between displaced shell and the light gray sand goes well beyond what would be expected in a tortoise burrow. This is evident in the sectioned plan of the unit at the base of Level F (Figure 3-36). The upper view in Figure 3-36 shows the plan at 40 cm below surface (base of Level D), where the dark grayish brown matrix with shell (Startum II) stands in contrast to the light grey sand lacking shell. The bottom shows a sectioned TU54, with the southern half taken down an additional 20 cm (60 cm BS) to the base of Level F. Observed in both the plan and profile of this cut is displaced shell following the basin-shaped outline of the light grey sand. It would thus appear that a large pit was excavated into the shell and underlying sand and before the pit was backfilled with light gray sand a good bit of the unconsolidated shall matrix dropped into the pit, forming an inverse talus slope of sorts. Based on these exposures, the pit measured at least 2 m in diameter at the top and at least 1 m in diameter at the base.

Figure 3-36. Plan view of Test Unit 54 at the base of Level D (top) and sectioned southern half at the base of Level F (bottom), 8LA1-East.

Figure 3-37. Cross-section view of Feature 63, Test Unit 54, 8LA1-East.

The cultural affiliation of this pit feature is difficult to infer based on stratigraphic principle alone. However, a small feature intrusive to the sand provides a good terminus ante quem for the backfilling of the pit. Seen in the TU54 plan as a circular dark stain in the north-central part of the light gray sand, this feature has the hallmarks of a burned post. Dubbed Feature 63, this apparent burned post has a well defined basal cross-section and diffuse margins (Figure 3-37). A sample of wood charcoal from this feature was submitted for an AMS assay and returned an age estimate of 670 ± 40 B.P. (cal AD 1270-1330/ AD 1340-1400. This placed the burned post in the St. Johns IIb subperiod, coeval with a pit feature from 8LA1-West Locus C containing the diagnostic check-stamped pottery of St. Johns II times (see Chapter 7). We can infer from this age that the pit was dug and backfilled sometime prior to the placement and burning of this post. More than likely, the pit was dug, backfilled, and post emplaced at about the same time. If so, this portion of 8LA1-east was the locus of substantial landscape modification long after the emplacement of shell along the south ridge. St. Johns Check-Stamped sherds are common in the water of the spring run, so a component of this age is not unexpected. One such sherd was recovered from the plowzone of TU56, four meters north of the in-filled pit. Bearing in mind that some portion of the south ridge was truncated by mining, a late date for the burned post suggests that the premining surface of the south ridge in the vicinity of TUs 53-56 was not all that high, perhaps well under a meter.

The overall inventory of artifacts from TUs 54-56 is unremarkable (Table 3-11). Once again we see a tendency for vertebrate fauna, sparse as it is, to be concentrated in the shell stratum, and for chert flakes and tools to be concentrated in the subshell sands. Few diagnostic Orange period sherds were recovered in these units, although crumb sherds were pervasive, if not numerous, and tended to be fiber tempered. On balance, the assemblage is consistent with others from the south ridge area, with the addition of a St. Johns II component represented more so by the sand-filled feature, rather than numerous artifacts. Of course, even a minor amount of shell mining in this area would have removed the latest components of this site, so the lack of more St. Johns II material in the immediate vicinity is not surprising.

One final note on the excavation of TUs 53-56 speaks to the vulnerability of the profiles to slumping and collapse after heavy rains. Late in the field season we experienced a deluge that flooded all units in the south ridge area. Considerable damage was inflicted on TU54, whose profiles collapsed soon after water receded (Figure 3-38). We were fortunate to have recorded much of the stratigraphic information before the collapse, but did lose the opportunity to photograph and map the south and west walls of this unit.

Figure 3-38. Collapsed profiles in Test Unit 54, 8LA1-East.

Test Units 50-51. A third location of subsurface testing in 2010 was opportunistic. Augering in the orange grove to the west of the GPR grids produced an Orange Incised sherd in shell matrix. To investigate this occurrence a 1 x 1-m unit (TU50) was placed adjacent to the auger hole, and it was soon expanded to a 1 x 2-m unit with the addition of a second unit (TU51). All four profiles of TUs 50-51 are illustrated in Figure 3-39. Description of the strata mapped in these profiles can be found in Table 3-12, and an inventory of all artifacts and vertebrate fauna recovered for these test units is provided in Table 3-13.

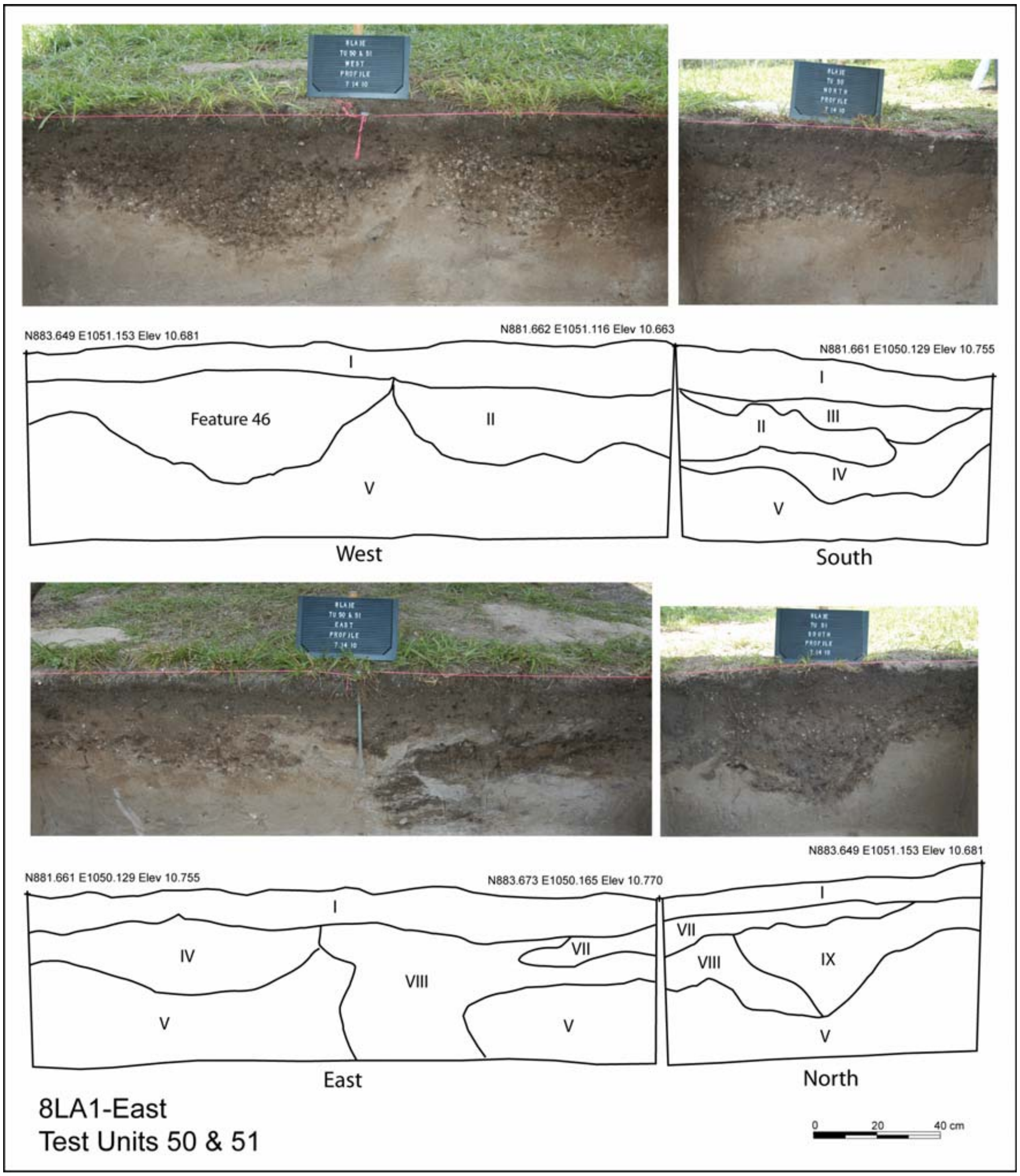

Figure 3-39. Photographs and line drawings of all profiles of Test Units 50 and 51, 8LA1-East.

The profiles of TUs 50-51 deviate a bit from those found elsewhere in the south ridge area. Beneath a thin plowzone (Stratum I) are shell deposits, but they appear to be restricted to shallow basin-shaped features, the best example being Feature 46 in the west profile. Others are not so well defined, and in the east and south profiles of these units, several recent intrusions are apparent. It does not appear that shell was emplaced on a buried A horizon, as seen in TU1, but instead in pits close to the present-day surface. It follows that shell may not have been mined from this area of the site, but that is not altogether clear.

Despite the recovery of Orange Incised pottery in the nearby auger test, TUs 50-51 did not produce much pottery. The recovered assemblage consists of only a small number of Orange Plain sherds, as well as crumb sherds, mostly from the shell matrix. What little vertebrate fauna recovered was concentrated in the shell as well. Feature 46 contained little other than shell and a small amount of vertebrate fauna. As we have seen throughout the area to the south ridge, chert flakes and tools are found primarily in the subshell sands.

Table 3-12. Stratigraphic Units of Test Units 50 and 51, 8LA1-East

Stratum	Max. Depth (cm BS)	Munsell Color	Description
I	17	10YR3/2	very dark grayish brown fine to medium sand with moderate *Viviparus* shell (plowzone)
Feat. 46	43	10YR3/2	whole *Viviparus* shell in very dark grayish brown fine to medium sand
II	38	10YR4/3	whole *Viviparus* shell in brown fine to medium sand
III	21	10YR3/3	dark yellowish brown fine to medium sand with trace of *Viviparus* shell
IV	32	10YR5/4	yellowish brown fine to mediums and grading eastward to 10YR3/2 very dark grayish brown fine to medium sand with moderate whole and crushed *Viviparus* shell
V	60	10YR6/3	pale brown fine to medium sand with no shell
VII	21	10YR3/3	dark brown fine to medium sand with minor *Viviparus* shell (recent intrusion)
VIII	52+	variable	10YR3/2 very dark grayish brown fine to medium sand, with 10YR5/3 brown and 10YR7/1 light gray sand stringers with trace of *Viviparus* shell (recent intrusion)
IX	41	10YR3/3	whole and crushed *Viviparus* shell in dark brown fine to medium sand (recent intrusion)

Table 3-13. Inventory of Artifacts, Vertebrate Fauna, and Miscellaneous Items Recovered from Level Excavation of Test Units 50 and 51, 8LA1-East.

TU50 Level	Lithic Flake (n)	Lithic Flake (g)	Modified Lithic (g)	Orange Plain Sherd (n)	Crumb Sherd (n)	Vert. Fauna (n)	Vert. Fauna (g)	Historic Artifacts (g)
A						1	1.3	10.9
B					2	6	2.9	
C				3	15	6	1.0	
D, Zone A					2	9	1.6	
D, Zone C				1	1	1	0.5	
E	4	0.6	1			1	0.3	
F	1	0.2						
Subtotal	5	0.8	1	4	20	24	7.6	10.9
TU51 Level								
A					4	1	1.4	
B					3	5	1.5	1.5
C					7	5	7.8	
D, Zone A*					1	3	0.4	
D, Zone B	1	2.0						
E					1			
F	2	0.9						
Subtotal	3	2.9			16	14	11.1	1.5
Total	8	3.7	1	4	36	38	18.7	12.4

*plus one piece modified marine shell, 29.3 g; one *Euglandina* shell, 0.8g

In sum, the results of testing in TUs 50-51 reinforce the observation made in 2007 that the distribution of shell and shell-filled pits is not restricted to the projected location of the south ridge, but instead extends westward to the edge of the landform fronting wetlands. This does not mean that the south ridge, before mining, was ill-defined or simply graded into the "natural" contours of the landform, only that there is no abrupt termination to subsurface shell in this portion of the site.

CONCLUSION

Field school investigations at 8LA1-East in 2007, 2008, and 2010 produced mixed results. One the one hand, subsurface testing across much of the area believed to be occupied by a massive U-shaped shellworks revealed a great deal of disturbance owing to shell-mining operations in the 1920s, particularly along the shoreline of Silver Glen Run, the presumed location of the north ridge. Coupled with recent review of Lake County probate records pertaining to the mining (Randall et al. 2011), subsurface tests on two of the islands at the mouth of the run and at Shell Point suggest that more than shell was removed in the operation. Apparently, mining involved severe dredging of the spring run, as well as large-scale sculpting of the shoreline to accommodate barges and other equipment needed to remove the shell. Some of the county documents relate to a settlement among all parties involved over the unauthorized excavation of the landform below the water table. The construction of a ramp at Shell Point appears to have enabled use of this portion of the landform for loading of shell onto barges that apparently were brought into a slip cut well into the shoreline. The deposition of shell as islands at the mouth of the run may have been an attempt on the part of the mining company to ameliorate damage inflicted by the construction of this slip and ramp. A similar ramp-like feature has been identified by Randall up the north side on the north shore, land now under jurisdiction of the U.S. Forest Service (Randall et al. 2011).

Whereas the shoreline of the spring run and adjoining lake shore to the east appears to have been obliterated by mining, subsurface remnants of the north ridge appear to remain intact beneath the water table of the mainland. Much of this resides below concreted shell and will thus require not only dewatering to excavate, but also considerably energy to break up concreted shell. From experience elsewhere in the region, we suspect that the concreted shell and what lies beneath it will date to the Mount Taylor period. The subsequent Orange period component and St. Johns components that followed may be completely removed from the north ridge. Abundant pottery of these periods has been recovered from beneath the water of the run, but little has been observed on the adjacent land.

The south ridge of 8LA1-East presents an altogether different challenge. Augering and limited controlled excavation in 2007 provided good evidence for the position and orientation of the south ridge, but it also showed that subsurface shell extended well beyond the projected western edge of the ridge. Subsurface shell observed in the profiles of TU1 suggested that shell along the south ridge was emplaced directly over an existing surface, with a well developed A horizon. However, subsurface shell elsewhere appears to have been placed over inorganic sands, the natural substrate of the landform. Throughout the area of the south ridge, shell-filled pits extended below the old surface, into the sands below, but it is never obvious if these originated from the original ground surface, or from above, in the emplaced shell that was removed through mining.

The application of Ground Penetrating Radar (GPR) in 2010 complicated the picture by offering evidence for a circular or arcuate arrangement of shell features in the area of the south ridge. Circular villages of Orange age are not unexpected, as this is the configuration of shell rings on the coast, and we have circumstantial evidence for circular village sof this era at Blue Springs in Volusia County (Sassaman et al. 2003), and in the immediate upland area of Silver Glen Run north of 8LA1-West (Randall et al. 2011). That being said, we continue to be disappointed in subsurface testing by the lack of obvious domestic features expected of a village occupation (e.g., heaths, house floors, post holes, etc.). To complicate matters, the sand-field pit found in TU54 contains a St. Johns II period burned post. To the extent this relates to domestic activity, the circular arrangements of anomalies found by GPR may have more to do with late period dwellings than it does the Orange period. However, it is equally possible that the entirety of 8LA1-East since Orange times was devoted to ritual activities that simply did not involve the sorts of domestic features and refuse we expect from relatively permanent dwelling.

On a positive note, the combined efforts of subsurface testing at 8LA1-East confirms the inference made since 2007 that the south ridge was added well after the formation of the north ridge and that this activity resulted in a concentration of Orange Plain pottery in the former area and Orange Incised pottery in the latter area. Investigations of 8LA1-West Locus B by Zack Gilmore (see Chapter 6) addresses this pattern directly, lending credence to the hypothesis that the construction of the U-shaped shellworks was a multistage process involving several cultural constituencies, some perhaps nonlocal.

We also learned through subsurface testing of GPR anomalies that mineralized roots in the sandy substrate of the south ridge area offer a good proxy for overlying shell. This of course may be critical in the ongoing reconstruction of the pre-mined landscape because subsurface sands with mineralized roots likely escaped mining even in locations where mining was thorough in removing overlying shell. One such area in particular is seen in the wooded wetlands to the west of the orange grove. The survey of tree throws in 2010 showed that shell is absent across an area that is fully within the projected location of the south ridge, but which apparently was mined aggressively, leaving no trace of shell.

Finally, because mineralized roots occur in locations that ostensibly received large quantities of shell, we must consider further the possibility that the landscape was denuded of vegetation (and in some areas the A horizon) before shell as emplaced. This implies that the construction of the south ridge was not only purposeful but involved a greater amount of labor and effort than ever imagined. No matter how badly damaged the U-shaped shellworks Wyman observed over 135 years ago may be, it remains a testament to the complexity and scale of Orange communities in the region.